Savannah River NUCLEAR SOLUTIONS℠
FLUOR • NEWPORT NEWS NUCLEAR • HONEYWELL

Removal Action Report for the 488-1D Ash Basin and 489-D Coal Pile Runoff Basin (U)

SEMS Number: 63

SRNS-RP-2018-01091

Volume II (Includes Appendices L through P)

Revision 0

January 2019

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U.S. Department of Energy
and
Savannah River Nuclear Solutions, LLC
Aiken, South Carolina

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APPENDIX L

LLDPE & GEOTEXTILE DATA AND DOCUMENTATION

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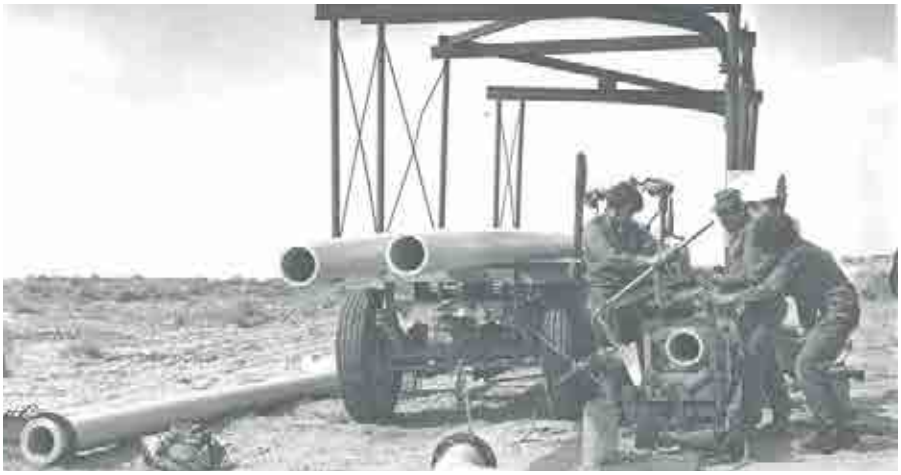
APPENDIX L1

AGRU Corporate Brochure

agru

The Plastics Experts.

AGRU Corporate Mission



SUCCESSFUL SINCE 1948

The AGRU success story has been unfolding now for seven decades. Founded in 1948 by Alois Gruber Sr., the company has become one of the world's most important suppliers for lining systems made from engineering plastics, pipe and fittings systems, concrete protection liners and semi-finished products.

Our ability to supply nearly everything as a single source sets us apart. We use only the highest-grade thermoplastic polymers as our raw materials. When it comes to application and technical consulting, we are your best partner in the field.

VISION

AGRU is established as the world's most important supplier for high-quality products made from engineering plastics. Resource conservation and environmentally sensitive decisions remain top of mind in all our business endeavors. This is why customers around the world continue to trust AGRU's plastics expertise.

MISSION

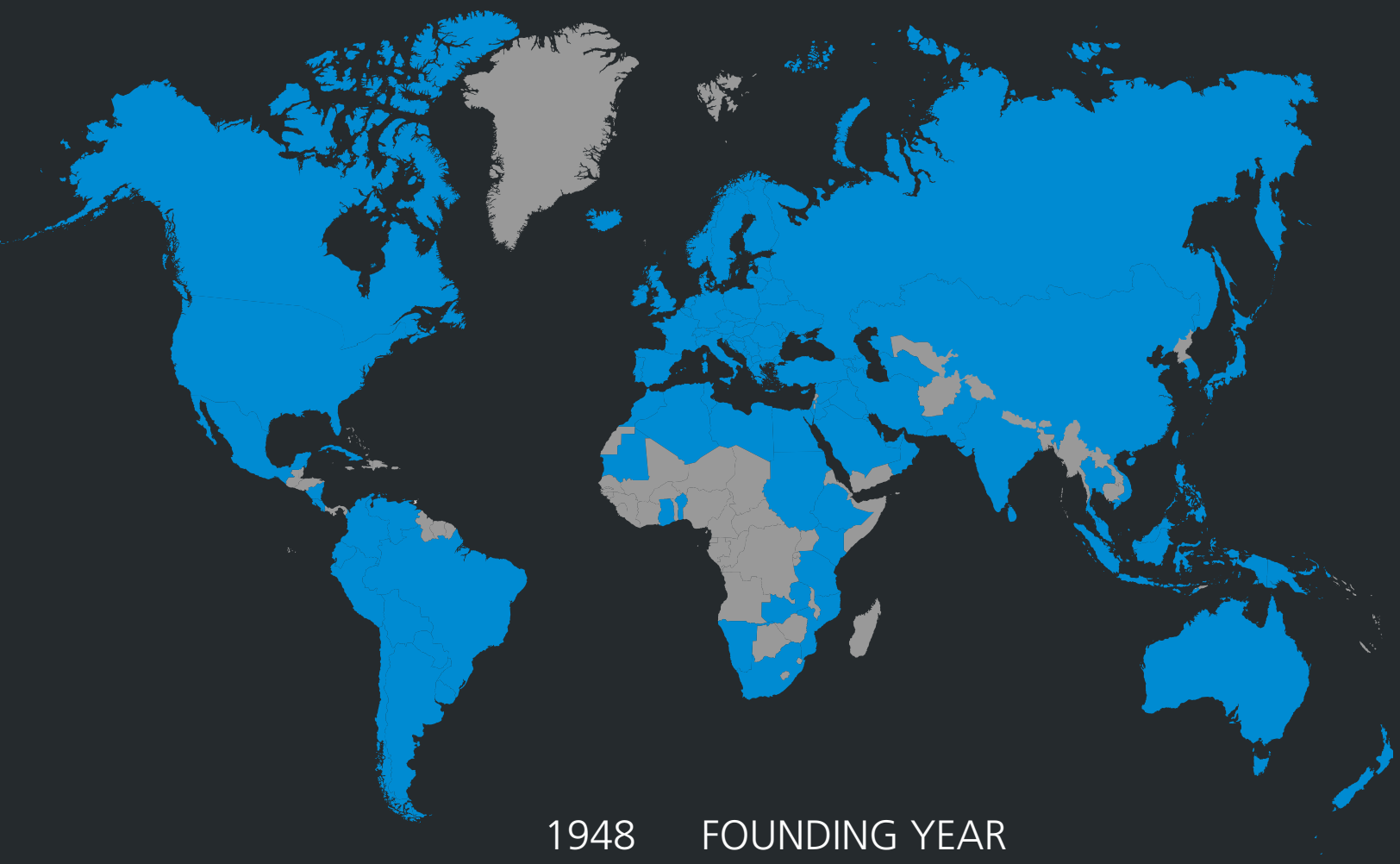
Our mission: To become the world's most reliable, client-focused supplier of geosynthetic and thermoplastic solutions.

As an experienced supplier, we now offer everything from semi-finished products to the largest diameter piping solutions in the western hemisphere. Our products meet and exceed the challenges of thousands of applications, and continue to be innovated. We stand for the maxims of uncompromising quality, outstanding customer service and operational dependability. We implement custom solutions with the highest flexibility and precision. Our dedicated employees, the true plastics experts, make AGRU successful globally.

THE PLASTICS EXPERTS.

With our extensive competence in engineered plastics and tailored solutions, AGRU is present in virtually every sector of industry. Our products have a wide range of possibilities, just as the requirements of our customers are diverse. You're likely to find our products where durability, dependability, cost certainty and versatility are essential.

AGRU
at a glance



1948	FOUNDING YEAR
6	CONTINENTS
100	COUNTRIES
150	DISTRIBUTION SITES
1140	EMPLOYEES
100%	CUSTOMER VALUE

AGRU Customers

AGRU
Plants in 5 Countries

AGRU KUNSTSTOFFTECHNIK
AUSTRIA

AGRU OBERFLÄCHENTECHNIK
AUSTRIA

AGRU-FRANK
GERMANY

TWS
POLAND

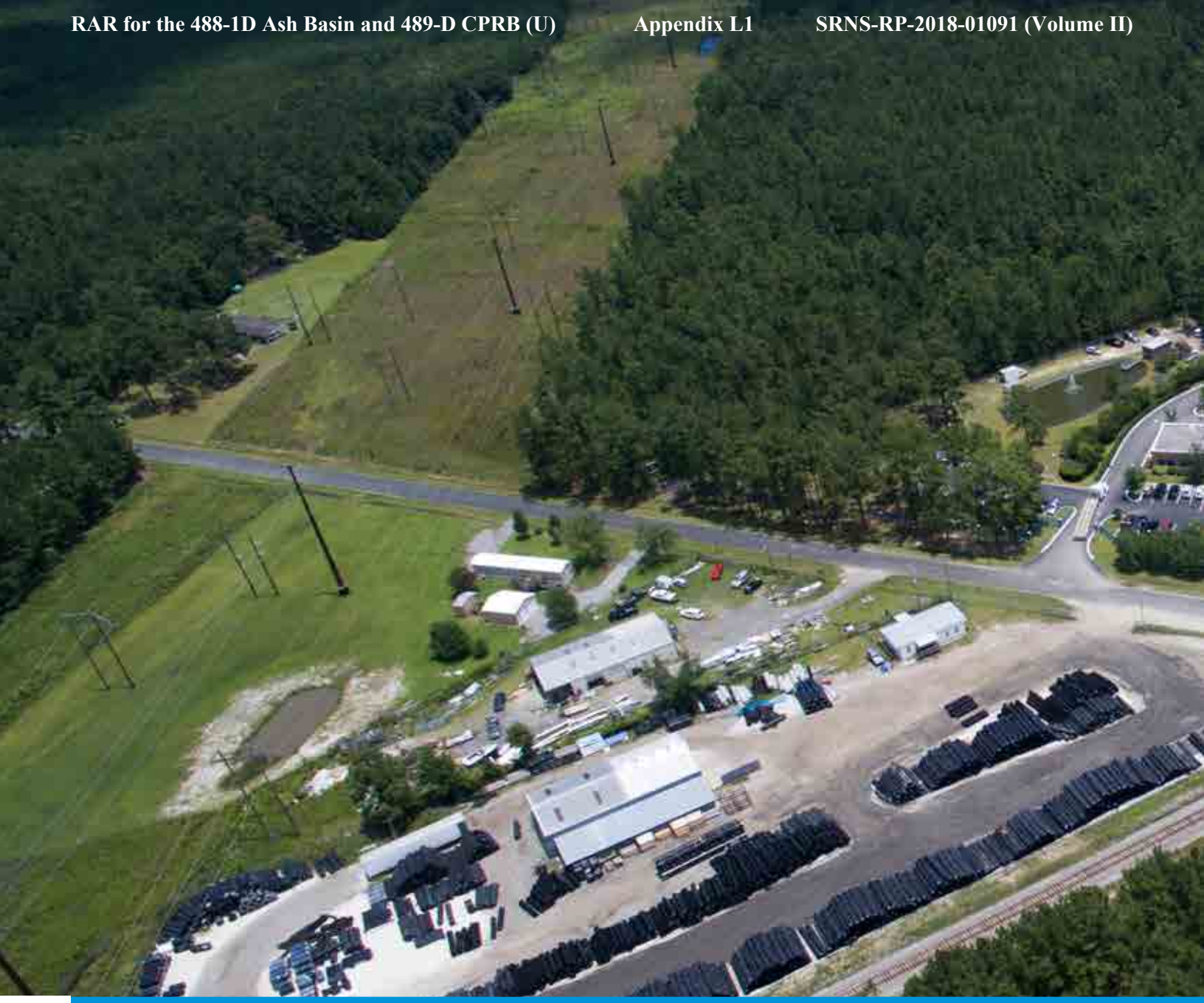
AGRU AMERICA
FERNLEY, NV/USA

AGRU AMERICA
GEORGETOWN, SC/USA

AGRU AMERICA
ANDREWS, SC/USA

AGRU AMERICA
CHARLESTON, SC/USA

TAICANG AGRU PLASTICS
CHINA



AGRU America HQ, Georgetown, SC

OPENED IN 1996 WITH PREVIOUS HEADQUARTERS OPENED IN BOSTON, MA

THE PLASTICS EXPERTS.

GEORGETOWN PLANT

ANDREWS PLANT

OPENED IN 2012

Applications

- COAL COMBUSTION RESIDUALS
- CIVIL ENGINEERING
- WASTE CLOSURE & CONTAINMENT
- ENERGY OIL & GAS
- ENVIRONMENTAL
- MINING
- TUNNELS
- WATER & WASTEWATER

THE PLASTICS EXPERTS.

SECTION 7

Project Reference List

(Specification Section I.F.5.b)

Executive Offices: 500 Garrison Road, Georgetown, SC 29440 • 843 546-0600 • 800 321-1379

Sales Office: 700 Rockmead, Suite 103, Kingwood, TX 77339 • 281 358-4741 • 800 373-2478

Email: salesmkg@agruamerica.com

AGRUTEX 081
Reference List

Project	Date	Qty (sf)
A E RESOURCES GROUP INC.	2012	72,000
AEP KYGER CREEK	2013	4,500
AJANI MINES	2012	337,505
ARIZONA LNG EVAP POND	2013	36,000
BUENO VENTURA PROJECT TEXTILE	2012	323,023
CUMMINGS ROAD LF CLOSURE	2012	1,122,000
DARLING INTERNATIONAL PONDS	2013	130,500
FLORIDA CANYON MINING, INC.	2013	18,000
FLUIDOS CONSIGNMENT	2013	44,981
FLUIDOS CONSIGNMENT LINER PO SI-706	2013	170,926
FRONT RANGE LF	2013	49,500
HYCROFT MINE	2011	396,000
ISEMOTO CONTRACTING CO. LTD	2013	85,500
JOHN SMITH ROAD LF	2013	121,500
JUNIPER MINE	2013	45,000
JUNIPER URANIUM MINE CAP	2012	121,500
LA ARENA	2012	675,010
MARK WEST CADIZ	2013	40,500
MIDDLESEX LOGISTICS	2012	603,000
MILLS IRRIGATION EVAP PONDS	2012	9,000
MINERA SAN RAFAEL ESCOBAL POND	2013	292,501
MINERA SAN RAFAEL, S.A.	2013	292,501
MINOSA - AURA MINERALS	2012	198,000
MULATOS / MINAS DE ORO	2012	184,420
NORTHERN BEEF WASTE WATER	2012	918,000
OKLAHOMA CITY LF	2012	265,500
OSAGE LF	2013	252,000
PRIMA DESHECA LF	2013	464,100
PRO FOWARDING	2012	465,345
PUEBLO VIEJO DOMINICANA CORP.	2011	26,999
RED CARPET LF	2012	166,500
ROUND MOUNTAIN GOLD CORP.	2013	67,500
SANDY HILL LF	2011	4,500
SAVANNAH RIVER MILL SITE	2012	95,940
SEABOARD WASTEWATER LAGOON	2013	9,000
SHAMROCK LAGOONS	2012	168,758
SOUTHSIDE LF	2012	45,000
T & T INGENIERIA CONST SA STOCK	2012	337,500
T&T STOCK	2013	675,010
TAJIGUAS LF	2012	139,500
TEXICO WTP PROJECT	2012	27,000

US ECOLOGY OF IDAHO	2012	22,500
VIKING ENVIRONMENTAL CORP.	2012	85,500
VILLAGE OF COWLIC	2013	99,000
VOLCAN & EL TORO	2013	405,006
		10,113,526

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SECTION 9

Project Reference List

(Specification Section I.G.6.b)

Executive Offices: 500 Garrison Road, Georgetown, SC 29440 • 843 546-0600 • 800 321-1379

Sales Office: 700 Rockmead, Suite 103, Kingwood, TX 77339 • 281 358-4741 • 800 373-2478

Email: salesmkg@agruamerica.com

AGRU America Integrated Drainage System (IDS) - Project Reference List

PROJECT NAME	PROJECT SIZE SQ FT	CITY STATE	MATERIAL
B & W Pantex	193,000	Amarillo, TX	50 LL Integrated Drainage System Geomembrane
Riverbirch LF	2,221,801	Avondale, LA	50 HD Integrated Drainage System Geomembrane
Private LF	779,700	Ball Ground, GA	50 HD Integrated Drainage System Geomembrane
Private LF	131,100	Ball Ground, GA	50 HD Integrated Drainage System Geomembrane
Sterling Mine Leach Pad	48,300	Beatty, NV	60 HD Integrated Drainage System Geomembrane
Private LF	565,800	Berlin, WI	50 LL Integrated Drainage System Geomembrane
Grasslands COWDF	910,800	Bill, WY	50 HD Integrated Drainage System Geomembrane
Pioneer Crossing LF	800,000	Birdsboro, PA	60 HD Integrated Drainage System Geomembrane
Bridgeport Landfill	611,250	Bridgeport, CA	60 LL Integrated Drainage System Geomembrane
Private LF	834,900	Brimfield, IL	50 HD Integrated Drainage System Geomembrane
Private LF	172,500	Brimfield, IL	50 HD Integrated Drainage System Geomembrane
Private LF	41,400	Brimfield, IL	60 HD Integrated Drainage System Geomembrane
Gibraltar Mine Site	109,408	British Columbia, Canada	50 LL Integrated Drainage System Geomembrane
Gibraltar Mine Site	117,300	British Columbia, Canada	60 LL Integrated Drainage System Geomembrane
Port Clements Project	158,700	British Columbia, Canada	60 LL Integrated Drainage System Geomembrane
Salmon Arm Landfill Closure	455,400	British Columbia, Canada	60 LL Integrated Drainage System Geomembrane
West Nassau LF	1,538,700	Callahan, FL	50 LL Integrated Drainage System Geomembrane
West Nassau LF	27,600	Callahan, FL	50 LL Integrated Drainage System Geomembrane
Private LF	1,055,700	Camden, SC	50 HD Integrated Drainage System Geomembrane
EWS LF	87,000	Camden, TN	50 LL Integrated Drainage System Geomembrane
Sechelt LF	241,500	Canada	60 LL Integrated Drainage System Geomembrane
Private Landfill Owner	207,000	Caney, KS	50 HD Integrate Drainage System Geomembrane
Covanta CMW	174,240	Carver, MA	50 HD Integrated Drainage System Geomembrane
Holcim-Catskill	1,987,200	Catskill, NY	50 LL Integrated Drainage System Geomembrane
Private LF	351,900	Clarksburg, WV	50 LL Integrated Drainage System Geomembrane
Austell Boxboard Industrial Waste LF	331,200	Cobb County, GA	50 LL Integrated Drainage System Geomembrane
Cranston LF	1,035,000	Cranston, RI	50 LL Integrated Drainage System Geomembrane
Fire Creek Cortez Pond	82,800	Crescent Valley, NV	60 HD Integrated Drainage System Geomembrane
Private LF	662,400	Danville, IN	50 LL Integrated Drainage System Geomembrane
UC David LF	317,400	Davis, CA	50 LL Integrated Drainage System Geomembrane
Gilt Edge Mine	22,770	Deadwood, SC	80 LL Integrated Drainage System Geomembrane

Gilt Edge Mine Superfund Site	34,500	Deadwood, SD	80 LL Integrated Drainage System Geomembrane
Gilt Edge Mine Superfund Site	82,800	Deadwood, SD	80 LL Integrated Drainage System Geomembrane
Pom Wonderful	351,900	Del Rey, CA	60 HD Integrated Drainage System Geomembrane
Del Rey Foods	347,760	Del Rey, CA	80 HD Integrated Drainage System Geomembrane
Del Rey Foods/Pom Wonderful	708,028	Del Rey, CA	80 HD Integrated Drainage System Geomembrane
Magnum Brine Pond	8,117,599	Delta, UT	80 HD Integrated Drainage System Geomembrane
Douglas Basin North	248,400	Douglas, WY	50 HD Integrated Drainage System Geomembrane
North Bill Disposal	496,800	Douglas, WY	50 HD Integrated Drainage System Geomembrane
North Bill Disposal Oilfield	289,800	Douglas, WY	50 HD Integrated Drainage System Geomembrane
North Bill Disposal Phase 6	572,700	Douglas, WY	60 HD Integrated Drainage System Geomembrane
Thunder Basin	634,800	Douglas, WY	60 HD Integrated Drainage System Geomembrane
ADS - Wolf Creek LF	869,400	Dry Branch, GA	50 LL Integrated Drainage System Geomembrane
LaSalle Landfill	167,610	Duluth, GA	50 LL Integrated Drainage System Geomembrane
Private LF	103,500	East St Louis, IL	50 LL Integrated Drainage System Geomembrane
Private LF	124,200	East St Louis, IL	50 LL Integrated Drainage System Geomembrane
Private LF	276,000	East St Louis, IL	60 LL Integrated Drainage System Geomembrane
Private LF	441,600	Elgin, SC	50 HD Integrated Drainage System Geomembrane
Private LF	448,500	Elgin, SC	50 HD Integrated Drainage System Geomembrane
Private LF	979,800	Elgin, SC	50 HD Integrated Drainage System Geomembrane
Private LF	986,700	Elgin, SC	50 HD Integrated Drainage System Geomembrane
Private LF	1,600,800	Elgin, SC	60 HD Integrated Drainage System Geomembrane
Private LF	855,600	Elkhart, IN	50 LL Integrated Drainage System Geomembrane
Jerritt Canyon Mine TSF Storage	7,124,862	Elko, NV	60 HD Integrated Drainage System Geomembrane
Wood Gulch Homestake Mine	503,578	Elko, NV	60 HD Integrated Drainage System Geomembrane
Mollie Gibson Mine	41,400	Ely, NV	60 HD Integrated Drainage System Geomembrane
Pan Project Construction Site	62,100	Ely, NV	60 HD Integrated Drainage System Geomembrane
Private LF	283,000	Emele, AL	60 HD Integrated Drainage System Geomembrane
Private Landfill	558,900	Emelle, AL	60 HD Integrated Drainage System Geomembrane
Private LF	13,800	Emelle, AL	60 LL Integrated Drainage System Geomembrane
Short Mountain LF	913,752	Eugene, OR	50 LL Integrated Drainage System Geomembrane
Short Mountain LF	875,840	Eugene, OR	60 HD Integrated Drainage System Geomembrane
Short Mountain Phase 3	830,115	Eugene, OR	60 LL Integrated Drainage System Geomembrane
Pan Construction Site	765,900	Eureka, NV	60 HD Integrated Drainage System Geomembrane
Cummings Road LF	1,097,100	Eureka, CA	60 LL Integrated Drainage System Geomembrane
Cummings Road LF	600,300	Eureka, CA	60 LL Integrated Drainage System Geomembrane
Seneca Landfill	326,250	Evans City, PA	50 LL Integrated Drainage System Geomembrane
DSWA Central LF-Sandtown LF	179,400	Feldon, DE	50 HD Integrated Drainage System Geomembrane

Fort Irwin WTDS	600,300	Fort Irwin, TX	60 HD Integrated Drainage System Geomembrane
Schrock Run Mine	289,800	Friedens, PA	50 HD Integrated Drainage System Geomembrane
Clarkelen Disposal Pond 4	372,600	Gillette, WY	60 HD Integrated Drainage System Geomembrane
Pumpkin Buttes	538,200	Gillette, WY	60 HD Integrated Drainage System Geomembrane
Pacheco Pass LF	41,400	Gilroy, CA	50 LL Integrated Drainage System Geomembrane
Kiewit Mine	48,300	Gold Hill, UT	60 HD Integrated Drainage System Geomembrane
Private LF	289,800	Greencastle, PA	50 HD Integrated Drainage System Geomembrane
Private LF	338,100	Greencastle, PA	50 HD Integrated Drainage System Geomembrane
Enoree MSW Phase II Closure	3,767,399	Greer, SC	60 HD Integrated Drainage System Geomembrane
Mar Kit Sanitary LF	393,921	Hallock, MN	50 HD Integrated Drainage System Geomembrane
Private LF	821,100	Hampton, VA	50 HD Integrated Drainage System Geomembrane
Private LF	310,500	Hampton, VA	50 HD Integrated Drainage System Geomembrane
Hartford LF	1,524,600	Hartford, CT	50 LL Integrated Drainage System Geomembrane
Borealis Mine	193,200	Hawthorne, NV	80 HD Integrated Drainage System Geomembrane
Florida Canyon Mine	69,000	Imlay, NV	80 HD Integrated Drainage System Geomembrane
Florida Canyon Mine	34,500	Imlay, NV	80 HD Integrated Drainage System Geomembrane
Florida Canyon Mining	69,169	Imlay, NV	80 HD Integrated Drainage System Geomembrane
Tangipahoa	1,045,440	Independence, LA	50 LL Integrated Drainage System Geomembrane
Indonesia Project	82,800	Indonesia	50 HD Integrated Drainage System Geomembrane
Grant Parish Landfill	413,250	Jena, LA	50 LL Integrated Drainage System Geomembrane
IP Joplin	152,000	Joplin, MO	50 LL Integrated Drainage System Geomembrane
Karnes County Disposal	634,800	Kenedy, TX	60 HD Integrated Drainage System Geomembrane
Pacificorp	2,000,000	Kemmerer, WY	60 HD Integrated Drainage System Geomembrane
Naughton Power Plant	2,030,082	Kemmerer, WY	60 HD Integrated Drainage System Geomembrane
Private LF	496,800	King George, VA	50 LL Integrated Drainage System Geomembrane
Polk County Landfill	264,282	Lake Wales, FL	50 LL Integrated Drainage System Geomembrane
Nevada Cogen	470,372	Las Vegas, NV	60 HD Integrated Drainage System Geomembrane
Wharf Resources	958,088	Lead, SD	50 LL Integrated Drainage System Geomembrane
Wharf Resources	25,760	Lead, SD	50 LL Integrated Drainage System Geomembrane
Gilt Edge Mine	2,305,778	Lead, SD	80 LL Integrated Drainage System Geomembrane
BP Oil L-5 Landfill	80,000	Lima, OH	60 HD Integrated Drainage System Geomembrane
Exxon Mobil	732,420	Linden, NJ	50 LL Integrated Drainage System Geomembrane
Private LF	1,235,100	Logansport, IN	50 LL Integrated Drainage System Geomembrane
Louisa County	755,000	Louisa, VA	50 LL Integrated Drainage System Geomembrane
Stage III Heap Leach Facility	193,200	Lovelock, NV	60 HD Integrated Drainage System Geomembrane
Private LF	855,600	Macon, GA	50 LL Integrated Drainage System Geomembrane
Private LF	296,700	Macon, GA	50 LL Integrated Drainage System Geomembrane

Private LF	1,262,700	Macon, GA	50 LL Integrated Drainage System Geomembrane
Martell Ash Pitt	276,000	Martell, CA	50 LL Integrated Drainage System Geomembrane
PROJECT EL PORVENIR	1,904,400	Mexico	60 HD Integrated Drainage System Geomembrane
Mulatos Mine	285,878	Mexico	60 HD Integrated Drainage System Geomembrane
Magnum Energy	6,793,539	Millard County, UT	80 HD Integrated Drainage System Geomembrane
Berkeley County Solid Waste	870,000	Moncks Corner, SC	50 LL Integrated Drainage System Geomembrane
Private LF	828,000	Monticello, IN	50 LL Integrated Drainage System Geomembrane
Private LF	372,600	Morrisville, PA	50 HD Integrated Drainage System Geomembrane
Private LF	483,000	Morrisville, PA	50 HD Integrated Drainage System Geomembrane
Private LF	303,600	Morrisville, PA	50 HD Integrated Drainage System Geomembrane
Private LF	262,200	Morrisville, PA	60 HD Integrated Drainage System Geomembrane
Nanaimo LF	331,200	Nanaimo, BC	60 LL Integrated Drainage System Geomembrane
Lanchester	282,750	Narvon, PA	50 LL Integrated Drainage System Geomembrane
Private LF	331,200	New Boston, TX	50 LL Integrated Drainage System Geomembrane
South Porcupine Mine	282,698	Ontario, Canada	60 HD Integrated Drainage System Geomembrane
South Porcupine Mine	45,080	Ontario, Canada	60 HD Integrated Drainage System Geomembrane
Private LF	1,014,300	Parkersburg, WV	50 LL Integrated Drainage System Geomembrane
Escambia	951,000	Pensacola, FL	50 LL Integrated Drainage System Geomembrane
Pescadero LF	165,600	Pescadero, CA	60 LL Integrated Drainage System Geomembrane
Private LF	124,200	Pine Grove, PA	50 HD Integrated Drainage System Geomembrane
Private LF	862,500	Pine Grove, PA	50 LL Integrated Drainage System Geomembrane
FMI Hidalgo project	296,700	Playas, NM	60 HD Integrated Drainage System Geomembrane
Hidalgo Smelter	296,700	Playas, NM	80 HD Integrated Drainage System Geomembrane
Prologis Business Park	309,120	Pompano Beach, FL	60 HD Integrated Drainage System Geomembrane
7 Mile Landfill	186,755	Port Moody, BC Canada	60 LL Integrated Drainage System Geomembrane
Portola	348,000	Portola, CA	50 LL Integrated Drainage System Geomembrane
RIEDSBM Cowansville	96,669	Quebec, Canada	50 LL Integrated Drainage System Geomembrane
Buckhorn Mine	82,800	Republic, WA	60 LL Integrated Drainage System Geomembrane
Buckhorn Mine	176,840	Republic, WA	60 HD Integrated Drainage System Geomembrane
Timber Ridge	443,700	Richwoods,Missouri	50 LL Integrated Drainage System Geomembrane
Savannah River Mill	2,918,700	Rincon, GA	50 HD Integrated Drainage System Geomembrane
Savannah River Mill	241,500	Rincon, GA	50 HD Integrated Drainage System Geomembrane
Round Mountain Mine	289,800	Round Mountain, NV	60 HD Integrated Drainage System Geomembrane
Round Mountain Mine	41,400	Round Mountain, NV	60 HD Integrated Drainage System Geomembrane
Private LF	345,000	Russellville, KY	50 LL Integrated Drainage System Geomembrane
Private LF	745,200	Russellville, KY	50 LL Integrated Drainage System Geomembrane
Crazy Horse LF	2,035,500	Salinas, CA	50 LL Integrated Drainage System Geomembrane

Crazy Horse LF	855,600	Salinas, CA	50 LL Integrated Drainage System Geomembrane
Pacheco Pass Landfill	710,700	Santa Clara, CA	50 LL Integrated Drainage System Geomembrane
PBS Combustion Coal Ash III	1,449,000	Somerset, PA	50 HD Integrated Drainage System Geomembrane
Juniper Mine	48,300	Sonora, CA	60 LL Integrated Drainage System Geomembrane
Magna Ponds	124,506	South Jordan, UT	60 HD Integrated Drainage System Geomembrane
Private LF	103,500	Taylor, PA	50 LL Integrated Drainage System Geomembrane
Private LF	386,400	Taylor, PA	50 LL Integrated Drainage System Geomembrane
Private LF	848,700	Taylorville, IL	50 LL Integrated Drainage System Geomembrane
Crescent Dunes Solar Energy	75,900	Tonapah, NV	50 HD Integrated Drainage System Geomembrane
Nevada Solar	1,904,769	Tonoipah, NV	60 HD Integrated Drainage System Geomembrane
Teoki Balefill	57,960	Tooele, UT	60 HD Integrated Drainage System Geomembrane
Goshlite Indian Reservation	58,104	Tooele, UT	60 HD Integrated Drainage System Geomembrane
Private LF	600,300	Tullytown, PA	50 HD Integrated Drainage System Geomembrane
Private LF	648,600	Tullytown, PA	50 HD Integrated Drainage System Geomembrane
Private LF	614,100	Tullytown, PA	50 HD Integrated Drainage System Geomembrane
Private LF	455,400	Tullytown, PA	60 HD Integrated Drainage System Geomembrane
Marigold Mine Heap Leach	144,900	Valmy, NV	60 HD Integrated Drainage System Geomembrane
Vancouver LF	213,900	Vancouver, BC	60 LL Integrated Drainage System Geomembrane
George AFB	130,680	Victorville, CA	50 LL Integrated Drainage System Geomembrane
Weatherford	356,700	Weatherford, TX	50 LL Integrated Drainage System Geomembrane
Private LF	1,504,200	Wellford, SC	50 LL Integrated Drainage System Geomembrane
Private LF	448,500	Whitelaw, WI	50 LL Integrated Drainage System Geomembrane
Hycroft Mine	400,200	Winnemucca, NV	80 HD Integrated Drainage System Geomembrane
Bi-County LF Solid Waste	213,900	Woodlawn, TN	50 LL Integrated Drainage System Geomembrane
Clarkelen Disposal Pond 3	351,900	Wright, WY	60 HD Integrated Drainage System Geomembrane
	113,511,772	**Square Feet**	
	2,605.9	**Acres**	

HDPE AND LLDPE STRUCTURED GEOMEMBRANE AND HEAT BURNISHED GEOTEXTILE INSTALLATION SPECIFICATION FOR CLOSURE PROJECTS

The information herein has been composed in accordance with current quality control and quality assurance standards of the geomembrane industry. Final determination of the suitability of any information or material for the use contemplated and its manner of use is the sole responsibility of the user.

Agru America, Inc. is not an installer of Geosynthetics Membranes. This manual is provided only as a guideline and not meant as an authority of exactitude. Agru America will not be held liable for the installation of others.

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6.01 Tables

PART 1 - GENERAL

1.01 Summary

A. This specification includes furnishing and installing HDPE and LLDPE SuperGripNet®, DrainLiner® and MicroDrain® with a formulated sheet density of 0.940 g/cc or greater associated with HDPE and a formulated sheet density of 0.939 or less for LLDPE.

1.02 References

A. American Society for Testing and Materials (ASTM):

1. D 6391, Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermno-Fusion Methods
2. D 5199, Standard Test Method for Measuring Nominal Thickness of Geosynthetics
3. D 5641, Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber.
4. D 5820, Standard Practive for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes
5. D 5994, Standard Test Method for Measuring Core Thickness of Textured Geomembrane
6. D 6365, Standard Practice for the Nondestructive Testing of Geomembrane Seams using The Spark Test
7. D5820, Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes
8. D5397, Standard Test Method for Evaluation of Stress Crack Resistance pf Polyolefin Geomembranes Using Notched Constant Tensile Load Test

B. Geosynthetic Research Institute (GRI):

1. GRI GM 9, Cold Weather Seaming of Geomembranes
2. GRI GM 13, Test Properties, Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes
3. GRI GM 14, Selecting Variable Intervals for Taking Geomembrane Destructive Seam Samples Using the Method of Atributes

4. GRI GM 17, Test Methods, Test Properties and Testing Frequency for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes.

5. GRI GM 19, Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembranes

1.03 Submittals

A. Submit under provisions of Section 01300, Submittals.

B. Submit the following to the Engineer or Owner, for review and approval, within a reasonable time to expedite shipment or installation of the geomembrane:

1. Documentation of manufacturer's qualifications as specified in subsection 1.04A
2. Manufacturer's Quality Control program manual or descriptive documentation.
3. A material properties sheet, including at a minimum all properties specified in GRI GM 13 (Not Included), including test methods used.
4. Sample of the material.
5. Documentation of Installer's qualifications, as specified below and in subsection 1.04B of this Section.

a. Submit a list of at least ten completed facilities. For each installation, provide: name and type of facility; its location; the date of installation; name and telephone number of contact at the facility; type and thickness of structured geomembrane and; surface area of the installed structured geomembrane or similar material. All Agru America materials will acceptable for this qualification.

b. Submit resumes or qualifications of the Installation Supervisor, Master Seamer and Technicians to be assigned to this project.

c. Quality Control Program.

C. Shop Drawings

1. Submit copies of shop drawings for engineer's approval within a reasonable time. Shop drawings shall show the proposed panel layout identifying seams and details.

Seams should generally follow the direction of the slope. Butt seams or roll-end seams should not occur on a slope unless approved by the Owner's Representative. Butt seams on a slope, if allowed, should be staggered.

2. Placement of structured geomembrane should not occur until Owner's Representative has received and approved the shop drawings.

D. Additional Submittals (In-Progress and at Completion)

1. Manufacturer's warranty (refer to subsection 1.07).
2. Structured Geomembrane installation warranty (refer to subsection 1.08).
3. Daily written acceptance of sub grade surface (refer to subsection 3.01.C).
4. Low-temperature seaming procedures if applicable (refer to subsection 3.03.A).
5. Prequalification test seam samples (refer to subsection 3.05.A.6).
6. Field seam non-destructive test results (refer to subsection 3.05.B.1).
7. Field seam destructive test results (refer to subsection 3.05.C.6).
8. Daily field installation reports (refer to subsection 3.05.G).
9. Installation record drawing, as discussed in subsection 3.05.

1.04 Quality Control

A. Installer's Qualifications

1. The Installer shall be an approved Manufacturer's Installer.
2. The Installer shall have at least three years experience in the installation of structured geomembrane or similar liners. The Installer shall list at least 10 projects totaling 500,000 M^2 (5,000,000FT^2) of structured geomembrane or similar liner type installed during the last three years.
3. Installation shall be performed under the direction of a Field Installation Supervisor who shall be responsible throughout the installation, for panel layout, seaming, patching, testing, repairs, and all other activities of the Installer. The Field Installation Supervisor shall have installed or supervised the installation and seaming of a minimum of 10 projects involving a total of 500,000 M^2 (5,000,000 FT^2) of structured geomembrane or similar product.
4. Seaming shall be performed under the direction of a Master Seamer (who may also be the Field Installation Supervisor or Crew Foreman) who has seamed a minimum of

300,000M^2 (3,000,000FT^2) of structured geomembrane or similar product, using the same type of seaming apparatus to be used in the current project. The Field Installation Supervisor and/or Master Seamer shall be present whenever seaming is performed.

5. All seaming, patching, other welding operations, and testing shall be performed by qualified technicians employed by the Installer.

1.05 Delivery, Storage and Handling

A. Each roll of structured geomembrane delivered to the site shall be labeled by the manufacturer. The label shall be firmly affixed and shall clearly state the manufacturer's name, product identification, material thickness, roll number, roll dimensions and roll weight.

B. Roll to be marked along upper selvage edge with type, thickness and length every meter.

C. Structured geomembrane shall be protected from mud, dirt, dust, puncture, cutting or any other damaging or deleterious conditions.

D. Rolls shall be stored away from high traffic areas. Continuously and uniformly support rolls on a smooth, level prepared surface. Chocks should be used to secure rolls.

1.06 Project Conditions

Structured geomembrane should not be installed in the presence of standing water, while precipitation is occurring, during excessive winds, or when material temperatures are outside the limits specified in Section 3.03.

1.07 Material Warranty

Material manufacturer shall guarantee material against defects and premature aging from environmental conditions on a pro rata basis for a specified period of time acceptable to owner and manufacturer.

1.08 Installation Warranty

A. The Installer shall guarantee the structured geomembrane installation against defects in the installation and workmanship for a time period satisfactory to all parties commencing with the date of final acceptance.

1.09 Pre-Construction Meeting

A. A Pre-Construction Meeting shall be held at the site prior to installation of the structured geomembrane. At a minimum, the meeting shall be attended by the Installer, Owner, Owner's representative (Engineer and/or CQA Firm), and the Earthwork Contractor.

B. Topics for this meeting shall include:

1. Health and Safety
2. Lines of authority and communication. Resolution of any project document ambiguity.
3. Methods for documenting, reporting and distributing documents and reports.
4. Procedures for packaging and storing archive samples.
5. Review of time schedule for all installation and testing.
6. Review of panel layout and numbering systems for panels and seams including details for marking on structured geomembrane.
7. Procedures and responsibilities for preparation and submission of as-built panel and seam drawings.
8. Temperature and weather limitations. Installation procedures for adverse weather conditions. Defining acceptable sub grade or ambient moisture and temperature conditions for working during liner installation.
9. Sub grade conditions, dewatering responsibilities and sub grade maintenance plan.
10. Deployment techniques including allowable sub grade for the structured geomembrane .
11. Plan for controlling expansion/contraction and wrinkling of the liner.
12. Covering of the structured geomembrane and cover soil placement.
13. Measurement and payment schedules.
14. Responsibilities of each party.

C. The meeting shall be documented by a person designated at the beginning of the meeting and minutes shall be transmitted to all parties.

PART 2 - PRODUCTS

2.01 Source Quality Control

A. Manufacturing Quality Control

1. The test methods and frequencies used by the manufacturer for quality control/quality assurance of the above structured geomembrane prior to delivery, shall be in accordance with the latest revision of the GRI GM 13 for HDPE or GRI GM 17 for LLDPE, or modified as required for project specific conditions.

2. The manufacturer's quality control certifications, including results of quality control testing of the products, as specified in subsection 2.01.A.3, must be supplied to the Owner's Representative to verify that the materials supplied for the project are in compliance with all product and or project specifications. The certification shall be signed by a responsible party employed by the manufacturer, such as the QA/QC Manager, Production Manager, or Technical Services Manager. Certifications shall include lot and roll numbers and corresponding shipping information.

3. The Manufacturer will provide Certification that the geomembrane and welding rod supplied for the project are made from the same material type and are compatible.

2.02 Structured Geomembrane Geosynthetic Material

A. The structured geomembrane shall consist of new, first quality products designed and manufactured specifically for the purpose of this work which shall have been satisfactorily demonstrated by prior testing to be suitable and durable for such purposes. The rolls shall be seamless, high density polyethylene (HDPE - Formulated Sheet Density $\geq$ 0.94g/cc) or linear low density polyethylene (LLDPE - Formulated Sheet Density $\leq$ 0.939 g/cc) containing no plasticizers, fillers or extenders and shall be free of holes, blisters or contaminants, and leak free verified by 100% in line spark or equivalent testing. The structured geomembrane shall be supplied as a continuous sheet with no factory seams in rolls. It will meet the property requirements as shown in (GRI GM 13for HDPE) or (GRI GM 17 for LLDPE). To down load current GRI GM specifications go to the Geosynthetic Research Institute: http://www.geosynthetic-institute.org/specifications.htm

B. Material conformance testing by the Owner's Representative, if required, will be conducted using in-plant sampling or as specified for the project.

C. The seams shall meet the property requirements as shown in Section 5 or as required by project specifications

D. Geotextile. A superior quality, nonwoven fabric heat burnished on one side produced by needle-punching together 100% synthetic staple fibers, in a random network, forming a high strength, dimensionally stable fabric. Synthetic fibers specially formulated to resist ultraviolet light deterioration, and inert to commonly encountered soil chemicals. The fabric will not be susceptible to rot or mildew, be non-biodegradable and resistant to damage from insects and rodents. The synthetic fiber to be stable within a pH range of 2 to 13.

PART 3 - EXECUTION

3.01 Sub grade Preparation

A. The sub grade shall be prepared in accordance with the project specifications. The sub grade shall be uniform and free of sharp or angular objects that may damage the structured geomembrane prior to installation.

B. The Installer and Owner's Representative shall inspect the surface to be covered with the structured geomembrane on each day's operations prior to placement to verify suitability.

C. The Installer and Owner's Representative shall provide daily written acceptance for the surface to be covered. The surface shall be maintained in a manner, during installation, to ensure sub grade suitability.

D. All sub grade damaged by construction equipment and deemed unsuitable for deployment shall be repaired prior to placement of structured geomembrane. All repairs shall be approved by the Owner's Representative and the Installer. This damage, repair, and the responsibilities of the contractor and Installer shall be defined in the preconstruction meeting.

3.02 Placement

A. No structured geomembrane shall be deployed until the applicable certifications and quality control certificates listed in subsection 1.03 are submitted to and approved by the Owner's Representative within the timeframe specified in the Contract Documents. If the material does not meet project specifications it shall be removed from the work area.

B. It shall be installed to the limits shown on the project drawings and essentially as shown on approved Panel Placement Drawings. Changes made to Panel Placement Drawings shall be submitted and approved prior to deployment of liner materials. No material shall be unrolled and deployed if the material temperatures are lower than 0 degrees C (32 degrees F) unless otherwise approved by the Owner's Representative. The specified minimum temperature for material deployment may be adjusted by the Owner's Representative. Temperature limitations should be defined in the preconstruction meeting. Typically, only

the quantity of structured geomembrane that will be anchored and seamed together in one day should be deployed.

D. No vehicular traffic shall travel on the structured geomembrane other than an approved low ground pressure vehicle or equivalent. It is suggested that a test pad simulating the methods to be used and showing no damage to the liner will result, be performed prior to implementation of the proposed method.

E. Sand bags or equivalent ballast shall be used as necessary to temporarily hold the material in position under the foreseeable and reasonably - expected wind conditions. Sand bag material shall be sufficiently close- knit to prevent fines from working through the bags and discharging on the structured geomembrane.

F. Placement shall not be done if moisture prevents proper sub grade preparation, panel placement, or panel seaming. Moisture limitations should be defined in the preconstruction meeting.

G. Damaged panels or portions of the damaged panels which have been rejected shall be marked and their removal from the work area recorded.

H. The structured geomembrane shall not be allowed to "bridge over" voids or low areas in the sub grade. It shall rest in intimate contact with the sub grade.

I. Wrinkles caused by panel placement or thermal expansion should be minimized in accordance with section 1.09 paragraph B11.

J. Considerations on Site Geometry: In general, seams shall be oriented parallel to the line of the maximum slope. In corners and odd shaped geometric locations, the total length of field seams shall be minimized. Seams shall not be located at low points in the sub grade unless geometry requires seaming at such locations and if approved by the Owner's Representative.

K. Overlapping: The panels shall be overlapped prior to seaming to whatever extent is necessary to affect a good weld and allow for proper testing. In no case shall this overlap be less than 75mm (3 in.).

L. Sharp stones or other hard objects that could potentially damage the membrane should not be within 1” (25mm) of the surface to be lined.

M. Sub-grade should be firm, unyielding and able to support deployment equipment without damage or rutting to the sub-grade.

3.03 Seaming Procedures

A. Cold weather installations should follow guidelines as outlined in GRI GM9.

B. No material shall be seamed when liner temperatures are less than 0 degrees C (32 degrees F) unless the following conditions are complied with:

1. Seaming when material temperatures are below 0 degrees C (32 degrees F) is allowed if the Installer can demonstrate to the Owner's Representative, using pre-qualification test seams, that field seams comply with the project specifications, the safety of the crew is ensured, and material can be fabricated (i.e. pipe boots, penetrations, repairs. etc.) at sub-freezing temperatures.

2. The Installer shall submit to the Owner's Representative for approval, detailed procedures for seaming at low temperatures, possibly including the following:

a. Preheating of the structured geomembrane

b. The provision of a tent or other device if necessary to prevent heat losses during seaming and rapid heat losses subsequent to seaming.

c. Number of test welds to determine appropriate seaming parameters

C. No material shall be seamed when the sheet temperature is above 75 degrees C (170 degrees F) as measured by an infrared thermometer or surface thermocouple unless otherwise approved by the Owner's Representative. This approval will be based on recommendations by the manufacturer and on a field demonstration by the Installer using prequalification test seams to demonstrate that seams comply with the specification.

D. Seaming shall primarily be performed using automatic fusion welding equipment and techniques along the smooth edges. Welding of the dimensional areas of the structured geomembrane can be accomplished with either wedge or extrusion welding methods. If a wedge is used it must be designed specifically for use with the dimensional material. Where extrusion welding is used where fusion welding is not possible such as at pipe penetrations,

patches, repairs and short (less than a roll width) runs of seams it will be necessary to remove all dimensional studs to allow intimate contact of the areas to be welded.

E. Fish mouths or excessive wrinkles at the seam overlaps shall be minimized and when necessary cut along the ridge of the wrinkles back into the panel so as to effect a flat overlap. The cut shall be terminated with a keyhole cut (nominal 10 mm (1/2 in) diameter hole) so as to minimize crack/tear propagation. The overlay shall subsequently be seamed. The key hole cut shall be patched with an oval or round patch of the same base material extending a minimum of 150 mm (6 in.) beyond the cut in all directions.

F. When extrusion welding 60 mil (1.5mm) or greater HDPE it is advisable to bevel the top portion of the seam in a lengthwise direction to maximize intimate contact of extrudate and improve continuity of weld.

G. Prior to seaming confirm area to be welded is free of moisture, dirt and any foreign matter that can affect the integrity of the weld on an ongoing basis.

H. Take precaution and into account of the well being of the liner technicians, that is extreme heat or cold that can affect the health of the individuals.

I. Seaming should run through the Anchor Trench to terminate at the end of the sheet goods.

3.04 Pipe and Structure Penetration Sealing System

A. Provide penetration sealing system as shown in the Project Drawings.

B. Penetrations shall be constructed from the base material, flat stock, prefabricated boots and accessories as shown on the Project Drawings. In the case of structured geomembranes such as SuperGripNet® or similar materials offered by Agru America, Inc, smooth or textured liner of the same density may be used for such fabrications if approved by owner's representative. The pre-fabricated or field fabricated assembly shall be welded to the structured geomembranes as shown on the Project Drawings so as to prevent leakage. This assembly shall be tested as outlined in section 3.05.B. alternatively, where field non destructive testing cannot be performed, attachments will be field spark tested by standard holiday leak detectors in accordance with ASTM 6365.

Spark testing should be done in areas where both air pressure testing and vacuum testing is not possible.

1. Equipment for Spark testing shall be comprised of but not limited to: A hand held holiday spark tester and conductive wand that generates a high voltage.

2. The testing activities shall be performed by the Installer by placing an electrically conductive tape or wire beneath the seam prior to welding. A trial seam containing a non welded segment shall be subject to a calibration test to ensure that such a defect (non welded segment) will be identified under the planned machine settings and procedures. Upon completion of the weld, enable the spark tester and hold approximately 25mm (1 in) above the weld moving slowly over the entire length of the weld in accordance with ASTM 6365. If there is no spark the weld is considered to be leak free.

3. A spark indicates a hole in the seam. The faulty area shall be located, repaired and retested by the Installer.

4. Care should be taken if flammable gases are present in the area to be tested.

3.05 Field Quality Control

The Owner's Representative shall be notified prior to all pre qualification and production welding and testing, or as agreed upon in the pre construction meeting.

A. Prequalification Test Seams

1. Test seams shall prepare and tested by the Installer to verify that seaming parameters (speed, temperature and pressure of welding equipment) are adequate.

2. Test seams shall be made by each welding technician and tested in accordance with ASTM D 6392 at the beginning of each seaming period. Test seaming shall be performed under the same conditions and with the same equipment and operator combination as production seaming. The test seam shall be approximately 3.3 meters (10 feet) long for fusion welding and 1 meter (3 feet) long for extrusion welding with the seam centered lengthwise. At a minimum, one test seam should be made by each technician after seaming 4–6 hours; additional tests may be required with changes in environmental conditions.

3. Two 25 mm (1 in) wide specimens shall be die-cut by the Installer from each end of the test seam. These specimens shall be tested by the Installer using a field tensiometer testing both tracks for peel strength and also for shear strength. Each specimen should fail in the parent material and not in the weld, “Film Tear Bond"(F.T.B. failure). Seam separation equal to or greater than 25% of the track width shall be considered a failing test.

4. The minimum acceptable seam strength values to be obtained for all specimens tested are listed in Tables in section 5. Four specimens out of five shall pass for the test seam to be considered passing.

5. If a test seam fails, an additional test seam shall be immediately conducted. If the additional test seam fails, the seaming apparatus shall be rejected and not used for production seaming until the deficiencies are corrected and a successful test seam can be produced.

6. A sample from each test seam shall be labeled. The label shall indicate the date, geomembrane temperature, number of the seaming unit, technician performing the test seam and pass or fail description. The sample shall then be given to the Owner's Representative for archiving.

B. Field Seam Non-destructive Testing

1. All field seams shall be non-destructively tested by the Installer over the full seam length before the seams are covered. Each seam shall be numbered or otherwise designated. The location, date, test unit, name of tester and outcome of all non-destructive testing shall be recorded and submitted to the Owner's Representative.

2. Testing should be done as the seaming work progresses, not at the completion of all field seaming, unless agreed to in advance by the Owner's Representative. All defects found during testing shall be numbered and marked immediately after detection. All defects should be repaired, retested and remarked to indicate acceptable completion of the repair.

3. Non-destructive testing shall be performed using vacuum box, air pressure or spark testing equipment.

4. Non-destructive tests shall be performed by experienced technicians familiar with the specified test methods. The Installer shall demonstrate to the Owner's Representative all test methods to verify the test procedures are valid.

5. Extrusion seams shall be vacuum box tested by the Installer in accordance with ASTM D 6392 and ASTM D 5641 with the following equipment and procedures:

a. Equipment for testing extrusion seams shall be comprised of but not limited to: a vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft rubber gasket attached to the base, port hole or valve assembly and a vacuum gauge; a vacuum pump assembly equipped with a pressure controller and pipe connections; a rubber pressure/vacuum hose with fittings and connections; a plastic bucket; wide paint brush or mop; and a soapy solution.

b. The vacuum pump shall be charged and the tank pressure adjusted to approximately 35 kPa (5 psig).

c. The Installer shall create a leak tight seal between the gasket and interface by wetting a strip of structured geomembrane approximately 0.3m (12 in) by 1.2m (48 in) (length and width of box) with a soapy solution, placing the box over the wetted area, and then compressing the box against the structured geomembrane. The Installer shall then close the bleed valve, open the vacuum valve, maintain initial pressure of approximately 35 kPa (5 psig) for approximately 3-4 seconds. The structured geomembrane should be continuously examined through the viewing window for the presence of soap bubbles, indicating a leak. If no bubbles appear after 3-4 seconds, the area shall be considered leak free. The box shall be depressurized and moved over the next adjoining area with an appropriate overlap and the process repeated.

d. All areas where soap bubbles appear shall be marked, repaired and then retested.

e. At locations where seams cannot be non destructively tested, such as pipe penetrations, alternate nondestructive spark testing (as outlined in section 3.04.B) or equivalent should be substituted.

f. All seams that are vacuum tested shall be marked with the date tested, the name of the technician performing the test and the results of the test.

6. Double Fusion seams with an enclosed channel shall be air pressure tested by the Installer in accordance with ASTM D 5820 and ASTM D 6392 and the following equipment and procedures:

a. Equipment for testing double fusion seams shall be comprised of but not limited to: an air pump equipped with a pressure gauge capable of generating and sustaining a pressure of 210 kPa (30 psig), mounted on a cushion to protect the structured geomembrane; and a manometer equipped with a sharp hollow needle or other approved pressure feed device.

b. The Testing activities shall be performed by the Installer. Both ends of the seam to be tested shall be sealed and a needle or other approved pressure feed device inserted into the tunnel created by the double wedge fusion weld. The air pump shall be adjusted to a pressure of 210 kPa (30 psig), and the valve closed.

Allow 2 minutes for the injected air to come to equilibrium in the channel, and sustain pressure for 5 minutes.

If pressure loss does not exceed 28 kPa (4 psig) after this five minute period the seam shall be considered leak tight. Release pressure from the opposite end verifying pressure drop on needle to ensure testing of the entire seam. The needle or other approved pressure feed device shall be removed and the feed hole sealed.

c. If loss of pressure exceeds 28 kPa (4 psig) during the testing period or pressure does not stabilize, the faulty area shall be located, repaired and retested by the Installer.

d. Results of the pressure testing shall be recorded on the liner at the seam tested and on a pressure testing record.

e. If release of pressure from opposite end of tested seam does NOT deflate seam, measures will be taken to determine cause and remedies taken to air test 100% of the seam uder scrutiny

C. Destructive Field Seam Testing

1. One destructive test sample per 150 linear m (500 linear ft) seam length or another predetermined length in accordance with GRI GM 14 shall be taken by the Installer from a location specified by the Owner's Representative. The Installer shall not be informed in

advance of the sample location. In order to obtain test results prior to completion of installation, samples shall be cut by the Installer as directed by the Owner's Representative as seaming progresses.

2. All field samples shall be marked with their sample number and seam number. The sample number, date, time, location, and seam number shall be recorded. The Installer shall repair all holes in the structured geomembrane resulting from obtaining the seam samples. All patches shall be vacuum box tested or spark tested. If a patch cannot be permanently installed over the test location the same day of sample collection, a temporary patch shall be tack welded or hot air welded over the opening until a permanent patch can be affixed.

3. The destructive sample size shall be 300 mm (12 in) wide by 1 m (36 in) long with the seam centered lengthwise. The sample shall be cut into three equal sections and distributed as follows: one section given to the Owner's Representative as an archive sample; one section given to the Owner's Representative for laboratory testing as specified in paragraph 5 below; and one section retained by the Installer for field testing as specified in paragraph 4 below.

4. For field testing, the Installer shall cut 10 identical 25 mm (1 in) wide replicate specimens from his sample. The Installer shall test five specimens for seam shear strength and five for peel strength. Peel tests will be performed on both inside and outside weld tracks. To be acceptable, 4 of 5 test specimens must pass the stated criteria in section 2.02 with less than 25% separation. If 4 of 5 specimens pass, the sample qualifies for testing by the testing laboratory if required.

5. If independent seam testing is required by the specifications it shall be conducted in accordance with ASTM 5820 or ASTM D6392.

6. Reports of the results of examinations and testing shall be prepared and submitted to the Owner's Representative.

7. For field seams, if a laboratory test fails, that shall be considered as an indicator of the possible inadequacy of the entire seamed length corresponding to the test sample. Additional destructive test portions shall then be taken by the Installer at locations indicated by the Engineer; typically 3 m (10 ft) on either side of the failed sample and

laboratory seem tests shall be performed. Passing tests shall be an indicator of adequate seams. Failing tests shall be an indicator of non-adequate seams and all seams represented by the failed destructive test location shall be either reseamed or repaired with a cap-strip. All cap-strip seams shall be non-destructively vacuum box tested until adequacy of the seams is achieved. Cap strip seams exceeding 50 M in length (150 FT) shall be destructively tested.

8. Destructive samples should be kept out of critical areas such as in the bottom of ponds and other locations such as slopes and sumps.

D. Identification of Defects

1. Panels and seams shall be inspected by the Installer and Owner's Representative during and after panel deployment to identify all defects, including holes, blisters, undispersed raw materials and signs of contamination by foreign matter.

E. Evaluation of Defects: Each suspect location on the liner (both in seam and non-seam areas) shall be non-destructively tested using one of the methods described in Section 3.05.B. Each location which fails non-destructive testing shall be marked, numbered, measured and posted on the daily "installation" drawings and subsequently repaired.

1. If a destructive sample fails the field or laboratory test, the Installer shall repair the seam between the two nearest passed locations on both sides of the failed destructive sample location.

2. Defective seams, tears or holes shall be repaired by reseaming or applying a extrusion welded cap strip.

3. Reseaming may consist of either:

a. Removing the defective weld area and rewelding the parent material using the original welding equipment; or

b. Reseaming by extrusion welding along the overlap at the outside seam edge left by the fusion welding process.

c. Cap stripping entire faulty seam.

4. Blisters, larger holes, and contamination by foreign matter shall be repaired by patches and/or extrusion weld beads as required. Each patch shall extend a minimum of 150 mm (6 in) beyond all edges of the defects.

5. All repairs shall be measured, located and recorded.

F. Verification of Repairs on Seams: Each repair shall be non-destructively tested using either vacuum box or spark testing methods. Tests which pass the non-destructive test shall be taken as an indication of a successful repair. Failed tests shall be reseamed and retested until a passing test results. The number, date, location, technician and test outcome of each patch shall be recorded.

G. Daily Field Installation Reports: At the beginning of each day's work, the Installer shall provide the Engineer with daily reports for all work accomplished on the previous work day. Reports shall include the following:

1. Total amount and location of structured geomembrane placed;
2. Total length and location of seams completed, name of technicians doing seaming and welding unit numbers;
3. Drawings of the previous day's installed structured geomembrane showing panel numbers, seam numbers and locations of non-destructive and destructive testing;
4. Results of pre-qualification test seams;
5. Results of non-destructive testing; and
6. Results of vacuum testing of repairs.

H. Destructive test results shall be reported prior to covering of liner.

I. Quality assurance to be performed and completed no more than 72 hours after deployment.

3.06 Liner Acceptance

A. Liner will be accepted by the Owner's Representative when:

1. The entire installation is completed or an agreed upon subsection of the installation is finished.
2. All Installer’s QC documentation is completed and submitted to the owner.
3. Verification of the adequacy of all field seams and repairs and associated testing is complete.
4. All submittals are accepted.

3.07 Anchor Trench

A. Construct as specified on the project drawings.

3.08 Disposal of Scrap Materials

A. On completion of installation, the Installer shall dispose of all trash and scrap material in a location approved by the Owner, remove equipment used in connection with the work herein, and shall leave the premises in a neat acceptable manner. No scrap material shall be allowed to remain on the surface.

PART 4 - MEASUREMENT AND PAYMENT

As per project specifications. Must be agreed upon prior to project start up.

PART 5 GEOTEXTILES, GEONETS and GEOCOMPOSITES

5.1 Geotextiles

Geotextiles will be generally aligned with seams parallel to the prevailing slope and HEAT TREATED side of the geotextile to be face down in contact with the structured geomembrane and can be seamed by either heat seaming with an approved hand held or self motivated thermal device or by sewing with a stitching approved by the engineer. Whichever stitching method is used the thread should be compatible with the fabric and have similar chemical resistance to the liner that is being used.
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5.4 Repairs

Any holes, tears, or burn throughs from thermal seaming in geotextiles will be repaired by patching with the same geotextiles. The patch will be a minimum of twelve inches (12"/30cm) larger in all directions than the area to be repaired and will be spot bonded thermally.

PART 6 - TABLES

"This section shall include the current GRI GM13 (HDPE) or GRI GM17 (LLDPE) manufacturer's specification or a revision of GRI GM13 (HDPE) or GRI GM 17 (LLDPE) specific to the unique project requirements and/or standards, as determined by the owner or owners' agent." TO BE INSERTED BY COMPANY PREPARING SUBMITTALS TO GUARANTEE MOST CURRENT GRI SPECIFICATION.

SEAM STRENGTHS - HDPE and LLDPE GRI GM 19

Table 1– Seam Strength and related Properties of Thermally Bonded Smooth and Textured High Density Polyethylene (HDPE) English Units

Nominal Thickness	**30 mils**	**40 mils**	**50 mils**	**60 mils**	**80 mils**	**100 mils**	**120 mils**
Hot Wedge Seams [1]							
shear strength[2], lb/in.	**57**	**80**	**100**	**120**	**160**	**200**	**240**
shear elongation at break[3] , %	50	50	50	50	50	50	50
peel strength [2], lb/in.	**45**	**60**	**76**	**91**	**121**	**151**	**181**
peel separation, %	25	25	25	25	25	25	25
Extrusion Fillet Seams [1]							
shear strength[2], lb/in.	**57**	**80**	**100**	**120**	**160**	**200**	**240**
shear elongation at break[3] , %	50	50	50	50	50	50	50
peel strength [2], lb/in.	**39**	**52**	**65**	**78**	**104**	**130**	**156**
peel separation, %	25	25	25	25	25	25	25

Notes for Table 1 - Also for hot air and ultrasonic seaming methods

1. Value listed for shear and peel strength are for 4 out of 5 test specimens; the 5th specimen can be low as 80% of the listed values
2. Elongation measurements should be omitted for field testing

Table 2 – Seam Strength and related Properties of Thermally Bonded Smooth and Textured Linear Low Density Polyethylene (LLDPE) English Units

Nominal Thickness	**30 mils**	**40 mils**	**50 mils**	**60 mils**	**80 mils**	**100 mils**	**120 mils**
Hot Wedge Seams [1]							
shear strength[2], lb/in.	**45**	**60**	**75**	**90**	**120**	**150**	**180**
shear elongationatbreak[3] , %	50	50	50	50	50	50	50
peel strength [2], lb/in.	**38**	**50**	**63**	**75**	**100**	**125**	**150**
peel separation, %	25	25	25	25	25	25	25
Extrusion Fillet Seams [1]							
shear strength[2], lb/in.	**45**	**60**	**75**	**90**	**120**	**150**	**180**
shear elongation at break[3] %	50	50	50	50	50	50	50
peel strength [2], lb/in.	**34**	**44**	**57**	**66**	**88**	**114**	**136**
peel separation, %	25	25	25	25	25	25	25

Notes for Table 2 - Also for hot air and ultrasonic seaming methods

1. Value listed for shear and peel strength are for 4 out of 5 test specimens; the 5th specimen can be low as 80% of the listed values
2. Elongation measurements should be omitted for field testing

Non Destructive Air Channel Test

Table 3 Initial Pressure Schedule

		Field Testing
Material	Minimum PSI	Maximum PSI
30 mil	15	30
40 mil	20	30
60 mil	24	30
80 mil	24	30
100 mil	24	32

Table 4 Maximum Allowable Pressure Drop

Field Test (after five minutes)
4 PSI

Note: At all times before heat sealing the end of the seam, the operator should insure that the void or air channel is free of obstruction.

Agru America, Inc. is not an installer of Geosynthetics and does not represent as such. This manual has been developed only as a guideline and not meant as an authority of exactitude. Agru America will not be held liable for the installation of others.

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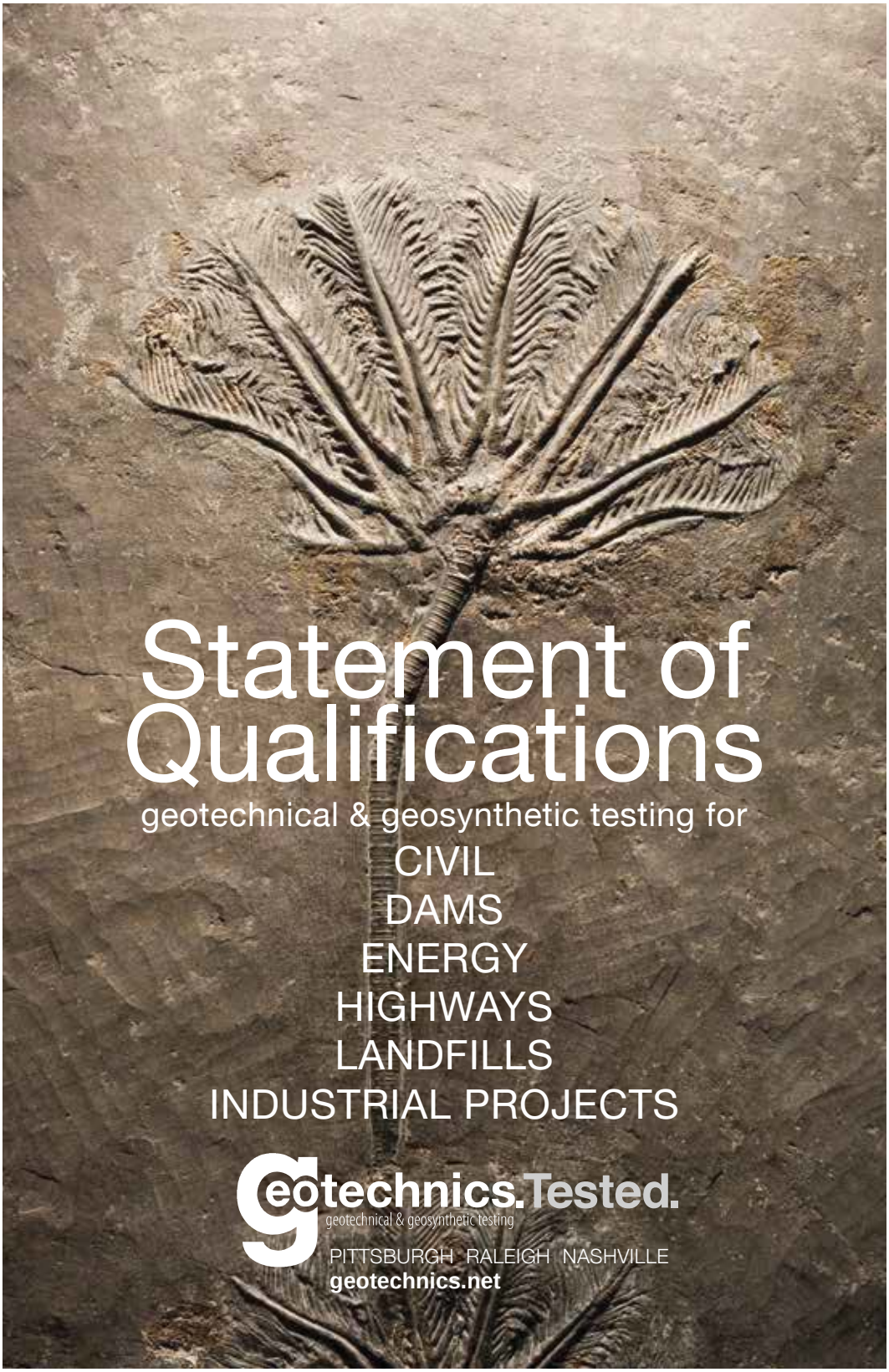

Statement of Qualifications
geotechnical & geosynthetic testing for
CIVIL
DAMS
ENERGY
HIGHWAYS
LANDFILLS
INDUSTRIAL PROJECTS
geotechnics.Tested.
geotechnical & geosynthetic testing
PITTSBURGH RALEIGH NASHVILLE
geotechnics.net

ge•o•tech•nics

[jēō'tekniks]

Geotechnics is the application of scientific methods and engineering principles, to the acquisition, interpretation and use of knowledge, of materials of the Earth's crust and earth materials for the solution of engineering problems.

It is the applied science of predicting the behavior of the Earth and its various materials towards making the Earth more habitable to human activities.

Statement of Qualifications

Geotechnics is an independent accredited laboratory that is nationally recognized for providing high quality geotechnical and geosynthetic laboratory and field testing services throughout the United States. Our staff is extremely experienced and committed to our client's needs and schedules while focusing on all aspects of quality. Geotechnics has combined experience and quality along with extensive capabilities to contribute to the design and construction of thousands of engineering projects.

Geotechnics has operations in the following locations:

Pittsburgh Facility
544 Braddock Avenue
East Pittsburgh, PA 15112
412.823.7600

Raleigh Facility
2200 Westinghouse Boulevard, Suite 103
Raleigh, NC 27604
919.876.0405

Nashville Facility
13 Industrial Park Drive Suite 500
Hendersonville, TN 37075
615.590.7695

Quality Accreditations

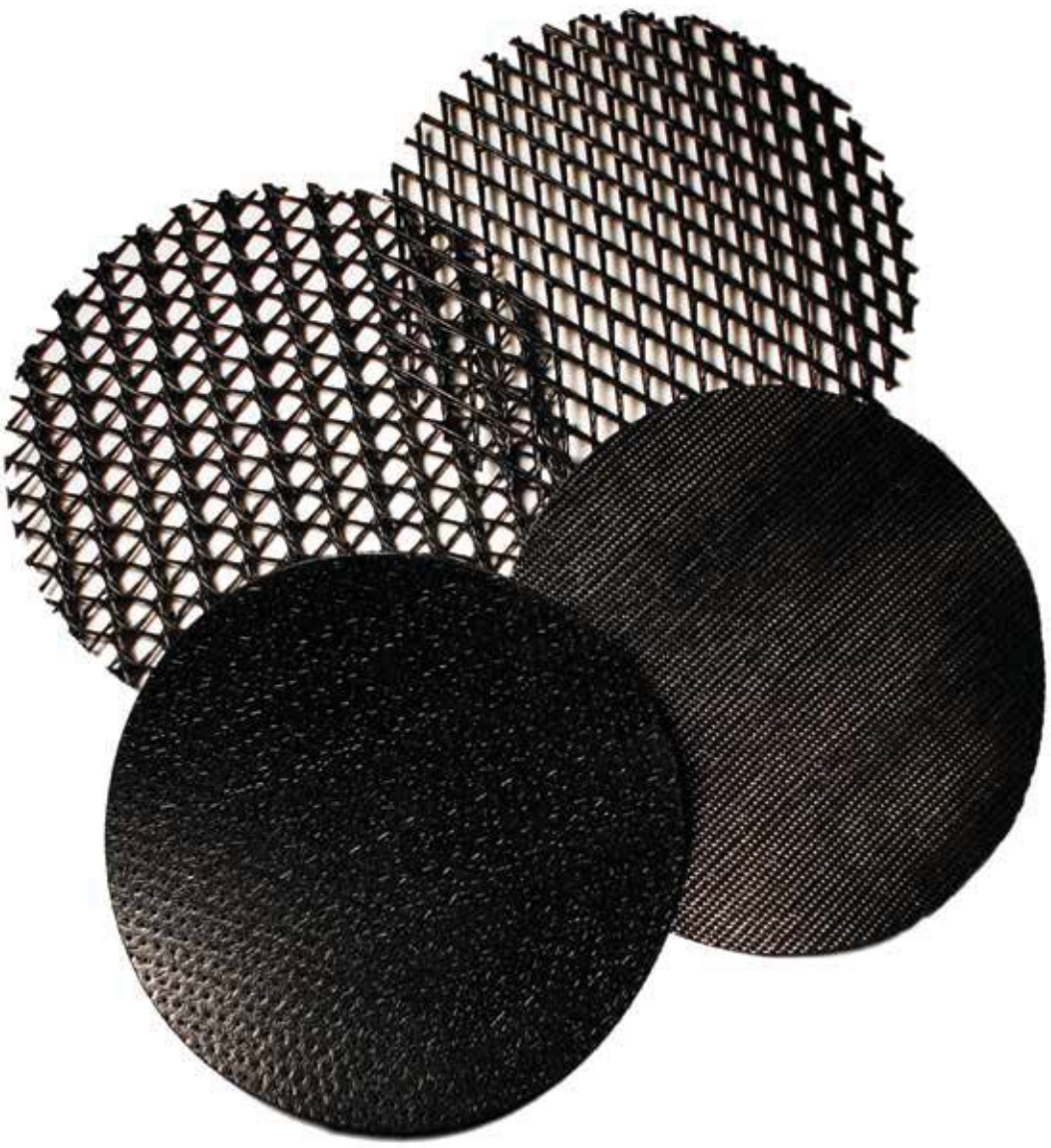
Geotechnics has been site audited and accredited by the following nationally recognized agencies for geotechnical and geosynthetic testing:

- The American Association of State Highway and Transportation Officials (AASHTO)
- Geosynthetics Accreditation Institute - Laboratory Accreditation Program (GAI -LAP)
- The United States Army Corps of Engineers (COE)
- Cement and Concrete Reference Laboratory

Geotechnics has participated in the AASHTO Proficiency sample-testing program for more than 25 years to assure that quality testing is maintained. While some labs are accredited to perform a few specific tests, we are honored to be consistently audited and accredited to perform all of the listed test methods for each of the nationally recognized agencies on the following pages.

NQA-1 Compliant

The Geotechnics testing laboratory is recognized as being in compliance with NQA-1-1994 Edition Quality Assurance Requirements for Nuclear Facility Applications. We are pleased that our quality system meets NQA-1 requirements.



Geosynthetics

Description	Methods	Accreditations
Geomembrane Destructive Seams		
Peel and Shear	ASTM D6214, D6392, D413, D751	GAI-LAP
Peel and Shear	ASTM D7408	
Geomembranes		
Thickness	ASTM D5199, D5994, D374, D1593, D751	GAI-LAP
Density	ASTM D1505, D792	GAI-LAP
Melt Flow Index	ASTM D1238	GAI-LAP
Carbon Black Content	ASTM D1603, D4218	GAI-LAP
Carbon Black Dispersion	ASTM D5596	GAI-LAP
Tear Resistance	ASTM D1004 Die C	GAI-LAP
Puncture Resistance	ASTM D4833	GAI-LAP
Tongue Tear	ASTM 751, D5884	GAI-LAP
Tensile Properties	ASTM D6693	GAI-LAP
Grab Tensile	ASTM D751, D7004	GAI-LAP
Strip Tensile	ASTM D882, D7003	GAI-LAP
Asperity Height	ASTM D7466	GAI-LAP
Dimensional Change	ASTM D1204	GAI-LAP
2% Secant Modulus	ASTM D5323	GAI-LAP
R-GM Adhesion	ASTM D6636	GAI-LAP
Geonets & Geocomposites		
Mass per Unit Area	ASTM D5261	GAI-LAP
Thickness	ASTM D5199	GAI-LAP
Density	ASTM D1505, D792	GAI-LAP
Melt Index	ASTM D1238, Con. E	GAI-LAP
Carbon Black Content	ASTM D1603, D4218	GAI-LAP
Tensile (MD)	ASTM D7179	GAI-LAP
Transmissivity	ASTM D4716	GAI-LAP
Ply Adhesion	ASTM D7005, D413, F905	GAI-LAP
Compression	ASTM D6364	GAI-LAP

Description	Methods	Accreditations
Geotextiles		
Mass per Unit Area	ASTM D5261	GAI-LAP
Thickness	ASTM D5199	GAI-LAP
Grab Strength	ASTM D4632	GAI-LAP
Wide Width Tensile	ASTM D4595	GAI-LAP
Strip Tensile	ASTM D5035	GAI-LAP
Sewn Seam	ASTM D4885	GAI-LAP
Trapezoidal Tear	ASTM D4533	GAI-LAP
Puncture Resistance	ASTM D4833	GAI-LAP
CBR Puncture	ASTM D6241	GAI-LAP
Mullen Burst	ASTM D3786	GAI-LAP
Permittivity	ASTM D4491	GAI-LAP
Apparent Opening Size (AOS)	ASTM D4751	GAI-LAP
Geosynthetic Clay Liners		
Bentonite Mass per Unit Area	ASTM D5993	GAI-LAP
Peel Strength (MD)	ASTM D6496	GAI-LAP
Tensile Strength	ASTM D6768	GAI-LAP
Swell Index	ASTM D5890	GAI-LAP
Fluid Loss	ASTM D5891	GAI-LAP
Index Flux or Permeability	ASTM D5887	GAI-LAP
Compatibility Flux	ASTM D6766	GAI-LAP
Interface Friction		
Geosynthetic to Geosynthetic	ASTM D5321	GAI-LAP
Geosynthetics to Soils	ASTM D5321	GAI-LAP
GCL Internal Shear	ASTM D6243	GAI-LAP
GCL to Geosynthetics	ASTM D6243	GAI-LAP
GCL to Soil	ASTM D6243	GAI-LAP

Quality Assurance Program

For your project, nothing is more important than accurate data. That's why our Quality Assurance Program has been customized to meet the various requirements of the accrediting agencies. We are extremely committed to quality and are directly involved with ASTM along with various national quality programs. Our Quality Assurance program helps to assure that the work performed by Geotechnics is of the highest professional standards and specifically meets the requirements of our clients.

The table below outlines our Quality Management System accreditations.

Description	Methods	Accreditations
Quality Management Systems		Since
Pittsburgh Facility		
Overall Quality System	ASTM R18	1996
Overall Quality System	ASTM D 3740	1996
Concrete	ASTM E 329	2007
Concrete	ASTM C1077	2007
Aggregates	ASTM E 329	1998
Aggregates	ASTM C1077	1998
Raleigh Facility		
Overall Quality System	ASTM R18	2003
Overall Quality System	ASTM D 3740	2003
Nashville Facility		
Overall Quality System	ASTM R18	2017
Overall Quality System	ASTM D 3740	2017

Quality Commitment

Geotechnics was selected by the ASTM Institute for Standards Research (ASTM /ISR) to participate in a prestigious comprehensive inter-laboratory testing program. The program was designed to obtain reliable estimates of testing precision, reproducibility, and repeatability.

The research project compared data from general classification testing as well as triaxial and direct shear, unconfined compression, compaction, one-dimensional consolidation, and permeability testing.

Based on our aggressive interest and commitment to quality, Geotechnics coordinates and participates in international round-robin testing programs for ASTM Task Groups. Geotechnics participates and maintains membership in various organizations that help insure that state of the art testing practices are performed.

Staff Experience & Education

We've built strong teams of seasoned professionals in all facets of our business. The combined company staff consists of approximately 45 full and part-time employees.

Mr. Randy O'Rourke is the President of the firm and has more than 40 years of experience in the engineering and laboratory industry. Randy holds a BS Degree in Engineering-Special Fields from the University of Pittsburgh and has extensive experience in engineering, laboratory and field testing services.

Mr. David Backstrom is the Vice President/Geotechnical Laboratory Advisor and has more than 40 years of experience in the laboratory industry. Mr. Backstrom holds a BS Degree in Civil Engineering from the University of Pittsburgh and is an active member of the ASTM D-18 Committee on geotechnical testing.

Mr. Michael Smith is the Vice President/Regional Director of the Raleigh and Nashville Facilities. He has over 20 years of experience in the engineering and laboratory industry and holds a BS Degree in Environmental Science from Northland College. Mike is also a member of the ASTM D-18 Committee on geotechnical testing.

Mr. J.P. Kline is the Technical Director/Geosynthetics Laboratory Director and has more than 20 years of experience in the geosynthetics industry. He holds a Master of Engineering Degree in Environmental Pollution Control from Pennsylvania State University, a BS Degree in Environmental Engineering Technology from Pennsylvania State University and a BA Degree in Classics from Randolph-Macon College, Virginia. A Professional Engineer, J.P. is also a member of ASTM Committee D-35 on Geosynthetics.

Mr. Nathan Melaro Is the Director of Operations for the Pittsburgh, Raleigh and Nashville Facilities. He has 20 years of experience in the laboratory and field services industry and holds a BS degree in Environmental Science from Westminster College.

Mr. George Moyer is the Vice President of Marketing and has nearly 40 years of experience in marketing and general business aspects. George holds a business degree from The Adrian College located in Michigan.

Mr. Kevin Lichtenfels is the Quality Control Director and has over 25 years of testing experience and more than 14 years implementing the laboratory quality program including equipment calibration, documentation, and filing. He holds a BS Degree in Science from the University of Pittsburgh. Kevin has successfully completed the ISO short course entitled Auditing to ISO 9000 Standards and routinely performs audits of our laboratories, in addition to site audits of construction projects.

Mr. Ryan O'Rourke is the Geosynthetics Laboratory Manager and has over 15 years of experience in the laboratory and field services industry. He has completed Civil Engineering studies at the University of Pittsburgh, Johnstown Pennsylvania Campus.

Mr. Shannon Sisell is the laboratory manager for the Raleigh. Shannon has over 10 years of experience in the field and laboratory services industry. He is a certified soils and geosynthetics GSI-ICP Technician and has an Associates' Degree in Civil Engineering from Wake Technical Community College. He is currently enrolled in the Geomatics Program at North Carolina Agricultural and Technical State University.

Mr. Thomas Eld obtained a B.S. Degree in Civil Engineering from West Virginia University and has 30 years of experience in the field and laboratory services industry. Prior to working at Geotechnics, he was a construction superintendent as well as a landfill manager.

Mr. Jeffrey Corchado is the Lead Technician/Staff Geologist of our concrete, grout and rock testing services and has 30 years of experience. He obtained a BS Degree in Geology from The University of Pittsburgh, Johnstown Pennsylvania Campus. He is in charge of all aspects of the concrete testing, including preparation of the samples for laboratory certification by CCRL and others.

Mr. Anthony Deluca Is the Project Coordinator for our Field Services and has 12 years of experience in the laboratory and field performing laboratory and field testing, including construction monitoring services for building construction, landfills, deep foundation construction, and remediation. He obtained a BS Degree in Geology from The University of Pittsburgh, Johnstown Pennsylvania Campus.

Name	Title	Location	Years of Experience
Corporate Personnel			
Truby Buccille	Administration	Pittsburgh	27
Judy O'Rourke	Administration	Pittsburgh	33
Randy O'Rourke	President	Pittsburgh	43
Dave Backstrom	Vice President/Advisor	Pittsburgh	44
Mike Smith	Vice President/Regional Director	Raleigh	20
J. P. Kline	Technical Director/All Facilities	Pittsburgh	21
Nate Melaro	Director of Operations/All Facilities	Pittsburgh	20
Ryan O'Rourke	Geosynthetics Laboratory Manager	Pittsburgh	15
Kevin Lichtenfels	Quality Control Director	Pittsburgh	26
George Moyer	Vice President of Marketing	Raleigh	45
James Barr	Information Technology Manager	Pittsburgh	25
Geotechnical Personnel			
Jeff Corchado	Lead Technician	Pittsburgh	30
Tom Eld	Laboratory Technician	Pittsburgh	30
Tony Miglio	Laboratory Technician	Pittsburgh	28
Tim O'Rourke	Laboratory Technician	Pittsburgh	28
Mike Furlong	Laboratory Technician	Pittsburgh	14
Kelly Cummings	Lead Data Manager	Pittsburgh	12
Patrick Cummings	Laboratory Technician	Pittsburgh	12
Caleb Kyper	Project Manager	Pittsburgh	12
Shannon Sisell	Supervising Technician	Raleigh	10
Robert LeDonne	Laboratory Technician	Pittsburgh	9
Robert Whitney	Laboratory Technician	Raleigh	6
John Muron	Laboratory Technician	Pittsburgh	5
Nate Cox	Laboratory Technician	Nashville	4
Jeff Bauman	Laboratory Technician	Pittsburgh	2
Shane Guzewicz	Laboratory Technician	Pittsburgh	2
Howard Lentz	Laboratory Technician	Pittsburgh	2
Andrew Francis	Laboratory Technician	Raleigh	2
Mike Yanik	Laboratory Technician	Raleigh	1
Geosynthetics Personnel			
Justin Onderick	Laboratory Technician	Pittsburgh	9
Tara Phillips	Data Manager	Pittsburgh	6
Steve Backo	Laboratory Technician	Pittsburgh	3
Chris Thomas	Laboratory Technician	Pittsburgh	12
Field Personnel			
Tim Lentz	Senior Field Technician	Pittsburgh	25
David Wright	Senior Field Technician	Raleigh	15
Rex Tobias	Field Technician	Nashville	11
Tony Deluca	Project Coordinator	Pittsburgh	7
Aaron Cessna	Field Technician	Pittsburgh	5
Mike Fox	Field Technician	Pittsburgh	5
Brent Eberhard	Field Technician	Nashville	3
Aaron Smith	Field Technician	Raleigh	2
Jeremy Shaw	Field Technician	Raleigh	1

Representative Clients

Consultants

AECOM
Alliance Consulting, Inc.
AMEC Foster Wheeler
ARCADIS
ARM Group
Barton & Loguidice, P.C.
Bergman Associates, Inc.
Brown & Caldwell
CB & I, Inc.
CDM Smith
CH 2M HILL
Civil & Environmental Consultants, Inc.
Clough, Harbour & Associates LLP
CME Engineering LP
Cornerstone Environmental Group, LLC
D'Appolonia
DiGioia, Gray & Associates
Envirocon, Inc.
Froehling & Robertson, Inc.
GAI Consultants, Inc.
Gannett Fleming, Inc.
Gateway Engineers
GeoSyntec Consultants
Golder & Associates, Inc.
HDR Engineering
Joyce Engineering, Inc.
Kleinfelder
McMahon & Mann Engineers
Michael Baker Jr., Inc.
Paul C. Rizzo & Associates, Inc.
Smith, Gardner & Associates
Schnabel Engineering Assoc.
Tetra Tech
Weaver Consultants

Utilities & Industrial

AEP
CONSOL
Dominion Resources
Dow Environmental
Duke Energy
Duquesne Electric Company
EAP Industries, Inc.
Equitable Gas Company
First Energy
Pa-American Water Co.
Progress Energy
Range Resources
Santee Cooper
South Carolina Electric & Gas
TVA
Wheeling Electric Power

Contractors

Beech Construction, Inc.
Bentley Construction
Brayman Construction Corporation
Dick Corporation
Geo-Solutions
Glover Construction Co., Inc.
Hallaton, Inc.
Hayward Baker
Joseph B. Fay Company
J. P. Mascaro & Sons
Lane Construction
Moretrench American Corporation
Morgan Corporation
Nicholson Construction of America
New Dominion Construction, Inc.
Phillips & Jordan
Sevenson Environmental Services, Inc.
Shamrock Mineral Company
Swank Associated Companies
Thalle Construction
Trumbull Corporation

Government

Allegheny County, Pennsylvania
Buffalo Museum of Science
City of Pittsburgh, Pennsylvania
City of Raleigh, North Carolina
Department. of Environmental Protection
Department of the Navy
Erie City Water Authority
Montana, DNCR
National Institute of Agriculture
Natural Affairs and Environmental Resources
New York State DOT
North Carolina DOT
North Dakota DOT
Pennsylvania DOT
Pennsylvania Turnpike Commission
U.S. Dept of the Interior
U.S.G.S. South Carolina District
U.S. Army Corps of Engineers
U.S. Air Force
U.S. Bureau of Mines

Capabilities

Our geotechnical laboratories routinely provide high-quality, responsive testing services for projects ranging in scope from a few samples with basic classification tests to several hundred samples with a complex series of characterization, compaction, consolidation, strength and permeability tests. Geotechnics features an extensive range of permeability testing capabilities with rigid and flex-wall permeameters ranging from 3 in diameter to 12 inches in diameter.

The following is a general guide to the types of tests that we perform:

Classification
Density Testing
Permeability
Strength Testing
Consolidation
Swell Potential
Corrositivity Testing
Concrete
Rock
Grout
Slurry
Soil Mix Designs
Soil Stabilization

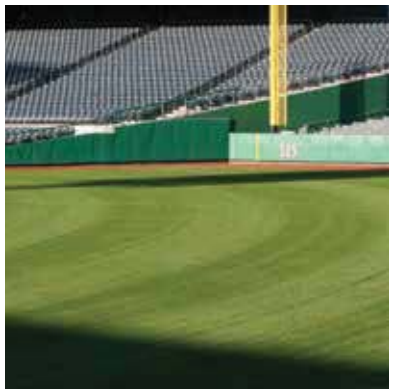
In our geosynthetic laboratory, we've developed innovative apparatus and fixtures designed to maximize the accuracy and precision of the test results while accelerating turnaround. We perform tests on the following materials. In addition, we perform in-plant sampling.

Geomembranes
Geonets
Geocomposites
Geotextiles
Geogrids
Geosynthetic Clay Liners

Geotechnics has extensive experience providing field services in concert with our clients on various types of projects. Our soils and concrete technicians have been utilized on a full-time or part-time basis to help relieve our client's field scheduling concerns. They are trained to work in various site conditions including mining, CCP and nuclear facilities.

Geotechnics experience includes the following:

Borehole logging and sampling
Construction observation and documentation
Caisson inspections
In place density testing for fill placement
Liner Integrity
Mobile concrete lab
Roller Compacted Concrete
Concrete sampling and coring
Plate Load Testing
In-Situ CBR Testing
In-Situ Soil Resistivity
Rock Anchor Pull Out Testing
Double Ring Infiltrometer
Boutwell Testing
Construction observation of synthetic liner systems
Observing the installation of various gas collection systems



Industry Sectors

Feats of engineering. Challenges in testing. Phenomenal results. And while the stories that follow are by no means exhaustive of the work we've done over the years, we think you'll find it as interesting as we do.

We are deeply honored to be a part of teams working around the globe. And we don't take lightly the responsibility entrusted with us for accurate testing and reliable data. Though we can't begin to imagine the projects of the future, we certainly know what's in ours. Integrity in testing.

CIVIL

The proven staff at Geotechnics has helped engineers throughout the country develop their most ambitious projects, from retaining walls and hillside stabilization to foundations built with caissons and driven piles.

- DAVID L. LAWRENCE CONVENTION CENTER
- HICKMAN BLUFF
- PNC PARK

DAMS, LAKES & WATERWAYS

The performance of a dam is based on smart engineering and accurate testing. And throughout the country, many projects have depended on the rigorous testing methodologies of Geotechnics, both in the lab and in the field. From classification and strength testing of site conditions to conformance testing on geomembranes, our experienced staff has provided that which today's engineers rely on most. Precisely accurate information in every step of the process.

- SALUDA DAM
- TAUM SAUK DAM
- BRADDOCK LOCKS AND DAM

HIGHWAYS & ROADWAYS

Nothing is more important than building a highway or bridge on a solid foundation. We've worked with hundreds of smart engineers throughout the world, conducting geotechnical, geosynthetic, and field testing services on a wide range of highway service projects, of all sizes and scopes.

- THE WOODROW WILSON BRIDGE
- MON/FAYETTE EXPRESSWAY
- PORT AUTHORITY OF ALLEGHENY COUNTY WEST BUSWAY

LANDFILLS

Geotechnics has helped with hundreds of landfill projects throughout the country. As an independent lab, we're able to seamlessly work with engineering firms, consultants and contractors, providing reliable data at every stage of a project. From initial site exploration to the development of design parameters or landfill closure, the Geotechnics team provides an important building block for the solid waste industry.

- SENECA MEADOWS LANDFILL
- CARBON LIMESTONE LANDFILL
- I-95 MUNICIPAL LANDFILL

INDUSTRIAL

Geotechnics has extensive experience in sludge stabilization often encountered on industrial sites.Our experience includes preparing and testing site materials blended with various add-mixtures, such as fly ash, bottom ash, Bentonite, cement and kiln dusts in varying proportions to optimize the strength, workability and economics. Geotechnics also maintains the appropriate testing equipment to perform various strength tests on a variety of mixed materials. Geotechnics has been involved with numerous slurry wall designs throughout the United States, from material selection to laboratory testing.

Our experience also includes characteristic testing with various types of Bentonite blends mixed with the site soils. We have also performed QA/QC services in the field for the construction of slurry walls. The field services involved the documentation of the material quantities along with compliance with the project specifications. We also perform general classification testing on select impacted soils to help determine the appropriate remediation or containment measures.

- MILLCREEK GOLF AND LEARNING CENTER
- AMCHITKA ISLAND MILITARY BASE
- JAMALCO AREA 45

ENERGY

- BRUNSWICK NUCLEAR POWER PLANT
- DUKE ENERGY CLIFFSIDE COAL-FIRED POWER STATION
- EVERPOWER HIGHLAND WIND
- TURKEY POINT NUCLEAR POWER PLANT, PALMETTO BAY, FLORIDA
- AKKUYU NUCLEAR POWER PLANT, TURKEY
- BRAKAH NUCLEAR POWER PLANT, ABU DHABI

COAL COMBUSTION PRODUCTS

Since our inception, Geotechnics has been involved with the testing characterization of mine tailings and coal combustion products. Our test results have been utilized for the design of numerous CCP and coal refuse disposal facilities. Including combined refuse facilities and coal slurry impoundments.

We have been involved from the beginning of the facilities by compiling various mix materials to best simulate the anticipated product along with beneficial use projects. We have experience providing field testing services in regard to in-place density testing along with construction observations and documentation.

Geotechnics contributed to the preparation of the U.S. Department of Labor, Mine Safety and Health Administration, Engineering & Design Manual Coal Refuse Disposal Facilities, Second Edition, May 2009.

- Brickhaven, Duke Energy
- Gallatin, TVA

Accreditation #:
GAI-LAP - 14 - 96
TEL (610) 522-8440

Geosynthetic Institute
475 Kedron, Ave.
Folsom, PA 19033

Geotechnics Inc.

is granted accreditation
for designated geosynthetic test methods in accordance with the
Geosynthetic Accreditation Institute - Laboratory Accreditation Program
(GAI-LAP), as published in its annual directory.
This accreditation is valid until June 30, 2018.

Robert M. Koerner, Ph.D., P.E.
Director Emeritus

GRI
GEI GII
GSI
GAI GCI

George R. Koerner, Ph.D., P.E. & CQA
Auditor

©GOES 74

We are grateful for the people we've had the opportunity to work with over the past 30 plus years that entrust us with their geotechnical and geosynthetic testing services.

As much as our work centers on data and testing, it's really all about people. Our employees. Our partners. Our clients.

geotechnics.Tested.
geotechnical & geosynthetic testing

PITTSBURGH RALEIGH NASHVILLE
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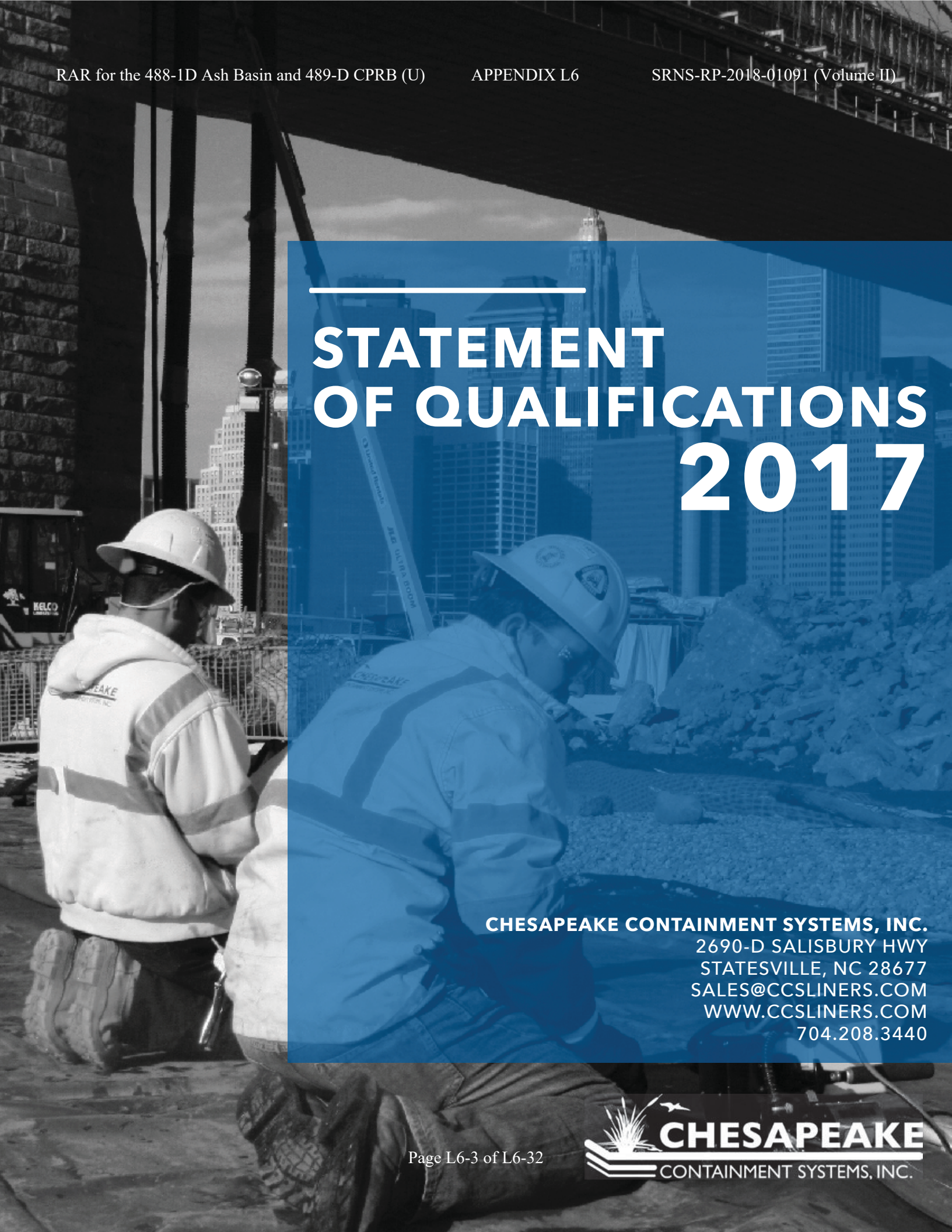

STATEMENT OF QUALIFICATIONS 2017

CHESAPEAKE CONTAINMENT SYSTEMS, INC.
2690-D SALISBURY HWY
STATESVILLE, NC 28677
SALES@CCSLINERS.COM
WWW.CCSLINERS.COM
704.208.3440

CHESAPEAKE
CONTAINMENT SYSTEMS, INC.

SAFETY QUALITY COMMITMENT

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COMPANY
CONFIDENTIAL

COMPANY CONFIDENTIAL

NAME
Chesapeake Containment Systems, Inc.

ADDRESS
Corporate Headquarters
2690-D Salisbury Hwy
Statesville, NC 28677

Regional Offices
Maryland Office:
352 Earls Road
Middle River, MD 21220

Tennessee Office:
800 East Reelfoot Avenue, Suite 214
Union City, TN 38261

CONTACT INFORMATION
704.208.3440
www.ccsliners.com

FOCUS OF BUSINESS
Chesapeake Containment Systems, headquartered in Statesville, North Carolina, is an environmental construction firm that focuses on the installation of geosynthetics and HDPE piping systems. Ryan Kamp, founded CCS in 2007, and continues to lead the day-to-day operations.

Ryan Clark, Executive Vice President, leads estimating and project management, while Matthew Garland, Vice President of Operations, manages all field production activities to ensure quality. Together, the three have more than 50 years of experience working in geosynthetics and with general contractors. Becky Kamp, Director of Accounting and HR, manages the company's finances and human resources department.

SERVICES, PRODUCTS AND APPLICATIONS

PROUDLY INSTALLING CONTAINMENT SYSTEMS

- Landfill Cell and Closure
- Wastewater Lagoons
- Portable Water Storage
- Transformer Containment
- Secondary Containment
- Power Generation
- Mining Leach Pads
- Runoff Pads
- Golf Course Ponds
- Decorative Ponds
- Tank Lining
- Vapor and Methane Gas Barriers

GEOSYNTHETIC SERVICES

- Complete Supply and Installation of Geosynthetic Materials
- Geosynthetic Repair Services
- Liner Inspection and Consulting
- Custom Fabrication of HDPE Pipe Products (Manholes, Risers, Bootless Pipe Penetrations)
- Custom Fabrication of Geosynthetic Materials
- Geosynthetic Material Sales
- Welding Equipment Sales, Rental, and Training
- Budget Pricing and Engineering Assistance

LINER REPAIR

- Highly Trained Technicians
- State-of-the-Art Welding Equipment
- Full QA/QC Testing and Reporting
- Full-Day and Half-Day Rates
- 24-Hour Emergency Service

CONCRETE PROTECTIVE LINER

Also termed "Concrete Embedment Liner," Concrete Protective Liner protects concrete from chemicals, and provides impervious barriers between concrete and contaminants.

Chesapeake Containment System's capabilities include full-service installation of cast-in-place embedment liner.

- Custom Fabrication
- Small or Large Installations
- Professional Shop Drawings
- Full Non-Destructive Testing

Applications Include:

- Wet-Well Structures
- Sanitary Sewer Structures
- Foundation Waterproofing and Protection
- Containment of Contaminants

PROJECT REFERENCES

POWER INDUSTRY

- CCB Landfills - Dry Storage
- CCB Impoundments
- Coal Storage Pads
- Settling Ponds
- Gypsum Pads
- Temporary Ash Pile Covers
- Leachate Storage Ponds
- Leachate Collection Piping

PROJECT REFERENCES: POWER/INDUSTRIAL

MITCHELL POWER PLANT CELL

Application: Cell

Date: 8/1/15

Location: Moundsville, WV

Owner: AEP

Engineer: CEC

Material:	Quantity:
GCL	512,000
30mil PVC	512,000
Coal Drain Geocomposite	512,000
Underdrain Geocomposite	414,000

ASHEVILLE AIRPORT PHASES 1-3

Application: Cell and Closure

Date: 6/1/15

Location: Arden, NC

Owner: Duke/Asheville Airport

Engineer: Geotrack

Material:	Quantity:
60mil HDPE	1,956,800
GCL	1,956,800
Geocomposite	1,956,800
40mil HDPE Liner	2,060511

CROSS STATION CELL 3 PHASES

Application: Cell and Closure

Date: 6/1/15

Location: Cross, SC

Owner: Santee Cooper

Engineer: Worley Parsons

Material:	Quantity:
60mil HDPE	3,066,137
GCL	2,452,910
Geocomposite	784,080
Geotextile	392,040

DOMINION POWER - CURLEY HOLLOW CELLS

Application: Cell

Date: 6/1/17

Location: St. Paul, VA

Owner: Dominion

Engineer: GAI

Material:	Quantity:
50mil PVC	4,516,155
Geocomposite	3,039,030
Geotextile	11,270,097
8mil Rain Cover	4,235,020
Wind Defender	4,235,020
60mil HDPE	301,950

DUKE CATAWBA CLOSURE

Application: Closure

Date: 11/1/16

Location: York, SC

Owner: Duke Catawba Nuclear

Engineer: S&ME

Material:	Quantity:
40mil HDPE Liner	340,000
Geocomposite	320,000
Geotextile	62,000

DUKE CLIFFSIDE CELL

Application: Cell

Date: 10/1/15

Location: Mooresboro, NC

Owner: Duke

Engineer: CDM Smith

Material:	Quantity:
60mil HDPE	609,840
GCL	609,840
Geocomposite	609,840
40mil HDPE Liner	64,400

PROJECT REFERENCES: POWER/INDUSTRIAL CONT.

LG&E KU GHENT CELL 1 A AND B

Application: Cell

Date: 12/1/15

Location: Ghent, KY

Owner: LG&E/KU

Engineer: GAI

Material:	Quantity:
60mil HDPE	4,981,496
Geotextile	4,981,496

SOUTHERN COMPANY PLANT GORGAS CELL

Application: Cell

Date: 12/1/15

Location: Gorgas, AL

Owner: Alabama Power

Engineer: SCS

Material:	Quantity:
60mil HDPE	2,031,481
GCL	2,031,481
Geocomposite	2,031,481

TVA KINGSTON CLOSURE

Application: Closure

Date: 1/17/15

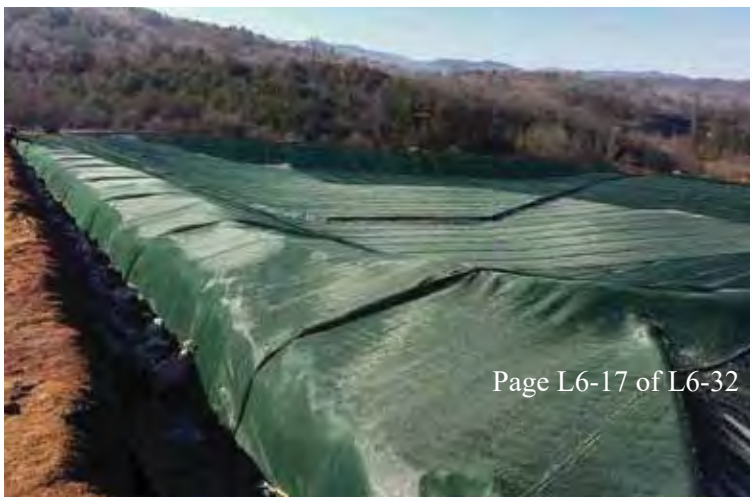
Location: Harriman, TN

Owner: TVA

Engineer: Stantec

Material:	Quantity:
40mil LLDPE Liner	9,900,000
Geocomposite	9,900,000

SOLID WASTE



- Landfill Cell
- Landfill Closures
- Leachate Ponds
- Floating Covers
- Rain Covers
- Temporary Caps
- Secondary Containment
- Tank Lining

PROJECT REFERENCES: SOLID WASTE

CCSWA LANCHESTER AREA D TURF CLOSURE

Application: Closure

Date: 1/1/14

Location: Narvon, PA

Owner: CCSWA

Engineer: ARM Group

Material:	Quantity:
Closure Turf System	287,715

HRRC LANDFILL

Application: Cell

Date: 5/1/16

Location: VA Beach, VA

Owner: HRRC

Engineer: Joyce

Material:	Quantity:
60mil HDPE	575,216
Geocomposite	575,216

ROWAN COUNTY LANDFILL CELL

Application: Cell

Date: 6/5/15

Location: Woodleaf, NC

Owner: Rowan County

Engineer: HDR

Material:	Quantity:
60mil HDPE	878,920
GCL	878,921
20mil Raincover	878,922
Geocomposite	693,570
Geotextile	185,352

HALEY PIKE LANDFILL CLOSURE

Application: Closure

Date: 8/1/12

Location: Lexington, KY

Owner: Lexington DSW

Engineer: Kenvirons

Material:	Quantity:
40mil LLDPE	1,200,000
Geocomposite	2,400,000

MILLENIUM LANDFILL

Application: Cell

Date: 11/1/15

Location: Ashtabula, OH

Owner: Ashtabula

Engineer: North Point

Material:	Quantity:
60mil HDPE Liner	350,000
Geocomposite	350,000

MID SHORE EXPOSED CLOSURE

Application: Closure

Date: 10/1/16

Location: Easton, MD

Owner: MES

Engineer: Geosyntec

Material:	Quantity:
60mil HDPE Green	2,918,520
Platypus Anchors	5,518

PROJECT REFERENCES: SOLID WASTE CONT.

RUMPKE RSL CLOSURE

Application: Closure

Date: 12/31/16

Location: Cincinnatti, OH

Owner: Rumpke

Engineer: AECOM

Material:	Quantity:
60mil HDPE	2,700,720

RIVERVIEW LANDFILL

Application: Cell

Date: 11/1/16

Location: Riverview, MI

Owner: Wayne County

Engineer: Cornerstone

Material:	Quantity:
60mil HDPE	815,000

SPENCERS EAST RUBBLE LANDFILL CLOSURE

Application: Closure

Date: 6/1/16

Location: Abingdon, MD

Owner: Spencers Landfill

Engineer: SCS

Material:	Quantity:
40mil LLDPE Liner	906,000
Geocomposite	906,000

CERTIFICATIONS

CERTIFICATIONS

CCS is a certified installer for many of the industry's leading material manufacturers. We have demonstrated through years of successful installations and training that we meet the stringent criteria set forth by the manufacturers.

CCS technicians are IAGI-Certified. This certification requires both a written and practical evaluation of the technician's abilities in geosynthetic welding. An IAGI-certified welding technician has proven themselves t be proficient in all facets of synthetic fusion welding.

CCS professionals who have earned their SWANA Landfill Certification have demonstrated superior knowledge and understanding in their field. SWANA's MOLO Certification Program is so highly regarded that numerous states throughout North America now accept successful completion of this program in lieu of their own certification requirements.

Our pipe installation technicians have been trained in butt, sidewall, electrofusion and extrusion welding applications. Training covers various size ranges of HDPE and is taught by master-welders at the distributor's facility.

IAGI International Association of Geosynthetic Installers

MEMBER OF SWANA SOLID WASTE ASSOCIATION of North America

LEE SUPPLY CO. INC.

agru america

GSE ENVIRONMENTAL™

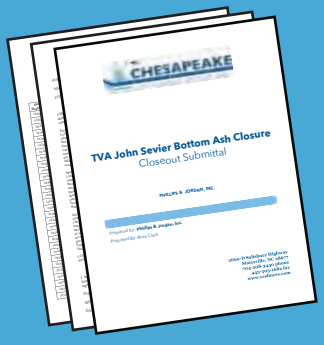
SKAPS

QUALITY STANDARDS

QUALITY STANDARDS

At Chesapeake Containment Systems, Inc., our **Quality Control and Management Commitment** is comprised of five major service quality criteria that we believe are paramount to executing consistently successful installations. These standards represent our unwavering dedication to delivering the highest quality professional services to our clients.

CAD Technician, Chris Kress, and Project Manager, Katie Charnigo, review drawings for a potential bid.



Example of professional documentation presented to a client during the closeout process.

1 DESIGN

CCS will carefully review your needs and requirements to determine the most comprehensive solution for your project.

2 PROPOSAL

CCS will present you with the best-valued engineered options for your geosynthetic project and provide insight to the costs associated with the installation.

3 PRE-INSTALLATION

CCS will provide you with clear and precise submittals relative to implementation and operation of installation. Our qualified Project Managers will visit and manage the site prior to mobilization.

4 DURING INSTALLATION

CCS regulates jobsite installation and performance. We offer support to our installation teams utilizing our full time Safety Director and Quality Control Manager.

5 CLOSE-OUT

After successful completion of the installation process, CCS will provide you with all necessary project documentation for review.

THE CCS, INC. QUALITY CONTROL AND MANAGEMENT COMMITMENT

DESIGN

- Constructability Review
- Peer Review
- Budget Estimating

PROPOSAL

- 3-Dimensional Modeling
- Spec Review & Value Engineering Evaluation

PRE-INSTALLATION

- Product Submittal
- Management & Review of Manufacturer Quality Control
- Management of Third Party Conformance Testing
- Dedicated In-Office Quality Control Manger Review of Specifications & Preparation of Quality Control Documents for Field Use
- Proposed Panel Layout

DURING INSTALLATION

- Experienced Supervision
- Dedicated On-Site Quality Control Technician with On-Site CAD & Electronic Quality Control Documentation
- On-Site Master Seamer
- Regional Operations Manager
- Dedicated Office Quality Control Manager to Review & Monitor Quality Control
- Daily Subgrade, Equipment & Material Inspection

CLOSE-OUT

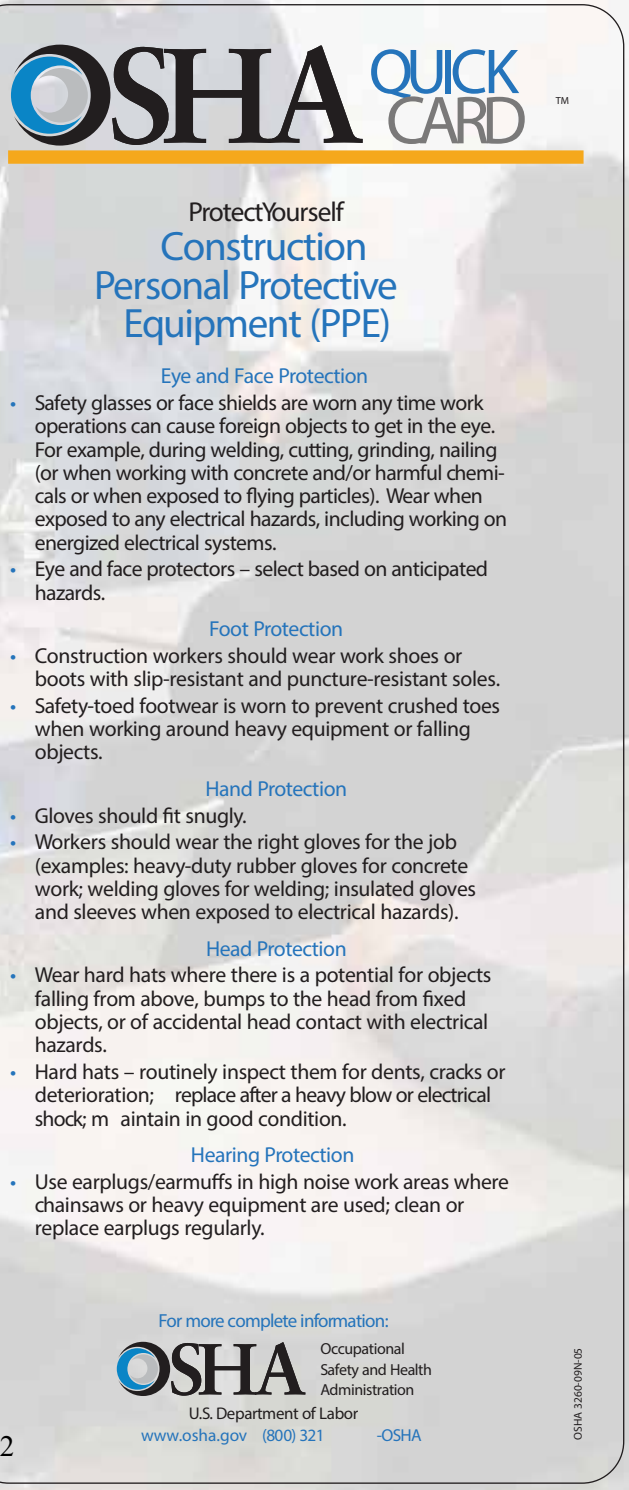
- Letter of Compliance with Project Specifications
- Blanket Subgrade Certification
- Quality Control Logs
- Tensiometer Certifications
- Warranties

SAFETY STANDARDS

SAFETY STANDARDS

Since our inception in 2007, Chesapeake Containment Systems has held firm to the belief that it is possible to have high-output production, coupled with impeccable quality, all the while maintaining a "second-to-none" safety standard in our industry.

With this goal in mind, CCS understands that to be on the forefront of liner safety, "minimum" is not the mark. We strive to create a culture that exceeds the expectations of both our clients, as well as the industry safety and training standards.



OSHA QUICK CARD™

ProtectYourself

Construction Personal Protective Equipment (PPE)

Eye and Face Protection

- Safety glasses or face shields are worn any time work operations can cause foreign objects to get in the eye. For example, during welding, cutting, grinding, nailing (or when working with concrete and/or harmful chemicals or when exposed to flying particles). Wear when exposed to any electrical hazards, including working on energized electrical systems.
- Eye and face protectors – select based on anticipated hazards.

Foot Protection

- Construction workers should wear work shoes or boots with slip-resistant and puncture-resistant soles.
- Safety-toed footwear is worn to prevent crushed toes when working around heavy equipment or falling objects.

Hand Protection

- Gloves should fit snugly.
- Workers should wear the right gloves for the job (examples: heavy-duty rubber gloves for concrete work; welding gloves for welding; insulated gloves and sleeves when exposed to electrical hazards).

Head Protection

- Wear hard hats where there is a potential for objects falling from above, bumps to the head from fixed objects, or of accidental head contact with electrical hazards.
- Hard hats – routinely inspect them for dents, cracks or deterioration; replace after a heavy blow or electrical shock; m aintain in good condition.

Hearing Protection

- Use earplugs/earmuffs in high noise work areas where chainsaws or heavy equipment are used; clean or replace earplugs regularly.

For more complete information:

OSHA Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov (800) 321 -OSHA

OSHA 3260-09N-05

SAFETY STANDARDS CONT.

Safety Training

All of Chesapeake Containment Systems' employees are not only oriented, but also trained in their native language. This "live classroom setting" approach, led by one of our trained professionals, ensures that our people are learning in an environment where the information they obtain is in a language they can understand and in turn, better retain and ultimately reuse in the field.

Superintendents

OSHA 30 HR
Frontline Supervisor Safety Leadership Training
Skid Steer
Excavator
Defensive driving
Cut Prevention
STOP Program
Site Safety Inspections
UTV
Global Harmonization Systems
Forklift (Class 1,4,5 and 7)

Additional Training Programs

Fall Prevention
Scaffolding
Ergonomics
Aerial Lift
Scissor Lift
Confined Space
Trenching and Excavation

Field Employees

OSHA 10 HR
Cut Prevention
STOP Program
UTV
Global Harmonization System

PROFESSIONAL REFERENCES

PROFESSIONAL REFERENCES

"We are always glad to recommend Chesapeake due to our confidence in the quality and competitive pricing of your work. Many of the owners and general contractors we have recommended Chesapeake to have awarded multiple projects to Chesapeake due to quality service."

- RICHARD A. BROWN,
P.E., Joyce Engineering

"CCS has always completed projects on time and within budget for our company. Their field crews and management understand the project specifications and jobsite restrictions, and execute the work in a professional manner."

- DAVID S. OVERLEY,
Ryan Inc. Central

BILL COOPER
General Manager
Ryan Central, Inc.
301.582.1959

CHRIS DOWNS
Project Manager
Ryan Central, Inc.
865.388.9301

EDDIE DOUGLAS
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CHRIS RUSH
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Saiia
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JOHN DOTTELLIS
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Waste Management
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WILLIAM TAFUTO
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ARM Engineering
717.533.8600

DARREN HUNT
General Manager
Day's Cove Reclamation
443.375.8512

ROBERT MOORE
Project Manager
C.S. Beatty
205.531.1496

TIM WOLFORD
Operations Manager
Rumpke
513.623.0532

TIM TORREZ
Area Engineer
Republic Services
804.640.7674

CONTACT INFORMATION

CONTACT INFORMATION

We are committed to providing high-quality products for our customers and deliver with exceptional performance to ensure our projects are completed safely and on time. Our clients can be at ease knowing that CCS is getting the job done.

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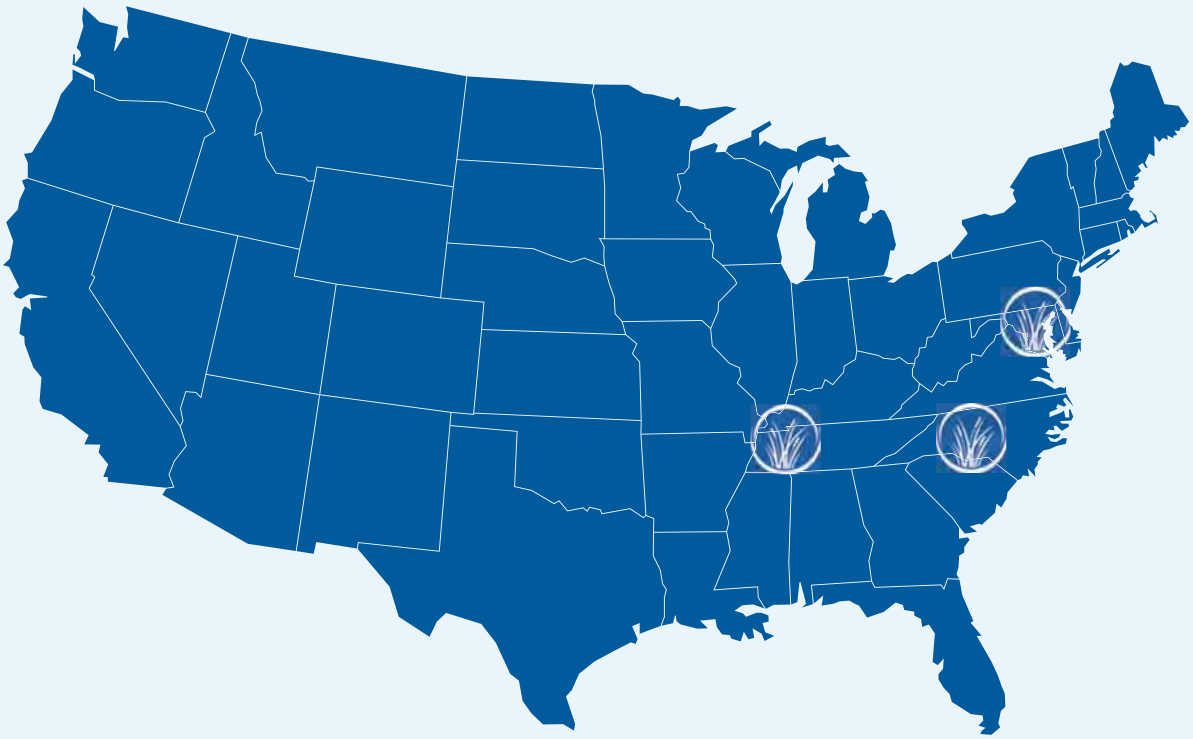
rkamp@ccsliners.com

RYAN CLARK
Executive Vice President
rclark@ccsliners.com

MATTHEW GARLAND
Vice President of Operations
mgarland@ccsliners.com



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APPENDIX M

LLDPE DATA AND DOCUMENTATION

Appendix M1 AGRU LLDPE QC & Product Specifications
Appendix M2 AGRU LLDPE QC Certifications and Test Data
Appendix M3 AGRU LLDPE QA Conformance Test Reports

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APPENDIX M1

AGRU LLDPE QC & Product Specifications

MANUFACTURING QUALITY CONTROL

GEOMEMBRANES AND DRAINAGE PRODUCTS

AGRU AMERICA, INC.

500 Garrison Road

Georgetown, SC 29440

Toll Free: (800) 373-2478

Telephone: (843) 546-0600

Fax: (843) 527-2738

salesmkg@agruamerica.com

www.agruamerica.com

08/09/2016

AGRU AMERICA, INC. - QA/QC

Manufacturing – Quality Assurance/Quality Control

AGRU AMERICA, Inc. extrudes high density polyethylene (HDPE) and linear low density polyethylene (LLDPE) geomembrane, HDPE Geonet, Geocomposite, geotextile and GCL products at its three production plants located at 500 Garrison Road, Georgetown, South Carolina, 29440, 2000 East Newlands Drive, Fernley, Nevada, 89408 and 181 Hwy 521, Andrews SC 29510.

Our USA Manufacturing Quality Assurance Program is dependent on the utilization of in-house laboratories in each plant which are, when necessary, complemented with testing performed by certified outside laboratories such as:

- TRI/Environmental California; Anaheim, CA
  Telephone (714) 520-9631; Fax (714) 520-9637
- TRI/Environmental, Inc.; Austin, Texas
  Telephone (512) 263-2101; Fax (512) 263-2558

  And other GRI-LAP accredited laboratories.

Raw Material – Manufacturer's Certificate of Conformity

HDPE and LLDPE resin is supplied to our plants in bulk and subjected to the following procedures:

- Prior to shipment, our resin supplier submits a certificate of analysis. Once approved, the resin is released for shipment to our plant.
- One sample is taken from each rail car after arrival and tested as follows:
  Melt Index ASTM D1238 190°C, 2.16kg, and Density ASTM D792 Method B.
- Once the tests have been completed and results found to be in compliance with our requirements, the resin is then unloaded into our silo system.
- At this stage, our supplier has performed one battery of tests and Agru America has performed one to verify the manufacturer's certificate of analysis.
- Off specification resin is returned to the supplier.
- The Manufacturer's MFI Test Data is reported on the Geomembrane Quality Certificate (Agru America's MFI Testing is done to verify the resin manufacturer's reported data).

GEOMEMBRANE

The Extrusion Process

The resin is conveyed through a vacuum pump system and flexible hoses to a dryer hopper, feeding the resin by gravity into an 8-inch barrel. This barrel is divided into five heating zones, each heating zone being computer controlled and constantly monitored.

A screw in the barrel turns at a prescribed and monitored speed. It conveys the resin slowly to full plastication, and then the plasticated resin is fed through a manifold into a coat hanger die having a width of approximately 24 feet. The die lips are open to a prescribed distance governed by the thickness of the geomembrane to be extruded.

Exiting the die, the plasticated resin forms a controlled and monitored bead, which feeds into a chrome three-roll stack in a prescribed pattern. Each chrome roll is set at a prescribed temperature, controlled by water circulation.

Exiting the controlled cooling of the roll stack, the geomembrane travels down the take off haulers towards the winder. On the way to the take off, the liner is trimmed to bring the finished width to the applicable standard. Trimmings are granulated.

The trimmed edge of one side of the geomembrane is marked every meter (3.28 ft) with thickness, resin type (HDPE or LLDPE), Agru America name, and year of manufacture. This marking also serves as product identification.

The geomembrane is visually inspected for surface defects as it travels down the take off by both the extruder and the winder operators.

The geomembrane is wound on a recycled HDPE core having 6” ID (150mm), 7” OD (175mm) and 22’8” (6.8m) length.

Each standard length roll weighs approximately 3,900 pounds (1770 kg.). Rolls are fitted with two nylon slings when shipped.

Post Extrusion Quality Control

Once start-up conditions are over and commercial extrusion is initiated, post-production quality control comes into operation. A series of test procedures are performed based upon either our standard frequency of testing (attached), or frequencies required by customer specifications.

A sample approximately 11” by the full width of the geomembrane is taken from every roll. Based on the specified test frequencies, certain specimens are die cut, tested, and the results summarized on the Quality Certificate issued by our Quality Control Department. The certificate is signed electronically by the Quality Control Manager.

Rolls failing to comply with either customer project specifications and/or our own latest revision to our published data sheets are set aside and re-classified as off-spec (Class B rolls).

Quality Certificates are provided for all rolls of geomembrane with the exception of off-spec (Class B rolls).

Sometimes a third party quality assurance representative is mandated by the owner of a project to oversee our manufacturing QA. We gladly subscribe to this procedure and make all our records available 24 hours a day for the duration of the mandate. The following roll identification items are reported in our Quality Certificate:

(example) **G16E000001**

G	1 6	E	000001
PLANT ID	**YEAR**	**MACHINE ID**	**COUNTER FOR YEAR**

First digit	Plant (G=Georgetown / F=Fernley)
Second and Third digits	Year (16 = 2016)
Fourth digit	Machine ID
Last six digits	Counter for the year (starts at 000001)

Product Description (liner type: Smooth, Microspike®, Drain®, Super Gripnet®, etc.)

Roll Length & Width in feet / meters, thickness in mils / mm.

Raw material lot and/or batch number and supplier/product identification (from resin manufacturer's Certificate of Analysis – sample attached)

All geomembrane rolls are labeled as follows:

- roll stickers on the cores for each roll
- roll stickers on the outside of the finished roll

The following test results are reported in the Geomembrane Quality Certificate, derived from our standard test frequency (attached) and/or supplied raw material manufacturer Certificates of Analysis. Tests performed are the latest revisions of the standards listed. At a minimum this meets or exceeds GRI GM 13/17 requirements:

Test / Method	Results Reported & Modifications to Standard (if any)
Thickness †ASTM D5199(Smooth) †ASTM D5994(Textured) **(Both Modified)**	Minimum, Maximum, and Average Sheet Thickness in mm and mils. **Modification from Standard** = Measurements are taken upon sample reaching Lab Temperature Equilibrium.
Asperity Height †ASTM D7466 **(Modified)** Textured liner only	Asperity height in mils **Modifications from Standard** = Edge samples are collected from the smooth/textured junction, **not** 1 foot from edge. ASTM D5994 specimens are used for this test, not direct placement.
Density †ASTM D792 method B	Density in g/cc
Melt Flow Index †ASTM D1238	g/10minutes (Conditions =190°C, 2.16kg). **NOTE:** Resin Manufacturer's **Certificate of Analysis result** is reported. Our testing
Carbon Black Content †ASTM D4218	% Carbon Black by weight
Carbon Black Dispersion †ASTM D5596	Category (Only near spherical agglomerates per GRI GM 13 & 17)
Tensile Strength †ASTM D6693 Type IV, 2 inches / minute **(Modified)**	Average Strength @ Yield & Break in psi, ppi, & N/mm Average Elongation @ Yield & Break in % **Modification from Standard** = Average of MD & TD results are reported **NOTE 1:** The D6693 results equate to the following **NOTE 2:** Yield data not reported for LLDPE
Tear Resistance †ASTM D1004 **(Modified)**	Tear Resistance in Lbs & N. **Modifications from Standard** = Test is run upon sample reaching Lab Temperature Equilibrium. Average Tear Resistance of MD & TD is reported.
Puncture Resistance †ASTM D4833 **(Both Modified)**	Puncture Resistance in Lbs & N. **Modification from Standard** = Test is run upon sample reaching Lab Temperature Equilibrium.
Notched Constant Tensile Load †ASTM D5397 (Single Point, Appx.)	Pass / Fail at 500 hours (or as required by customer specifications). First roll of new resin lot tested. This test is run on HDPE only, and on smooth edge of textured liners.
Oxidative Induction Time (OIT) †ASTM D3895 Standard, 200°C, 1atm.	OIT Time in minutes. **Modification from Standard** = One run only – if result is below 140 minutes, a second run is done to verify the first.

The following test methods are now certified by Agru America based on historical results, as they are not required by the GRI GM13 / 17, and are not considered typical MQC tests.

Test / Method	Results Certified
Low Temperature Brittleness ASTM D746	Pass / Fail for each specimen (5 specimens in both MD & TD), 100 % of samples passing. Results Certified to -80°C (-112°F)
ESCR †ASTM D1693	Pass / Fail for each specimen (5 specimens in both MD & TD), 100 % of samples passing. Results Certified to 2,000 hours
Dimensional Stability †ASTM D1204 **(Modified)**	15 minutes or 1 hour at 100°C Results Certified to ± 2% for all geomembranes

†GRI-LAP Accredited for this method (Including Modifications)

In addition to the testing described above, an in-house procedure is performed within the smooth edges of Textured (Microspike DS & SS) and Structured (Supergrip, Grip, Drain, MicroDrain) liner by the QC Lab in both plants.

Summarized, the procedure is a modified Graves Tear test (ASTM D1004), testing 2 specimens taken in the cross machine direction, and 2 specimens from the machine direction from within the smooth edges. Both the individual specimen results and the specimens themselves are checked. This test is currently being performed on each test roll (each time a tensile test is performed) produced in both plants.

The average result will be reported on the geomembrane roll Quality Certificates.

In addition to our MQC testing, Agru America will continually strive to produce superior products with isotropic characteristics.

Drainage Net (Geonet)

AGRU America drainage net is made from a blend of high quality HDPE resin and a carbon black masterbatch. The purpose of the carbon black is to protect the plastic from UV damage in the field application.

All raw materials as well as the finished products are consistently monitored by specially trained lab technicians. Raw materials are tested as above for Geomembrane.

The blend of raw materials is plasticized by an extruder, which presses the melt through a screen changer to filter out impurities. The plastic is then fed into a rotating die which creates the net. The cooling of the net takes place in a water tank at a tightly controlled temperature. A series of nip rollers pull the net out of the tank and through the downstream equipment to the winders. The net is cut to length automatically and wound onto a 4" OD cardboard core.

Before the finished rolls are taken out of the winder frame, the quality control technician either releases the material into stock or classifies the material as scrap.

When approved by QC, the rolls are transferred to the storage yard.

Geocomposite

In addition to the drainage net, AGRU America offers geocomposites which consist of geotextiles laminated to one or both sides of the net.

All geotextiles used for this lamination process are being inspected to meet AGRU America's (or project) specifications.

The lamination process takes place just before the net reaches the winders at the end of the extrusion line. After melting the surface of the HDPE drainage net, a geotextile is pressed into the net by means of a calender. The outer 6 inches of net are not laminated and the geotextile overlaps the net by an additional 6 inches on both sides of the product.

Before the finished rolls are taken out of the winder frame, the quality control technician either releases the material into stock or classifies the material as scrap.

When approved by QC, the rolls are stretch wrapped and transferred to the storage yard. All drainage net and geocomposite rolls are labeled as follows:

- one label on each face of the roll
- one label on the laboratory sample
- numbering system is as above for geomembrane

The following test results are reported in the Geonet/Composite Quality Certificate, derived from our test results and/or supplied raw material manufacturer Certificates of Analysis. Tests performed are the latest revisions of the Standards listed:

Test / Method	Results Reported & Modifications to Standard (if any)
Thickness (Geonet) †ASTM D5199	Minimum, Maximum, and Average Geonet Thickness in mm and mils. **Modification from Standard** = Measurements are taken upon sample reaching Lab Temperature Equilibrium. English Units reported
Density (Geonet) †ASTM D792	Geonet Density in g/cc
Melt Flow Index (Geonet) †ASTM D1238	g/10minutes (Conditions =190°C, 2.16kg). **NOTE:** Resin Manufacturer's **Certificate of Analysis result** is reported. Our testing verifies this result.
Carbon Black Content (Geonet) †ASTM D4218	% Carbon Black by weight
Peak Tensile Strength (Geonet) †ASTM D5035 or †ASTM D7179 **(Both Modified)**	MD Only tested, TD upon request only. Peak Strength @ Break in ppi **Modification from Standard** = English Units reported
Mass Per Unit Area (Geonet) †ASTM D5261	Average Mass per Unit Area in lb/ft^2 **Modification from Standard** = English Units reported
Transmissivity (Geonet) †ASTM D4716	Transmissivity, m^2 / sec Plate to Plate , 21°C, **gradient = 0.1, load = 10,000psf, seat time = 15 minutes** is Agru America's Standard Geonet MQC Transmissivity test (may be changed per project MQC specs)
Transmissivity (Geocomposite) †ASTM D4716	Transmissivity, m^2 / sec Plate to Plate , 21°C, **gradient = 0.1, load = 10,000psf, seat time = 15 minutes** is Agru America's Standard Geocomposite MQC Transmissivity test (may be changed per project MQC specs)
Ply Adhesion (Geocomposite) †ASTM D7005	Peel Strength, lbs/in, min. ave.

†GRI-LAP Accredited for this method (Including Modifications)

Geomembrane
Standard Frequency of Testing

Product Data

Property	Test Method	Frequency of testing (minimum)*
Thickness (min. ave.), mil	ASTM D5994/D5199	per roll
Asperity Height (min. ave.), mil	ASTM D7466	per roll, for textured liner
Density, g/cc, minimum	ASTM D792, Method B	200,000 lbs (railcar) on finished liner & incoming resin
Tensile Properties (ave. both directions)	ASTM D6693, Type IV	
Strength @ Yield (min. ave.), lb/in width	2 in/minute	20,000 lbs
Elongation @ Yield (min. ave.), % (GL=1.3in)	5 specimens in each direction	20,000 lbs
Strength @ Break (min. ave.), lb/in width		20,000 lbs
Elongation @ Break (min. ave.), % (GL=2.0in)		20,000 lbs
Tear Resistance, lbs. (min. ave.)	ASTM D1004	45,000 lbs
Puncture Resistance, lbs. (min. ave.)	ASTM D4833	45,000 lbs
Carbon Black Content (range in %)	ASTM D4218	20,000 lbs
Carbon Black Dispersion (Category)	ASTM D5596	45,000 lbs
Stress Crack Resistance (NCTL), hours	ASTM D5397, Appendix	200,000 lbs (railcar)
Oxidative Induction Time, minutes	ASTM D3895, 200°C, 1 atm O_2	200,000 lbs (railcar) on finished liner
Melt Flow Index, g/10 minutes	ASTM D1238, 190°C, 2.16kg	200,000 lbs (railcar) on incoming resin
Oven Aging with HP OIT, (% retained after 90 days)	ASTM D5721 ASTM D5885, 150°C, 500psi O_2	per resin formulation
UV Resistance with HP OIT, (% retained after 1600 hours)	ASTM D7238 ASTM D5885, 150°C, 500psi O_2	per resin formulation
2% Secant Modulus, lb/in. (max.)	ASTM D5323	per resin formulation-**for LLDPE liner only**
Axi-Symmetric Break Resistance Strain, % (min.)	ASTM D5617	per resin formulation-**for LLDPE liner only**

These test frequencies meet or exceed GRI's GM13 and GM17.
***Theses test frequencies may be changed based on project specifications, and represent the minimum MQC testing performed.**
Additional costs may be incurred if required testing is greater than listed above

All information, recommendations and suggestions appearing in this literature concerning the use of our products are based upon tests and data believed to be reliable; however, it is the users responsibility to determine the suitability for their own use of the products described herein. Since the actual use by others is beyond our control, no guarantee or warranty of any kind, expressed or implied, is made by Agru America as to the effects of such use or the results to be obtained, nor does Agru America assume any liability in connection herewith. Any statement made herein may not be absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations. Nothing herein is to be construed as permission or as a recommendation to infringe any patent.

500 Garrison Road, Georgetown, South Carolina 29440 843-546-0600 800-373-2478 Fax: 843-527-2738
email: salesmkg@agruamerica.com www.AgruAmerica.com

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Geonet, Geotextile and Geocomposite Standard Frequency of Testing

Geonet Component[4]

Property	Test Method	Frequency of Testing (min.)*
Thickness, (mm)	ASTM D5199	per 50,000 ft^2
Peak Tensile Strength, lbs./in. (MD)	ASTM D5035/ASTM D7179	per 50,000 ft^2
Density, g/cm^3	ASTM D792, Method B	per 50,000 ft^2
Carbon Black Content	ASTM D4218	per 50,000 ft^2
Transmissivity[1], m^2/sec.	ASTM D4716	per 500,000 ft^2

Geotextile Component[4]

Property	Test Method	Frequency of Testing (min.)*
Mass per Unit Area, oz./sq. yd.	ASTM D5261	per 100,000 ft^2
Grab Tensile Strength, lbs.	ASTM D4632	per 100,000 ft^2
Grab Elongation, %	ASTM D4632	per 100,000 ft^2
Trapezoidal Tear, lbs.	ASTM D4533	per 100,000 ft^2
Puncture, lbs.	ASTM D6241	per 540,000 ft^2
Permittivity[2], sec.$^{-1}$	ASTM D4491	per 540,000 ft^2
Water Flow[2], gpm./ft^2	ASTM D4491	per 540,000 ft^2
Apparent Opening Size,[2] U.S. Stnd Sieve Size (max.)	ASTM D4751	per 540,000 ft^2
UV Resistance after 500 hours, % Strength Retained	ASTM D4355	per resin formulation

Geocomposite

Property	Test Method	Frequency of Testing (min.)*
Laminated Strength (Ply Adhesion), lbs./in.	ASTM D7005	per 50,000 ft^2
Transmissivity[3], m^2/sec.	ASTM D4716	per 500,000 ft^2

***These test frequencies may be changed based on project specifications, and represent the minimum MQC testing performed. Additional costs may be incurred if required testing is greater than listed above.**

Notes: 1. Geonet Transmissivity at a temp. of 21°C, gradient of 0.1 and a load of 10,000psf: seating time 15 min. between steel plates.
2. At time of manufacture. Handling may change these properties.
3. Geocomposite Transmissivity at a temp. of 21°C, gradient of 0.1 and a load of 10,000psf: seating time 15 min. between steel plates.
4. Component Properties are prior to Lamination

All information, recommendations and suggestions appearing in this literature concerning the use of our products are based upon tests and data believed to be reliable; however, it is the users responsibility to determine the suitability for their own use of the products described herein. Since the actual use by others is beyond our control, no guarantee or warranty of any kind, expressed or implied, is made by Agru America as to the effects of such use or the results to be obtained, nor does Agru America assume any liability in connection herewith. Any statement made herein may not be absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations. Nothing herein is to be construed as permission or as a recommendation to infringe any patent.

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email: salesmkg@agruamerica.com www.AgruAmerica.com

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CoA Date: 04/11/2014

Certificate of Analysis

Shipped To: AGRU AMERICA INC:GEORGETOWN
500 GARRISON RD
GEORGETOWN SC 29440-9688
USA

Recipient: PALMER
Fax:

Delivery #: 88834459
PO #: 8206
Weight: 185400 LB
Ship Date: 04/11/2014
Package: BULK
Mode: Hopper Car
Car #: PSPX002181
Seal No: 322565

Product:
MARLEX POLYETHYLENE K307 BULK

Lot Number: H7240417

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.22	g/10mi
HLMI Flow Rate	ASTM D1238	21	g/10mi
Density	D1505 or D4883	0.938	g/cm3
Pellet Count	P02.08.03	27	pel/g
Production Date		03/29/2014	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem). **However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.**

Troy Griffin
Quality Systems Coordinator

For CoA questions contact Customer Service Representative at +1-832-813-4806

SAMPLE

EXHIBIT A

Low Density Polyethylene

MicroDrain Liner®

Product Data

Property	Test Method	Frequency	Minimum Average Values			
Thickness (nominal), mil (mm)	ASTM D5994	Per Roll	50 (1.25)	60 (1.5)	80 (2.0)	100 (2.5)
Thickness (min avg), mil (mm)			47.5 (1.19)	57 (1.43)	76 (1.9)	95 (2.38)
Thickness (min 8 of 10), mil (mm)			45 (1.12)	54 (1.35)	72 (1.8)	90 (2.25)
Thickness (lowest individual), mil (mm)			42.5 (1.06)	51 (1.28)	68 (1.7)	85 (2.13)
Drainage Stud Height, mil (mm)	ASTM D7466	2nd Roll	130 (3.3)	130 (3.3)	130 (3.3)	130 (3.3)
MicroSpike® Asperity Height, mil (mm)	ASTM D7466	2nd Roll	20 (0.51)	20 (0.51)	18 (0.46)	18 (0.46)
Density, g/cc, maximum	ASTM D792, Method B	200,000 lb	0.939	0.939	0.939	0.939
Tensile Properties (both directions)	ASTM D6693, Type IV					
Strength @ Break, lb/in width (N/mm)	2 in/minute	20,000 lb	105 (18.4)	126 (22.1)	168 (29.4)	210 (36.8)
Elongation @ Break, % (GL=2.0in)			300	300	300	300
Tear Resistance, lbs. (N)	ASTM D1004	45,000 lb	30 (133)	40 (178)	53 (236)	67 (298)
Puncture Resistance, lbs. (N)	ASTM D4833	45,000 lb	55 (245)	70 (311)	90 (400)	110 (489)
Carbon Black Content, % (range)	ASTM D4218	20,000 lb	2 - 3	2 - 3	2 - 3	2 - 3
Carbon Black Dispersion (Category)	ASTM D5596	45,000 lb	Only near spherical agglomerates: 10 views in Cat 1 or 2			
Oxidative Induction Time, minutes	ASTM D3895, 200°C, 1 atm O_2	200,000 lb	≥140	≥140	≥140	≥140

Agru America's geomembranes are certified to pass Low Temp. Brittleness via ASTM D746 (-80°C), Dimensional Stability via ASTM D1204 (±2% @ 100°C). Oven Aging and UV Resistance are tested per GRI GM 17. These product specifications meet or exceed GRI's GM17.

Supply Information (Standard Roll Dimensions)

Thickness		Width		Length		Area (approx.)	
mil	mm	ft	m	ft	m	ft^2	m^2
50	1.25	23	7	300	91.4	6,900	640
60	1.5	23	7	300	91.4	6,900	640
80	2.0	23	7	300	91.4	6,900	640
100	2.5	23	7	300	91.4	6,900	640

Note:

Average roll weight is 4,000 lbs (1,814 kg) for 100 mil and 3,000 lbs (1,300 kg) for other thicknesses. All rolls are supplied with two slings. Rolls are wound on a 6" core. Special length available upon request. Roll length and width have a tolerance of ±1%. The weight values may change due to project specifications (i.e. absolute minimum thickness or special length) or shipping requirments (i.e. international contanerized shipments).

All information, recommendations and suggestions appearing in this literature concerning the use of our products are based upon tests and data believed to be reliable; however, it is the users responsibility to determine the suitability for their own use of the products described herein. Since the actual use by others is beyond our control, no guarantee or warranty of any kind, expressed or implied, is made by Agru America as to the effects of such use or the results to be obtained, nor does Agru America assume any liability in connection herewith. Any statement made herein may not be absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations. Nothing herein is to be construed as permission or as a recommendation to infringe any patent.

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APPENDIX M2

AGRU LLDPE QC Certifications and Test Data

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Geomembrane Certification Package for

Savannah River Site 488-1D Ash Basin & 489-D CPRD Closure

Aiken, South Carolina

Executive Offices: 500 Garrison Road, Georgetown, SC 29440 • 843 546-0600 • 800 321-1379
Sales Office: 700 Rockmead, Suite 103, Kingwood, TX 77339 • 281 358-4741 • 800 373-2478
Email: salesmkg@agruamerica.com

MATERIAL CERTIFICATIONS IN THIS PACKAGE:

- 50 mil LLDPE MicroDrain

Executive Offices: 500 Garrison Road, Georgetown, SC 29440 • 843 546-0600 • 800 321-1379
Sales Office: 700 Rockmead, Suite 103, Kingwood, TX 77339 • 281 358-4741 • 800 373-2478
Email: salesmkg@agruamerica.com

SECTION 1

List of Materials

Executive Offices: 500 Garrison Road, Georgetown, SC 29440 • 843 546-0600 • 800 321-1379
Sales Office: 700 Rockmead, Suite 103, Kingwood, TX 77339 • 281 358-4741 • 800 373-2478
Email: salesmkg@agruamerica.com

Cust: Chesapeake Containment Systems
PO#: 17201 Savannah River Site-Envirocon Sys.
Dest: Aiken, SC

Doc#: 38542

85 rolls 50LL microdrain (500) 977,500 ft²

English

roll #	width	length	area	check weld rod qty (if ordered)	wgt	resin lot #	Production Date	Sampling Date
	ft.	ft.	ft².		lbs.			

The conformance frequency is 1/250ksf for both products. Please provide the following sample sizes:
50LL = 3ft X RW for 1st sample & 1ft XRW for remaining samples
Agru cuts and sends. Please ship samples via ground delivery on our UPS Account (# 13E321) and reference "Savannah" on the shipping label

G17A003208	23	500	11,500	50LL microdrain	85tot	1	4102	3ft RW	CHE811830	10/4/17	10/17/2017
G17A003209	23	500	11,500	50LL microdrain	85tot	2	4110		CHE811830	10/5/17	
G17A003210	23	500	11,500	50LL microdrain	85tot	3	4100		CHE811830	10/5/17	
G17A003211	23	500	11,500	50LL microdrain	85tot	4	4100		CHE811830	10/5/17	
G17A003212	23	500	11,500	50LL microdrain	85tot	5	4092		CHE811830	10/5/17	
G17A003213	23	500	11,500	50LL microdrain	85tot	6	4068		CHE811830	10/5/17	
G17A003214	23	500	11,500	50LL microdrain	85tot	7	4073		CHE811830	10/5/17	
G17A003215	23	500	11,500	50LL microdrain	85tot	8	4078		CHE811830	10/5/17	
G17A003216	23	500	11,500	50LL microdrain	85tot	9	4078		CHE811830	10/5/17	
G17A003217	23	500	11,500	50LL microdrain	85tot	10	4084		CHE811830	10/5/17	
G17A003218	23	500	11,500	50LL microdrain	85tot	11	4092		CHE811830	10/6/17	
G17A003219	23	500	11,500	50LL microdrain	85tot	12	4092		CHE811830	10/6/17	
G17A003283	23	500	11,500	50LL microdrain	85tot	13	4018		CHG811090	10/30/17	
G17A003284	23	500	11,500	50LL microdrain	85tot	14	4038		CHG811090	10/30/17	
G17A003285	23	500	11,500	50LL microdrain	85tot	15	4018		CHG811090	10/30/17	12/14/2017
G17A003286	23	500	11,500	50LL microdrain	85tot	16	4022		CHG811090	10/30/17	
G17A003287	23	500	11,500	50LL microdrain	85tot	17	4023		CHG811090	10/30/17	
G17A003288	23	500	11,500	50LL microdrain	85tot	18	4020		CHG811090	10/30/17	
G17A003289	23	500	11,500	50LL microdrain	85tot	19	4018		CHG811090	10/30/17	
G17A003290	23	500	11,500	50LL microdrain	85tot	20	4040		CHG811090	10/31/17	
G17A003291	23	500	11,500	50LL microdrain	85tot	21	4034		CHG811090	10/31/17	
G17A003292	23	500	11,500	50LL microdrain	85tot	22	4016	*3FT	CHG811090	10/31/17	11/1/2017
G17A003293	23	500	11,500	50LL microdrain	85tot	23	4006		CHG811090	10/31/17	
G17A003294	23	500	11,500	50LL microdrain	85tot	24	3998		CHG811090	10/31/17	
G17A003295	23	500	11,500	50LL microdrain	85tot	25	4012		CHG811090	10/31/17	
G17A003296	23	500	11,500	50LL microdrain	85tot	26	4006		CHG811090	10/31/17	12/14/2017
G17A003297	23	500	11,500	50LL microdrain	85tot	27	4012		CHG811090	10/31/17	
G17A003298	23	500	11,500	50LL microdrain	85tot	28	4024		CHG811090	11/1/17	
G17A003299	23	500	11,500	50LL microdrain	85tot	29	4032		CHG811090	11/1/17	
G17A003300	23	500	11,500	50LL microdrain	85tot	30	4022		CHG811090	11/1/17	
G17A003301	23	500	11,500	50LL microdrain	85tot	31	3996		CHG811090	11/1/17	
G17A003302	23	500	11,500	50LL microdrain	85tot	32	3904		CHG811090	11/1/17	
G17A003303	23	433	11,500	50LL microdrain	85tot	33	3364		CHG811090	11/1/17	
G17A003305	23	500	11,500	50LL microdrain	85tot	34	3852		CHG811090	11/1/17	12/14/2017
G17A003306	23	500	11,500	50LL microdrain	85tot	35	4012		CHG811090	11/1/17	
G17A003307	23	500	11,500	50LL microdrain	85tot	36	3854		CHG811090	11/2/17	
G17A003308	23	500	11,500	50LL microdrain	85tot	37	3874		CHG811090	11/2/17	
G17A003309	23	500	11,500	50LL microdrain	85tot	38	3840		CHG811090	11/2/17	
G17A003310	23	500	11,500	50LL microdrain	85tot	39	3832		CHG811090	11/2/17	
G17A003311	23	500	11,500	50LL microdrain	85tot	40	3816		CHG811090	11/2/17	
G17A003312	23	500	11,500	50LL microdrain	85tot	41	3825		CHG811090	11/2/17	
G17A003313	23	500	11,500	50LL microdrain	85tot	42	3836		CHG811090	11/2/17	
G17A003314	23	500	11,500	50LL microdrain	85tot	43	3834	*3FT	CHG811090	11/2/17	11/3/2017
G17A003315	23	500	11,500	50LL microdrain	85tot	44	3838		CHG811090	11/2/17	
G17A003316	23	500	11,500	50LL microdrain	85tot	45	3870		CHG811090	11/3/17	
G17A003317	23	500	11,500	50LL microdrain	85tot	46	3850		CHG811090	11/3/17	
G17A003318	23	500	11,500	50LL microdrain	85tot	47	3848		CHG811090	11/3/17	
G17A003319	23	500	11,500	50LL microdrain	85tot	48	3806		CHG811090	11/3/17	
G17A003320	23	500	11,500	50LL microdrain	85tot	49	3758		CHG811090	11/4/17	
G17A003321	23	500	11,500	50LL microdrain	85tot	50	3754		CHG811090	11/4/17	
G17A003322	23	500	11,500	50LL microdrain	85tot	51	3766		CHG811090	11/4/17	
G17A003323	23	500	11,500	50LL microdrain	85tot	52	3772		CHG811090	11/4/17	12/14/2017
G17A003324	23	500	11,500	50LL microdrain	85tot	53	3770		CHG811090	11/4/17	
G17A003325	23	500	11,500	50LL microdrain	85tot	54	3794		CHG811090	11/4/17	
G17A003326	23	500	11,500	50LL microdrain	85tot	55	3790		CHG811090	11/4/17	
G17A003327	23	500	11,500	50LL microdrain	85tot	56	3790		CHG811090	11/4/17	
G17A003328	23	500	11,500	50LL microdrain	85tot	57	3760		CHG811090	11/4/17	
G17A003329	23	500	11,500	50LL microdrain	85tot	58	3758		CHG811090	11/5/17	
G17A003330	23	500	11,500	50LL microdrain	85tot	59	3760		CHG811090	11/5/17	
G17A003331	23	500	11,500	50LL microdrain	85tot	60	3756		CHG811090	11/5/17	
G17A003332	23	500	11,500	50LL microdrain	85tot	61	3778		CHG811090	11/5/17	
G17A003335	23	500	11,500	50LL microdrain	85tot	62	4068		CHG811090	11/5/17	

printed 10/16/17

Printed 10/31/17

Cust: Chesapeake Containment Systems
PO#: 17201 Savannah River Site-Envirocon Sys.
Dest: Aiken, SC

Doc#: 38542

85 rolls 50LL microdrain (500) 977,500 ft²

The conformance frequency is 1/250ksf for both products. Please provide the following sample sizes:
50LL = 3ft X RW for 1st sample & 1ft XRW for remaining samples
Agru cuts and sends. Please ship samples via ground delivery on our UPS Account (# 13E321) and reference "Savannah" on the shipping label

roll #	English width	length	area	check weld rod qty (if ordered)			wgt		resin lot #	Production Date	Sampling Date
	ft.	ft.	ft².				lbs.				
G17A003336	23	500	11,500	50LL microdrain	85tot	63	4050		CHG811090	11/5/17	
G17A003337	23	500	11,500	50LL microdrain	85tot	64	4070	*3FT	CHG811090	11/5/17	11/6/2017
G17A003338	23	500	11,500	50LL microdrain	85tot	65	4058		CHG811090	11/5/17	
G17A003339	23	500	11,500	50LL microdrain	85tot	66	4030		CHG811090	11/5/17	
G17A003340	23	500	11,500	50LL microdrain	85tot	67	4028		CHG811090	11/6/17	
G17A003341	23	500	11,500	50LL microdrain	85tot	68	4075		CHG811090	11/6/17	12/14/2017
G17A003342	23	500	11,500	50LL microdrain	85tot	69	4075		17HB245	11/6/17	
G17A003343	23	500	11,500	50LL microdrain	85tot	70	4056		17HB245	11/6/17	
G17A003345	23	500	11,500	50LL microdrain	85tot	71	4024		17HB245	11/6/17	
G17A003346	23	500	11,500	50LL microdrain	85tot	72	3826		17HB245	11/6/17	
G17A003347	23	500	11,500	50LL microdrain	85tot	73	3816		17HB245	11/6/17	
G17A003348	23	500	11,500	50LL microdrain	85tot	74	3798		17HB245	11/6/17	
G17A003349	23	500	11,500	50LL microdrain	85tot	75	3740		17HB245	11/6/17	
G17A003350	23	500	11,500	50LL microdrain	85tot	76	3785		17HB245	11/6/17	
G17A003351	23	500	11,500	50LL microdrain	85tot	77	3730		17HB245	11/7/17	12/14/2017
G17A003352	23	500	11,500	50LL microdrain	85tot	78	3759		17HB245	11/7/17	
G17A003353	23	500	11,500	50LL microdrain	85tot	79	3764		17HB245	11/7/17	
G17A003354	23	500	11,500	50LL microdrain	85tot	80	3758		17HB245	11/7/17	
G17A003355	23	500	11,500	50LL microdrain	85tot	81	3784		17HB245	11/7/17	
G17A003356	23	500	11,500	50LL microdrain	85tot	82	3728		17HB245	11/7/17	
G17A003357	23	500	11,500	50LL microdrain	85tot	83	3720		17HB245	11/7/17	
G17A003358	23	500	11,500	50LL microdrain	85tot	84	3728		17HB245	11/7/17	
G17A003359	23	475	10,925	50LL microdrain	85tot	85	3684	*3FT	17HB245	11/7/17	11/8/2017

certs sent

976,925
total for order

SECTION 2

Geomembrane Quality Control Certifications

Executive Offices: 500 Garrison Road, Georgetown, SC 29440 • 843 546-0600 • 800 321-1379
Sales Office: 700 Rockmead, Suite 103, Kingwood, TX 77339 • 281 358-4741 • 800 373-2478
Email: salesmkg@agruamerica.com

agru america quality control dept.

quality certificate

ROLL #: G17A003208 **LOT #:** CHE811830 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.63** mm	**64** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.40** mm	**55** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**158** minutes
Asperity ASTM D7466	Average	Top (Drain)			**3.96** mm	**156** mil
		Bottom (Grip)			**.79** mm	**31** mil
Specific Gravity ASTM D792	Average Density					**.932** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.37**
Carbon Black Content ASTM D4218	Range					**2.3** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**26** N/mm	**150** ppi		**2807** psi
		TD	**31** N/mm	**179** ppi		**3288** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**406** %
		TD				**586** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**209.1** N	**47** lbs.
		TD			**191.3** N	**43** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**551.6** N	**124** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/4/2017** OA#: **38542**

Signature: _____

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Quality Control Department

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quality certificate

ROLL #: G17A003209 **LOT #:** CHE811830 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.27** mm	**50** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.57** mm	**62** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.35** mm	**53** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**158** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.17** mm	**164** mil
		Bottom (Grip)			**.76** mm	**30** mil
Specific Gravity ASTM D792	Average Density					**.932** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.37**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**26** N/mm	**150** ppi		**2807** psi
		TD	**31** N/mm	**179** ppi		**3288** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**406** %
		TD				**586** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**209.1** N	**47** lbs.
		TD			**191.3** N	**43** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**551.6** N	**124** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/4/2017** OA#: **38542**

Signature: _____

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ROLL #: G17A003210 **LOT #:** CHE811830 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.57** mm	**62** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.37** mm	**54** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**158** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.17** mm	**164** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.932** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.37**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**26** N/mm	**150** ppi		**2807** psi
		TD	**31** N/mm	**179** ppi		**3288** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**406** %
		TD				**586** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**209.1** N	**47** lbs.
		TD			**191.3** N	**43** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**551.6** N	**124** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/4/2017** OA#: **38542**

Signature:

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ROLL #: G17A003211 **LOT #:** CHE811830 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.27** mm	**50** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.57** mm	**62** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.37** mm	**54** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**158** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.19** mm	**165** mil
		Bottom (Grip)			**.76** mm	**30** mil
Specific Gravity ASTM D792	Average Density					**.932** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.37**
Carbon Black Content ASTM D4218	Range					**2.3** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**46** N/mm		**264** ppi	**5252** psi
		TD	**46** N/mm		**264** ppi	**5095** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**438** %
		TD				**628** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**209.1** N	**47** lbs.
		TD			**191.3** N	**43** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**551.6** N	**124** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/4/2017** OA#: **38542**

Signature:

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ROLL #: G17A003212 **LOT #:** CHE811830 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.47** mm	**58** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.32** mm	**52** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**158** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.06** mm	**160** mil
		Bottom (Grip)			**.79** mm	**31** mil
Specific Gravity ASTM D792	Average Density					**.932** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.37**
Carbon Black Content ASTM D4218	Range					**2.3** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**46** N/mm		**264** ppi	**5252** psi
		TD	**46** N/mm		**264** ppi	**5095** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**438** %
		TD				**628** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**209.1** N	**47** lbs.
		TD			**191.3** N	**43** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**551.6** N	**124** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/5/2017** OA#: **38542**

Signature:

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quality certificate

ROLL #: G17A003213 **LOT #:** CHE811830 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.57** mm	**62** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.40** mm	**55** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**158** minutes
Asperity ASTM D7466	Average	Top (Drain)			**3.96** mm	**156** mil
		Bottom (Grip)			**.84** mm	**33** mil
Specific Gravity ASTM D792	Average Density					**.932** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.37**
Carbon Black Content ASTM D4218	Range					**2.3** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**46** N/mm		**264** ppi	**5252** psi
		TD	**46** N/mm		**264** ppi	**5095** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**438** %
		TD				**628** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**209.1** N	**47** lbs.
		TD			**191.3** N	**43** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**551.6** N	**124** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/5/2017** OA#: **38542**

Signature: _____

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ROLL #: G17A003214 **LOT #:** CHE811830 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.55** mm	**61** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.35** mm	**53** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**158** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.11** mm	**162** mil
		Bottom (Grip)			**.76** mm	**30** mil
Specific Gravity ASTM D792	Average Density					**.932** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.37**
Carbon Black Content ASTM D4218	Range					**2.6** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**46** N/mm		**264** ppi	**5252** psi
		TD	**46** N/mm		**264** ppi	**5095** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**438** %
		TD				**628** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**209.1** N	**47** lbs.
		TD			**191.3** N	**43** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**551.6** N	**124** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/5/2017** OA#: **38542**

Signature: _____

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quality certificate

ROLL #: G17A003215 **LOT #:** CHE811830 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.24** mm	**49** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.45** mm	**57** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.35** mm	**53** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**158** minutes
Asperity ASTM D7466	Average	Top (Drain)			**3.94** mm	**155** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.932** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.37**
Carbon Black Content ASTM D4218	Range					**2.6** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**46** N/mm		**264** ppi	**5252** psi
		TD	**46** N/mm		**264** ppi	**5095** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**438** %
		TD				**628** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**209.1** N	**47** lbs.
		TD			**191.3** N	**43** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**551.6** N	**124** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/5/2017** OA#: **38542**

Signature: _____

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Quality Control Department

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quality certificate

ROLL #: G17A003216 **LOT #:** CHE811830 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.37** mm	**54** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.27** mm	**50** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**158** minutes
Asperity ASTM D7466	Average	Top (Drain)			**3.96** mm	**156** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.932** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.37**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**46** N/mm		**263** ppi	**5035** psi
		TD	**50** N/mm		**288** ppi	**5454** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**436** %
		TD				**698** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**249.1** N	**56** lbs.
		TD			**249.1** N	**56** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**556.0** N	**125** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/5/2017** OA#: **38542**

Signature: _____

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Quality Control Department

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quality certificate

ROLL #: G17A003217 **LOT #:** CHE811830 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.24** mm	**49** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.50** mm	**59** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.35** mm	**53** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**158** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.14** mm	**163** mil
		Bottom (Grip)			**.66** mm	**26** mil
Specific Gravity ASTM D792	Average Density					**.932** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.37**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**46** N/mm		**263** ppi	**5035** psi
		TD	**50** N/mm		**288** ppi	**5454** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**436** %
		TD				**698** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		**249.1** N		**56** lbs.
		TD		**249.1** N		**56** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			**556.0** N		**125** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/5/2017** OA#: **38542**

Signature: _____

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ROLL #: G17A003218 **LOT #:** CHE811830 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.50** mm	**59** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.32** mm	**52** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**158** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.14** mm	**163** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.932** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.37**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**46** N/mm		**263** ppi	**5035** psi
		TD	**50** N/mm		**288** ppi	**5454** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**436** %
		TD				**698** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		**249.1** N		**56** lbs.
		TD		**249.1** N		**56** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			**556.0** N		**125** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/6/2017** OA#: **38542**

Signature: _____

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quality certificate

ROLL #: G17A003219 **LOT #:** CHE811830 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.28** mm	**50** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.56** mm	**61** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.40** mm	**55** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**158** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.11** mm	**162** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.932** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.37**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**46** N/mm		**263** ppi	**5035** psi
		TD	**50** N/mm		**288** ppi	**5454** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**436** %
		TD				**698** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**249.1** N	**56** lbs.
		TD			**249.1** N	**56** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**556.0** N	**125** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/6/2017** OA#: **38542**

Signature: _____

Maria Coffey
Quality Control Department

agru america quality control dept.

quality certificate

ROLL #: G17A003283 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.45** mm	**57** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**3.84** mm	**151** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.5** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**35** N/mm		**202** ppi	**3914** psi
		TD	**37** N/mm		**210** ppi	**4132** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**430** %
		TD				**648** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**293.6** N	**66** lbs.
		TD			**298.0** N	**67** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**511.5** N	**115** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/30/2017** OA#: **38542**

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ROLL #: G17A003284 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.42** mm	**56** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.06** mm	**160** mil
		Bottom (Grip)			**.89** mm	**35** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.5** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**35** N/mm		**202** ppi	**3914** psi
		TD	**37** N/mm		**210** ppi	**4132** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**430** %
		TD				**648** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**293.6** N	**66** lbs.
		TD			**298.0** N	**67** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**511.5** N	**115** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/30/2017** OA#: **38542**

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ROLL #: G17A003285 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.24** mm	**49** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.50** mm	**59** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.32** mm	**52** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.14** mm	**163** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.5** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**35** N/mm		**202** ppi	**3914** psi
		TD	**37** N/mm		**210** ppi	**4132** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**430** %
		TD				**648** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**293.6** N	**66** lbs.
		TD			**298.0** N	**67** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**511.5** N	**115** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/30/2017** OA#: **38542**

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ROLL #: G17A003286 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.27** mm	**50** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.35** mm	**53** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.04** mm	**159** mil
		Bottom (Grip)			**.91** mm	**36** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.3** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**35** N/mm		**202** ppi	**3914** psi
		TD	**37** N/mm		**210** ppi	**4132** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**430** %
		TD				**648** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**293.6** N	**66** lbs.
		TD			**298.0** N	**67** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**511.5** N	**115** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/30/2017** OA#: **38542**

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ROLL #: G17A003287 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.17** mm	**46** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.35** mm	**53** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.27** mm	**50** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**3.89** mm	**153** mil
		Bottom (Grip)			**.76** mm	**30** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.3** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**35** N/mm		**202** ppi	**3914** psi
		TD	**37** N/mm		**210** ppi	**4132** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**430** %
		TD				**648** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**293.6** N	**66** lbs.
		TD			**298.0** N	**67** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**511.5** N	**115** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/30/2017** OA#: **38542**

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ROLL #: G17A003288 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.24** mm	**49** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.37** mm	**54** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**3.91** mm	**154** mil
		Bottom (Grip)			**.74** mm	**29** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.3** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**38** N/mm		**218** ppi	**4371** psi
		TD	**37** N/mm		**213** ppi	**4205** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**384** %
		TD				**600** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**293.6** N	**66** lbs.
		TD			**293.6** N	**66** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**507.1** N	**114** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/30/2017** OA#: **38542**

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ROLL #: G17A003289 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.17** mm	**46** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.52** mm	**60** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.32** mm	**52** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.22** mm	**166** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.3** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**38** N/mm		**218** ppi	**4371** psi
		TD	**37** N/mm		**213** ppi	**4205** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**384** %
		TD				**600** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**293.6** N	**66** lbs.
		TD			**293.6** N	**66** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**507.1** N	**114** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/30/2017** OA#: **38542**

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ROLL #: G17A003290 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.27** mm	**50** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.45** mm	**57** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.35** mm	**53** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.17** mm	**164** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.3** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**38** N/mm		**218** ppi	**4371** psi
		TD	**37** N/mm		**213** ppi	**4205** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**384** %
		TD				**600** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**293.6** N	**66** lbs.
		TD			**293.6** N	**66** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**507.1** N	**114** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/31/2017** OA#: **38542**

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ROLL #: G17A003291 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.40** mm	**55** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.09** mm	**161** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.3** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**38** N/mm		**218** ppi	**4371** psi
		TD	**37** N/mm		**213** ppi	**4205** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**384** %
		TD				**600** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**293.6** N	**66** lbs.
		TD			**293.6** N	**66** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**507.1** N	**114** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/31/2017** OA#: **38542**

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ROLL #: G17A003292 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.45** mm	**57** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.17** mm	**164** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.3** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**38** N/mm		**218** ppi	**4371** psi
		TD	**37** N/mm		**213** ppi	**4205** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**384** %
		TD				**600** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**293.6** N	**66** lbs.
		TD			**293.6** N	**66** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**507.1** N	**114** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/31/2017** OA#: **38542**

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ROLL #: G17A003293 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.40** mm	**55** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.11** mm	**162** mil
		Bottom (Grip)			**.84** mm	**33** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**37** N/mm		**214** ppi	**4231** psi
		TD	**33** N/mm		**190** ppi	**3757** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**566** %
		TD				**441** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**293.6** N	**66** lbs.
		TD			**293.6** N	**66** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**507.1** N	**114** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/31/2017** OA#: **38542**

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ROLL #: G17A003294 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.40** mm	**55** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.09** mm	**161** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**37** N/mm		**214** ppi	**4231** psi
		TD	**33** N/mm		**190** ppi	**3757** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**566** %
		TD				**441** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**293.6** N	**66** lbs.
		TD			**293.6** N	**66** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**507.1** N	**114** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/31/2017** OA#: **38542**

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ROLL #: G17A003295 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.24** mm	**49** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.57** mm	**62** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.37** mm	**54** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.09** mm	**161** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**37** N/mm		**214** ppi	**4231** psi
		TD	**33** N/mm		**190** ppi	**3757** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**566** %
		TD				**441** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**293.6** N	**66** lbs.
		TD			**293.6** N	**66** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**507.1** N	**114** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/31/2017** OA#: **38542**

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ROLL #: G17A003296 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.27** mm	**50** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.55** mm	**61** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.40** mm	**55** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.09** mm	**161** mil
		Bottom (Grip)			**.89** mm	**35** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**37** N/mm		**214** ppi	**4231** psi
		TD	**33** N/mm		**190** ppi	**3757** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**566** %
		TD				**441** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**293.6** N	**66** lbs.
		TD			**293.6** N	**66** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**507.1** N	**114** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/31/2017** OA#: **38542**

Signature:

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ROLL #: G17A003297 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.27** mm	**50** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.55** mm	**61** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.40** mm	**55** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.09** mm	**161** mil
		Bottom (Grip)			**.89** mm	**35** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**37** N/mm		**214** ppi	**4231** psi
		TD	**33** N/mm		**190** ppi	**3757** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**566** %
		TD				**441** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**293.6** N	**66** lbs.
		TD			**293.6** N	**66** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**507.1** N	**114** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/31/2017** OA#: **38542**

Signature: _____

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ROLL #: G17A003298 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.52** mm	**60** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.32** mm	**52** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.22** mm	**166** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.6** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**38** N/mm		**218** ppi	**4129** psi
		TD	**39** N/mm		**222** ppi	**3991** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**405** %
		TD				**634** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**258.0** N	**58** lbs.
		TD			**266.9** N	**60** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**582.7** N	**131** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/31/2017** OA#: **38542**

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ROLL #: G17A003299 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.24** mm	**49** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.52** mm	**60** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.32** mm	**52** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.17** mm	**164** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.6** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**38** N/mm		**218** ppi	**4129** psi
		TD	**39** N/mm		**222** ppi	**3991** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**405** %
		TD				**634** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**258.0** N	**58** lbs.
		TD			**266.9** N	**60** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**582.7** N	**131** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **10/31/2017** OA#: **38542**

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ROLL #: G17A003300 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.47** mm	**58** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.27** mm	**168** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.6** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**38** N/mm		**218** ppi	**4129** psi
		TD	**39** N/mm		**222** ppi	**3991** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**405** %
		TD				**634** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**258.0** N	**58** lbs.
		TD			**266.9** N	**60** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**582.7** N	**131** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/1/2017** OA#: **38542**

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ROLL #: G17A003301 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.50** mm	**59** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.32** mm	**52** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.17** mm	**164** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.7** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**38** N/mm		**218** ppi	**4129** psi
		TD	**39** N/mm		**222** ppi	**3991** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**405** %
		TD				**634** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**258.0** N	**58** lbs.
		TD			**266.9** N	**60** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**582.7** N	**131** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/1/2017** OA#: **38542**

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ROLL #: G17A003302 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.55** mm	**61** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.32** mm	**52** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.09** mm	**161** mil
		Bottom (Grip)			**.79** mm	**31** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.7** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**38** N/mm		**218** ppi	**4129** psi
		TD	**39** N/mm		**222** ppi	**3991** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**405** %
		TD				**634** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**258.0** N	**58** lbs.
		TD			**266.9** N	**60** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**582.7** N	**131** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/1/2017** OA#: **38542**

Signature:

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ROLL #: G17A003303 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.40** mm	**55** mil	Length:	**131.980** m	**433** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.06** mm	**160** mil
		Bottom (Grip)			**.84** mm	**33** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.0** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**36** N/mm		**207** ppi	**4016** psi
		TD	**38** N/mm		**218** ppi	**4233** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**458** %
		TD				**658** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**258.0** N	**58** lbs.
		TD			**266.9** N	**60** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**582.7** N	**131** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/1/2017** OA#: **38542**

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ROLL #: G17A003305 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.14** mm	**45** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.45** mm	**57** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.27** mm	**50** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.06** mm	**160** mil
		Bottom (Grip)			**.79** mm	**31** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.0** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**36** N/mm		**207** ppi	**4016** psi
		TD	**38** N/mm		**218** ppi	**4233** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**458** %
		TD				**658** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**258.0** N	**58** lbs.
		TD			**266.9** N	**60** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**582.7** N	**131** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/1/2017** OA#: **38542**

Signature:

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ROLL #: G17A003306 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.45** mm	**57** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.01** mm	**158** mil
		Bottom (Grip)			**.84** mm	**33** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.0** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**36** N/mm		**207** ppi	**4016** psi
		TD	**38** N/mm		**218** ppi	**4233** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**458** %
		TD				**658** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**258.0** N	**58** lbs.
		TD			**266.9** N	**60** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**582.7** N	**131** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/1/2017** OA#: **38542**

Signature: _____

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ROLL #: G17A003307 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.14** mm	**45** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.47** mm	**58** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.27** mm	**50** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.06** mm	**160** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.0** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**36** N/mm		**207** ppi	**4016** psi
		TD	**38** N/mm		**218** ppi	**4233** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**458** %
		TD				**658** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		**258.0** N		**58** lbs.
		TD		**266.9** N		**60** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			**582.7** N		**131** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/2/2017** OA#: **38542**

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ROLL #: G17A003308 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.09** mm	**43** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.47** mm	**58** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.27** mm	**50** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.01** mm	**158** mil
		Bottom (Grip)			**.91** mm	**36** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.0** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**36** N/mm		**207** ppi	**4016** psi
		TD	**38** N/mm		**218** ppi	**4233** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**458** %
		TD				**658** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**258.0** N	**58** lbs.
		TD			**266.9** N	**60** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**582.7** N	**131** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/2/2017** OA#: **38542**

Signature:

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ROLL #: G17A003309 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.42** mm	**56** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.27** mm	**50** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.22** mm	**166** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.5** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**33** N/mm		**186** ppi	**3617** psi
		TD	**36** N/mm		**206** ppi	**4064** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**380** %
		TD				**624** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**226.8** N	**51** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**538.2** N	**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/2/2017** OA#: **38542**

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ROLL #: G17A003310 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.40** mm	**55** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.19** mm	**165** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.5** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**33** N/mm		**186** ppi	**3617** psi
		TD	**36** N/mm		**206** ppi	**4064** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**380** %
		TD				**624** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**226.8** N	**51** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**538.2** N	**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/2/2017** OA#: **38542**

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ROLL #: G17A003311 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.47** mm	**58** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**3.96** mm	**156** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.5** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**33** N/mm		**186** ppi	**3617** psi
		TD	**36** N/mm		**206** ppi	**4064** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**380** %
		TD				**624** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**226.8** N	**51** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**538.2** N	**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/2/2017** OA#: **38542**

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ROLL #: G17A003312 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.24** mm	**49** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.45** mm	**57** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.14** mm	**163** mil
		Bottom (Grip)			**.76** mm	**30** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.5** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**33** N/mm		**186** ppi	**3617** psi
		TD	**36** N/mm		**206** ppi	**4064** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**380** %
		TD				**624** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**226.8** N	**51** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**538.2** N	**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/2/2017** OA#: **38542**

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ROLL #: G17A003313 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.52** mm	**60** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.37** mm	**54** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.11** mm	**162** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.6** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**33** N/mm		**186** ppi	**3617** psi
		TD	**36** N/mm		**206** ppi	**4064** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**380** %
		TD				**624** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**226.8** N	**51** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**538.2** N	**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/2/2017** OA#: **38542**

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ROLL #: G17A003314 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.32** mm	**52** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.27** mm	**50** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**3.99** mm	**157** mil
		Bottom (Grip)			**.84** mm	**33** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.7** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**46** N/mm		**261** ppi	**5204** psi
		TD	**47** N/mm		**270** ppi	**5406** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**516** %
		TD				**615** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		**235.7** N		**53** lbs.
		TD		**226.8** N		**51** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			**538.2** N		**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/2/2017** OA#: **38542**

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ROLL #: G17A003315 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.14** mm	**45** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.42** mm	**56** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.24** mm	**49** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**3.91** mm	**154** mil
		Bottom (Grip)			**.71** mm	**28** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.7** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**46** N/mm		**261** ppi	**5204** psi
		TD	**47** N/mm		**270** ppi	**5406** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**516** %
		TD				**615** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**226.8** N	**51** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**538.2** N	**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/2/2017** OA#: **38542**

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ROLL #: G17A003316 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.17** mm	**46** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.40** mm	**55** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.01** mm	**158** mil
		Bottom (Grip)			**.84** mm	**33** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.7** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**46** N/mm		**261** ppi	**5204** psi
		TD	**47** N/mm		**270** ppi	**5406** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**516** %
		TD				**615** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		**235.7** N		**53** lbs.
		TD		**226.8** N		**51** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			**538.2** N		**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/3/2017** OA#: **38542**

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ROLL #: G17A003317 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.17** mm	**46** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.45** mm	**57** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.27** mm	**50** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.09** mm	**161** mil
		Bottom (Grip)			**.74** mm	**29** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**46** N/mm		**261** ppi	**5204** psi
		TD	**47** N/mm		**270** ppi	**5406** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**516** %
		TD				**615** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**226.8** N	**51** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**538.2** N	**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/3/2017** OA#: **38542**

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ROLL #: G17A003318 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.37** mm	**54** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.09** mm	**161** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**46** N/mm	**261** ppi		**5204** psi
		TD	**47** N/mm	**270** ppi		**5406** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**516** %
		TD				**615** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**226.8** N	**51** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**538.2** N	**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/3/2017** OA#: **38542**

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ROLL #: G17A003319 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.35** mm	**53** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.11** mm	**162** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.2** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**30** N/mm		**172** ppi	**2846** psi
		TD	**32** N/mm		**181** ppi	**3577** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**529** %
		TD				**379** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**249.1** N	**56** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**573.8** N	**129** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/3/2017** OA#: **38542**

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ROLL #: G17A003320 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.45** mm	**57** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.24** mm	**167** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.2** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**30** N/mm		**172** ppi	**2846** psi
		TD	**32** N/mm		**181** ppi	**3577** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**529** %
		TD				**379** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**249.1** N	**56** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**573.8** N	**129** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/3/2017** OA#: **38542**

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ROLL #: G17A003321 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.42** mm	**56** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**3.94** mm	**155** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.2** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**30** N/mm		**172** ppi	**2846** psi
		TD	**32** N/mm		**181** ppi	**3577** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**529** %
		TD				**379** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**249.1** N	**56** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**573.8** N	**129** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/3/2017** OA#: **38542**

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ROLL #: G17A003322 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.09** mm	**43** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.30** mm	**51** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.24** mm	**49** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**3.94** mm	**155** mil
		Bottom (Grip)			**.84** mm	**33** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.7** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**30** N/mm		**172** ppi	**2846** psi
		TD	**32** N/mm		**181** ppi	**3577** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**529** %
		TD				**379** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**249.1** N	**56** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**573.8** N	**129** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/3/2017** OA#: **38542**

Signature: _____

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ROLL #: G17A003323 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.45** mm	**57** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.09** mm	**161** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.7** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**30** N/mm		**172** ppi	**2846** psi
		TD	**32** N/mm		**181** ppi	**3577** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**529** %
		TD				**379** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**249.1** N	**56** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**573.8** N	**129** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/3/2017** OA#: **38542**

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ROLL #: G17A003324 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.12** mm	**44** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.40** mm	**55** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.22** mm	**48** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.14** mm	**163** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.7** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**35** N/mm		**202** ppi	**4077** psi
		TD	**36** N/mm		**208** ppi	**4209** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**634** %
		TD				**503** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**249.1** N	**56** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**573.8** N	**129** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/3/2017** OA#: **38542**

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ROLL #: G17A003325 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.17** mm	**46** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.37** mm	**54** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.27** mm	**50** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**3.99** mm	**157** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.7** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**35** N/mm		**202** ppi	**4077** psi
		TD	**36** N/mm		**208** ppi	**4209** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**634** %
		TD				**503** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**249.1** N	**56** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**573.8** N	**129** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/4/2017** OA#: **38542**

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ROLL #: G17A003326 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.24** mm	**49** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.40** mm	**55** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.17** mm	**164** mil
		Bottom (Grip)			**.84** mm	**33** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.7** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**35** N/mm		**202** ppi	**4077** psi
		TD	**36** N/mm		**208** ppi	**4209** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**634** %
		TD				**503** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**249.1** N	**56** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**573.8** N	**129** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/4/2017** OA#: **38542**

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ROLL #: G17A003327 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.47** mm	**58** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.01** mm	**158** mil
		Bottom (Grip)			**.84** mm	**33** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.7** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**35** N/mm		**202** ppi	**4077** psi
		TD	**36** N/mm		**208** ppi	**4209** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**634** %
		TD				**503** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**249.1** N	**56** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**573.8** N	**129** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/4/2017** OA#: **38542**

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ROLL #: G17A003328 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.45** mm	**57** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.27** mm	**50** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.24** mm	**167** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.7** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**35** N/mm		**202** ppi	**4077** psi
		TD	**36** N/mm		**208** ppi	**4209** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**634** %
		TD				**503** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**235.7** N	**53** lbs.
		TD			**249.1** N	**56** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**573.8** N	**129** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/4/2017** OA#: **38542**

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ROLL #: G17A003329 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.24** mm	**49** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.37** mm	**54** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.27** mm	**50** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.11** mm	**162** mil
		Bottom (Grip)			**.89** mm	**35** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.6** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**36** N/mm		**204** ppi	**4013** psi
		TD	**36** N/mm		**204** ppi	**3992** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**475** %
		TD				**634** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		**231.3** N		**52** lbs.
		TD		**213.5** N		**48** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			**538.2** N		**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/4/2017** OA#: **38542**

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ROLL #: G17A003330 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.37** mm	**54** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.27** mm	**50** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.09** mm	**161** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.6** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**36** N/mm		**204** ppi	**4013** psi
		TD	**36** N/mm		**204** ppi	**3992** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**475** %
		TD				**634** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**231.3** N	**52** lbs.
		TD			**213.5** N	**48** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**538.2** N	**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/4/2017** OA#: **38542**

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ROLL #: G17A003331 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.12** mm	**44** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.42** mm	**56** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.27** mm	**50** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**3.96** mm	**156** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.6** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**36** N/mm		**204** ppi	**4013** psi
		TD	**36** N/mm		**204** ppi	**3992** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**475** %
		TD				**634** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		**231.3** N		**52** lbs.
		TD		**213.5** N		**48** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			**538.2** N		**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/4/2017** OA#: **38542**

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ROLL #: G17A003332 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.09** mm	**43** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.50** mm	**59** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.22** mm	**48** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.14** mm	**163** mil
		Bottom (Grip)			**.89** mm	**35** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.6** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**36** N/mm		**204** ppi	**4013** psi
		TD	**36** N/mm		**204** ppi	**3992** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**475** %
		TD				**634** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD		**231.3** N		**52** lbs.
		TD		**213.5** N		**48** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load			**538.2** N		**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/4/2017** OA#: **38542**

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ROLL #: G17A003335 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.27** mm	**50** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.60** mm	**63** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.40** mm	**55** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.22** mm	**166** mil
		Bottom (Grip)			**.89** mm	**35** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.5** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**39** N/mm		**223** ppi	**4333** psi
		TD	**41** N/mm		**233** ppi	**4357** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**466** %
		TD				**674** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**231.3** N	**52** lbs.
		TD			**213.5** N	**48** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**538.2** N	**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/5/2017** OA#: **38542**

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ROLL #: G17A003336 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.30** mm	**51** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.60** mm	**63** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.40** mm	**55** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.19** mm	**165** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.5** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**39** N/mm		**223** ppi	**4333** psi
		TD	**41** N/mm		**233** ppi	**4357** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**466** %
		TD				**674** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**231.3** N	**52** lbs.
		TD			**213.5** N	**48** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**538.2** N	**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/5/2017** OA#: **38542**

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ROLL #: G17A003337 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.47** mm	**58** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.32** mm	**52** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.11** mm	**162** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.5** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**39** N/mm		**223** ppi	**4333** psi
		TD	**41** N/mm		**233** ppi	**4357** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**466** %
		TD				**674** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**231.3** N	**52** lbs.
		TD			**213.5** N	**48** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**538.2** N	**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/5/2017** OA#: **38542**

Signature: _____

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ROLL #: G17A003338 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.55** mm	**61** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.37** mm	**54** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.01** mm	**158** mil
		Bottom (Grip)			**.89** mm	**35** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.5** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**39** N/mm		**223** ppi	**4333** psi
		TD	**41** N/mm		**233** ppi	**4357** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**466** %
		TD				**674** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**231.3** N	**52** lbs.
		TD			**213.5** N	**48** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**538.2** N	**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/5/2017** OA#: **38542**

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ROLL #: G17A003339 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.55** mm	**61** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.32** mm	**52** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.04** mm	**159** mil
		Bottom (Grip)			**.84** mm	**33** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.5** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**39** N/mm		**223** ppi	**4333** psi
		TD	**41** N/mm		**233** ppi	**4357** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**466** %
		TD				**674** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**231.3** N	**52** lbs.
		TD			**213.5** N	**48** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**538.2** N	**121** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

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ROLL #: G17A003340 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.19** mm	**47** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.57** mm	**62** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.37** mm	**54** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**3.89** mm	**153** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**35** N/mm		**200** ppi	**3926** psi
		TD	**38** N/mm		**219** ppi	**4101** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**427** %
		TD				**650** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**280.2** N	**63** lbs.
		TD			**253.5** N	**57** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**467.0** N	**105** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/5/2017** OA#: **38542**

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ROLL #: G17A003341 **LOT #:** CHG811090 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.24** mm	**49** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.52** mm	**60** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.32** mm	**52** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**155** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.14** mm	**163** mil
		Bottom (Grip)			**.79** mm	**31** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **7104**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**35** N/mm		**200** ppi	**3926** psi
		TD	**38** N/mm		**219** ppi	**4101** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**427** %
		TD				**650** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**280.2** N	**63** lbs.
		TD			**253.5** N	**57** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**467.0** N	**105** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/5/2017** OA#: **38542**

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ROLL #: G17A003342 **LOT #:** 17HB245 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.55** mm	**61** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.32** mm	**52** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**221** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.11** mm	**162** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **L91507H**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**35** N/mm		**200** ppi	**3926** psi
		TD	**38** N/mm		**219** ppi	**4101** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**427** %
		TD				**650** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**280.2** N	**63** lbs.
		TD			**253.5** N	**57** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**467.0** N	**105** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/5/2017** OA#: **38542**

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ROLL #: G17A003343 **LOT #:** 17HB245 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.24** mm	**49** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.60** mm	**63** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.37** mm	**54** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**221** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.11** mm	**162** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **L91507H**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.3** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**35** N/mm		**200** ppi	**3926** psi
		TD	**38** N/mm		**219** ppi	**4101** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**427** %
		TD				**650** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**280.2** N	**63** lbs.
		TD			**253.5** N	**57** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**467.0** N	**105** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/6/2017** OA#: **38542**

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ROLL #: G17A003345 **LOT #:** 17HB245 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.22** mm	**48** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.63** mm	**64** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.35** mm	**53** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**221** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.22** mm	**166** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **L91507H**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**38** N/mm	**216** ppi		**3889** psi
		TD	**35** N/mm	**199** ppi		**3539** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**396** %
		TD				**547** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**253.5** N	**57** lbs.
		TD			**253.5** N	**57** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**467.0** N	**105** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/6/2017** OA#: **38542**

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ROLL #: G17A003346 **LOT #:** 17HB245 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.12 mm	44 mil	Thickness:	1.27 mm	50 mil
	MAX:	1.52 mm	60 mil	Length:	152.402 m	500 feet
	AVE:	1.32 mm	52 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						221 minutes
Asperity ASTM D7466	Average	Top (Drain)			4.19 mm	165 mil
		Bottom (Grip)			.89 mm	35 mil
Specific Gravity ASTM D792	Average Density					.934 g/cc
MFI ASTM D1238 COND. E Grade: **L91507H**	Melt Flow Index 190C/2160 g - g/10 min					.35
Carbon Black Content ASTM D4218	Range					2.4 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	38 N/mm	216 ppi		3889 psi
		TD	35 N/mm	199 ppi		3539 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				396 %
		TD				547 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			253.5 N	57 lbs.
		TD			253.5 N	57 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				467.0 N	105 lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/6/2017** OA#: **38542**

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ROLL #: G17A003347 **LOT #:** 17HB245 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.12** mm	**44** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.47** mm	**58** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.24** mm	**49** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**221** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.09** mm	**161** mil
		Bottom (Grip)			**.91** mm	**36** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **L91507H**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.4** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**38** N/mm		**216** ppi	**3889** psi
		TD	**35** N/mm		**199** ppi	**3539** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**396** %
		TD				**547** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**253.5** N	**57** lbs.
		TD			**253.5** N	**57** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**467.0** N	**105** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/6/2017** OA#: **38542**

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ROLL #: G17A003348 **LOT #:** 17HB245 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.17** mm	**46** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.47** mm	**58** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.30** mm	**51** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**221** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.11** mm	**162** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **L91507H**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.6** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**38** N/mm		**216** ppi	**3889** psi
		TD	**35** N/mm		**199** ppi	**3539** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**396** %
		TD				**547** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**253.5** N	**57** lbs.
		TD			**253.5** N	**57** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**467.0** N	**105** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/6/2017** OA#: **38542**

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ROLL #: G17A003349 **LOT #:** 17HB245 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.09** mm	**43** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.52** mm	**60** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.24** mm	**49** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**221** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.11** mm	**162** mil
		Bottom (Grip)			**.89** mm	**35** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **L91507H**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.6** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**38** N/mm		**216** ppi	**3889** psi
		TD	**35** N/mm		**199** ppi	**3539** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**396** %
		TD				**547** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**253.5** N	**57** lbs.
		TD			**253.5** N	**57** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**467.0** N	**105** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/6/2017** OA#: **38542**

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ROLL #: G17A003350 **LOT #:** 17HB245 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.09** mm	**43** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.52** mm	**60** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.24** mm	**49** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**221** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.24** mm	**167** mil
		Bottom (Grip)			**.84** mm	**33** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **L91507H**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.6** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**31** N/mm		**179** ppi	**3642** psi
		TD	**37** N/mm		**210** ppi	**4157** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**386** %
		TD				**659** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**222.4** N	**50** lbs.
		TD			**240.2** N	**54** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**475.9** N	**107** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/6/2017** OA#: **38542**

Signature:

Maria Coffey
Quality Control Department

agru america quality control dept.

quality certificate

ROLL #: G17A003351 **LOT #:** 17HB245 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.14** mm	**45** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.50** mm	**59** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.24** mm	**49** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**221** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.11** mm	**162** mil
		Bottom (Grip)			**.84** mm	**33** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **L91507H**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.6** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**31** N/mm	**179** ppi		**3642** psi
		TD	**37** N/mm	**210** ppi		**4157** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**386** %
		TD				**659** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**222.4** N	**50** lbs.
		TD			**240.2** N	**54** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**475.9** N	**107** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/6/2017** OA#: **38542**

Signature: _____

Maria Coffey
Quality Control Department

agru america quality control dept.

quality certificate

ROLL #: G17A003352 **LOT #:** 17HB245 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.09** mm	**43** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.45** mm	**57** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.27** mm	**50** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**221** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.06** mm	**160** mil
		Bottom (Grip)			**.84** mm	**33** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **L91507H**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.6** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**31** N/mm	**179** ppi		**3642** psi
		TD	**37** N/mm	**210** ppi		**4157** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**386** %
		TD				**659** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**222.4** N	**50** lbs.
		TD			**240.2** N	**54** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**475.9** N	**107** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/7/2017** OA#: **38542**

Signature: _____

Maria Coffey
Quality Control Department

agru america quality control dept.

quality certificate

ROLL #: G17A003353 **LOT #:** 17HB245 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.12** mm	**44** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.50** mm	**59** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.22** mm	**48** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**221** minutes
Asperity ASTM D7466	Average	Top (Drain)			**3.76** mm	**148** mil
		Bottom (Grip)			**.81** mm	**32** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **L91507H**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.7** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**31** N/mm		**179** ppi	**3642** psi
		TD	**37** N/mm		**210** ppi	**4157** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**386** %
		TD				**659** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**222.4** N	**50** lbs.
		TD			**240.2** N	**54** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**475.9** N	**107** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/7/2017** OA#: **38542**

Signature: _____

Maria Coffey
Quality Control Department

agru america quality control dept.

quality certificate

ROLL #: G17A003354 **LOT #:** 17HB245 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.09** mm	**43** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.52** mm	**60** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.22** mm	**48** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**221** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.19** mm	**165** mil
		Bottom (Grip)			**.86** mm	**34** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **L91507H**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.7** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**31** N/mm	**179** ppi		**3642** psi
		TD	**37** N/mm	**210** ppi		**4157** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**386** %
		TD				**659** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**222.4** N	**50** lbs.
		TD			**240.2** N	**54** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**475.9** N	**107** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/7/2017** OA#: **38542**

Signature: _____

Maria Coffey
Quality Control Department

agru america quality control dept.

quality certificate

ROLL #: G17A003355 **LOT #:** 17HB245 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	1.09 mm	43 mil	Thickness:	1.27 mm	50 mil
	MAX:	1.50 mm	59 mil	Length:	152.402 m	500 feet
	AVE:	1.22 mm	48 mil	Width:	7.01 m	23 feet
OIT(Standard) ASTM D 3895						221 minutes
Asperity ASTM D7466	Average	Top (Drain)			4.04 mm	159 mil
		Bottom (Grip)			.86 mm	34 mil
Specific Gravity ASTM D792	Average Density					.934 g/cc
MFI ASTM D1238 COND. E Grade: **L91507H**	Melt Flow Index 190C/2160 g - g/10 min					.35
Carbon Black Content ASTM D4218	Range					2.3 %
Carbon Black Dispersion ASTM D5596	Category					10 in Category 1
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	29 N/mm		168 ppi	3615 psi
		TD	30 N/mm		173 ppi	3652 psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				506 %
		TD				425 %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			222.4 N	50 lbs.
		TD			240.2 N	54 lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				475.9 N	107 lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/7/2017** OA#: **38542**

Signature: _____

Maria Coffey
Quality Control Department

agru america quality control dept.

quality certificate

ROLL #: G17A003356 **LOT #:** 17HB245 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.12** mm	**44** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.60** mm	**63** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.24** mm	**49** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**221** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.09** mm	**161** mil
		Bottom (Grip)			**.89** mm	**35** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **L91507H**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.3** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**29** N/mm	**168** ppi		**3615** psi
		TD	**30** N/mm	**173** ppi		**3652** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**506** %
		TD				**425** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**222.4** N	**50** lbs.
		TD			**240.2** N	**54** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**475.9** N	**107** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/7/2017** OA#: **38542**

Signature: _____

Maria Coffey
Quality Control Department

agru america quality control dept.

quality certificate

ROLL #: G17A003357 **LOT #:** 17HB245 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.14** mm	**45** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.52** mm	**60** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.24** mm	**49** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**221** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.11** mm	**162** mil
		Bottom (Grip)			**.89** mm	**35** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **L91507H**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.3** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**29** N/mm	**168** ppi		**3615** psi
		TD	**30** N/mm	**173** ppi		**3652** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**506** %
		TD				**425** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**222.4** N	**50** lbs.
		TD			**240.2** N	**54** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**475.9** N	**107** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/7/2017** OA#: **38542**

Signature: _____

Maria Coffey
Quality Control Department

agru america quality control dept.

quality certificate

ROLL #: G17A003358 **LOT #:** 17HB245 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.09** mm	**43** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.42** mm	**56** mil	Length:	**152.402** m	**500** feet
	AVE:	**1.22** mm	**48** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**221** minutes
Asperity ASTM D7466	Average	Top (Drain)			**4.17** mm	**164** mil
		Bottom (Grip)			**.84** mm	**33** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **L91507H**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.5** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**29** N/mm		**168** ppi	**3615** psi
		TD	**30** N/mm		**173** ppi	**3652** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**506** %
		TD				**425** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**222.4** N	**50** lbs.
		TD			**240.2** N	**54** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**475.9** N	**107** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/7/2017** OA#: **38542**

Signature: _____

Maria Coffey
Quality Control Department

agru america quality control dept.

quality certificate

ROLL #: G17A003359 **LOT #:** 17HB245 **LINER TYPE:** 50 LL MICRO DRAIN

		METRIC	ENGLISH		METRIC	ENGLISH
Thickness Measurement ASTM D5994 (Modified)	MIN:	**1.09** mm	**43** mil	Thickness:	**1.27** mm	**50** mil
	MAX:	**1.47** mm	**58** mil	Length:	**144.782** m	**475** feet
	AVE:	**1.22** mm	**48** mil	Width:	**7.01** m	**23** feet
OIT(Standard) ASTM D 3895						**221** minutes
Asperity ASTM D7466	Average	Top (Drain)			**3.96** mm	**156** mil
		Bottom (Grip)			**.84** mm	**33** mil
Specific Gravity ASTM D792	Average Density					**.934** g/cc
MFI ASTM D1238 COND. E Grade: **L91507H**	Melt Flow Index 190C/2160 g - g/10 min					**.35**
Carbon Black Content ASTM D4218	Range					**2.5** %
Carbon Black Dispersion ASTM D5596	Category					**10 in Category 1**
Tensile Strength ASTM D6693 (2 inches / minute)	Average Strength @ Break	MD	**29** N/mm		**168** ppi	**3615** psi
		TD	**30** N/mm		**173** ppi	**3652** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @Break	MD				**506** %
		TD				**425** %
Tear Resistance ASTM D1004 (Modified)	Average Tear Resistance	MD			**222.4** N	**50** lbs.
		TD			**240.2** N	**54** lbs.
Puncture Resistance ASTM D4833 (Modified)	Average Peak Load				**475.9** N	**107** lbs.

Customer: Chesapeake Containment Systems
PO: 17201 Savannah River Site-Envirocon Sys.
Destination: Aiken, SC

Production Date: **11/7/2017** OA#: **38542**

Signature: _____

Maria Coffey
Quality Control Department

Chevron Phillips Chemical Company LP

Yingying Lu, Ph.D., Geomembrane Technical Service & Applications Development
Highways 60 & 123, Bartlesville Research and Technology Center, Room 149 PTC
Bartlesville, OK 74003
■ *918-977-6894* ■ *luyy@cpchem.com* ■ *Fax: 918-977-7599* ■ *www.cpchem.com*

June 17, 2015

Grant Palmer
Agru America
500 Garrison Road
Georgetown, SC 29440

Dear Grant:

This letter is to report the final results of oven-aging and UV-aging tests (according to GRI-GM13 and GRI-GM17) on Agru America black sheet samples that you provided to us recently. These tests were performed by CPChem's Materials Evaluation Laboratory in Bartlesville, OK. The tests were completed June 2015.

The GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) durability tests were done according to the following procedures.

Test	Exposure	Method
HP-OIT	150 °C, 500 psi oxygen	D5885
Oven Aging	90 days, 85 °C	D5721
UV Aging	1600 UV hrs (Conditions were 20 hours UVA-340 at 75 °C followed by 4 hrs dark with condensation at 60 °C. Irradiance was 0.72 W/m^2 at 340 nm.)	D7238

Oven-Aging Results

Sample	Initial HP-OIT (min)	HP-OIT Value after Oven Aging 90 Days (min)	% HP-OIT Retained after Oven Aging 90 Days	GRI-GM13 and GRI-GM17% Retained Requirement (Oven Aging 90 Days)
60 mil HDPE Roll # G14F514045 from Marlex® K307 Polyethylene Lot # H71-4-1337	1066	883	**83**	**80**
40 mil LLDPE Roll # G14C243027 from Marlex® 7104 Polyethylene Lot # CEC810320	512	422	**82**	**60**

UV-Aging Results

Sample	Initial HP-OIT (min)	HP-OIT Value after UV Aging (min)	% HP-OIT Retained	GRI-GM13 and GRI-GM17 % Retained Requirement
60 mil HDPE Roll # G14F514045 from Marlex® K307 Polyethylene Lot # H71-4-1337	1066	930	**87**	**50**
40 mil LLDPE Roll # G14C243027 from Marlex® 7104 Polyethylene Lot # CEC810320	512	351	**69**	**35**

According to these test results, the durability requirements are met.

If you have any questions, please call me at 918-977-6894.

Sincerely,

Yingying Lu, Ph. D.

Polyethylene Technical Service and Applications Development

Any technical advice, recommendations, results, or analysis ("Information") contained herein, including, without limitation, Information as it may relate to the selection of a specific product ("Product") for your use and application, is given ***without warranty or guarantee*** *and is accepted at your sole risk. It is imperative that you test the Information (and Product, if applicable) to determine to your own satisfaction whether the Information (and Product, if applicable) are suitable for your intended use and application.* ***You expressly assume, and release Chevron Phillips Chemical Company, from all risk and liability, whether based in contract, tort or otherwise, in connection with the use of, or results obtained from, such Information (and Product, if applicable).***

TESTING, RESEARCH, CONSULTING AND FIELD SERVICES
AUSTIN, TX - USA | ANAHEIM, CA - USA | ANDERSON, SC - USA | GOLD COAST - AUSTRALIA | SUZHOU - CHINA

September 29, 2016
January 11, 2017 Updated UV Resistance (D 7238) & Oven Aging (D 5721)

Mail To:

Nathan Ivy
Agru America
500 Garrison Rd
Georgetown, SC 29440

email: nivy@agruamerica.com

Bill To:

<= Same

Dear Mr. Ivy:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Project: **Trial 16-006**

TRI Job Reference Number: 24280

Material(s) Tested: One, Agru 40 mil Smooth LLDPE Geomembrane

Test(s) Requested: 2% Secant Modulus (ASTM D 5323)
Multi-axial Tensile (ASTM D 5617)
Data Updated==> UV Resistance (ASTM D 7238)
Data Updated==> Oven Aging (ASTM D5721)

If you have any questions or require any additional information, please call us at 1-800-880-8378

Sincerely,

Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

TRI ENVIRONMENTAL, INC.
9063 BEE CAVES RD. – AUSTIN, TX 78733 – USA | PH: 800.880.TEST OR 512.263.2101

TESTING, RESEARCH, CONSULTING AND FIELD SERVICES
AUSTIN, TX - USA | ANAHEIM, CA - USA | ANDERSON, SC - USA | GOLD COAST - AUSTRALIA | SUZHOU - CHINA

GEOMEMBRANE TEST RESULTS
TRI Client: Agru America
Project: Trial 16-006

Material: Agru 40 mil Smooth LLDPE Geomembrane
Sample Identification: G16D002549 , , Formasa L91507H
TRI Log #: 24280

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.
2% Secant Modulus (ASTM D 5323, 2 ipm strain rate, modulus at 2% strain)												
MD 2% Secant Modulus (psi)	30710	32447	32924	31549	30236						**31573**	1132
MD 2% Secant Modulus (ppi)	1367	1430.9	1481.6	1303	1285						**1373**	83
TD 2% Secant Modulus (psi)	33432	30097	32079	34335	32442						**32477**	1596
TD 2% Secant Modulus (ppi)	1381	1258.1	1340.9	1407.7	1326.9						**1343**	57
Multi-axial Tensile (ASTM D 5617)												
Thickness (mils)	40	38	40								**40**	1
Maximum Stress (psi)	1540	1612	1590								**1581**	37
% Elongation @ Rupture (%)	90.6	107.6	86.3								**94.8**	11.3
Failure Description	H-CAT N-EF	TDT N-EF	MDT N-EF									

MDT	A tear in the machine direction.
H	Circular or elliptical hole in the specimen.
H-CAT	Circular or elliptical hole in an area where the material has significantly necked down or thinned. The large thinned area resembles a pupil of a cat eye.
N-EF	No edge failure

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

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GEOMEMBRANE TEST RESULTS
TRI Client: Agru America
Project: Trial 16-006

Material: Agru 40 mil Smooth LLDPE Geomembrane
Sample Identification: G16D002549 , , Formasa L91507H
TRI Log #: 24280

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	
	1	2	3	4	5	6	7	8	9	10			
UV Resistance (ASTM D 7238)													
The resistance to degradation due to exposure to ultraviolet light and moisture was determined in accordance with GRI-GM11, Accelerated Weathering of Geomembranes Using a Fluorescent UVA Device. This standard covers the basic principles for using the QUV apparatus to accelerate the weathering of geomembranes using UVA bulbs and condensation. To comply with Specification GRI GM13, the sample was exposed to 1600 hours of UV exposure composed of 80 cycles of UA at 75 C for 20 hours followed by condensation at 60 C for 4 hours. The High Pressure Oxidative Induction Time (HPOIT) was evaluated before and after the exposure and results were as follows.													
													PERCENT RETAINED
HPOIT (minutes) - Baseline	574										**574**		
HPOIT (minutes) - After QUV Aging	418										**418**		73
Note: No surface cracking was observed.													
Oven Aging (ASTM D 5721)													
The geomembrane was exposed to 90 days of elevated temperature exposure in an air oven maintained at 85°C ± 0.5°C in accordance with ASTM D 5721-95, Standard Practice for Air-Oven Aging of Polyolefin Geomembranes. High Pressure Oxidative Induction Time (HPOIT) was tested after exposure and compared to values generated for unexposed material. The results are provided below.													
													PERCENT RETAINED
HPOIT (minutes) - Baseline	574										**574**		
HPOIT (minutes) - After Oven Aging	561										**561**		98
Note: No surface cracking was observed.													

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

TRI ENVIRONMENTAL, INC.
9063 BEE CAVES RD. – AUSTIN, TX 78733 – USA | PH: 800.880.TEST OR 512.263.2101

SECTION 3

Resin Quality Control Certifications

Executive Offices: 500 Garrison Road, Georgetown, SC 29440 • 843 546-0600 • 800 321-1379
Sales Office: 700 Rockmead, Suite 103, Kingwood, TX 77339 • 281 358-4741 • 800 373-2478
Email: salesmkg@agruamerica.com

CoA Date: 07/05/2017

Certificate of Analysis

Shipped To: AGRU AMERICA INC:GEORGETOWN
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

Delivery #: 89492790
PO #: 011688
Weight: 189450.000 LB
Ship Date: 07/05/2017
Package: BULK
Mode: Hopper Car
Car #: NAHX610114
Seal No: 80877

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: CHE811830

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.37	g/10min
HLMI	ASTM D1238	15.63	g/10min
Pellet Count	ST-905	35	pelet/gram
Production date		20170527	
Density	D1505 or D4883	0.918	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

KEVIN AYRES
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Customer Service Representative at +1832813

CoA Date: 08/11/2017

Certificate of Analysis

Shipped To: AGRU AMERICA INC:GEORGETOWN
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

Delivery #: 89515558
PO #: 011806
Weight: 189000.000 LB
Ship Date: 08/11/2017
Package: BULK
Mode: Hopper Car
Car #: CHVX889231
Seal No: 96087

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: CHG811090

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.35	g/10min
HLMI	ASTM D1238	16.85	g/10min
Pellet Count	ST-905	31	pelet/gram
Production date		20170715	
Density	D1505	0.919	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

KEVIN AYRES
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Customer Service Representative at +1832813

Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS

201 FORMOSA DRIVE PHONE:(888)FPCUSA3
PO BOX 700
POINT COMFORT TX 77978

Certificate of Analysis
(CONFIDENTIAL)

CUSTOMER:AGRU/AMERICA, INC.
500 GARRISON ROAD

GEORGETOWN SC 29440
PRODUCT :L91507H
RAILCAR GPLX075081
CLEANING/INSPECTION NO: 075081081417

S/O NO : JS9A456
CUSTOMER PO : 011998
DATE SHIPPED: 10/05/17
LOT NO : 17HB245
WEIGHT (LB) : 184,300.00
CUSTID:FT03888 SPIDM1

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index, g/10min	ASTM D1238	.79
Density, g/cm3	ASTM D1505	.9170

Linda Kao

QC SUPERVISOR: LINDA KAO

APPENDIX M3

AGRU LLDPE QA Conformance Test Reports

CONFORMANCE TEST RESULTS

Geotechnics
INTEGRITY IN TESTING

CLIENT: Chesapeake Containmnet Systems, Inc.
CLIENT PROJECT: Savannah River
PROJECT NO.: L17174-01
LAB ID NO.: L17174-01-01
MATERIAL: Agru 50 mil LLDPE Microdrain
SAMPLE I.D. NA
ROLL NO: G17A003208

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	55.3	53.6	55.0	52.7	55.5		
			54.8	52.6	53.1	56.4	55.9	**54.5**	1.31
ASPERITY	D 7466	mils	160	164	163	166	160		
HEIGHT	Nub Side		158	166	168	164	163	**163.2**	2.96
ASPERITY	D 7466	mils	33	34	32	33	32		
HEIGHT	Textured Side		33	34	32	31	34	**32.8**	0.98
DENSITY	D 792	g/cc	0.9343	0.9355				**0.93**	0.0006
CARBON BLACK CONTENT	D 4218	%	2.53	2.65				**2.59**	0.058
CARBON BLACK DISPERSION	D 5596	CATEGORY	1	1	1	1	1		
			1	1	1	1	1		
PUNCTURE RESISTANCE	D 4833	lbs	121.7	120.8	129.8	141.6	129.9		
			124.9	112.7	119.0	123.9	131.4		
			125.6	142.9	140.1	122.1	120.6	**127.1**	8.52
TEAR RESISTANCE	D 1004	MD-lbs	48.0	47.4	58.2	61.1	49.1		
			47.0	50.0	49.4	60.5	57.3	**52.8**	5.45
		CD-lbs	51.3	56.0	46.0	51.0	48.3		
			50.1	57.3	56.2	49.0	52.9	**51.8**	3.55
TENSILE PROPERTIES	D 6693								
STRENGTH AT BREAK		MD-ppi	196	177	230	237	173	**202**	26.36
		CD-ppi	209	234	208	206	214	**214**	10.38
ELONGATION AT BREAK		MD%	399	374	494	489	451	**441**	47.89
Lo = 2.0"		CD%	612	680	659	635	534	**624**	50.45

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CONFORMANCE TEST RESULTS

Geotechnics
INTEGRITY IN TESTING

CLIENT: Chesapeake Containmnet Systems, Inc.
CLIENT PROJECT: Savannah River
PROJECT NO.: L17174-03
LAB ID NO.: L17174-03-01
MATERIAL: Agru 50 mil LLDPE Microdrain
SAMPLE I.D. NA
ROLL NO: G17A003292

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	51.5	51.3	51.1	50.5	50.5		
			51.0	50.5	52.5	51.1	51.5	**51.2**	0.58
ASPERITY	D 7466	mils	165	155	161	158	158		
HEIGHT	Nub Side		158	162	161	160	164	**160.2**	2.89
ASPERITY	D 7466	mils	37	37	37	38	37		
HEIGHT	Textured Side		37	35	37	35	35	**36.5**	1.02
DENSITY	D 792	g/cc	0.9354	0.9342				**0.93**	0.0006
CARBON BLACK CONTENT	D 4218	%	2.43	2.74				**2.58**	0.156
CARBON BLACK DISPERSION	D 5596	CATEGORY	1	1	1	1	1		
			1	1	1	1	1		
PUNCTURE RESISTANCE	D 4833	lbs	116.2	113.2	113.9	120.2	119.5		
			116.2	112.8	116.1	110.4	111.9		
			121.6	111.8	113.8	112.9	112.2	**114.8**	3.25
TEAR RESISTANCE	D 1004	MD-lbs	48.4	58.5	52.4	46.0	42.5		
			61.7	50.0	45.0	47.2	49.1	**50.1**	5.69
		CD-lbs	45.3	55.0	42.2	51.2	49.0		
			48.0	40.3	46.0	47.0	49.3	**47.3**	4.03
TENSILE PROPERTIES	D 6693								
STRENGTH AT BREAK		MD-ppi	173	141	231	262	200	**201**	42.38
		CD-ppi	236	235	184	212	200	**213**	20.16
ELONGATION AT BREAK		MD%	388	255	486	509	371	**402**	90.85
Lo = 2.0"		CD%	725	722	628	644	643	**672**	42.12

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CONFORMANCE TEST RESULTS

Geotechnics
INTEGRITY IN TESTING

CLIENT: Chesapeake Containmnet Systems, Inc.
CLIENT PROJECT: Savannah River
PROJECT NO.: L17174-04
LAB ID NO.: L17174-04-01
MATERIAL: Agru 50 mil LLDPE Microdrain
SAMPLE I.D. NA
ROLL NO: G17F003305

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	49.7	49.9	49.5	49.5	49.6		
			49.7	49.1	49.5	49.1	49.5	**49.5**	0.24
ASPERITY	D 7466	mils	156	159	160	159	160		
HEIGHT	Nub Side		159	156	154	158	158	**157.9**	1.87
ASPERITY	D 7466	mils	37	38	38	37	38		
HEIGHT	Textured Side		39	38	38	37	38	**37.8**	0.60
DENSITY	D 792	g/cc	0.9339	0.9340				**0.93**	0.0000
CARBON BLACK CONTENT	D 4218	%	2.25	2.18				**2.22**	0.038
CARBON BLACK DISPERSION	D 5596	CATEGORY	1	1	1	1	1		
			1	1	1	1	1		
PUNCTURE RESISTANCE	D 4833	lbs	127.8	112.2	125.7	113.3	109.9		
			109.7	114.1	109.7	110.0	107.4		
			110.8	109.0	109.0	107.1	106.1	**112.1**	6.12
TEAR RESISTANCE	D 1004	MD-lbs	43.4	46.3	43.0	37.7	51.2		
			41.6	48.1	44.0	44.4	43.6	**44.3**	3.46
		CD-lbs	41.4	64.2	46.3	47.3	38.4		
			45.5	44.0	43.1	39.3	47.0	**45.7**	6.85
TENSILE PROPERTIES	D 6693								
STRENGTH AT BREAK		MD-ppi	216	195	176	228	200	**203**	18.12
		CD-ppi	234	179	188	210	174	**197**	22.30
ELONGATION AT BREAK		MD%	496	522	497	465	462	**488**	22.38
Lo = 2.0"		CD%	707	613	563	693	560	**627**	62.51

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CONFORMANCE TEST RESULTS

Geotechnics
INTEGRITY IN TESTING

CLIENT: Chesapeake Containmnet Systems, Inc.
CLIENT PROJECT: Savannah River
PROJECT NO.: L17174-04
LAB ID NO.: L17174-04-02
MATERIAL: Agru 50 mil LLDPE Microdrain
SAMPLE I.D. NA
ROLL NO: G17F003327

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	49.6	49.3	49.5	49.7	49.9		
			49.6	49.7	49.5	49.6	49.8	**49.6**	0.16
ASPERITY	D 7466	mils	159	155	156	149	157		
HEIGHT	Nub Side		156	156	143	155	156	**154.2**	4.45
ASPERITY	D 7466	mils	36	37	39	38	37		
HEIGHT	Textured Side		37	38	39	38	37	**37.6**	0.92
DENSITY	D 792	g/cc	0.9322	0.9332				**0.93**	0.0005
CARBON BLACK CONTENT	D 4218	%	2.33	2.23				**2.28**	0.051
CARBON BLACK DISPERSION	D 5596	CATEGORY	1	1	1	1	1		
			1	1	1	1	1		
PUNCTURE RESISTANCE	D 4833	lbs	119.8	113.5	107.7	100.0	102.6		
			105.7	109.0	113.6	110.5	105.2		
			109.9	107.8	100.7	102.4	105.2	**107.6**	5.21
TEAR RESISTANCE	D 1004	MD-lbs	43.2	49.0	46.0	44.0	38.4		
			41.2	43.3	43.6	40.7	43.0	**43.2**	2.75
		CD-lbs	42.0	51.2	42.9	45.0	38.0		
			44.0	37.7	42.2	42.3	57.0	**44.2**	5.55
TENSILE PROPERTIES	D 6693								
STRENGTH AT BREAK		MD-ppi	258	225	219	165	208	**215**	30.08
		CD-ppi	209	192	242	228	234	**221**	18.16
ELONGATION AT BREAK		MD%	460	517	463	384	559	**477**	59.09
Lo = 2.0"		CD%	598	556	716	730	712	**662**	71.23

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CONFORMANCE TEST RESULTS

Geotechnics
INTEGRITY IN TESTING

CLIENT: Chesapeake Containmnet Systems, Inc.
CLIENT PROJECT: Savannah River
PROJECT NO.: L17174-05
LAB ID NO.: L17174-05-01
MATERIAL: Agru 50 mil LLDPE Microdrain
SAMPLE I.D. NA
ROLL NO: G17A003359

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	49.5	49.7	48.6	48.5	48.5		
			49.1	49.5	49.5	50.0	49.9	**49.3**	0.54
ASPERITY	D 7466	mils	158	162	164	159	159		
HEIGHT	Nub Side		158	159	165	165	165	**161.4**	2.94
ASPERITY	D 7466	mils	38	38	39	39	39		
HEIGHT	Textured Side		39	36	35	38	38	**37.9**	1.30
DENSITY	D 792	g/cc	0.9317	0.9319				**0.93**	0.0001
CARBON BLACK CONTENT	D 4218	%	2.69	2.79				**2.74**	0.049
CARBON BLACK DISPERSION	D 5596	CATEGORY	1	1	1	1	1		
			1	1	1	1	1		
PUNCTURE RESISTANCE	D 4833	lbs	110.9	103.7	101.6	120.4	115.6		
			119.3	98.4	104.3	108.3	100.1		
			105.6	111.6	109.6	94.0	106.2	**107.3**	7.25
TEAR RESISTANCE	D 1004	MD-lbs	39.7	38.0	40.6	43.0	43.4		
			46.7	41.4	45.9	45.3	43.4	**42.7**	2.67
		CD-lbs	40.0	46.8	44.1	39.1	43.0		
			51.9	48.9	38.1	39.0	45.0	**43.6**	4.41
TENSILE PROPERTIES	D 6693								
STRENGTH AT BREAK		MD-ppi	220	211	183	220	230	**213**	16.00
		CD-ppi	164	182	209	196	229	**196**	22.24
ELONGATION AT BREAK		MD%	527	447	484	546	460	**493**	38.08
Lo = 2.0"		CD%	644	597	643	664	681	**646**	28.15

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CONFORMANCE TEST RESULTS

Geotechnics
INTEGRITY IN TESTING

CLIENT: Chesapeake Containment Systems, Inc.
CLIENT PROJECT: Savannah River
PROJECT NO.: L17174-07
LAB ID NO.: L17174-07-01
MATERIAL: 50 mil LLDPE Microdrain
SAMPLE I.D. NA
ROLL NO: G17A003285

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	50	51	52	52	51		
			51	54	52	57	57	**53**	2.37
ASPERITY	D 7466	mils	150	149	156	162	162		
HEIGHT	Nub Side		157	156	156	162	165	**158**	5.02
ASPERITY	D 7466	mils	32	33	35	33	30		
HEIGHT	Textured Side		28	35	33	34	33	**33**	2.06
DENSITY	D 792	g/cc	0.9310	0.9325				**0.93**	0.0008
TENSILE PROPERTIES	D 6693								
STRENGTH AT BREAK		MD-ppi	232	155	238	256	221	**220**	34.53
		CD-ppi	185	188	246	220	170	**202**	27.43
ELONGATION AT BREAK		MD%	415	193	625	691	615	**508**	182.48
Lo = 2.0"		CD%	554	332	482	475	480	**465**	72.42

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CONFORMANCE TEST RESULTS

geotechnics
INTEGRITY IN TESTING

CLIENT: Chesapeake Containment Systems, Inc.
CLIENT PROJECT: Savannah River
PROJECT NO.: L17174-07
LAB ID NO.: L17174-07-02
MATERIAL: 50 mil LLDPE Microdrain
SAMPLE I.D. NA
ROLL NO: G17A003296

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	48	46	50	49	51		
			50	48	50	53	55	**50**	2.45
ASPERITY	D 7466	mils	154	157	155	159	158		
HEIGHT	Nub Side		156	164	168	162	164	**160**	4.36
ASPERITY	D 7466	mils	34	36	35	35	34		
HEIGHT	Textured Side		36	31	33	36	37	**35**	1.68
DENSITY	D 792	g/cc	0.9312	0.9329				**0.93**	0.0009
TENSILE PROPERTIES	D 6693								
STRENGTH AT BREAK		MD-ppi	225	231	220	190	208	**215**	14.71
		CD-ppi	201	172	186	190	178	**185**	10.00
ELONGATION AT BREAK		MD%	366	497	477	399	471	**442**	50.43
Lo = 2.0"		CD%	635	530	582	572	497	**563**	47.05

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CONFORMANCE TEST RESULTS

Geotechnics INTEGRITY IN TESTING

CLIENT: Chesapeake Containment Systems, Inc.
CLIENT PROJECT: Savannah River
PROJECT NO.: L17174-07
LAB ID NO.: L17174-07-03
MATERIAL: 50 mil LLDPE Microdrain
SAMPLE I.D. NA
ROLL NO: G17A003305

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	60	57	49	48	44		
			43	47	45	47	48	**49**	5.21
ASPERITY	D 7466	mils	161	155	158	156	157		
HEIGHT	Nub Side		161	152	161	155	157	**157**	2.87
ASPERITY	D 7466	mils	32	36	35	35	33		
HEIGHT	Textured Side		34	36	33	32	34	**34**	1.41
DENSITY	D 792	g/cc	0.9311	0.9336				**0.93**	0.0012
TENSILE PROPERTIES	D 6693								
STRENGTH AT BREAK		MD-ppi	212	222	206	240	180	**212**	19.81
		CD-ppi	220	210	215	192	232	**214**	13.16
ELONGATION AT BREAK		MD%	542	477	617	458	366	**492**	84.12
Lo = 2.0"		CD%	674	656	654	580	487	**610**	69.54

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CONFORMANCE TEST RESULTS

geotechnics
INTEGRITY IN TESTING

CLIENT: Chesapeake Containment Systems, Inc.
CLIENT PROJECT: Savannah River
PROJECT NO.: L17174-07
LAB ID NO.: L17174-07-04
MATERIAL: 50 mil LLDPE Microdrain
SAMPLE I.D. NA
ROLL NO: G17A003323

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	56	56	50	48	46		
			44	48	46	43	45	**48**	4.35
ASPERITY	D 7466	mils	154	164	156	161	164		
HEIGHT	Nub Side		164	163	161	155	156	**160**	3.89
ASPERITY	D 7466	mils	34	36	32	34	36		
HEIGHT	Textured Side		34	33	34	36	34	**34**	1.27
DENSITY	D 792	g/cc	0.9314	0.9331				**0.93**	0.0008
TENSILE PROPERTIES	D 6693								
STRENGTH AT BREAK		MD-ppi	190	164	168	199	192	**183**	13.98
		CD-ppi	160	208	192	219	213	**198**	21.08
ELONGATION AT BREAK		MD%	373	491	491	436	439	**446**	43.65
Lo = 2.0"		CD%	535	622	594	390	486	**525**	82.48

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CONFORMANCE TEST RESULTS

geotechnics
INTEGRITY IN TESTING

CLIENT: Chesapeake Containment Systems, Inc.
CLIENT PROJECT: Savannah River
PROJECT NO.: L17174-07
LAB ID NO.: L17174-07-05
MATERIAL: 50 mil LLDPE Microdrain
SAMPLE I.D. NA
ROLL NO: G17A003341

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	47	52	54	57	51		
			54	52	52	55	54	**53**	2.56
ASPERITY	D 7466	mils	152	156	158	164	165		
HEIGHT	Nub Side		166	163	157	158	160	**160**	4.28
ASPERITY	D 7466	mils	32	32	35	34	30		
HEIGHT	Textured Side		29	32	34	34	33	**33**	1.80
DENSITY	D 792	g/cc	0.9325	0.9324				**0.93**	0.0000
TENSILE PROPERTIES	D 6693								
STRENGTH AT BREAK		MD-ppi	204	262	236	226	220	**230**	19.20
		CD-ppi	205	198	233	224	242	**220**	16.45
ELONGATION AT BREAK		MD%	426	493	412	638	471	**488**	80.54
Lo = 2.0"		CD%	516	519	401	634	652	**544**	91.24

CHECKED BY: TMP DATE: 12-18-17

Z:\Synthetics\2017 SYNTHETICS\174- CHESAPEAKE CONTAINMENT- Savannah River\[L17174-07-05 LLDPE Conformance.xls]Sheet1 L17174-07-05 12/18/17

CONFORMANCE TEST RESULTS

Geotechnics
INTEGRITY IN TESTING

CLIENT: Chesapeake Containment Systems, Inc.
CLIENT PROJECT: Savannah River
PROJECT NO.: L17174-07
LAB ID NO.: L17174-07-06
MATERIAL: 50 mil LLDPE Microdrain
SAMPLE I.D. NA
ROLL NO: G17A003351

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	51	54	43	45	50		
			51	46	43	42	43	**47**	4.09
ASPERITY	D 7466	mils	165	162	171	168	161		
HEIGHT	Nub Side		157	154	158	155	156	**161**	5.48
ASPERITY	D 7466	mils	35	33	32	34	35		
HEIGHT	Textured Side		36	34	33	32	30	**33**	1.69
DENSITY	D 792	g/cc	0.9322	0.9310				**0.93**	0.0006
TENSILE PROPERTIES	D 6693								
STRENGTH AT BREAK		MD-ppi	140	213	185	188	208	**187**	25.77
		CD-ppi	184	166	189	208	188	**187**	13.37
ELONGATION AT BREAK		MD%	476	505	488	396	550	**483**	50.23
Lo = 2.0"		CD%	635	582	643	697	475	**606**	75.14

CHECKED BY: TMP DATE: 12-18-17

Z:\Synthetics\2017 SYNTHETICS\174- CHESAPEAKE CONTAINMENT- Savannah River\[L17174-07-06 LLDPE Conformance.xls]Sheet1 L17174-07-06 12/18/17

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APPENDIX N

GEOTEXTILE DATA AND DOCUMENTATION

Appendix N1 AGRU Geotextile QC & Product Specifications
Appendix N2 AGRU Geotextile QC Certifications and Test Data
Appendix N3 AGRU Geotextile QA Conformance Test Reports

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APPENDIX N1

AGRU Geotextile QC & Product Specifications

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MANUFACTURING QUALITY CONTROL PROCEDURES AGRUTEX SERIES NONWOVENS

SALES OFFICE:

AGRU AMERICA, INC.

500 Garrison Road

Georgetown, SC 29440

Toll Free: (800) 373-2478

Telephone: (843) 546-0600

Fax: (843) 527-2738

saleskg@agruamerica.com

www.agruamerica.com

5/1/2012

THE QUALITY CONTROL SYSTEM

The Quality Control System is for the purpose of continuous improvement of our AGRUTEX Series Geosynthetics and the service of these products. Audits and Management reviews are preformed annually to assess the Quality Control System. The Quality Control Manager is responsible for establishing, implementing, and maintaining the Quality Control System.

Each employee has the responsibility to perform the tasks assigned to them under the Quality Control System. It is also their responsibility to take appropriate actions to ensure that the Quality Control System is followed so that all AGRUTEX Series Geosynthetics conform to their specifications.

PERSONNEL

The Quality Control Lab contains adequate test equipment and personnel to properly conduct quality testing on AGRUTEX Series Geosynthetics. The QC Manager determines “adequate personnel” based on the testing requirements. The resources required are regularly analyzed during Management’s review process.

TRAINING

Job descriptions are maintained for each job classification with training forms maintained for each employee. These training forms are kept in the QC Lab detailing the training activities. Job descriptions and training forms are maintained by the Quality Control Manager and /or the HR department.

Personnel are authorized based on their abilities, education, on-the-job training, and other specialized skills.

OUTSIDE SERVICES AND SUPPLIES

Agru America, Inc. requires approved vendors for raw materials and services in order to maintain Quality Control and to make sure that the inspection practices and techniques ensure delivery of high standard raw materials and services.

The Quality Control Manager will verify vendors before purchases are made to assure their quality history, performance record, and their ability to meet Agru America’s requirements.

MANUFACTURING QUALITY CONTROL

All testing is accomplished in accordance with documented and controlled test methods. Where methods of inspection are not specified, methods will be selected that have published in international or national standards by reputable technical organizations or in relevant scientific texts or journals. Use of selected methods will be verified and approved by the Quality Control Manager.

Testing is carried out under controlled conditions which include the following:

Overall management of process control is governed by documented procedures.

Documented test methods and work instructions govern the comprehensive inspection and testing of each lot.

Testing equipment is selected based upon needs and the ability to satisfy specified requirements and the equipment is suitably maintained.

Training of personnel is adequate and documented.

Appropriate quality records are maintained.

Each test sample in the lab is accompanied by a label for that particular roll number. Test results are recorded on Quality Control Test Reports by number and then entered into the computer database by the roll number.

All samples are brought to the Quality Control lab and the sample is tested to meet minimum specification values. The standard operating procedure for each test is documented and copies of ASTM procedures are kept in the lab.

Preparation for each sample is conducted in accordance with Standard Operating Procedures and ASTM requirements.

TESTING FREQUENCY

Physical Property	Minimum Frequency
Grab Tensile (ASTM D4632)	18,000 y^2
CBR (ASTM D6241)	100,000 y^2
Trapezoidal Tear (ASTM D4533)	18,000 y^2
Water Flow Rate (ASTM D4491)	36,000 y^2
AOS (ASTM D4751)	100,000 y^2
Thickness (ASTM D5199)	18,000 y^2
Mass per Unit Area (ASTM D5261)	18,000 y^2

MATERIAL IDENTIFICATION

All material is identified by a stock code or style number. This stock code or style number corresponds to a product specification. Each production run is assigned a lot number to control production, record production, and maintain records for that lot. Rolls within a lot are assigned a roll number in sequential order.

HANDLING/STORAGE

Handling methods and procedures are implemented to prevent damage and deterioration to material during the manufacturing process. All Geotextile rolls are given sufficient wrapping to protect against moisture and to prevent ultraviolet exposure prior to placement. Rolls are labeled and marked to provide product identification for inventory and quality control purposes. All rolls are storeD so that they are protected from the elements.

Archived samples are identified by labels and sufficiently stored to prevent deterioration.

SUPPORTING DOCUMENTATION

ASTM D4354 Practice for Sampling of Geosynthetics for Testing
ASTM D4873 Guide for Identification, Storage, and Handling of Geotextiles

CONTROL OF NONCONFORMING PRODUCT

Agru America geosynthetics procedures require the documentation of all nonconforming products. All products that are considered nonconforming are tagged and/or segregated. The status of nonconforming product is reviewed by the QC Manager to determine whether the product will be reworked, downgraded, scrapped or continue through the manufacturing process. All reworked material is re-inspected and must meet all of the original product requirements.

CORRECTIVE AND PREVENTATIVE ACTION

The effectiveness of a corrective and preventative action policy is critical to the success of a Quality Control System.

Corrective Action procedures include:

Reviewing customer complaints

Investigating the root cause of nonconforming products and system nonconformances.

Determination of corrective action to eliminate the cause of the nonconformance.

The Quality Control System provides for preventative action by reviewing data including but not exclusive to: customer complaints, audit results, and past nonconformance. This is to assist in detecting and eliminating potential causes of nonconformance.

AUTHORITY STATEMENT

The Quality Control Manager has been assigned the ultimate responsibility for implementing the Quality Control System as well as the authority for ensuring its maintenance.

If the Quality Control Manager is absent, this responsibility will fall to the appropriate personnel to act in those instances to ensure continuation of operations.

Responsibility for activities described under each element may be assigned to the appropriate personnel. Delegation of authority and responsibility includes the responsibility to assure all procedures described are implemented as written.

CERTIFICATIONS

All product certifications originate from the Quality Control Manager and are supported by test data.

Each shipment of geosynthetic textile is certified to meet product specifications and is supported with actual test results. The results of each test, or series of tests, is reported in the certification and contains all necessary information which is as follows:

Report Identification
Test Method Identification
Property values
Date of Certification

The Quality Control Manager is responsible for signing reports or designating personnel to sign reports. This signature assures that they accept responsibility that the report content is accurate.

If a certification report is sent to a customer and then determined to have an erroneous result, the QC Manager will amend the report and submit a revised report.

Statements concerning confidentially and reproducibility are included on the certification where these statements are considered appropriate.

AGRUTEX®

Nonwoven Polypropylene Geotextiles

Environmental Applications

Agrutex® geotextiles are a series of polypropylene, staple fiber, needle punched nonwoven products. Staple fibers are needled together to form a stable network that retains dimensional stability relative to each other. The geotextile(s) are resistant to ultraviolet degradation and to biological and chemical environments normally found in soils.

Agrutex conforms to the property values listed below.[1] Agru America's Laboratories are accredited by the Geosynthetic Accreditation Institute's Laboratory Accreditation Program (GAI-LAP).

PROPERTY	TEST METHOD	FREQUENCY	MINIMUM AVERAGE ROLL VALUE(S)					
STYLE NAME			AT041	AT061	AT081	AT101	AT121	AT161
Physical								
Mass/Unit Area, oz/sy (g/m^2)	ASTM D-5261	100,000 SF	4 (136)	6 (203)	8 (271)	10 (339)	12 (407)	16 (544)
Mechanical								
Grab Tensile, lbs (N)	ASTM D-4632	100,000 SF	120 (534)	170 (757)	220 (979)	270 (1200)	320 (1424)	390 (1736)
Elongation, %	ASTM D-4632	100,000 SF	50	50	50	50	50	50
CBR Puncture, lbs (kN)	ASTM D-6241	500,000 SF	335 (1.5)	435 (1.9)	600 (2.7)	725 (3.2)	925 (4.1)	1125 (5.0)
Trapezoidal Tear, lbs (N)	ASTM D-4533	100,000 SF	50 (223)	65 (289)	95 (423)	105 (467)	125 (556)	150 (668)
Endurance								
UV Resistance % Strength Retained after 500 hrs	ASTM D-4355	Formulation	70	70	70	70	70	70
Hydraulic								
Apparent Opening Size, US Sieve (mm)[2,3]	ASTM D-4751	500,000 SF	70 (0.212)	70 (0.212)	80 (0.180)	100 (0.150)	100 (0.150)	100 (0.150)
Permittivity[2], sec^{-1}	ASTM D-4491	500,000 SF	1.8	1.5	1.3	1.1	1.0	0.7
Permeability[2] cm/sec	ASTM D-4491	500,000 SF	0.21	0.25	0.30	0.29	0.29	0.26
Water Flow Rate[2], g/min/sf (l/min/m^2)	ASTM D-4491	500,000 SF	135 (5500)	110 (4479)	95 (3895)	80 (3280)	60 (2445)	50 (2050)
Roll Dimensions[4]	Length, ft (m)		1,200 (110)	825 (252)	600 (183)	525 (160)	405 (123)	300 (92)
	Area, sf (m^2)		18,000 (1,672)	12,375 (1,150)	9,000 (836)	7,875 (732)	6,075 (564)	4,500 (418)

NOTES:

1. Effective May 2016 and subject to change without notice.
2. Values established at the time of manufacturing. Handling, storage, and shipping may change these properties.
3. Apparent Opening Size, (AOS), reported as maximum average roll value.
4. Standard roll width is 15' (4.6 m)

All information, recommendations and suggestions appearing in this literature concerning the use of our products are based upon tests and data believed to be reliable; however, it is the users responsibility to determine the suitability for their own use of the products described herein. Since the actual use by others is beyond our control, no guarantee or warranty of any kind, expressed or implied, is made by Agru/America as to the effects of such use or the results to be obtained, nor does Agru/America assume any liability in connection herewith. Any statement made herein may not be absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations. Nothing herein is to be construed as permission or as a recommendation to infringe any patent.

Rev: 5/03/2016

Executive Offices: 500 Garrison Road, Georgetown, SC 29440 (843) 546-0600, (800) 321-1379
Manufacturing: 181 Hwy 521 Andrews, SC (843) 221-4121, (800) 321-1379
email: salesmkg@agruamerica.com website: www.agruamerica.com

APPENDIX N2

AGRU Geotextile QC Certifications and Test Data

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Geotextile Certification Package for

Savannah River Site 488-1D Ash Basin & 489-D CPRD Closure

Aiken, South Carolina

Executive Offices: 500 Garrison Road, Georgetown, SC 29440 • 843 546-0600 • 800 321-1379
Sales Office: 700 Rockmead, Suite 103, Kingwood, TX 77339 • 281 358-4741 • 800 373-2478
Email: salesmkg@agruamerica.com

MATERIAL CERTIFICATIONS IN THIS PACKAGE:

- 101 Non-Woven Geotextile

Executive Offices: 500 Garrison Road, Georgetown, SC 29440 • 843 546-0600 • 800 321-1379
Sales Office: 700 Rockmead, Suite 103, Kingwood, TX 77339 • 281 358-4741 • 800 373-2478
Email: salesmkg@agruamerica.com

SECTION 1

Geotextile Quality Control Certifications

Executive Offices: 500 Garrison Road, Georgetown, SC 29440 • 843 546-0600 • 800 321-1379
Sales Office: 700 Rockmead, Suite 103, Kingwood, TX 77339 • 281 358-4741 • 800 373-2478
Email: salesmkg@agruamerica.com

Geotextile Quality Certification

OA # / PROJECT: 38452
Customer: CCS SAVANNAH RIVER
Destination: AIKEN SC
Item Code/Description AGRUTEX 101
DATE: 12/11/2017

agru america quality control dept.

ASTM	D5261	D4632				D4533		D4491	D4491	D4491	D6241	D475	D4355	
Method	Average Weight	Average Grab Tensile(MD)	Average Grab Tensile(CD)	Average Elongation (MD)	Average Elongation (CD)	Average Trap Tear (MD)	Average TRAP Tear (CD)	Water Flow Rate	Permeability	Permittivity	Average CBR Puncture	Apparent Opening Size	UV Resist % Retained @ 500 hrs	Roll Length
Units	oz / yd^2	Lbs	Lbs	%	%	Lbs	Lbs	gpm / ft^2	cm/sec	sec -1	Units: Lbs	seive	* % ret.	yds
1111330822	11.40	356.00	416.00	86	89	151.00	179.00	99.00	.38	1.34	961	100	70	175
1111330823	11.40	356.00	416.00	86	89	151.00	179.00	99.00	.38	1.34	961	100	70	175
1111330824	11.40	356.00	416.00	86	89	151.00	179.00	99.00	.38	1.34	961	100	70	175
1111330825	11.40	356.00	416.00	86	89	151.00	179.00	99.00	.38	1.34	961	100	70	175
1111330826	11.40	356.00	416.00	86	89	151.00	179.00	99.00	.38	1.34	961	100	70	175
1111330827	11.40	356.00	416.00	86	89	151.00	179.00	99.00	.38	1.34	961	100	70	175
1111330828	10.87	358.00	355.00	84	89	153.00	180.00	104.00	.39	1.41	961	100	70	175
1111330829	10.87	358.00	355.00	84	89	153.00	180.00	104.00	.39	1.41	961	100	70	175
1111330830	10.87	358.00	355.00	84	89	153.00	180.00	104.00	.39	1.41	961	100	70	175
1111330831	10.87	358.00	355.00	84	89	153.00	180.00	104.00	.39	1.41	961	100	70	175
1111330832	10.87	358.00	355.00	84	89	153.00	180.00	104.00	.39	1.41	961	100	70	175
1111330833	10.87	358.00	355.00	84	89	153.00	180.00	104.00	.39	1.41	961	100	70	175
1111330834	10.71	353.00	368.00	79	92	148.00	173.00	103.00	.39	1.40	961	100	70	175
1111330835	10.71	353.00	368.00	79	92	148.00	173.00	103.00	.39	1.40	961	100	70	175
1111330836	10.71	353.00	368.00	79	92	148.00	173.00	103.00	.39	1.40	961	100	70	175
1111330837	10.71	353.00	368.00	79	92	148.00	173.00	103.00	.39	1.40	961	100	70	175
1111330838	10.71	353.00	368.00	79	92	148.00	173.00	103.00	.39	1.40	961	100	70	175
1111330839	10.71	353.00	368.00	79	92	148.00	173.00	103.00	.39	1.40	961	100	70	175
1111330840	10.79	347.00	364.00	83	90	146.00	172.00	101.00	.41	1.38	961	100	70	175
1111330841	10.79	347.00	364.00	83	90	146.00	172.00	101.00	.41	1.38	961	100	70	175
1111330842	10.79	347.00	364.00	83	90	146.00	172.00	101.00	.41	1.38	961	100	70	175
1111330843	10.79	347.00	364.00	83	90	146.00	172.00	101.00	.41	1.38	961	100	70	175
1111330844	10.79	347.00	364.00	83	90	146.00	172.00	101.00	.41	1.38	961	100	70	175
1111330845	10.79	347.00	364.00	83	90	146.00	172.00	101.00	.41	1.38	961	100	70	175
1111330846	10.71	338.00	353.00	79	91	147.00	162.00	101.00	.38	1.37	961	100	70	175
1111330847	10.71	338.00	353.00	79	91	147.00	162.00	101.00	.38	1.37	961	100	70	175
1111330848	10.71	338.00	353.00	79	91	147.00	162.00	101.00	.38	1.37	961	100	70	175
1111330849	10.71	338.00	353.00	79	91	147.00	162.00	101.00	.38	1.37	961	100	70	175
1111330850	10.71	338.00	353.00	79	91	147.00	162.00	101.00	.38	1.37	961	100	70	175
1111330851	10.71	338.00	353.00	79	91	147.00	162.00	101.00	.38	1.37	961	100	70	175
1111330852	10.55	341.00	374.00	82	92	152.00	169.00	107.00	.39	1.46	961	100	70	175
1111330853	10.55	341.00	374.00	82	92	152.00	169.00	107.00	.39	1.46	961	100	70	175
1111330854	10.55	341.00	374.00	82	92	152.00	169.00	107.00	.39	1.46	961	100	70	175
1111330855	10.55	341.00	374.00	82	92	152.00	169.00	107.00	.39	1.46	961	100	70	175
1111330856	10.55	341.00	374.00	82	92	152.00	169.00	107.00	.39	1.46	961	100	70	175
1111330857	10.55	341.00	374.00	82	92	152.00	169.00	107.00	.39	1.46	961	100	70	175

OA # / PROJECT: 38452

Customer: CCS SAVANNAH RIVER

Destination: AIKEN SC

Item Code/Description AGRUTEX 101

DATE: 12/11/2017

agru america quality control dept.

ASTM	D5261	D4632				D4533		D4491	D4491	D4491	D6241	D475	D4355	
Method	Average Weight	Average Grab Tensile(MD)	Average Grab Tensile(CD)	Average Elongation (MD)	Average Elongation (CD)	Average Trap Tear (MD)	Average TRAP Tear (CD)	Water Flow Rate	Permeability	Permittivity	Average CBR Puncture	Apparent Opening Size	UV Resist % Retained @ 500 hrs	Roll Length
Units	oz / yd^2	Lbs	Lbs	%	%	Lbs	Lbs	gpm / ft^2	cm/sec	sec -1	Units: Lbs	seive	* % ret.	yds
1111330858	10.97	337.00	402.00	82	90	130.00	179.00	88.00	.34	1.20	961	100	70	175
1111330859	10.97	337.00	402.00	82	90	130.00	179.00	88.00	.34	1.20	961	100	70	175
1111330860	10.97	337.00	402.00	82	90	130.00	179.00	88.00	.34	1.20	961	100	70	175
1111330861	10.97	337.00	402.00	82	90	130.00	179.00	88.00	.34	1.20	961	100	70	175
1111330862	10.97	337.00	402.00	82	90	130.00	179.00	88.00	.34	1.20	961	100	70	175
1111330863	10.97	337.00	402.00	82	90	130.00	179.00	88.00	.34	1.20	961	100	70	175
1111330864	10.24	329.00	346.00	78	91	140.00	151.00	96.00	.34	1.31	961	100	70	175
1111330865	10.24	329.00	346.00	78	91	140.00	151.00	96.00	.34	1.31	961	100	70	175
1111330866	10.24	329.00	346.00	78	91	140.00	151.00	96.00	.34	1.31	961	100	70	175
1111330867	10.24	329.00	346.00	78	91	140.00	151.00	96.00	.34	1.31	961	100	70	175
1111330868	10.24	329.00	346.00	78	91	140.00	151.00	96.00	.34	1.31	961	100	70	175
1111330869	10.24	329.00	346.00	78	91	140.00	151.00	96.00	.34	1.31	961	100	70	175
1111330870	10.36	342.00	361.00	81	90	142.00	172.00	101.00	.36	1.38	961	100	70	175
1111330871	10.36	342.00	361.00	81	90	142.00	172.00	101.00	.36	1.38	961	100	70	175
1111330872	10.36	342.00	361.00	81	90	142.00	172.00	101.00	.36	1.38	961	100	70	175
1111330873	10.36	342.00	361.00	81	90	142.00	172.00	101.00	.36	1.38	961	100	70	175
1111330874	10.36	342.00	361.00	81	90	142.00	172.00	101.00	.36	1.38	961	100	70	175
1111330875	10.36	342.00	361.00	81	90	142.00	172.00	101.00	.36	1.38	961	100	70	175
1111330876	10.75	345.00	339.00	83	88	146.00	179.00	107.00	.39	1.45	974	100	70	175
1111330877	10.75	345.00	339.00	83	88	146.00	179.00	107.00	.39	1.45	974	100	70	175
1111330878	10.75	345.00	339.00	83	88	146.00	179.00	107.00	.39	1.45	974	100	70	175
1111330879	10.75	345.00	339.00	83	88	146.00	179.00	107.00	.39	1.45	974	100	70	175
1111330880	10.75	345.00	339.00	83	88	146.00	179.00	107.00	.39	1.45	974	100	70	175
1111330881	10.75	345.00	339.00	83	88	146.00	179.00	107.00	.39	1.45	974	100	70	175
1111330882	10.37	337.00	376.00	86	94	135.00	176.00	113.00	.43	1.53	974	100	70	175
1111330883	10.37	337.00	376.00	86	94	135.00	176.00	113.00	.43	1.53	974	100	70	175
1111330884	10.37	337.00	376.00	86	94	135.00	176.00	113.00	.43	1.53	974	100	70	175
1111330885	10.37	337.00	376.00	86	94	135.00	176.00	113.00	.43	1.53	974	100	70	175
1111330886	10.37	337.00	376.00	86	94	135.00	176.00	113.00	.43	1.53	974	100	70	175
1111330887	10.37	337.00	376.00	86	94	135.00	176.00	113.00	.43	1.53	974	100	70	175
1111330888	10.57	340.00	367.00	79	93	139.00	171.00	117.00	.43	1.59	974	100	70	175
1111330889	10.57	340.00	367.00	79	93	139.00	171.00	117.00	.43	1.59	974	100	70	175
1111330890	10.57	340.00	367.00	79	93	139.00	171.00	117.00	.43	1.59	974	100	70	175
1111330891	10.57	340.00	367.00	79	93	139.00	171.00	117.00	.43	1.59	974	100	70	175
1111330892	10.57	340.00	367.00	79	93	139.00	171.00	117.00	.43	1.59	974	100	70	175
1111330893	10.57	340.00	367.00	79	93	139.00	171.00	117.00	.43	1.59	974	100	70	175
1111330894	10.49	360.00	381.00	84	89	139.00	174.00	100.00	.40	1.35	974	100	70	175
1111330895	10.49	360.00	381.00	84	89	139.00	174.00	100.00	.40	1.35	974	100	70	175
1111330896	10.49	360.00	381.00	84	89	139.00	174.00	100.00	.40	1.35	974	100	70	175
1111330897	10.49	360.00	381.00	84	89	139.00	174.00	100.00	.40	1.35	974	100	70	175
1111330898	10.49	360.00	381.00	84	89	139.00	174.00	100.00	.40	1.35	974	100	70	175

OA # / PROJECT: 38452

Customer: CCS SAVANNAH RIVER

Destination: AIKEN SC

Item Code/Description AGRUTEX 101

DATE: 12/11/2017

agru america quality control dept.

ASTM	D5261	D4632				D4533		D4491	D4491	D4491	D6241	D475	D4355	
Method	Average Weight	Average Grab Tensile(MD)	Average Grab Tensile(CD)	Average Elongation (MD)	Average Elongation (CD)	Average Trap Tear (MD)	Average TRAP Tear (CD)	Water Flow Rate	Permeability	Permittivity	Average CBR Puncture	Apparent Opening Size	UV Resist % Retained @ 500 hrs	Roll Length
Units	oz / yd^2	Lbs	Lbs	%	%	Lbs	Lbs	gpm / ft^2	cm/sec	sec -1	Units: Lbs	seive	* % ret.	yds
1111330899	10.49	360.00	381.00	84	89	139.00	174.00	100.00	.40	1.35	974	100	70	175
1111330900	10.52	373.00	375.00	87	93	132.00	182.00	103.00	.41	1.40	974	100	70	175
1111330901	10.52	373.00	375.00	87	93	132.00	182.00	103.00	.41	1.40	974	100	70	175
1111330902	10.52	373.00	375.00	87	93	132.00	182.00	103.00	.41	1.40	974	100	70	175
1111330903	10.52	373.00	375.00	87	93	132.00	182.00	103.00	.41	1.40	974	100	70	175
1111330904	10.52	373.00	375.00	87	93	132.00	182.00	103.00	.41	1.40	974	100	70	175
1111330905	10.52	373.00	375.00	87	93	132.00	182.00	103.00	.41	1.40	974	100	70	175
1111330906	10.81	335.00	367.00	88	94	127.00	161.00	94.00	.37	1.27	974	100	70	175
1111330907	10.81	335.00	367.00	88	94	127.00	161.00	94.00	.37	1.27	974	100	70	175
1111330908	10.81	335.00	367.00	88	94	127.00	161.00	94.00	.37	1.27	974	100	70	175
1111330909	10.81	335.00	367.00	88	94	127.00	161.00	94.00	.37	1.27	974	100	70	175
1111330910	10.81	335.00	367.00	88	94	127.00	161.00	94.00	.37	1.27	974	100	70	175
1111330911	10.81	335.00	367.00	88	94	127.00	161.00	94.00	.37	1.27	974	100	70	175
1111330912	10.76	325.00	373.00	88	97	133.00	170.00	106.00	.42	1.43	974	100	70	175
1111330913	10.76	325.00	373.00	88	97	133.00	170.00	106.00	.42	1.43	974	100	70	175
1111330914	10.76	325.00	373.00	88	97	133.00	170.00	106.00	.42	1.43	974	100	70	175
1111330915	10.76	325.00	373.00	88	97	133.00	170.00	106.00	.42	1.43	974	100	70	175
1111330916	10.76	325.00	373.00	88	97	133.00	170.00	106.00	.42	1.43	974	100	70	175
1111330917	10.76	325.00	373.00	88	97	133.00	170.00	106.00	.42	1.43	974	100	70	175
1111330918	10.52	345.00	387.00	87	93	136.00	165.00	112.00	.44	1.52	974	100	70	175
1111330919	10.52	345.00	387.00	87	93	136.00	165.00	112.00	.44	1.52	974	100	70	175
1111330920	10.52	345.00	387.00	87	93	136.00	165.00	112.00	.44	1.52	974	100	70	175
1111330921	10.52	345.00	387.00	87	93	136.00	165.00	112.00	.44	1.52	974	100	70	175
1111330922	10.52	345.00	387.00	87	93	136.00	165.00	112.00	.44	1.52	974	100	70	175
1111330923	10.52	345.00	387.00	87	93	136.00	165.00	112.00	.44	1.52	974	100	70	175
1111330924	10.34	329.00	363.00	82	92	129.00	158.00	115.00	.44	1.55	974	100	70	175
1111330925	10.34	329.00	363.00	82	92	129.00	158.00	115.00	.44	1.55	974	100	70	175
1111330926	10.34	329.00	363.00	82	92	129.00	158.00	115.00	.44	1.55	974	100	70	175
1111330927	10.34	329.00	363.00	82	92	129.00	158.00	115.00	.44	1.55	974	100	70	175
1111330928	10.34	329.00	363.00	82	92	129.00	158.00	115.00	.44	1.55	974	100	70	175
1111330929	10.34	329.00	363.00	82	92	129.00	158.00	115.00	.44	1.55	974	100	70	175
1111330930	10.51	352.00	329.00	86	94	132.00	172.00	104.00	.41	1.41	974	100	70	175
1111330931	10.51	352.00	329.00	86	94	132.00	172.00	104.00	.41	1.41	974	100	70	175
1111330932	10.51	352.00	329.00	86	94	132.00	172.00	104.00	.41	1.41	974	100	70	175
1111330933	10.51	352.00	329.00	86	94	132.00	172.00	104.00	.41	1.41	974	100	70	175
1111330934	10.51	352.00	329.00	86	94	132.00	172.00	104.00	.41	1.41	974	100	70	175
1111330935	10.51	352.00	329.00	86	94	132.00	172.00	104.00	.41	1.41	974	100	70	175
1111330936	10.27	330.00	385.00	82	94	151.00	178.00	119.00	.44	1.62	871	100	70	175
1111330937	10.27	330.00	385.00	82	94	151.00	178.00	119.00	.44	1.62	871	100	70	175
1111330938	10.27	330.00	385.00	82	94	151.00	178.00	119.00	.44	1.62	871	100	70	175
1111330939	10.27	330.00	385.00	82	94	151.00	178.00	119.00	.44	1.62	871	100	70	175

OA # / PROJECT: 38452

Customer: CCS SAVANNAH RIVER

Destination: AIKEN SC

Item Code/Description AGRUTEX 101

DATE: 12/11/2017

ASTM	D5261	D4632				D4533		D4491	D4491	D4491	D6241	D475	D4355	
Method	Average Weight	Average Grab Tensile(MD)	Average Grab Tensile(CD)	Average Elongation (MD)	Average Elongation (CD)	Average Trap Tear (MD)	Average TRAP Tear (CD)	Water Flow Rate	Permeability	Permittivity	Average CBR Puncture	Apparent Opening Size	UV Resist % Retained @ 500 hrs	Roll Length
Units	oz / yd^2	Lbs	Lbs	%	%	Lbs	Lbs	gpm / ft^2	cm/sec	sec -1	Units: Lbs	seive	* % ret.	yds
1111330940	10.27	330.00	385.00	82	94	151.00	178.00	119.00	.44	1.62	871	100	70	175
1111330941	10.27	330.00	385.00	82	94	151.00	178.00	119.00	.44	1.62	871	100	70	175
1111330942	10.69	330.00	385.00	82	94	151.00	178.00	119.00	.44	1.62	871	100	70	175
1111330943	10.69	330.00	385.00	82	94	151.00	178.00	119.00	.44	1.62	871	100	70	175
MIN	10.24	325	329	78	88	127	151	88	.34	1.20	871	100.00	70	122 ROLLS

Mark Lockliear

Mark Lockliear, Lab Manager, Agru Andrev

Date: 12/11/2017

For Questions, Please Contact: Lab Manager, Agru Andrews
Mark Lockliear

* UV test results are based on test performe at TRI Environmental Laboratory on similar weight products with the same raw material components per ASTM D-4355

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APPENDIX N3

AGRU Geotextile QA Conformance Test Reports

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CONFORMANCE TEST RESULTS

Geotechnics INTEGRITY IN TESTING

CLIENT: Chesapeake Containment Systems, Inc.
CLIENT PROJECT: Savannah River
PROJECT NO.: L17174-06
LAB ID NO.: L17174-06-01
MATERIAL: Agrutex 101 Non-Woven Geotextile
ROLL NO: 1111330822

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	6	7	8	9	10	AVG	STD
MASS/UNIT AREA	D 5261	oz/sy	9.56	9.94	10.1	9.79	10.3	10.3	10.9	11.2	10.6	10.8	**10.3**	**0.502**
GRAB STRENGTH	D 4632	MD-lbs	339.0	332.3	373.5	312.0	317.1	337.1	327.6	352.2	369.1	382.7	**344.3**	**23.00**
		CD-lbs	251.0	366.7	345.7	373.5	402.2	386.1	357.0	364.8	380.1	363.2	**359.0**	**39.00**
GRAB ELONGATION	D 4632	MD-%	96.7	100.0	110.0	106.7	110.0	110.0	100.0	103.3	103.3	100.0	**104.0**	**4.67**
		CD-%	116.7	120.0	116.7	120.0	126.7	120.0	113.3	106.7	113.3	130.0	**118.3**	**6.37**
TRAPEZOIDAL TEAR	D 4533	MD-lbs	153.9	187.1	201.4	204.3	206.3	190.9	177.3	153.4	180.3	187.9	**184.3**	**17.85**
		CD-lbs	233.4	244.4	243.1	223.7	237.0	232.0	191.7	188.3	211.0	218.7	**222.3**	**18.95**
CBR PUNCTURE	D 6241	lbs	1059.6	1017.6	1037.0	1016.0	920.0	1047.0	958.0	856.0	1056.0	1072.0	**1003.9**	**66.90**
PERMITTIVITY	D 4491	sec-1	1.31	1.32	1.46	1.38							**1.37**	
A.O.S.	D 4751	mm	0.144	0.123	0.121	0.117	0.129						**0.127**	
								AVERAGE AOS, US STD.SIEVE SIZE =					**#100**	

CHECKED BY: JM DATE: 12-14-17

\\geoserver\Data Drive\Synthetics\2017 SYNTHETICS\174- CHESAPEAKE CONTAINMENT- Savannah River\[L17174-06-01 Text. Conformance, AOS, Perm.xls]AOS L17174-06-01 12/14/2017

CONFORMANCE TEST RESULTS

Geotechnics INTEGRITY IN TESTING

CLIENT: Chesapeake Containment Systems, Inc.
CLIENT PROJECT: Savannah River
PROJECT NO.: L17174-06
LAB ID NO.: L17174-06-02
MATERIAL: Agrutex 101 Non-Woven Geotextile
ROLL NO: 1111330853

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	6	7	8	9	10	AVG	STD
MASS/UNIT AREA	D 5261	oz/sy	10.7	10.4	11.2	11.2	11.1	11.1	11.4	11.6	10.7	11.5	**11.1**	**0.376**
GRAB STRENGTH	D 4632	MD-lbs	358.6	357.9	372.2	326.8	340.5	308.7	358.4	369.2	363.6	372.8	**352.9**	**20.06**
		CD-lbs	415.2	340.1	358.0	408.0	376.6	398.5	445.4	411.2	327.9	354.7	**383.6**	**35.96**
GRAB ELONGATION	D 4632	MD-%	103.3	100.0	106.7	106.7	120.0	103.3	116.7	110.0	110.0	110.0	**108.7**	**5.81**
		CD-%	120.0	133.3	120.0	123.3	120.0	120.0	113.3	113.3	120.0	126.7	**121.0**	**5.59**
TRAPEZOIDAL TEAR	D 4533	MD-lbs	216.0	149.3	214.5	195.7	174.5	191.3	155.9	178.5	191.6	165.9	**183.3**	**21.54**
		CD-lbs	231.9	207.6	218.0	229.6	251.7	272.8	243.7	243.9	211.7	180.3	**229.1**	**24.76**

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CONFORMANCE TEST RESULTS

Geotechnics INTEGRITY IN TESTING

CLIENT: Chesapeake Containment Systems, Inc.
CLIENT PROJECT: Savannah River
PROJECT NO.: L17174-06
LAB ID NO.: L17174-06-03
MATERIAL: Agrutex 101 Non-Woven Geotextile
ROLL NO: 1111330884

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	6	7	8	9	10	AVG	STD
MASS/UNIT AREA	D 5261	oz/sy	10.5	10.3	10.1	10.9	10.7	10.2	11.4	11.8	11.3	11.6	**10.9**	**0.582**
GRAB STRENGTH	D 4632	MD-lbs	415.3	358.2	403.0	394.4	322.0	373.5	389.1	301.2	355.8	377.0	**369.0**	**33.96**
		CD-lbs	307.8	370.5	371.6	384.1	374.5	356.9	427.5	391.4	400.4	370.0	**375.5**	**29.41**
GRAB ELONGATION	D 4632	MD-%	103.3	103.3	110.0	106.7	100.0	123.3	130.0	106.7	113.3	103.3	**110.0**	**9.19**
		CD-%	113.3	123.3	120.0	120.0	113.3	116.7	130.0	120.0	126.7	126.7	**121.0**	**5.39**
TRAPEZOIDAL TEAR	D 4533	MD-lbs	232.3	196.4	178.0	168.2	152.5	187.9	191.6	136.2	241.6	143.6	**182.8**	**33.25**
		CD-lbs	244.3	223.2	223.7	259.3	187.6	197.5	238.6	225.0	264.5	178.4	**224.2**	**27.60**
CBR PUNCTURE	D 6241	lbs	832.0	957.0	979.0	1027.0	997.0	902.0	967.0	933.0	937.0	941.0	**947.2**	**51.00**
PERMITTIVITY	D 4491	sec-1	1.33	1.39	1.32	1.44							**1.37**	
A.O.S.	D 4751	mm	0.141	0.114	0.135	0.114	0.113						**0.123**	
								AVERAGE AOS, US STD.SIEVE SIZE =					**#120**	

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CONFORMANCE TEST RESULTS

Geotechnics INTEGRITY IN TESTING

CLIENT: Chesapeake Containment Systems, Inc.
CLIENT PROJECT: Savannah River
PROJECT NO.: L17174-06
LAB ID NO.: L17174-06-04
MATERIAL: Agrutex 101 Non-Woven Geotextile
ROLL NO: 1111330915

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	6	7	8	9	10	AVG	STD
MASS/UNIT AREA	D 5261	oz/sy	10.7	10.2	10.3	10.4	10.5	11.4	10.5	11.8	11.3	11.0	**10.8**	**0.504**
GRAB STRENGTH	D 4632	MD-lbs	386.7	405.1	374.9	345.9	376.1	351.9	316.6	319.6	337.2	368.4	**358.2**	**27.51**
		CD-lbs	324.6	355.6	420.1	414.9	399.0	374.4	471.4	392.6	393.1	359.5	**390.5**	**38.58**
GRAB ELONGATION	D 4632	MD-%	110.0	116.7	113.3	120.0	120.0	120.0	106.7	113.3	110.0	103.3	**113.3**	**5.58**
		CD-%	120.0	113.3	113.3	120.0	120.0	110.0	120.0	126.7	116.7	113.3	**117.3**	**4.67**
TRAPEZOIDAL TEAR	D 4533	MD-lbs	171.3	192.6	162.0	170.2	132.1	178.0	210.8	194.0	189.9	164.9	**176.6**	**20.75**
		CD-lbs	249.0	250.2	278.6	177.0	231.8	261.1	184.5	191.3	170.2	228.9	**222.3**	**36.68**

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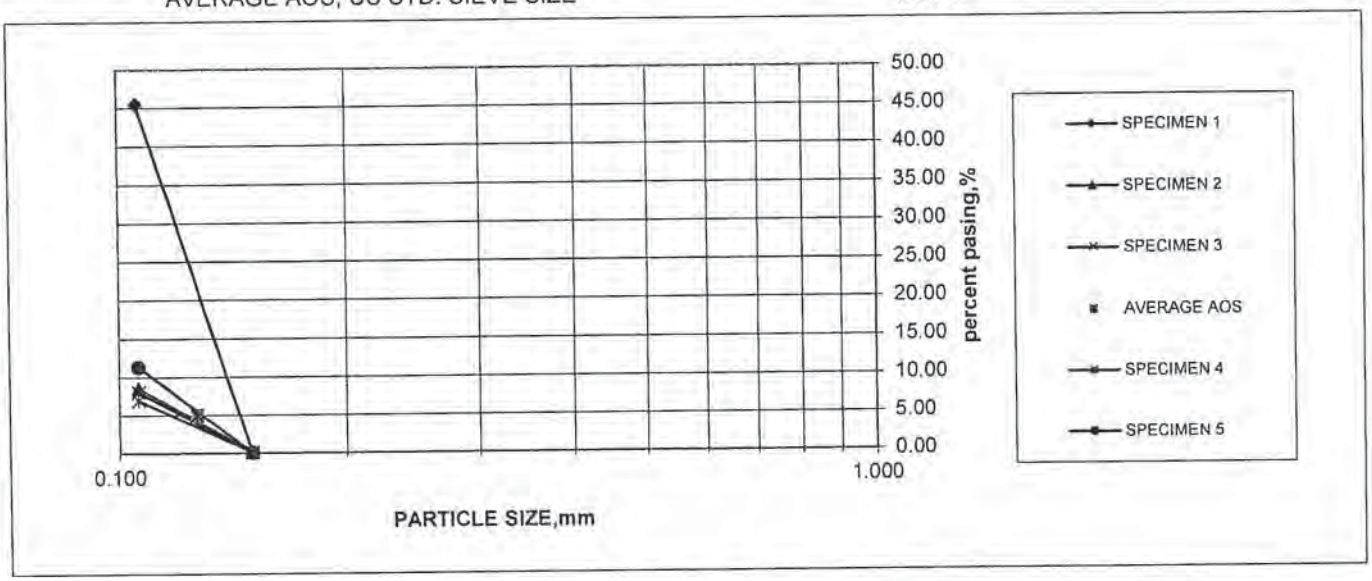
Geotechnics
INTEGRITY IN TESTING

APPARENT OPENING SIZE
ASTM D 4751

CLIENT: Chesapeake Containment Systems, Inc. PROJECT NO.: L17174-06
CLIENT PROJECT: Savannah River LAB ID NO.: L17174-06-01
MATERIAL: Agrutex 101 Non-Woven Geotextile ROLL NO: 1111330822

US STD. SIEVE SIZE	SIEVE OPENING (mm)	WT. FRAME & GEOTEXTILE & BEADS (gm)	WT. FRAME & GEOTEXTILE (gm)	WT. BEADS (gm)	WT. PAN & BEADS (gm)	WT. PAN (gm)	WT. BEADS PASSING (gm)	PERCENT PASSING (%)	AOS @ 5% PASSING (mm)
SPECIMEN 1									
#140	0.106	1547.57	1497.57	50.00	319.75	297.02	22.73	45.46	
#100	0.150	1547.77	1497.77	50.00	297.04	297.02	0.02	0.04	**0.144**
SPECIMEN 2									
#140	0.106	548.07	498.07	50.00	413.79	409.51	4.28	8.56	
#100	0.150	548.30	498.30	50.00	409.58	409.51	0.07	0.14	**0.123**
SPECIMEN 3									
#140	0.106	536.54	486.54	50.00	412.91	408.90	4.01	8.02	
#100	0.150	536.74	486.74	50.00	408.92	408.90	0.02	0.04	**0.121**
SPECIMEN 4									
#140	0.106	544.13	494.13	50.00	412.87	409.40	3.47	6.94	
#100	0.150	544.22	494.22	50.00	409.43	409.40	0.03	0.06	**0.117**
SPECIMEN 5									
#140	0.106	546.38	496.38	50.00	416.49	410.82	5.67	11.34	
#100	0.150	546.55	496.55	50.00	410.84	410.82	0.02	0.04	**0.129**

AVERAGE AOS @ 5% PASSING, mm 0.127
AVERAGE AOS, US STD. SIEVE SIZE **#100**



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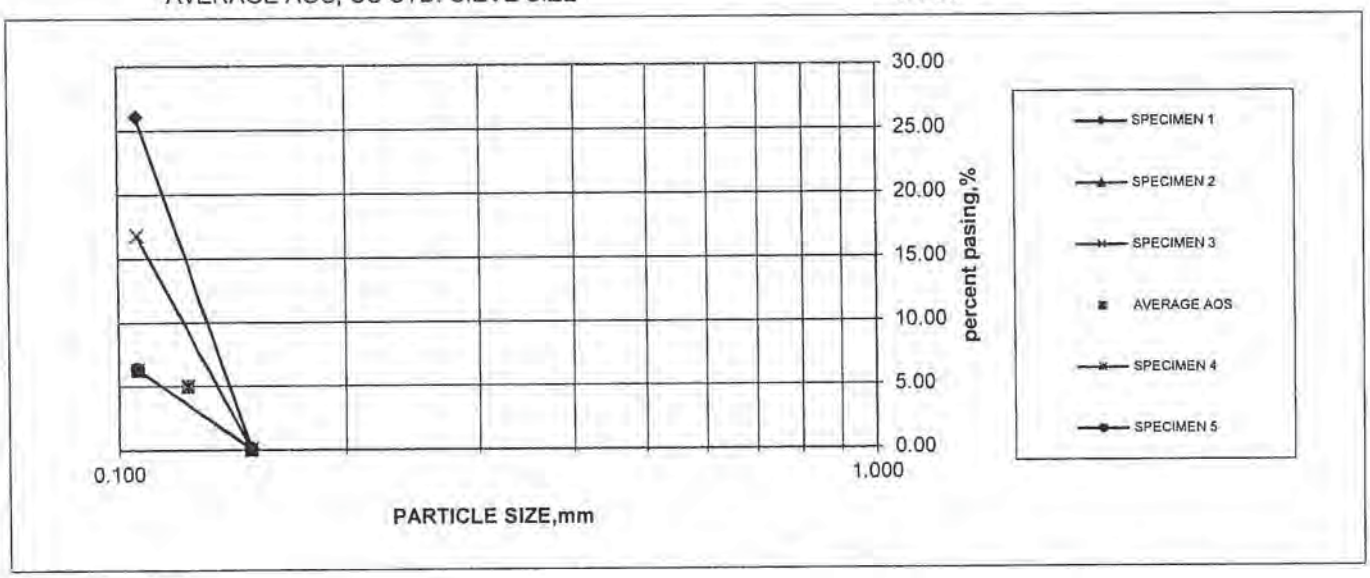
APPARENT OPENING SIZE
ASTM D 4751

CLIENT: Chesapeake Containment Systems, Inc. PROJECT NO.: L17174-06
CLIENT PROJECT: Savannah River LAB ID NO.: L17174-06-03
MATERIAL: Agrutex 101 Non-Woven Geotextile ROLL NO: 1111330884

US STD. SIEVE SIZE	SIEVE OPENING (mm)	WT. FRAME & GEOTEXTILE & BEADS (gm)	WT. FRAME & GEOTEXTILE (gm)	WT. BEADS (gm)	WT. PAN & BEADS (gm)	WT. PAN (gm)	WT. BEADS PASSING (gm)	PERCENT PASSING (%)	AOS @ 5% PASSING (mm)
SPECIMEN 1									
#140	0.106	1547.61	1497.61	50.00	304.04	291.02	13.02	26.04	
#100	0.150	1547.72	1497.72	50.00	297.08	297.02	0.06	0.12	**0.141**
SPECIMEN 2									
#140	0.106	548.25	498.25	50.00	412.67	409.51	3.16	6.32	
#100	0.150	548.34	498.34	50.00	409.53	409.51	0.02	0.04	**0.114**
SPECIMEN 3									
#140	0.106	536.44	486.44	50.00	417.30	408.90	8.40	16.80	
#100	0.150	536.58	486.58	50.00	408.93	408.90	0.03	0.06	**0.135**
SPECIMEN 4									
#140	0.106	544.39	494.39	50.00	412.55	409.40	3.15	6.30	
#100	0.150	544.49	494.49	50.00	409.44	409.40	0.04	0.08	**0.114**
SPECIMEN 5									
#140	0.106	546.62	496.62	50.00	413.99	410.82	3.17	6.34	
#100	0.150	546.73	496.73	50.00	410.84	410.82	0.02	0.04	**0.114**

AVERAGE AOS @ 5% PASSING, mm 0.124
AVERAGE AOS, US STD. SIEVE SIZE **#120**



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Geotechnics
INTEGRITY IN TESTING

PERMITTIVITY TEST RESULTS

ASTM D 4491
CONSTANT HEAD TEST

CLIENT: Chesapeake Containment Systems, Inc.
CLIENT PROJECT: Savannah River
PROJECT NO.: L17174-06
LAB ID NO.: L17174-06-01
MATERIAL: Agrutex 101 Non-Woven Geotextile
ROLL NO: 1111330822

SPECIMEN NO.	1	2	3	4	
SPEC.THICKNESS, mils	108.5	107.5	102	106.5	
CONSTANT HEAD, in	2.0	2.0	2.0	2.0	
COLLECTION DIVISIONS	5	5	5	5	
READING NO.	COLLECTION TIME, sec				
1	17.16	17.03	15.36	16.27	
2	17.20	17.06	15.41	16.31	
3	17.21	17.09	15.46	16.32	
4	17.26	17.10	15.42	16.33	
5	17.22	17.01	15.40	16.39	SAMPLE
AVERAGE, sec	**17.21**	**17.06**	**15.41**	**16.32**	**AVERAGE**
PERMITTIVITY @ 20 C,sec-1	1.31	1.32	1.46	1.38	**1.37 sec-1**
PERMEABILITY @ 20 C, cm/sec	0.36	0.36	0.38	0.37	**0.368 cm/sec**
FLOW RATE @ 2" CONSTANT HEAD gpm/s.f.	97.9	98.8	109.3	103.2	**102.3 gpm/s.f.**

TEST PARAMETERS

QUANTITY COLLECTED PER DIV., cc	457
SPECIMEN DIA., cm	5.08
AREA, cm2	20.27
TEMP, C°	19.6
CORRECTION FACTOR, Rt	1.01
OXYGEN CONTENT, ppm	< 6

CHECKED BY: JMP DATE: 12-14-17

C:\My Documents\EXCEL\Templates\[Textile-Perm-FallHead.xls]Sheet1
\\geoserver\Data Drive\Synthetics\2017 SYNTHETICS\174- CHESAPEAKE CONTAINMENT- Savannah River\[L17174-06-01 Text. Conformanci L17174-06-01 12/14/2017

Geotechnics
INTEGRITY IN TESTING

PERMITTIVITY TEST RESULTS

ASTM D 4491
CONSTANT HEAD TEST

CLIENT: Chesapeake Containment Systems, Inc.
CLIENT PROJECT: Savannah River
PROJECT NO.: L17174-06
LAB ID NO.: L17174-06-03
MATERIAL: Agrutex 101 Non-Woven Geotextile
ROLL NO: 1111330884

SPECIMEN NO.	1	2	3	4	
SPEC.THICKNESS, mils	117.5	108.5	121	101	
CONSTANT HEAD, in	2.0	2.0	2.0	2.0	
COLLECTION DIVISIONS	5	5	5	5	
READING NO.	COLLECTION TIME, sec				
1	16.85	16.21	17.06	15.66	
2	16.90	16.22	17.10	15.67	
3	16.87	16.23	17.12	15.59	
4	16.91	16.18	17.09	15.61	
5	16.92	16.26	17.11	15.64	SAMPLE
AVERAGE, sec	**16.89**	**16.22**	**17.10**	**15.63**	**AVERAGE**
PERMITTIVITY @ 20 C,sec-1	1.33	1.39	1.32	1.44	**1.37 sec-1**
PERMEABILITY @ 20 C, cm/sec	0.40	0.38	0.40	0.37	**0.389 cm/sec**
FLOW RATE @ 2" CONSTANT HEAD gpm/s.f.	99.8	103.9	98.6	107.8	**102.5 gpm/s.f.**

TEST PARAMETERS

QUANTITY COLLECTED PER DIV., cc	457
SPECIMEN DIA., cm	5.08
AREA, cm2	20.27
TEMP, C°	19.6
CORRECTION FACTOR, Rt	1.01
OXYGEN CONTENT, ppm	< 6

CHECKED BY: TH DATE: 12-14-17

C:\My Documents\EXCEL\Templates\[Textile-Perm-FallHead.xls]Sheet1

\\geoserver\Data Drive\Synthetics\2017 SYNTHETICS\174- CHESAPEAKE CONTAINMENT- Savannah River\[L17174-06-03 Text, Conformance L17174-06-03 12/14/2017

APPENDIX O

SOIL TEST DATA AND DOCUMENTATION

Appendix O1 CSRA Soil Testing Laboratory
Appendix O2 Soil Gradation & Proctor Including Compaction (NWB) Reports
Appendix O3 Other Area Wide Compaction Reports

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APPENDIX O1

CSRA Soil Testing Laboratory

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csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Project Construction Testing and Quality Assurance Plan

February 16, 2015

Project: Ash Landfill Closure

Location: Savannah River Site, Aiken Co., SC

Contractor/Client: Envirocon
101 International Drive
Missoula, MT 59808
(406) 523-1150

Project Description

All tests will be performed in accordance with all applicable ASTM Standards and all QA requirements therein.

Laboratory Reports

The testing laboratory will submit one (1) copy of laboratory reports to Envirocon as specified in Section 01410. The laboratory report will include the following information:

- Date Issued
- Project Number
- Name of Inspector
- Date and Time of Sampling or Inspection
- Identification of Product and Specifications Section
- Location of the project
- Types of Inspection or Test
- Date of Test
- Location and/or boundaries of the specified inspection or test
- Conformance with Subcontract Documents

Laboratory Qualifications

This laboratory meets the requirements of:

ASTM E329	Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction
ASTM D3740	Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
ASTM C1077	Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation

Professional Engineers, James M. Pope (P.E. Georgia 6271 and South Carolina No. 3665) and Jon E. Pruett (P.E. Georgia No. 027602 and South Carolina No. 20965 and) are employed by CSRA Testing and Engineering Company, Inc., to oversee all projects and have current engineering licenses.

CSRA Testing and Engineering Company, Inc., is currently licensed in Georgia and South Carolina. Please see attached "Statement of Qualifications and Experience" for additional information on this firm and resumes of key personnel.

Management

All work on this project will be under the direction of James M. Pope, Professional Engineer, with Georgia License Number 6271.

The Laboratory Supervisor on this project will be Jeffery S. Pope with 25 years experience and with the following credentials:

- NICET-Engineering Technologies, Construction Level III, Subsurface Investigation Level II & Lab Level III
- American Concrete Institute (ACI) Technician Grade I
- Troxler Training Course - Nuclear Testing Equipment Certificate
- OSHA Forty-Hour Hazardous Waste and Emergency Response Course
- International Code Council - Structural Masonry Special Inspector
- American Concrete Institute (ACI) - Concrete Construction Special Inspector
- GA DOT Roadway Testing Technician

An inspector, or technician, will be assigned to this project having adequate training and experience in concrete sampling and testing and soil compaction and analysis in accordance with ASTM E329.

Quality System

The testing laboratory has begun a program to document the elements of this quality system and this documentation is available for use by all laboratory personnel. The testing laboratory has defined and documented its policies and objectives for, and its commitment to good laboratory practice and quality of calibration or testing services. The laboratory management ensures that these policies and objects are documented in a quality manual and communicated to, understood, and implemented by all laboratory personnel concerned. The quality manual is maintained under the responsibility of the laboratory supervisor.

All equipment is calibrated in accordance with the appropriate ASTM test designation. Records of these calibrations is kept in files and under the administration of the laboratory supervisor. All measuring and testing equipment having an effect on the accuracy or validity of calibrations or tests is calibrated and/or verified before being put into service. The laboratory has an established program for the calibration and verification of its measuring and test equipment.

The overall program of calibration and/or verification and validation of equipment is designed and operated so as to ensure that, wherever applicable measurements made by the laboratory are traceable to national standards of measurements where available as stated in QA manual.

Where traceability to national standards of measurement is not applicable, the laboratory will endeavor to provide satisfactory evidence of correlation of results.

Reference standards of measurements are calibrated by a body that can provide traceability to a national standard of measurement. There is a program of calibration and verification for referenced standards.

Where relevant, reference standards and measuring and testing equipment is subjected to in-service checks between calibrations and verifications.

Reference materials can, where possible, be traceable to national or international standards of measurement, or to a national or international standard reference materials.

Should calibration procedures reveal that a piece of equipment was not in proper calibration and that this lack of calibration could have caused past test reports to be significantly incorrect, the testing laboratory will immediately notify all clients that would be affected by this our of calibration deficiency.

The laboratory manager will make a comprehensive search of all project files to ensure that every client who may be effected is notified.

The laboratory maintains a record system to suit its particular circumstances and comply with any applicable regulations. It retains on record all original observations, calculations and derived data, calibration records and a copy of the calibration certificate, test certificate, or test reports for an appropriate period. The records of each calibration and test contains sufficient information to permit this repetition. The records include the identity of personnel involved in sampling, preparation, calibration or testing.

All records (including those pertaining to calibration and test equipment), certificates and reports are safely stored.

Procedure

All testing work will be performed at the direction of Envirocon under the supervision of James M. Pope, P.E.

All testing procedures will be in strict accordance with applicable ASTM Standards, supervised by Jeffery S. Pope, Laboratory Supervisor, and performed by a trained technician.

Test reports will be supplied to Envirocon for all tests performed or inspections made.

It will be the responsibility of the testing laboratory to ensure that it performs only tests and inspections, or both, for which it is adequately equipped and staffed, and that its employees perform only tests and inspections, or both, for which they are adequately trained.

The following duties are those usually performed by the testing laboratory.

1) Obtain representative samples of these materials required by project specifications, and authorized by contract, to be tested and evaluated.

2) When samples are collected by this firm, we will ensure that there is proper protection, handling and storing of the samples to ensure that they remain representative of the material being used at the time of sampling.

3) When the testing laboratory is responsible for collecting samples the samples must be identified with the respective portions of the work in which the material represented was or will be used.

4) Perform all testing and inspection operations in accordance with appropriate standards as referenced in the contract.

5) Call to the attention of the project sponsor any irregularities or deficiencies in the construction materials or processes, or both, as related to construction materials, that the contract specifically states the testing laboratory is responsible for inspecting.

6) Submit promptly to the project sponsor and distribute as specified in the contract formal reports of all tests and inspections which indicate compliance or noncompliance with the specifications. The reports will be complete and factual, citing the methods used in obtaining samples, the tests performed, the specified values for the measured characteristics, the values obtained, the parts of the structure involved, and similar pertinent data. We will be prepared to substantiate its reports to the extent necessary.

Unless specifically authorized, the testing laboratory does not have the right of rejection.

James M. Pope, P.E., President — Date 2-16-15

Jeffery S. Pope, Laboratory Manager — Date 2-16-15

Statement of Qualifications and Experience

csra TESTING AND ENGINEERING CO., INC.
1005 Emmett Street • Suite A • Augusta, Georgia 30904
Phone (706) 733-6960 • Fax (706) 737-0629

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Introduction

ORGANIZATION

CSRA Testing and Engineering Company, Inc., was founded in Augusta, Georgia in 1968. Since that time our company has continuously strived to provide professional testing and engineering services with the highest possible degree of quality assurance.

We provide an extensive range of services, including subsurface investigations, environmental investigations, and selective analytical laboratory analysis. We provide well equipped drilling crews to perform geotechnical and environmental borings. Our construction testing department is highly diversified, providing on-site construction inspections and testing of soils, concrete, asphalt, and aggregates. We also supply concrete or asphalt coring services as well as environmental assessment and underground fuel storage tank studies and monitor well installations.

This company's growth, existence, and reputation is based upon our capability to perform professional tests within the strict, prescribed guidelines of technical associations, and government standards and regulations. Considerable pride and expertise in procedures and manner of conducting technical tests have been the trademark for CSRA Testing and Engineering Company, Inc.

We employ only experienced, qualified, and dedicated personnel. Our capability to perform testing services for both small and large projects in a successful, timely manner is a result of our organized engineering approach. Our intent is to perform quality tests in strict accordance with established procedures and to document, review, and certify all test results.

Over the past ten years, our small company has professionally performed approximately 75,000 various tests for over 900 different clients. This has given us extensive experience in a wide variety of testing services. We are the only American owned testing firm in the Central Savannah River Area offering soil, concrete, asphalt, and physical testing services.

SERVICES PROVIDED

SUBSURFACE INVESTIGATIONS

Geotechnical Borings
Environmental Borings
Foundation Recommendations

ON-SITE CONSTRUCTION TESTING

Asphalt
Bolt Tension
Concrete
Soil
Stone Aggregate
Welding

NON-DESTRUCTIVE TESTING

Radiographic
Ultrasonic
Dye Penetrant
Welding Procedure Preparation

ON-SITE CONSTRUCTION INSPECTIONS

Masonry
Soil
Structural Steel

ENVIRONMENTAL ASSESSMENT STUDIES & REPORTS

UNDERGROUND FUEL STORAGE TANK STUDIES

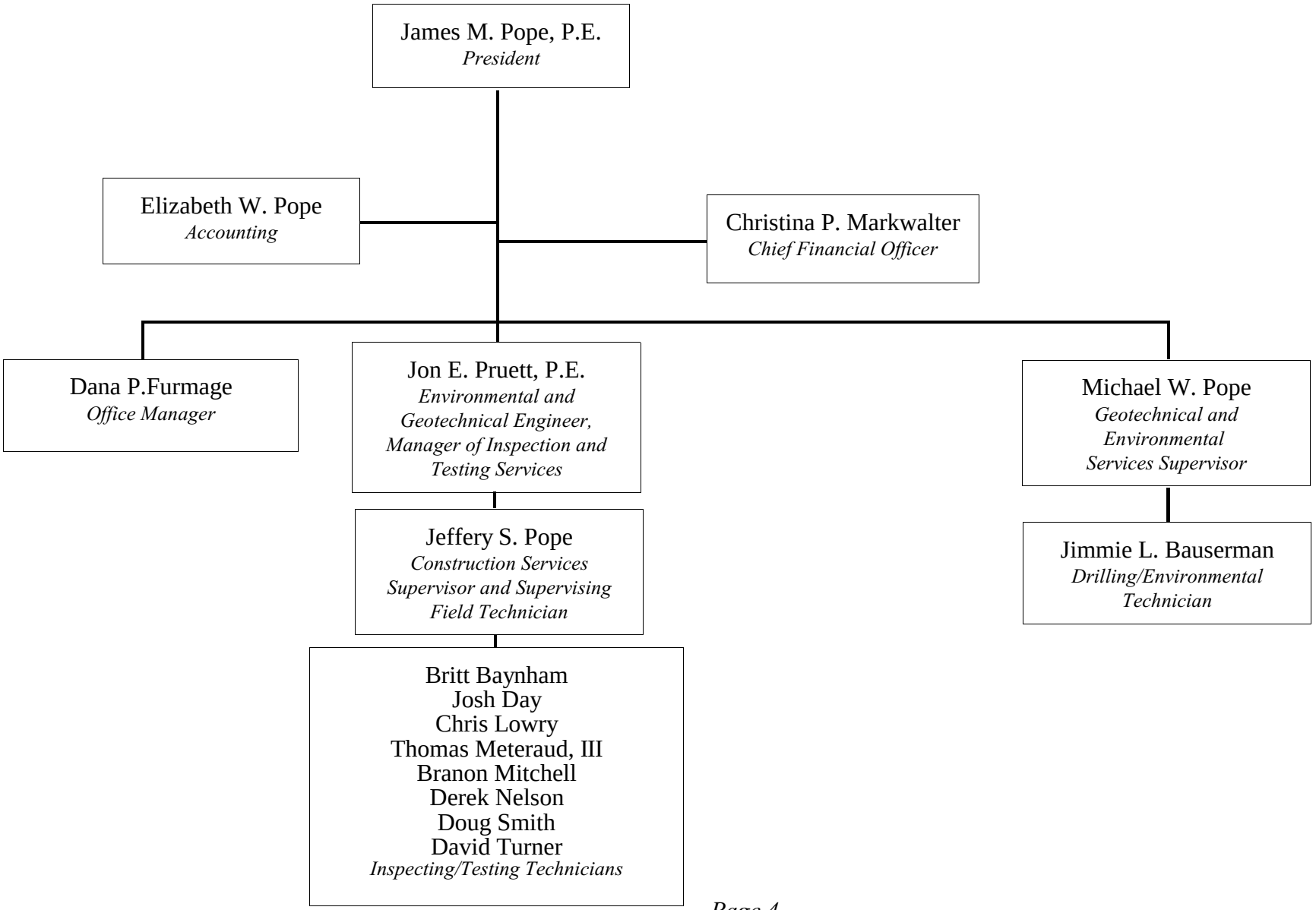
MONITOR WELL INSTALLATION

CONCRETE AND ASPHALT CORING

STORMWATER AND EROSION CONTROL INSPECTIONS

Resumes of Principles and Key Personnel

Organization Chart



James M. Pope, P.E.

President and Owner

Education

Bachelor of Civil Engineering (1964), Georgia Institute of Technology, Atlanta, Georgia

Professional and Service Organizations

Chairman - Past Chairman - Richmond County Plumbing Board
Member - Past Member - Aiken County Planning Commission
Past Member - North Augusta Board of Appeals
American Society of Civil Engineering
National Drilling Association
American Society for Testing and Materials
National Groundwater Association

Experience

Principal Professional Engineer and Owner of CSRA Testing and Engineering Company, Inc. for 35 years

Major Categories

Materials testing, subsurface investigations, environmental assessment studies, analytical, testing services, and engineering design services. Directly responsible for testing and engineering tasks performed by associates and employees which include Administrators, Construction Inspectors, Surveyors, Architects, Mechanical Engineers, Structural Engineers, Laboratory Technicians, and Quality Control Technicians Supervisor - Director of all office personnel which include Specification Writers, Bookkeepers, Report Writers, Receptionists, and Secretaries.

Former Employment

Florida Department of Health
Augusta, Georgia Engineering Department
Jones & Fellers, Architects and Engineers, Augusta, Georgia

Years Experience

Fifty

Registrations

Georgia-Professional Engineer (Civil) 6271
South Carolina-Professional Engineer (Civil) 3665
South Carolina-Licensed Well Driller #A 791

Michael W. Pope

Engineer

Education

Bachelor of Science in Engineering
University of South Carolina, Columbia, South Carolina
Emphasis on Geotechnical and Environmental Engineering

Major Categories of Experience

Construction Engineering
Construction Management
Geotechnical Engineering
Environmental Engineering

Professional and Service Organizations

Georgia Society of Professional Engineers
Professional Construction Estimators Association

Former Employment

APAC of Georgia, Inc.
Augusta, Georgia

Georgia Department of Agriculture
Augusta, Georgia

Years Experience

Twenty

Registrations

Level IA - Fundamentals of Erosion and Sediment Control

Jeffery S. Pope

Project Coordinator

Education/Training

University of South Carolina
Concentration in Math/Chemistry
Columbia, South Carolina (2 years)

National Institute for Certification in Engineering Technologies Construction-Level III
Subsurface Investigation-Level III, Laboratory-Level III, Generalist-Level III

Concrete Field Testing
Technician, Grade I by the American Concrete Institute

Troxler Training Course for use of Nuclear Testing Equipment

Environmental Analytical Testing Short School
University of Georgia
OSHA Forty-hour Hazardous Waste and Emergency Response Course

North Augusta High School
North Augusta, South Carolina

Major Categories of Experience

Management
Construction Testing
Environmental Assessments

Years Experience

Twenty-four

Registrations

NICET-Engineering Technologies, Construction Level III, Subsurface Investigation Level II & Lab Level III
American Concrete Institute (ACI) Technician Grade I
Troxler Training Course - Nuclear Testing Equipment Certificate
OSHA Forty-Hour Hazardous Waste and Emergency Response Course
International Code Council - Structural Masonry Special Inspector
American Concrete Institute (ACI) - Concrete Construction Special Inspector
GA DOT Roadway Testing Technician

Christina P. Markwalter

Comptroller

Education

North Augusta High School
University of South Carolina
Bachelor of Science in Business Administration - Major in Marketing

Major Categories of Experience

Financial Officer, bookkeeping, insurance, personnel manager, tax reports - Radiological Safety Officer.

Work Experience

Fifteen

Certifications

Humboldt Scientific, Inc.
Nuclear Gauge Training Certification
Radiation Safety Officer Certification

Jonathan E. Pruett, P.E.

Engineer

Education

Bachelor of Civil Engineering
Clemson University
Emphasis on Environmental Engineering and Hydrogeology
Wetlands Delineation Training

Professional and Service Organizations

Member - American Society of Civil Engineers

Experience

Environmental Department Manager, Hydrogeology

Major Categories

Responsibilities include site inspections, use of radiological detection devices, and deed research. Analytical Laboratory Coordinator, supervising all laboratory procedures. Responsible for collection and editing of environmental assessment and underground storage tank study data. Hydrogeology (supervises geological borings, writes boring logs, etc.).

Years Experience

Twenty-one

Certifications

GA Professional Engineer (Civil) - 027602
South Carolina-Professional Engineer (Civil) 20965
Wetlands Delineation Certification for U.S. Army Corps of Engineers Certificate No. 190-3/96
EIT Certificate No. 14774 Certificate Date 6/19/2000
Asbestos Building Inspector Certificate No. 1R27120-02217

Robert T. Hart, P.E.

Engineer

Education

Bachelor of Civil Engineering
University of Maryland (1974)

Experience

Thirty years heavy civil construction, includes subways, lock and dams, bridges and commercial projects and deep piling foundations.

Major Categories of Experience

Deep excavation shoring design, materials testing and inspection services, emphasis on welding inspections including radiography, ultrasonic, etc.

Professional Registrations

Georgia - Professional Engineer - 13522
South Carolina - Professional Engineer - 9754
Florida - Professional Engineer
Maryland - Professional Engineer

Dana P. Furmage

Office Manager

Education

Vocational Office Training
Evans High School
Evans, Georgia

Major Categories of Experience

Plans, prepares and designs all report documents. Oversees office and computer programming procedures. Insurance and workman's compensation administrator. Assists in daily scheduling of secretaries and technicians. Monitors incoming and outgoing data distribution.

Years Experience

Twenty

Jimmie L. Bauserman

Geotechnical Drilling Technician

Education

Butler High School
Augusta, Georgia

Experience

Extensive training and experience in soils, concrete and asphalt construction and test procedures both "on-site" and in the laboratory. Knowledgeable of all applicable ASTM, AASHTO, and Corps of Engineers standards. Responsible for sampling and evaluations of environmental and geotechnical study sites.

Major Categories

Subsurface Exploration, Rock Boring, Monitor Well Installation, and Concrete Coring.

Years Experience

Twenty-four

Training and Certifications

Well Drillers Certification-South Carolina No. 1380
Use of Nuclear Testing Equipment Certification
OSHA Hazardous Waste and Emergency Response
ACI Concrete Field Testing Certification
NICET - Level I, Geotechnical Engineering Technology - Exploration
NICET - Level I, Geotechnical Engineering Technology - Construction
NICET - Level I, Geotechnical Engineering Technology - Generalist
GSWCC Level IA Certification No. 70417

Chris Lowry

Inspector

Education

Aiken High School
Aiken, South Carolina

Experience

Quality Control Inspector/Technician

Extensive training and experience passing written and oral examinations in soils, concrete and asphalt construction and test procedures both "on-site" and in the laboratory. Knowledgeable of applicable ASTM, AASHTO, and Corps of Engineers standards. Special inspections.

Years Experience

Three

Training and Experience

Use of Nuclear Testing Equipment Certification
OSHA Hazardous Waste and Emergency Response
WACEL Soils Level I Technician
ACI Concrete Field Testing Technician-Grade I

Doug Smith

Inspector

Education

Augusta Technical College
Augusta, Georgia

Hephzibah High School
Hephzibah, Georgia

Experience

Quality Control Inspector/Technician

Extensive training and experience passing written and oral examinations in soils, concrete and asphalt construction and test procedures both "on-site" and in the laboratory. Knowledgeable of applicable ASTM, AASHTO, and Corps of Engineers standards. Special Inspections.

Years Experience

Fifteen

Training and Experience

Use of Nuclear Testing and Equipment Certification
OSHA Hazardous Waste and Emergency Response
Level IA - Fundamentals of Erosion and Sediment Control
International Code Council - Soils Special Inspector
SCDOT - Asphalt Roadway Technician
ACI Concrete Field Testing Technician-Grade I

Branon Mitchell

Inspector

Education

North Augusta High School
North Augusta, South Carolina

Experience

Quality Control Inspector/Technician

Extensive training and experience in soils, concrete and asphalt construction and test procedures both "on-site" and in the laboratory. Knowledgeable of applicable ASTM, AASHTO, and Corps of Engineers standards. Special inspections.

Years Experience

Three

Training and Experience

Use of Nuclear Testing and Equipment Certification
OSHA Hazardous Waste and Emergency Response
International Code Council Structural Masonry Special Inspector
SC Office of State Facilities Special Inspector

Sample Listing of Clients

SAMPLE LISTING OF CLIENTS OF

CSRA Testing and Engineering Company, Inc.

GOVERNMENTAL AGENCIES

Federal

Department of Energy
Federal Aviation Administration
Federal Housing Authority-Farmers Home Administration
HQ Army and Airforce Exchange Service
Small Business Administration
U.S. Army Corps of Engineers
U.S. Department of Veterans Affairs
U.S. Fish and Wildlife Service
Veterans Administration

State

Georgia Department of Education
Georgia Department of Industry and Trade
Georgia Department of Labor
Georgia Department of Natural Resources
Georgia Department of Transportation
Georgia Gam and Fish Commission
Georgia Medical Research Foundation
Georgia Rehabilitation Institute
Georgia State Finance and Investment Commission
Medical College of Georgia
South Carolina Department of Parks

Local

Aiken, South Carolina
Aiken County Public Works Department
Augusta, Georgia
Augusta Housing Authority
Beech Island, South Carolina
Ben Hill County, Georgia
Burke County, Georgia
Bush Field Municipal Airport
City of Jackson, South Carolina
Columbia County Board of Education
Columbia County, Georgia
Daniel Field Municipal Airport
Edgefield County, South Carolina

Local (Con't)

Edgefield County School Board
Evans, Georgia
Fitzgerald, Georgia
Green County, Georgia
Lexington County Board of Education
Lincolnton, Georgia
McDuffie County, Georgia
North Augusta, South Carolina
Richmond County Board of Education
Richmond County, Georgia
St. Joseph Hospital
Thomson, Georgia
University Hospital
Williston School District

ARCHITECTS - ENGINEERS

John Brown, Architect
James Buckley and Associates
J.R. Chasman and Associates
Cheatham, Fletcher, Scott and Sears, AIA
Cranston, Robertson and Whitehurst, PC
Davis and Floyd Engineers
Nicholas Dickinson and Associates
Ebasco Environmental
Eckles, Martin and Rule, AIA
Hass-Hilderbrand and Associates
Holroyd, King and Associates, PC
Hughes/Beattie and Associates
Metcalf and Eddy Engineers
Nix-Mann Architects
Patchen, Mingledorff and Associates
E.L. Perry, Architect
Sandeford - Webb, Architects
Fred Sigg, Architect
Simons-Eastern Consultants, Inc.
Southern Partners
Stevens and Wilkinson, Inc.
James G. Swift and Associates
Tribble and Richardson, Inc.
Ben G. Turnipseed Engineers
Wells, Law and Associates
Whitaker Laboratory, Inc.
Wiedman and Singleton Engineers
Woodhurst Partnership, Architects
Zimmerman, Evans, and Leopold

MISCELLANEOUS

American Medicorps, Inc.
Atlanta Gas and Light Company
Augusta Mall, Inc. (The Rouse Company)
Augusta Country Club
Augusta National Golf Course
Banker's First
Blanchard and Calhoun
Boardman Oil Company
Cameron Brown Company
Caper House, Inc.
Champion Oil Company
Coca Cola Company
The Crom Corporation
CSX Railroad
Firestone
Global Van Lines
Goody's
Goodyear
The Huddle House
Hydrico
Industrial Rubber and Safety Company
Koger-Walters Oil Company
Krispy Kreme Company
Long John Silver, Inc.
Marathon Oil Company
McDonald Corporation
Oglethorpe Power Corporation
Orkin Exterminating Company
Pizza Hut, Inc.
Regency Mall
Republic Parking Company
The Rouse Company
Shoney's Big Boy
Southern Natural Gas Company
Syntek Corporation
Union '76
Waffle House, Inc.
Wal-Mart
Wells Oil Company
Wendy's
Western Sizzlin' Steak House
Wyatt Development Company

CONTRACTORS

A.L. Adams Construction Company
R.W. Allen Construction Company
APAC-Georgia, Inc.
BCB Company
Bowen and Watson Construction Company
Bradsfield and Gorie, Inc.
Brown Steel Contractors, Inc.
R.D. Brown Construction Company
Carolina Cranes, Inc.
CESP, Inc.
Curry Contracting Company
Flournoy Construction Company
Fluor Daniel Company
Gregory Bridge Company
R.J. Griffin Company
Perry M. Hartley Company
M.B. Kahn Construction Company
A.J. Kellos Construction Company
Knox-Rivers Construction Company
Kuhlke Construction Company
Litchfield Company
Mabus Brothers Construction Company
The Marley Cooling Tower Company
McCrory Construction Company
McKnight Construction Company
Metric Construction Company
Meybohm and Associates
Mobley Construction Company
Norsouth Construction Company
Olen Construction Company
Republic Contracting Company
H.G. Reynolds Company
Richmond Paving Company
Satterfield Construction Company
Scott's Grading and Paving Company
Shellhouse Construction Company
Sheriff Construction Company
J.C. Stockton and Son, Inc.
Nello L. Teer Company
Two State Construction Company
Vercon Construction
R.B. Wright Construction Company

American Association of State Highway and Transportation Officials

AASHTO Accreditation Program - Certificate of Accreditation

This is to signify that

CSRA Testing & Engineering Company, Inc.

Augusta, Georgia

has demonstrated proficiency for the testing of construction materials
and has met the minimum requirements in AASHTO R18
set forth by the AASHTO Highway Subcommittee on Materials.

The scope of accreditation can be obtained by viewing
the AAP Directories of Accredited Laboratories (www.amrl.net)
or by contacting AMRL.

Executive Director

Chair, AASHTO Highway
Subcommittee on Materials

AAP®
AASHTO R18

CSRA Testing & Engineering Company, Inc.

Augusta, Georgia

Show This Entry Only

Jeffery S. Pope
1005 Emmett Street
Suite A
Augusta, Georgia 30904

Phone: (706) 733-6960
Fax:
jeff@csratesting.net
http://www.csratesting.com

Quality Systems - accredited since 5/2/2006
R18

Soil - accredited since 5/2/2006
D698, D1140, D1556, D1557, D2216, D2487, D4318, D6938

Portland Cement Concrete - accredited since 9/13/2006
C31, C39, C78, C138, C143, C172, C173, C231, C511, C1064, C1231 (7000 psi and below)

Please note that our accreditations do not include an expiration date. An accreditation only expires when the laboratory fails to comply with our accreditation requirements.

* This information is only valid as of 9/5/2013. Please visit http://www.amrl.net for current accreditation status.

AMRL AASHTO Materials Reference Laboratory
DEKRA ISO 9001:2008 Certified
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Contact Us | Terms of Use | Privacy Policy

APPENDIX O2

Soil Gradation & Proctor Including Compaction (NWB) Reports

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csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-8960
FAX (706) 737-0629

Report No. T16-AI01

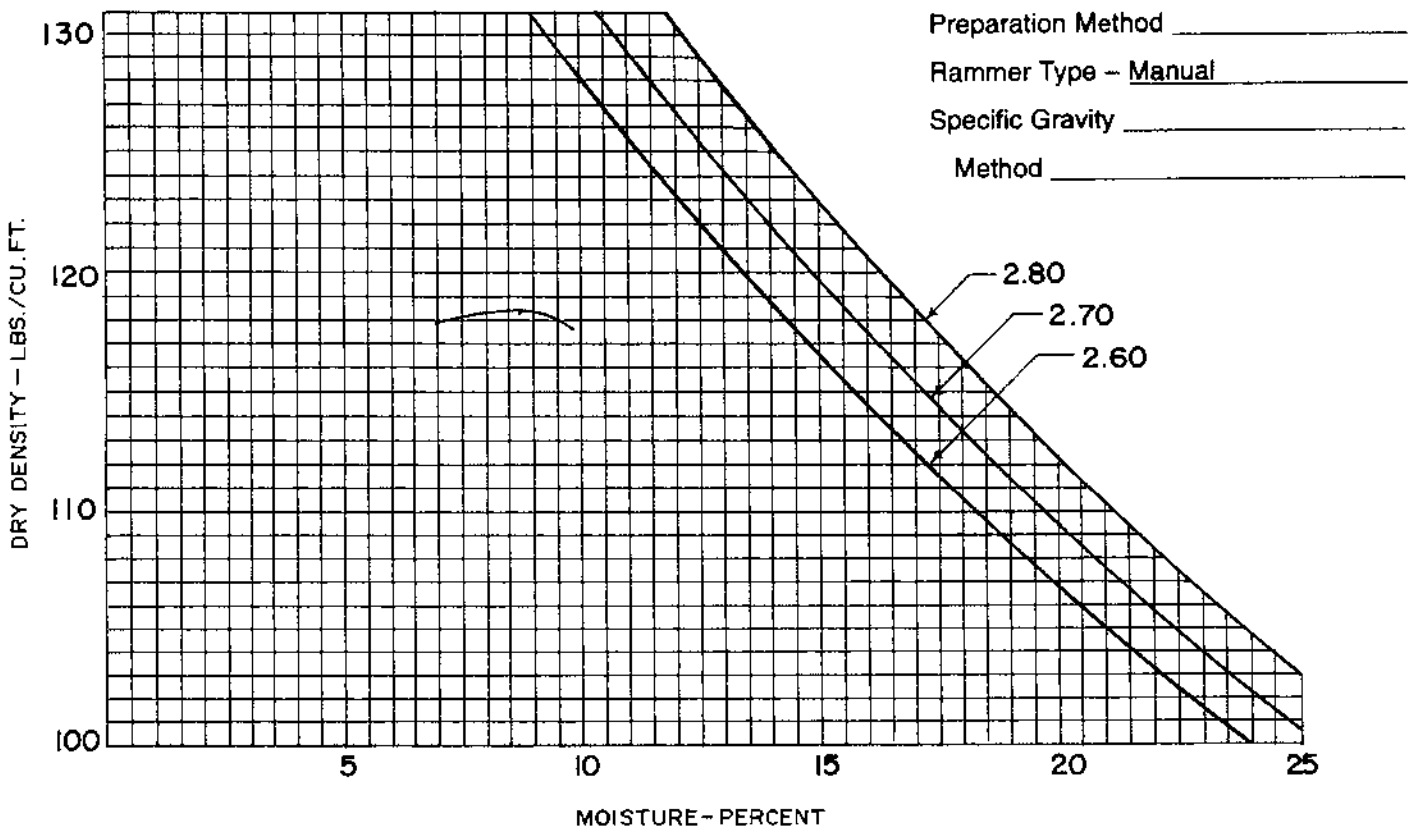
Date December 8, 2016

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: Ash Basin Closure,C-SPP-D-00002 LOCATION: Savannah River Site, Aiken Co., SC

SOIL PROCTOR TEST

Maximum Dry Density — 118.2 pcf
Optimum Moisture Content — 8.7%
Soil Description — Brown Silty Sand (Borrow Pit #1 Common Fill)



ASTM D - 1557 , Method – A

Technician Andrew Doolittle

Accredited By AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T16-AI02
Date Sampled December 7, 2016
Date of Test December 14, 2016
Date Issued December 15, 2016

CLIENT: Envirocon, Inc.
PROJECT: 488-4D Ash Landfill Closure, C-SPP-D-00002,
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Brown Silty Sand (Borrow Pit #1 - Common Fill)

Sieve No.	% Passing
4	100.0%
10	99.8%
20	96.6%
40	71.6%
60	38.0%
140	14.8%
200	11.6%

1 cc: Envirocon, Inc.; Trip Winfree (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T16-AH97

Date December 8, 2016

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

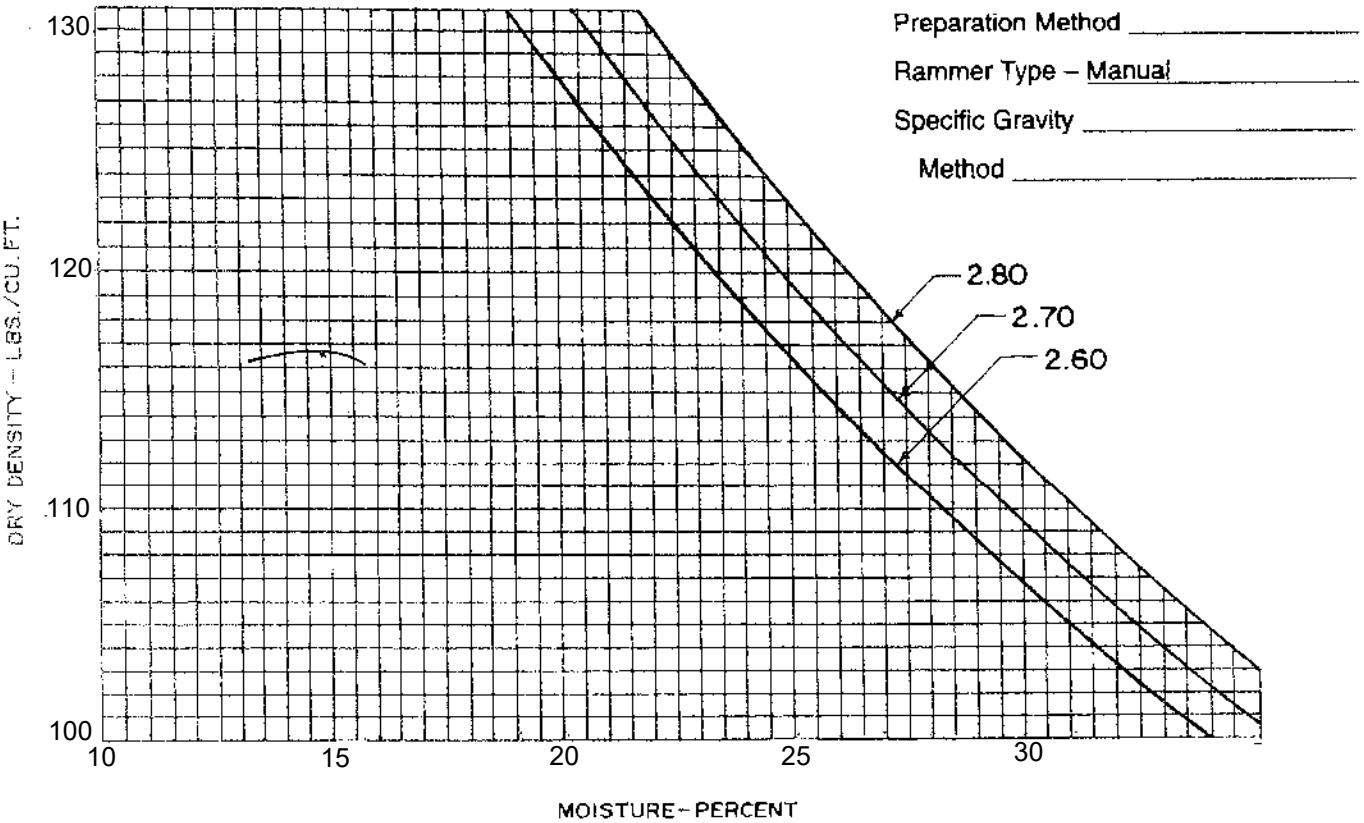
PROJECT: Ash Basin Closure,C-SPP-D-00002 LOCATION: Savannah River Site, Aiken Co., SC

SOIL PROCTOR TEST

Maximum Dry Density — 116.8 pcf

Optimum Moisture Content — 14.9%

Soil Description — Brown Silty Sand (Borrow Pit #2-West End)



ASTM D - 1557 , Method – A

Technician Andrew Doolittle

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T16-AI05
Date Sampled December 7, 2016
Date of Test December 14, 2016
Date Issued December 15, 2016

CLIENT: Envirocon, Inc.
PROJECT: 488-4D Ash Landfill Closure, C-SPP-D-00002,
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Brown Silty Sand (Borrow Pit #2 - West End)

Sieve No.	% Passing
4	100.0%
10	100.0%
20	92.0%
40	63.0%
60	44.0%
140	26.0%
200	19.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-E59
Date Sampled February 3, 2017
Date of Test February 7, 2017
Date Issued February 7, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Light Brown Silty Sand

Sieve No.	% Passing
4	100.0%
10	99.0%
20	95.0%
40	70.0%
60	39.0%
140	16.0%
200	13.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-E52

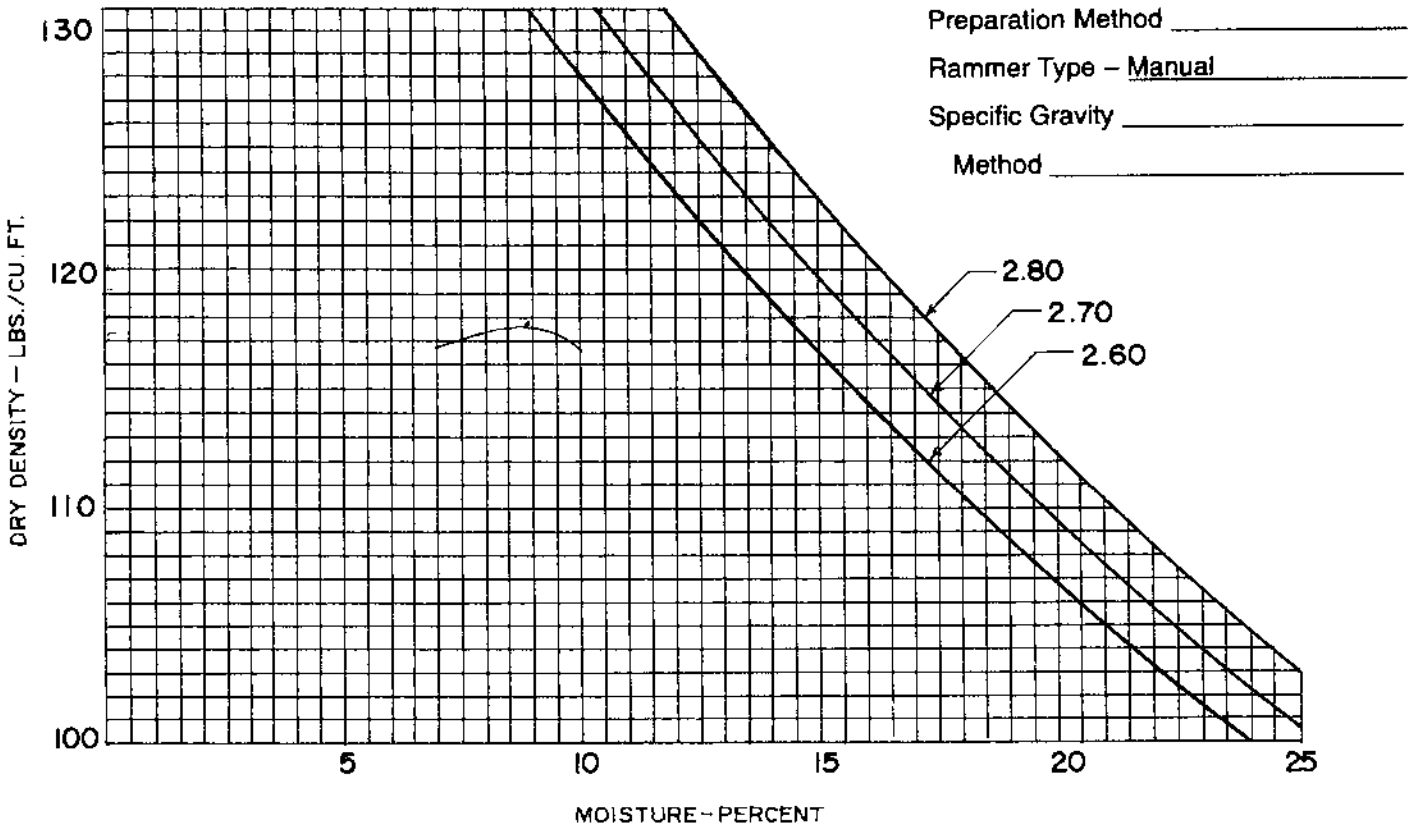
Date February 3, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO #258194

SOIL PROCTOR TEST

Maximum Dry Density — 117.9 pcf
Optimum Moisture Content — 8.9%
Soil Description — Light Brown Silty Sand



ASTM D - 1557 , Method – A

Technician David Turner

Accredited By AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-C58
Date Sampled January 18, 2017
Date of Test January 19, 2017
Date Issued January 19, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Brown Clayey Sand

Sieve No.	% Passing
⅜	100.0%
4	99.6%
10	73.8%
20	50.8%
40	25.1%
60	13.0%
140	4.7%
200	3.3%

1 cc: Envirocon, Inc.; Trip Winfree (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-C56

Date January 18, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC

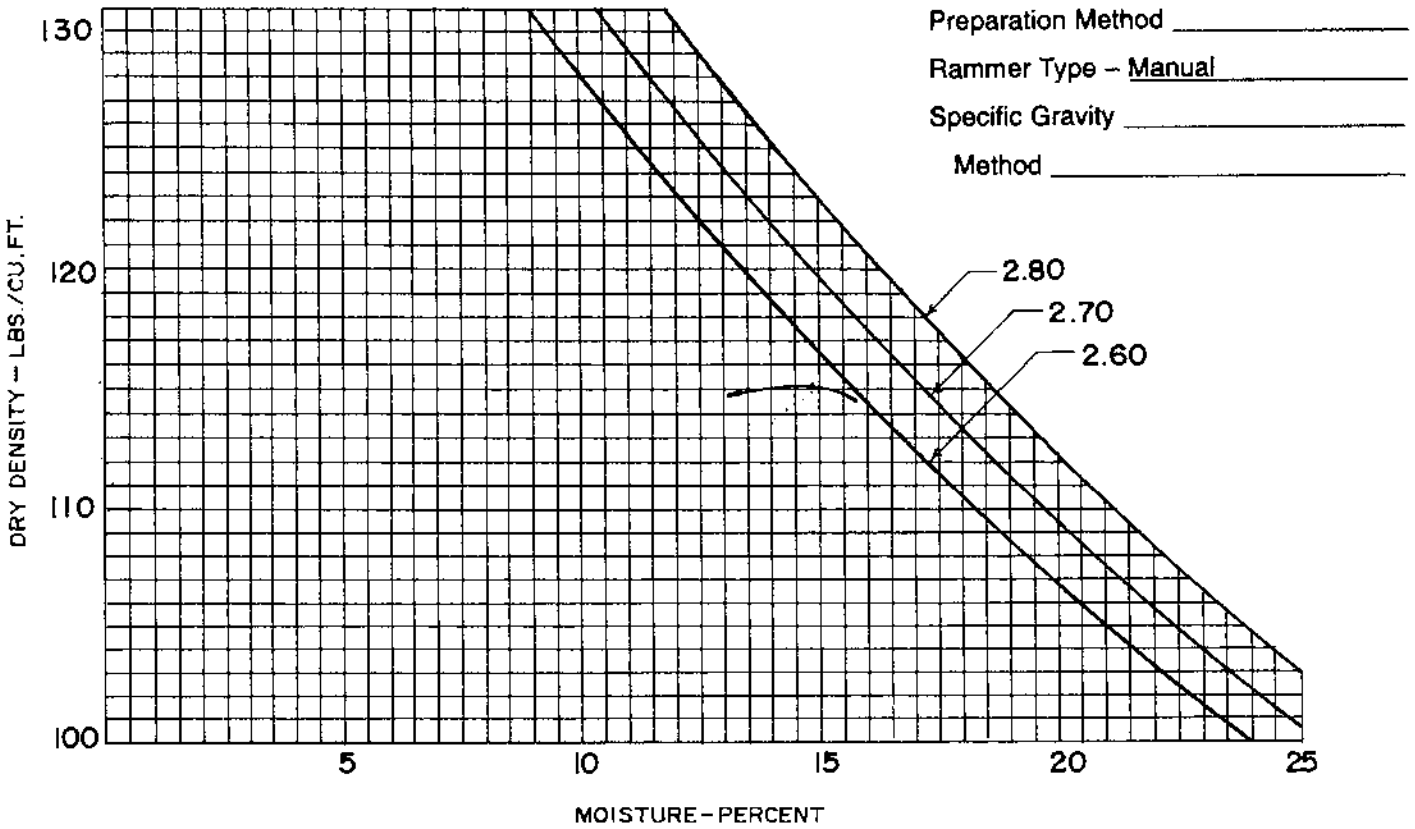
SRNS P0# 258194

SOIL PROCTOR TEST

Maximum Dry Density — 115.1 pcf

Optimum Moisture Content — 14.9%

Soil Description — Reddish-Brown Clayey Sand



ASTM D - 1557 , Method – A

Technician Britt Baynham

Accredited By AASHTO Accreditation Program (AAP)

029-Gradation & Proctor
CPRB Page 2 of 2

Phoenix #126739

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-J23
Date Sampled March 1, 2017
Date of Test March 3, 2017
Date Issued March 3, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Brownish-Tan Slightly Silty Sand

Sieve No.	% Passing
4	100.0%
10	99.0%
20	93.0%
40	63.0%
60	35.0%
140	17.0%
200	14.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-J22

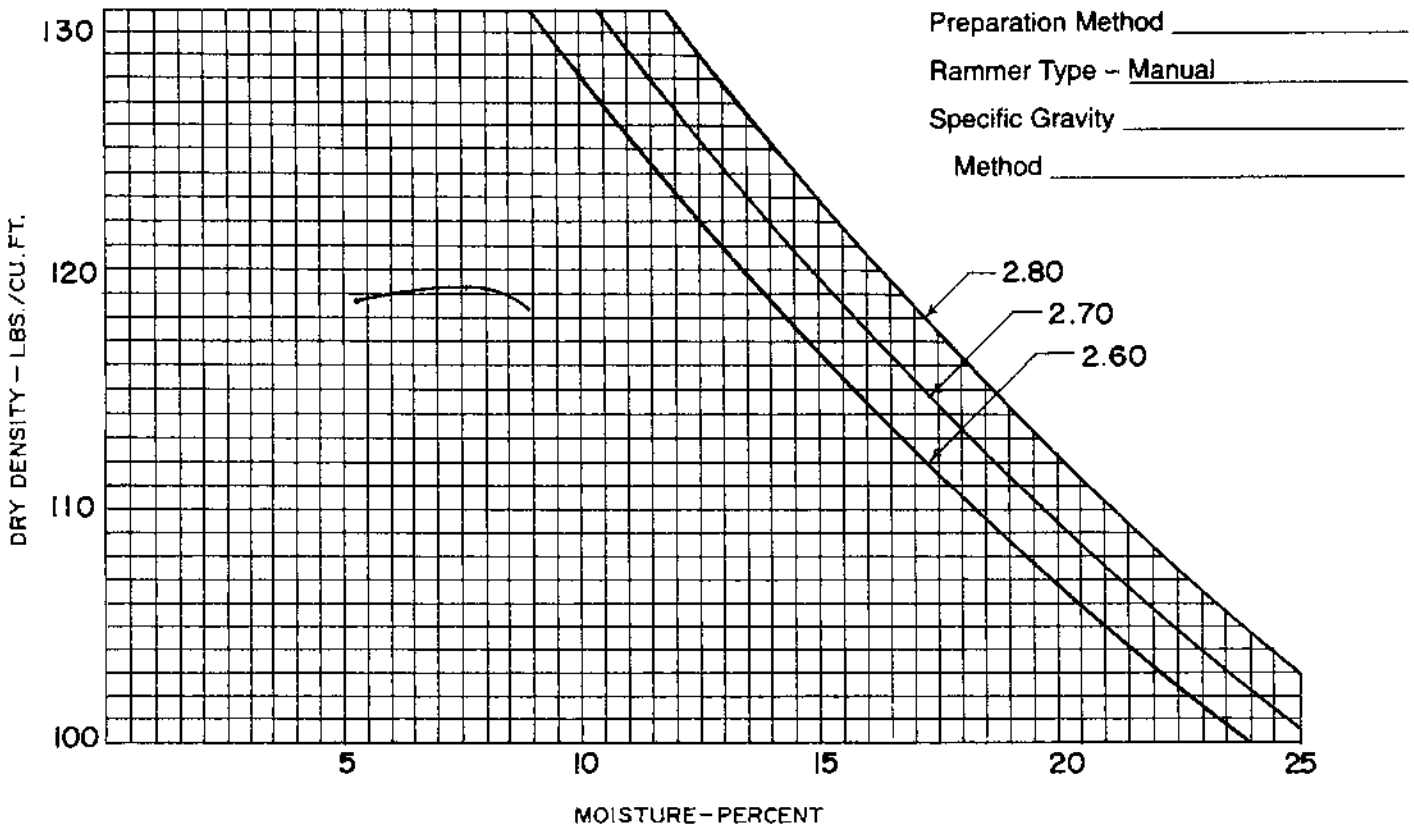
Date March 3, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin & 489-D CPRB Closure LOCATION: Savannah River Site, Aiken Co., SC
Project No.: C-SPP-D-00002, SRNS PO: 258194

SOIL PROCTOR TEST

Maximum Dry Density — 119.1 pcf
Optimum Moisture Content — 7.6%
Soil Description — Brownish-Tan Slightly Silty Sand



ASTM D - 1557 , Method – A

Technician David Turner

Accredited By AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-J07
Date Sampled March 1, 2017
Date of Test March 3, 2017
Date Issued March 3, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Tan Clayey Sand

Sieve No.	% Passing
4	100.0%
10	98.0%
20	89.0%
40	66.0%
60	48.0%
140	32.0%
200	30.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-J09

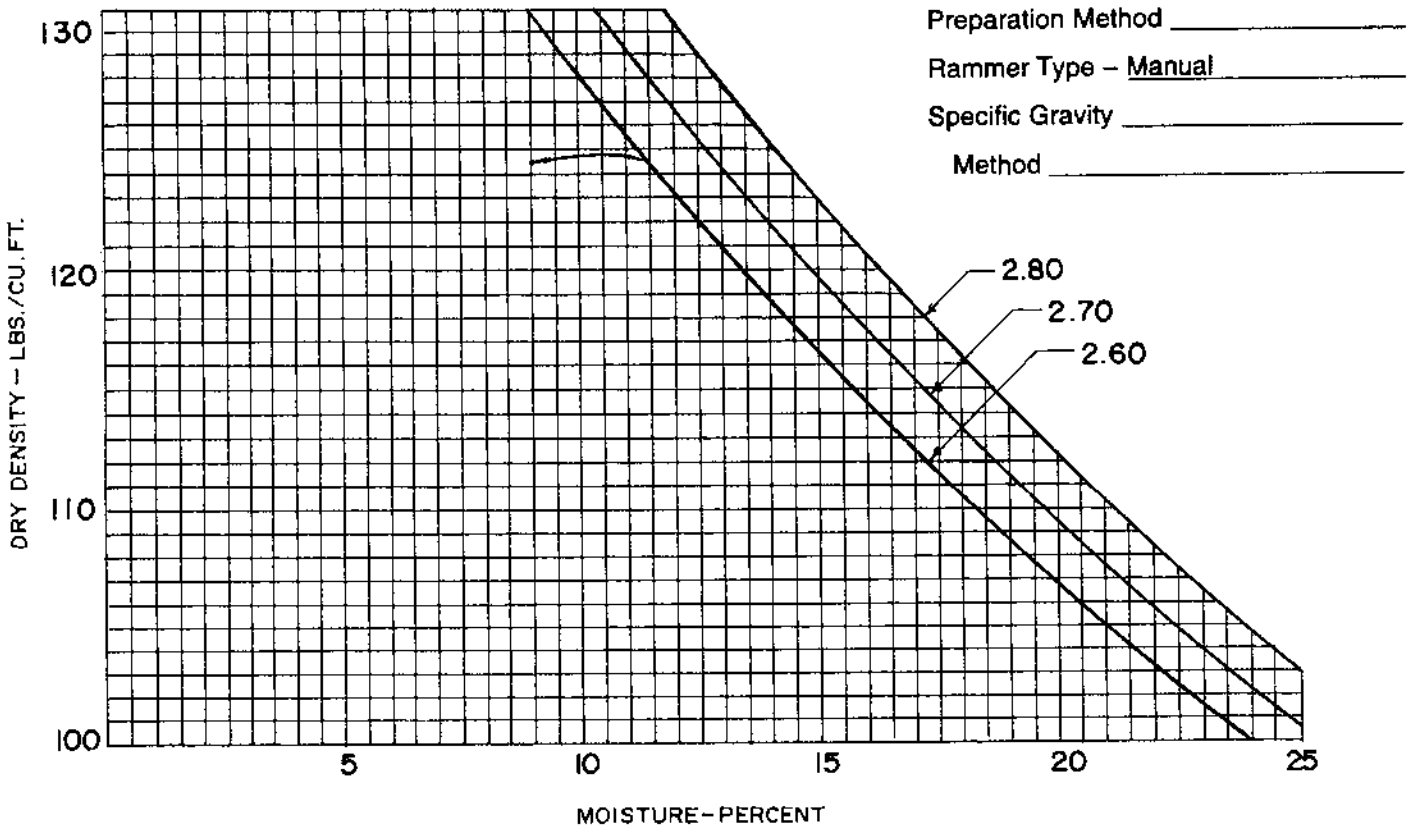
Date March 3, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken Co., SC
Project No.: C-SPP-D-00002, SRNS PO: 258194

SOIL PROCTOR TEST

Maximum Dry Density — 124.8 pcf
Optimum Moisture Content — 11.1%
Soil Description — Reddish-Tan Clayey Sand



ASTM D - 1557 , Method – A

Technician Andrew Doolittle

Accredited By AASHTO Accreditation Program (AAP)

Phoenix #* 26739

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-F86
Date Sampled February 13, 2017
Date of Test February 14, 2017
Date Issued February 16, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Tan Clayey Sand (488 4D East)

Sieve No.	% Passing
4	100.0%
10	99.5%
20	94.0%
40	68.0%
60	39.0%
140	18.0%
200	15.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-8960
FAX (706) 737-0629

Report No. T17-F87

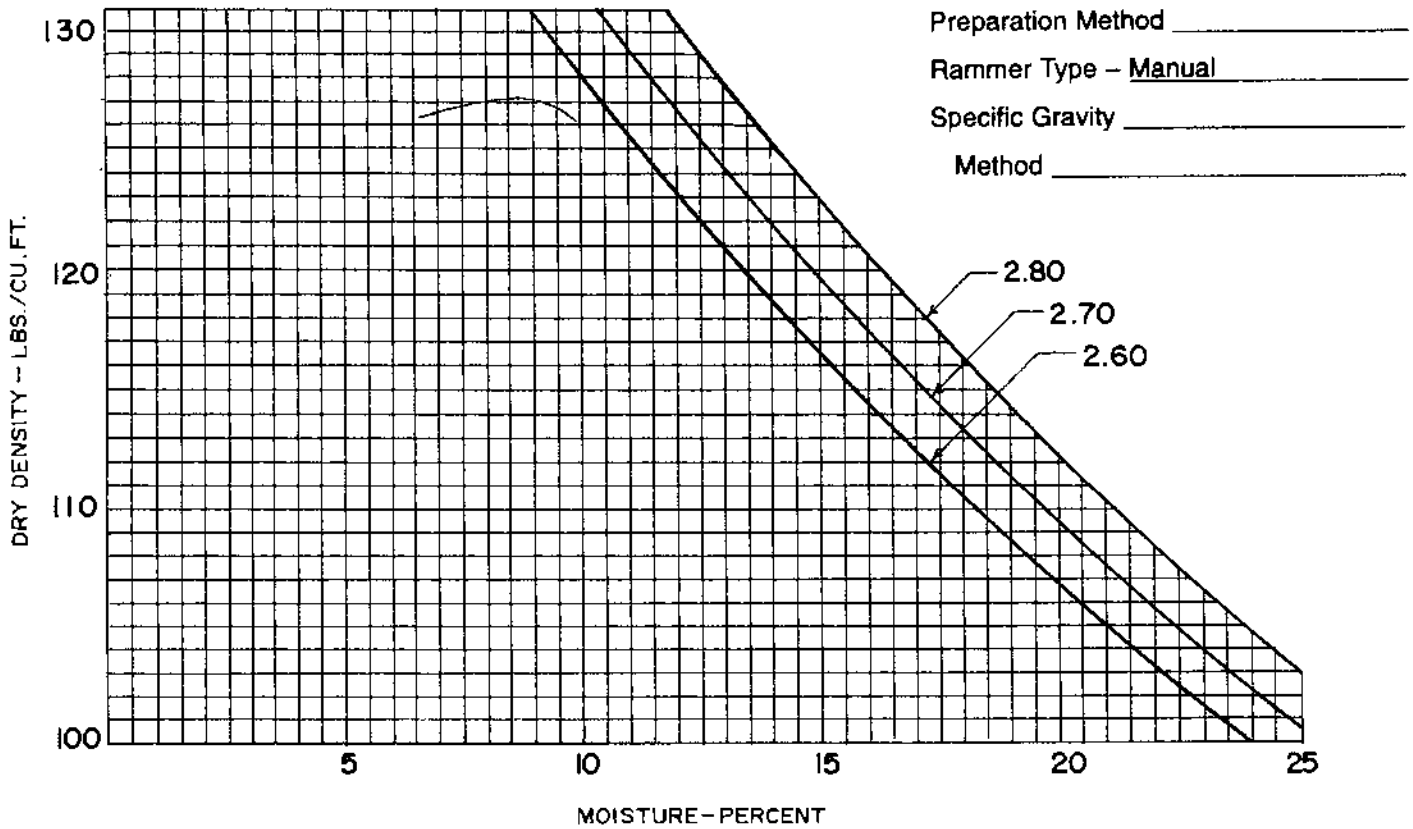
Date February 14, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO# 258194

SOIL PROCTOR TEST

Maximum Dry Density — 127.1 pcf
Optimum Moisture Content — 8.7%
Soil Description — Tan Clayey Sand (488-4D East)



ASTM D - 1557 , Method – A

Technician Andrew Doolittle

Accredited By AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-F84
Date Sampled February 13, 2017
Date of Test February 15, 2017
Date Issued February 16, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Tan Sand (Borrow Pit #1)

Sieve No.	% Passing
4	100.0%
10	99.5%
20	95.0%
40	67.0%
60	37.0%
140	15.0%
200	11.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-8960
FAX (706) 737-0629

Report No. T17-F85

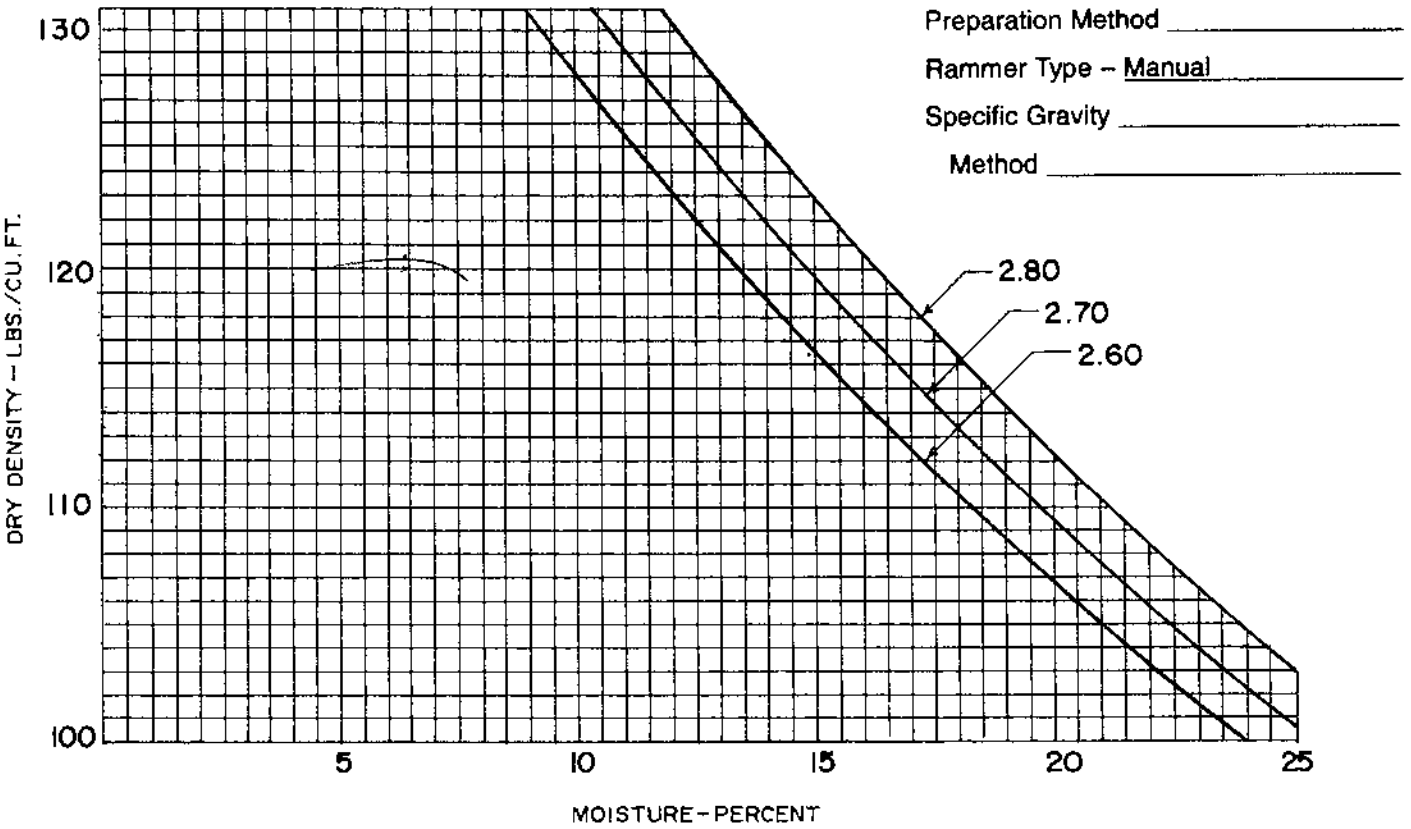
Date February 15, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO# 258194

SOIL PROCTOR TEST

Maximum Dry Density — 120.7 pcf
Optimum Moisture Content — 6.4%
Soil Description — Tan Sand (Borrow Pit #1)



ASTM D - 1557 , Method – A

Technician Andrew Doolittle

Accredited By AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-J06
Date Sampled March 1, 2017
Date of Test March 3, 2017
Date Issued March 3, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Tan Slightly Clayey Sand

Sieve No.	% Passing
4	100.0%
10	99.0%
20	94.0%
40	68.0%
60	38.0%
140	15.0%
200	12.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-J08

Date March 3, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin & 489-D CPRB Closure LOCATION: Savannah River Site, Aiken Co., SC

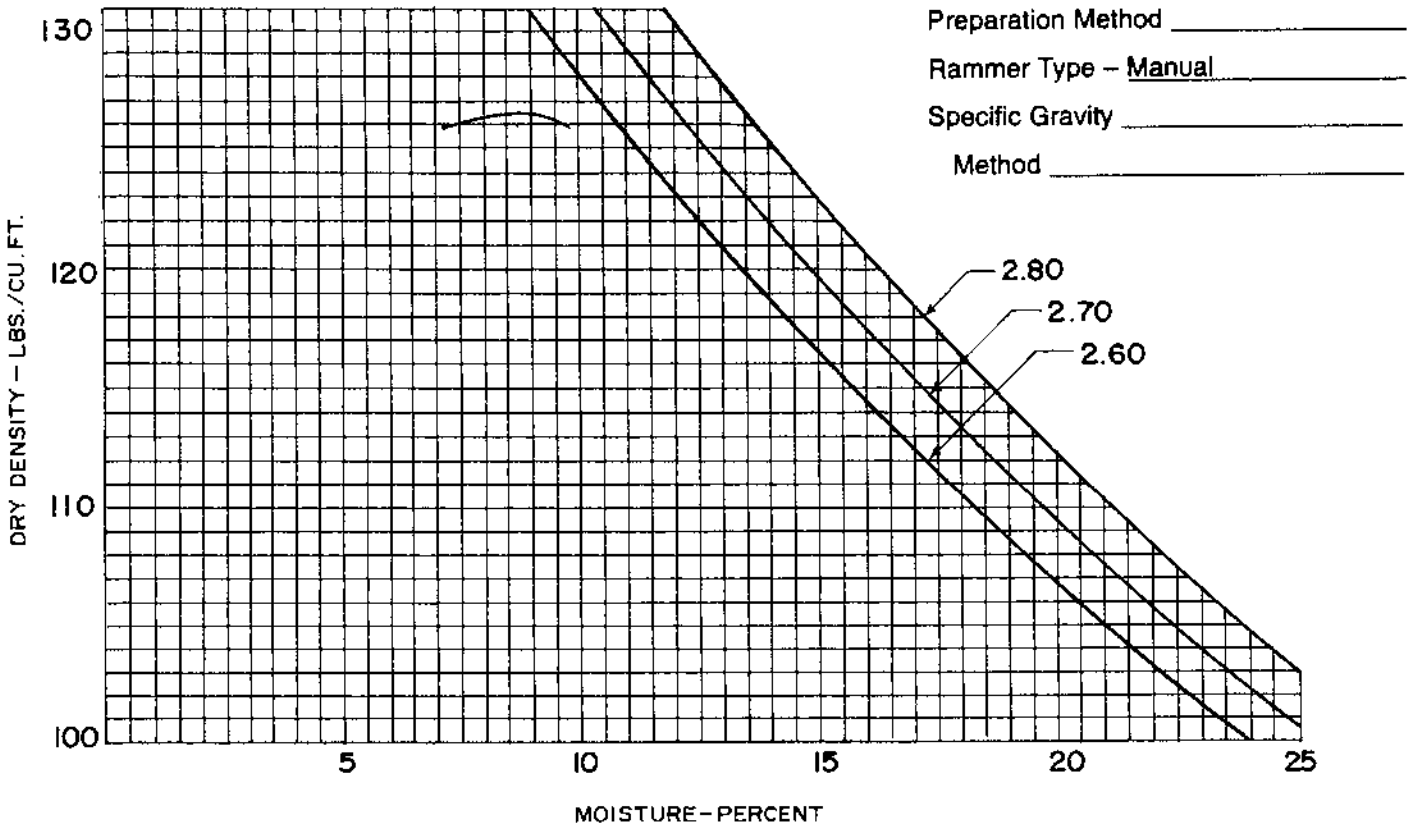
Project No.: C-SPP-D-00002, SRNS PO: 258194

SOIL PROCTOR TEST

Maximum Dry Density — 126.6 pcf

Optimum Moisture Content — 8.7%

Soil Description — Tan Slightly Clayey Sand



ASTM D - 1557 , Method – A

Technician Andrew Doolittle

Accredited By AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-U34
Date Sampled May 8, 2017
Date of Test May 10, 2017
Date Issued May 15, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Brown Clayey Sand

Sieve No.	% Passing
⅜"	100.0%
4	96.0%
10	94.0%
20	90.0%
40	65.5%
60	38.0%
140	15.0%
200	12.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-U33

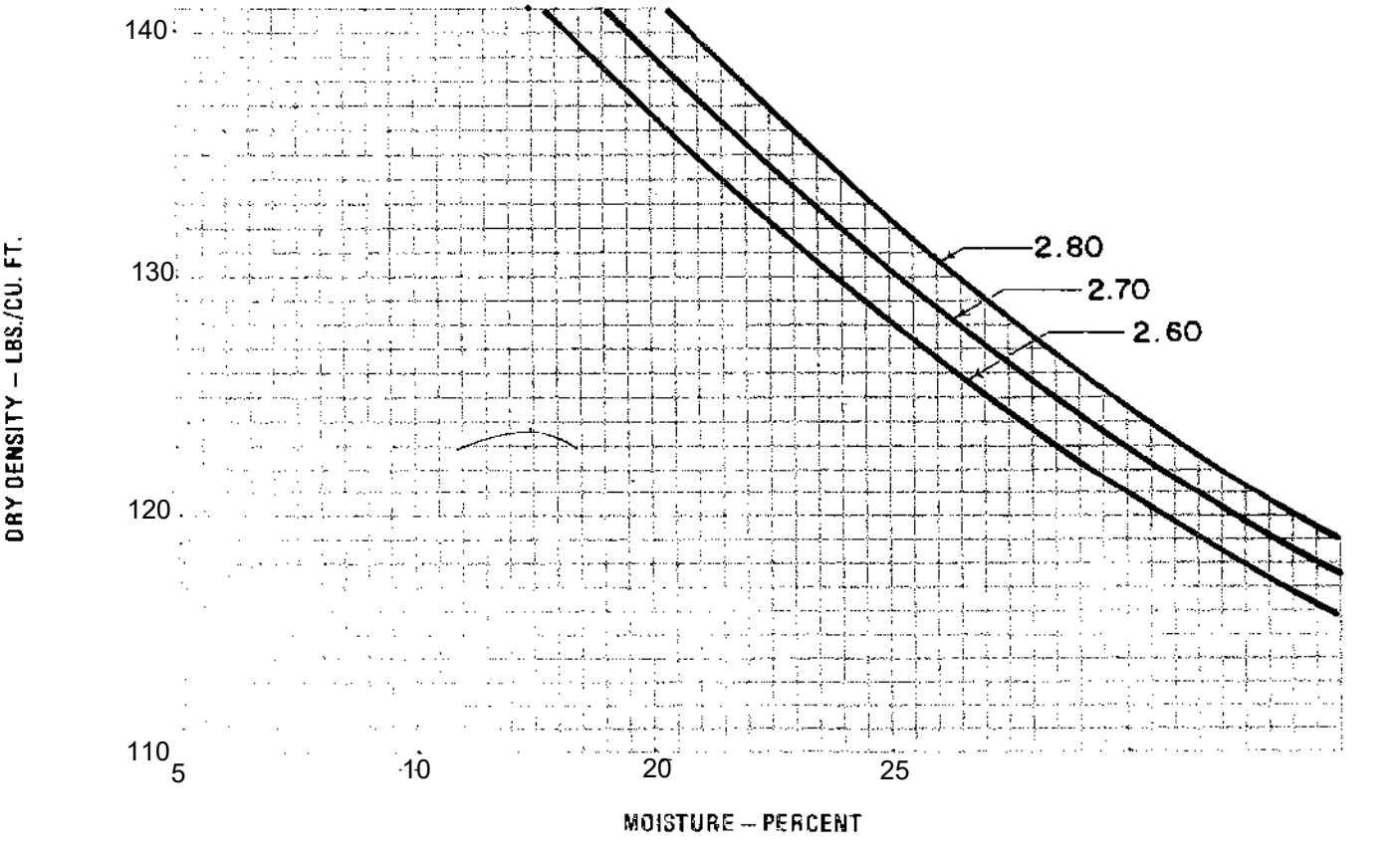
Date May 12, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin & 489-D CPRB Closure LOCATION: Savannah River Site, Aiken Co., SC
Project No.: C-SPP-D-00002, SRNS PO: 258194

SOIL PROCTOR TEST

Maximum Dry Density	—	123.8 pcf
Optimum Moisture Content	—	12.4%
Soil Description	—	Reddish-Brown Clayey Sand



ASTM D - 1557 Method A

Technician: Justin Walling

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-GG71
Date Sampled August 15, 2017
Date of Test August 22, 2017
Date Issued August 24, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Brownish-Tan Slightly Clayey Silty Sand (NIB #1)

Sieve No.	% Passing
½"	100.0%
4	93.0%
10	87.4%
20	68.8%
40	52.8%
60	37.0%
140	25.4%
200	22.8%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-DD63

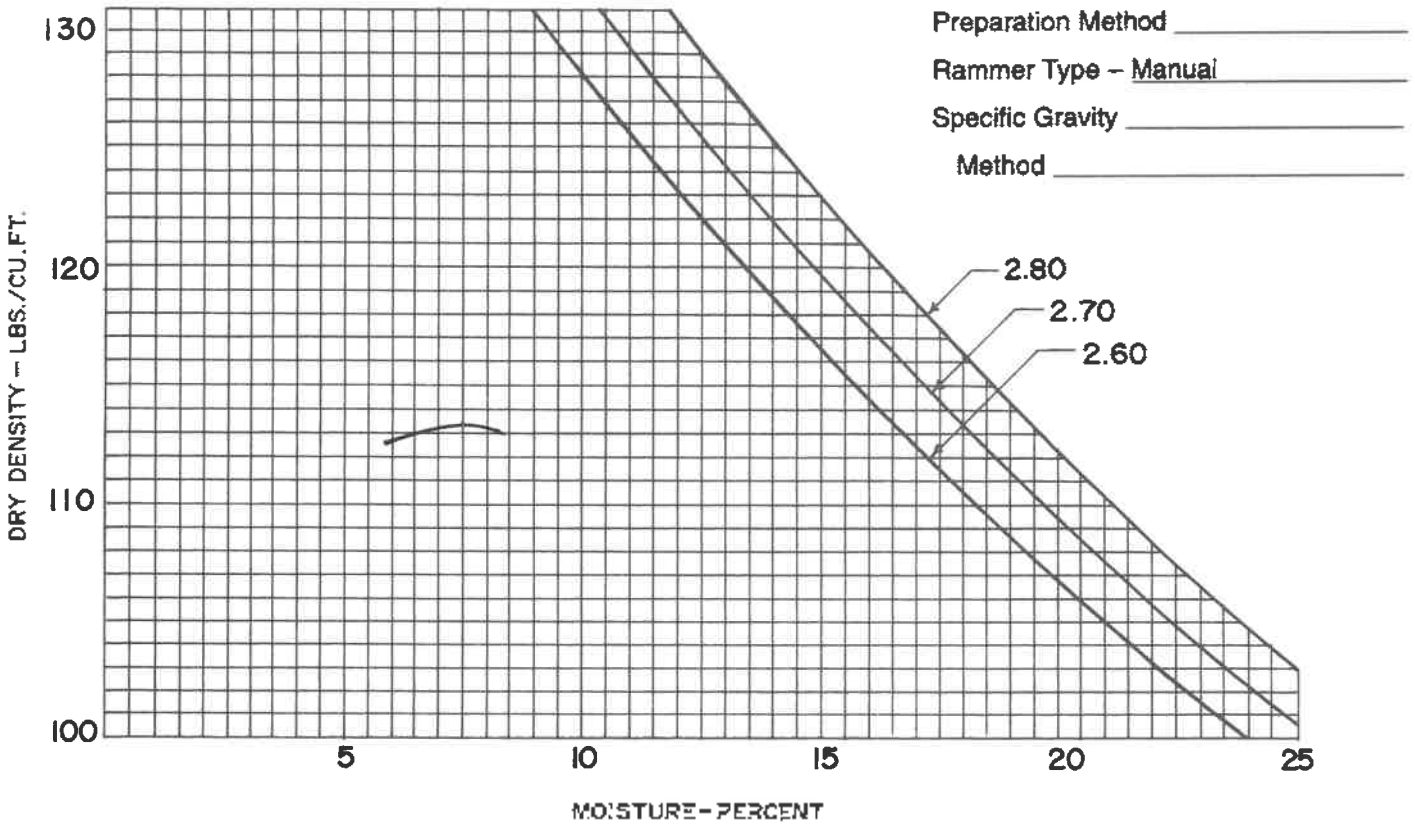
Date July 27, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin & 489-D CPRB Closure LOCATION: Savannah River Site, Aiken Co., SC
Project No.: C-SPP-D-00002, SRNS PO: 258194

SOIL PROCTOR TEST

Maximum Dry Density — 113.3 pcf
Optimum Moisture Content — 7.5%
Soil Description — Brownish-Tan Slightly Clayey Silty Sand (NIB #1)



ASTM D - 1557 , Method – A

Technician Branon Mitchell

Accredited By AASHTO Accreditation Program (AAP)

Phoenix #126739

165-Gradation & Proctor NIB 1
Page 2 of 2

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-GG70
Date Sampled August 15, 2017
Date of Test August 22, 2017
Date Issued August 24, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Brownish-Tan Slightly Clayey Silty Sand (NIB #2)

Sieve No.	% Passing
½"	100.0%
4	91.0%
10	85.6%
20	67.0%
40	52.6%
60	37.9%
140	27.5%
200	25.9%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-FF01

Date August 7, 2017

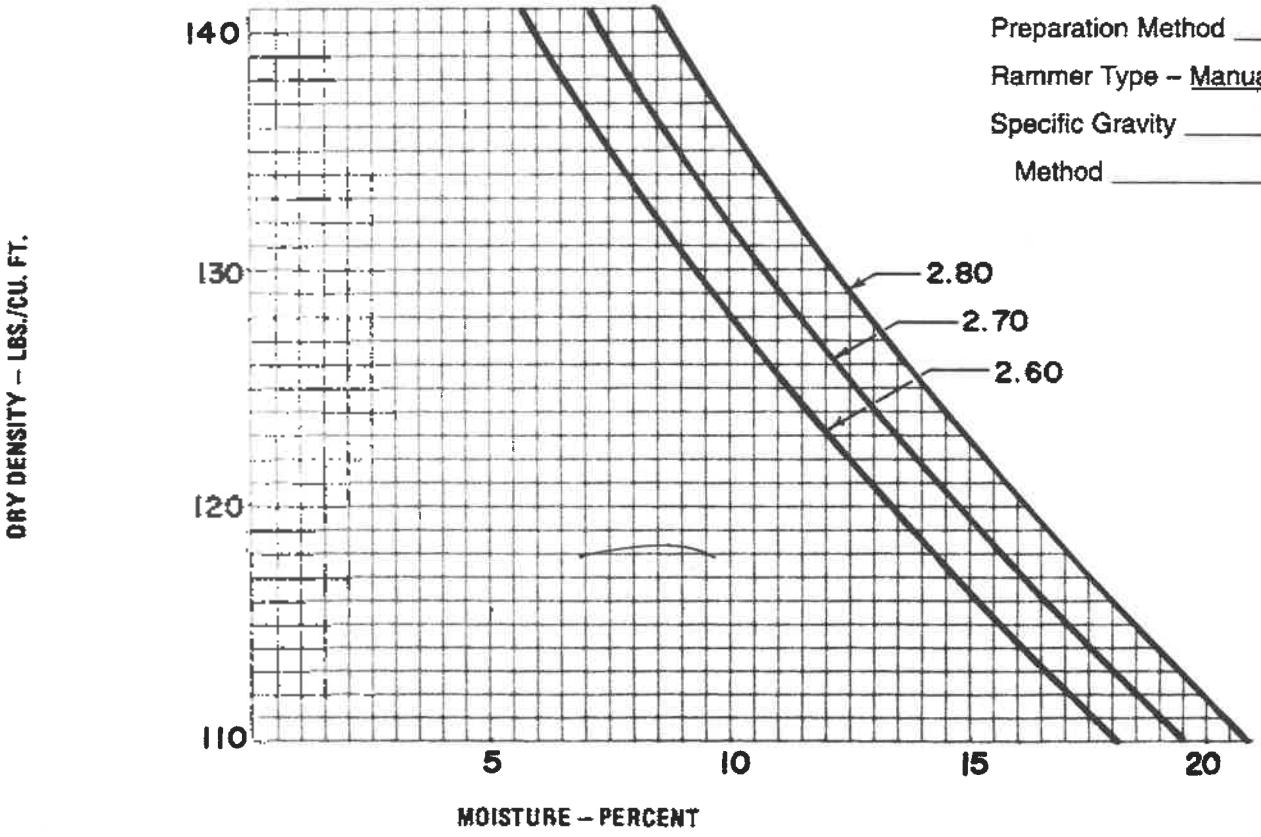
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin & 489-D CPRB Closure LOCATION: Savannah River Site, Aiken Co., SC
Project No.: C-SPP-D-00002, SRNS PO: 258194

SOIL PROCTOR TEST

Maximum Dry Density — 118.4 pcf
Optimum Moisture Content — 8.7%
Soil Description — Brownish-Tan Slighlty Clayey Silty Sand (NIB #2)

Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____



ASTM D - 1557 , Method – A

Technician Chip Stewart

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-GG73
Date Sampled August 15, 2017
Date of Test August 22, 2017
Date Issued August 24, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Brown Clayey Sand (NIB #3)

Sieve No.	% Passing
½"	100.0%
4	89.7%
10	83.9%
20	71.9%
40	43.4%
60	35.2%
140	26.2%
200	25.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-GG72

Date August 22, 2017

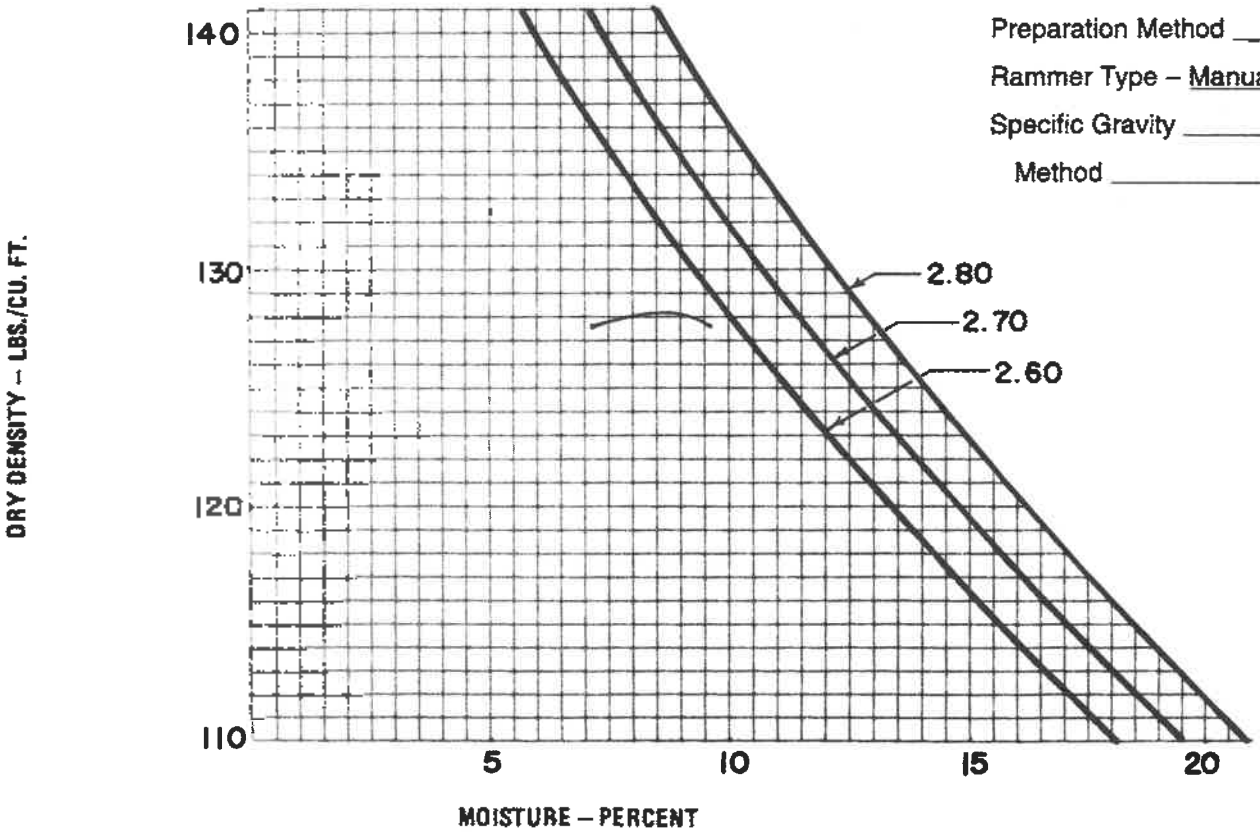
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin & 489-D CPRB Closure LOCATION: Savannah River Site, Aiken Co., SC
Project No.: C-SPP-D-00002, SRNS PO: 258194

SOIL PROCTOR TEST

Maximum Dry Density — 128.1 pcf
Optimum Moisture Content — 8.7%
Soil Description — Reddish-Brown Clayey Sand (NIB #3)

Preparation Method
Rammer Type – Manual
Specific Gravity
Method



ASTM D - 1557 , Method – A

Technician Branon Mitchell

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-AA64
Date Sampled June 29, 2017
Date of Test June 30, 2017
Date Issued July 3, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Brown Slightly Clayey Sand

Sieve No.	% Passing
4	99.5%
10	99.0%
20	89.0%
40	65.0%
60	39.0%
140	24.0%
200	23.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

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168-Gradation & Proctor SIB
Page 1 of 2

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-8960
FAX (706) 737-0829

Report No. T17-AA65

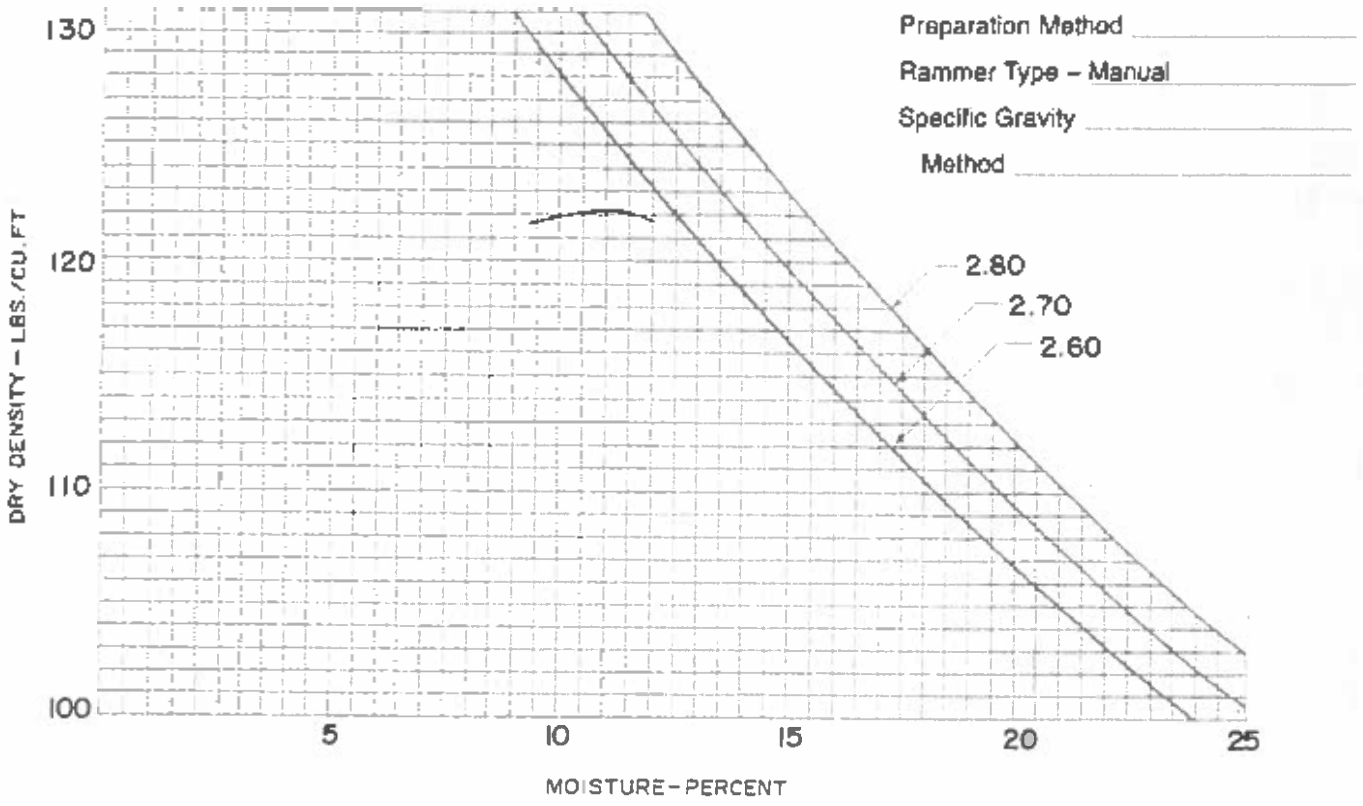
Date June 30, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin & 489-D CPRB Closure LOCATION: Savannah River Site, Aiken Co., SC
Project No.: C-SPP-D-00002, SRNS PO: 258194

SOIL PROCTOR TEST

Maximum Dry Density — 122.1 pcf
Optimum Moisture Content — 11.1%
Soil Description — Reddish-Brown Slightly Clayey Sand



ASTM D - 1557 , Method – A

Technician Chip Stewart

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168-Gradation & Proctor SIB
Page 2 of 2

Envirocon

Backfill Inspection Report

Date: December 11, 2017	
Project Title: SRNS 488-1D Ash Landfill	**Location:** Jackson, SC

Observations of Fill Placement & Compaction Activities: New Western Berm

Envirocon, Inc. removed the ash from 488-1D from within the footprint of the New Western Berm. This removal process was conducted in a progressive fashion, allowing for the removal and backfill to occur simultaneously along the length of the berm foot print. To accomplish this, the berm footprint was split into grids. This allowed for final cleaning and clay placement to occur in one grid while bulk ash removal occurred in another grid. This footprint required visual inspection to ensure all ash was removed, but no confirmation sampling was required within the footprint. The excavations extended to 1 foot below the original basin bottom. Please see the attached figure for the Grid locations. The CSRA proctor data, and test inspections are also provided as attachments at the end of this document.

- August 01, 2017: Envirocon fully cleaned Grid 4 within the New Western Berm footprint. SRNS Engineering and the STR inspected the area and visually confirmed that no more ash was present. Excavation was to 1' below the original basin floor.
- August 02, 2017: Lift 1 of clay sourced from the North Inlet Basin center "finger" berm was placed into Grid 4. The material was compacted with an 84" sheep's foot compactor in static mode. Approximately 4 passes were made with the compactor over the placed clay. CSRA Testing tested the compaction and found the relative compaction to be 98.9% at 5.7% moisture.
- August 02, 2017: Envirocon fully cleaned Grid 3 within the New Western Berm footprint. SRNS Engineering and the STR inspected the area and visually confirmed that no more ash was present. Excavation was to 1' below the original basin floor.
- August 03, 2017: Lift 1 of clay sourced from the North Inlet Basin center "finger" berm was placed into Grid 3. The material was compacted with an 84" sheep's foot compactor in static mode. Approximately 4 passes were made with the compactor over the placed clay. CSRA Testing tested the compaction and found the relative compaction to be 99.0% at 8.3% moisture.
- August 03, 2017: Lift 2 of clay sourced from the North Inlet Basin and a small amount from the South Inlet Basin center "finger" berm was placed into Grid 4. The material was compacted with an 84" sheep's foot compactor in static mode. Approximately 4 passes were made with the compactor over the placed clay. CSRA Testing tested the compaction and found the relative compaction to be 98.7% at 6.9% moisture.
- August 30, 2017: Lift 2 of clay sourced from the North Inlet Basin center "finger" berm was placed into Grid 3. The material was compacted with an 84" sheep's foot compactor in vibratory mode. Approximately 4 passes were made with the compactor over the placed clay. CSRA Testing tested the compaction and found the relative compaction to be 97.7% at 10.6% moisture.
- September 06, 2017: Envirocon fully cleaned Grid 5 within the New Western Berm footprint. SRNS Engineering and the STR inspected the area and visually confirmed that no ash was present. Excavation was generally to 1' below the original basin floor with a large "hot spot" extending about another 2' below this level.
- September 06, 2017: Lift 1 of clay sourced from the North Inlet Basin was placed into Grid 5. The clay was compacted with an 84" sheep's foot compactor, two passes vibratory and

two passes static. CSRA tested the compaction and found the relative compaction to be 99.5 at 12.2% moisture.

- September 08, 2017: Lift 3 of clay sourced from the South Inlet Basin was placed into Grids 3 and 4. CSRA tested the compaction and found the relative compaction to be 98.0% at 9.1% moisture. Lift 2 of clay sourced from the South Inlet Basin was placed into Grid 5. CSRA tested the compaction and found the relative compaction to be 98.4% at 8.4% moisture. The clay was compacted with an 84" sheep's foot compactor, two passes vibratory and two passes static. Lift 3 was then placed into Grid 3 and CSRA returned to test this lift, finding a relative density of 97.5% and a moisture content of 10.3%.
- September 19, 2017: Grid 2 was verified as visually clean of ash by Frank S (SRNS) and Steve H (STR). Clay placement commenced into this Grid after the verification was complete. Envirocon also placed 1' of clay in Grid 3. The South Inlet Basin was the source of this clay. Compaction was achieved using 4 static passes of an 84" sheep's foot compactor. CSRA tested Lift 1 in Grid 2 and Lift 4 in Grid 3. For Grid 2 Lift 1, the relative density was 98.4% at 13.0% moisture. For Grid 3 Lift 4, the relative density was 96.2% at 11.2% moisture.
- September 20, 2017: Grid 1 was verified as visually clean of ash by Frank S (SRNS) and Steve H (STR). Clay placement commenced into this Grid after the verification was complete. The South Inlet Basin was the source of this clay. Lift 1 was not complete and so final compaction and testing of this lift occurred on September 21, 2017.
- September 21, 2017: CSRA tested Grid 1 Lift 1. This clay was compacted using 4 static passes of the 84" sheep's foot compactor. The relative density was 97.7% at 13.0% moisture. Additionally, Envirocon added another 1' lift to Grid 2. The source of this material was the South Inlet Basin "center finger". CSRA tested this at 98.0% relative density at a moisture content of 13.4%. Additionally, CSRA to 5 soil samples for gradation and proctor analysis. SIB-3 was taken from the NE side of the South Inlet Basin "center finger" at approximately 2' BGS. SIB-4 was a grayish material taken in the floor of the South Inlet Basin "center finger" at approximately elevation 111.5. 3 samples were taken from the existing western berm. WB-3 was collected at approximately 500' south of the pipes in the NW corner of the berm, at approximately 3' below ground surface. WB-2 was taken approximately 250' south of the pipes, at approximately 4' up from the floor of the basin along the east side of the slope. WB-1 was taken approximately 100' south of the pipe on the eastern slope approximately ½ way along the berm height. During the afternoon, Envirocon placed lifts of clay in Grids 1 and 2. CSRA also tested these lifts. Grid 1 Lift 2 had a relative density of 97.5%at 10.2% moisture and Grid 2 Lift 3 had a relative density of 98.4% at a moisture content of 12.5%. Compaction was achieved with 4 static passes of the 84" sheep's foot compactor.
- September 22, 2017: Two lifts of clay sourced from the South Inlet Basin were placed in Grid 1 and 1 lift into Grid 4. The soil was compacted using 2 vibratory passes of the 84" smooth drum compactor and 1 static pass. CSRA tested the lifts: Grid 2 Lift 4 had a relative density of 98.7% at 10.1% moisture. Grid 1 Lift 3 had a relative density of 98.0% at 10.7% moisture. Grid 1 Lift 4 had a relative density of 98.6% at 13.4% moisture.
- September 25, 2017: Clay sourced from the South Inlet Basin was placed into lifts 5 and 6 in Grid 1. The material was compacted using 2 vibratory followed by 2 static passes of an 84" sheep's foot compactor. CSRA tested the lifts. Grid 1 Lift 5: relative density was 98.4% at 9.6% moisture. Grid 1 Lift 6 has a relative density of 98.7% at 10.1% moisture.
- September 26, 2017: Clay sourced from the South Inlet Basin "center finger" was placed into Grids 1, 4 and 5. The clay was compacted using an 84" sheep's foot compactor making 2 vibratory passes followed by 2 static passes. CSRA tested the lifts: Grid 1 Lift 7 had a relative density of 97.1% at 11.6% moisture. Grid 5 Lift 4 had a relative density of 96.5% at 9.4% moisture, and Grid 4 Lift 4 had a relative density at 96.7% at 6.5% moisture.

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Backfill Inspection Report

- September 27, 2017: Clay sourced from the South Inlet Basin "center finger" was placed into Grids 1, 2, and 3. Two lifts were placed into Grids 1 and 2 today. The clay was compacted using 2 vibratory followed by 2 static passes of an 84" sheep's foot compactor. CSRA tested the lifts with the following results: Grid 1 Lift 8: relative density was 98.0% with a moisture of 10.8%. Grid 2 Lift 5 had a relative density of 87.9% at 10.1% moisture. Grid 3 Lift 5 had a relative density of 97.4% and a moisture of 10.4%. Grid 2 Lift 6 had a relative density of 98.6% at 13.6% moisture. Grid 1 Lift 3 had a relative density of 98.0% at 14.0% moisture.
- September 28, 2017: Clay sourced from the South Inlet Basin "center finger" was placed in Grid 1 Lift 10 and Grid 2 Lift 7 of the New Western Berm. Grid 1 Lift 10 had a relative density of 98.7% with a moisture content of 10.2%. Grid 2 Lift 7 had a relative density of 98.0% with a moisture content of 10.0%. The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making 2 vibratory and 2 static passes. CSRA also took 3 samples from the west berm for proctor and gradation analyses (WB-4, WB-5, WB-6). WB-4 was at ~6' BGS, 100' south of WB-3. WB-5 was ~3' BGS, 300' north of the southwest corner of the berm, and WB-6 was located in the southwest corner of the berm at ~4' up from the floor of the basin.
- November 29, 2017: CSRA took 3 samples from the south berm for proctor and gradation analyses (Sberm-1, Sberm-2, Sberm-3). Sberm-1 was at ~4' up from the floor of 488-1D West in approximately the Center of the New Western Berm. Sberm-2 was located at approximately the middle portion of the 488-1D West Berm and located approximately ½ way vertically along the face of the berm. Sberm-3 was located 4' BGS on the interior slope of the berm, 200' east of the southwest corner of the 488-1D basin.

Attachments:

- CSRA Compaction Testing Reports
- CSRA Proctor Reports
- Location Sketch

I certify that the placement of the fills described were in compliance with the plans and specifications.

Mike Beardsley, PE

12/11/2017

Project Engineer

488-1D Ash Basin Closure Project

(720) 838 – 7107

Mbeardsley@greenglobeinc.com

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Wednesday, Aug 2, 2017	14:35	South / NWB

Subject:

Lift 1 in Grid 4 of the fill in the New Western Berm was tested.

Date:	Time:	Direction of View / Location:
Thursday, Aug 3, 2017	9:18	Northwest / NWB

Subject:

Lift 1 in Grid 3 of the fill in the New Western Berm was tested.

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Wednesday, Aug 30, 2017	13:01	Southeast / NWB

Subject:

Lift 2 in Grid 3 being created.

Date:	Time:	Direction of View / Location:
Wednesday, Sept. 6, 2017	15:53	N/A / NWB

Subject:

Lift 1 in Grid 5 was built and tested.

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Friday, Sept. 8, 2017	10:38	Southeast / NWB

Subject:
Lift 3 in Grid 5 being created.

Date:	Time:	Direction of View / Location:
Friday, Sept. 8, 2017	7:54	West / NWB

Subject:
Lift 2 in Grid 5 was tested.

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Tuesday, Sept. 19, 2017	16:08	N/A / NWB

Subject:

CSRA technician was on-site testing Grids 2 and 3 today.

Date:	Time:	Direction of View / Location:
Wednesday, Sept. 20, 2017	10:12	West / NWB

Subject:

Cleaned Grid 1 subgrade. Hotspot removal extended into the groundwater. Black areas are organic, not ash.

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Wednesday, Sept. 20, 2017	16:20	West / NWB

Subject:
Compacting Lift 1 in Grid 1.

Date:	Time:	Direction of View / Location:
Thursday, Sept. 21, 2017	8:24	North / NWB

Subject:
CSRA technician testing Grid 2 Lift 2.

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Friday, Sept. 22, 2017	15:20	Southeast / NWB

Subject:

CSRA testing technician using a nuclear density gauge in Grid 1.

Date:	Time:	Direction of View / Location:
Monday, Sept. 25, 2017	12:11	North / NWB

Subject:

CSRA technician testing Grid 1 Lift 5.

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Tuesday, Sept. 26, 2017	08:17	N/A / NWB

Subject:

CSRA testing a lift in the New Western Berm.

Date:	Time:	Direction of View / Location:
Wednesday, Sept. 27, 2017	12:11	North / NWB

Subject:

CSRA technician testing Grid 3 Lift 6.

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Thursday, Sept. 28, 2017	12:17	North / NWB

Subject:

CSRA testing Lift 7 in Grid 2 of the New Western Berm.

Date:	Time:	Direction of View / Location:
Thursday, Sept. 28, 2017	12:53	North / 488-1D West Berm

Subject:

CSRA collected 3 samples from the south half of the west berm for proctor and gradation testing (WB-4, WB-5, and WB-6).

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Wednesday, Nov. 29, 2017	11:33	N/A / 488-1D

Subject:

CSRA testing collected 3 soil samples from the south berm for proctor and gradation testing. This soil will be used for New Western Berm construction.

Envirocon

Backfill Inspection Report

CSRA COMPACTION TEST REPORTS

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-EE33		
Date Issued:	August 3, 2017		
Date & Time of Test:	August 2, 2017 (2:30 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Slightly Clayey Silty Sand

Proctor Density-Optimum Moisture: 113.3 pcf / 7.5% (mod.)

Test No.	1							
Course Level	Lift 1							
Area to Be	Grid 4							
Dry Density In-Place	112.1							
% Proctor Density	98.9							
Moisture Content	6.3							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: 1. Center of grid 4

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E. Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-EE34		
Date Issued:	August 4, 2017		
Date & Time of Test:	August 3, 2017 (2:45 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Slightly Clayey Silty Sand

Proctor Density-Optimum Moisture: 113.3 pcf / 7.5% (mod.)

Test No.	1	2						
Course Level	Lift 1	Lift 2						
Area to Be	Grid 3	Grid 4						
Dry Density In-Place	112.2	111.8						
% Proctor Density	99.0	98.7						
Moisture Content	8.3	6.9						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations:
1. Center of grid 3
2. Center of grid 4

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

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1005 Emmett St., Suite A
Augusta, Georgia 30904
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Report No.:	T17-JJ22		
Date Issued:	September 8, 2017		
Date & Time of Test:	September 8, 2017 (7:30 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Slightly Clayey Sand (SIB #2)

Proctor Density-Optimum Moisture: 122.1 pcf / 11.1% (mod.)

Test No.	1	2						
Course Level	Lift 2	Lift 3						
Area to Be	Grid 5	Grid 3/4						
Dry Density In-Place	120.2	119.7						
% Proctor Density	98.4	98.0						
Moisture Content	8.4	9.1						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
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csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
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Report No.:	T17-JJ23		
Date Issued:	September 8, 2017		
Date & Time of Test:	September 6, 2017 (3:15 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Slightly Clayey Silty Sand (NIB #2)

Proctor Density-Optimum Moisture: 118.4 pcf / 8.7% (mod.)

Test No.	1							
Course Level	Lift 1							
Area to Be	Grid #5							
Dry Density In-Place	117.8							
% Proctor Density	99.5							
Moisture Content	12.2							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25138

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
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csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
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(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-JJ36		
Date Issued:	September 11, 2017		
Date & Time of Test:	September 8, 2017 (3:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Slightly Clayey Sand (SIB #1)

Proctor Density-Optimum Moisture: 122.1 pcf / 11.1% (mod.)

Test No.	1							
Course Level	Lift 3							
Area to Be	Grid #5							
Dry Density In-Place	119.0							
% Proctor Density	97.5							
Moisture Content	10.3							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
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csra TESTING AND ENGINEERING CO., INC.

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Augusta, Georgia 30904
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Report No.:	T17-KK54		
Date Issued:	September 22, 2017		
Date & Time of Test:	September 19, 2017 (3:45 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Slightly Clayey Sand (SIB #1)

Proctor Density-Optimum Moisture: 122.1 pcf / 11.1% (mod.)

Test No.	1	2						
Course Level	Lift 4	Lift 1						
Area to Be	New western berm							
Dry Density In-Place	117.5	120.1						
% Proctor Density	96.2	98.4						
Moisture Content	11.2	13.0						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.
1. Grid 3
2. Grid 2

Serial No. of Troxler: 65585

Branon Mitchell, Technician

James M. Pope, P.E./ Reviewer

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csra TESTING AND ENGINEERING CO., INC.

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Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-KK96		
Date Issued:	September 22, 2017		
Date & Time of Test:	September 21, 2017 (9:00 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Tan Clayey Sand (SIB #2)

Proctor Density-Optimum Moisture: 122.5 pcf / 13.6% (mod.)

Test No.	1	2						
Course Level	Lift 1	Lift 2						
Area to Be	Grid 1	Grid 2						
Dry Density In-Place	119.7	120.1						
% Proctor Density	97.7	98.0						
Moisture Content	13.0	13.4						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
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Report No.:	T17-KK97		
Date Issued:	September 22, 2017		
Date & Time of Test:	September 21, 2017 (2:30 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Tan Clayey Sand (SIB #2)

Proctor Density-Optimum Moisture: 122.5 pcf / 13.6% (mod.)

Test No.	1	2						
Course Level	Lift 2	Lift 3						
Area to Be	Grid 1	Grid 2						
Dry Density In-Place	119.4	120.5						
% Proctor Density	97.5	98.4						
Moisture Content	10.2	12.5						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

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csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
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(706) 733-6960
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Report No.:	T17-LL22		
Date Issued:	September 25, 2017		
Date & Time of Test:	September 22, 2017 (3:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Tan Clayey Sand (SIB #2)

Proctor Density-Optimum Moisture: 122.5 pcf / 13.6% (mod.)

Test No.	1							
Course Level	Lift 4							
Area to Be	Grid #1							
Dry Density In-Place	120.8							
% Proctor Density	98.6							
Moisture Content	13.4							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-LL32		
Date Issued:	September 25, 2017		
Date & Time of Test:	September 22, 2017 (10:30 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Tan Clayey Sand (SIB #2)

Proctor Density-Optimum Moisture: 122.5 pcf / 13.6% (mod.)

Test No.	1	2						
Course Level	Lift 3	Lift 4						
Area to Be	Grid #1	Grid #2						
Dry Density In-Place	120.1	120.9						
% Proctor Density	98.0	98.7						
Moisture Content	10.7	10.1						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
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Fax (706) 737-0629

Report No.:	T17-LL54		
Date Issued:	September 26, 2017		
Date & Time of Test:	September 25, 2017 (12:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Reddish-Tan Slightly Clayey Sand (SIB #3)

Proctor Density-Optimum Moisture: 126.9 pcf / 9.9% (mod.)

Test No.	1	2						
Course Level	Lift 5	Lift 6						
Area to Be	Grid #1							
Dry Density In-Place	124.9	125.3						
% Proctor Density	98.4	98.7						
Moisture Content	9.6	10.1						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

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Augusta, Georgia 30904
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Fax (706) 737-0629

Report No.:	T17-LL58		
Date Issued:	September 26, 2017		
Date & Time of Test:	September 26, 2017 (7:30 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Grayish-Tan Slightly Kaolinitic Sand (SIB #4)

Proctor Density-Optimum Moisture: 130.6 pcf / 8.7% (mod.)

Test No.	1							
Course Level	Lift 7							
Area to Be	Grid #1							
Dry Density In-Place	126.8							
% Proctor Density	97.1							
Moisture Content	11.6							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-LL73		
Date Issued:	September 27, 2017		
Date & Time of Test:	September 26, 2017 (1:45 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Grayish-Tan Slightly Kaolinitic Sand (SIB #4)

Proctor Density-Optimum Moisture: 130.6 pcf / 8.7% (mod.)

Test No.	1	2						
Course Level	Lift 4							
Area to Be	Grid #5	Grid #4						
Dry Density In-Place	126.0	126.3						
% Proctor Density	96.5	96.7						
Moisture Content	9.4	6.5						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E. Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
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Fax (706) 737-0629

Report No.:	T17-MM08		
Date Issued:	September 28, 2017		
Date & Time of Test:	September 27, 2017 (3:45 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Tan Clayey Sand (SIB #2)

Proctor Density-Optimum Moisture: 122.5 pcf / 13.6% (mod.)

Test No.	1	2	3					
Course Level	Lift 6		Lift 9					
Area to Be	Grid #2	Grid #3	Grid #1					
Dry Density In-Place	120.8	118.6	120.0					
% Proctor Density	98.6	96.8	98.0					
Moisture Content	13.6	13.5	14.0					
% Compaction Required	95.0	95.0	95.0					
Conformance	✓	✓	✓					
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
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1005 Emmett St., Suite A
Augusta, Georgia 30904
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Fax (706) 737-0629

Report No.:	T17-MM12		
Date Issued:	September 28, 2017		
Date & Time of Test:	September 27, 2017 (11:40 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Tan Slightly Clayey Sand (SIB #3)/*Grayish-Tan Slightly Kaolinitic Sand (SIB #4)

Proctor Density-Optimum Moisture: 126.9 pcf / 9.9% (mod.)/*130.6 pcf / 8.7% (mod.)

Test No.	1	*2	*3					
Course Level	Lift 8	Lift 5						
Area to Be	Grid #1	Grid #2	Grid #3					
Dry Density In-Place	124.4	127.8	127.2					
% Proctor Density	98.0	97.9	97.4					
Moisture Content	10.8	10.1	10.4					
% Compaction Required	95.0	95.0	95.0					
Conformance	✓	✓	✓					
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-MM18		
Date Issued:	September 29, 2017		
Date & Time of Test:	September 28, 2017 (12:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Grayish-Tan Slightly Kaolinitic Sand (SIB #4)

Proctor Density-Optimum Moisture: 130.6 pcf / 8.7% (mod.)

Test No.	1	2						
Course Level	Lift 10	Lift 7						
Area to Be	Grid #1	Grid #2						
Dry Density In-Place	128.9	128.0						
% Proctor Density	98.7	98.0						
Moisture Content	10.2	10.4						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

Envirocon

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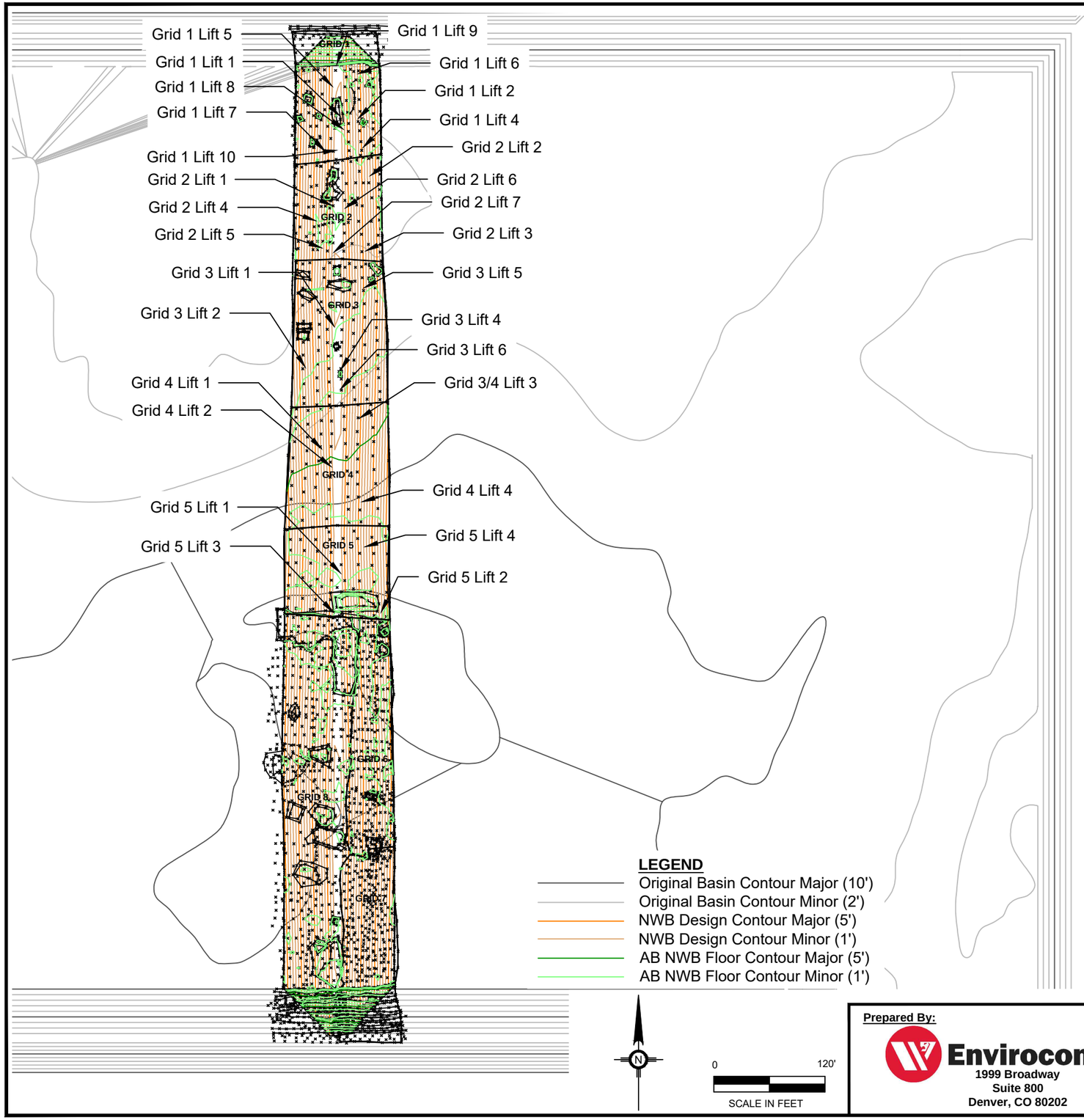
LOCATION MAP



NOTES:

1) Grid 4 Lift 1 tested on 08/02/17. Relative density: 98.9%. Moisture: 6.3%.
2) Grid 4 Lift 2 tested on 08/03/17. Relative density: 98.7%. Moisture: 6.9%.
3) Grid 3 Lift 1 tested on 08/03/17. Relative density: 99.0%. Moisture: 8.3%.
4) Grid 3 Lift 2 tested on 08/30/17. Relative density: 97.7%. Moisture: 10.6%.
5) Grid 5 Lift 1 tested on 09/06/17. Relative density: 99.5%. Moisture: 12.2%.
6) Grids 3/4 Lift 3 tested on 09/08/17. Relative density: 98.0%. Moisture: 9.1%.
7) Grid 5 Lift 3 tested on 09/08/17. Relative density: 97.5%. Moisture: 10.3%.
8) Grid 2 Lift 1 tested on 09/19/17. Relative density: 98.4%. Moisture: 13.0%.
9) Grid 3 Lift 4 tested on 09/19/17. Relative density: 96.2%. Moisture: 11.2%.
10) Grid 1 Lift 1 tested on 09/21/17. Relative density: 97.7%. Moisture: 13.0%.
11) Grid 2 Lift 2 tested on 09/21/17. Relative density: 98.0%. Moisture: 13.4%.
12) Grid 1 Lift 2 tested on 09/21/17. Relative density: 97.5%. Moisture: 10.2%.
13) Grid 2 Lift 3 tested on 09/21/17. Relative density: 98.4%. Moisture 12.5%.
14) Grid 2 Lift 4 tested on 09/22/17. Relative density: 98.7%. Moisture: 10.1%.
15) Grid 1 Lift 3 tested on 09/22/17. Relative density 98.0%. Moisture: 10.7%.
16) Grid 1 Lift 4 tested on 09/22/17. Relative density: 98.6%. Moisture: 13.4%.
17) Grid 1 Lift 5 tested on 09/25/17. Relative density: 98.4%. Moisture: 9.6%.
18) Grid 1 Lift 6 tested on 09/25/17. Relative density: 98.7%. Moisture: 10.1%.
19) Grid 1 Lift 7 tested on 09/26/17. Relative density: 97.1%. Moisture: 11.6%.
20) Grid 5 Lift 4 tested on 09/26/17. Relative density: 96.5%. Moisture: 9.4%.
21) Grid 4 Lift 4 tested on 09/26/17. Relative density: 96.7%. Moisture: 6.5%.
22) Grid 1 Lift 8 tested on 09/27/17. Relative density: 98.0%. Moisture: 10.8%.
23) Grid 2 Lift 5 tested on 09/27/17. Relative density: 97.9%. Moisture: 10.1%.
24) Grid 3 Lift 5 tested on 09/27/17. Relative density: 97.4%. Moisture: 10.4%.
25) Grid 2 Lift 6 tested on 09/27/17. Relative density: 98.6%. Moisture: 13.6%.
26) Grid 1 Lift 9 tested on 09/27/17. Relative density: 98.0%. Moisture: 14.0%.
27) Grid 3 Lift 6 tested on 09/27/17. Relative density: 96.8%. Moisture: 13.5%.
28) Grid 1 Lift 10 tested on 09/28/17. Relative density: 98.7%. Moisture: 10.2%.
29) Grid 2 Lift 7 tested on 09/28/17. Relative density: 98.0%. Moisture: 10.4%.

Prepared By:
Envirocon
1999 Broadway
Suite 800
Denver, CO 80202

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Drew Murphy, Billy West

Figure #: 01	
Date: 12/11/2017	
Revision #: 0	
Drawn By: GGE	
Approved By: EI	
Project #: 1495402	

New Western Berm
Compaction Test Locations

488-1D Ash Basin Closure

231-Gradation, Proctor & Compaction NWB Page 31 of 66

E:\ GGE \ PROJECT DATA \ ENVIROCON \ SRNS POND 1D \ PE FILES \ 488-1D TESTING \ NEW WESTERN BERM \ 12-11-17 NWB COMPACTION TEST LOCATIONS.DWG

Envirocon

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CSRA PROCTOR REPORTS

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-GG71
Date Sampled August 15, 2017
Date of Test August 22, 2017
Date Issued August 24, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Brownish-Tan Slightly Clayey Silty Sand (NIB #1)

Sieve No.	% Passing
½"	100.0%
4	93.0%
10	87.4%
20	68.8%
40	52.8%
60	37.0%
140	25.4%
200	22.8%

Sample not collected at the time of the Proctor Sample Collection. This material was taken from the East Side of Lift 1 in Grid 3 at the placement area, as it corresponds to the material used and collected in the NIB-1 Proctor.

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-DD63

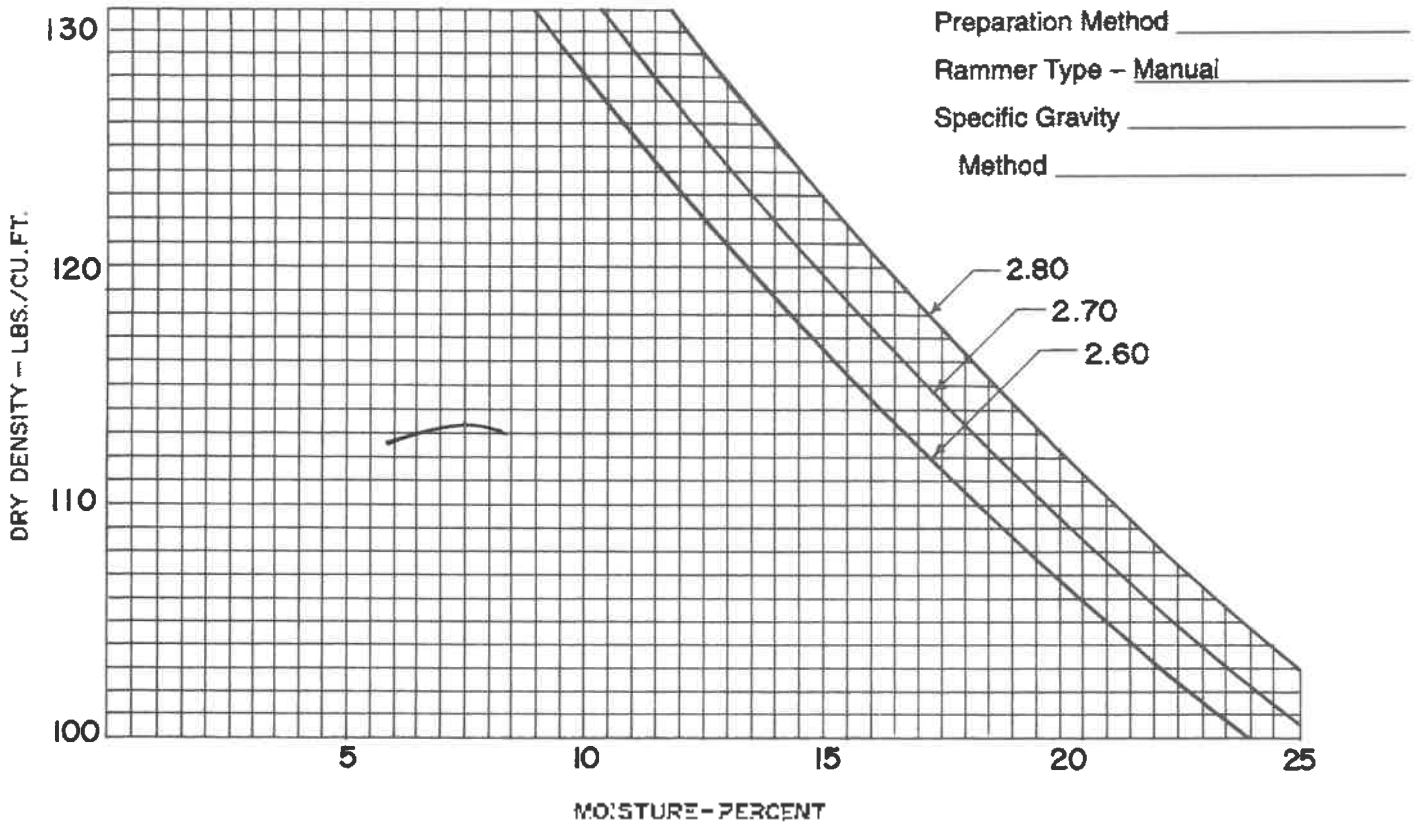
Date July 27, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin & 489-D CPRB Closure LOCATION: Savannah River Site, Aiken Co., SC
Project No.: C-SPP-D-00002, SRNS PO: 258194 North Inlet Basin Center Finger NIB-1

SOIL PROCTOR TEST

Maximum Dry Density — 113.3 pcf
Optimum Moisture Content — 7.5%
Soil Description — Brownish-Tan Slightly Clayey Silty Sand (NIB #1)



ASTM D - 1557 , Method – A

Technician Branon Mitchell

Accredited By AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-GG70
Date Sampled August 15, 2017
Date of Test August 22, 2017
Date Issued August 24, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC North Inlet Basin Center Finger NIB-2
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Brownish-Tan Slightly Clayey Silty Sand (NIB #2)

Sieve No.	% Passing
½"	100.0%
4	91.0%
10	85.6%
20	67.0%
40	52.6%
60	37.9%
140	27.5%
200	25.9%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-FF01

Date August 15, 2017

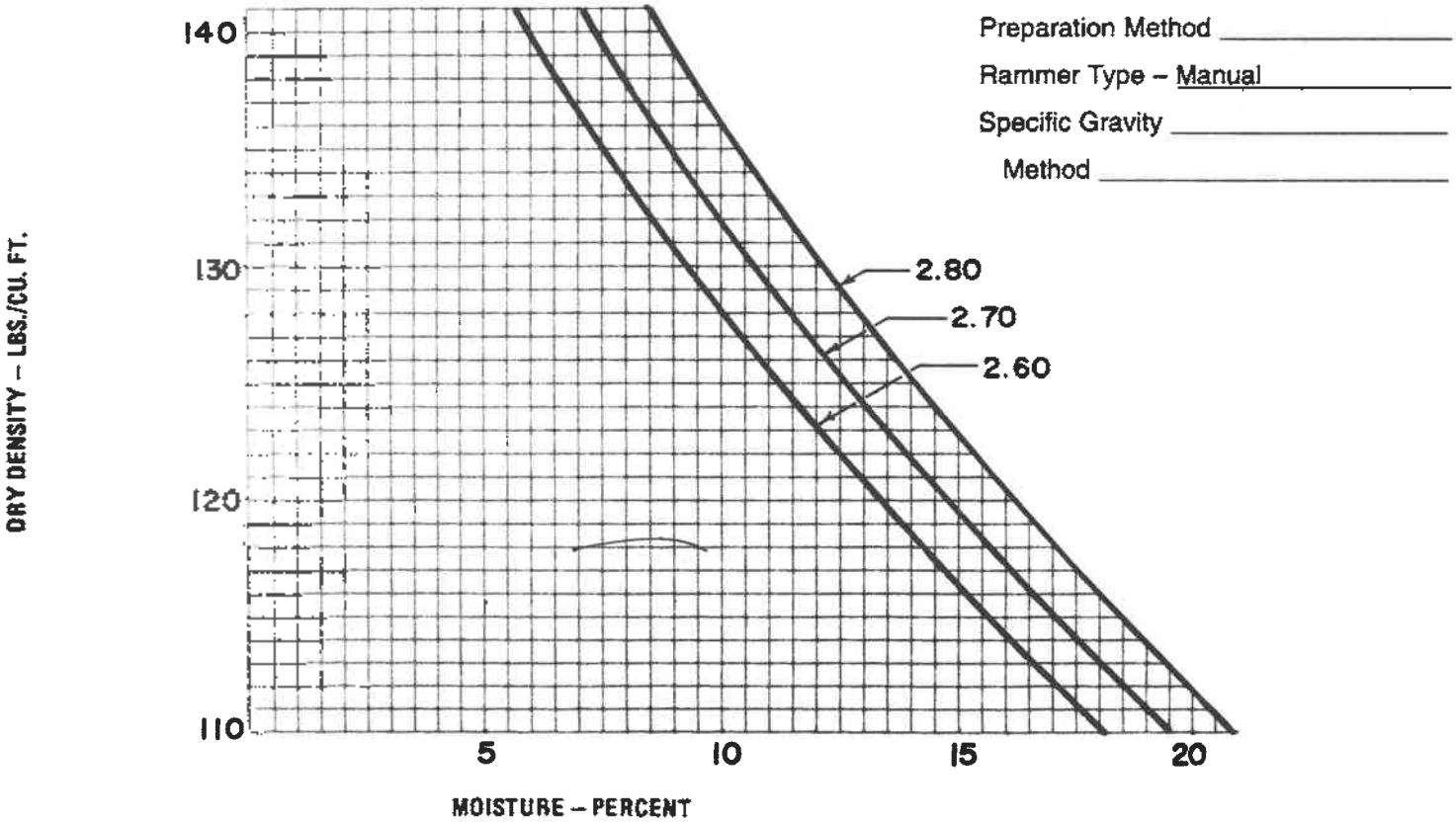
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin & 489-D CPRB Closure LOCATION: Savannah River Site, Aiken Co., SC
Project No.: C-SPP-D-00002, SRNS PO: 258194

SOIL PROCTOR TEST

Maximum Dry Density — 118.4 pcf
Optimum Moisture Content — 8.7%
Soil Description — Brownish-Tan Slighlty Clayey Silty Sand (NIB #2)

Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____



ASTM D - 1557 , Method – A

Technician Chip Stewart

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
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Report No. T17-GG73
Date Sampled August 15, 2017
Date of Test August 22, 2017
Date Issued August 24, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC: North Inlet Basin Center Finger NIB-3
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Brown Clayey Sand (NIB #3)

Sieve No.	% Passing
½"	100.0%
4	89.7%
10	83.9%
20	71.9%
40	43.4%
60	35.2%
140	26.2%
200	25.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-GG72

Date August 22, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

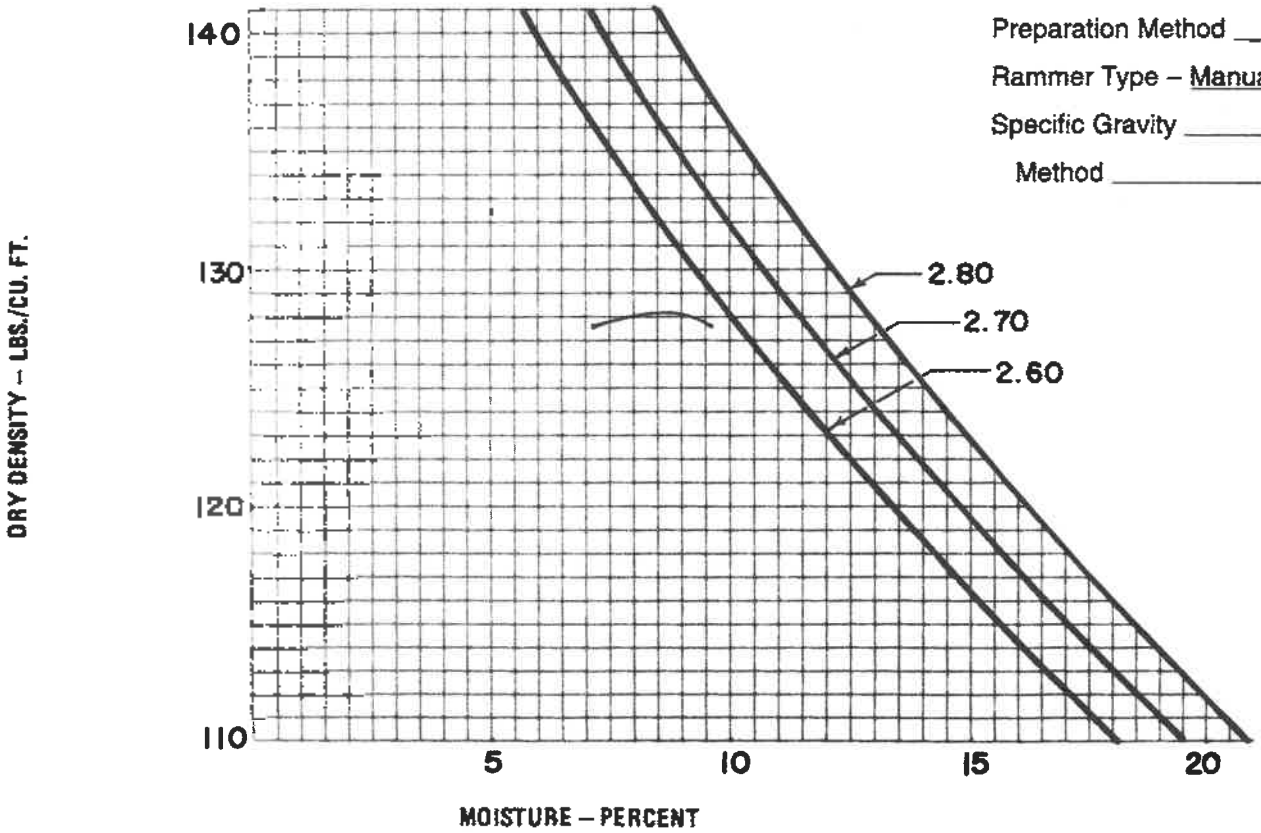
PROJECT: 488-1D Ash Basin & 489-D CPRB Closure
Project No.: C-SPP-D-00002, SRNS PO: 258194

LOCATION: Savannah River Site, Aiken Co., SC
North Inlet Basin Center Finger NIB-3

SOIL PROCTOR TEST

Maximum Dry Density — 128.1 pcf
Optimum Moisture Content — 8.7%
Soil Description — Reddish-Brown Clayey Sand (NIB #3)

Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____



ASTM D - 1557 , Method – A

Technician Branon Mitchell

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-AA64
Date Sampled June 29, 2017
Date of Test June 30, 2017
Date Issued July 3, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC: South Inlet Basin Center Finger SIB-1
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Brown Slightly Clayey Sand

Sieve No.	% Passing
4	99.5%
10	99.0%
20	89.0%
40	65.0%
60	39.0%
140	24.0%
200	23.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-AA65

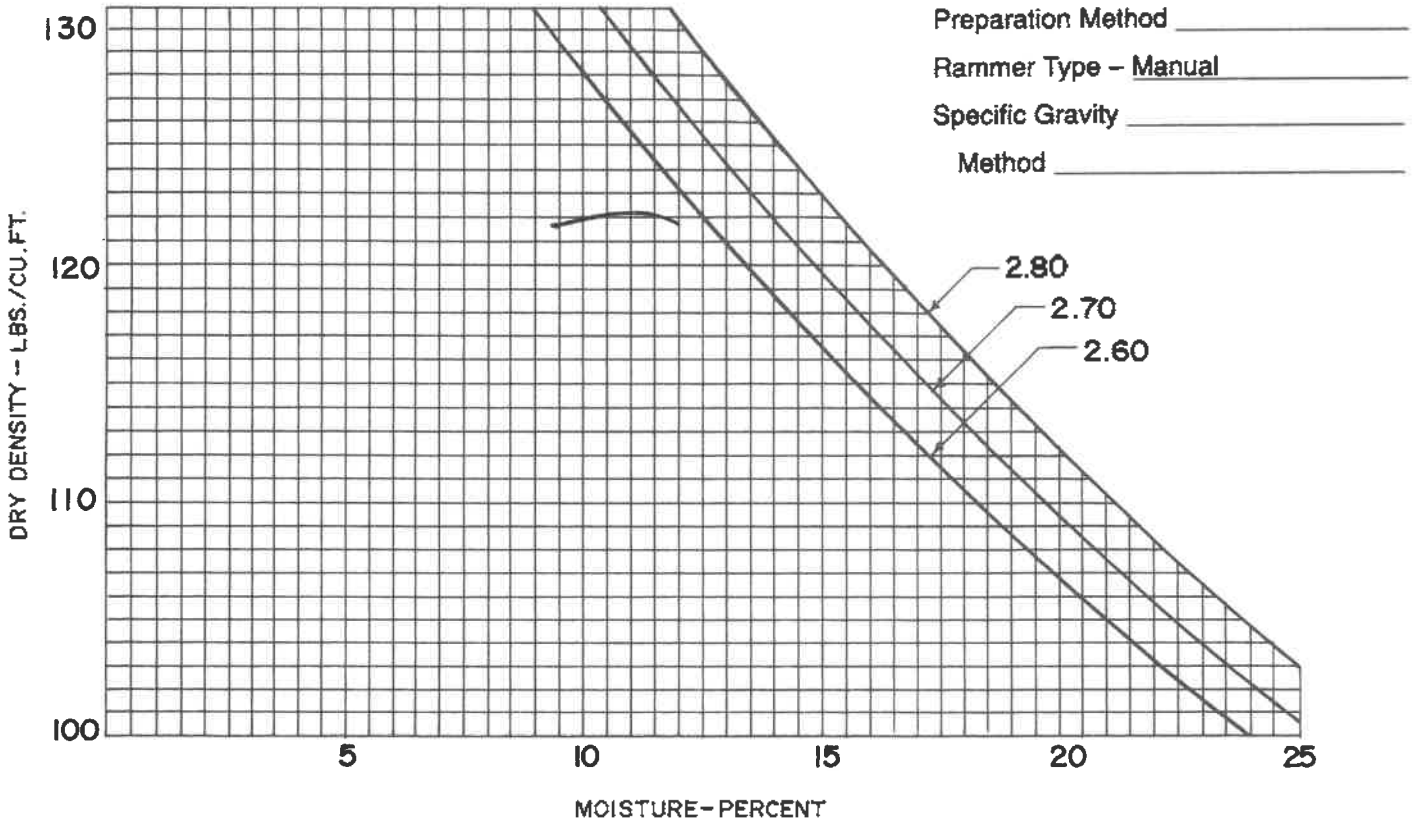
Date June 30, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin & 489-D CPRB Closure LOCATION: Savannah River Site, Aiken Co., SC
Project No.: C-SPP-D-00002, SRNS PO: 258194 South Inlet Basin Center Finger: SIB-1

SOIL PROCTOR TEST

Maximum Dry Density — 122.1 pcf
Optimum Moisture Content — 11.1%
Soil Description — Reddish-Brown Slightly Clayey Sand



ASTM D - 1557 , Method – A

Technician Chip Stewart

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1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-JJ73
Date Sampled September 6, 2017
Date of Test September 12, 2017
Date Issued September 15, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC South Inlet Basin Center Finger SIB-2
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Tan Clayey Sand (SIB #2)

Sieve No.	% Passing
4	100.0%
10	91.3%
20	80.6%
40	59.4%
60	38.8%
140	22.2%
200	19.4%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-JJ72

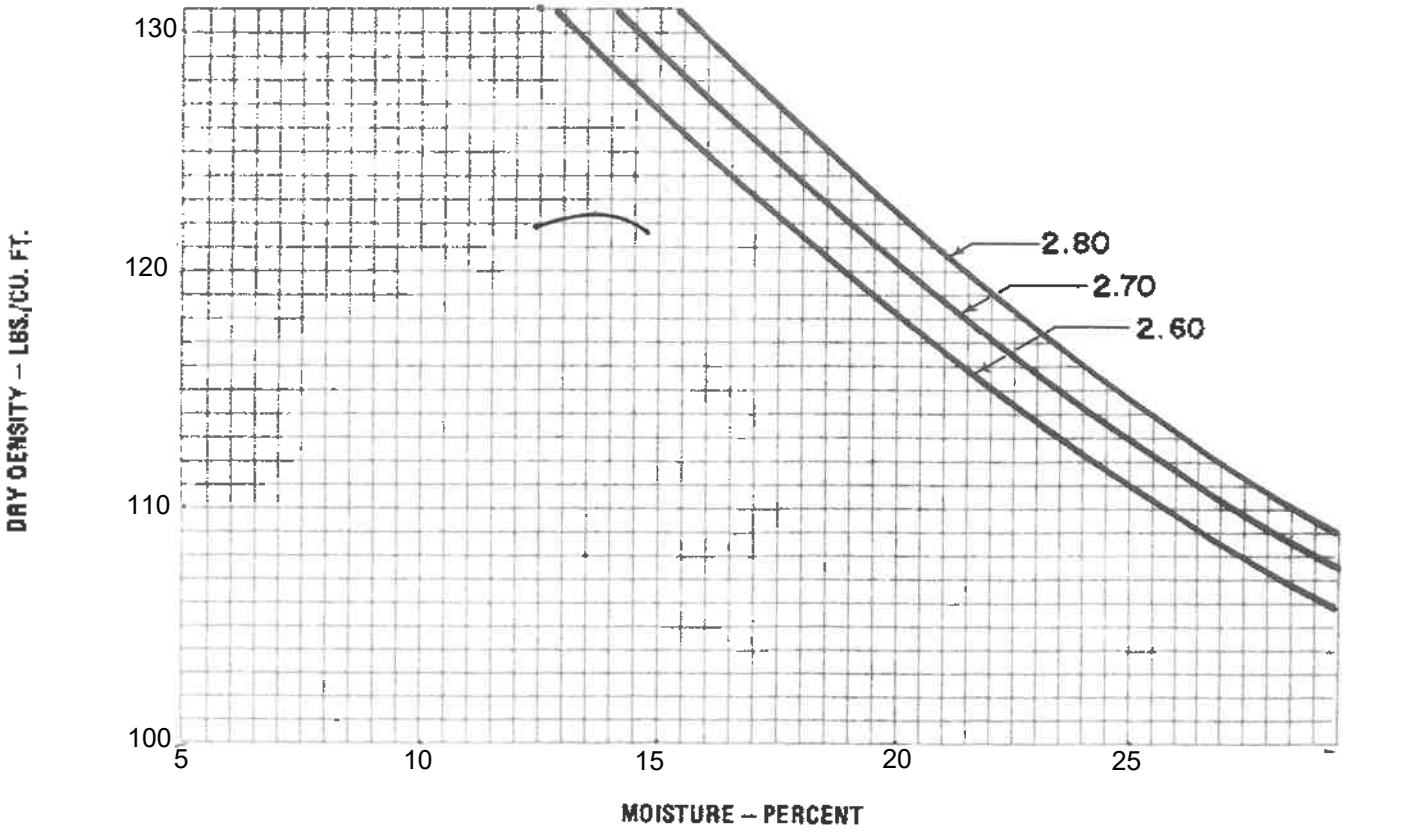
Date September 12, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin & 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
Project No.: C-SPP-D-00002, SRNS PO: 258194 South Inlet Basin Center Finger SIB-2

SOIL PROCTOR TEST

Maximum Dry Density — 122.5 pcf
Optimum Moisture Content — 13.6%
Soil Description — Reddish-Tan Clayey Sand (SIB #2)



csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-NN09
Date Sampled September 21 2017
Date of Test October 3, 2017
Date Issued October 3, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC South Inlet Basin Center Finger SIB-3
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Tan Slightly Clayey Sand (SIB #3)

Sieve No.	% Passing
2	100.0%
4	86.5%
10	73.2%
20	54.9%
40	39.2%
60	27.2%
140	21.1%
200	20.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-NN08

Date September 21, 2017

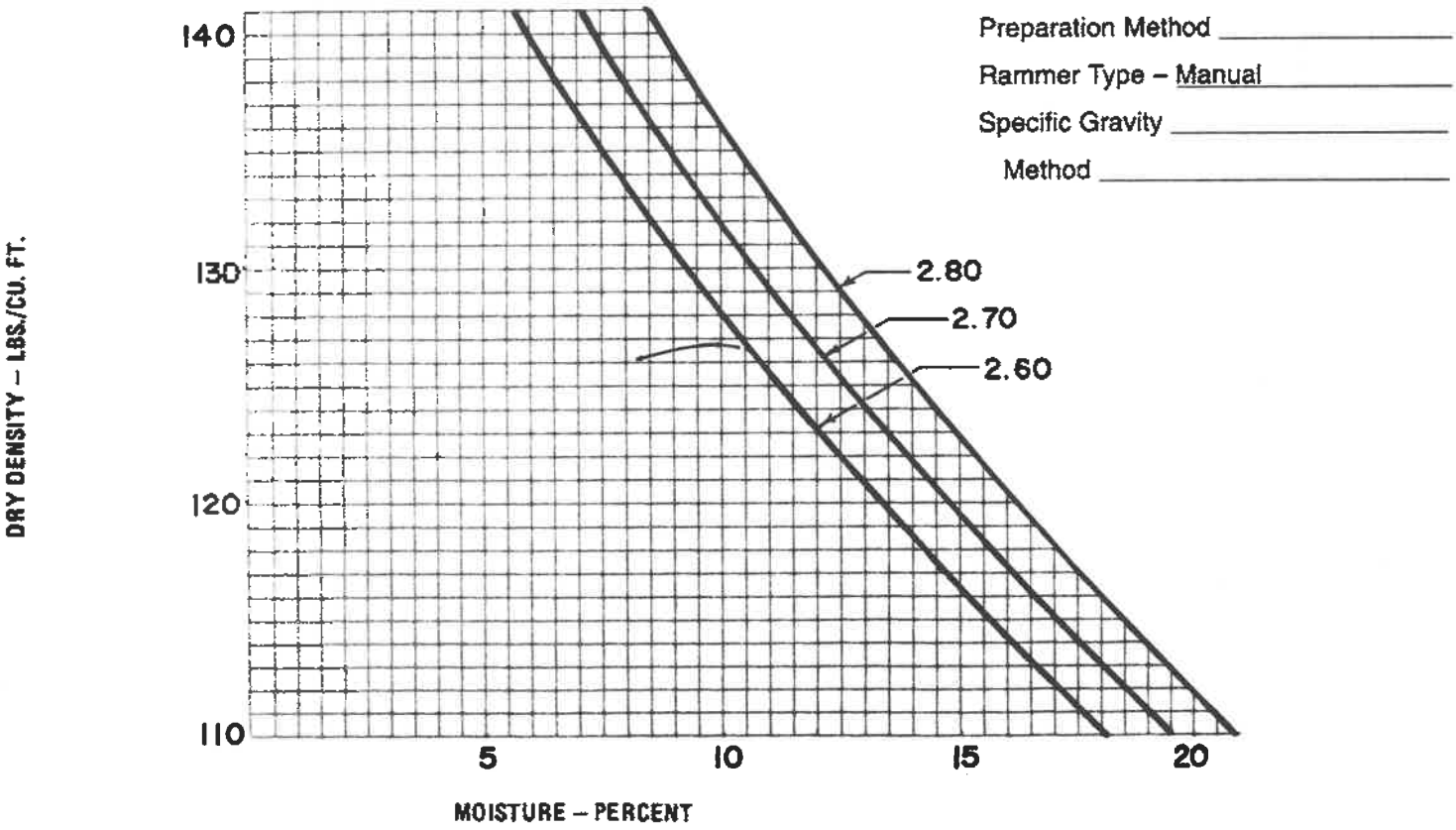
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO #258194 South Inlet Basin Center Finger SIB-3

SOIL PROCTOR TEST

Maximum Dry Density — 126.9 pcf
Optimum Moisture Content — 9.9%
Soil Description — Reddish-Tan Slighlty Clayey Sand (SIB #3)

Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____



ASTM D - 1557 , Method – A

Technician Jason Hawkins

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-MM53
Date Sampled September 21, 2017
Date of Test September 29, 2017
Date Issued September 29, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC South Inlet Basin Center Finger, ~EL 111
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Grayish-Tan Slightly Kaolinitic Sand (SIB #4)

Sieve No.	% Passing
⅜"	100.0%
4	98.5%
10	96.1%
20	88.7%
40	75.9%
60	61.1%
140	39.4%
200	34.5%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-MM52

Date September 21, 2017

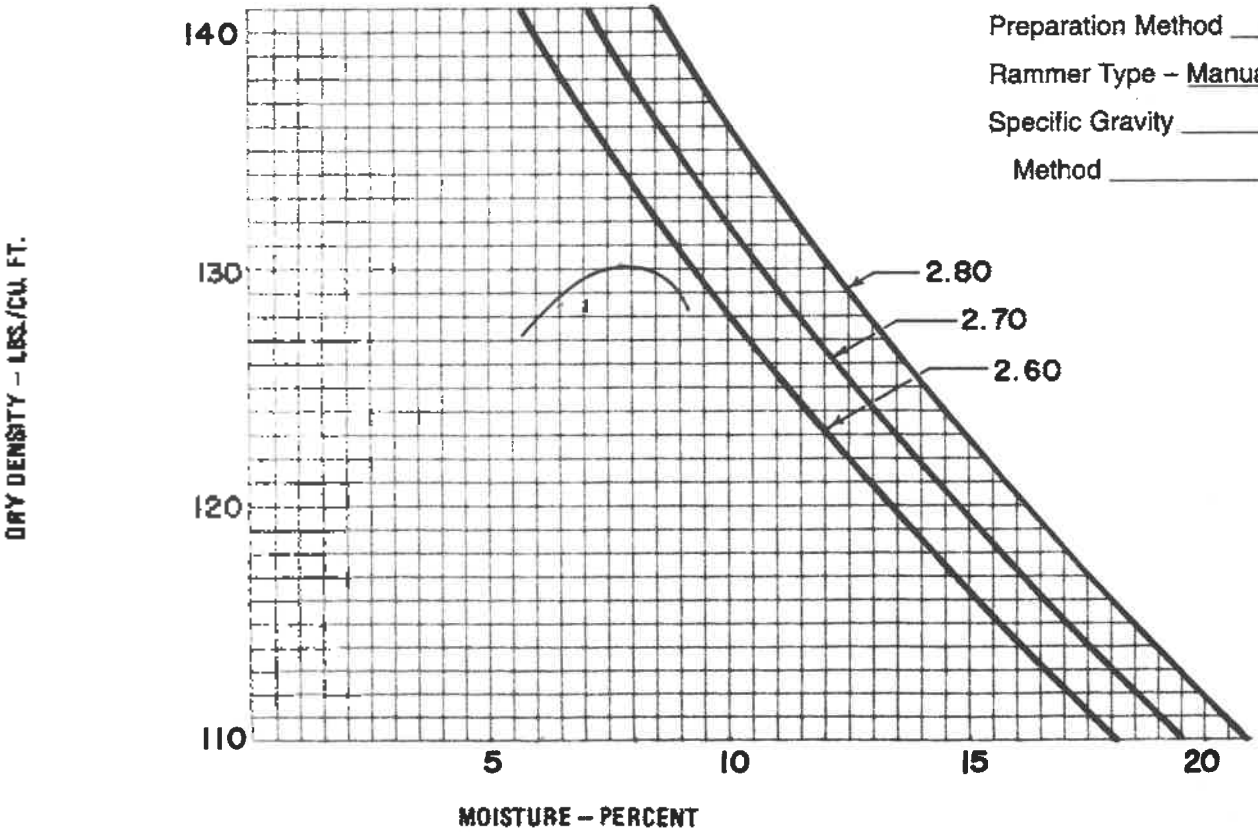
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River site, Aiken County, SC
SRNS PO #258194 South Inlet Basin Center Finger, ~ EL 111

SOIL PROCTOR TEST

Maximum Dry Density — 130.6 pcf
Optimum Moisture Content — 7.7%
Soil Description — Grayish-Tan Slightly Kaolintic Sand (SIB #4)

Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____



ASTM D - 1557 , Method – A

Technician Branon Mitchell

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-MM46
Date Sampled September 21, 2017
Date of Test September 29, 2017
Date Issued September 29, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC West Berm, Mid Berm Height, Interior
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Brown Clayey Sand (WB #1)

Sieve No.	% Passing
1"	100.0%
4	85.1%
10	77.2%
20	60.8%
40	44.8%
60	31.3%
140	23.5%
200	22.4%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-MM45

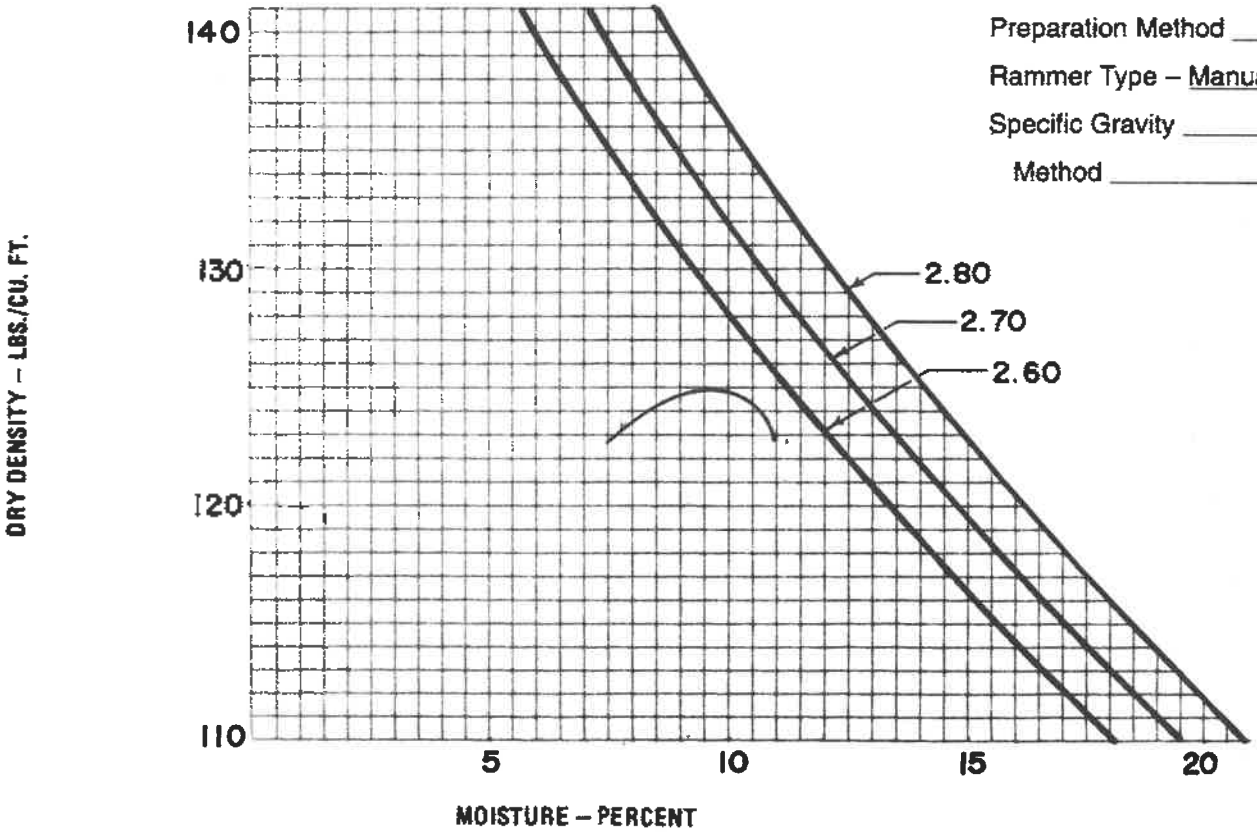
Date September 22, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO# 258194 West Berm, Mid Berm Height, Interior

SOIL PROCTOR TEST

Maximum Dry Density — 125.7 pcf
Optimum Moisture Content — 9.1%
Soil Description — Reddish-Brown Clayey Sand (WB #1)



Preparation Method
Rammer Type – Manual
Specific Gravity
Method

ASTM D - 1557 , Method – A

Technician Branon Mitchell

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-MM48
Date Sampled September 8, 2017
Date of Test September 29, 2017
Date Issued September 29, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC West Berm, 4' From Floor, Interior
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Brown Clayey Sand (WB #2)

Sieve No.	% Passing
¾"	100.0%
4	93.8%
10	88.7%
20	76.5%
40	55.0%
60	36.0%
140	24.9%
200	24.4%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-MM47

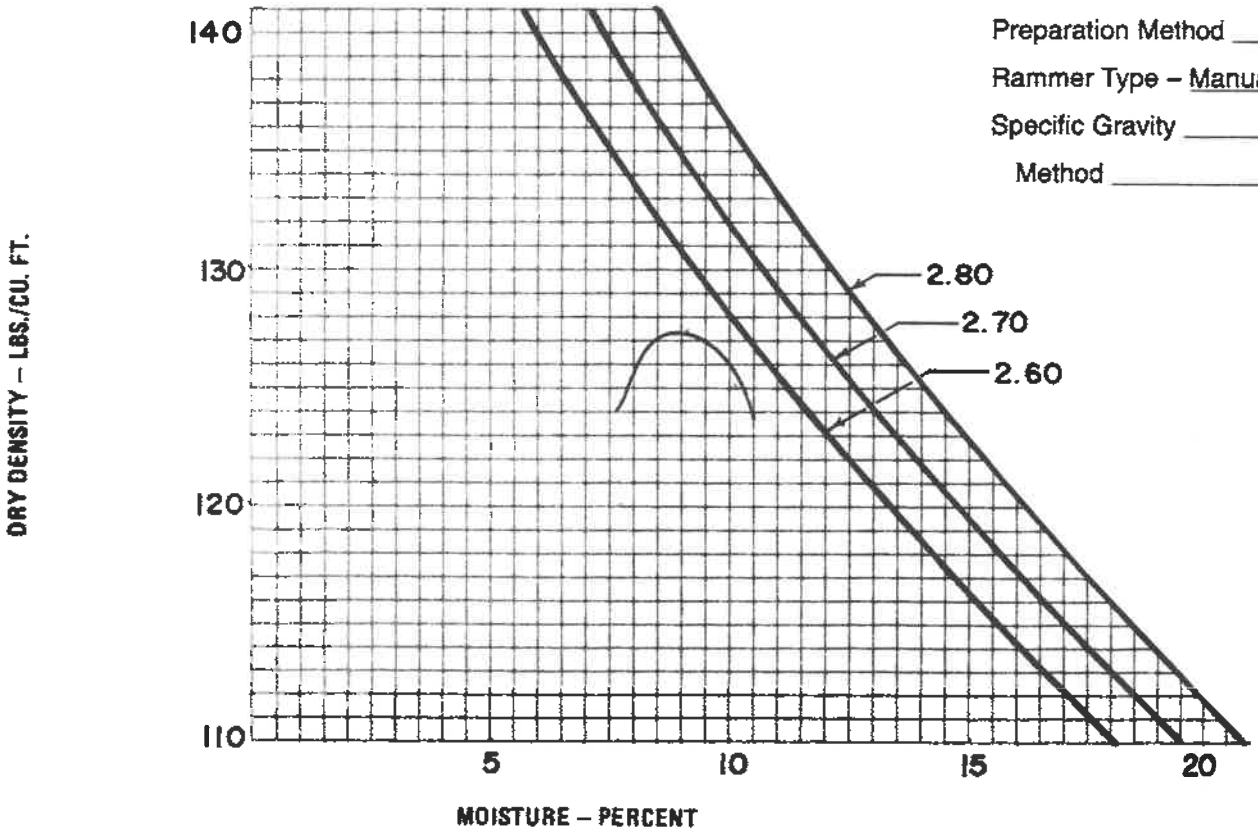
Date September 22, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
West Berm, 4' From Floor, Interior

SOIL PROCTOR TEST

Maximum Dry Density — 125.7 pcf
Optimum Moisture Content — 9.1%
Soil Description — Reddish-Brown Clayey Sand (WB #2)



Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____

ASTM D - 1557 , Method – A

Technician Branon Mitchell

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-MM50
Date Sampled September 21, 2017
Date of Test September 29, 2017
Date Issued September 29, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC West Berm, 3' BGS, Top
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Brownish-Tan Clayey Silty Sand (WB #3)

Sieve No.	% Passing
1"	100.0%
4	82.4%
10	78.1%
20	68.3%
40	49.3%
60	35.2%
140	23.9%
200	22.2%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-MM49

Date September 22, 2017

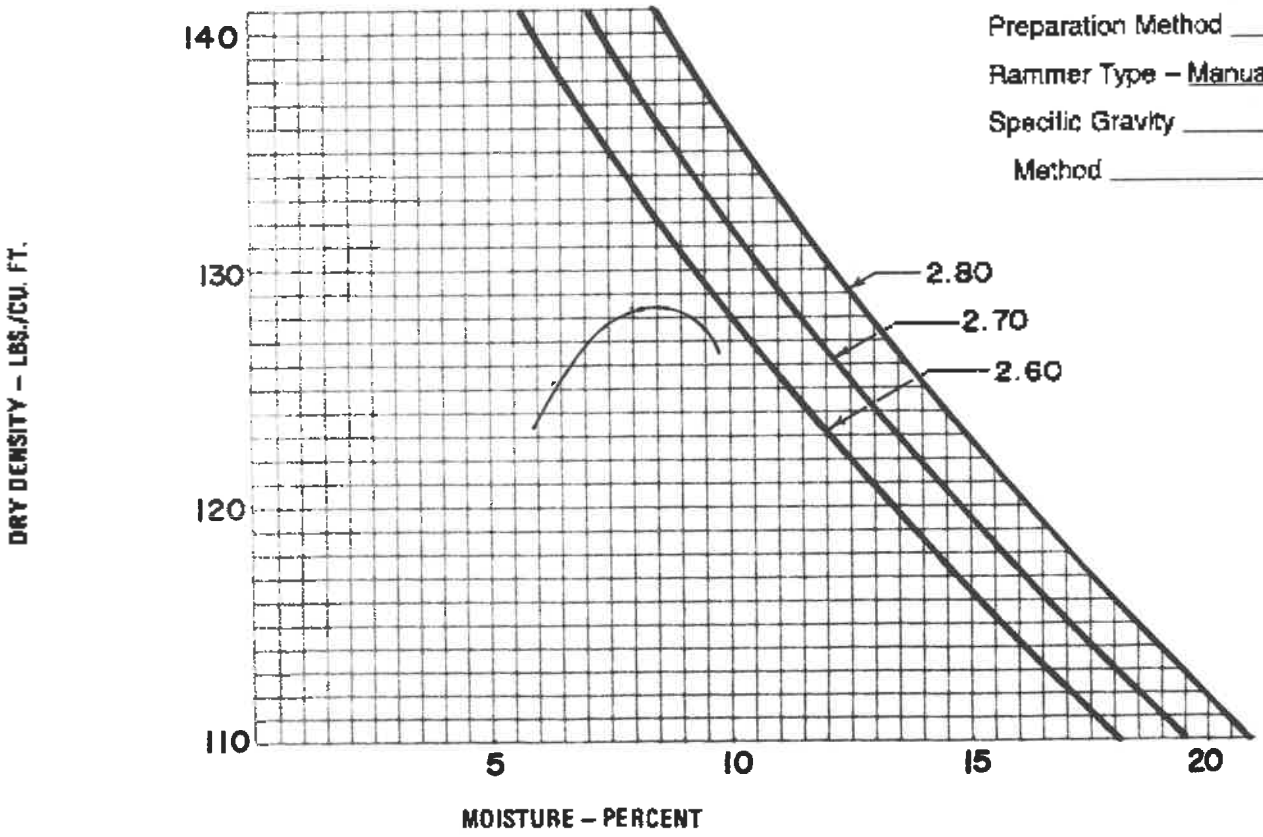
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO #258194 West Berm, 3' BGS, Top

SOIL PROCTOR TEST

Maximum Dry Density — 128.2 pcf
Optimum Moisture Content — 8.0%
Soil Description — Brownish-Tan Clayey Silty Sand (WB #3)

Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____



ASTM D - 1557 , Method – A

Technician Matt Spires

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-NN07
Date Sampled September 28, 2017
Date of Test October 3, 2017
Date Issued October 3, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC West Berm, 6' BGS, Interior
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Tan Slightly Silty Clayey Sand (WB #4)

Sieve No.	% Passing
2	100.0%
4	98.5%
10	96.6%
20	90.3%
40	72.4%
60	51.5%
140	36.6%
200	35.8%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-NN06

Date September 29, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC

SRNS PO #258194 West Berm, 6' BGS, Interior

SOIL PROCTOR TEST

Maximum Dry Density — 124.2 pcf

Optimum Moisture Content — 11.1%

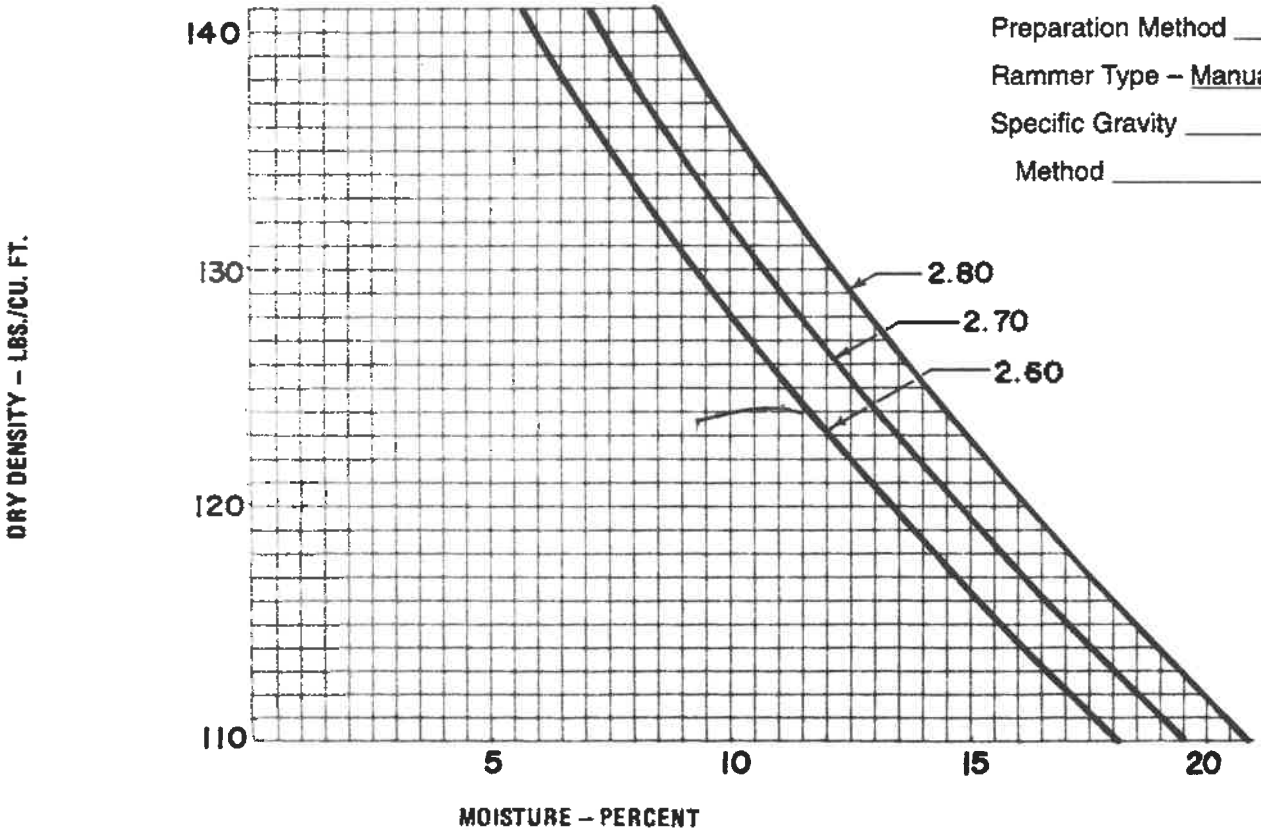
Soil Description — Reddish-Tan Slightly Silty Clayey Sand (WB #4)

Preparation Method _____

Rammer Type – Manual

Specific Gravity _____

Method _____



ASTM D - 1557 , Method – A

Technician Branon Mitchell

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-NN05
Date Sampled September 28, 2017
Date of Test October 3, 2017
Date Issued October 3, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC West Berm, 3' BGS, Top
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Tan Clayey Sand (WB #5)

Sieve No.	% Passing
2	100.0%
4	90.9%
10	86.9%
20	70.8%
40	46.6%
60	33.6%
140	23.8%
200	22.8%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-NN04

Date September 29, 2017

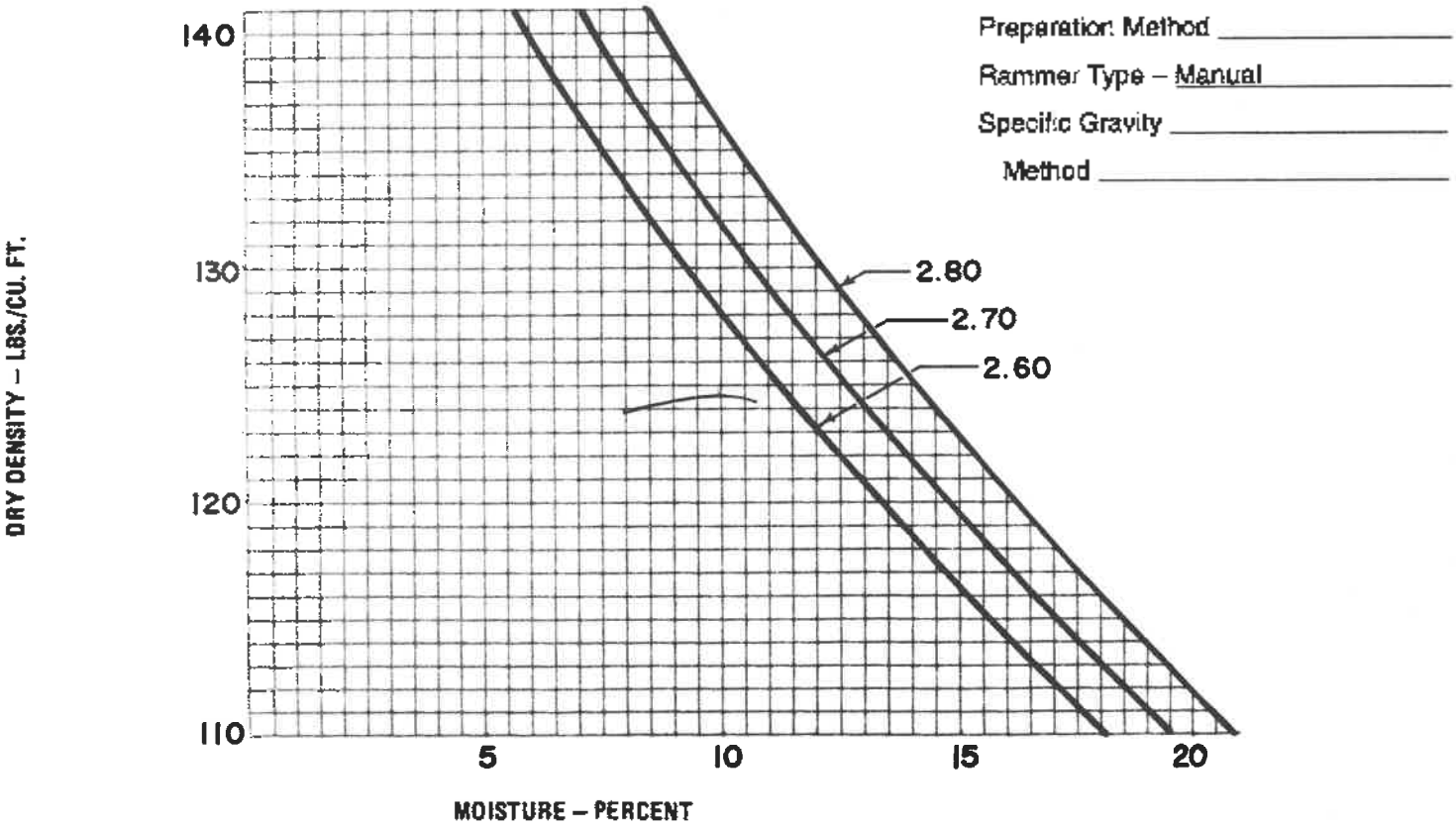
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO #258194 West Berm, 3' BGS, Top

SOIL PROCTOR TEST

Maximum Dry Density — 124.7 pcf
Optimum Moisture Content — 9.9%
Soil Description — Reddish-Tan Clayey Sand (WB #5)

Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____



ASTM D - 1557 , Method – A

Technician Chip Stewart

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-NN15
Date Sampled September 28, 2017
Date of Test October 3, 2017
Date Issued October 3, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC West Berm, 4' up from floor, interior
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Light Reddish-Tan Clayey Sand (WB #6)

Sieve No.	% Passing
2	100.0%
4	97.5%
10	96.1%
20	88.6%
40	49.6%
60	33.6%
140	27.5%
200	26.8%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-NN14

Date September 29, 2017

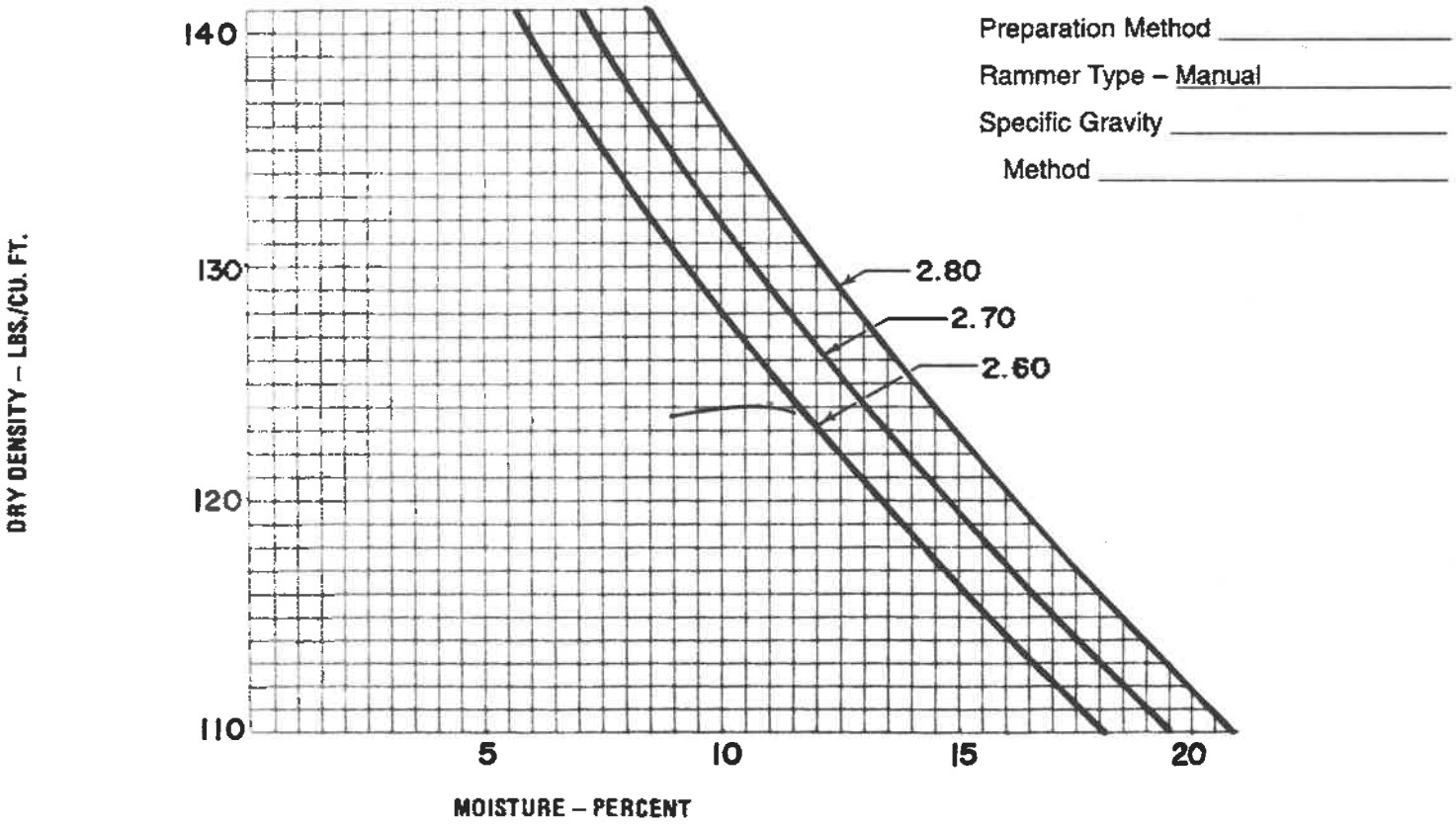
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO #258194 West Berm, 4' From Floor, Interior

SOIL PROCTOR TEST

Maximum Dry Density — 124.1 pcf
Optimum Moisture Content — 11.1%
Soil Description — Light Reddish-Brown Clayey Sand (WB #6)

Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____



ASTM D - 1557 , Method – A

Technician Chip Stewart

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-WW65
Date Sampled November 29, 2017
Date of Test November 30, 2017
Date Issued December 1, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Brown Clayey Sand (S Berm #1)

Sieve No.	% Passing
4	100.0%
10	94.0%
20	75.0%
40	51.0%
60	36.0%
140	29.0%
200	28.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-WW64

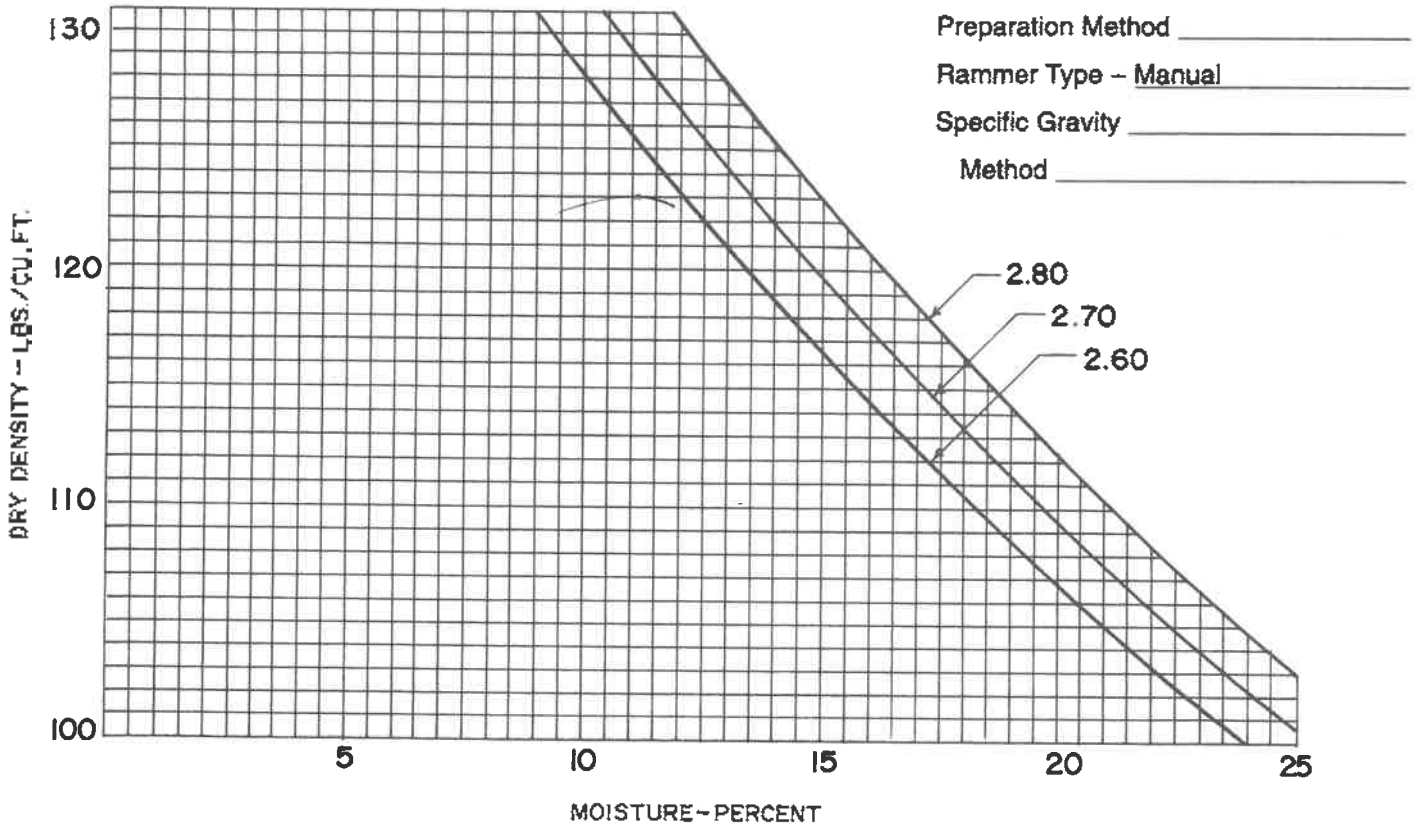
Date November 30, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO #258194

SOIL PROCTOR TEST

Maximum Dry Density — 123.0 pcf
Optimum Moisture Content — 11.1%
Soil Description — Reddish-Brown Clayey Sand (S Berm #1)



ASTM D - 1557 , Method – A

Technician Matt Spires

Accredited By AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-WW67
Date Sampled November 29, 2017
Date of Test November 30, 2017
Date Issued December 1, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Light Reddish-Brown Clayey Sand (S Berm #2)

Sieve No.	% Passing
4	100.0%
10	94.0%
20	81.0%
40	59.0%
60	42.0%
140	31.0%
200	29.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-WW66

Date November 30, 2017

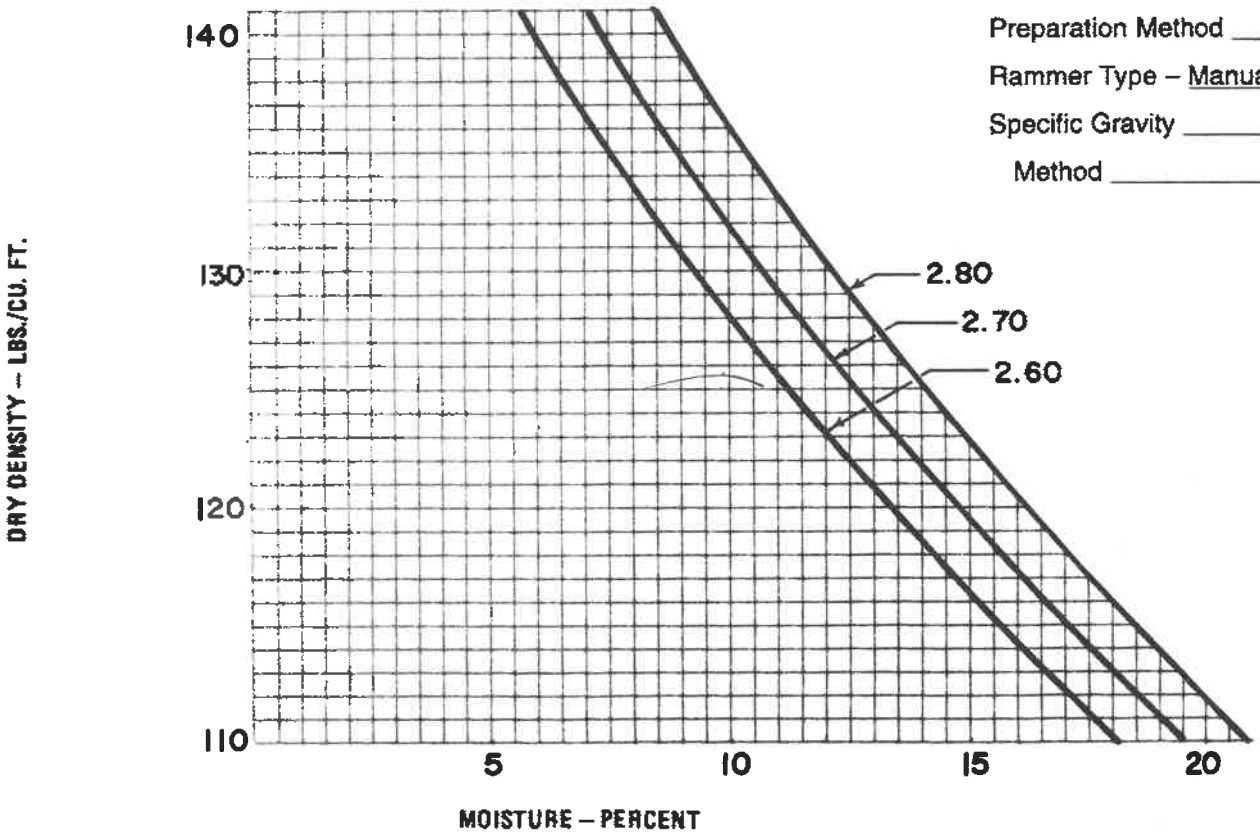
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO #258194

SOIL PROCTOR TEST

Maximum Dry Density — 125.8 pcf
Optimum Moisture Content — 9.9%
Soil Description — Light Reddish-Brown Clayey Sand (S Berm #2)

Preparation Method
Rammer Type – Manual
Specific Gravity
Method



ASTM D - 1557 , Method – A

Technician Matt Spires

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-WW69
Date Sampled November 29, 2017
Date of Test November 30, 2017
Date Issued December 1, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Dark Reddish-Brown Clayey Sand (S Berm #3)

Sieve No.	% Passing
4	100.0%
10	99.0%
20	88.0%
40	62.0%
60	39.0%
140	27.0%
200	26.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6860
FAX (706) 737-0629

Report No. T17-WW68

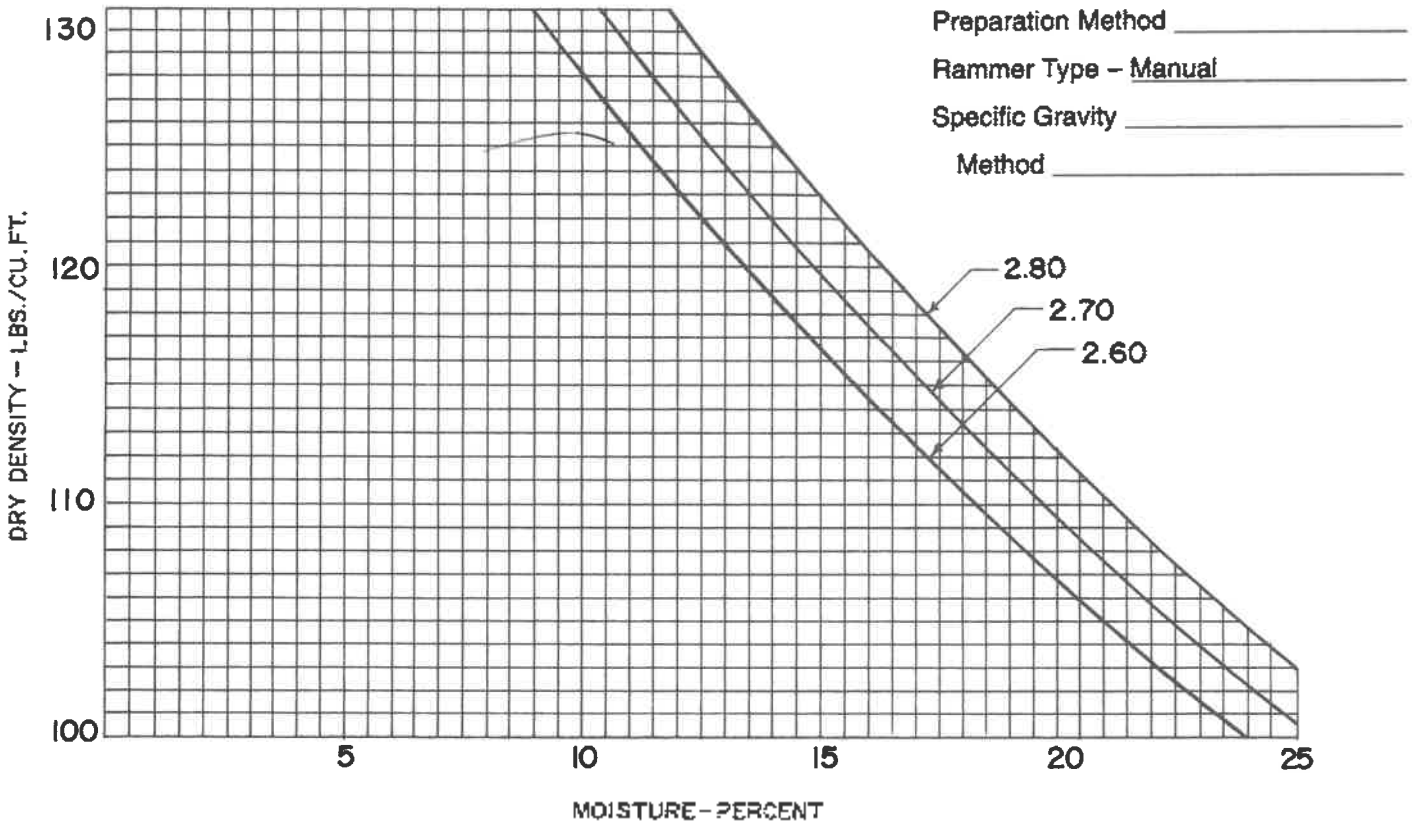
Date November 30, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC

SOIL PROCTOR TEST

Maximum Dry Density — 125.7 pcf
Optimum Moisture Content — 9.9%
Soil Description — Dark Reddish-Brown Clayey Sand (S Berm #3)

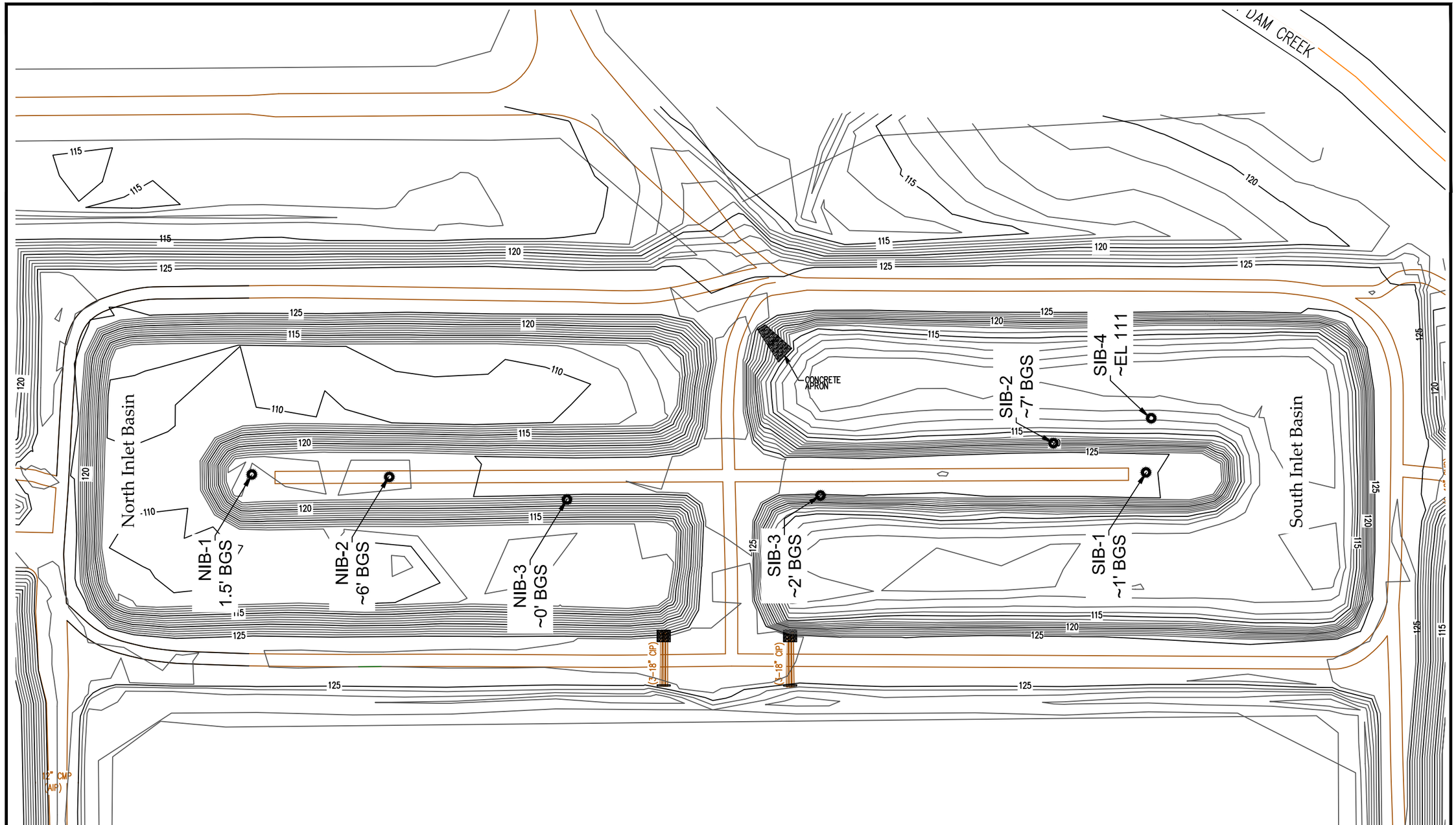


ASTM D - 1557 , Method – A

Technician Matt Spires

Accredited By AASHTO Accreditation Program (AAP)

E:\GGE\PROJECT DATA\ENVIROCON\SRNS POND 1D\PE FILES\488-1D TESTING\COMPACTION\NEW WESTERN BERM\PROCTORS\INLET BASIN GEOTECH LOCATIONS.DWG



NOTES:

1) SIB-1 Collected: 06/29/2017
2) NIB-1 Collected: 07/27/2017 Proctor, Gradation on 08/15/2017
3) NIB-2 Collected: 08/15/2017
4) NIB-3 Collected: 08/15/2017
5) SIB-3 Collected: 09/05/2017
6) SIB-3 Collected: 09/21/2017
7) SIB-4 Collected: 09/21/2017

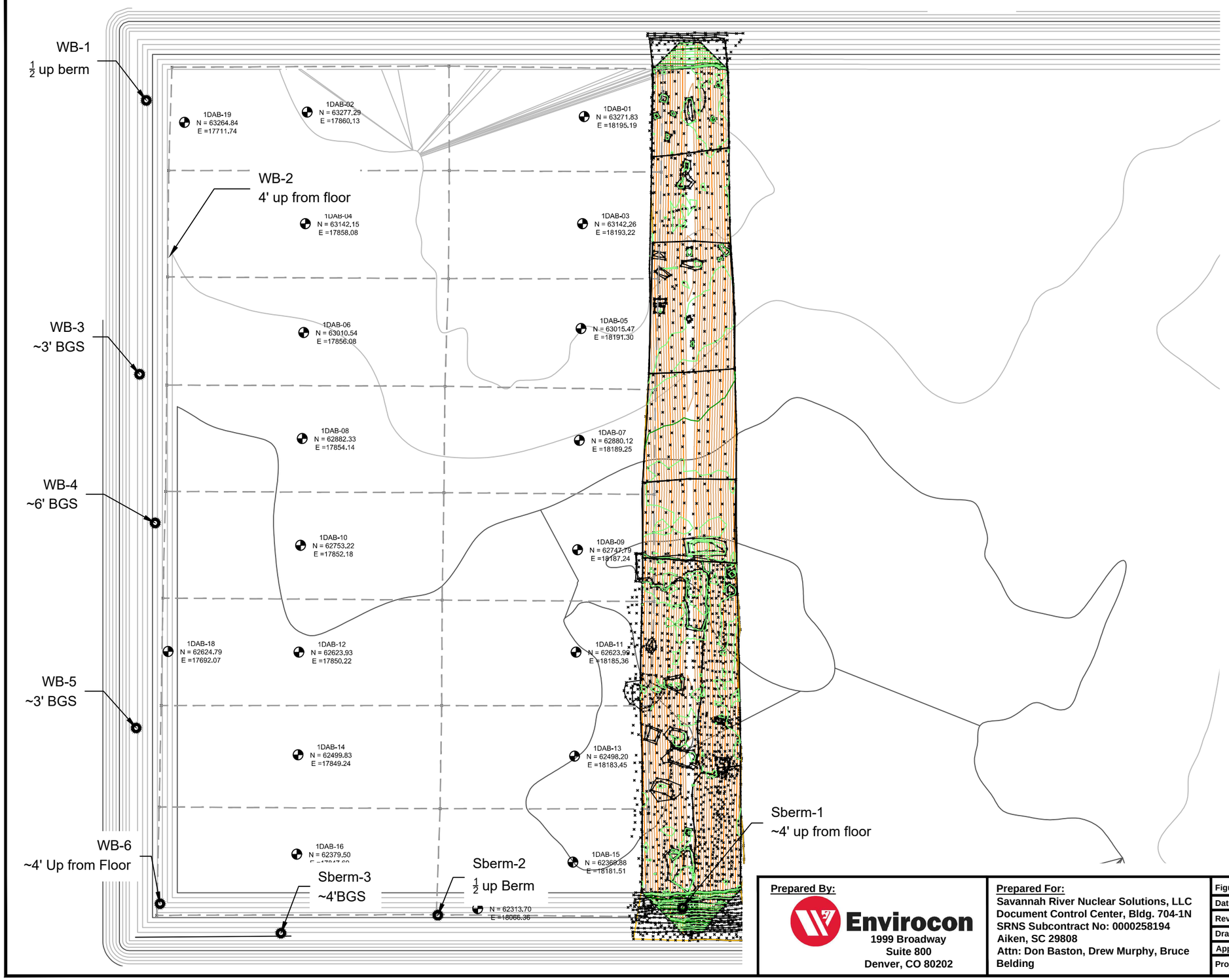
0 80' 160'

SCALE IN FEET

Prepared By: Envirocon, 7878 Wadsworth Blvd, Suite 340, Arvada, CO 80003	**Prepared For:** Savannah River Nuclear Solutions, LLC, Document Control Center, Bldg. 704-1N, SRNS Subcontract No: 0000258194, Aiken, SC 29808, Attn: Don Baston, Drew Murphy, Steve Hoover
Figure #: 01	
Date: 09/21/2017	
Revision #: 0	
Drawn By: GGE	
Approved By: EI	
Project #: 1495402	

Geotech Test Locations for Inlet Basin Clay

488-1D Ash Basin Closure



LEGEND

- Original Basin Contour Major (10')
- Original Basin Contour Minor (2')
- NWB Design Contour Major (5')
- NWB Design Contour Minor (1')
- AB NWB Floor Contour Major (5')
- AB NWB Floor Contour Minor (1')

NOTES:

1) WB-1, WB-2, and WB-3 collected on 09/21/2017.
2) WB-4, WB-5, and WB-6 collected on 09/28/2017.
3) Sberm-1, Sberm-2, and Sberm-3 collected on 11/29/2017.

Prepared By:
Envirocon
1999 Broadway
Suite 800
Denver, CO 80202

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Drew Murphy, Bruce Belding

Figure #: 01	
Date: 12/11/2017	
Revision #: 0	
Drawn By: GGE	
Approved By: EI	
Project #: 1495402	

Proctor Sample Locations
West & South Berms

488-1D Ash Basin Closure

231-Gradation, Proctor & Compaction NWB Page 66 of 66

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Envirocon

Backfill Inspection Report

Date: January 31, 2018	
Project Title: SRNS 488-1D Ash Landfill	**Location:** Jackson, SC

Observations of Fill Placement & Compaction Activities: New Western Berm

Envirocon, Inc. removed the ash from 488-1D from within the footprint of the New Western Berm. This removal process was conducted in a progressive fashion, allowing for the removal and backfill to occur simultaneously along the length of the berm foot print. To accomplish this, the berm footprint was split into grids. This allowed for final cleaning and clay placement to occur in one grid while bulk ash removal occurred in another grid. This footprint required visual inspection to ensure all ash was removed, but no confirmation sampling was required within the footprint. The excavations extended to 1 foot below the original basin bottom. Please see the attached figure for the Grid locations. The CSRA proctor data, and test inspections are also provided as attachments at the end of this document. This report documents a continuation of that process.

- December 19, 2017: Clay sourced from the West Berm was placed in Grid 6, Grid 7, Grid 8 Lift 1 of the New Western Berm. Grid 6 Lift 1 had a relative density of 98.6% with a moisture content of 10.0%. Grid 7 Lift 1 had a relative density of 97.8% with a moisture content of 11.1% Grid 8 Lift 1 had a relative density of 99.3% with a moisture content of 9.6%. The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making 2 vibratory and 2 static passes.
- December 20, 2017: Clay sourced from the South Berm was placed in Grid 8 Lift 2 of the New Western Berm. Grid 8 Lift 2 had a relative density of 95.3% with a moisture content of 13.5%. The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making 2 vibratory and 2 static passes.
- January 2, 2018: Clay sourced from the South Berm was placed in Grid 6 and Grid 7 Lift 2 of the New Western Berm. Grid 6 Lift 2 had a relative density of 98.9% with a moisture content of 8.3%. Grid 7 Lift 2 had a relative density of 99.4% with a moisture content of 8.1%.The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.
- January 8, 2018: Clay sourced from the West Berm was placed in Grid 6 and Grid 7 Lift 3 of the New Western Berm. Grid 6 Lift 3 had a relative density of 95.1% with a moisture content of 11.6%. Grid 7 Lift 3 had a relative density of 96.3% with a moisture content of 9.5%.The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.
- January 9, 2018: Clay sourced from the West Berm was placed in Grid 6 and Grid 7 Lift 4 of the New Western Berm. Grid 6 Lift 4 had a relative density of 95.6% with a moisture content of 12.2%. Grid 7 Lift 4 had a relative density of 97.8% with a moisture content of 9.5%.The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.
- January 10, 2018: Clay sourced from the West Berm was placed in Grid 6 and Grid 7 Lift 5 of the New Western Berm. Grid 6 Lift 5 had a relative density of 97.3% with a moisture content of 11.5%. Grid 7 Lift 5 had a relative density of 98.7% with a moisture content of 10.2%.The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.
- January 11, 2018: Clay sourced from the West Berm was placed in Grid 6 and Grid 7 Lift 6 of the New Western Berm. Grid 6 Lift 6 had a relative density of 97.6% with a moisture content of 10.2%. Grid 7 Lift 6 had a relative density of 98.1% with a moisture content of

Envirocon

Backfill Inspection Report

10.5%.The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.

- January 12, 2018: Clay sourced from the West Berm was placed in Grid 6 and Grid 7 Lift 7 of the New Western Berm. Grid 6 Lift 7 had a relative density of 100.3% with a moisture content of 13.8%. Grid 7 Lift 7 had a relative density of 100.0% with a moisture content of 11.3%.The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.
- January 16, 2018: Clay sourced from the South Berm was placed in Grid 6 and Grid 7 Lift 8 and Grid 8 Lift 3 of the New Western Berm. Grid 6 Lift 8 had a relative density of 97.8% with a moisture content of 11.5%. Grid 7 Lift 8 had a relative density of 98.1% with a moisture content of 9.9%. Grid 8 Lift 3 had a relative density of 97.1-97.3% with a moisture content of 9.0-10.2%.The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.
- January 17, 2018: Clay sourced from the South Berm was placed in Grid 4 and Grid 5 Lift 5 of the New Western Berm. Grid 4 Lift 5 had a relative density of 96.5% with a moisture content of 11.7%. Grid 5 Lift 5 had a relative density of 97.0% with a moisture content of 12.6%.The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.
- January 18, 2018: Clay sourced from the South Berm was placed in Grid 8 Lift 4 of the New Western Berm. Grid 8 Lift 4 had a relative density of 97.5-98.5% with a moisture content of 10.8-9.8%.The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.
- January 22, 2018: Clay sourced from the South Berm was placed in Grid 4 and Grid 5 Lift 6 and Grid 6 and Grid 7 Lift 9 of the New Western Berm. Grid 4 Lift 6 had a relative density of 97.0% with a moisture content of 8.8%. Grid 5 Lift 6 had a relative density of 95.3% with a moisture content of 8.8%. Grid 6 Lift 9 had a relative density of 95.5% with a moisture content of 7.6%. Grid 7 Lift 9 had a relative density of 99.3% with a moisture content of 7.2%.The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.
- January 23, 2018: Clay sourced from the South Berm was placed in Grid 4 and Grid 5 Lift 7 and Grid 6 and Grid 7 Lift 10 of the New Western Berm. Grid 4 Lift 7 had a relative density of 96.3% with a moisture content of 9.4%. Grid 5 Lift 7 had a relative density of 95.6% with a moisture content of 11.4%. Grid 6 Lift 10 had a relative density of 96.1% with a moisture content of 12.7%. Grid 7 Lift 10 had a relative density of 98.2% with a moisture content of 11.0%.The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.
- January 24, 2018: Clay sourced from the West Berm was placed in Grid 4 and Grid 5 Lift 8 and Grid 8 Lift 5 of the New Western Berm. Grid 4 Lift 8 had a relative density of 98.5% with a moisture content of 12.2%. Grid 5 Lift 8 had a relative density of 96.0% with a moisture content of 11.5%. Grid 8 Lift 5 had a relative density of 97.4% with a moisture content of 10.7%. The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.

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Backfill Inspection Report

Attachments:

- CSRA Compaction Testing Reports
- CSRA Proctor Reports
- Location Sketch

I certify that the placement of the fills described were in compliance with the plans and specifications.

Patrick P. Tinnes, PE

January 31, 2018

Project Engineer

488-1D Ash Basin Closure Project

(323) 728-5463

ptinnes@envirocon.com

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Tuesday, Dec 19, 2017	1309	East / NWB

Subject:

Lift 1 in Grid 6 of the fill in the New Western Berm was tested.

Date:	Time:	Direction of View / Location:
Tuesday, Dec 19, 2017	827	North / NWB

Subject:

Lift 1 in Grid 7 of the fill in the New Western Berm.

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Wednesday, Dec 20, 2017	1121	Southeast / NWB

Subject:

Lift 2 in Grid 8 being created.

Date:	Time:	Direction of View / Location:
Wednesday, Dec 20, 2017	1324	South / NWB

Subject:

Lift 2 in Grid 8 was tested.

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
January 11, 2018	1300	South / NWB

Subject:

Date:	Time:	Direction of View / Location:
January 25, 2018	1611	North / NWB

Subject:

Lift 6 in Grid 8 was tested.

Envirocon

Backfill Inspection Report

CSRA COMPACTION TEST REPORTS

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-AI04		
Date Issued:	December 19, 2017		
Date & Time of Test:	December 19, 2017 (12:30 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Reddish-Tan Clayey Sand (WB #5)

Proctor Density-Optimum Moisture: 124.7 pcf / 9.9% (mod.)

Test No.	1	2	3	4	5			
Course Level	Lift 1							
Area to Be	Grid 6	Grid 7	Grid 8					
Dry Density In-Place	122.9	122.0	123.8	120.4	121.9			
% Proctor Density	98.6	97.8	99.3	96.6	97.8			
Moisture Content	10.0	11.1	9.6	11.4	10.0			
% Compaction Required	95.0	95.0	95.0	95.0	95.0			
Conformance	✓	✓	✓	✓	✓			
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-AI49		
Date Issued:	December 27, 2017		
Date & Time of Test:	December 20, 2017 (1:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (S Berm 1)

Proctor Density-Optimum Moisture: 123.0 pcf / 11.1% (mod.)

Test No.	1	2	3					
Course Level	2nd lift							
Area to Be	Grid #8							
Dry Density In-Place	117.2	117.6	121.9					
% Proctor Density	95.3	95.6	99.1					
Moisture Content	13.5	13.8	14.0					
% Compaction Required	95.0	95.0	95.0					
Conformance	✓	✓	✓					
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-A10		
Date Issued:	January 8, 2018		
Date & Time of Test:	January 2, 2018 (3:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Cool	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Dark Reddish-Brown Clayey Sand (S Berm 3)

Proctor Density-Optimum Moisture: 125.7 pcf / 9.9% (mod.)

Test No.	1	2						
Course Level	Lift 2							
Area to Be	Grid #6	Grid #7						
Dry Density In-Place	124.3	124.9						
% Proctor Density	98.9	99.4						
Moisture Content	8.3	8.1						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer

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csra TESTING AND ENGINEERING CO., INC.

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Report No.:	T18-A44		
Date Issued:	January 9, 2018		
Date & Time of Test:	January 8, 2018 (3:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Cool	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Dark Reddish-Brown Clayey Sand (S Berm 3)

Proctor Density-Optimum Moisture: 125.7 pcf / 9.9% (mod.)

Test No.	1	2						
Course Level	Lift 3							
Area to Be	Grid #6	Grid #7						
Dry Density In-Place	119.5	121.0						
% Proctor Density	95.1	96.3						
Moisture Content	11.6	9.5						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
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Report No.:	T18-A54		
Date Issued:	January 10, 2018		
Date & Time of Test:	January 9, 2018 (4:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Cloudy and Cool	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (S Berm 1)

Proctor Density-Optimum Moisture: 123.1 pcf / 11.1% (mod.)

Test No.	1	2						
Course Level	Lift 4							
Area to Be	Grid #6	Grid #7						
Dry Density In-Place	117.6	120.3						
% Proctor Density	95.6	97.8						
Moisture Content	12.2	9.5						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer

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csra TESTING AND ENGINEERING CO., INC.

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Report No.:	T18-A91		
Date Issued:	January 11, 2018		
Date & Time of Test:	January 10, 2018 (3:10 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Cloudy and Cool	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Tan Slightly Silty Clayey Sand (W Berm 4)

Proctor Density-Optimum Moisture: 124.2 pcf / 11.1% (mod.)

Test No.	1	2						
Course Level	Lift 5							
Area to Be	Grid #6	Grid #7						
Dry Density In-Place	120.9	122.6						
% Proctor Density	97.3	98.7						
Moisture Content	11.5	10.2						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer

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Report No.:	T18-B32		
Date Issued:	January 12, 2018		
Date & Time of Test:	January 11, 2018 (12:30 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Cloudy and Cool	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Tan Slightly Silty Clayey Sand (W Berm 4)

Proctor Density-Optimum Moisture: 124.2 pcf / 11.1% (mod.)

Test No.	1	2						
Course Level	Lift 6							
Area to Be	Grid #7	Grid #6						
Dry Density In-Place	121.9	121.2						
% Proctor Density	98.1	97.6						
Moisture Content	10.5	10.2						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

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1005 Emmett St., Suite A
Augusta, Georgia 30904
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Report No.:	T18-B40 (rev.)		
Date Issued:	January 15, 2018		
Date & Time of Test:	January 12, 2018 (11:00 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Reddish-Tan Slightly Silty Clayey Sand (W Berm 4)

Proctor Density-Optimum Moisture: 124.2 pcf / 11.1% (mod.)

Test No.	1	2						
Course Level	Lift 7							
Area to Be	Grid #6	Grid #7						
Dry Density In-Place	124.6	124.2						
% Proctor Density	100.3	100.0						
Moisture Content	13.8	11.3						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

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Report No.:	T18-B71		
Date Issued:	January 16, 2018		
Date & Time of Test:	January 16, 2018 (11:00 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Cool	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Dark Reddish-Brown Clayey Sand (S Berm 3)

Proctor Density-Optimum Moisture: 125.7 pcf / 9.9% (mod.)

Test No.	1	2	3	4				
Course Level	Lift 8		Lift 3					
Area to Be	Grid #6	Grid #7	Grid #8					
Dry Density In-Place	122.9	123.3	121.9	122.3				
% Proctor Density	97.8	98.1	97.0	97.3				
Moisture Content	11.5	9.9	10.2	9.0				
% Compaction Required	95.0	95.0	95.0	95.0				
Conformance	✓	✓	✓	✓				
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Rope, P.E., Reviewer

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csra TESTING AND ENGINEERING CO., INC.

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Augusta, Georgia 30904
(706) 733-6960
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Report No.:	T18-B90		
Date Issued:	January 18, 2018		
Date & Time of Test:	January 17, 2018 (3:30 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Cool	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Dark Reddish-Brown Clayey Sand (S Berm 3)

Proctor Density-Optimum Moisture: 125.7 pcf / 9.9% (mod.)

Test No.	1	2						
Course Level	Lift 5							
Area to Be	Grid #4	Grid #5						
Dry Density In-Place	121.3	121.9						
% Proctor Density	96.5	97.0						
Moisture Content	11.7	12.6						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
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Report No.:	T18-C04		
Date Issued:	January 19, 2018		
Date & Time of Test:	January 18, 2018 (3:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Cold	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Light Reddish-Brown Clayey Sand (S Berm 2)

Proctor Density-Optimum Moisture: 125.8 pcf / 9.9% (mod.)

Test No.	1	2						
Course Level	Lift 4							
Area to Be	Grid #8							
Dry Density In-Place	122.6	123.9						
% Proctor Density	97.5	98.5						
Moisture Content	10.8	9.8						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

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csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
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(706) 733-6960
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Report No.:	T18-C54FD		
Date Issued:	January 23, 2018		
Date & Time of Test:	January 22, 2018 (11:30 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Cloudy and Cool	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Light Reddish-Brown Clayey Sand (S Berm 2)

Proctor Density-Optimum Moisture: 125.8 pcf / 9.9% (mod.)

Test No.	1	2	3	4				
Course Level	Lift 6		Lift 9					
Area to Be	Grid #4	Grid #5	Grid #6	Grid #7				
Dry Density In-Place	122.0	119.9	120.2	124.9				
% Proctor Density	97.0	95.3	95.5	99.3				
Moisture Content	8.8	8.8	7.6	7.2				
% Compaction Required	95.0	95.0	95.0	95.0				
Conformance	✓	✓	✓	✓				
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-C70		
Date Issued:	January 24, 2018		
Date & Time of Test:	January 23, 2018 (2:30 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Dark Reddish-Brown Clayey Sand (S Berm 3)

Proctor Density-Optimum Moisture: 125.7 pcf / 9.9% (mod.)

Test No.	1	2	3	4				
Course Level	Lift 7		Lift 10					
Area to Be	Grid #4	Grid #5	Grid #6	Grid #7				
Dry Density In-Place	121.0	120.2	120.8	123.4				
% Proctor Density	96.3	95.6	96.1	98.2				
Moisture Content	9.4	11.4	12.7	11.0				
% Compaction Required	95.0	95.0	95.0	95.0				
Conformance	✓	✓	✓	✓				
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-C88		
Date Issued:	January 25, 2018		
Date & Time of Test:	January 24, 2018 (3:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Cool	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Light Reddish-Brown Clayey Sand (W Berm 6)

Proctor Density-Optimum Moisture: 124.1 pcf / 11.1% (mod.)

Test No.	1	2	3					
Course Level	Lift 8		Lift 5					
Area to Be	Grid #4	Grid #5	Grid #8					
Dry Density In-Place	119.3	116.2	117.9					
% Proctor Density	98.5	96.0	97.4					
Moisture Content	12.2	11.5	10.7					
% Compaction Required	95.0	95.0	95.0					
Conformance	✓	✓	✓					
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Envirocon

Backfill Inspection Report

CSRA PROCTOR REPORTS

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-NN07
Date Sampled September 28, 2017
Date of Test October 3, 2017
Date Issued October 3, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC West Berm, 6' BGS, Interior
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Tan Slightly Silty Clayey Sand (WB #4)

Sieve No.	% Passing
2	100.0%
4	98.5%
10	96.6%
20	90.3%
40	72.4%
60	51.5%
140	36.6%
200	35.8%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-NN06

Date September 29, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC

SRNS PO #258194 West Berm, 6' BGS, Interior

SOIL PROCTOR TEST

Maximum Dry Density — 124.2 pcf

Optimum Moisture Content — 11.1%

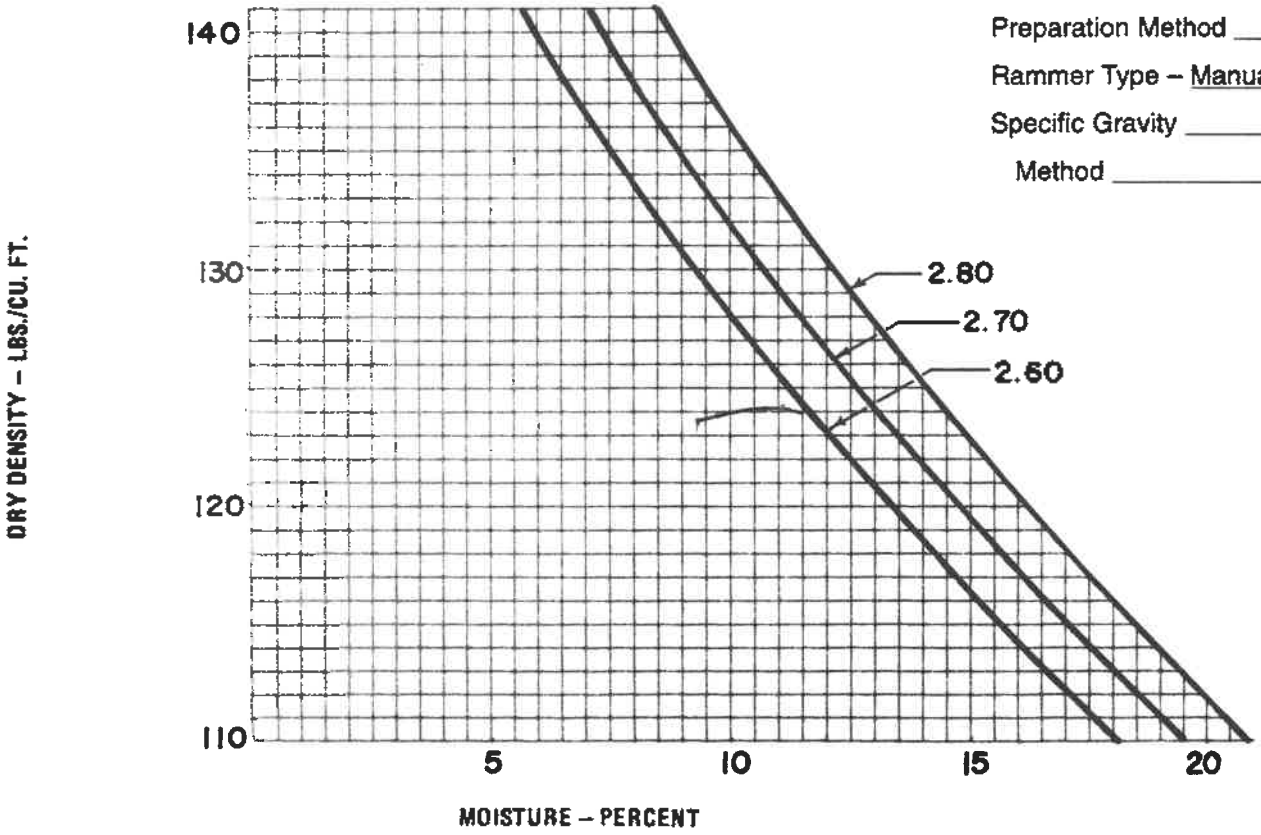
Soil Description — Reddish-Tan Slightly Silty Clayey Sand (WB #4)

Preparation Method _____

Rammer Type – Manual

Specific Gravity _____

Method _____



ASTM D - 1557 , Method – A

Technician Branon Mitchell

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-NN05
Date Sampled September 28, 2017
Date of Test October 3, 2017
Date Issued October 3, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC West Berm, 3' BGS, Top
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Tan Clayey Sand (WB #5)

Sieve No.	% Passing
2	100.0%
4	90.9%
10	86.9%
20	70.8%
40	46.6%
60	33.6%
140	23.8%
200	22.8%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-NN04

Date September 29, 2017

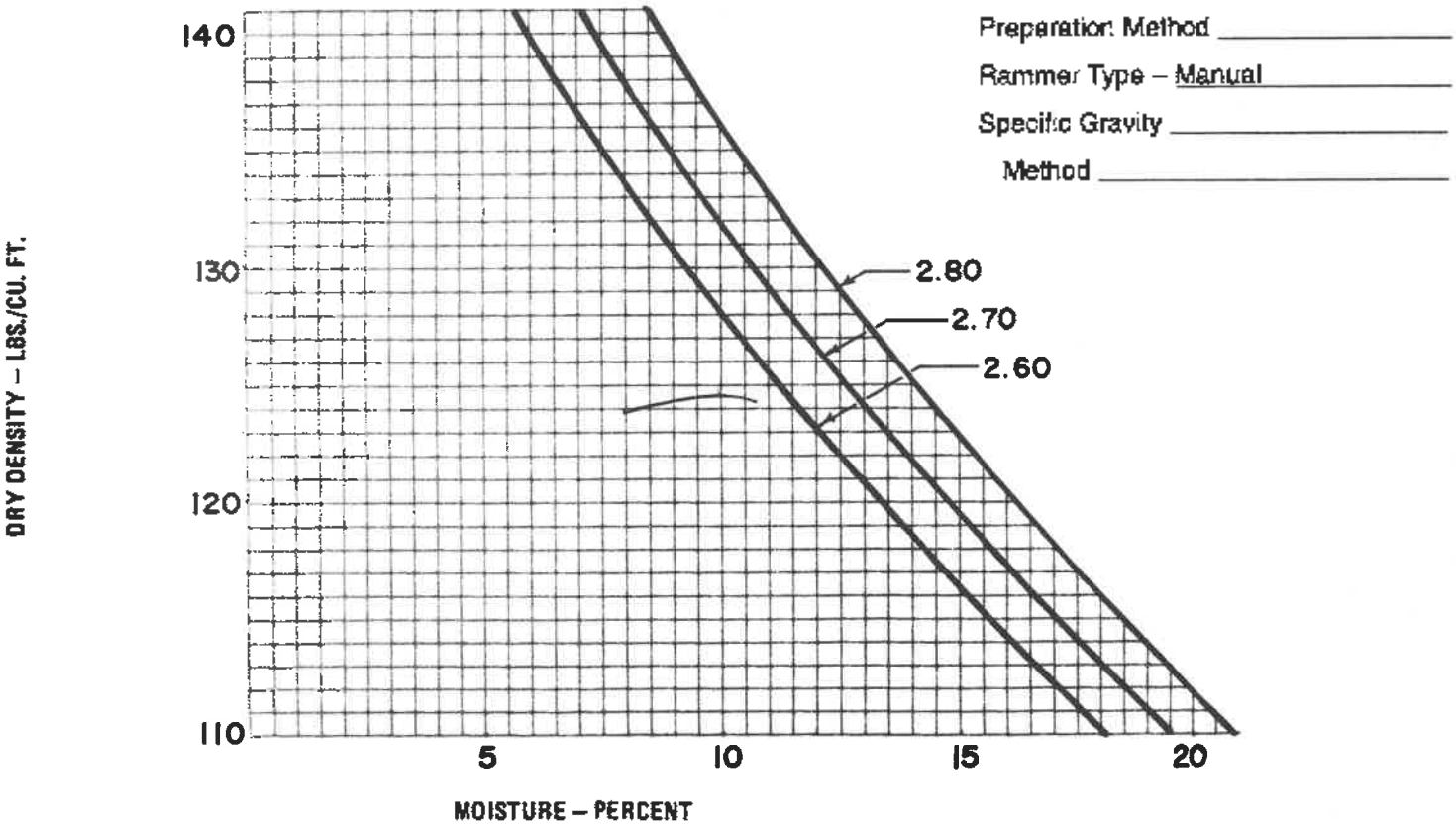
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO #258194 West Berm, 3' BGS, Top

SOIL PROCTOR TEST

Maximum Dry Density — 124.7 pcf
Optimum Moisture Content — 9.9%
Soil Description — Reddish-Tan Clayey Sand (WB #5)

Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____



ASTM D - 1557 , Method – A

Technician Chip Stewart

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-NN15
Date Sampled September 28, 2017
Date of Test October 3, 2017
Date Issued October 3, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC West Berm, 4' up from floor, interior
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Light Reddish-Tan Clayey Sand (WB #6)

Sieve No.	% Passing
2	100.0%
4	97.5%
10	96.1%
20	88.6%
40	49.6%
60	33.6%
140	27.5%
200	26.8%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-NN14

Date September 29, 2017

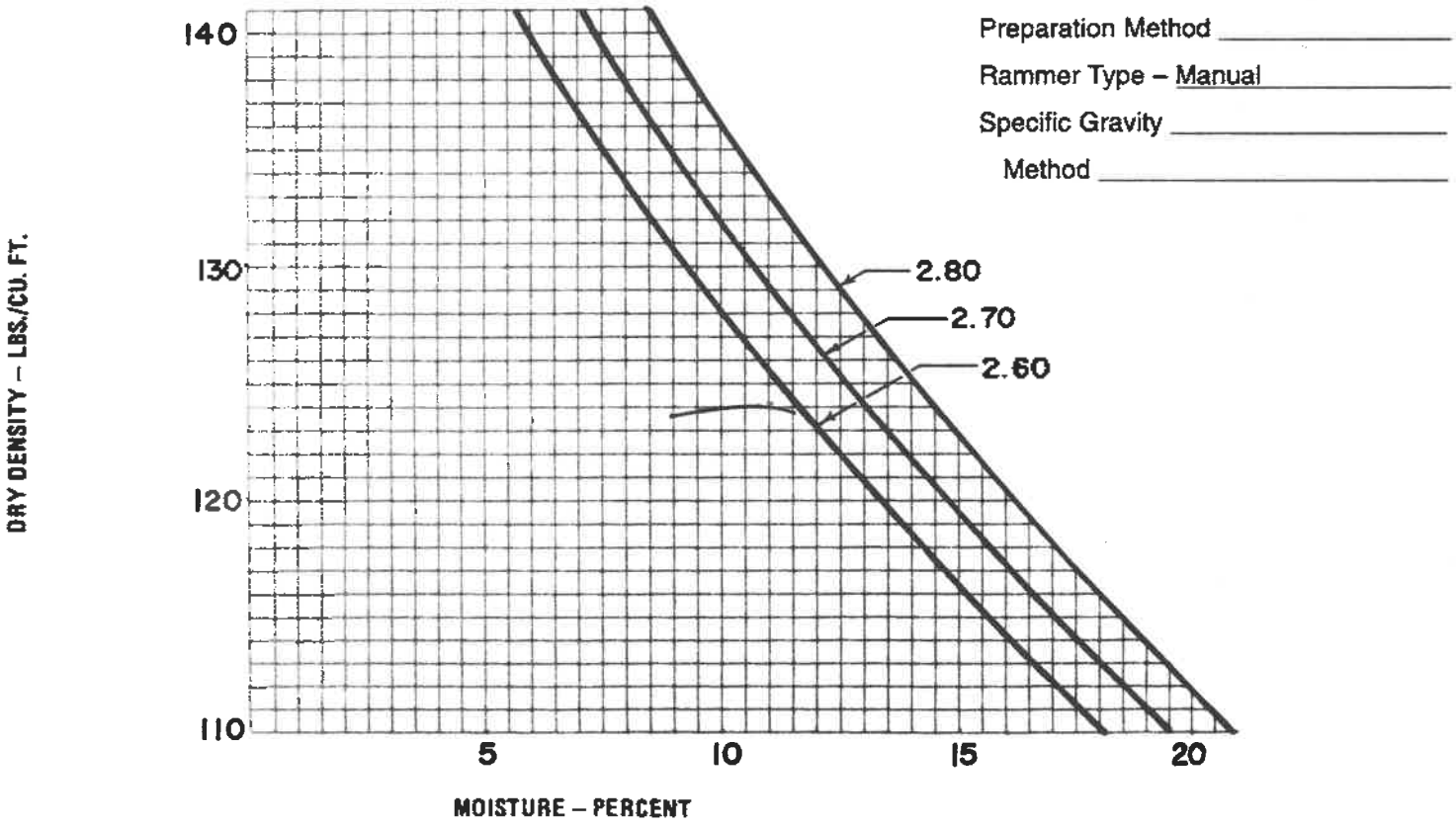
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO #258194 West Berm, 4' From Floor, Interior

SOIL PROCTOR TEST

Maximum Dry Density — 124.1 pcf
Optimum Moisture Content — 11.1%
Soil Description — Light Reddish-Brown Clayey Sand (WB #6)

Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____



ASTM D - 1557 , Method – A

Technician Chip Stewart

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-WW65
Date Sampled November 29, 2017
Date of Test November 30, 2017
Date Issued December 1, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Brown Clayey Sand (S Berm #1)

Sieve No.	% Passing
4	100.0%
10	94.0%
20	75.0%
40	51.0%
60	36.0%
140	29.0%
200	28.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-WW64

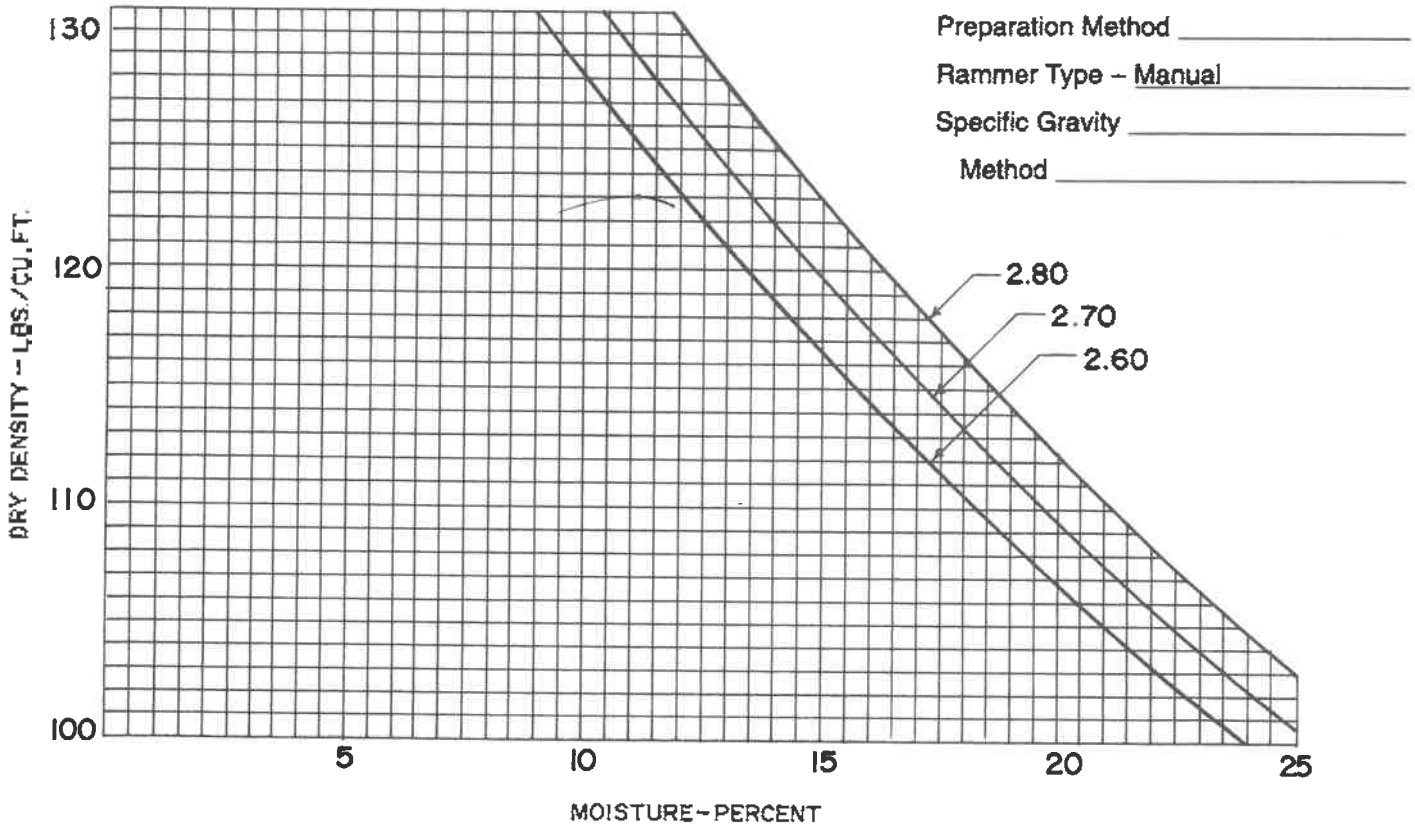
Date November 30, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO #258194

SOIL PROCTOR TEST

Maximum Dry Density — 123.0 pcf
Optimum Moisture Content — 11.1%
Soil Description — Reddish-Brown Clayey Sand (S Berm #1)



ASTM D - 1557 , Method – A

Technician Matt Spires

Accredited By AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-WW67
Date Sampled November 29, 2017
Date of Test November 30, 2017
Date Issued December 1, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Light Reddish-Brown Clayey Sand (S Berm #2)

Sieve No.	% Passing
4	100.0%
10	94.0%
20	81.0%
40	59.0%
60	42.0%
140	31.0%
200	29.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-WW66

Date November 30, 2017

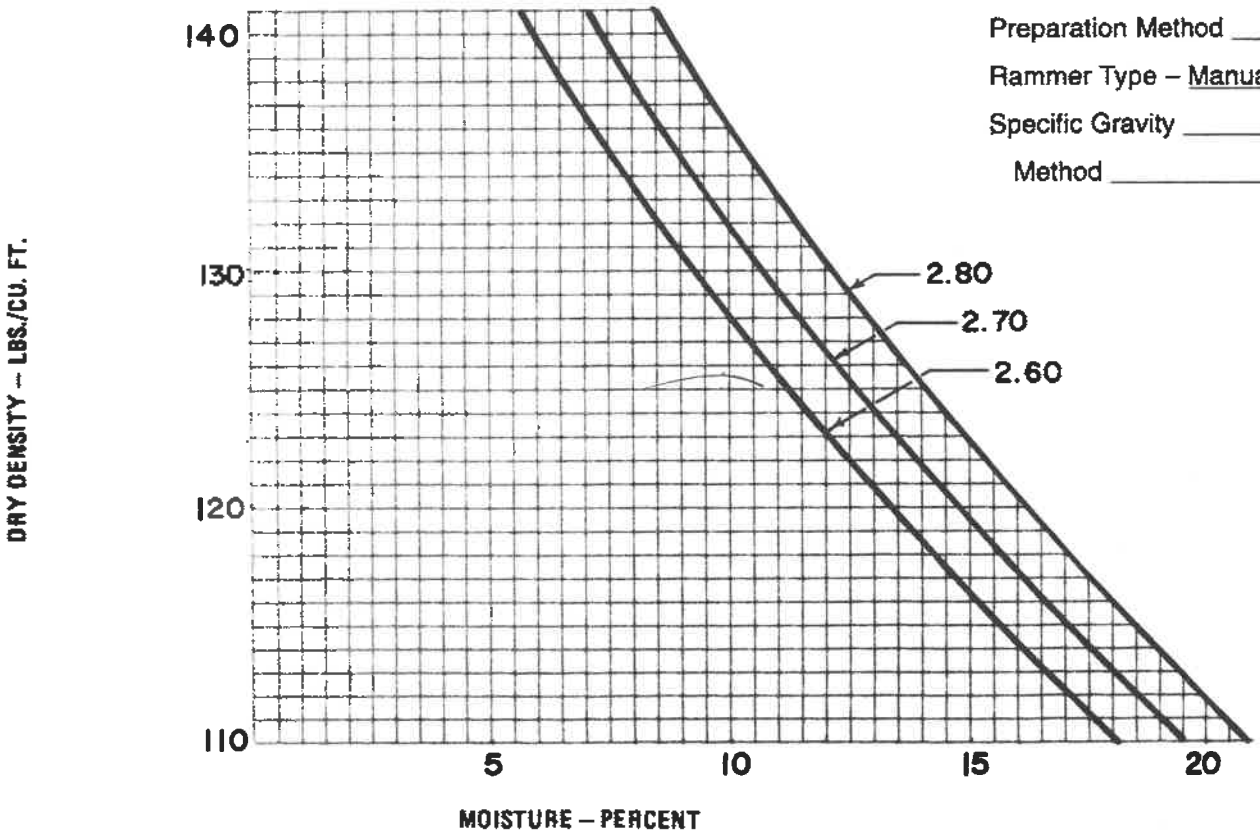
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO #258194

SOIL PROCTOR TEST

Maximum Dry Density — 125.8 pcf
Optimum Moisture Content — 9.9%
Soil Description — Light Reddish-Brown Clayey Sand (S Berm #2)

Preparation Method
Rammer Type – Manual
Specific Gravity
Method



ASTM D - 1557 , Method – A

Technician Matt Spires

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-WW69
Date Sampled November 29, 2017
Date of Test November 30, 2017
Date Issued December 1, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Dark Reddish-Brown Clayey Sand (S Berm #3)

Sieve No.	% Passing
4	100.0%
10	99.0%
20	88.0%
40	62.0%
60	39.0%
140	27.0%
200	26.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6860
FAX (706) 737-0629

Report No. T17-WW68

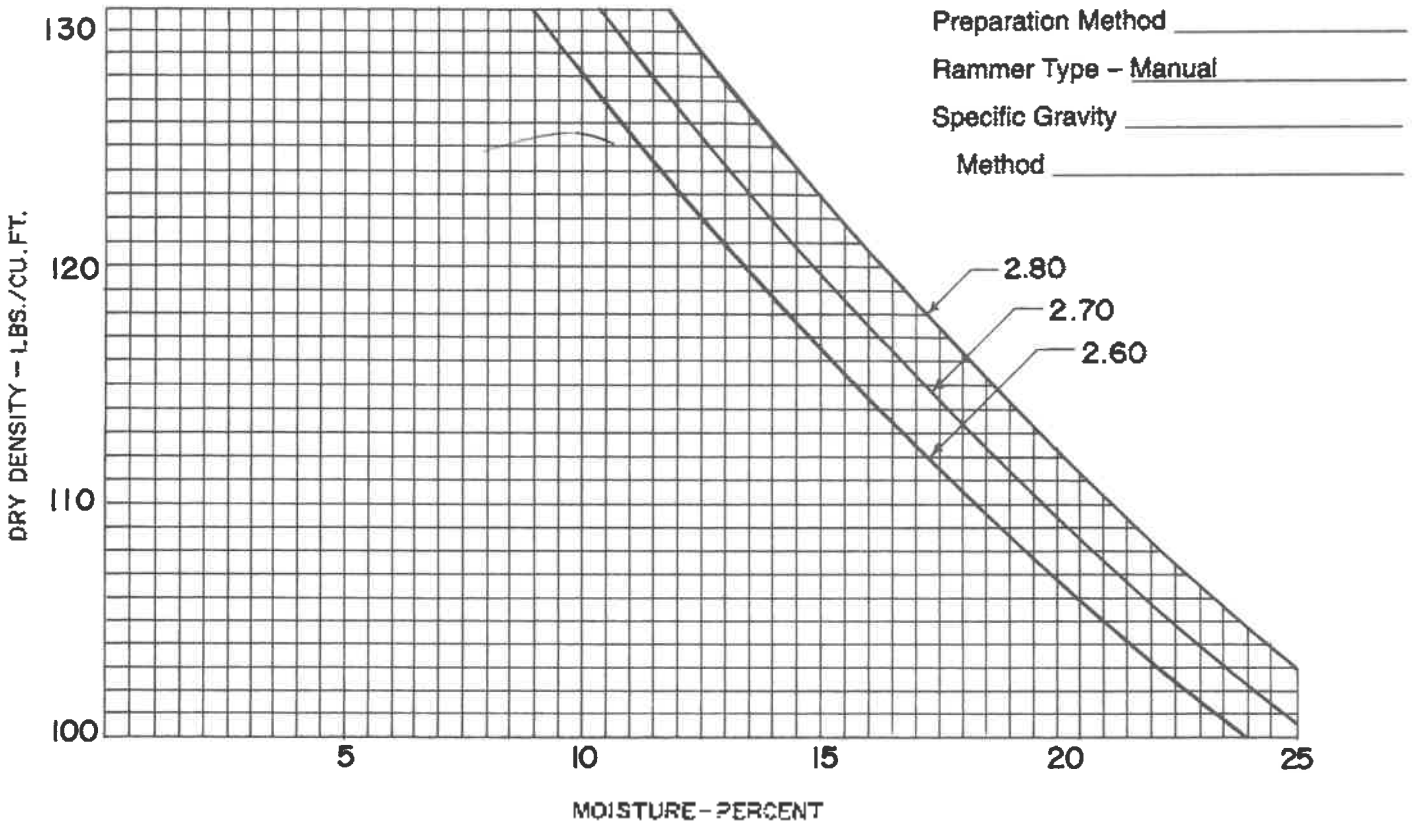
Date November 30, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC

SOIL PROCTOR TEST

Maximum Dry Density — 125.7 pcf
Optimum Moisture Content — 9.9%
Soil Description — Dark Reddish-Brown Clayey Sand (S Berm #3)

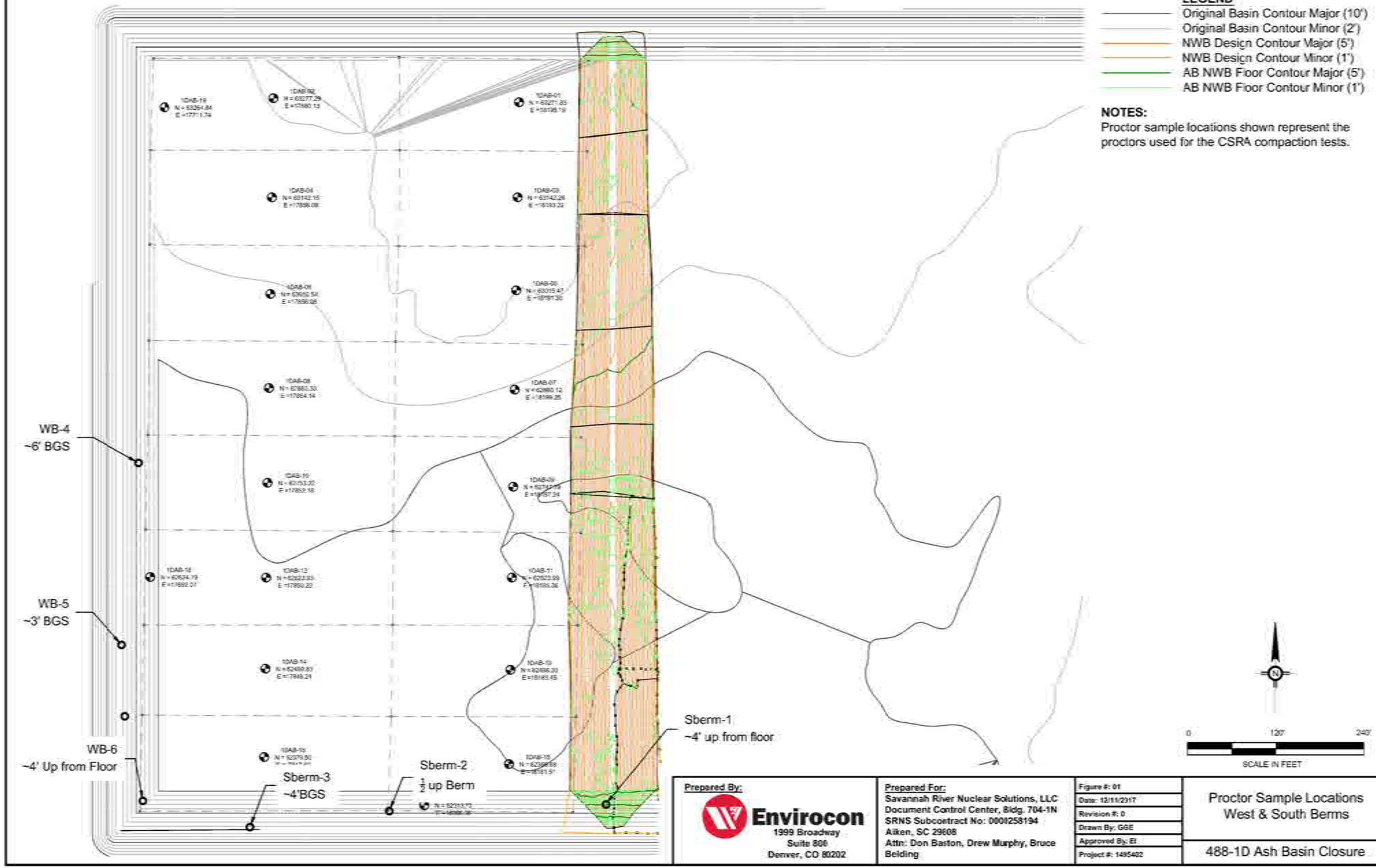


ASTM D - 1557 , Method – A

Technician Matt Spires

Accredited By AASHTO Accreditation Program (AAP)

C:\USFRS\WLIVINGSTON\DOCUMENTS\1495402.SRNS 488-1D & 489-D CLOSURE\SURVEY\02-02-18 NWB COMPACTION TEST LOCATIONS.DWG



Envirocon

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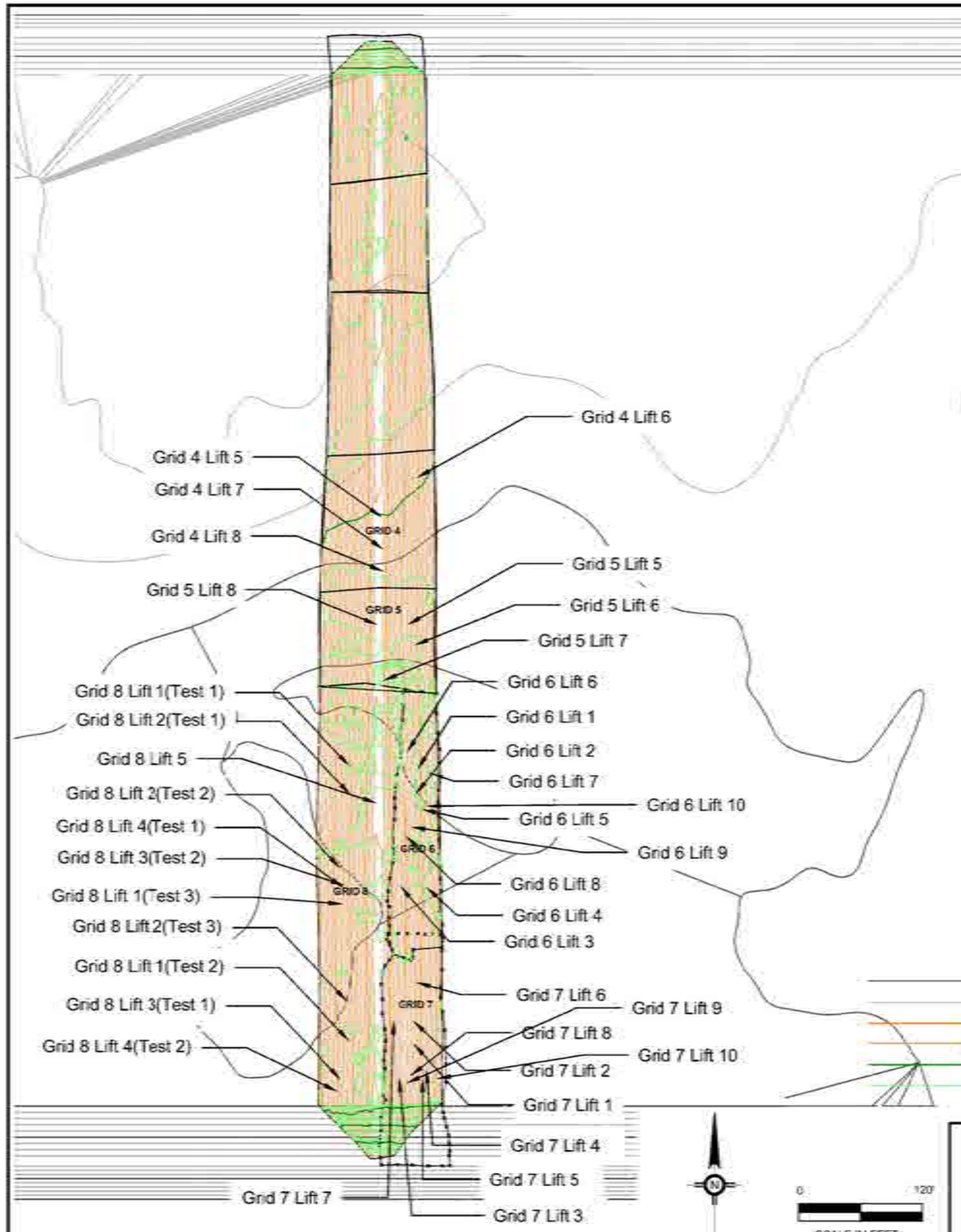
LOCATION MAP



NOTES:

1) Grid 6 Lift 1 tested on 12/19/17. Relative density: 98.6%. Moisture: 10.0%.
2) Grid 7 Lift 1 tested on 12/19/17. Relative density: 97.8%. Moisture: 11.1%.
3) Grid 8 Lift 1(Test 1) tested on 12/19/17. Relative density: 99.3%. Moisture: 9.6%.
4) Grid 8 Lift 1(Test 2) tested on 12/19/17. Relative density: 97.8%. Moisture: 10.0%
5) Grid 8 Lift 1(Test 3) tested on 12/19/17. Relative density: 96.6%. Moisture: 11.4%
6) Grid 8 Lift 2(Test 1) tested on 12/20/17. Relative density: 95.3%. Moisture: 13.5%
7) Grid 8 Lift 2(Test 2) tested on 12/20/17. Relative density: 95.6%. Moisture: 13.8%
8) Grid 8 Lift 2(Test 3) tested on 12/20/17. Relative density: 99.1%. Moisture: 14.0%
9) Grid 6 Lift 2 tested on 01/02/18. Relative density: 98.9%. Moisture: 8.3%.
10) Grid 7 Lift 2 tested on 01/02/18. Relative density: 99.4%. Moisture: 8.1%.
11) Grid 6 Lift 3 tested on 01/08/18. Relative density: 95.1%. Moisture: 11.6%.
12) Grid 7 Lift 3 tested on 01/08/18. Relative density: 96.3%. Moisture: 9.5%.
13) Grid 6 Lift 4 tested on 01/09/18. Relative density: 95.6%. Moisture: 12.2%.
14) Grid 7 Lift 4 tested on 01/09/18. Relative density: 97.8%. Moisture: 9.5%.
15) Grid 6 Lift 5 tested on 01/10/18. Relative density: 97.3%. Moisture: 11.5%.
16) Grid 7 Lift 5 tested on 01/10/18. Relative density: 98.7%. Moisture: 10.2%.
17) Grid 6 Lift 6 tested on 01/11/18. Relative density: 97.6%. Moisture: 10.2%.
18) Grid 7 Lift 6 tested on 01/11/18. Relative density: 98.1%. Moisture: 10.5%.
19) Grid 6 Lift 7 tested on 01/12/18. Relative density: 97.2%. Moisture: 13.8%.
20) Grid 7 Lift 7 tested on 01/12/18. Relative density: 96.9%. Moisture: 11.3%.
21) Grid 6 Lift 8 tested on 01/16/18. Relative density: 97.8%. Moisture: 11.5%.
22) Grid 7 Lift 8 tested on 01/16/18. Relative density: 98.1%. Moisture: 9.9%.
23) Grid 8 Lift 3(Test 1) tested on 01/16/18. Relative density: 97.0%. Moisture: 10.2%.
24) Grid 8 Lift 3(Test 2) tested on 01/16/18. Relative density: 97.3%. Moisture: 9.0%.
25) Grid 4 Lift 5 tested on 01/17/18. Relative density: 96.5%. Moisture: 11.7%.
26) Grid 5 Lift 5 tested on 01/17/18. Relative density: 97.0%. Moisture: 12.6%.
27) Grid 8 Lift 4(Test 1) tested on 01/18/18. Relative density: 97.5%. Moisture: 10.8%.
28) Grid 8 Lift 4(Test 2) tested on 01/18/18. Relative density: 98.5%. Moisture: 9.8%.
29) Grid 4 Lift 6 tested on 01/22/18. Relative density: 97.0%. Moisture: 8.8%.
30) Grid 5 Lift 6 tested on 01/22/18. Relative density: 95.3%. Moisture: 8.8%.
31) Grid 6 Lift 9 tested on 01/22/18. Relative density: 95.5%. Moisture: 7.6%.
32) Grid 7 Lift 9 tested on 01/22/18. Relative density: 99.3%. Moisture: 7.2%.
33) Grid 4 Lift 7 tested on 01/23/18. Relative density: 96.3%. Moisture: 9.4%.
34) Grid 5 Lift 7 tested on 01/23/18. Relative density: 95.6%. Moisture: 11.4%.
35) Grid 6 Lift 10 tested on 01/23/18. Relative density: 96.1%. Moisture: 12.7%.
36) Grid 7 Lift 10 tested on 01/23/18. Relative density: 98.2%. Moisture: 11.0%.
37) Grid 4 Lift 8 tested on 01/24/18. Relative density: 98.5%. Moisture: 12.2%.
38) Grid 5 Lift 8 tested on 01/24/18. Relative density: 96.0%. Moisture: 11.5%.
39) Grid 8 Lift 5 tested on 01/24/18. Relative density: 97.4%. Moisture: 10.7%.

LEGEND

- Original Basin Contour Major (10')
- Original Basin Contour Minor (2')
- NWB Design Contour Major (5')
- NWB Design Contour Minor (1')
- AB NWB Floor Contour Major (5')
- AB NWB Floor Contour Minor (1')

Prepared By:
Envirocon
1999 Broadway
Suite 800
Denver, CO 80202

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0008258194
Aiken, SC 29808
Attn: Don Baston, Drew Murphy, Billy West

Figure #: 01	
Date: 01/12/2018	
Revision #: 0	
Drawn By: WEL	
Approved By: EI	
Project #: 1495402	

New Western Berm
Compaction Test Locations

488-1D Ash Basin Closure

C:\USERS\WLIVINGSTON\DOCUMENTS\1495402 SRNS 488-1D & 489-D CLOSURE\SURVEY\02-02-18 NWB COMPACTION TEST LOCATIONS.DWG

Envirocon

Backfill Inspection Report

Date: March 09, 2018	
Project Title: SRNS 488-1D Ash Landfill	**Location: Jackson, SC**

Observations of Fill Placement & Compaction Activities: New Western Berm

Mike Beardsley, PE of Green Globe Environmental, Inc. observed site operations for the 488-1D Landfill project 02/26/2018 – 03/02/2018, while Mr. Patrick Tinnes was off site. During this observation period, two (2) 1-foot thick lifts were placed upon the New Western Berm. The details of the compaction results are as detailed below:

- February 28, 2018: Clay sourced from the southwest corner of the existing South and West berms was placed loose to 1' thick. The lift was "corner bit" to dry back the moisture (original placement occurred between 02-26-18 and 02-27-18, with dry back occurring until 02-28-18). The lift was spread uniformly using the D6 LGP dozer and track walked. Next, it was compacted using an 84" Sheep's Foot Compactor, in vibratory and static modes (three passes vibratory followed by 1 pass static). Once the lift was compacted, CSRA arrived on the site to test the layer. The following locations were tested: Grid 1, Lift 11; Grid 3, Lift 8; and Grid 8, Lift 8. CSRA found the following results:
  - Grid 1 Lift 11: Relative Density: 98.3%, Moisture: 11.5%
  - Grid 3 Lift 8: Relative Density: 97.8%, Moisture: 9.9%
  - Grid 8 Lift 8: Relative Density: 98.1%, Moisture: 11.4%

- February 28, 2018: CSRA collected two samples for gradation and modified proctor testing. The first sample was a composite of clay from the north and south berm that was being disked in a drying pad on the 488-1D West floor. The second sample was collected from the clay in the New Western Berm that was excavated out in order to install CB-9. These gradations and proctors are attached to this report, along with the proctors used for determining the percent relative densities during testing on the berm.

- March 02, 2018: Clay sourced from the southwest corner of the existing South and West berms was placed loose to 1' thick on March 01, 2018. The lift was disked to dry back the moisture. The lift dried between March 01 and March 02. On March 02, 2018 the lift was smoothed with a D6 LGP dozer and track walked. Then the lift was compacted using an 84" Sheep's Foot Compactor, in vibratory and static modes (3 passes vibratory followed by 1 pass in static). Once the lift was compacted, CSRA arrived on the site to test the layer. The following locations were tested: Grid 2, Lift 10; Grid 4, Lift 12; and Grid 7, Lift 13. CSRA found the following results:
  - Grid 2 Lift 10: Relative Density: 97.9%, Moisture: 7.8%
  - Grid 4 Lift 12: Relative Density: 98.8%, Moisture: 10.5%
  - Grid 7 Lift 13: Relative Density: 97.1%, Moisture: 11.2%

All observed tests passed.

To avoid confusion on how a 1' lift spread across the entire New Western Berm is at multiple lift heights along the berm, (e.g. on March 02, Grid 2 was at Lift 10 elevation, while Grid 4 was at lift 12 elevation and Grid 7 was at Lift 13 elevation), a conceptual sketch has been provided herein.

Envirocon

Backfill Inspection Report

Note that this sketch is for conceptual purposes only and should not be used literally to transcribe lifts across at a particular elevation.

Attachments:

- Lift Explanation Sketch
- CSRA Compaction Testing Reports
- CSRA Proctor Reports
- Location Sketch

I certify that the placement of the fills described were in compliance with the plans and specifications.

Mike Beardsley, PE

03/09/2017

Project Engineer

488-1D Ash Basin Closure Project

(720) 838 – 7107

Mbeardsley@greenglobeinc.com

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Monday, Feb 26, 2018	13:52	East / NWB

Subject:

Grading the West 3:1 and placing a loose 1’ lift atop the NWB.

Date:	Time:	Direction of View / Location:
Wednesday, Feb 28, 2018	8:05	Southwest / NWB

Subject:

D6LGP dozer smoothing and track walking the clay for the 84” sheep’s foot compactor.

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Wednesday, Feb 28, 2018	8:05	Northwest / NWB

Subject:

84” Sheep’s foot compactor making 3 vibratory and 1 smooth pass on the placed fill.

Date:	Time:	Direction of View / Location:
Wednesday, Feb 28, 2018	9:17	N/A / NWB

Subject:

CSRA testing (3 test locations) the placed lift. All tests passed.

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Friday, March 2, 2018	16:16	N/A / NWB

Subject:

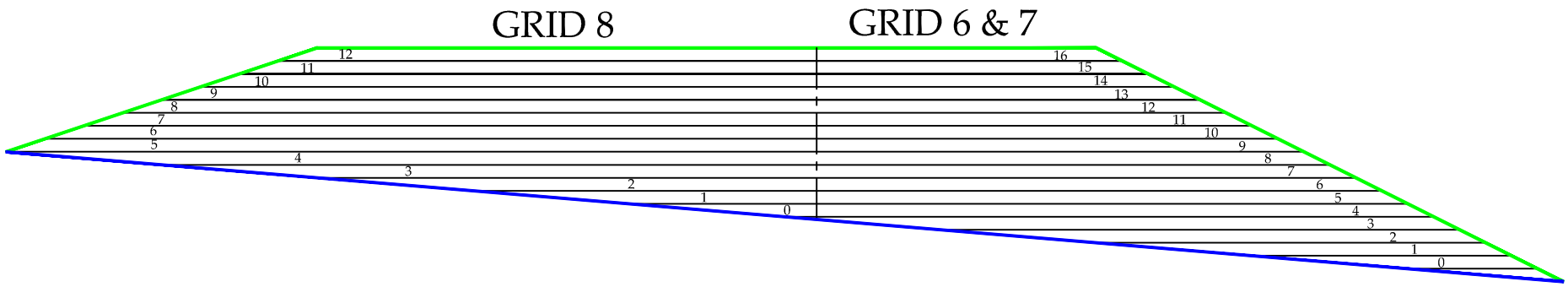
CSRA testing the second 1' compacted lift placed during the week of 02-26-18 through 03-02-18. All 3 test locations passed.

Envirocon

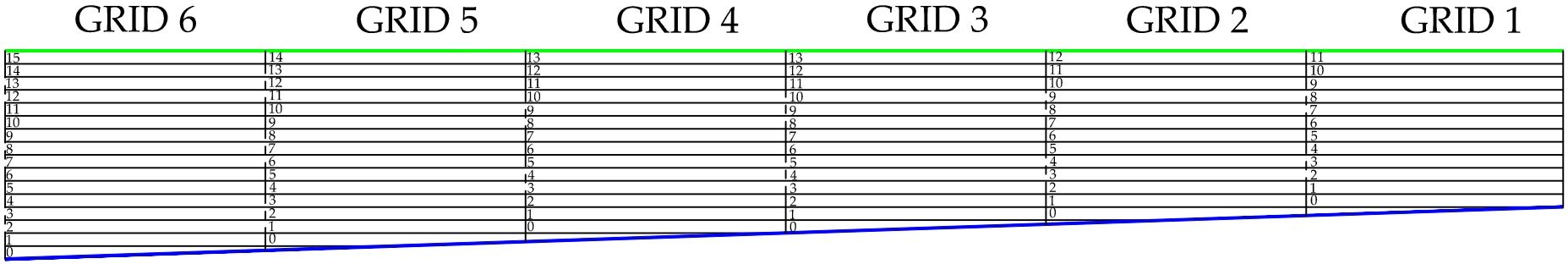
Backfill Inspection Report

LIFT EXPLANATION SKETCH

Illustrative South NWB Cross Section



Illustrative NWB Profile



NOTES:

1) Not to Scale
2) Drawing is for conceptual purposes only. Actual number of lifts and how the lift numbers relate to one another may vary. The point of this figure is to illustrate why a Lift number in a certain grid with a lower lift number may be at the same elevation as a lift with a higher number in another grid.

LEGEND

Finish Ground

Subgrade

Prepared By:

Envirocon

7878 Wadsworth Blvd
Suite 340
Arvada, CO 80003

Prepared For:

Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Nicanor Aguilar, Steve Hoover

Figure #:	
Date:	
Revision #:	
Drawn By:	
Approved By:	
Project #: 1495402	

Explanation of Lift Thickness ID's in the New Western Berm

488-1D Ash Basin Closure

C:\USERS\MIKE BEARDSLEY\DESKTOP\FEB TRIP\NWB LIFT EXPLANATION SKETCH.DWG

Envirocon

Backfill Inspection Report

CSRA COMPACTION TEST REPORTS

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-H94		
Date Issued:	March 1, 2018		
Date & Time of Test:	February 28, 2018 (9:00 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Cool	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Light Reddish-Brown Clayey Sand (WB #6)

Proctor Density-Optimum Moisture: 124.1 pcf / 11.1% (mod.)

Test No.	1	2	3					
Course Level	Lift 11	Lift 8						
Area to Be	Grid #1	Grid #3	Grid #8					
Dry Density In-Place	122.0	121.4	121.8					
% Proctor Density	98.3	97.8	98.1					
Moisture Content	11.5	9.9	11.4					
% Compaction Required	95.0	95.0	95.0					
Conformance	✓	✓	✓					
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-J41		
Date Issued:	March 6, 2018		
Date & Time of Test:	March 2, 2018 (4:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Light Reddish-Brown Clayey Sand (WB #6)

Proctor Density-Optimum Moisture: 124.1 pcf / 11.1% (mod.)

Test No.	1	2	3					
Course Level	Lift 10	Lift 12	Lift 13					
Area to Be	Ash basin							
Dry Density In-Place	121.5	122.6	123.0					
% Proctor Density	97.9	98.8	99.1					
Moisture Content	9.8	10.5	11.2					
% Compaction Required	95.0	95.0	95.0					
Conformance	✓	✓	✓					
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

Envirocon

Backfill Inspection Report

CSRA PROCTOR REPORTS

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-NN14

Date September 29, 2017

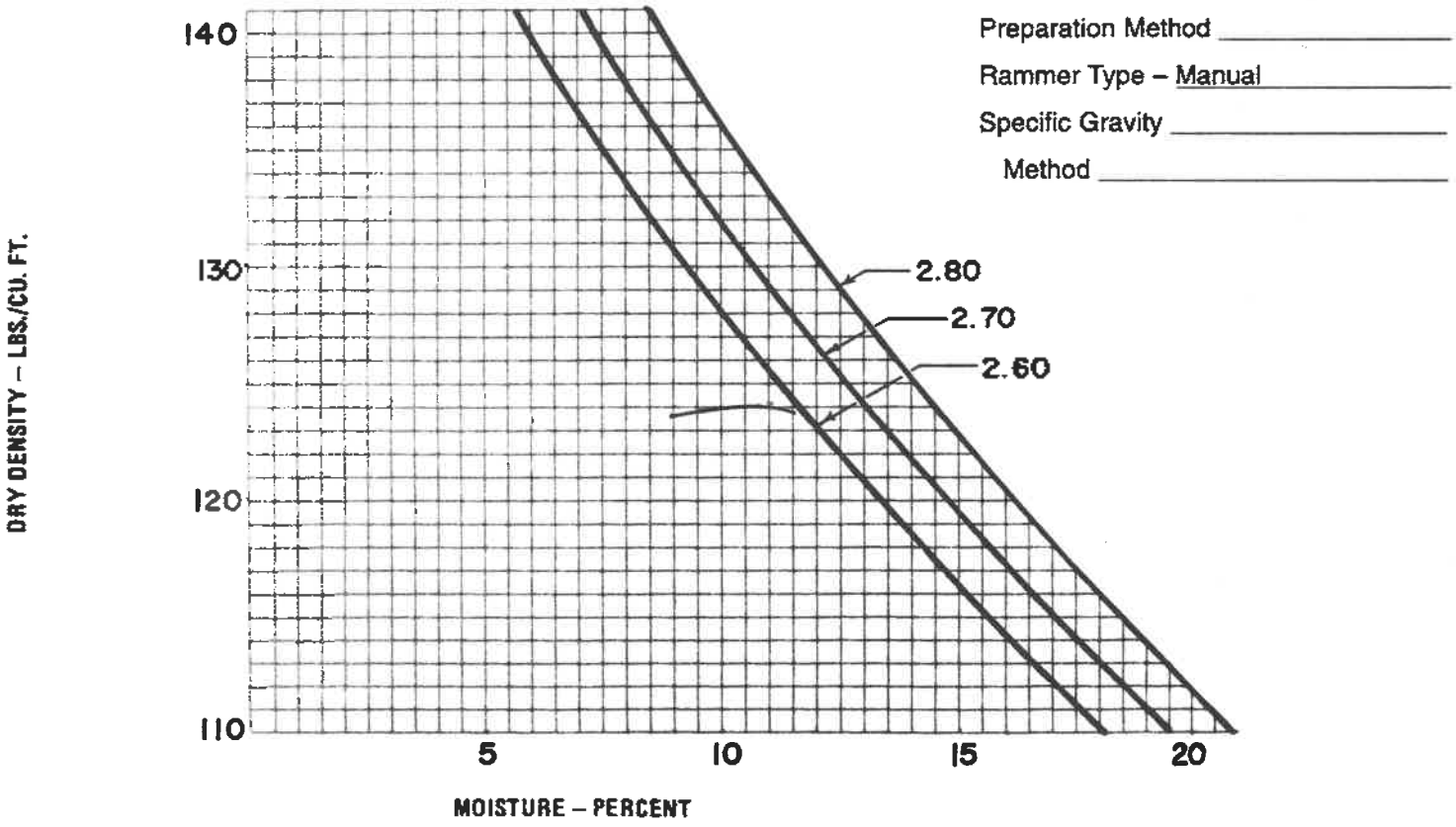
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO #258194 West Berm, 4' From Floor, Interior

SOIL PROCTOR TEST

Maximum Dry Density — 124.1 pcf
Optimum Moisture Content — 11.1%
Soil Description — Light Reddish-Brown Clayey Sand (WB #6)

Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____



ASTM D - 1557 , Method – A

Technician Chip Stewart

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-NN15
Date Sampled September 28, 2017
Date of Test October 3, 2017
Date Issued October 3, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC West Berm, 4' up from floor, interior
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Light Reddish-Tan Clayey Sand (WB #6)

Sieve No.	% Passing
2	100.0%
4	97.5%
10	96.1%
20	88.6%
40	49.6%
60	33.6%
140	27.5%
200	26.8%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1006 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6980
FAX (706) 737-0629

Report No. T18-J84

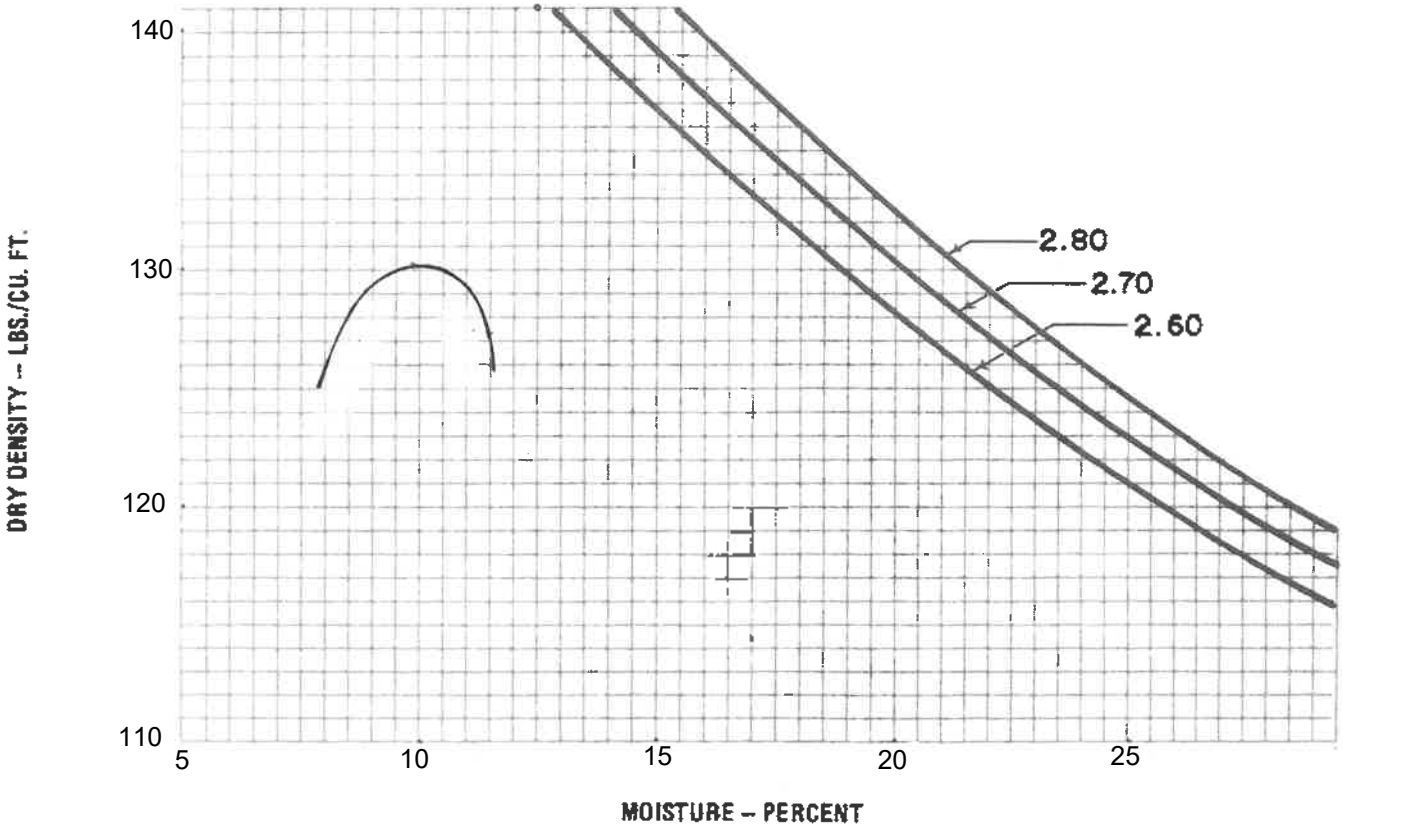
Date March 1, 2018

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure SRNS PO #258194 LOCATION: Savannah River Site, Aiken County, SC

SOIL PROCTOR TEST

Maximum Dry Density — 130.2 pcf
Optimum Moisture Content — 9.9%
Soil Description — Light Reddish-Brown Clayey Sand (CB9)



ASTM D-1557 Method A

Technician: Dennis Mays

Member of American Society for Testing and Materials

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T18-J85
Date Sampled February 28, 2018
Date of Test March 7, 2018
Date Issued March 8, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Light Reddish-Brown Clayey Sand (CB9)

Sieve No.	% Passing
½"	100.0%
⅜"	97.5%
4	94.3%
10	89.0%
20	77.3%
40	58.5%
60	41.8%
140	28.8%
200	26.8%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1006 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T18-J87

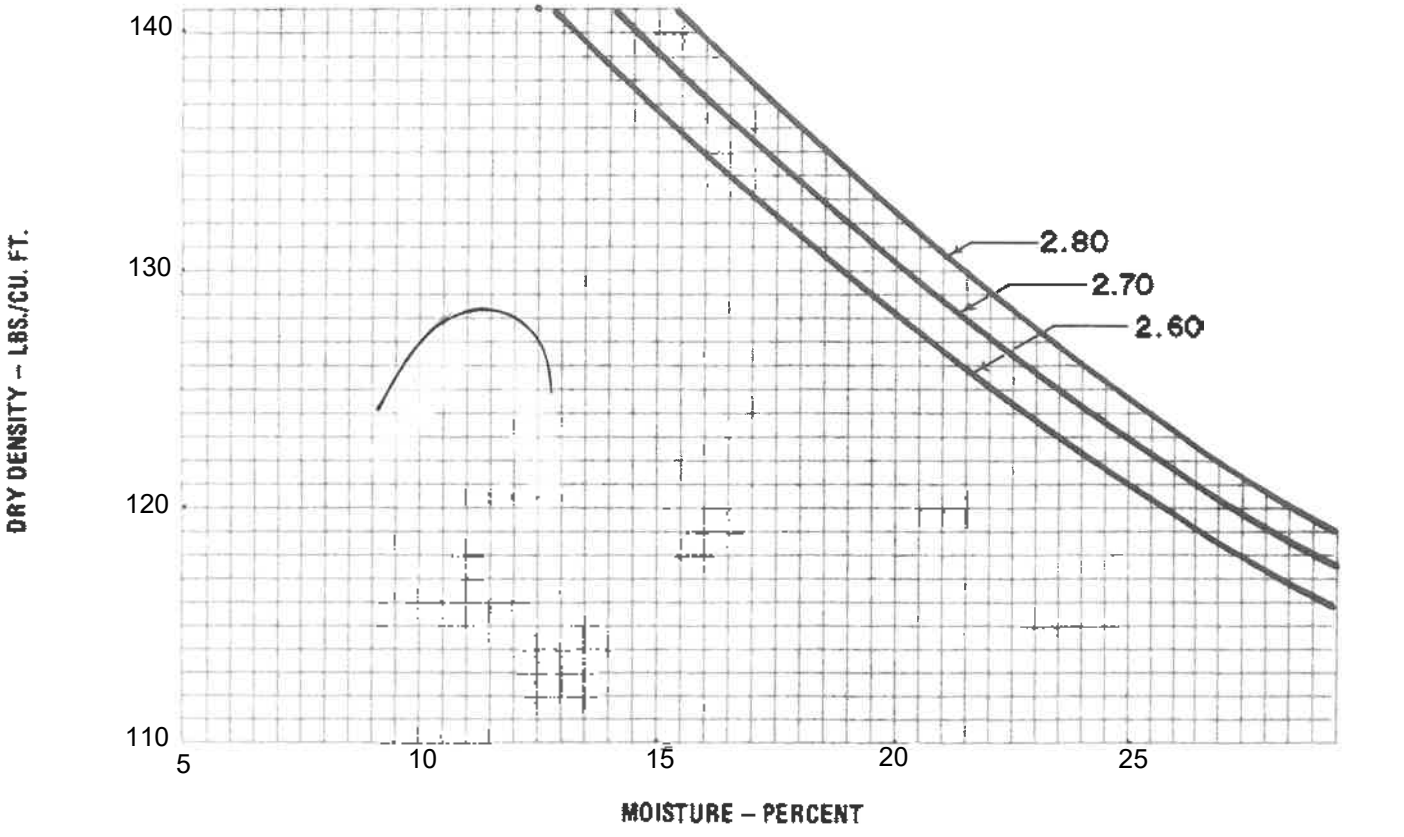
Date March 1, 2018

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO# 258194

SOIL PROCTOR TEST

Maximum Dry Density	—	128.3 pcf
Optimum Moisture Content	—	11.1%
Soil Description	—	Reddish-Brown Clayey Sand (processed west and south material)



ASTM D-1557 Method A

Technician: Dennis Mays

Member of American Society for Testing and Materials

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T18-J86
Date Sampled February 28, 2018
Date of Test March 7, 2018
Date Issued March 8, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Brown Clayey Sand (processed west and south material)

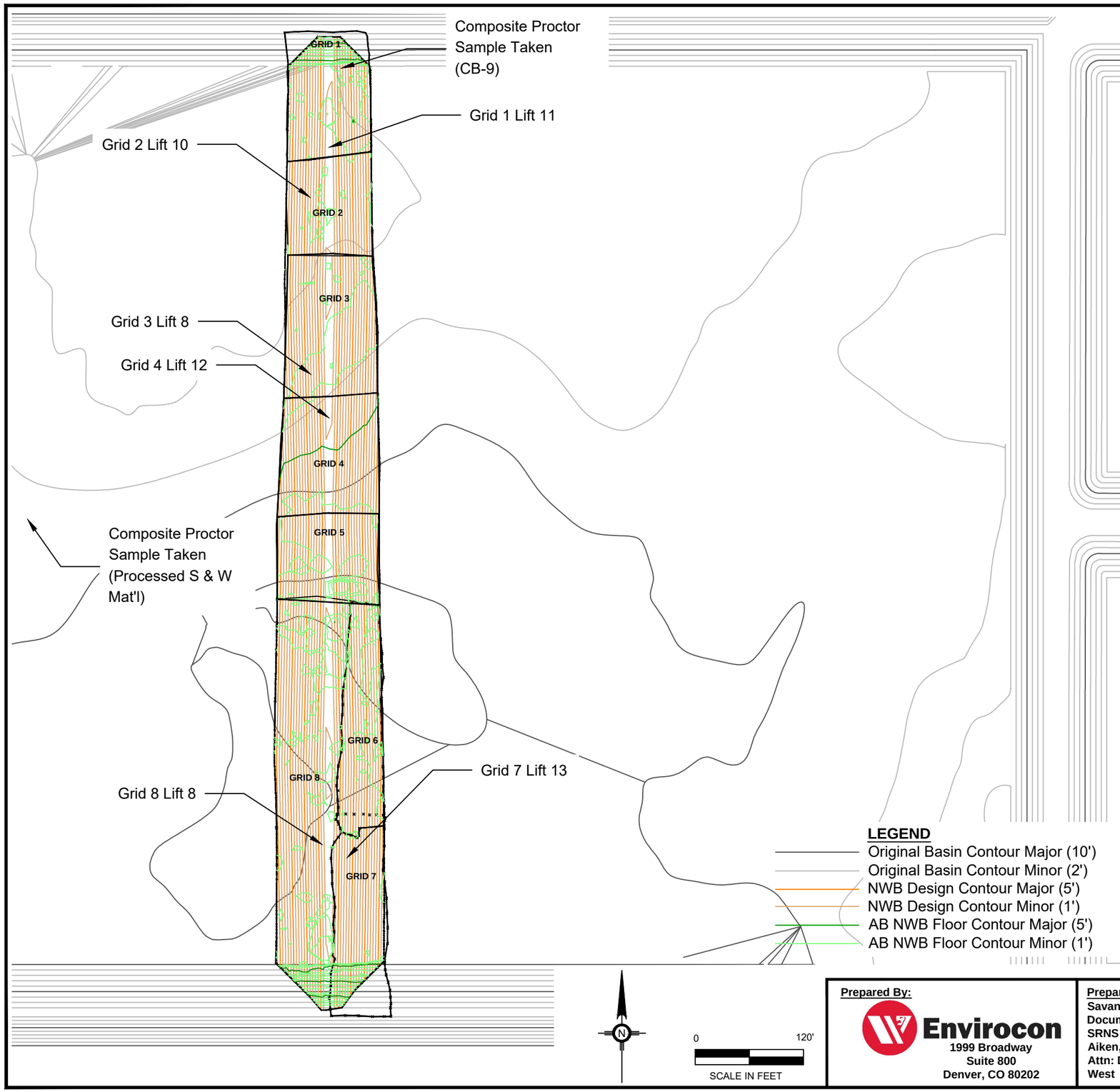
Sieve No.	% Passing
⅜"	100.0%
4	98.3%
10	92.8%
20	82.3%
40	65.3%
60	50.3%
140	38.0%
200	35.5%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

Envirocon

Backfill Inspection Report

LOCATION MAP



NOTES:
During the week of 02-26-18 through 03-02-18 compaction tests 77 - 82 on the New Western Berm were taken.

Note: All grids gained a lift (1') on 02/26/18
77) Grid 1 Lift 11 tested on 02/28/18. Relative density: 98.3%. Moisture: 11.5%.
78) Grid 3 Lift 8 tested on 02/28/18. Relative density: 97.8%. Moisture: 9.9%.
79) Grid 8 Lift 8 tested on 02/28/18. Relative density: 98.1%. Moisture: 11.4%.

Note: All grids gained a lift (1') on 02/28/18
80) Grid 2 Lift 10 tested on 03/02/18. Relative density: 97.9%. Moisture: 9.8%.
81) Grid 4 Lift 12 tested on 03/02/18. Relative density: 98.8%. Moisture: 10.5%.
82) Grid 7 Lift 13 tested on 03/02/18. Relative density: 99.1%. Moisture: 11.2%.

Note: All grids gained a lift (1') on 03/02/18 except Grid 1

Prepared By:
Envirocon
1999 Broadway
Suite 800
Denver, CO 80202

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Drew Murphy, Billy West

Figure #: 01	
Date: 03/12/2018	
Revision #: 0	
Drawn By: GGE	
Approved By: EI	
Project #: 1495402	

New Western Berm
Compaction Test Locations
02/26/18 - 03/02/18

488-1D Ash Basin Closure

330-Gradation, Proctor & Compaction NWB Page 19 of 19

C:\USERS\MIKE BEARDSLEY\DESKTOP\FEB TRIP\03-02-18 NWB COMPACTION TEST LOCATIONS.DWG

Envirocon

Backfill Inspection Report

Date: April 10, 2018	
Project Title: SRNS 488-1D Ash Landfill	Location: Jackson, SC

Observations of Fill Placement & Compaction Activities: New Western Berm

Envirocon, Inc. removed the ash from 488-1D from within the footprint of the New Western Berm. This removal process was conducted in a progressive fashion, allowing for the removal and backfill to occur simultaneously along the length of the berm foot print. To accomplish this, the berm footprint was split into grids. This allowed for final cleaning and clay placement to occur in one grid while bulk ash removal occurred in another grid. This footprint required visual inspection to ensure all ash was removed, but no confirmation sampling was required within the footprint. The excavations extended to 1 foot below the original basin bottom. Please see the attached figure for the Grid locations. The CSRA proctor data, and test inspections are also provided as attachments at the end of this document. This report documents a continuation of that process.

- February 2, 2018: Clay sourced from the South Berm was placed in Grid 4 and Grid 5 Lift 9, Grid 8 Lift 6 and Grid 6 and Grid 7 Lift 11, of the New Western Berm. Grid 4 Lift 9 had a relative density of 98.3% with a moisture content of 9.4%. Grid 5 Lift 9 had a relative density of 97.6% with a moisture content of 10.3%. Grid 8 Lift 6 had a relative density of 96.3% with a moisture content of 11.5%. Grid 6 Lift 11 had a relative density of 97.4% with a moisture content of 10.7%. Grid 7 Lift 11 had a relative density of 97.1% with a moisture content of 10.9%.The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.
- March 9, 2018: Clay sourced from the Berm was placed in Grid 3 Lift 10 and Grid 2 Lift 11 of the New Western Berm. Grid 3 Lift 10 had a relative density of 96.5% with a moisture content of 12.2%. Grid 2 Lift 11 had a relative density of 96.7% with a moisture content of 9.8%.The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.
- March 22, 2018: Clay sourced from the Processed West and South Berm stockpile was placed in Grid 5 Lift 14 and Grid 6 and 7 Lift 15 of the New Western Berm. Grid 5 Lift 14 had a relative density of 97.7% with a moisture content of 10.0%. Grid 6 Lift 15 had a relative density of 98.5% with a moisture content of 9.1%. Grid 7 Lift 15 had a relative density of 98.2% with a moisture content of 9.7%.The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.
- March 22, 2018: Clay sourced from the Processed West and South Berm stockpile was placed in the area where a pipe crossing was removed on the East Berm. The clay test here had a relative density of 97.5% with a moisture content of 10.5%.The clay was spread with an excavator and then compacted using a remote controlled sheep's foot roller making a minimum of 2 vibratory and 2 static passes.
- March 23, 2018: Clay sourced from the Processed West and South Berm stockpile was placed in Grid 8 Lift 12, Grid 7 Lift 16, Grid 6 Lift 16, Grid 5 Lift 15, Grid 4 Lift 14, Grid 3 Lift 11 and Grid 2 Lift 12 of the New Western Berm. Grid 8 Lift 12 had a relative density of 97.4% with a moisture content of 9.9%. Grid 7 Lift 16 had a relative density of 96.7% with a moisture content of 13.1%. Grid 6 Lift 16 had a relative density of 98.0% with a moisture content of 9.4% Grid 5 Lift 15 had a relative density of 98.5% with a moisture content of 11.8%. Grid 4 Lift 14 had a relative density of 97.1% with a moisture content of 10.1%. Grid 3 Lift 11 had a relative density of 96.4% with a moisture content of 9.6% and Grid 2 Lift 12 had a relative density of 98.8% with a moisture content of 8.6%.The clay was spread with a D6 LGP dozer

and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.

- March 23, 2018: Clay sourced from the North Inlet Basin was placed in the area where a pipe crossing was removed on the East Berm. The clay test here had a relative density of 99.5% with a moisture content of 9.9%.The clay was spread with an excavator and then compacted using a remote controlled sheep's foot roller making a minimum of 2 vibratory and 2 static passes.
- March 26, 2018: Clay sourced from the Processed West and South Berm stockpile was placed in Grid 5 Lift 16 and Grid 7 Lift 17 of the New Western Berm. Grid 5 Lift 16 had a relative density of 98.1% with a moisture content of 12.7%. Grid 7 Lift 17 had a relative density of 98.8% with a moisture content of 11.6%.The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.
- March 29, 2018: Clay sourced from the Processed West and South Berm stockpile was placed in Grid 3 Lift 12 of the New Western Berm. Grid 3 Lift 12 had a relative density of 98.1% with a moisture content of 9.7%. The clay was spread with a D6 LGP dozer and then compacted using an 84" sheep's foot roller making a minimum of 2 vibratory and 2 static passes.

Envirocon

Backfill Inspection Report

Attachments:

- CSRA Compaction Testing Reports
- CSRA Proctor Reports
- Location Sketch

I certify that the placement of the fills described were in compliance with the plans and specifications.

South Carolina

Temporary Permit No.
2017025

Date Issued 12/15/2017

Patrick P. Tinnes, PE
April 10, 2018
Project Engineer
488-1D Ash Basin Closure Project
(323) 728-5463
ptinnes@envirocon.com

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
March 9, 2018	1025	South / NWB

Subject:

Lift 11 in Grid 2 was tested.

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Thursday, March 22, 2018	1544	West / Pipe crossing

Subject:

Testing backfill at pipe crossing removal.

Date:	Time:	Direction of View / Location:
Friday, March 23, 2017	1605	South /NWB

Subject:

Taking compaction test on New West Berm

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Friday, March 23, 2018	1542	West / Pipe Crossing

Subject:

Testing clay backfill where drainage pipe was removed.

Date:	Time:	Direction of View / Location:
Monday, March 26, 2017	1402	North / NWB

Subject:

Lift 17 in Grid 7 was tested.

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Thursday, March 22, 2018	1544	West / Pipe crossing

Subject:

Testing backfill at pipe crossing removal.

Date:	Time:	Direction of View / Location:
Friday, March 23, 2017	1605	South /NWB

Subject:

Taking compaction test on New West Berm

Envirocon

Backfill Inspection Report

Date:	Time:	Direction of View / Location:
Friday, March 23, 2018	1542	West / Pipe Crossing

Subject:

Testing clay backfill where drainage pipe was removed.

Date:	Time:	Direction of View / Location:
Monday, March 26, 2017	1402	North / NWB

Subject:

Lift 17 in Grid 7 was tested.

Envirocon

Backfill Inspection Report

CSRA COMPACTION TEST REPORTS

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-M81		
Date Issued:	March 30, 2018		
Date & Time of Test:	March 29, 2018 (3:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1							
Course Level	Lift 12							
Area to Be	Grid 3							
Dry Density In-Place	125.9							
% Proctor Density	98.1							
Moisture Content	9.7							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-M32		
Date Issued:	March 27, 2018		
Date & Time of Test:	March 26, 2018 (1:45 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Cloudy and Cold	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1	2						
Course Level	Lift 16	Lift 17						
Area to Be	Grid 5	Grid 7						
Dry Density In-Place	125.9	126.7						
% Proctor Density	98.1	98.8						
Moisture Content	12.7	11.6						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-M08		
Date Issued:	March 26, 2018		
Date & Time of Test:	March 23, 2018 (3:30 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Cool	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (NIB #3)

Proctor Density-Optimum Moisture: 128.1 pcf / 8.7% (mod.)

Test No.	8							
Course Level	Lift 2							
Area to Be	WR-NIB							
Dry Density In-Place	127.4							
% Proctor Density	99.5							
Moisture Content	9.9							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-L88		
Date Issued:	March 26, 2018		
Date & Time of Test:	March 23, 2018 (3:30 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Cool	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1	2	3	4	5	6	7	
Course Level	Lift 12	Lift 16		Lift 15	Lift 14	Lift 11	Lift 12	
Area to Be	Grid 8	Grid 7	Grid 6	Grid 5	Grid 4	Grid 3	Grid 2	
Dry Density In-Place	125.0	124.1	125.7	126.4	124.6	123.7	126.7	
% Proctor Density	97.4	96.7	98.0	98.5	97.1	96.4	98.8	
Moisture Content	9.9	13.1	9.4	11.8	10.1	9.6	8.6	
% Compaction Required	95.0	95.0	95.0	95.0	95.0	95.0	95.0	
Conformance	✓	✓	✓	✓	✓	✓	✓	
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-L78		
Date Issued:	March 23, 2018		
Date & Time of Test:	March 22, 2018 (3:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Cool	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1							
Course Level	Lift 1							
Area to Be	WR-N1B							
Dry Density In-Place	124.9							
% Proctor Density	97.5							
Moisture Content	10.5							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-L75		
Date Issued:	March 23, 2018		
Date & Time of Test:	March 22, 2018 (9:00 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Cool	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1	2	3					
Course Level	Lift 14	Lift 15						
Area to Be	Grid 5	Grid 6	Grid 7					
Dry Density In-Place	125.3	126.4	126.0					
% Proctor Density	97.7	98.5	98.2					
Moisture Content	10.0	9.1	9.7					
% Compaction Required	95.0	95.0	95.0					
Conformance	✓	✓	✓					
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-L07		
Date Issued:	March 16, 2018		
Date & Time of Test:	March 15, 2018 (8:00 am - 5:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1	2						
Course Level	Lift 13	Lift 10						
Area to Be	Grid 4	Grid 8						
Dry Density In-Place	124.6	123.2						
% Proctor Density	97.1	96.0						
Moisture Content	10.6	10.9						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E. Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-K50		
Date Issued:	March 12, 2018		
Date & Time of Test:	March 9, 2018 (8:00 am - 4:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1	2						
Course Level	Lift 10	Lift 11						
Area to Be	Grid 3	Grid 2						
Dry Density In-Place	124.0	124.3						
% Proctor Density	96.6	96.9						
Moisture Content	12.2	9.8						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-H77		
Date Issued:	February 28, 2018		
Date & Time of Test:	February 23, 2018 (2:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Light Reddish-Brown Clayey Sand (WB #6)

Proctor Density-Optimum Moisture: 124.1 pcf / 11.1% (mod.)

Test No.	1	2	3					
Course Level	Lift 10		Lift 7					
Area to Be	Grid #4	Grid #5	Grid #8					
Dry Density In-Place	122.0	122.2	123.4					
% Proctor Density	98.3	98.5	99.4					
Moisture Content	11.3	13.6	13.2					
% Compaction Required	95.0	95.0	95.0					
Conformance	✓	✓	✓					
Non Conformance								
Sand Cone								

Locations: Please see attached map.
1. New western berm Section 2
2. New western berm Section 4
3. New western berm Section 6

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-E69		
Date Issued:	February 5, 2018		
Date & Time of Test:	February 2, 2018 (12:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Cold	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Dark Reddish-Brown Clayey Sand (S Berm 3)

Proctor Density-Optimum Moisture: 125.7 pcf / 9.9% (mod.)

Test No.	1	2	3	4	5			
Course Level	Lift 9		Lift 11		Lift 6			
Area to Be	Grid #4	Grid #5	Grid #6	Grid #7	Grid #8			
Dry Density In-Place	123.6	122.7	122.4	122.0	121.1			
% Proctor Density	98.3	97.6	97.4	97.1	96.3			
Moisture Content	9.4	10.3	10.7	10.9	11.5			
% Compaction Required	95.0	95.0	95.0	95.0	95.0			
Conformance	✓	✓	✓	✓	✓			
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Envirocon

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CSRA PROCTOR REPORTS

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-WW69
Date Sampled November 29, 2017
Date of Test November 30, 2017
Date Issued December 1, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Dark Reddish-Brown Clayey Sand (S Berm #3)

Sieve No.	% Passing
4	100.0%
10	99.0%
20	88.0%
40	62.0%
60	39.0%
140	27.0%
200	26.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6860
FAX (706) 737-0629

Report No. T17-WW68

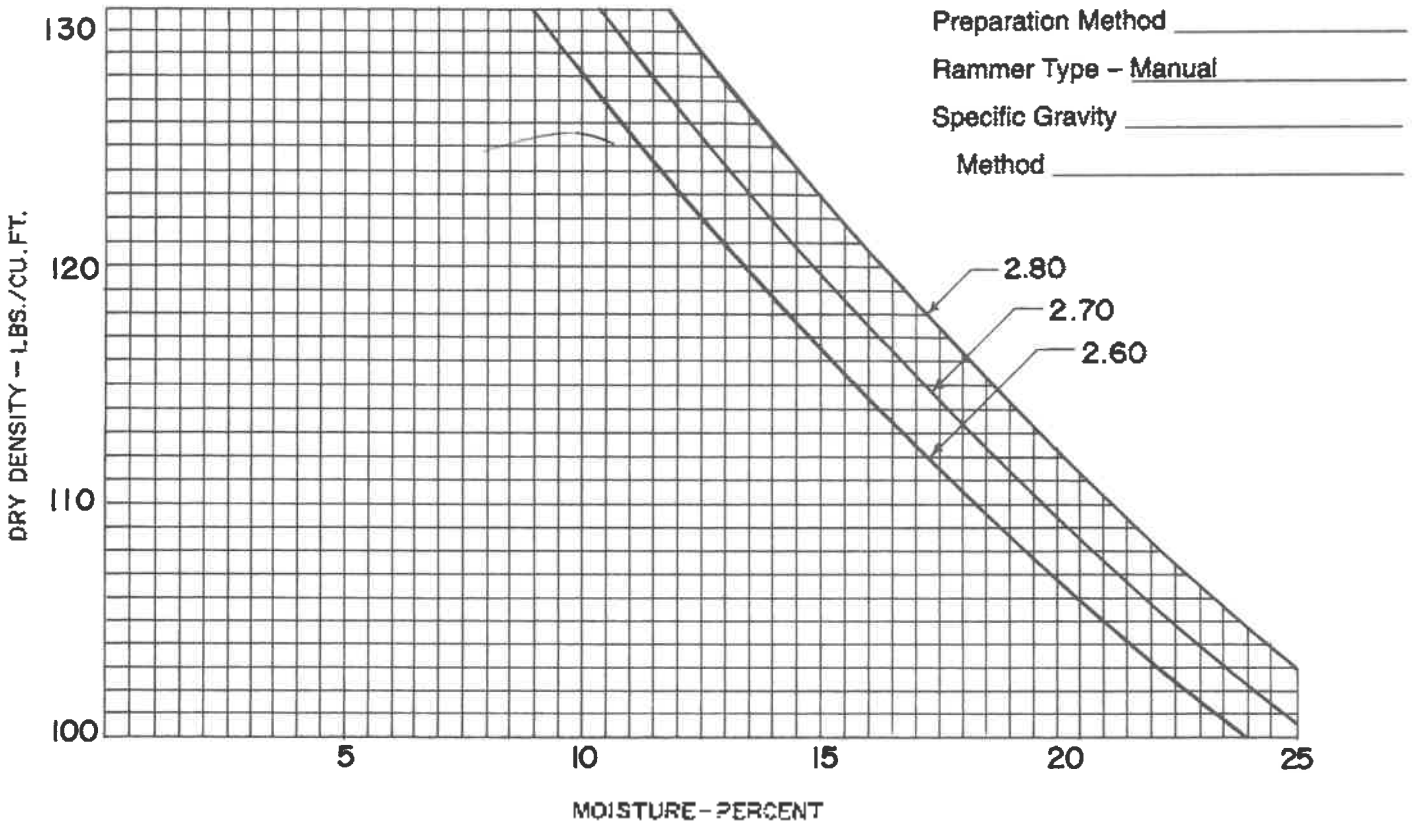
Date November 30, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC

SOIL PROCTOR TEST

Maximum Dry Density — 125.7 pcf
Optimum Moisture Content — 9.9%
Soil Description — Dark Reddish-Brown Clayey Sand (S Berm #3)



ASTM D - 1557 , Method – A

Technician Matt Spires

Accredited By AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-NN15
Date Sampled September 28, 2017
Date of Test October 3, 2017
Date Issued October 3, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC West Berm, 4' up from floor, interior
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Light Reddish-Tan Clayey Sand (WB #6)

Sieve No.	% Passing
2	100.0%
4	97.5%
10	96.1%
20	88.6%
40	49.6%
60	33.6%
140	27.5%
200	26.8%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-NN14

Date September 29, 2017

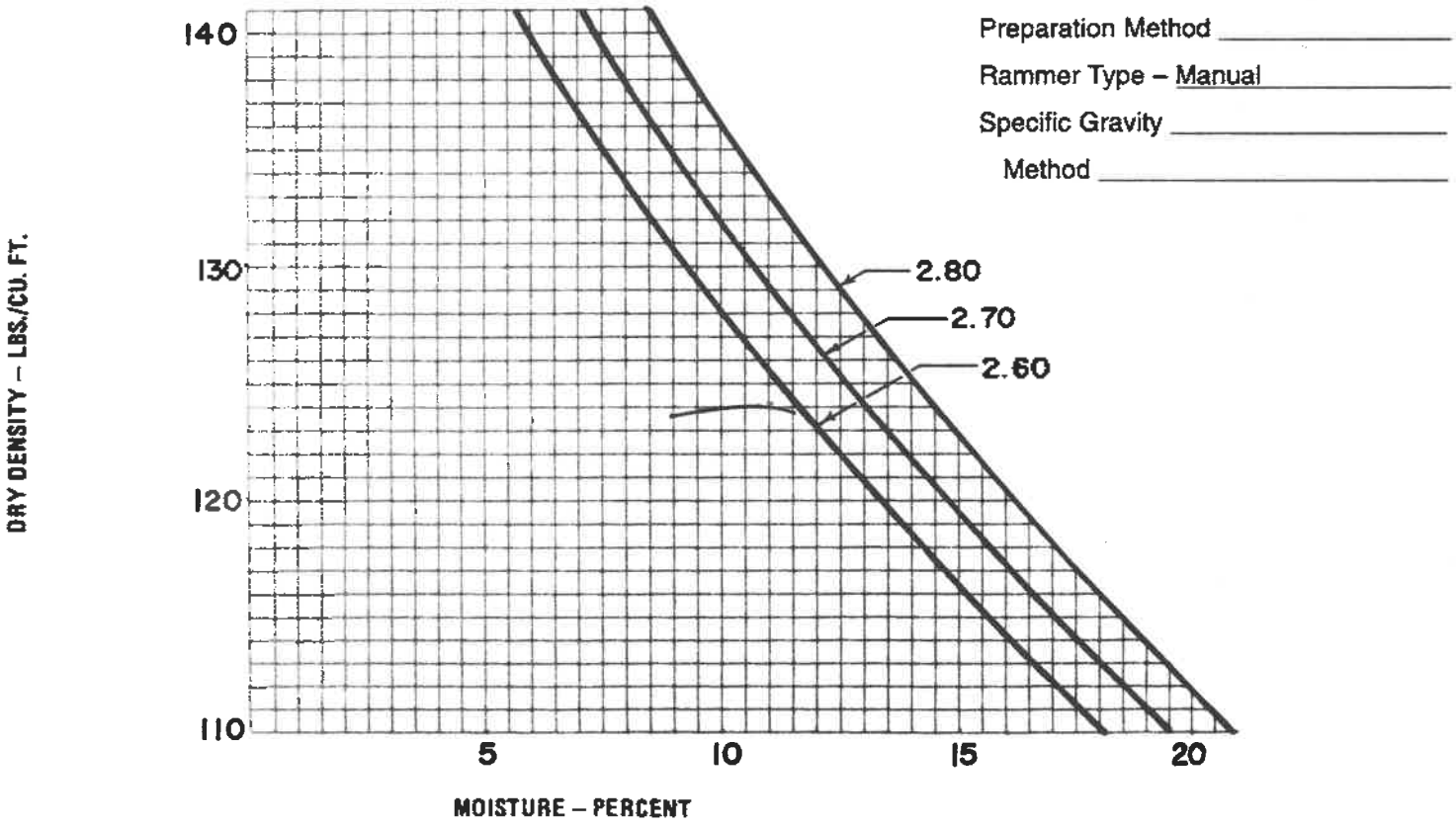
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO #258194 West Berm, 4' From Floor, Interior

SOIL PROCTOR TEST

Maximum Dry Density — 124.1 pcf
Optimum Moisture Content — 11.1%
Soil Description — Light Reddish-Brown Clayey Sand (WB #6)

Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____



ASTM D - 1557 , Method – A

Technician Chip Stewart

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-GG73
Date Sampled August 15, 2017
Date of Test August 22, 2017
Date Issued August 24, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC: North Inlet Basin Center Finger NIB-3
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Brown Clayey Sand (NIB #3)

Sieve No.	% Passing
½"	100.0%
4	89.7%
10	83.9%
20	71.9%
40	43.4%
60	35.2%
140	26.2%
200	25.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T17-GG72

Date August 22, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

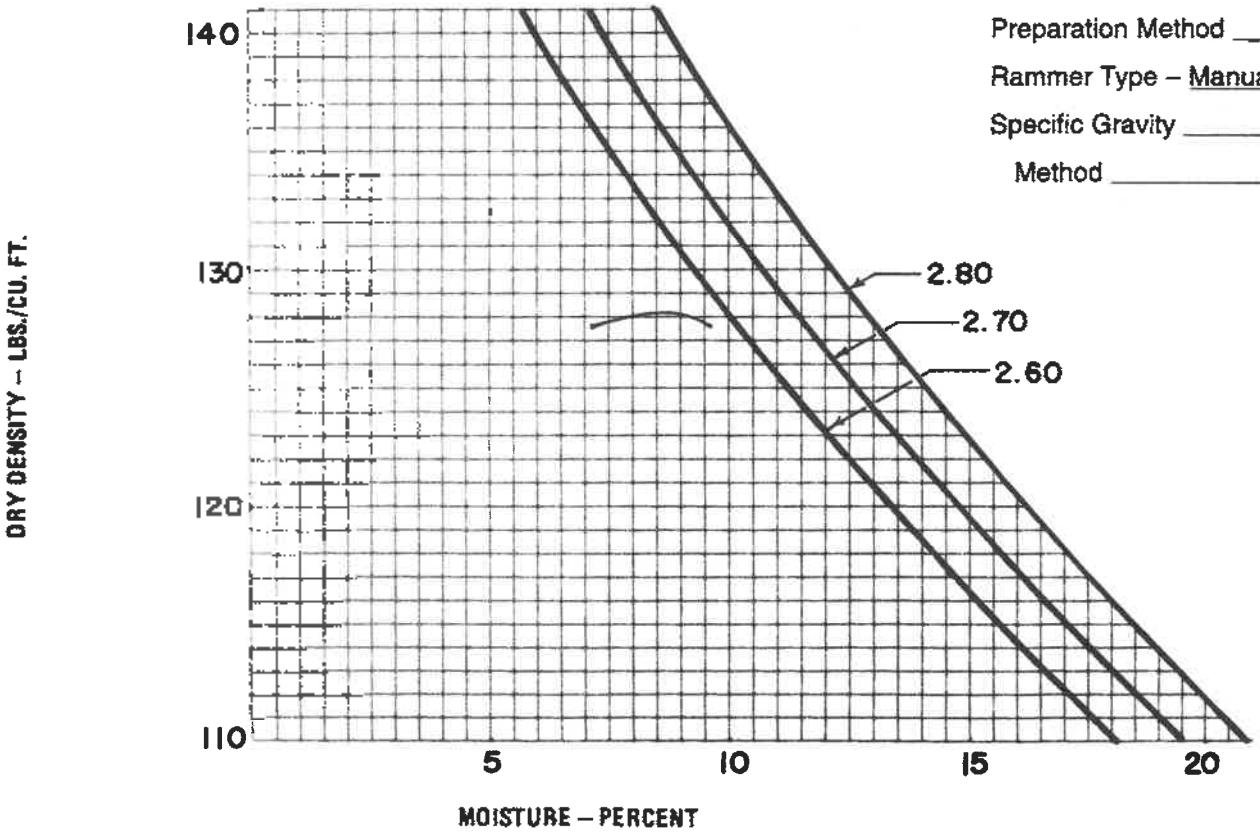
PROJECT: 488-1D Ash Basin & 489-D CPRB Closure
Project No.: C-SPP-D-00002, SRNS PO: 258194

LOCATION: Savannah River Site, Aiken Co., SC
North Inlet Basin Center Finger NIB-3

SOIL PROCTOR TEST

Maximum Dry Density — 128.1 pcf
Optimum Moisture Content — 8.7%
Soil Description — Reddish-Brown Clayey Sand (NIB #3)

Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____



ASTM D - 1557 , Method – A

Technician Branon Mitchell

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T18-J86
Date Sampled February 28, 2018
Date of Test March 7, 2018
Date Issued March 8, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Brown Clayey Sand (processed west and south material)

Sieve No.	% Passing
⅜"	100.0%
4	98.3%
10	92.8%
20	82.3%
40	65.3%
60	50.3%
140	38.0%
200	35.5%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1006 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T18-J87

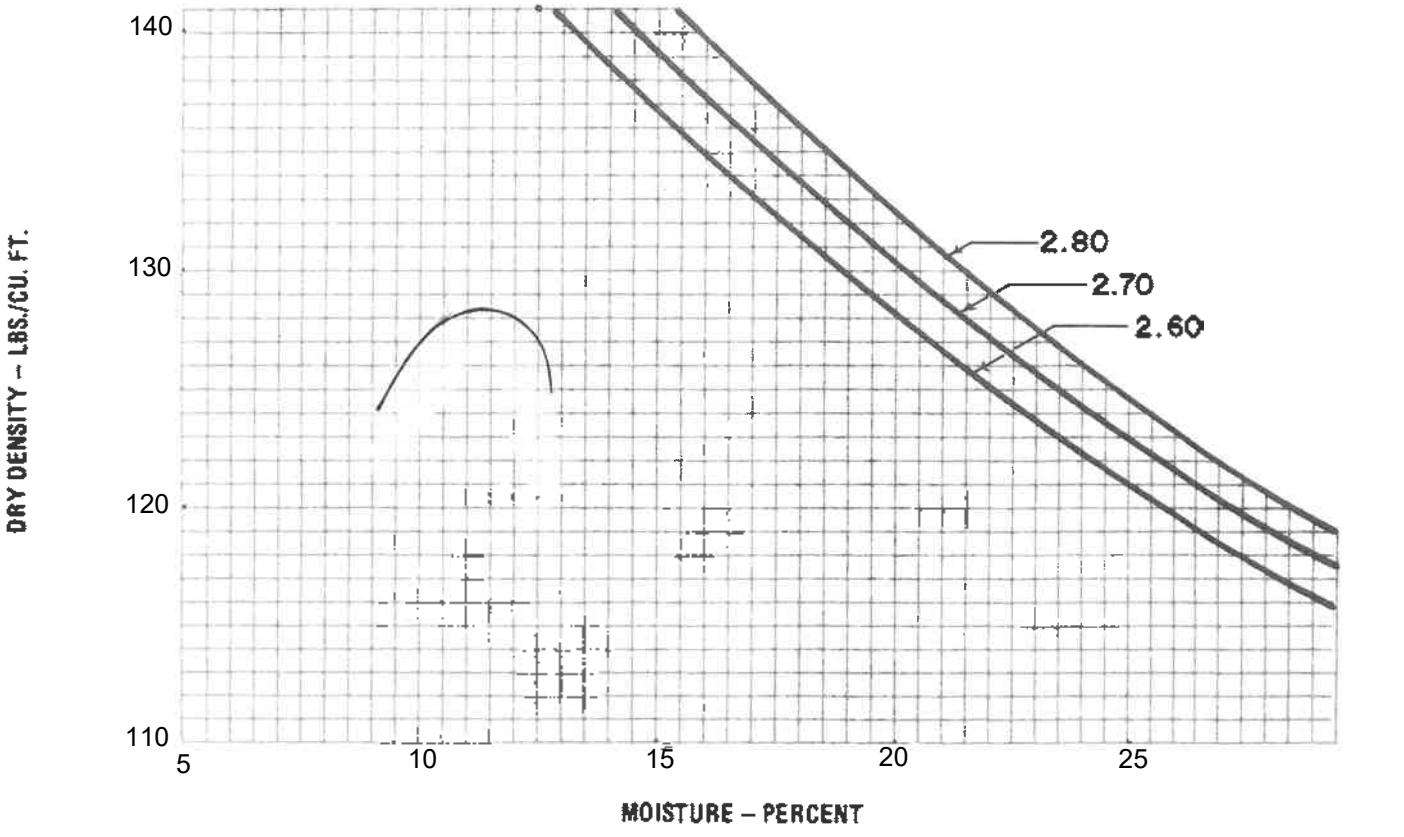
Date March 1, 2018

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO# 258194

SOIL PROCTOR TEST

Maximum Dry Density	—	128.3 pcf
Optimum Moisture Content	—	11.1%
Soil Description	—	Reddish-Brown Clayey Sand (processed west and south material)



ASTM D-1557 Method A

Technician: Dennis Mays

Envirocon

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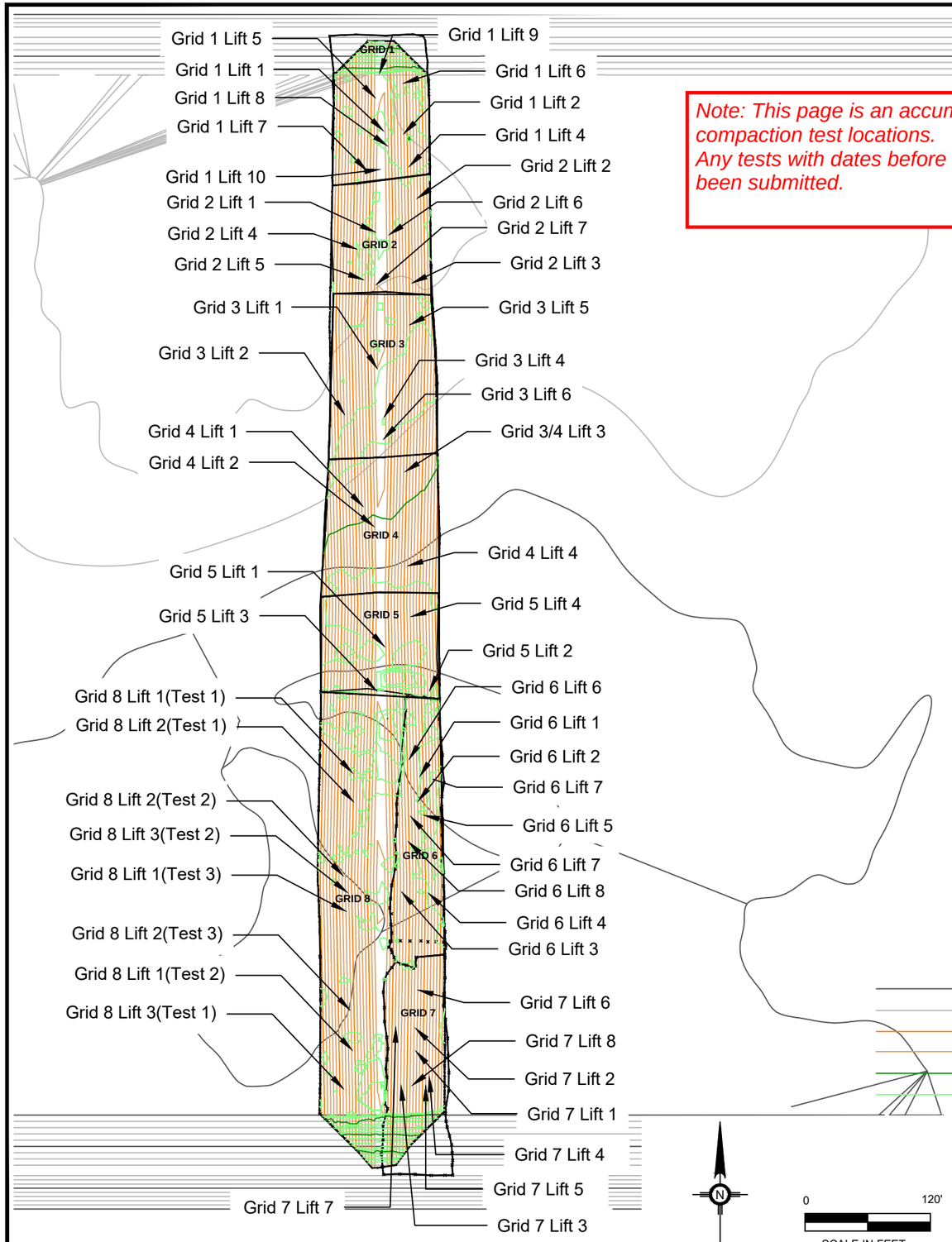
LOCATION MAP



Note: This page is an accumulation of compaction test locations.
Any tests with dates before 1/24/2018 have been submitted.

NOTES:

1) Grid 4 Lift 1 tested on 08/02/17. Relative density: 98.9%. Moisture: 6.3%.
2) Grid 4 Lift 2 tested on 08/03/17. Relative density: 98.7%. Moisture: 6.9%.
3) Grid 3 Lift 1 tested on 08/03/17. Relative density: 99.0%. Moisture: 8.3%.
4) Grid 3 Lift 2 tested on 08/30/17. Relative density: 97.7%. Moisture: 10.6%.
5) Grid 5 Lift 1 tested on 09/06/17. Relative density: 99.5%. Moisture: 12.2%.
6) Grids 3/4 Lift 3 tested on 09/08/17. Relative density: 98.0%. Moisture: 9.1%.
7) Grid 5 Lift 3 tested on 09/08/17. Relative density: 97.5%. Moisture: 10.3%.
8) Grid 2 Lift 1 tested on 09/19/17. Relative density: 98.4%. Moisture: 13.0%.
9) Grid 3 Lift 4 tested on 09/19/17. Relative density: 96.2%. Moisture: 11.2%.
10) Grid 1 Lift 1 tested on 09/21/17. Relative density: 97.7%. Moisture: 13.0%.
11) Grid 2 Lift 2 tested on 09/21/17. Relative density: 98.0%. Moisture: 13.4%.
12) Grid 1 Lift 2 tested on 09/21/17. Relative density: 97.5%. Moisture: 10.2%.
13) Grid 2 Lift 3 tested on 09/21/17. Relative density: 98.4%. Moisture 12.5%.
14) Grid 2 Lift 4 tested on 09/22/17. Relative density: 98.7%. Moisture: 10.1%.
15) Grid 1 Lift 3 tested on 09/22/17. Relative density 98.0%. Moisture: 10.7%.
16) Grid 1 Lift 4 tested on 09/22/17. Relative density: 98.6%. Moisture: 13.4%.
17) Grid 1 Lift 5 tested on 09/25/17. Relative density: 98.4%. Moisture: 9.6%.
18) Grid 1 Lift 6 tested on 09/25/17. Relative density: 98.7%. Moisture: 10.1%.
19) Grid 1 Lift 7 tested on 09/26/17. Relative density: 97.1%. Moisture: 11.6%.
20) Grid 5 Lift 4 tested on 09/26/17. Relative density: 96.5%. Moisture: 9.4%.
21) Grid 4 Lift 4 tested on 09/26/17. Relative density: 96.7%. Moisture: 6.5%.
22) Grid 1 Lift 8 tested on 09/27/17. Relative density: 98.0%. Moisture: 10.8%.
23) Grid 2 Lift 5 tested on 09/27/17. Relative density: 97.9%. Moisture: 10.1%.
24) Grid 3 Lift 5 tested on 09/27/17. Relative density: 97.4%. Moisture: 10.4%.
25) Grid 2 Lift 6 tested on 09/27/17. Relative density: 98.6%. Moisture: 13.6%.
26) Grid 1 Lift 9 tested on 09/27/17. Relative density: 98.0%. Moisture: 14.0%.
27) Grid 3 Lift 6 tested on 09/27/17. Relative density: 96.8%. Moisture: 13.5%.
28) Grid 1 Lift 10 tested on 09/28/17. Relative density: 98.7%. Moisture: 10.2%.
29) Grid 2 Lift 7 tested on 09/28/17. Relative density: 98.0%. Moisture: 10.4%.
30) Grid 6 Lift 1 tested on 12/19/17. Relative density: 98.6%. Moisture: 10.0%.
31) Grid 7 Lift 1 tested on 12/19/17. Relative density: 97.8%. Moisture: 11.1%.
32) Grid 8 Lift 1(Test 1) tested on 12/19/17. Relative density: 99.3%. Moisture: 9.6%.
33) Grid 8 Lift 1(Test 2) tested on 12/19/17. Relative density: 97.8%. Moisture: 10.0%
34) Grid 8 Lift 1(Test 3) tested on 12/19/17. Relative density: 96.6%. Moisture: 11.4%
35) Grid 8 Lift 2(Test 1) tested on 12/20/17. Relative density: 95.3%. Moisture: 13.5%
36) Grid 8 Lift 2(Test 2) tested on 12/20/17. Relative density: 95.6%. Moisture: 13.8%
37) Grid 8 Lift 2(Test 3) tested on 12/20/17. Relative density: 99.1%. Moisture: 14.0%
38) Grid 6 Lift 2 tested on 01/02/18. Relative density: 98.9%. Moisture: 8.3%.
39) Grid 7 Lift 2 tested on 01/02/18. Relative density: 99.4%. Moisture: 8.1%.
40) Grid 6 Lift 3 tested on 01/08/18. Relative density: 95.1%. Moisture: 11.6%.
41) Grid 7 Lift 3 tested on 01/08/18. Relative density: 96.3%. Moisture: 9.5%.
42) Grid 6 Lift 4 tested on 01/09/18. Relative density: 95.6%. Moisture: 12.2%.
43) Grid 7 Lift 4 tested on 01/09/18. Relative density: 97.8%. Moisture: 9.5%.
44) Grid 6 Lift 5 tested on 01/10/18. Relative density: 97.3%. Moisture: 11.5%.
45) Grid 7 Lift 5 tested on 01/10/18. Relative density: 98.7%. Moisture: 10.2%.
46) Grid 6 Lift 6 tested on 01/11/18. Relative density: 97.6%. Moisture: 10.2%.
47) Grid 7 Lift 6 tested on 01/11/18. Relative density: 98.1%. Moisture: 10.5%.
48) Grid 6 Lift 7 tested on 01/12/18. Relative density: 97.2%. Moisture: 13.8%.
49) Grid 7 Lift 7 tested on 01/12/18. Relative density: 96.9%. Moisture: 11.3%.
50) Grid 6 Lift 8 tested on 01/16/18. Relative density: 97.8%. Moisture: 11.5%.
51) Grid 7 Lift 8 tested on 01/16/18. Relative density: 98.1%. Moisture: 9.9%.
52) Grid 8 Lift 3(Test 1) tested on 01/16/18. Relative density: 97.0%. Moisture: 10.2%.
53) Grid 8 Lift 3(Test 2) tested on 01/16/18. Relative density: 97.3%. Moisture: 9.0%.

**See additional sheet for continuation of testing locations and results*

LEGEND

- Original Basin Contour Major (10')
- Original Basin Contour Minor (2')
- NWB Design Contour Major (5')
- NWB Design Contour Minor (1')
- AB NWB Floor Contour Major (5')
- AB NWB Floor Contour Minor (1')

Prepared By:
Envirocon
1999 Broadway
Suite 800
Denver, CO 80202

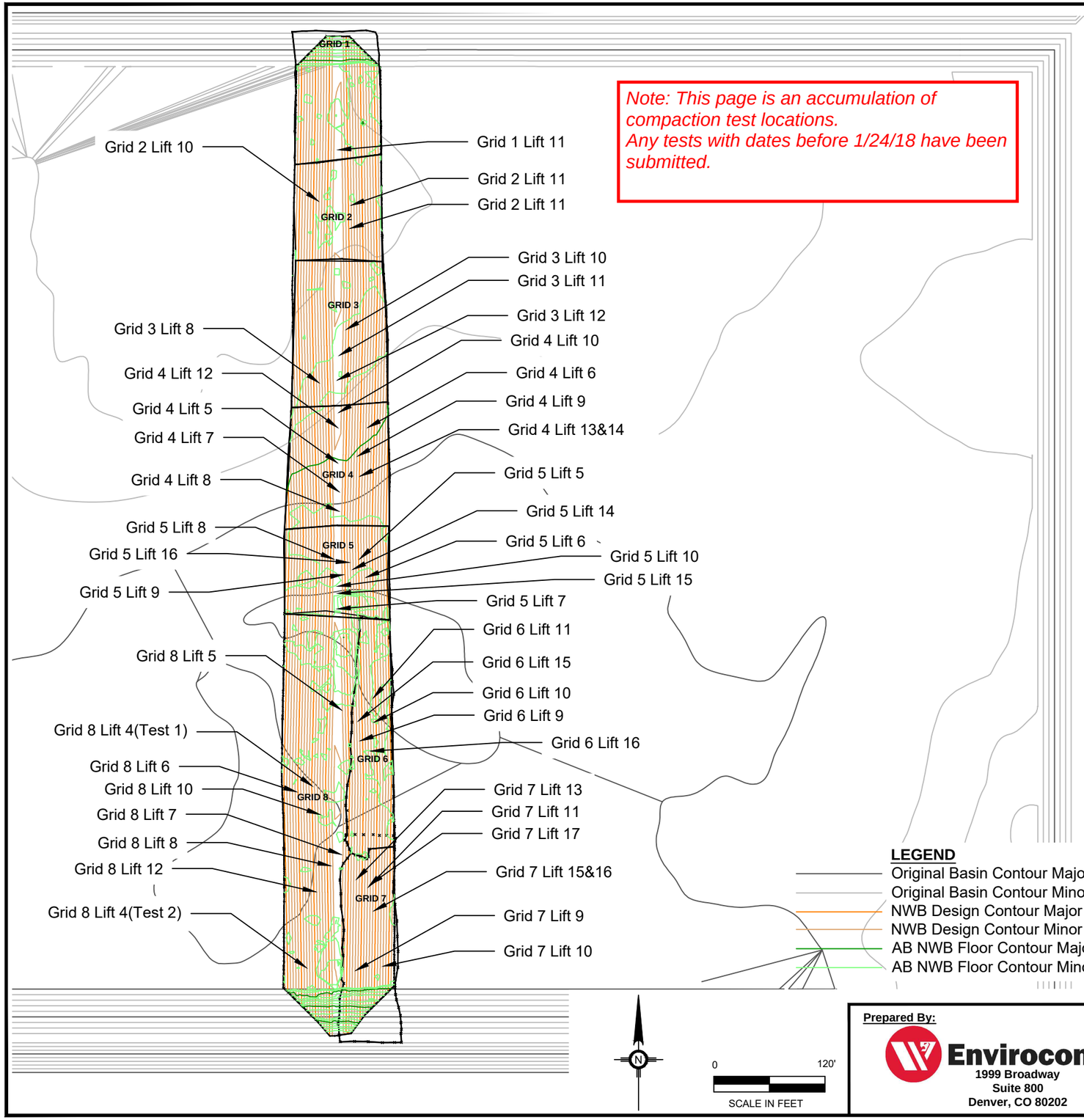
Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Drew Murphy, Billy West

Figure #: 01	
Date: 04/27/2018	
Revision #: 0	
Drawn By: WEL	
Approved By: EI	
Project #: 1495402	

New Western Berm
Compaction Test Locations

488-1D Ash Basin Closure

C:\USERS\WLIVINGSTON\DOCUMENTS\1495402 SRNS 488-1D & 4891-D CLOSURE\SURVEY\03-26-18 NWB COMPACTION TEST LOCATIONS.DWG



Note: This page is an accumulation of compaction test locations.
Any tests with dates before 1/24/18 have been submitted.

LEGEND

- Original Basin Contour Major (10')
- Original Basin Contour Minor (2')
- NWB Design Contour Major (5')
- NWB Design Contour Minor (1')
- AB NWB Floor Contour Major (5')
- AB NWB Floor Contour Minor (1')

NOTES:

54) Grid 4 Lift 5 tested on 01/17/18. Relative density: 96.5%. Moisture: 11.7%.
55) Grid 5 Lift 5 tested on 01/17/18. Relative density: 97.0%. Moisture: 12.6%.
56) Grid 8 Lift 4(Test 1) tested on 01/18/18. Relative density: 97.5%. Moisture: 10.8%.
57) Grid 8 Lift 4(Test 2) tested on 01/18/18. Relative density: 98.5%. Moisture: 9.8%.
58) Grid 4 Lift 6 tested on 01/22/18. Relative density: 97.0%. Moisture: 8.8%.
59) Grid 5 Lift 6 tested on 01/22/18. Relative density: 95.3%. Moisture: 8.8%.
60) Grid 6 Lift 9 tested on 01/22/18. Relative density: 95.5%. Moisture: 7.6%.
61) Grid 7 Lift 9 tested on 01/22/18. Relative density: 99.3%. Moisture: 7.2%.
62) Grid 4 Lift 7 tested on 01/23/18. Relative density: 96.3%. Moisture: 9.4%.
63) Grid 5 Lift 7 tested on 01/23/18. Relative density: 95.6%. Moisture: 11.4%.
64) Grid 6 Lift 10 tested on 01/23/18. Relative density: 96.1%. Moisture: 12.7%.
65) Grid 7 Lift 10 tested on 01/23/18. Relative density: 98.2%. Moisture: 11.0%.
66) Grid 4 Lift 8 tested on 01/24/18. Relative density: 98.5%. Moisture: 12.2%.
67) Grid 5 Lift 8 tested on 01/24/18. Relative density: 96.0%. Moisture: 11.5%.
68) Grid 8 Lift 5 tested on 01/24/18. Relative density: 97.4%. Moisture: 10.7%.
69) Grid 4 Lift 9 tested on 02/02/18. Relative density: 98.3%. Moisture: 9.4%.
70) Grid 5 Lift 9 tested on 02/02/18. Relative density: 97.6%. Moisture: 10.3%.
71) Grid 6 Lift 11 tested on 02/02/18. Relative density: 97.4%. Moisture: 10.7%.
72) Grid 7 Lift 11 tested on 02/02/18. Relative density: 97.1%. Moisture: 10.9%.
73) Grid 8 Lift 6 tested on 02/02/18. Relative density: 96.3%. Moisture: 11.5%.
74) Grid 4 Lift 10 tested on 02/23/18. Relative density: 98.3%. Moisture: 11.3%.
75) Grid 5 Lift 10 tested on 02/23/18. Relative density: 98.5%. Moisture: 13.6%.
76) Grid 8 Lift 7 tested on 02/23/18. Relative density: 99.4%. Moisture: 13.2%.
Note: All grids gained a lift (1') on 02/23/18
77) Grid 1 Lift 11 tested on 02/28/18. Relative density: 98.3%. Moisture: 11.5%.
78) Grid 3 Lift 8 tested on 02/28/18. Relative density: 97.8%. Moisture: 9.9%.
79) Grid 8 Lift 8 tested on 02/28/18. Relative density: 98.1%. Moisture: 11.4%.
Note: All grids gained a lift (1') on 02/28/18
80) Grid 2 Lift 10 tested on 03/02/18. Relative density: 97.9%. Moisture: 9.8%.
81) Grid 4 Lift 12 tested on 03/02/18. Relative density: 98.8%. Moisture: 10.5%.
82) Grid 7 Lift 13 tested on 03/02/18. Relative density: 99.1%. Moisture: 11.2%.
Note: All grids gained a lift (1') on 03/02/18 except Grid 1
83) Grid 3 Lift 10 tested on 03/09/18. Relative density: 96.6%. Moisture: 12.2%.
84) Grid 2 Lift 11 tested on 03/09/18. Relative density: 96.9%. Moisture: 9.6%.
85) Grid 4 Lift 13 tested on 03/15/18. Relative density: 97.1%. Moisture: 10.6%.
86) Grid 8 Lift 10 tested on 03/15/18. Relative density: 96.0%. Moisture: 10.9%.
Note: Grids 5,6, & 7 gained a lift (1') on 03/15/18
87) Grid 5 Lift 14 tested on 03/22/18. Relative density: 97.7%. Moisture: 10.0%.
88) Grid 6 Lift 15 tested on 03/22/18. Relative density: 98.5%. Moisture: 9.1%.
89) Grid 7 Lift 15 tested on 03/22/18. Relative density: 98.2%. Moisture: 9.7%.
Note: Grid 8 gained a lift (1') on 03/22/18
90) Grid 8 Lift 12 tested on 03/23/18. Relative density: 97.4%. Moisture: 9.9%.
91) Grid 7 Lift 16 tested on 03/23/18. Relative density: 96.7%. Moisture: 13.1%.
92) Grid 6 Lift 16 tested on 03/23/18. Relative density: 98.0%. Moisture: 9.4%.
93) Grid 5 Lift 15 tested on 03/23/18. Relative density: 98.5%. Moisture: 11.8%.
94) Grid 4 Lift 14 tested on 03/23/18. Relative density: 97.1%. Moisture: 10.1%.
95) Grid 3 Lift 11 tested on 03/23/18. Relative density: 96.4%. Moisture: 9.6%.
96) Grid 2 Lift 12 tested on 03/23/18. Relative density: 98.8%. Moisture: 8.6%.
97) Grid 5 Lift 16 tested on 03/26/18. Relative density: 98.1%. Moisture: 12.7%.
98) Grid 7 Lift 17 tested on 03/26/18. Relative density: 98.8%. Moisture: 11.7%.
Note: Grids 4, 6, & 8 gained a lift (1') on 03/26/18
99) Grid 3 Lift 12 tested on 03/29/18. Relative density: 98.1%. Moisture: 9.7%.
Note: Grids 4, 5, 6, 7, & 8 gained a lift (1') on 03/29/18

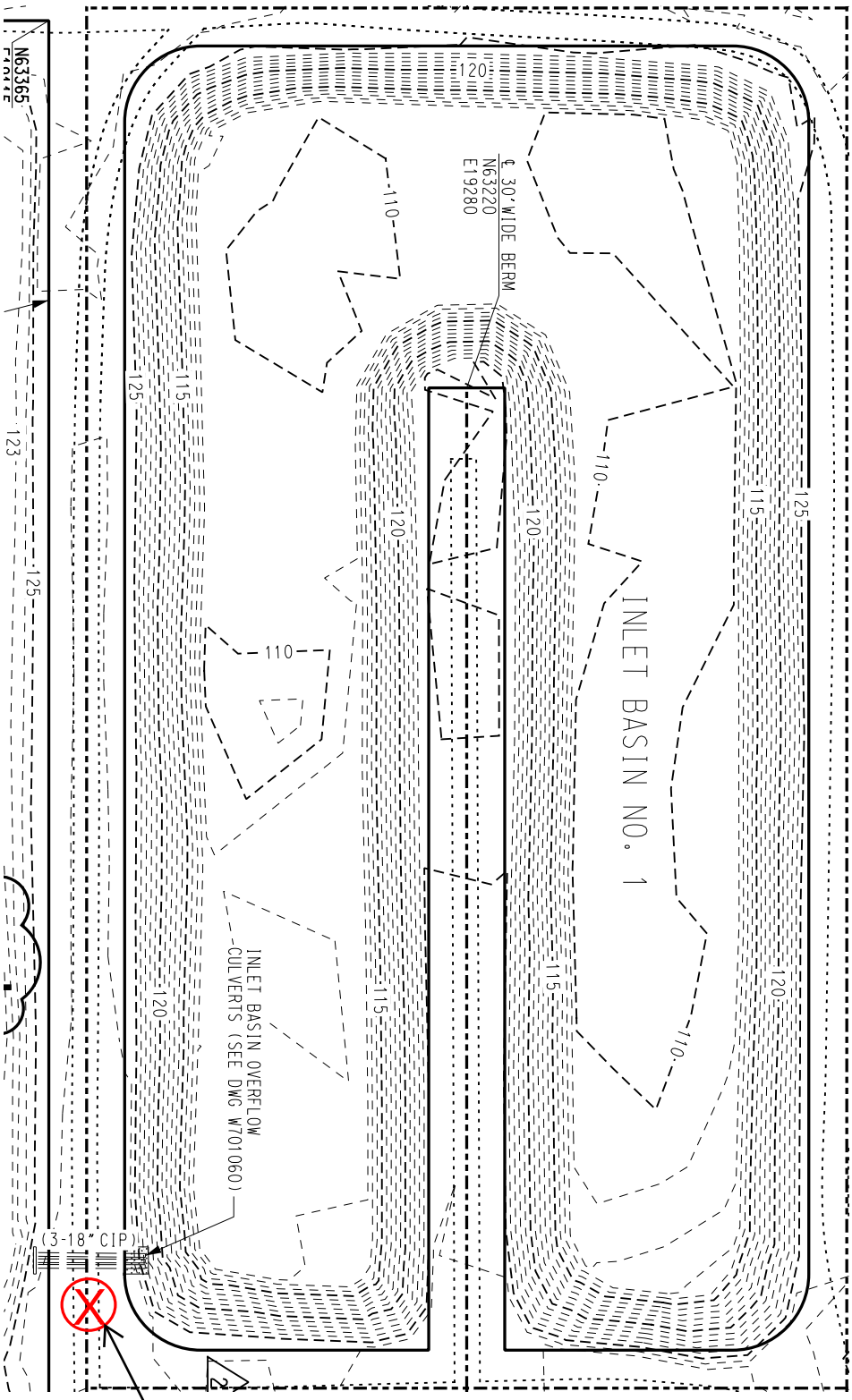
Prepared By:
Envirocon
1999 Broadway
Suite 800
Denver, CO 80202

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Drew Murphy, Billy West

Figure #: 01	New Western Berm Compaction Test Locations
Date: 04/27/2018	
Revision #: 0	
Drawn By: WEL	
Approved By: EI	
Project #: 1495402	488-1D Ash Basin Closure

C:\USERS\WLIVINGSTON\DOCUMENTS\1495402 SRNS 488-1D & 4891-D CLOSURE\SURVEY\03-26-18 NWB COMPACTION TEST LOCATIONS.DWG

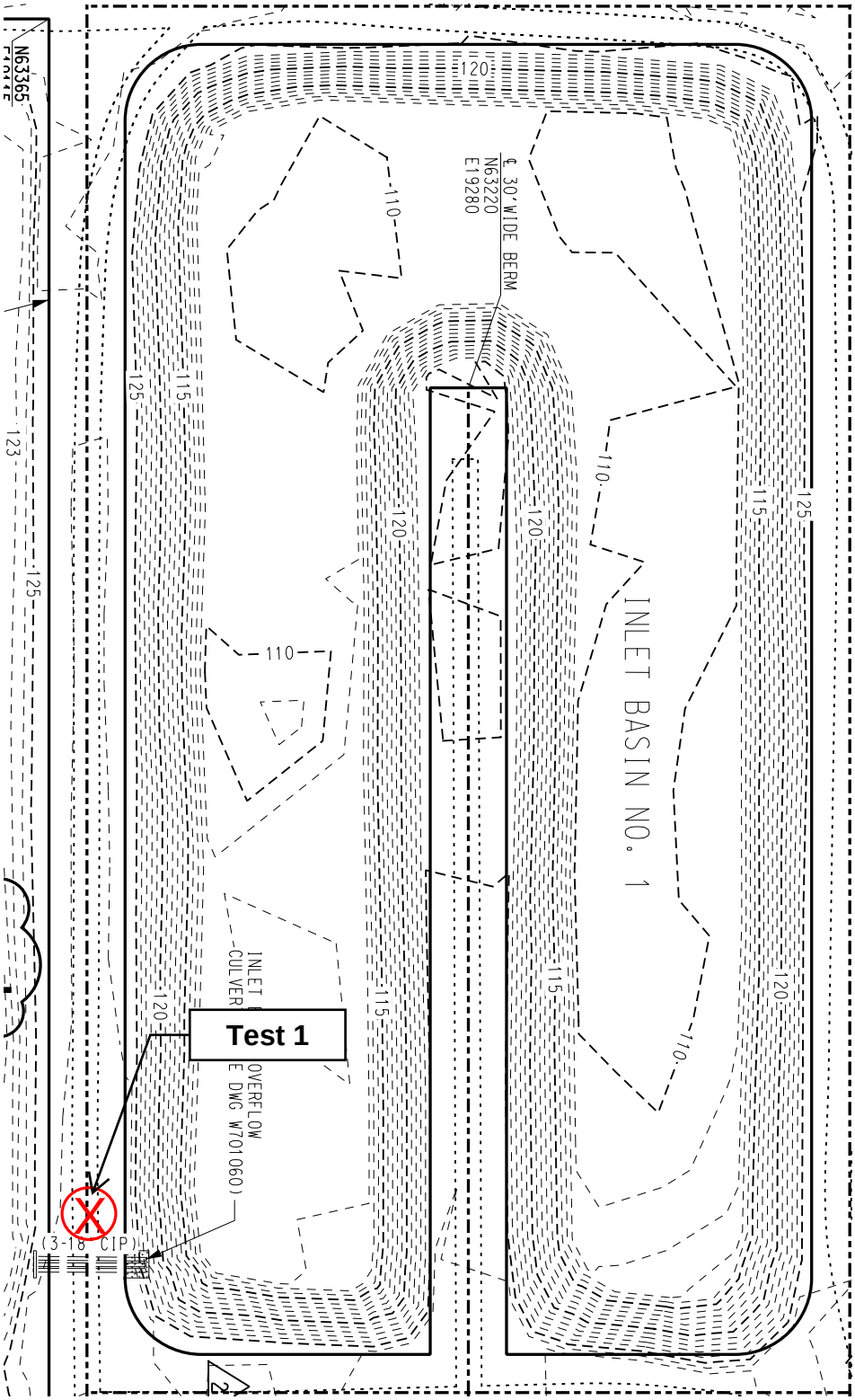
Compaction Test Locations
West Road - North Inlet Basin
Date: 3/23/18



Test 1
WR-NIB L2
ρ: 99.5% m: 9.9%

Compaction Test Locations
West Road - North Inlet Basin
Date: 3/22/18

N



Test 1
WR-NIB L1
ρ: 97.5% m: 10.5%

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T18-T47

Date May 8, 2018

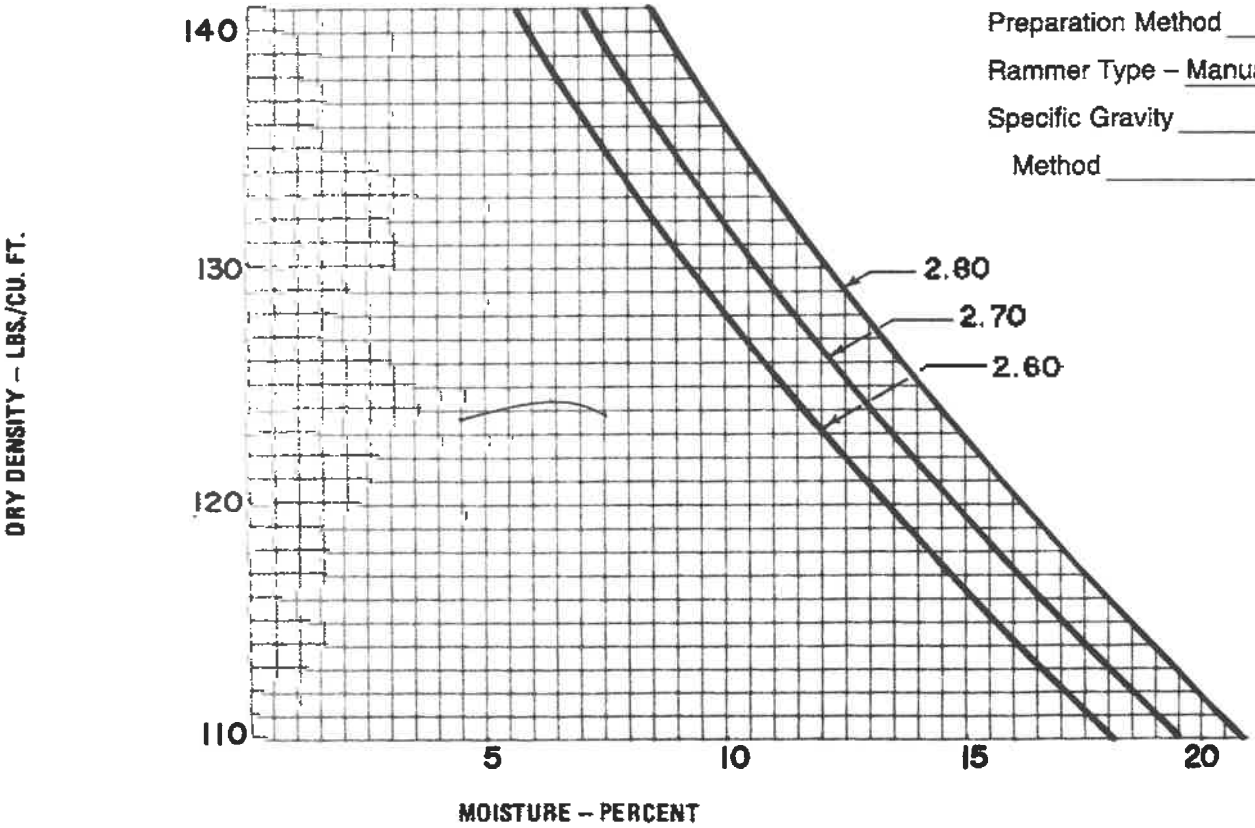
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO# 258194

SOIL PROCTOR TEST

Maximum Dry Density — 124.5 pcf
Optimum Moisture Content — 6.4%
Soil Description — Brownish-Tan Slightly Silty Sand (TC-20-1)

Preparation Method
Rammer Type – Manual
Specific Gravity
Method



ASTM D - 1557 , Method – A

Technician Chip Stewart

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T18-T48
Date Sampled May 7, 2018
Date of Test May 10, 2018
Date Issued May 10, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Brownish-Tan Slightly Silty Sand (TC-20-1)

Sieve No.	% Passing
4	100.0%
10	99.4%
20	94.4%
40	69.6%
60	37.5%
140	20.1%
200	16.8%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T18-T49

Date May 8, 2018

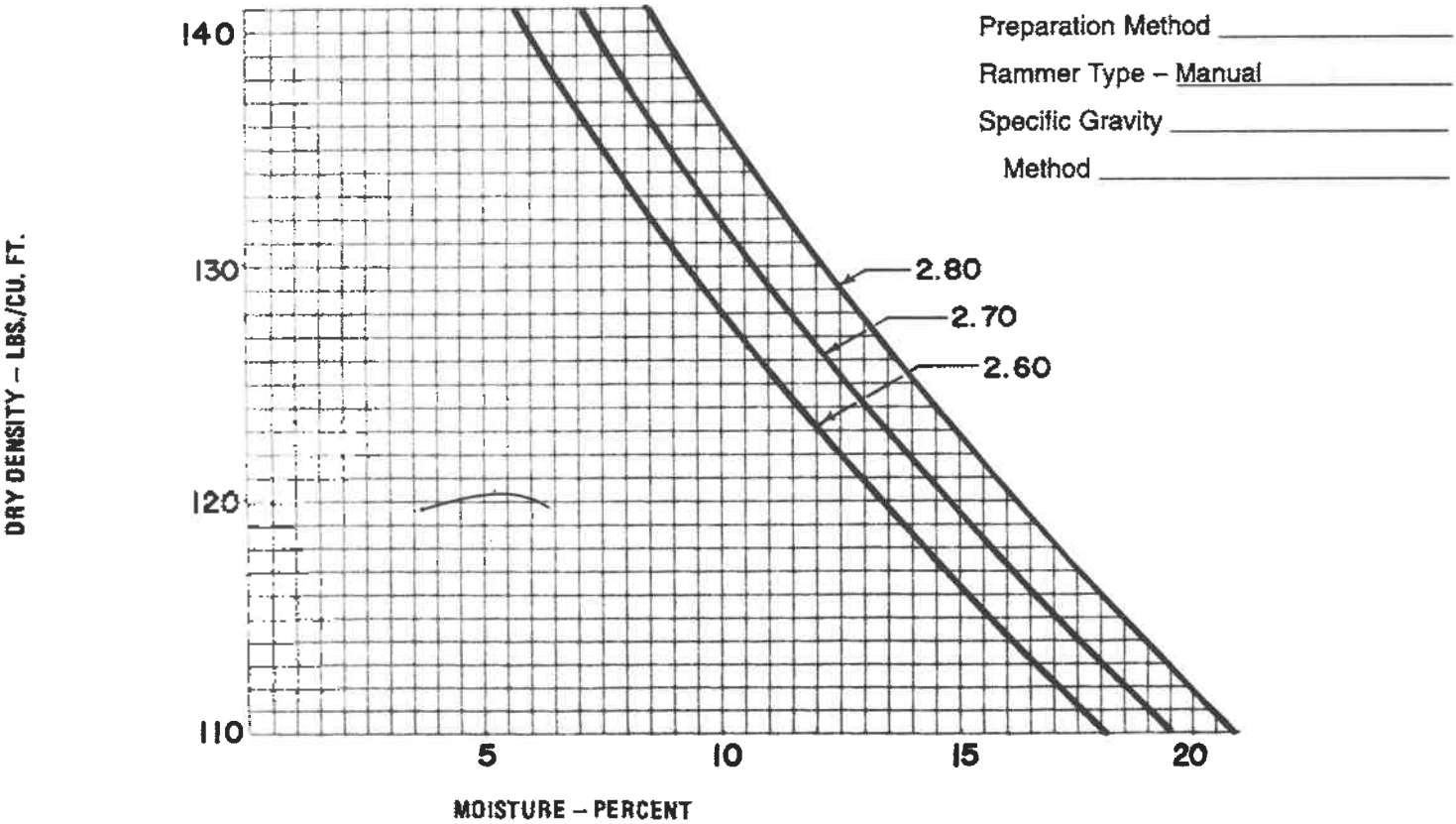
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO# 258194

SOIL PROCTOR TEST

Maximum Dry Density — 120.7 pcf
Optimum Moisture Content — 5.3%
Soil Description — Brownish-Tan Slightly Silty Sand (TC-20-2)

Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____



ASTM D - 1557 , Method – A

Technician Matt Spires

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T18-T50
Date Sampled May 7, 2018
Date of Test May 10, 2018
Date Issued May 10, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Brownish-Tan Slightly Silty Sand (TC-20-2)

Sieve No.	% Passing
4	100.0%
10	99.6%
20	94.3%
40	52.8%
60	31.4%
140	16.2%
200	14.4%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T18-T51

Date May 9, 2018

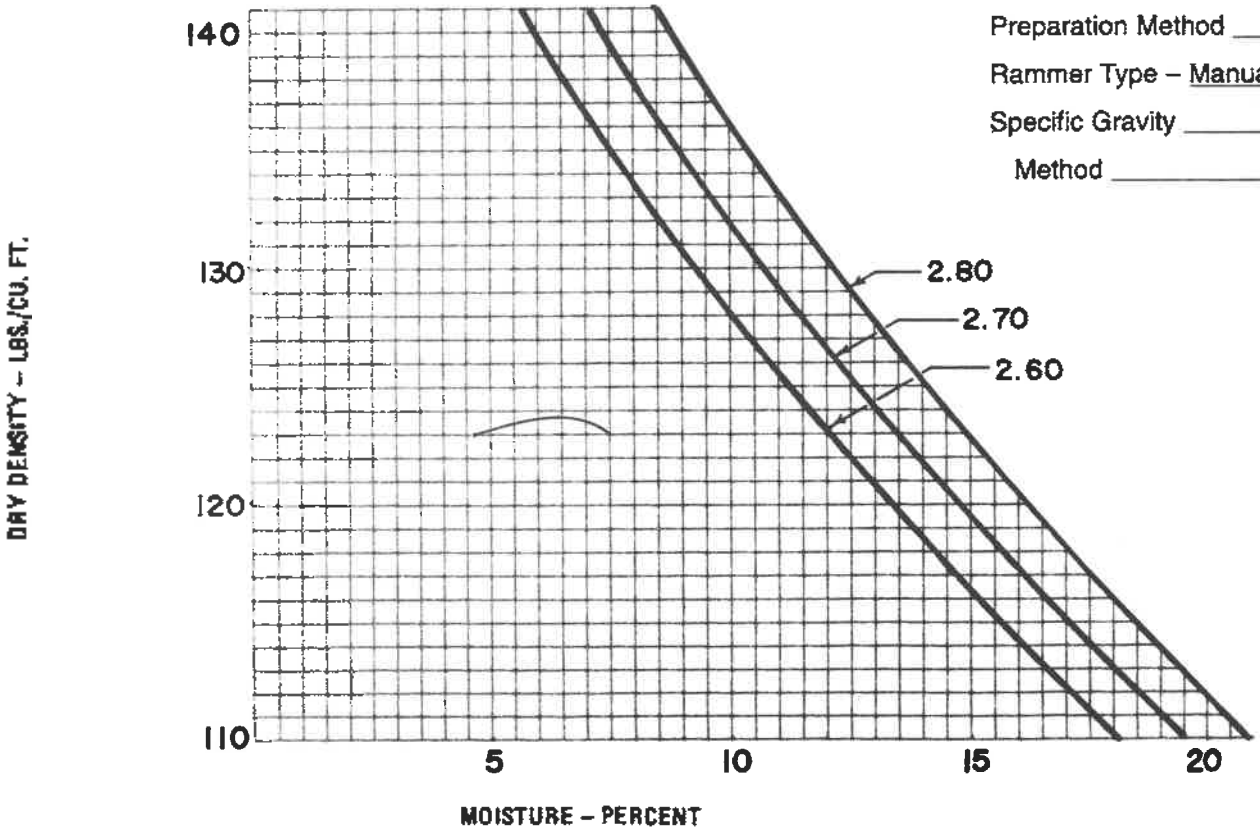
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO# 258194

SOIL PROCTOR TEST

Maximum Dry Density — 123.9 pcf
Optimum Moisture Content — 6.4%
Soil Description — Brownish-Tan Slightly Silty Sand (TC-20-3)

Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____



ASTM D - 1557 , Method – A

Technician Jack Salva

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T18-T52
Date Sampled May 7, 2018
Date of Test May 10, 2018
Date Issued May 10, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Brownish-Tan Slightly Silty Sand (TC-20-3)

Sieve No.	% Passing
4	100.0%
10	99.6%
20	93.4%
40	48.0%
60	32.7%
140	19.2%
200	16.8%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T18-T53

Date May 8, 2018

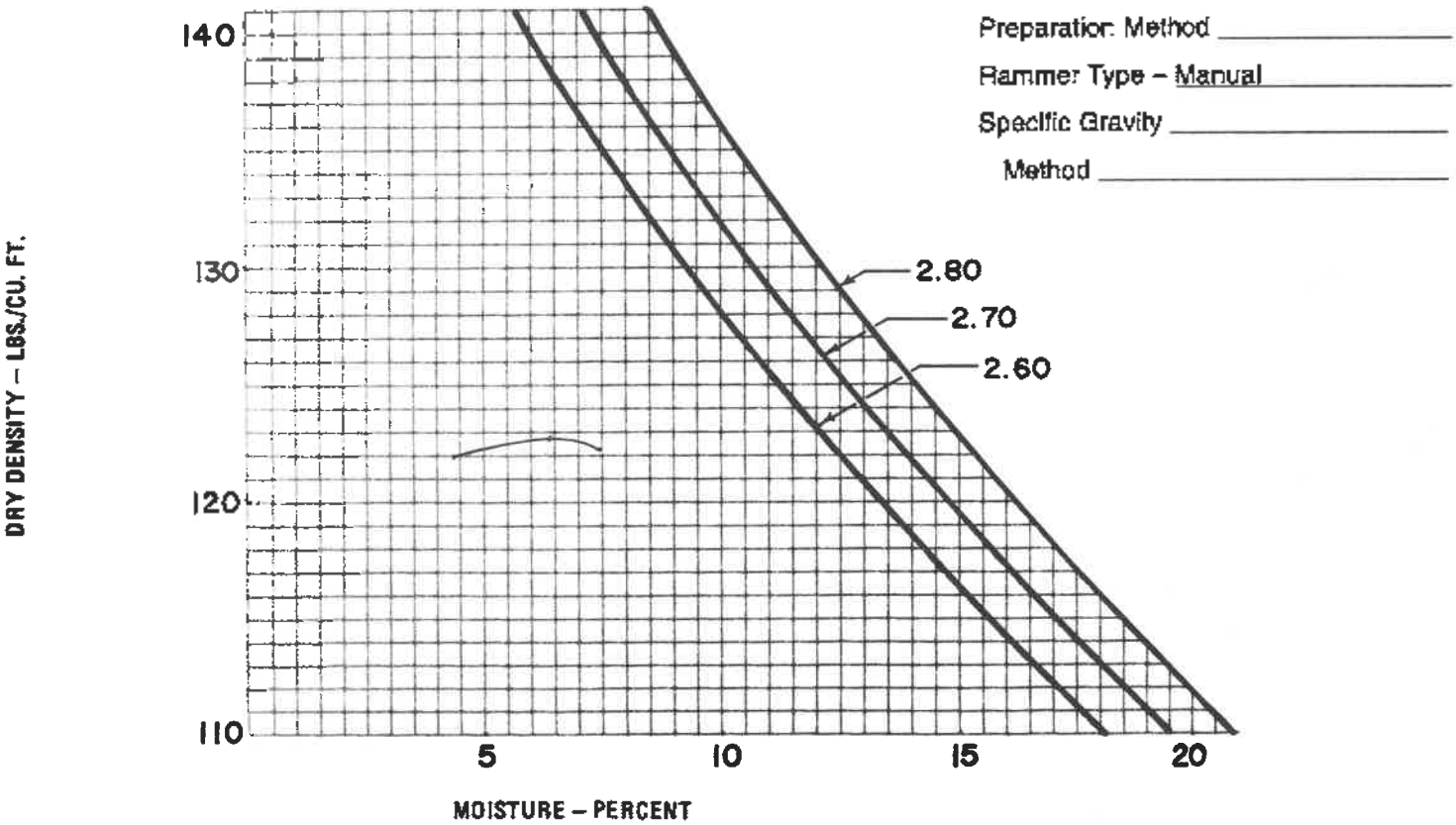
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO# 258194

SOIL PROCTOR TEST

Maximum Dry Density — 122.9 pcf
Optimum Moisture Content — 6.4%
Soil Description — Brownish-Tan Slightly Silty Sand (TC-20-4)

Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____



ASTM D - 1557 , Method – A

Technician Matt Spires

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T18-T54
Date Sampled May 7, 2018
Date of Test May 10, 2018
Date Issued May 10, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Brownish-Tan Slightly Silty Sand (TC-20-4)

Sieve No.	% Passing
4	100.0%
10	99.8%
20	92.2%
40	47.5%
60	30.7%
140	14.8%
200	12.0%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T18-Y03

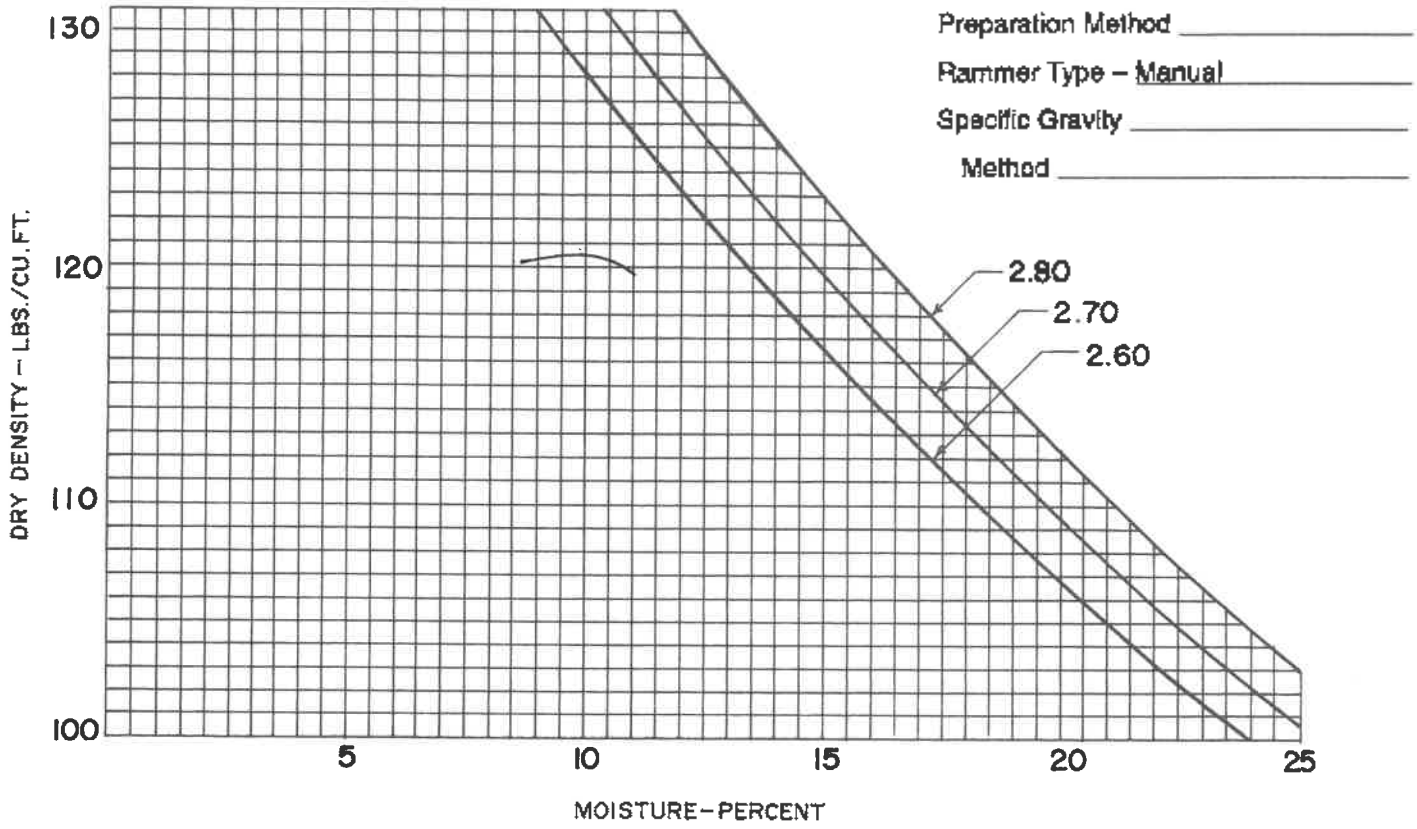
Date June 7, 2018

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO# 258194

SOIL PROCTOR TEST

Maximum Dry Density — 120.7 pcf
Optimum Moisture Content — 9.9%
Soil Description — Tan Slightly Clayey Sand (TC-20-5)



ASTM D - 1557 , Method – A

Technician Matt Spires

Accredited By AASHTO Accreditation Program (AAP)

Phoenix #126739

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No. T18-X96
Date Sampled June 6, 2018
Date of Test June 11, 2018
Date Issued June 15, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Tan Slightly Clayey Sand (TC-20-5)

Sieve No.	% Passing
⅜"	100.0%
4	99.8%
10	99.0%
20	92.6%
40	56.6%
60	35.8%
140	20.0%
200	17.8%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-8960
FAX (706) 737-0629

Report No. T18-Y02

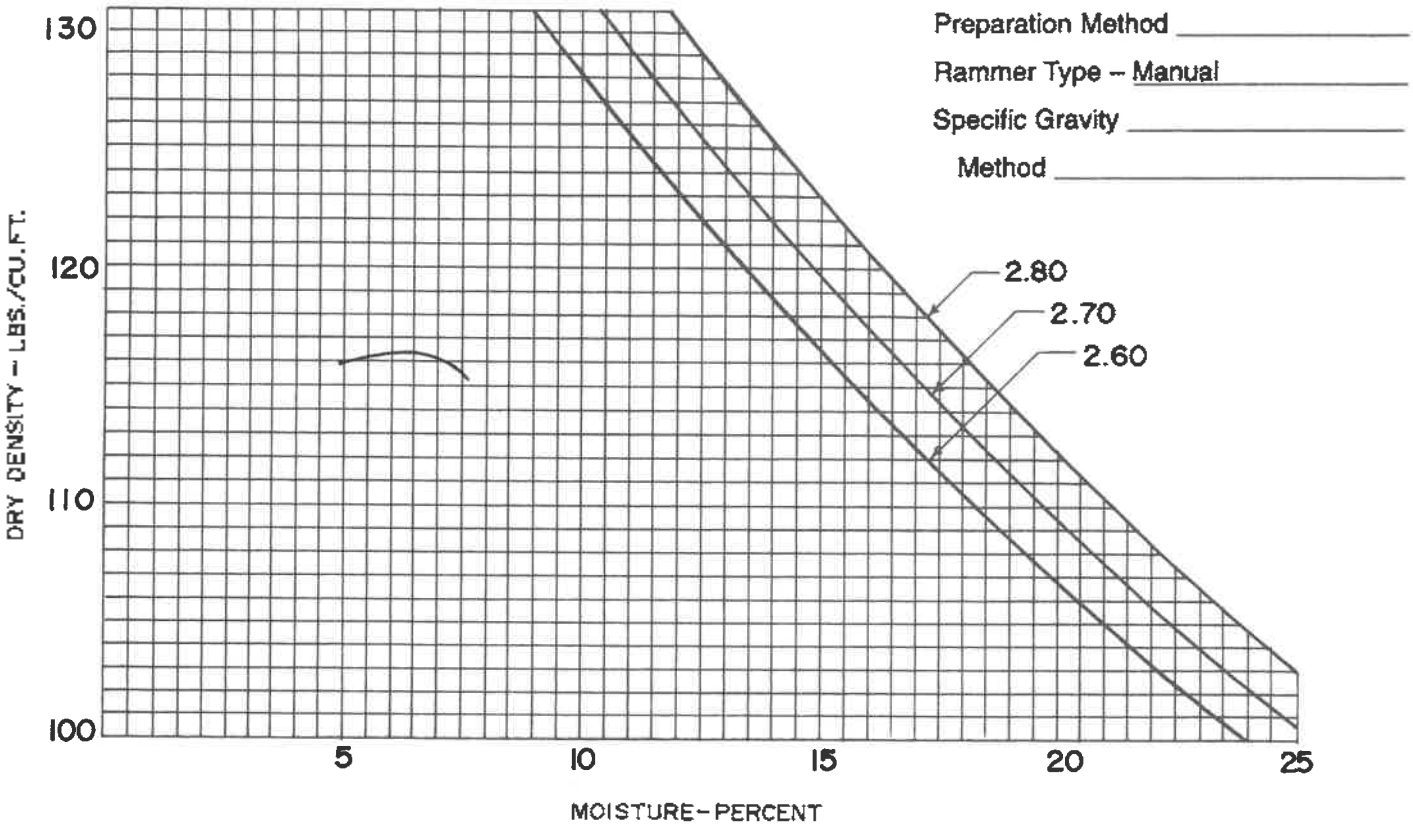
Date June 7, 2018

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO# 258194

SOIL PROCTOR TEST

Maximum Dry Density — 116.4 pcf
Optimum Moisture Content — 6.4%
Soil Description — Tan Slightly Clayey Sand (TC-20-6)



ASTM D - 1557 , Method – A

Technician Chip Stewart

Accredited By AASHTO Accreditation Program (AAP)

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No. T18-X95
Date Sampled June 6, 2018
Date of Test June 11, 2018
Date Issued June 15, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Tan Slightly Clayey Sand (TC-20-6)

Sieve No.	% Passing
4	100.0%
10	99.6%
20	93.8%
40	65.4%
60	34.0%
140	15.6%
200	13.4%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T18-Y04

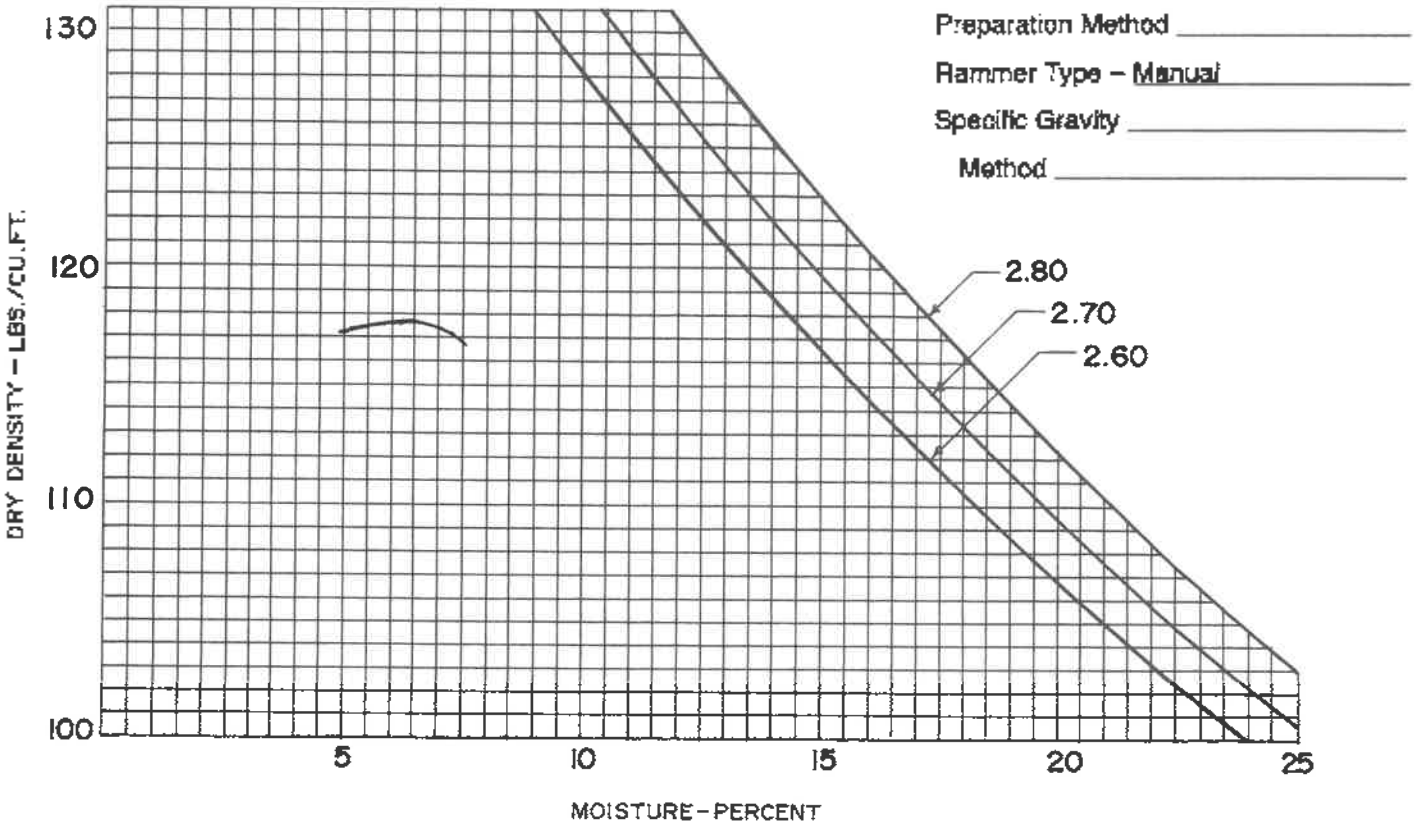
Date June 12, 2018

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO# 258194

SOIL PROCTOR TEST

Maximum Dry Density — 117.8 pcf
Optimum Moisture Content — 6.4%
Soil Description — Tan Slightly Clayey Sand (TC-20-7)



ASTM D - 1557 , Method – A

Technician Chip Stewart

Accredited By AASHTO Accreditation Program (AAP)

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No. T18-X97
Date Sampled June 6, 2018
Date of Test June 11, 2018
Date Issued June 15, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Tan Slightly Clayey Sand (TC-20-7)

Sieve No.	% Passing
4	100.0%
10	99.8%
20	92.0%
40	58.4%
60	31.0%
140	13.4%
200	11.0%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T18-Y52

Date June 18, 2018

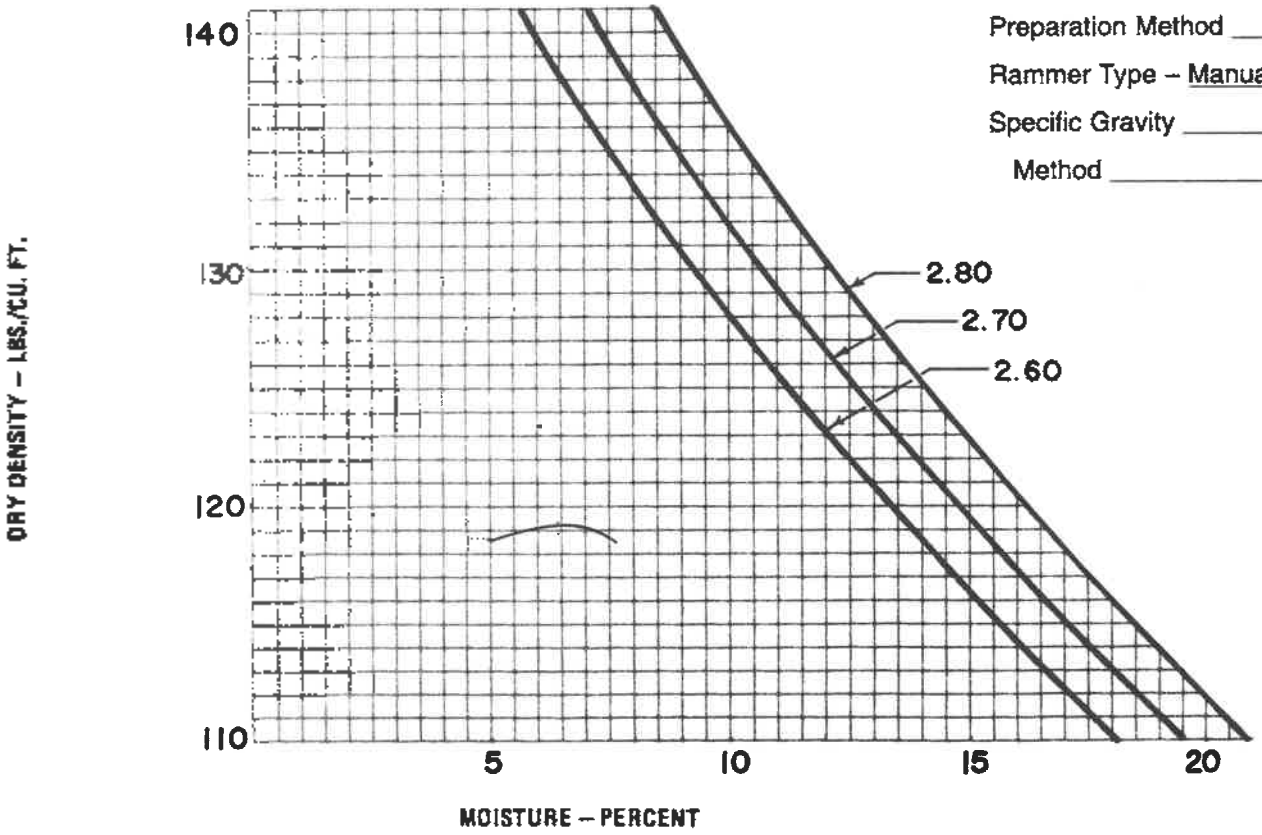
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO# 258194

SOIL PROCTOR TEST

Maximum Dry Density — 119.2 pcf
Optimum Moisture Content — 6.4%
Soil Description — Light Brownish-Tan Slightly Clayey Sand (TC-20-8)

Preparation Method
Rammer Type – Manual
Specific Gravity
Method



ASTM D - 1557 , Method – A

Technician Branon Mitchell

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No. T18-Y51
Date Sampled June 15, 2018
Date of Test June 19, 2018
Date Issued June 19, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Light Brownish-Tan Slightly Clayey Sand (TC-20-8)

Sieve No.	% Passing
4	100.0%
10	99.6%
20	94.0%
40	61.6%
60	35.0%
140	16.8%
200	14.4%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T18-Y54

Date June 19, 2018

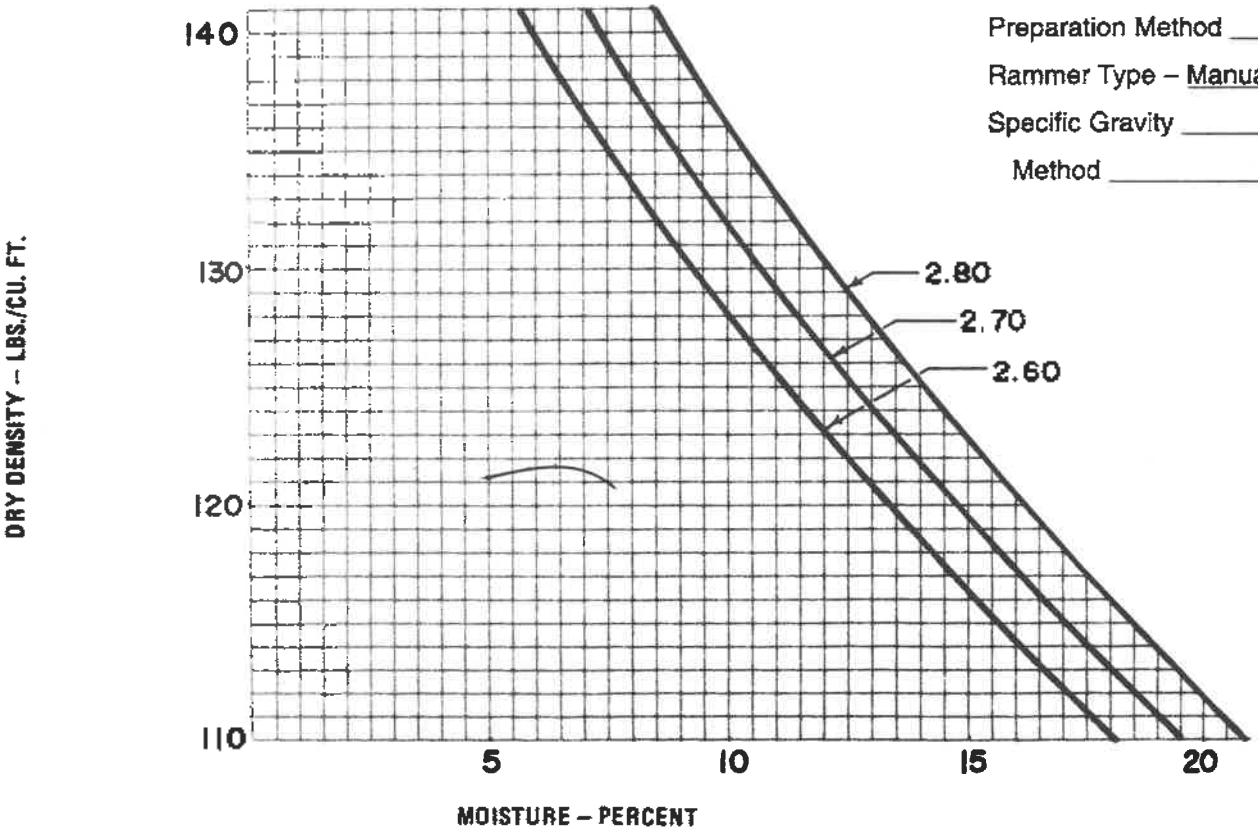
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO# 258194

SOIL PROCTOR TEST

Maximum Dry Density — 121.9 pcf
Optimum Moisture Content — 6.4%
Soil Description — Tannish-Brown Slightly Silty Sand (TC-20-9)

Preparation Method
Rammer Type – Manual
Specific Gravity
Method



ASTM D - 1557 , Method – A

Technician Chip Stewart

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No. T18-Y53
Date Sampled June 15, 2018
Date of Test June 19, 2018
Date Issued June 19, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Tannish-Brown Slightly Silty Sand (TC-20-9)

Sieve No.	% Passing
4	100.0%
10	99.6%
20	93.6%
40	63.4%
60	36.2%
140	17.2%
200	14.4%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T18-CC58

Date July 18, 2018

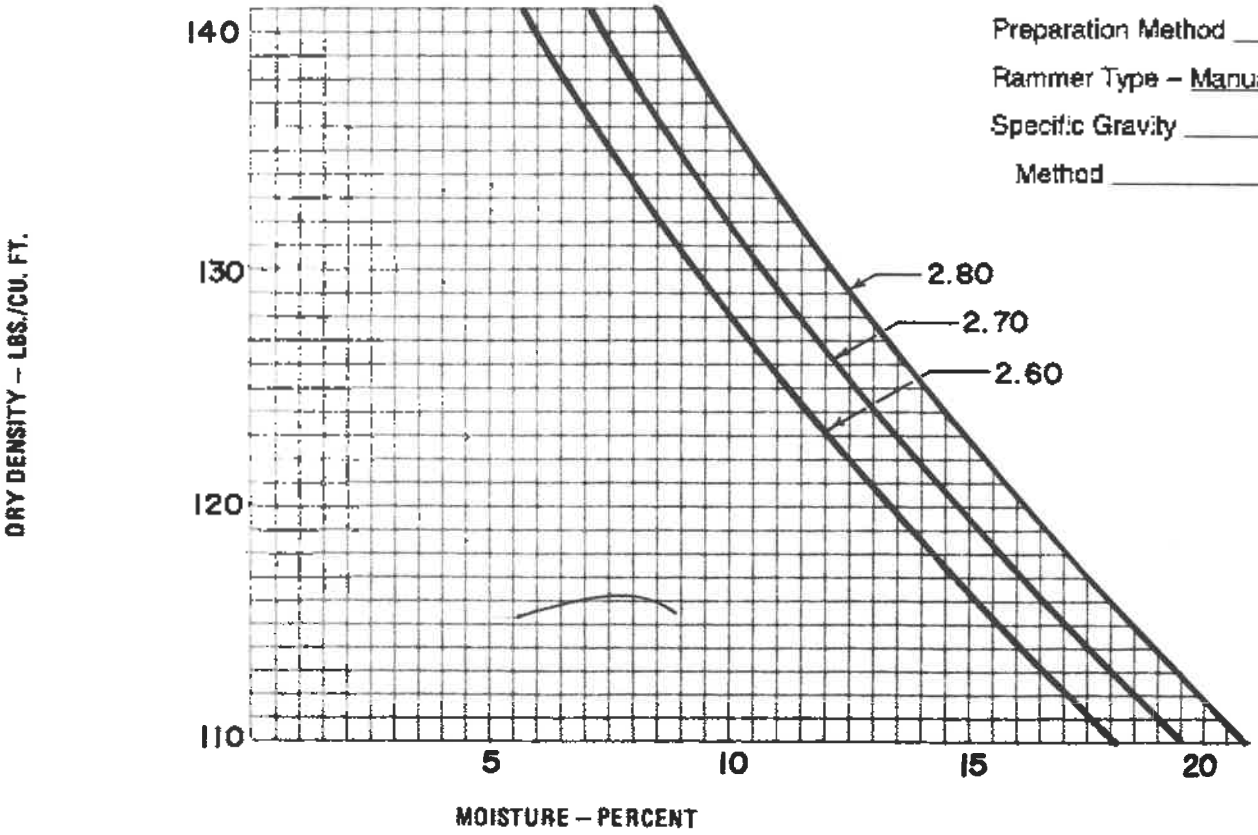
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken Co., SC
SRNS PO # 258194

SOIL PROCTOR TEST

Maximum Dry Density — 116.3 pcf
Optimum Moisture Content — 7.5%
Soil Description — Brownsih-Tan Slightly Silty Sand (TC-20-10)

Preparation Method
Rammer Type – Manual
Specific Gravity
Method



ASTM D - 1557 , Method – A

Technician Branon Mitchell

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No. T18-CC61
Date Sampled July 12, 2018
Date of Test July 18, 2018
Date Issued July 19, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Brownish-Tan Slightly Silty Sand (TC-20-10)

Sieve No.	% Passing
4	100.0%
10	99.7%
20	95.3%
40	60.7%
60	32.3%
140	14.0%
200	12.0%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T18-CC59

Date July 18, 2018

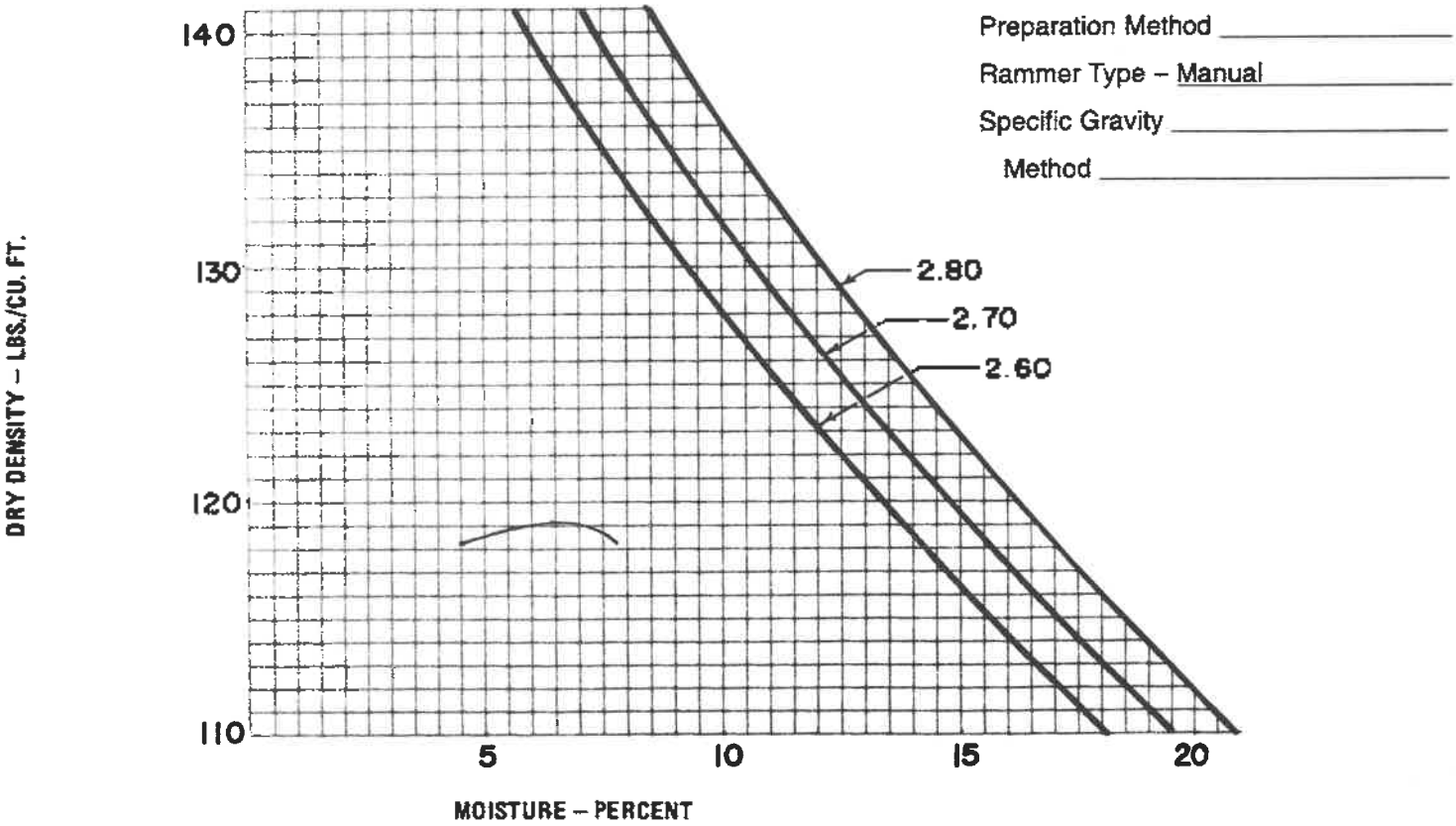
CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken Co, SC
SRNS PO# 258194

SOIL PROCTOR TEST

Maximum Dry Density — 119.1 pcf
Optimum Moisture Content — 6.4%
Soil Description — Brownish-Tan Slightly Silty Sand (TC-20-11)

Preparation Method _____
Rammer Type – Manual
Specific Gravity _____
Method _____



ASTM D - 1557 , Method – A

Technician Branon Mitchell

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No. T18-CC60
Date Sampled July 12, 2018
Date of Test July 18, 2018
Date Issued July 19, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Brownish-Tan Slightly Silty Sand (TC-20-11)

Sieve No.	% Passing
4	100.0%
10	99.3%
20	94.7%
40	59.0%
60	33.3%
140	16.7%
200	13.0%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6660
FAX (706) 737-0629

Report No. T18-Y01

Date June 11, 2018

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC

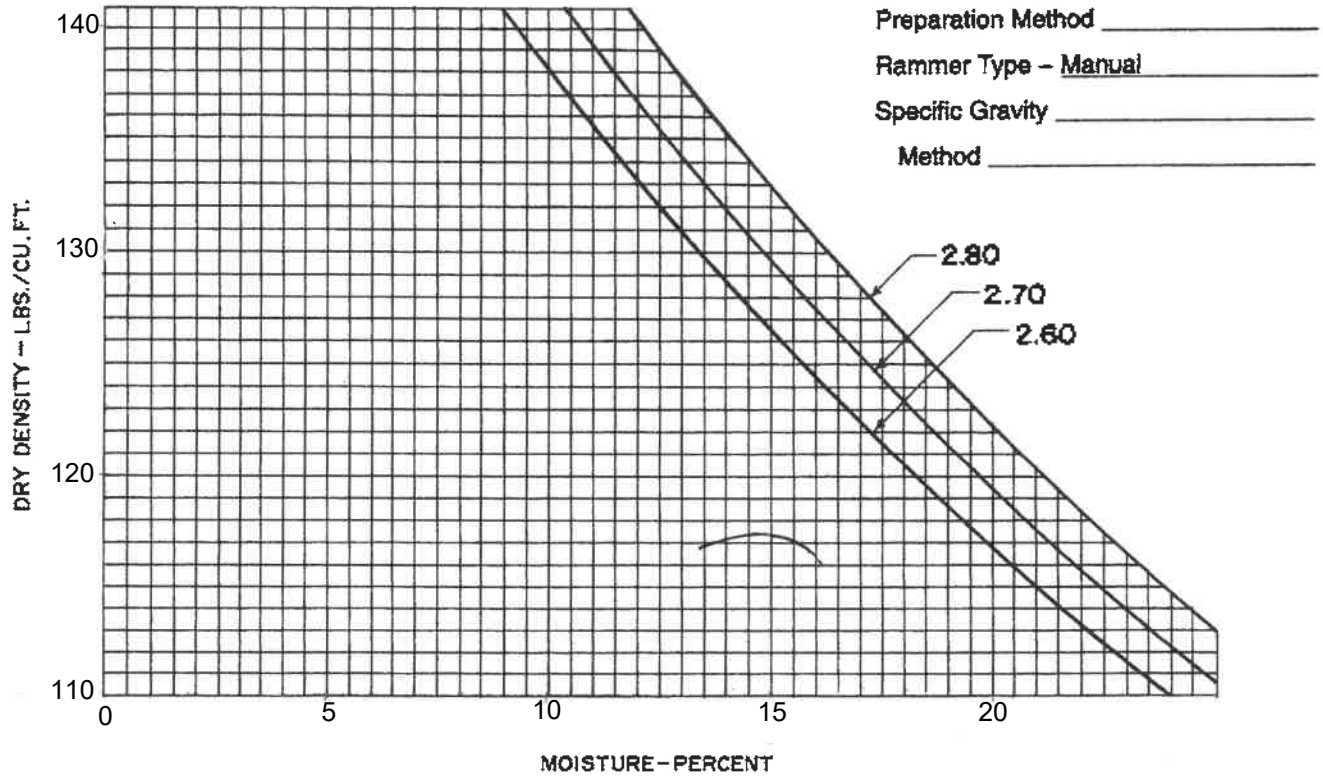
SRNS PO# 258194

SOIL PROCTOR TEST

Maximum Dry Density — 117.6 pcf

Optimum Moisture Content — 14.9%

Soil Description — Reddish-Brown Sandy Clay (BA-2-E1)



ASTM D - 1557 , Method – A

Technician Jason Hawkins

Accredited By AASHTO Accreditation Program (AAP)

Phoenix #126739

460-Gradation & Proctor
488 1D Page 23 of 35

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No. T18-X94
Date Sampled June 6, 2018
Date of Test June 11, 2018
Date Issued June 15, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Brown Sandy Clay (BA-2-E1)

Sieve No.	% Passing
4	100.0%
10	99.2%
20	97.0%
40	91.2%
60	84.4%
140	63.6%
200	59.8%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T18-X98

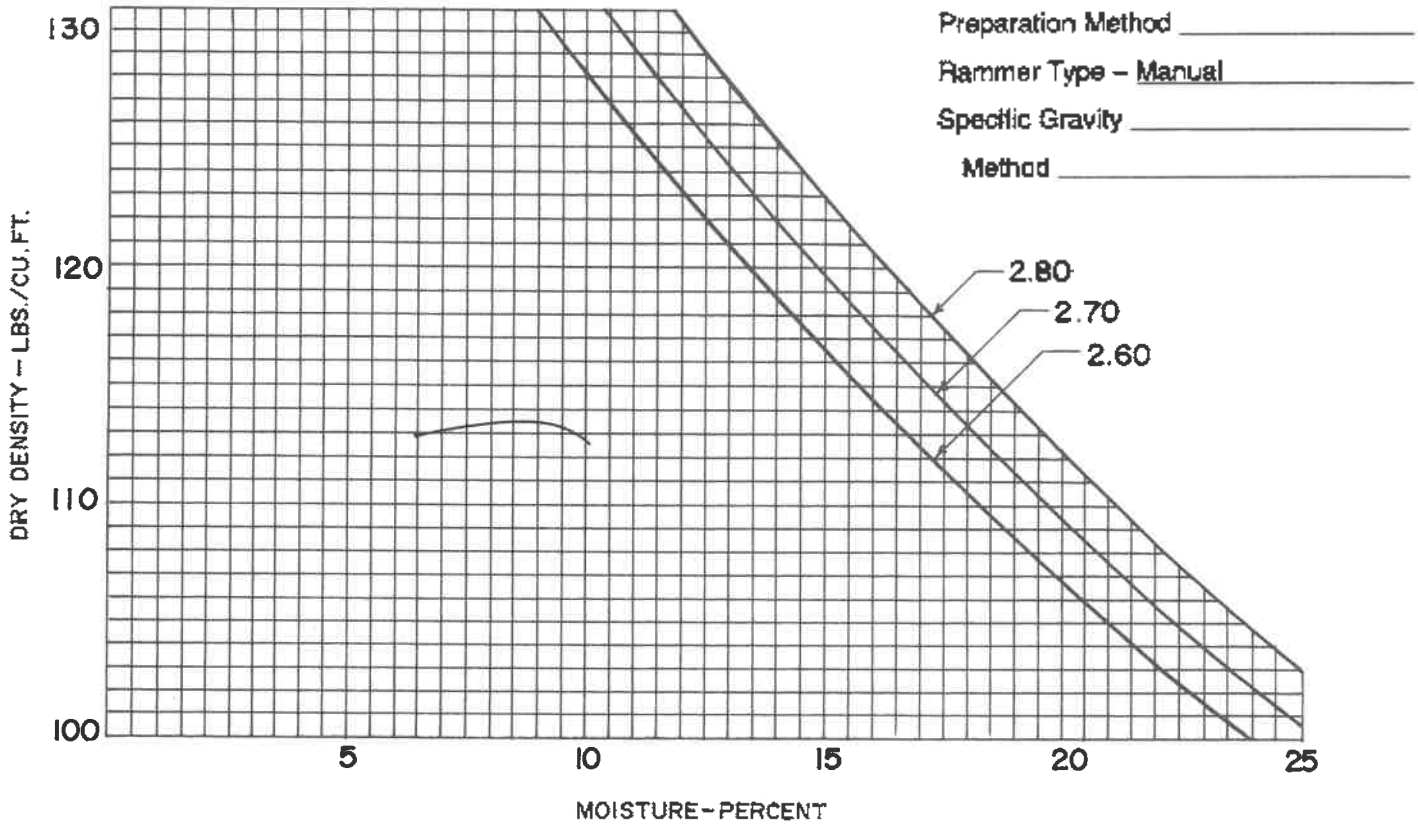
Date June 8, 2018

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO# 258194

SOIL PROCTOR TEST

Maximum Dry Density — 113.5 pcf
Optimum Moisture Content — 8.7%
Soil Description — Tannish-Brown Coarse Sand (BA-2-W1 Bar Area - West)



ASTM D - 1557 , Method – A

Technician Branon Mitchell

Accredited By AASHTO Accreditation Program (AAP)

Phoenix #126739

460-Gradation & Proctor
488 1D Page 25 of 35

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No. T18-X92
Date Sampled June 6, 2018
Date of Test June 11, 2018
Date Issued June 15, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Tannish-Brown Coarse Sand (BA-2-W1)

Sieve No.	% Passing
4	100.0%
10	99.8%
20	92.4%
40	60.0%
60	32.8%
140	11.0%
200	7.2%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T18-R32
Date Sampled April 20, 2018
Date of Test April 25, 2018
Date Issued April 26, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Dark Brownish-Tan Sandy Clay (North Road West Basin-Sample 3)

Sieve No.	% Passing
4	100.0%
10	99.3%
20	96.0%
40	88.8%
60	81.5%
140	69.5%
200	67.0%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0829

Report No. T18-X99

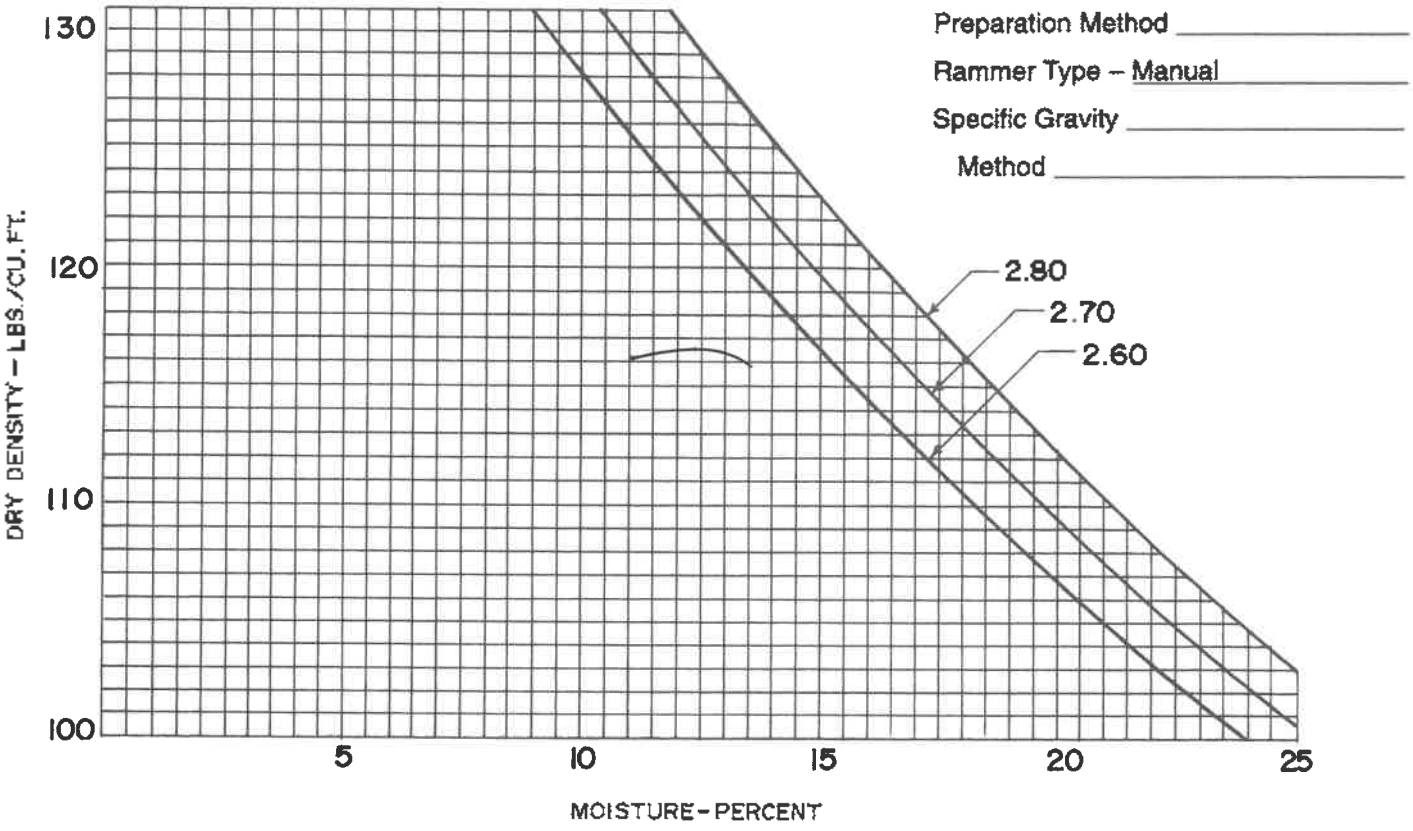
Date June 13, 2018

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO# 258194

SOIL PROCTOR TEST

Maximum Dry Density — 116.7 pcf
Optimum Moisture Content — 12.4%
Soil Description — Brownish-Tan Silty Clayey Sand (SIB #1 Stockpile)



ASTM D - 1557 , Method – A

Technician Branon Mitchell

Accredited By AASHTO Accreditation Program (AAP)

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No. T18-X93
Date Sampled June 6, 2018
Date of Test June 11, 2018
Date Issued June 15, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Brownish-Tan Silty Clayey Sand (SIB #1 Stockpile)

Sieve No.	% Passing
½"	100.0%
⅜"	99.2%
4	96.8%
10	91.6%
20	83.4%
40	71.4%
60	57.4%
140	46.8%
200	45.4%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6960
FAX (706) 737-0629

Report No. T18-R37

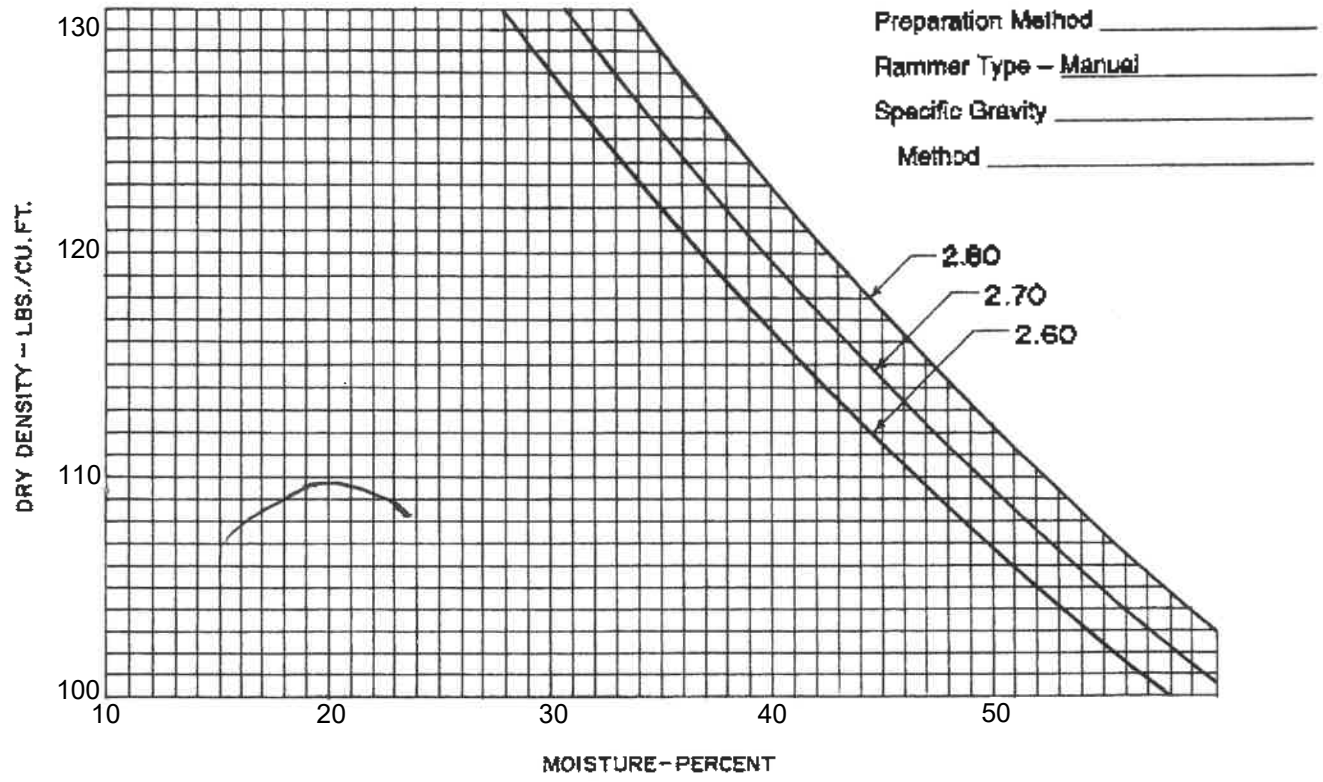
Date April 23, 2018

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO #258194

SOIL PROCTOR TEST

Maximum Dry Density — 109.3 pcf
Optimum Moisture Content — 19.0%
Soil Description — Brownish-Tan Sandy Clay (North Road West Basin-Sample 1)



ASTM D - 1557 , Method – A

Technician Matt Spires

Accredited By AASHTO Accreditation Program (AAP)

Phoenix #128739

460-Gradation & Proctor
488 1D Page 30 of 35

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T18-R36
Date Sampled April 20, 2018
Date of Test April 25, 2018
Date Issued April 26, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Brownish-Tan Sandy Clay (North Road West Basin-Sample 1)

Sieve No.	% Passing
4	100.0%
10	98.7%
20	92.3%
40	81.3%
60	72.3%
140	62.3%
200	61.0%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-8960
FAX (706) 737-0629

Report No. T18-R35

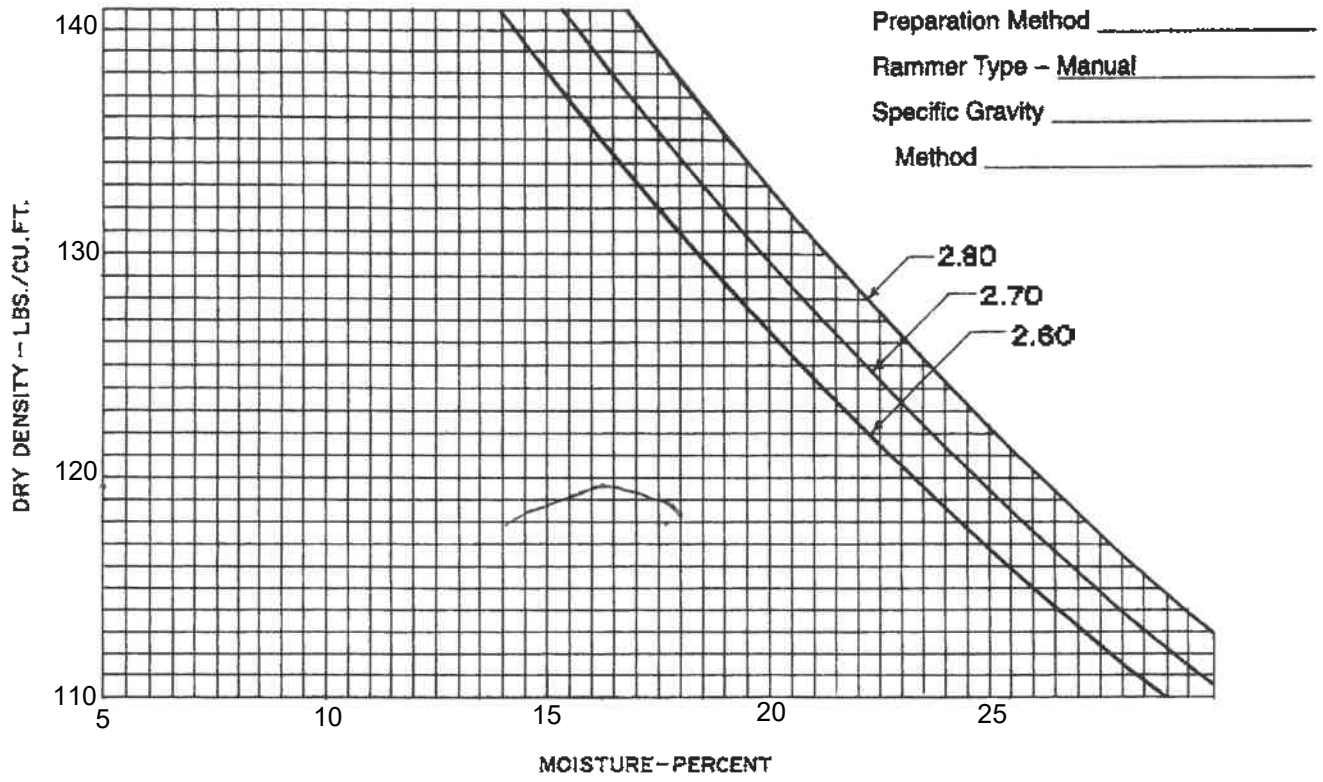
Date April 23, 2018

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO # 258194

SOIL PROCTOR TEST

Maximum Dry Density — 119.5 pcf
Optimum Moisture Content — 16.3%
Soil Description — Brownish-Tan Sandy Clay (North Road West Basin-Sample 2)



ASTM D - 1557 , Method – A

Technician Matt Spires

Accredited By AASHTO Accreditation Program (AAP)

Phoenix #126739

460-Gradation & Proctor
488 1D Page 32 of 35

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T18-R34
Date Sampled April 20, 2018
Date of Test April 25, 2018
Date Issued April 26, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Brownish-Tan Sandy Clay (North Road West Basin-Sample 2)

Sieve No.	% Passing
4	100.0%
10	99.0%
20	92.8%
40	80.8%
60	69.0%
140	53.8%
200	51.0%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-8960
FAX (706) 737-0629

Report No. T18-R33

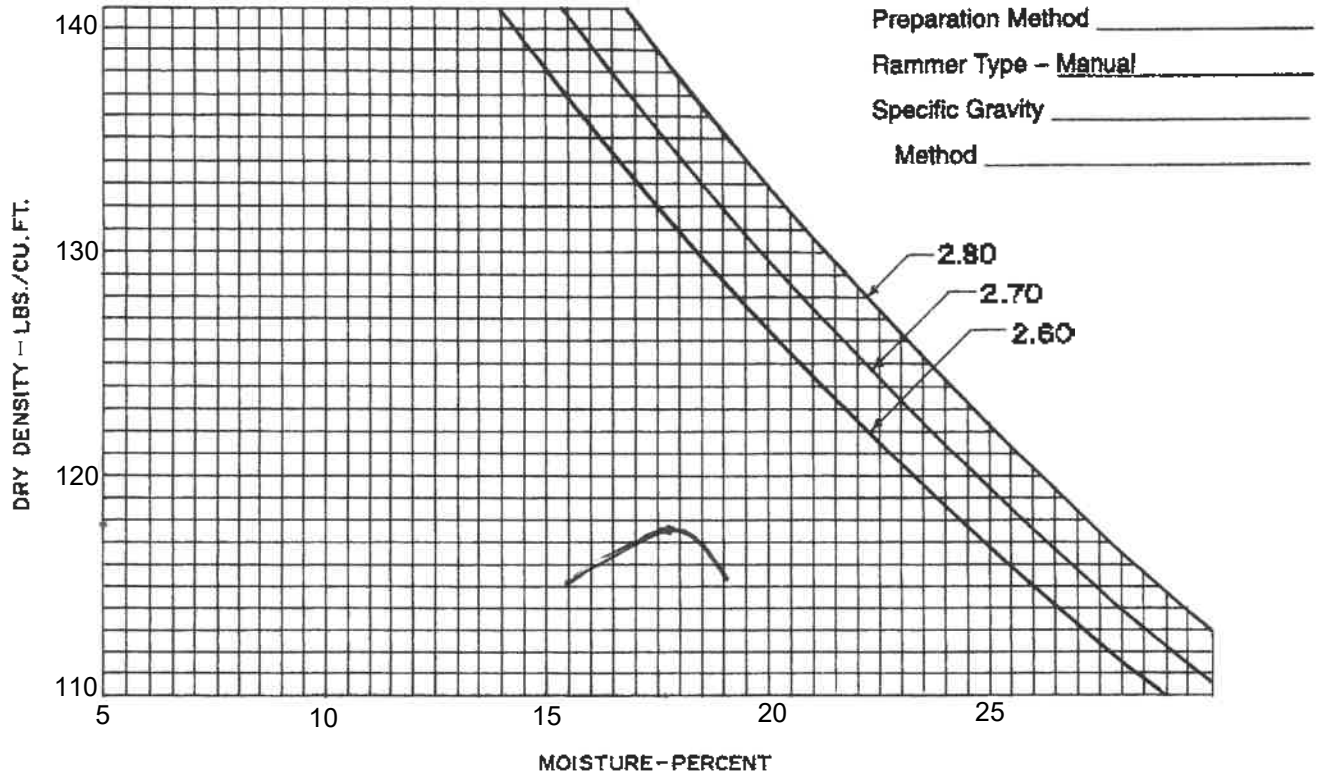
Date April 23, 2018

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin and 489-D CPRB Closure LOCATION: Savannah River Site, Aiken County, SC
SRNS PO # 258194

SOIL PROCTOR TEST

Maximum Dry Density — 117.7 pcf
Optimum Moisture Content — 17.6%
Soil Description — Dark Brownish-Tan Sandy Clay (North Road West Basin-Sample 3



ASTM D - 1557 , Method – A

Technician Matt Spires

Accredited By AASHTO Accreditation Program (AAP)

Phoenix #126739

460-Gradation & Proctor
488 1D Page 34 of 35

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T18-R32
Date Sampled April 20, 2018
Date of Test April 25, 2018
Date Issued April 26, 2018

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Dark Brownish-Tan Sandy Clay (North Road West Basin-Sample 3)

Sieve No.	% Passing
4	100.0%
10	99.3%
20	96.0%
40	88.8%
60	81.5%
140	69.5%
200	67.0%

1 cc: Envirocon, Inc.; Trip Winfree, Patrick Tinnes, William Livingston (via email)

APPENDIX O3

Other Area Wide Compaction Reports

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csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-E82		
Date Issued:	February 8, 2017		
Date & Time of Test:	February 7, 2017 (AM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Light Brown Silty Sand

Proctor Density-Optimum Moisture: 117.9 pcf / 8.9% (mod.)

Test No.	1	2	3					
Course Level	1st lift							
Area to Be	Fill							
Dry Density In-Place	115.3	114.6	113.4					
% Proctor Density	97.8	97.2	96.2					
Moisture Content	10.2	9.5	11.8					
% Compaction Required	95.0	95.0	95.0					
Conformance	✓	✓	✓					
Non Conformance								
Sand Cone								

Locations:
1. 200' from north end
2. 400' from north end
3. Center of open space

Serial No. of Troxler: 38248

Chris Lowry, Technician

James M. Pope, P.E., Reviewer

SRP DRAWING NO. N/A

MATCHLINE C-C (SEE DWG C-CG-D-00030 AND C-CG-D-00033)

488-4D ASH LANDFILL
(CLOSED)

TIE TO EXIST EDGE OF ROAD
N63780.00
E19246.63
EL=127.55

EOR (STA 0+00.00)
N63803.01
E19241.38
EL=127.00

EOR (STA 0+41.47)
N63840.09
E19259.95
EL=127.29

EOR (STA 0+89.81)
N63881.52
E19284.85
EL=127.33

EOR (STA 1+72.34)
N63951.13
E19329.19
EL=127.56

EOR (STA 2+33.71)
N64003.36
E19361.42
EL=128.00

EOR (STA 2+93.89)
N64055.45
E19391.56
EL=129.00

EOR (STA 3+26.37)
N64084.28
E19406.50
EL=130.00

EOR (STA 3+69.77)
N64123.59
E19424.89
EL=130.27

EOR (STA 4+44.14)
N64193.00
E19451.61
EL=129.34

EOR (STA 5+09.65)
N64255.04
E19472.65
EL=128.98

EOR (STA 5+48.30)
N64290.08
E19488.97
EL=128.42

EOR (STA 5+93.57)
N64329.80
E19510.67
EL=127.84

EOR (STA 6+42.09)
N64369.48
E19538.60
EL=127.14

EOR (STA 6+54.83)
N64387.94
E19543.77
EL=127.00

TIE TO EXIST R ROAD
N64398.49
E19554.97
EL=126.45

N63739.76
E19258.12
EL=124.00

N63777.76
E19251.10
EL=127.30

N63736.11
E19269.76
EL=121.00

N63704.20
E19323.28
EL=118.00

N63744.37
E19289.20
EL=114.00

N63793.88
E19259.17
EL=126.45

N63830.45
E19277.49
EL=126.74

N63782.33
E19294.02
EL=114.37

N63809.20
E19307.76
EL=114.51

N63870.99
E19301.86
EL=126.78

N63711.91
E19335.68
EL=113.13

N63849.50
E19331.10
EL=114.73

N63697.71
E19339.68
EL=113.39

N63793.92
E19377.41
EL=113.17

N63913.16
E19372.96
EL=114.54

N63940.48
E19346.12
EL=127.01

N63992.68
E19378.34
EL=127.45

N63967.92
E19409.01
EL=114.38

N64045.84
E19409.10
EL=128.45

N64075.44
E19424.44
EL=129.45

N64019.02
E19442.72
EL=114.17

N64115.59
E19443.27
EL=129.72

N63888.60
E19431.50
EL=113.23

N64054.43
E19464.77
EL=114.29

N63978.50
E19473.31
EL=113.19

N64079.41
E19475.60
EL=114.72

N64112.27
E19485.61
EL=116.00

N64146.14
E19490.87
EL=118.00

N64186.19
E19470.42
EL=128.78

N64211.69
E19506.28
EL=120.00

N64247.58
E19491.24
EL=128.43

N64281.05
E19506.83
EL=127.81

N64238.77
E19511.26
EL=121.13

N64287.14
E19523.94
EL=123.66

N64299.00
E19523.10
EL=125.67

N64319.22
E19527.68
EL=127.29

N64238.07
E19566.14
EL=120.00

N64261.68
E19566.14
EL=121.00

N64074.80
E19546.10
EL=114.59

N64160.28
E19566.51
EL=117.46

N64191.47
E19565.90
EL=118.00

N64301.78
E19566.14
EL=125.00

N64346.68
E19566.14
EL=126.00

N64381.27
E19566.15
EL=126.13

N64364.86
E19557.05
EL=127.00

LIMITS OF DISTURBANCE (LOD) ALONG THIS SIDE MATCHES EXCAVATION LIMITS SHOWN ON C-CG-D-00069 EXCEPT WHERE NOTED

SEE NOTE 3

Test Location 1

Test Location 2

Test Location 3

REGRADE/SHAPE EXISTING ROAD PRIOR TO FINAL STABILIZATION SHOWN ON DRAWING C-CG-D-00072

RESTORE EXISTING ROAD TO ORIGINAL WIDTH AND HORIZONTAL ALIGNMENT

BEAVER DAM CREEK

PIPE BRIDGE

TRUE NORTH
PLANT NORTH
36° 27'

0 10 20 40 60
1" = 20'

NOTES

1. SEE DRAWING C-CG-D-00021 FOR GENERAL NOTES.
2. SEE DWG C-CG-D-00067 FOR ABANDONED MONITORING WELLS LOCATED WITHIN THE PROJECT AREA (NOT SHOWN ON THIS SHEET FOR CLARITY).
3. HORIZONTAL ALIGNMENT IS STATIONED ALONG THE WEST EDGE OF THE ACCESS ROAD. THE AREA BETWEEN THE EDGE OF ROAD AND THE LIMITS OF DISTURBANCE SHALL BE RESTORED TO EXISTING GRADE AS SHOWN. SEE DRAWING C-CG-D-00071 FOR CROSS SECTIONS AT STATIONING.

LEGEND

EXISTING	NEW	ITEM
		DIRT/GRAVEL ROAD
		TREE LINE
-115-	115	CONTOUR (MAJOR)
-114-	114	CONTOUR (MINOR)
		RIP RAP
		UNDERGROUND UTILITY
		CATCH BASIN
		MANHOLE
		FLARED END SECTION
CO		CLEAN OUT
	LOD	LIMITS OF DISTURBANCE
		SILT FENCE
		GRADE BREAK/CENTERLINE

ABBREVIATIONS

CO	CLEAN OUT
CPP	CORRUGATED POLYETHYLENE PIPE
EOR	EDGE OF ROAD
LOD	LIMITS OF DISTURBANCE
S	STORM
SSD	SUBSURFACE DRAIN
STA	STATION

PROJ.	Rev. No.	REVISION	INITIAL AND DATE PRP'D	LEAD ENG	CHK'D/VERIF'D	APRV'D	APRV'D	APRV'D
N/A	0	ISSUED FOR CONSTRUCTION	APPROVALS MAINTAINED IN DCR/EDMS					

THIS DRAWING HAS BEEN FURNISHED BY THE SAVANNAH RIVER SITE. THE INFORMATION AND KNOW HOW CONTAINED THEREON MAY NOT BE USED NOR THE DRAWING REPRODUCED WITHOUT WRITTEN PERMISSION OF THE PRIME CONTRACTOR. ALL REPRODUCTIONS IN WHOLE OR IN PART, INCLUDING VENDOR'S SHOP DRAWINGS SHALL BEAR OR REFER TO THIS STAMP.

REFERENCE DRAWINGS

C-CG-D-00021	VIC. MAP, GEN. NOTES & DOC. INDEX
C-CG-D-00030	488-1D FINAL GRADING PLAN (SH. 2/2)
C-CG-D-00033	488-1D E&SC PLAN PH. 2 (SH. 2/2)
C-CG-D-00067	EXIST. SITE PLAN 488-4D EAST
C-CG-D-00069	EXCAVATION GRADING PLAN 488-4D EAST
C-CG-D-00071	CROSS SECTIONS 488-4D EAST
C-CG-D-00072	E&SC PLAN PH. 3 488-4D EAST

REFERENCE STANDARDS

UNITED STATES DEPARTMENT OF ENERGY
SAVANNAH RIVER SITE

BLDG. NO.	SITE CLEARANCE NO.	DESIGN AREA NO.	DESIGN GROUP
488-4D/488-1D	SC-7243	D	DE

TITLE

D-AREA OPERABLE UNIT

488-1D ASH BASIN & 489-D CPRB CLOSURE

FINAL GRADING PLAN AREA EAST OF 488-4D E&SC PHASE 2 - CONSTRUCTION

SCALE	SRP DRAWING NO.	SHEET NO.	LATEST REVISION
1" = 20'	N/A	1 OF 1	0

C CG D 00070 — LATEST REVISION 0

The scale shown on this drawing is only applicable when plotted at 30" x 42" (Full drawing size)

Area: Slide Compaction
Test Region:
Filename: CCGD00070.dgn
Plot Date: 11/3/2015 Plot Time: 1:32:40 PM By: tk413

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
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Fax (706) 737-0629

Report No.:	T17-F94		
Date Issued:	February 16, 2017		
Date & Time of Test:	February 9, 2017 (2:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Light Brown Silty Sand

Proctor Density-Optimum Moisture: 117.9 pcf / 8.9% (mod.)

Test No.	1							
Course Level	2nd lift							
Area to Be	Fill							
Dry Density In-Place	110.5							
% Proctor Density	93.7							
Moisture Content	13.0							
% Compaction Required	95.0							
Conformance								
Non Conformance	✓							
Sand Cone								

Locations: 1. 400' from north end

Serial No. of Troxler: 38248

Chris Lowry, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

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Report No.:	T17-G32		
Date Issued:	February 21, 2017		
Date & Time of Test:	February 17, 2017 (3:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Light Brown Silty Sand

Proctor Density-Optimum Moisture: 117.9 pcf / 8.9% (mod.)

Test No.	1							
Course Level	2nd lift							
Area to Be	Fill							
Dry Density In-Place	112.4							
% Proctor Density	95.3							
Moisture Content	11.3							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: 1. 400' from north end (retest of test report T17-F94)

Serial No. of Troxler: 38248

Chris Lowry, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

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Report No.:	T17-G42		
Date Issued:	February 22, 2017		
Date & Time of Test:	February 21, 2017 (3:30 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Tan Sand

Proctor Density-Optimum Moisture: 120.7 pcf / 6.4% (mod.)

Test No.	1	2						
Course Level	3rd lift							
Area to Be	East area							
Dry Density In-Place	114.8	115.1						
% Proctor Density	95.1	95.3						
Moisture Content	8.4	5.3						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: 1. 30' east from high wall and 140' from north ramp
2. 7' from high wall

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer

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Report No.:	T17-G59		
Date Issued:	February 23, 2017		
Date & Time of Test:	February 22, 2017 (4:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Tan Sand

Proctor Density-Optimum Moisture: 120.7 pcf / 6.4% (mod.)

Test No.	1							
Course Level	Lift 4A							
Area to Be	Fill (east side)							
Dry Density In-Place	115.1							
% Proctor Density	95.3							
Moisture Content	6.1							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: 1. 125' north of south ramp and 35' east of high wall

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

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Report No.: T17-H36
Date Issued: February 28, 2017
Date & Time of Test: February 23, 2017 (PM)

Client: Envirocon, Inc. **Address:** Missoula, Montana
Project Title: 488-1D Ash Basin & 489-D CPRB Closure **Location:** SRS, Aiken Co., South Carolina
Project No.: C-SPP-D-00002 **SRNS PO#:** 258194
Weather: Sunny and Mild **Activity:** Compaction

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Light Brown Silty Sand

Proctor Density-Optimum Moisture: 117.9 pcf / 8.9% (mod.)

Test No.	1	2						
Course Level	4th lift	5th lift						
Area to Be	Fill							
Dry Density In-Place	114.1	112.6						
% Proctor Density	96.8	95.5						
Moisture Content	8.3	8.0						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: 1. Center of lift 4B
2. 150' from south ramp

Serial No. of Troxler: 38248

Chris Lowry Technician

James M. Pope, P.E., Reviewer

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Report No.:	T17-H35		
Date Issued:	February 28, 2017		
Date & Time of Test:	February 24, 2017 (AM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Light Brown Silty Sand

Proctor Density-Optimum Moisture: 117.9 pcf / 8.9% (mod.)

Test No.	1	2						
Course Level	5th lift 5B	6th lift 6A						
Area to Be	Fill							
Dry Density In-Place	112.5	113.4						
% Proctor Density	95.4	96.2						
Moisture Content	8.5	8.3						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: 1. Center of lift 5B 5B failed due to mositure issue
2. 100' from south ramp

Serial No. of Troxler: 38248

Chris Lowry Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

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Report No.:	T17-H58		
Date Issued:	February 28, 2017		
Date & Time of Test:	February 24, 2017 (PM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Light Brown Silty Sand

Proctor Density-Optimum Moisture: 117.9 pcf / 8.9% (mod.)

Test No.	5B 1	7A 2						
Course Level	5th lift	7th lift						
Area to Be	Fill							
Dry Density In-Place	114.1	114.8						
% Proctor Density	96.8	97.4						
Moisture Content	8.2	7.8						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: 1. Center of lift 5B
2. 175' from south ramp

Serial No. of Troxler: 38248

Chris Lowry, Technician

James M. Pope, P.E., Reviewer

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Report No.:	T17-H17
Date Issued:	February 28, 2017
Date & Time of Test:	February 27, 2017 (AM)

Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Tan Clayey Sand

Proctor Density-Optimum Moisture: 127.1 pcf / 8.7% (mod.)

Test No.	1	2						
Course Level	Lift 6B	Lift 7B						
Area to Be	East area							
Dry Density In-Place	122.8	123.1						
% Proctor Density	96.6	96.8						
Moisture Content	7.7	8.5						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: 1 100' south of north ramp and 30' east of high wall
2. 25' east of high wall and 165' south of north ramp

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

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Report No.:	T17-H48		
Date Issued:	February 28, 2017		
Date & Time of Test:	February 27, 2017 (PM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Tan Clayey Sand

Proctor Density-Optimum Moisture: 127.1 pcf / 8.7% (mod.)

Test No.	1							
Course Level	Lift 8							
Area to Be	East area							
Dry Density In-Place	124.6							
% Proctor Density	98.0							
Moisture Content	8.7							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: 1. 300' north of south ramp and 12' east of high wall

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

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Report No.:	T17-H27		
Date Issued:	February 28, 2017		
Date & Time of Test:	February 28, 2017 (AM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Tan Clayey Sand

Proctor Density-Optimum Moisture: 127.1 pcf / 8.7% (mod.)

Test No.	1	2						
Course Level	Lift 9A	Lift 9B						
Area to Be	East area							
Dry Density In-Place	121.3	125.3						
% Proctor Density	95.4	98.5						
Moisture Content	6.7	9.2						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations:
1. 90' north of south ramp and 7' east of high wall
2. Center of fill 10' east of high wall, 375' south of north ramp

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

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Report No.:	T17-H47		
Date Issued:	February 28, 2017		
Date & Time of Test:	February 28, 2017 (PM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Tan Clayey Sand

Proctor Density-Optimum Moisture: 127.1 pcf / 8.7% (mod.)

Test No.	1	2						
Course Level	Lift 10A	Lift 10B						
Area to Be	East area							
Dry Density In-Place	126.8	125.1						
% Proctor Density	99.7	98.4						
Moisture Content	7.0	8.1						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations:
1. 5' east of high wall and 75' north of south ramp
2. 5' east of high wall and 70' south of north ramp

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

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Report No.:	T17-H96		
Date Issued:	March 3, 2017		
Date & Time of Test:	March 1, 2017 (PM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Tan Sand

Proctor Density-Optimum Moisture: 120.7 pcf / 6.4% (mod.)

Test No.	1	2	3	4				
Course Level	Lift 11A	Lift 11B	Lift 12A	Lift 12B				
Area to Be	Fill							
Dry Density In-Place	117.6	115.6	117.3	118.4				
% Proctor Density	97.4	95.8	97.2	98.1				
Moisture Content	7.8	7.5	7.8	7.3				
% Compaction Required	95.0	95.0	95.0	95.0				
Conformance	✓	✓	✓	✓				
Non Conformance								
Sand Cone								

Locations:
1. 100' north from south ramp
2. 150' south from north ramp
3. 96' north from south ramp
4. 275' south from north ramp

Serial No. of Troxler: 38248

Chris Lowry, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

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Report No.:	T17-H76		
Date Issued:	March 3, 2017		
Date & Time of Test:	March 2, 2017 (PM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Tan Clayey Sand

Proctor Density-Optimum Moisture: 127.1 pcf / 8.7% (mod.)

Test No.	1	2						
Course Level	Lift 13A	Lift 13B						
Area to Be	East area							
Dry Density In-Place	126.3	126.4						
% Proctor Density	99.3	99.4						
Moisture Content	8.3	8.9						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations:
1. 50' north of south ramp and 6' east of high wall (final course 120' north of south ramp)
2. Center of fill and 12' east of high wall

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

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Report No.:	T17-J46		
Date Issued:	March 7, 2017		
Date & Time of Test:	March 6, 2017 (AM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Tan Clayey Sand

Proctor Density-Optimum Moisture: 127.1 pcf / 8.7% (mod.)

Test No.	1							
Course Level	Lift 14A							
Area to Be	East area							
Dry Density In-Place	125.8							
% Proctor Density	98.9							
Moisture Content	8.4							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: 1. 165' from south ramp and 8' from high wall

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
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Report No.:	T17-J47		
Date Issued:	March 7, 2017		
Date & Time of Test:	March 6, 2017 (PM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Tan Clayey Sand

Proctor Density-Optimum Moisture: 127.1 pcf / 8.7% (mod.)

Test No.	1							
Course Level	Lift 14B							
Area to Be	East area							
Dry Density In-Place	124.0							
% Proctor Density	99.3							
Moisture Content	12.5							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: 1. 65' from north ramp and 12' from high wall

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
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Report No.:	T17-J84		
Date Issued:	March 9, 2017		
Date & Time of Test:	March 7, 2017 (AM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand

Proctor Density-Optimum Moisture: 115.1 pcf / 14.9% (mod.)

Test No.	1							
Course Level	Lift 15							
Area to Be	East area							
Dry Density In-Place	108.0							
% Proctor Density	93.8							
Moisture Content	18.9							
% Compaction Required	95.0							
Conformance								
Non Conformance	✓							
Sand Cone								

Locations: 1. 100' from north ramp

Serial No. of Troxler: 38248

Chris Lowry, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

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Augusta, Georgia 30904
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Report No.:	T17-J85		
Date Issued:	March 9, 2017		
Date & Time of Test:	March 7, 2017 (PM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand

Proctor Density-Optimum Moisture: 115.1 pcf / 14.9% (mod.)

Test No.	1							
Course Level	Lift 15							
Area to Be	East area							
Dry Density In-Place	109.1							
% Proctor Density	94.8							
Moisture Content	18.5							
% Compaction Required	95.0							
Conformance								
Non Conformance	✓							
Sand Cone								

Locations: 1. 125' from north ramp (retest from AM)

Serial No. of Troxler: 38248

Chris Lowry, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

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Augusta, Georgia 30904
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Report No.:	T17-J86		
Date Issued:	March 9, 2017		
Date & Time of Test:	March 8, 2017 (AM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand

Proctor Density-Optimum Moisture: 115.1 pcf / 14.9% (mod.)

Test No.	1							
Course Level	Lift 15							
Area to Be	East area							
Dry Density In-Place	113.5							
% Proctor Density	95.3							
Moisture Content	8.9							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: 1. 125' from north ramp (retest from 3-7-2017)

Serial No. of Troxler: 38248

Chris Lowry, Technician

James M. Pope, P.E. / Reviewer

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-K12		
Date Issued:	March 10, 2017		
Date & Time of Test:	March 9, 2017 (AM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Slightly Silty Sand

Proctor Density-Optimum Moisture: 119.1 pcf / 7.6% (mod.)

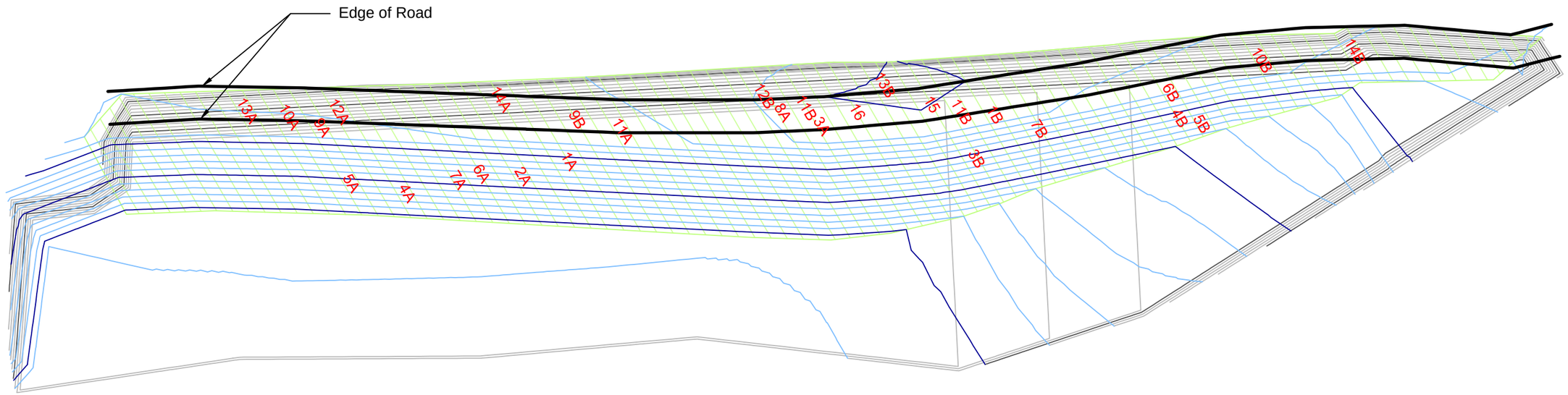
Test No.	1							
Course Level	Lift 16							
Area to Be	East area							
Dry Density In-Place	117.7							
% Proctor Density	98.8							
Moisture Content	6.6							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: 1. Center of road at high point

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer



LEGEND:

- As-Built Bottom of Excavation Contour Major (5')
- As-Built Bottom of Excavation Contour Minor (1')
- Design Finish Grade Contour Major (5')
- Design Finish Grade Contour Minor (1')
- # Compaction Test Location
- Embankment / Road Fill Area

0 50' 100'

SCALE IN FEET

NOTES:

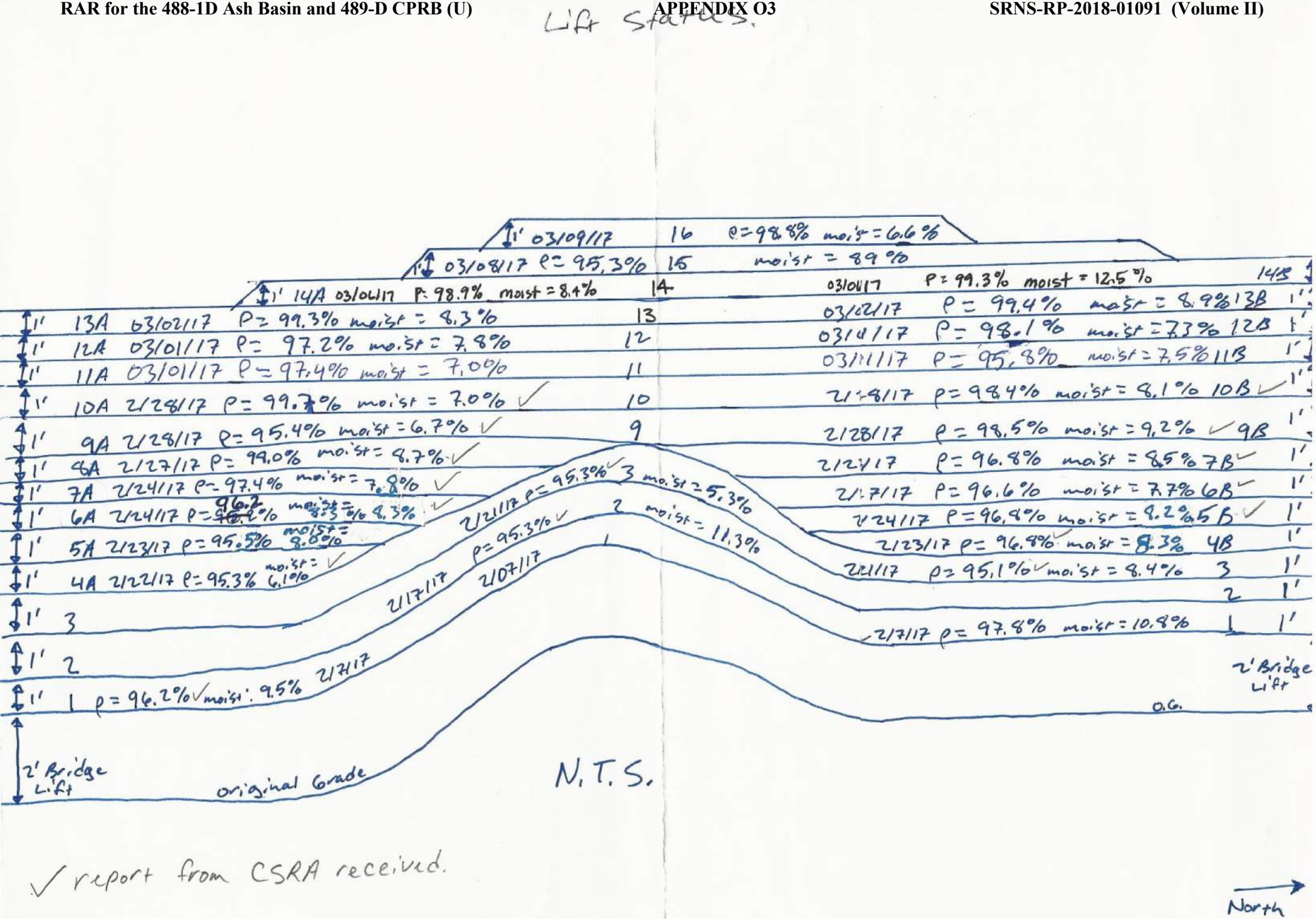
1) Locations are approximate.
2) Please see report for results of the tests.

Prepared By:
Envirocon
7878 Wadsworth Blvd
Suite 340
Arvada, CO 80003

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Nicanor Aguilar, Steve Hoover

Figure #: 1	Compaction Test Locations 488-4D East Area Backfill Placement
Date: 03/14/2017	
Revision #: 0	
Drawn By: GGE	
Approved By: EI	488-1D Ash Basin Closure
Project #: 1495402	

E:\GGE\PROJECT DATA\ENVIROCON\SRNS POND 1D\PE FILES\488-1D TESTING\COMPACTION\488-4D EA\488-4D EAST AREA COMPACTION LOCATIONS.DWG



✓ report from CSRA received.

*O.G. Center floor vertical is Exaggerated (Not to Scale) to depict proper Lifts placed

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Report No.:	T18-Y61
Date Issued:	June 20, 2018
Date & Time of Test:	June 19, 2018 (9:00 am - 12:00 pm)

Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Hot	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (S Berm 1)/*Tan Slightly Clayey Sand (TC-20-7)

Proctor Density-Optimum Moisture: 123.0 pcf / 11.1% (mod.)/*117.8 / 6.4% (mod.)

Test No.	1	2	3	4	*5	*6		
Course Level	Lift 1	Lift 2	Lift 3	Lift 4	Final lift			
Area to Be	Access roadway							
Dry Density In-Place	118.2	119.7	120.2	118.4	112.9	113.2		
% Proctor Density	96.1	97.3	97.7	96.3	95.8	96.1		
Moisture Content	9.8	10.1	12.4	10.2	4.8	5.1		
% Compaction Required	95.0	95.0	95.0	95.0	95.0	95.0		
Conformance	✓	✓	✓	✓	✓	✓		
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer

488-1D East Road Compaction Test Locations

T18-Y6
6/19/14

Test 1 Lift 1

123.0 @ 11.1%
S. Berm "I" Proctor
Redish brown Clayey Sand

e: 96.1% M: 9.8%

Test 2 Lift 2

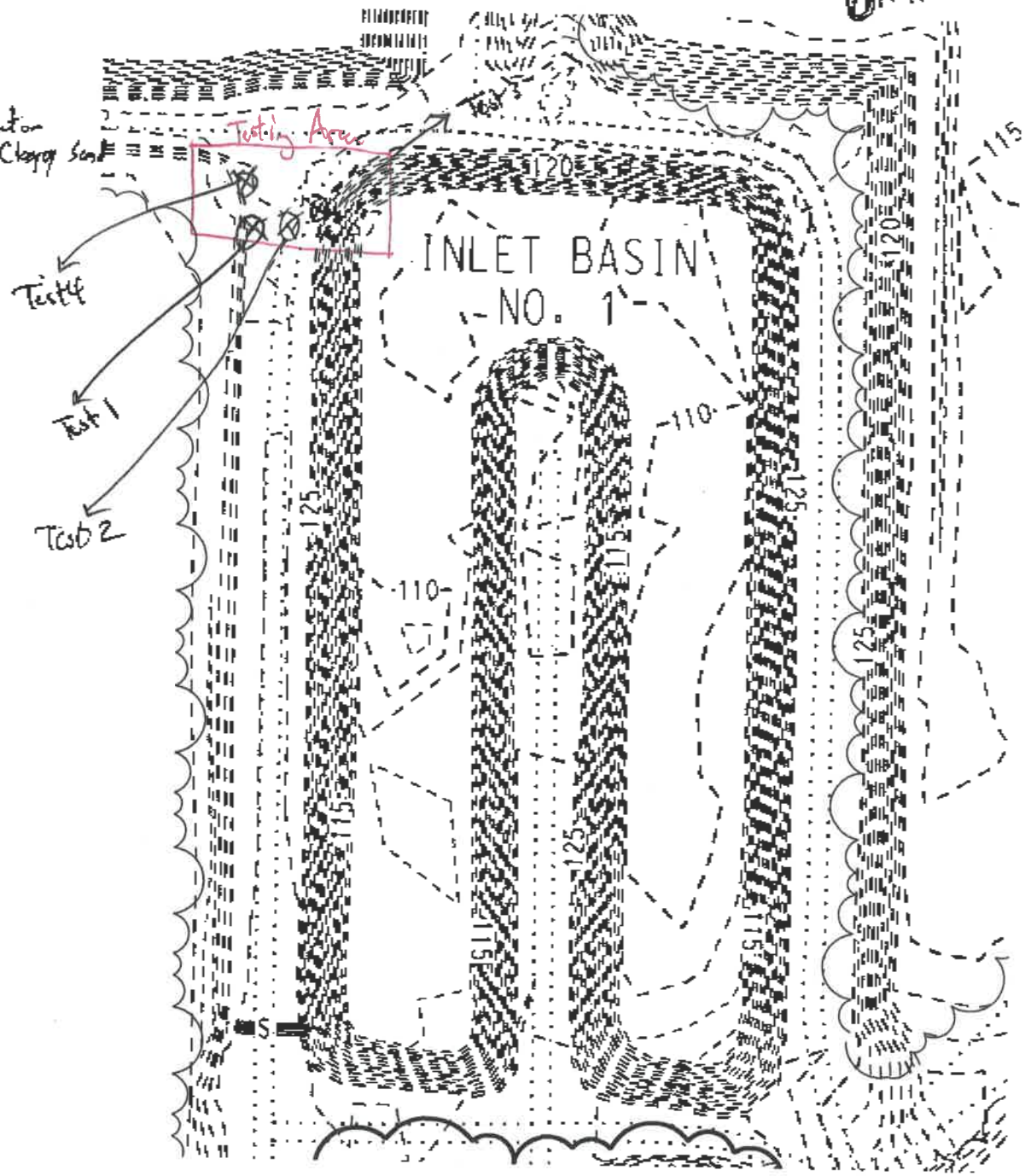
e: 97.5% M: 10.1%

Test 3 Lift 3

e: 97.7% M: 12.4%

Test 4 Lift 4

e: 96.3% M: 10.2%



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Report No.:	T18-W60
Date Issued:	August 21, 2018
Date & Time of Test:	August 17, 2018 (10:00 am/3:00 pm)

Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Warm	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Silty Clayey Sand (SIB #1 Stockpile)

Proctor Density-Optimum Moisture: 116.7 pcf / 12.4% (mod.)

Test No.	1	2	3					
Course Level	Lift 1		Lift 2					
Area to Be	NIB Roadway							
Dry Density In-Place	113.9	113.1	113.4					
% Proctor Density	97.6	96.9	97.2					
Moisture Content	11.6	10.9	11.6					
% Compaction Required	95.0	95.0	95.0					
Conformance	✓	✓	✓					
Non Conformance								
Sand Cone								

Locations: Please see attached map.

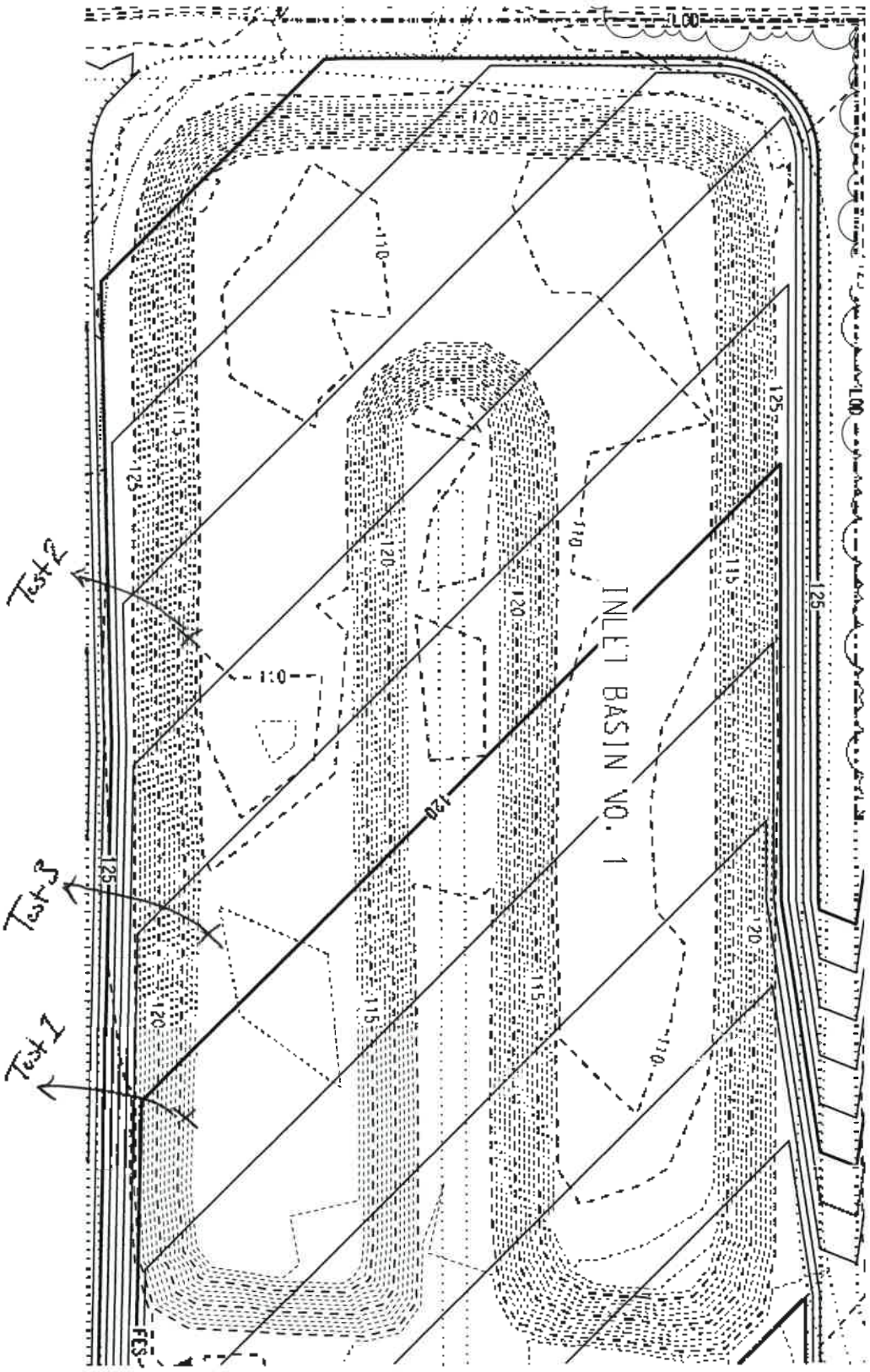
Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

North Inlet Basin Compaction Test Locations

8/17/18
T18-WG0



Lift 1 Test 1

ρ: 97.6% M: 11.6%

Lift 1 Test 2

ρ: 96.9% M: 10.9%

Lift 2 Test 3

ρ: 97.2% M: 11.6%

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Report No.:	T18-W62		
Date Issued:	August 21, 2018		
Date & Time of Test:	August 20, 2018 (10:00 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Overcast and Warm	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Brownish-Tan Silty Clayey Sand (SIB #1 Stockpile)

Proctor Density-Optimum Moisture: 116.7 pcf / 12.4% (mod.)

Test No.	1							
Course Level	Lift 3							
Area to Be	NIB Roadway							
Dry Density In-Place	114.6							
% Proctor Density	98.2							
Moisture Content	10.4							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

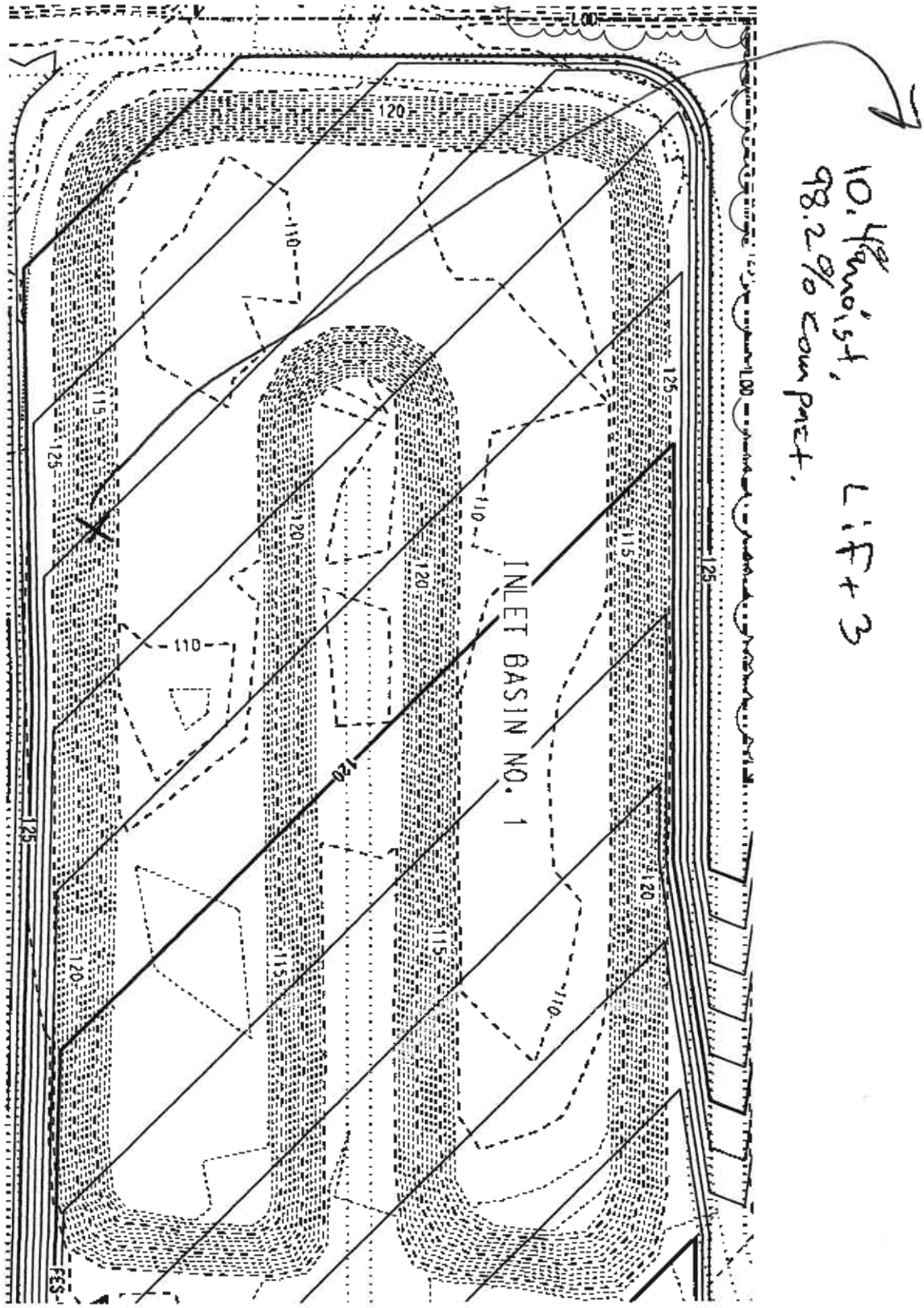
Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

North Inlet Basin Compaction Test Locations



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Report No.:	T18-X11
Date Issued:	August 23, 2018
Date & Time of Test:	August 22, 2018 (9:45 am)

Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Warm	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Silty Clayey Sand (SIB #1 Stockpile)

Proctor Density-Optimum Moisture: 116.7 pcf / 12.4% (mod.)

Test No.	1							
Course Level	Lift 4							
Area to Be	NIB Roadway							
Dry Density In-Place	114.3							
% Proctor Density	97.9							
Moisture Content	10.6							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

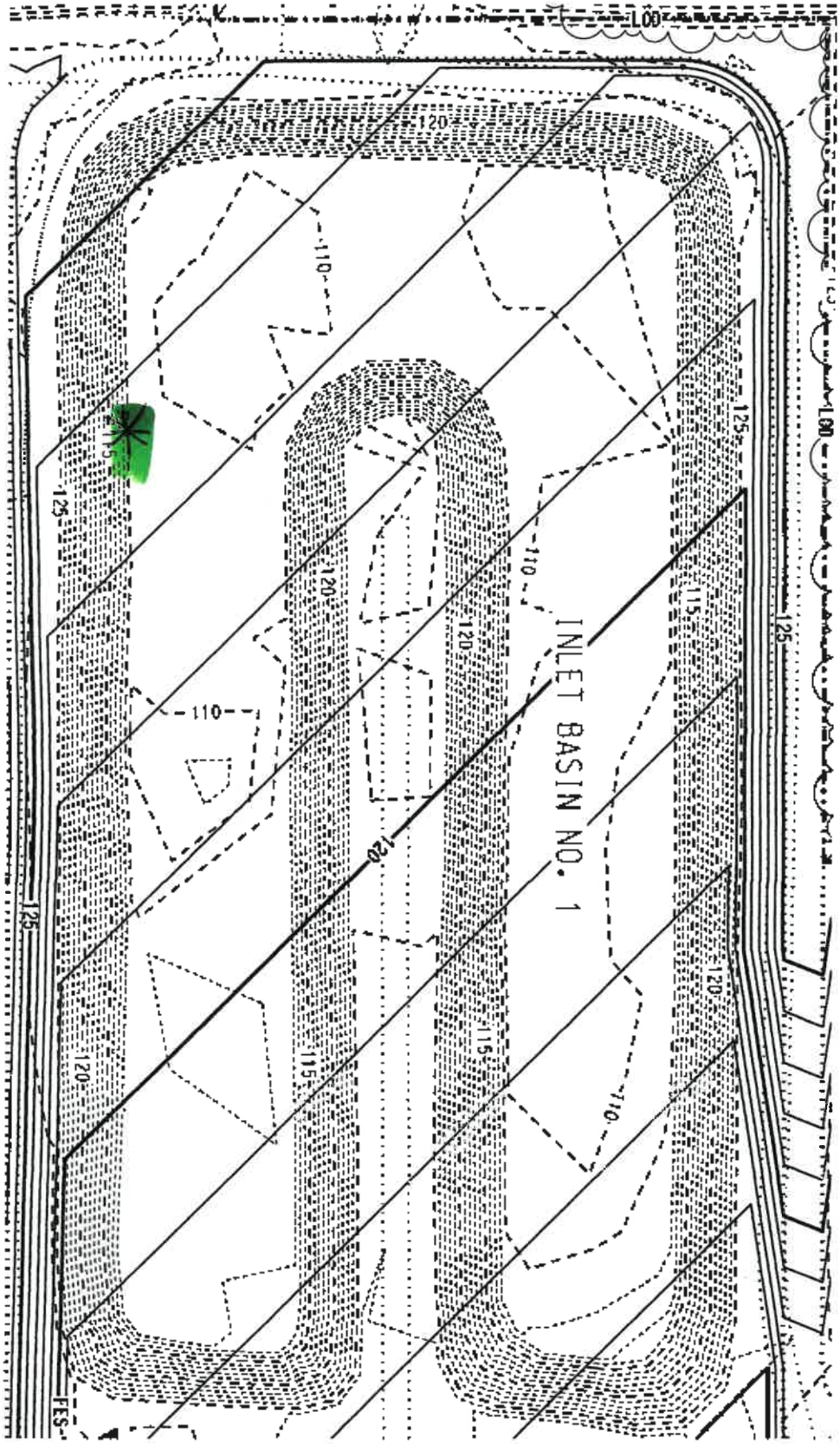
Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

North Inlet Basin Compaction Test Locations



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Report No.:	T18-X54		
Date Issued:	August 24, 2018		
Date & Time of Test:	August 23, 2018 (11:00 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Warm	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Brownish-Tan Slightly Silty Sand (TC-20-10)

Proctor Density-Optimum Moisture: 116.3 pcf / 7.5% (mod.)

Test No.	1							
Course Level	Lift 5							
Area to Be	NIB Roadway							
Dry Density In-Place	112.7							
% Proctor Density	96.6							
Moisture Content	10.9							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: Please see attached map.

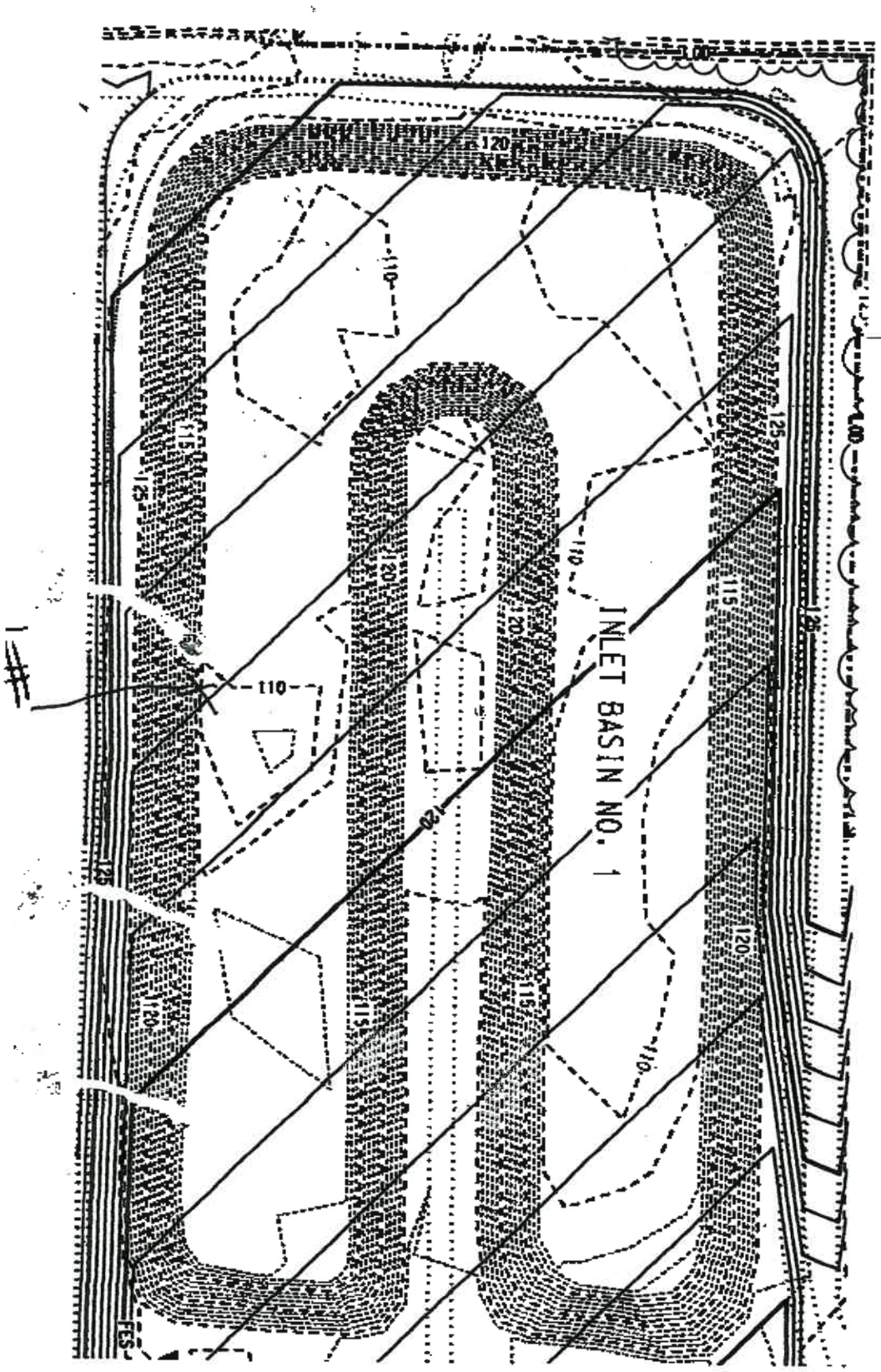
Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

North Inlet Basin Compaction Test Locations

T18-X54
8/23/18
#1 10.9% moisture 1ft+5
96.6% comp



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Report No.:	T18-W61		
Date Issued:	August 21, 2018		
Date & Time of Test:	August 17, 2018 (10:00 am/3:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Warm	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Silty Clayey Sand (SIB #1 Stockpile)

Proctor Density-Optimum Moisture: 116.7 pcf / 12.4% (mod.)

Test No.	1	2						
Course Level	Lift 1	Lift 2						
Area to Be	SIB Roadway							
Dry Density In-Place	113.2	115.1						
% Proctor Density	97.0	98.6						
Moisture Content	11.1	11.8						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

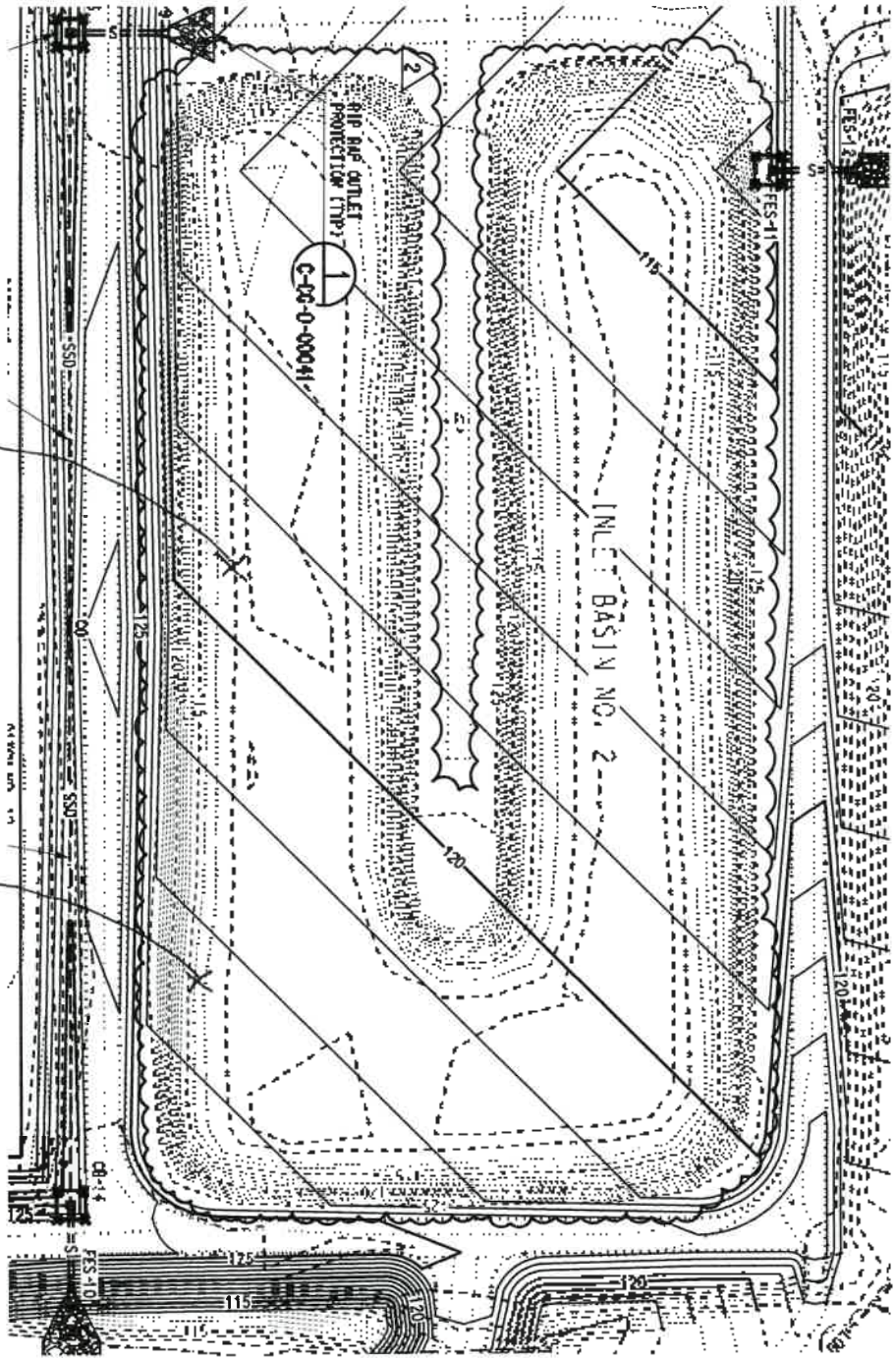
Chip Stewart, Technician

James M. Pope, P.E., Reviewer

T18-W61
8/17/18

South Inlet Basin Compaction Test Locations

N



Lift 1 Test 1
ρ: 97.0% M: 11.1%

Lift 2 Test 2
ρ: 98.6% M: 11.8%

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Report No.:	T18-W35
Date Issued:	August 20, 2018
Date & Time of Test:	August 20, 2018 (9:00 am)

Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Warm	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Silty Clayey Sand (SIB #1 Stockpile)

Proctor Density-Optimum Moisture: 116.7 pcf / 12.4% (mod.)

Test No.	1							
Course Level	Lift 3							
Area to Be	Roadway							
Dry Density In-Place	116.1							
% Proctor Density	99.5							
Moisture Content	11.7							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

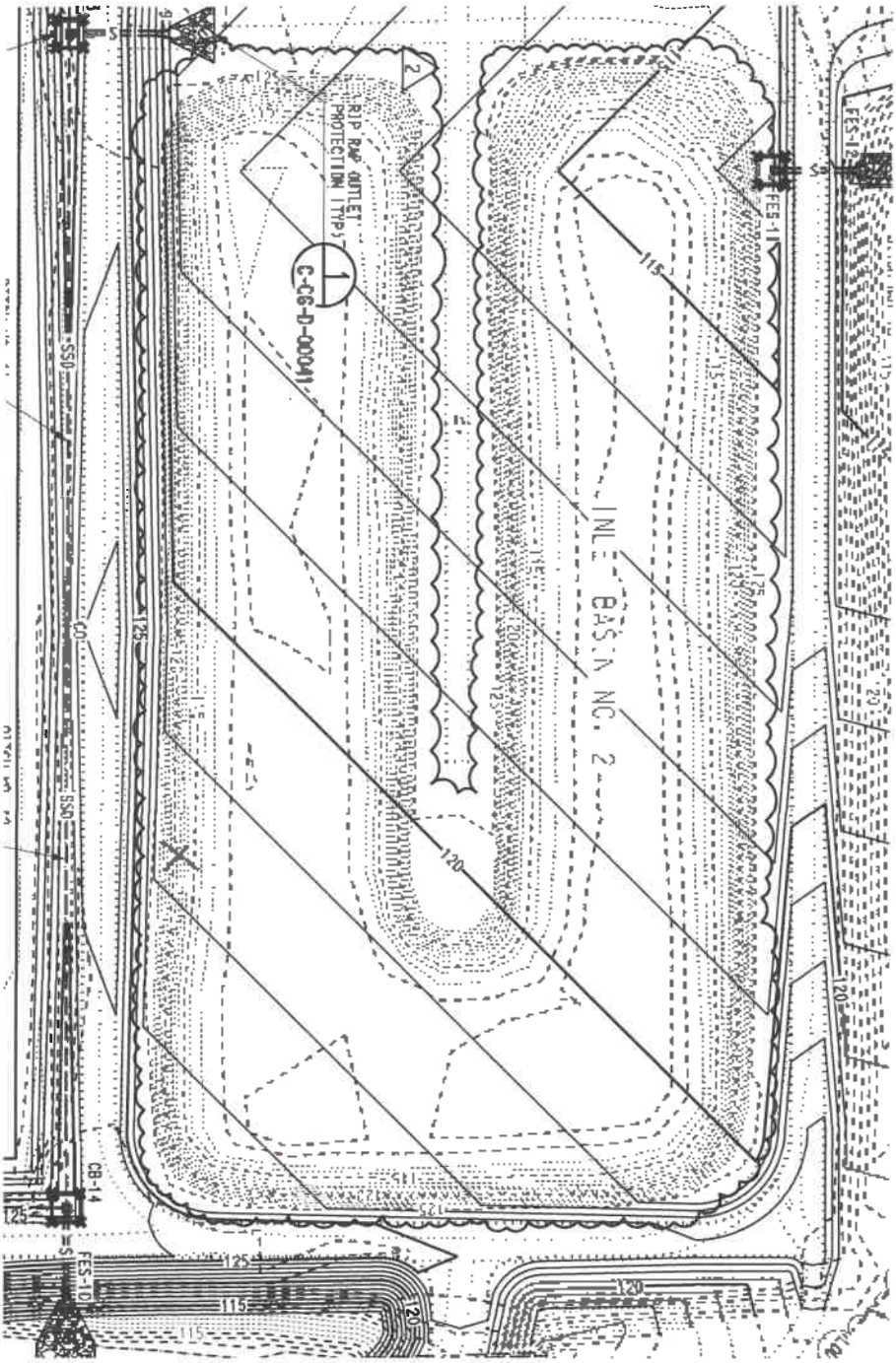
Branon Mitchell, Technician

James M. Pope, P.E. Reviewer

South Inlet Basin Compaction Test Locations

8/18/18

T18-W35



Lift 3 Test 1

ρ: 95.5% M: 11.7%

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Report No.:	T18-W63
Date Issued:	August 21, 2018
Date & Time of Test:	August 20, 2018 (10:00 am)

Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Overcast and Warm	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Silty Clayey Sand (SIB #1 Stockpile)

Proctor Density-Optimum Moisture: 116.7 pcf / 12.4% (mod.)

Test No.	1							
Course Level	Lift 4							
Area to Be	SIB Roadway							
Dry Density In-Place	115.3							
% Proctor Density	98.8							
Moisture Content	10.8							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

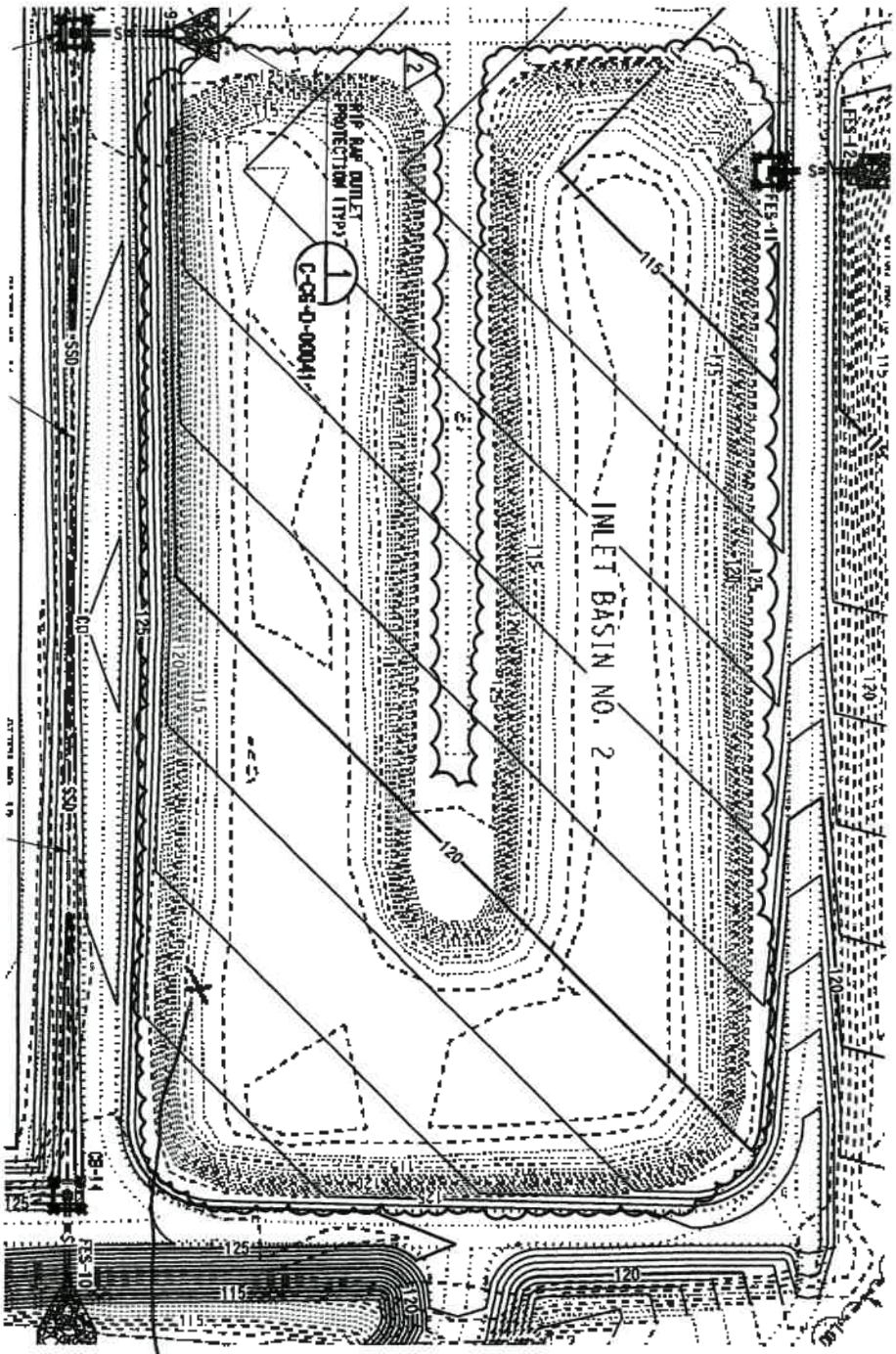
Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

South Inlet Basin Compaction Test Locations



N

Lift 4

10,8% moist

98,8%

8/20/18

T18-W63

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Report No.:	T18-X10		
Date Issued:	August 23, 2018		
Date & Time of Test:	August 22, 2018 (9:45 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Warm	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Silty Clayey Sand (SIB #1 Stockpile)

Proctor Density-Optimum Moisture: 116.7 pcf / 12.4% (mod.)

Test No.	1							
Course Level	Lift 5							
Area to Be	SIB Roadway							
Dry Density In-Place	116.0							
% Proctor Density	99.4							
Moisture Content	10.3							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

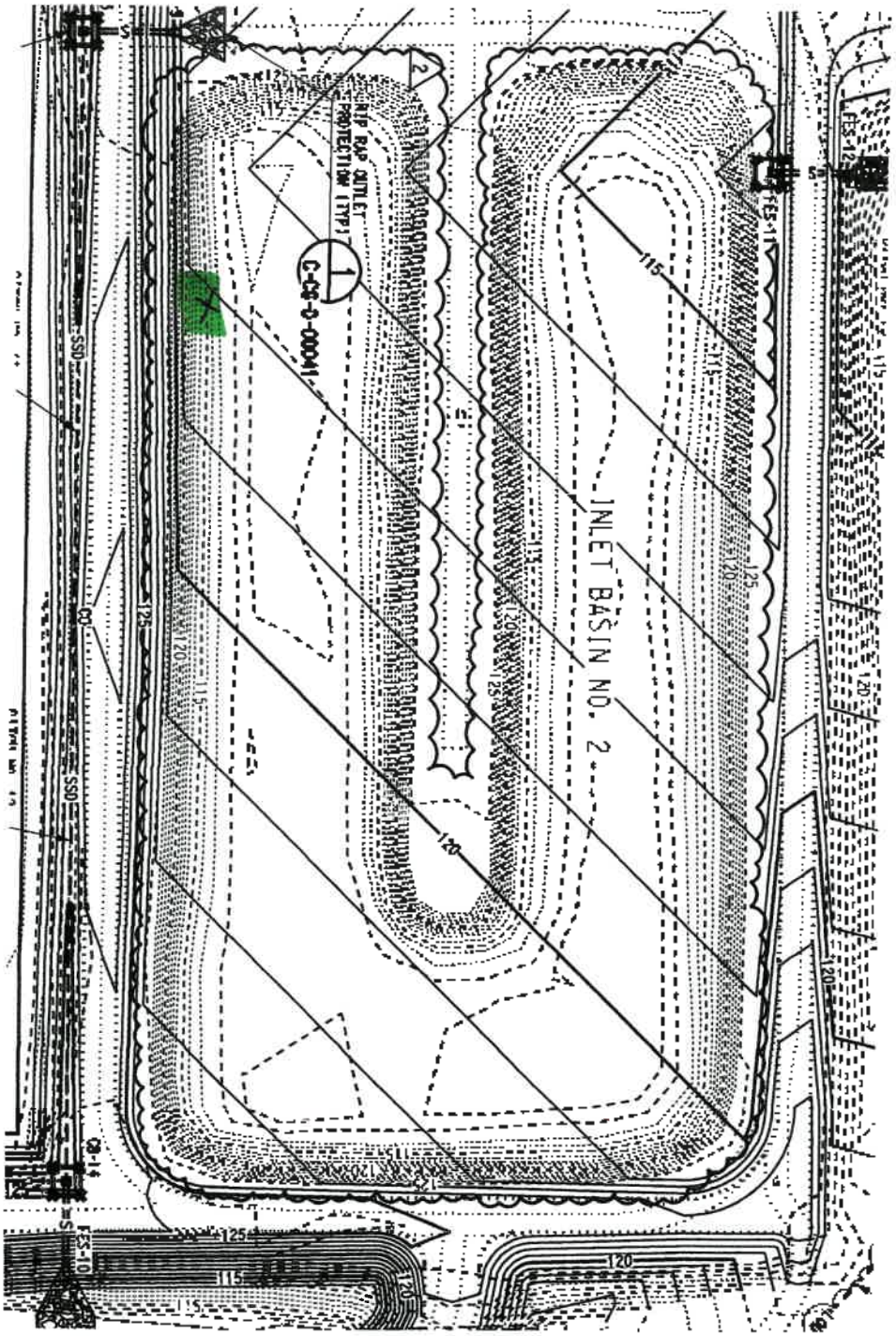
Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

South Inlet Basin Compaction Test Locations



Lift 5

10,3 % moist,
99.5
99,4% compaction

csra TESTING & ENGINEERING CO., INC.
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Report No.:	T18-X56		
Date Issued:	August 24, 2018		
Date & Time of Test:	August 23, 2018 (11:00 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Warm	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Silty Clayey Sand (SIB #1 Stockpile)

Proctor Density-Optimum Moisture: 116.7 pcf / 12.4% (mod.)

Test No.	1							
Course Level	Lift 6							
Area to Be	SIB Roadway							
Dry Density In-Place	114.8							
% Proctor Density	98.4							
Moisture Content	10.1							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: Please see attached map.

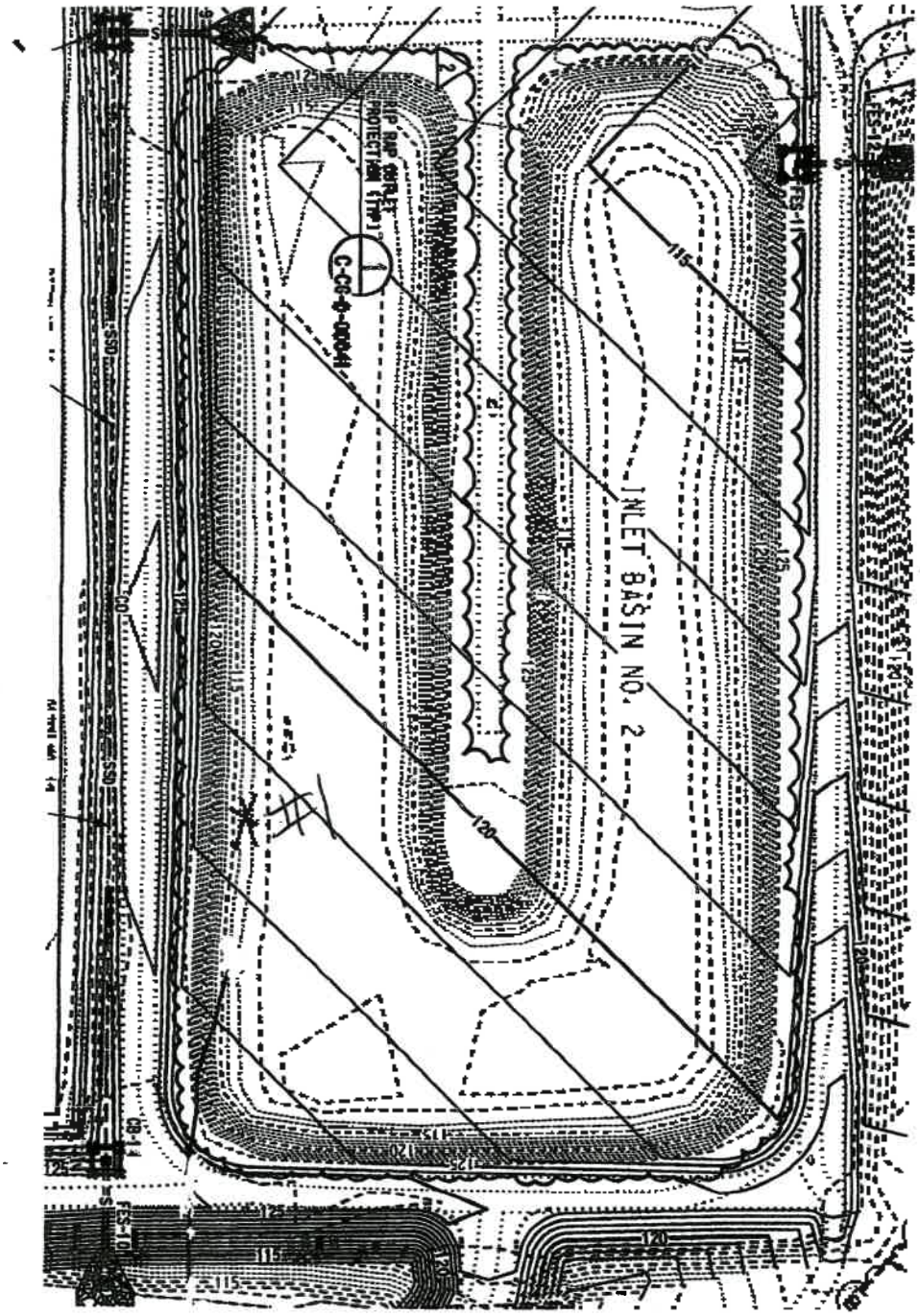
Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

T18-X56
8/23/18

South Inlet Basin Compaction Test Locations



#1 Lift 6
10.1% moist
98.4% comp.

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
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Report No.:	T18-Q92		
Date Issued:	April 20, 2018		
Date & Time of Test:	April 19, 2018 (11 am & 3:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1	2	3					
Course Level	Lift 1							
Area to Be	North road west basin							
Dry Density In-Place	116.9	125.4	124.3					
% Proctor Density	91.1	97.7	96.9					
Moisture Content	15.9	11.7	10.5					
% Compaction Required	95.0	95.0	95.0					
Conformance		✓	✓					
Non Conformance	✓							
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

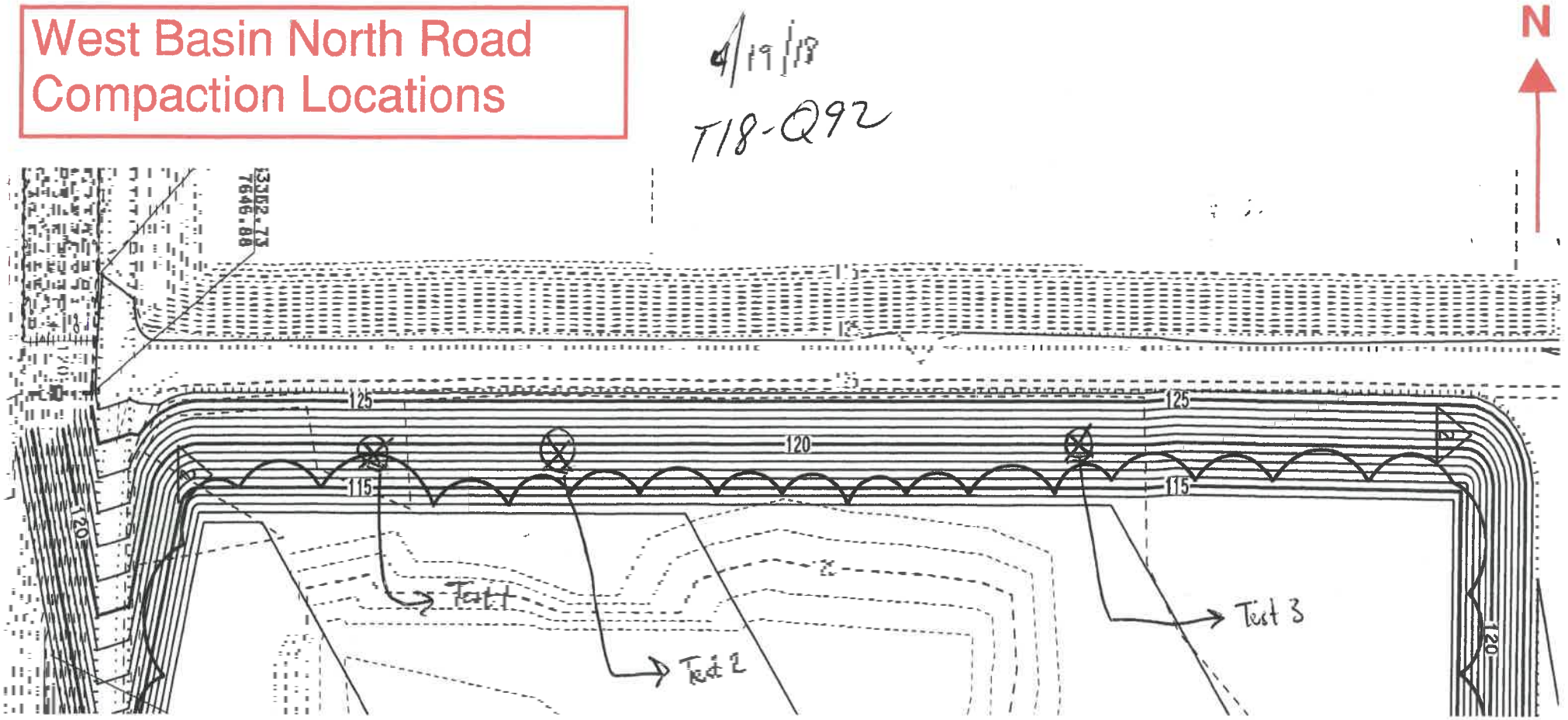
Chip Stewart, Technician

James M. Pope, P.E., Reviewer

West Basin North Road Compaction Locations

4/19/18

T18-Q92



Test 1 L1

ρ: [illegible]

M: [illegible]

Test 2 L1

ρ: 97.7%

M: 11.7%

Test 3 L1

ρ: 96.9%

M: 10.5%

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1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-S23		
Date Issued:	May 3, 2018		
Date & Time of Test:	May 2, 2018 (11:30 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Sandy Clay (North Road WB2)
*Dark Brownish-Tan Sandy Clay (North Road WB3)

Proctor Density-Optimum Moisture: 119.5 pcf / 16.3% (mod.)/*117.7 pcf / 17.6% (mod.)

Test No.	1	*2						
Course Level	Lift 2							
Area to Be	WB North Road							
Dry Density In-Place	118.2	117.1						
% Proctor Density	98.9	99.5						
Moisture Content	15.4	16.9						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

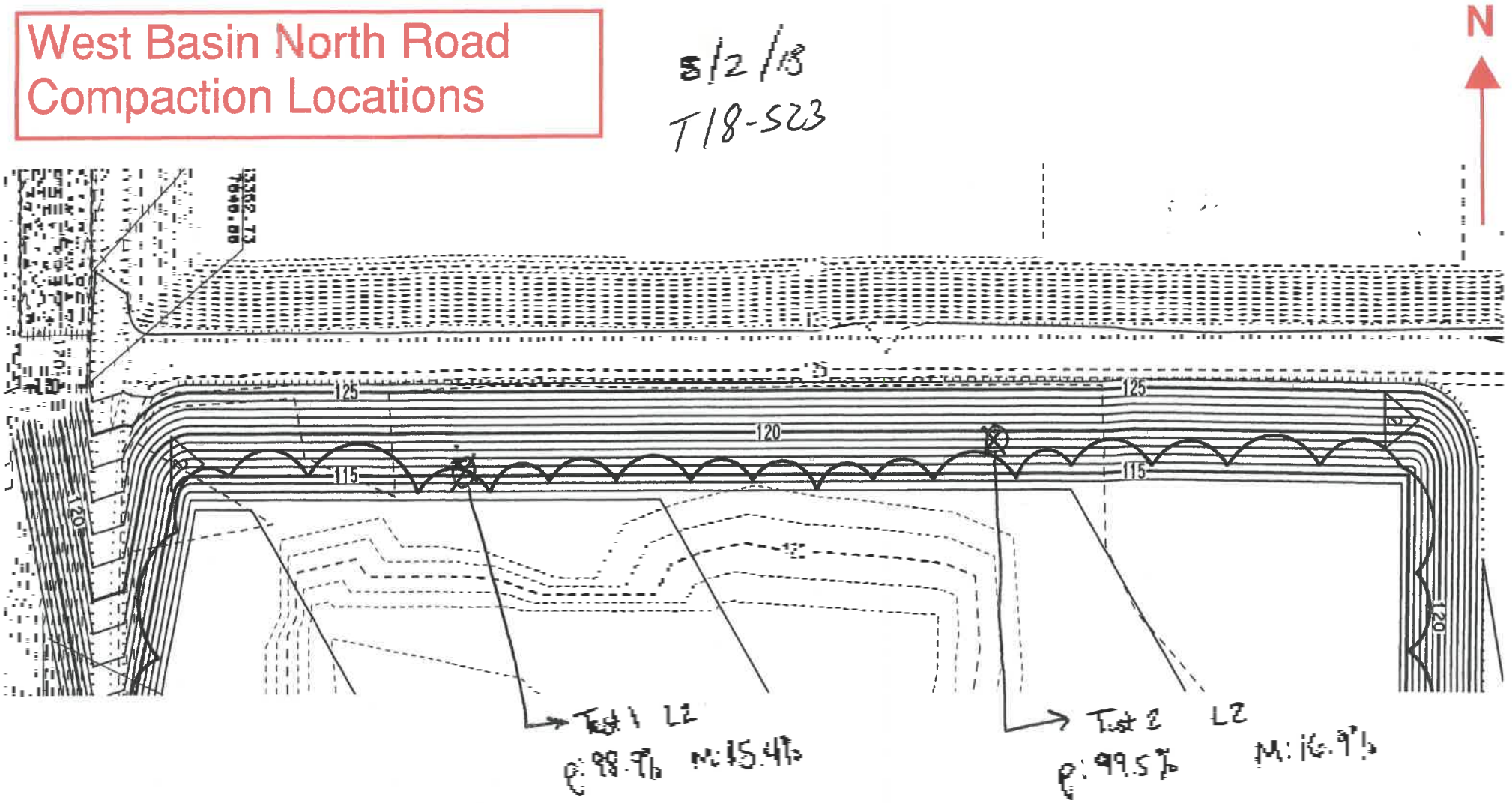
Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

West Basin North Road Compaction Locations

5/2/18
T18-523



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Report No.:	T18-U64		
Date Issued:	May 17, 2018		
Date & Time of Test:	May 16, 2018 (1:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Cloudy and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Slightly Silty Sand (TC-20-2)
*Dark Brownish-Tan Slightly Silty Sand (TC-20-4)
**Dark Brownish-Tan Sandy Clay (North Road West Basin #3)

Proctor Density-Optimum Moisture: 120.7 pcf / 5.3% (mod.)/*122.9 pcf / 6.4% (mod.)
**117.7 pcf / 17.6% (mod.)

Test No.	1	*2	**3					
Course Level	Lift 1		Lift 3					
Area to Be	20 in. cover		North Rd					
Dry Density In-Place	113.7	116.9	115.9					
% Proctor Density	94.2	95.1	98.5					
Moisture Content	6.2	6.1	15.8					
% Compaction Required	90.0	90.0	95.0					
Conformance	✓	✓	✓					
Non Conformance								
Sand Cone								

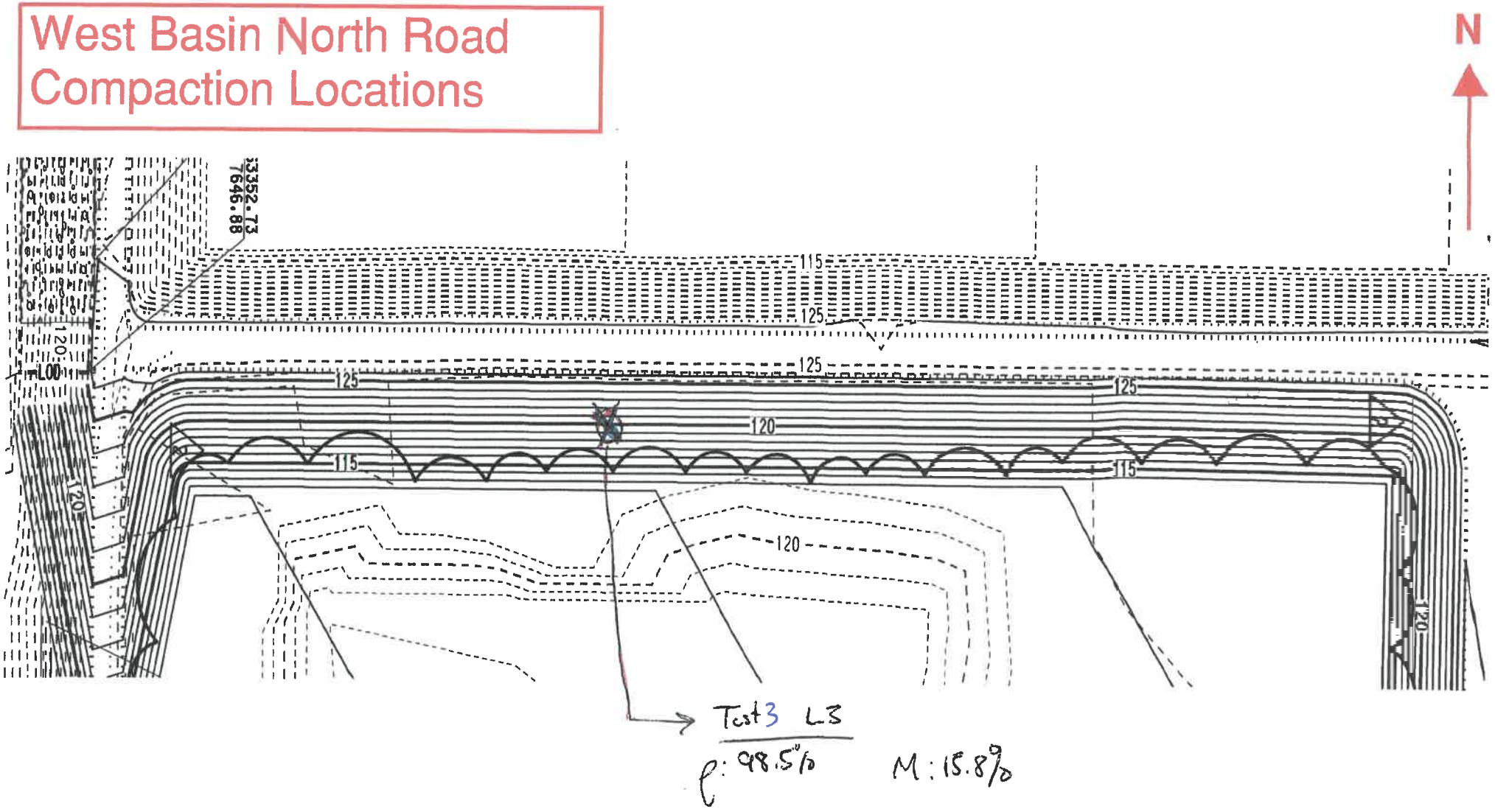
Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

West Basin North Road Compaction Locations



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Report No.:	T18-Y42		
Date Issued:	June 19, 2018		
Date & Time of Test:	June 15, 2018 (10:00 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Warm	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Sandy Clay (North Road West Basin 1)
*Dark Brownish-Tan Sandy Clay (North Road West Basin 3)

Proctor Density-Optimum Moisture: 109.3 pcf / 19.0% (mod.)/*117.7 pcf / 17.6% (mod.)

Test No.	1	*2						
Course Level	Lift 4							
Area to Be	West basin	North road						
Dry Density In-Place	107.3	116.2						
% Proctor Density	98.2	98.7						
Moisture Content	17.6	15.9						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

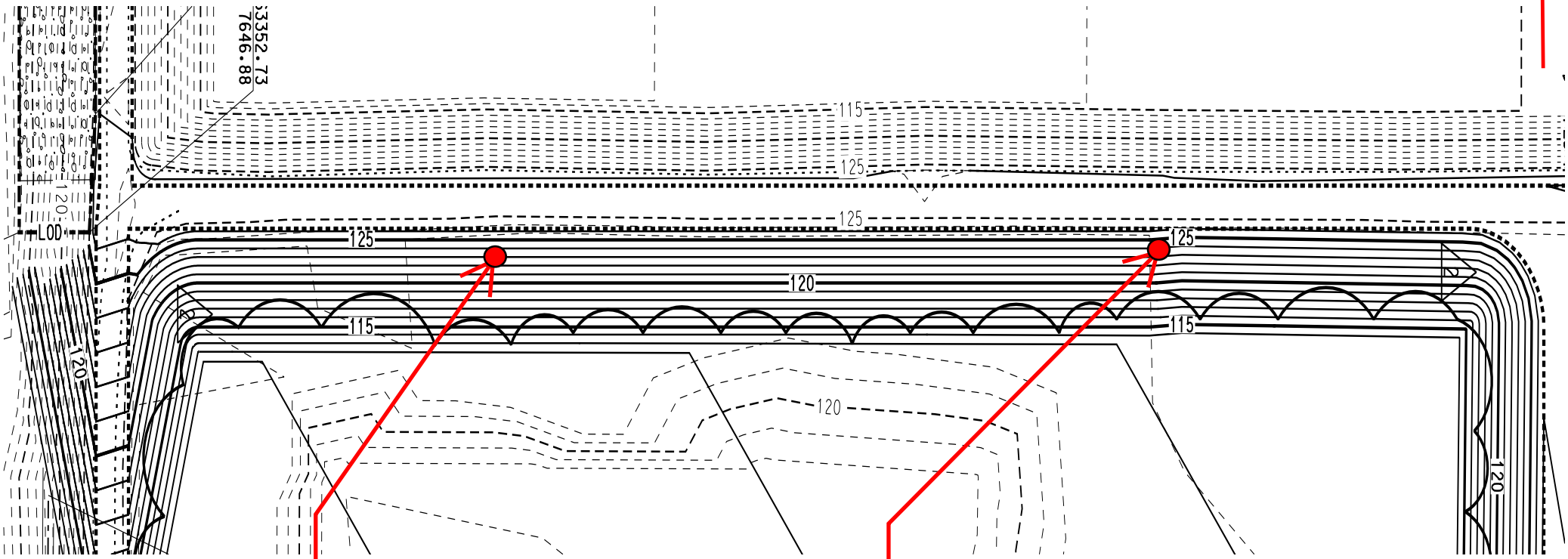
Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

West Basin North Road Compaction Locations

Date: 6/15/18



Test 1 Lift 4
ρ: 98.2% m: 17.6%
Passed

Test 2 Lift 4
ρ: 98.7% m: 15.9%
Passed

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Report No.:	T18-Z05		
Date Issued:	June 22, 2018		
Date & Time of Test:	June 22, 2018 (10:00 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Warm	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Dark Brownish-Tan Sandy Clay (North Road West Basin 3)
*Brownish-Tan Sandy Clay (North Road West Basin 2)

Proctor Density-Optimum Moisture: 117.7 pcf / 17.6% (mod.)/*119.5 pcf / 16.3% (mod.)

Test No.	*1	2						
Course Level	Lift 5							
Area to Be	West basin north road							
Dry Density In-Place	117.0	116.9						
% Proctor Density	97.9	99.3						
Moisture Content	14.4	16.2						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

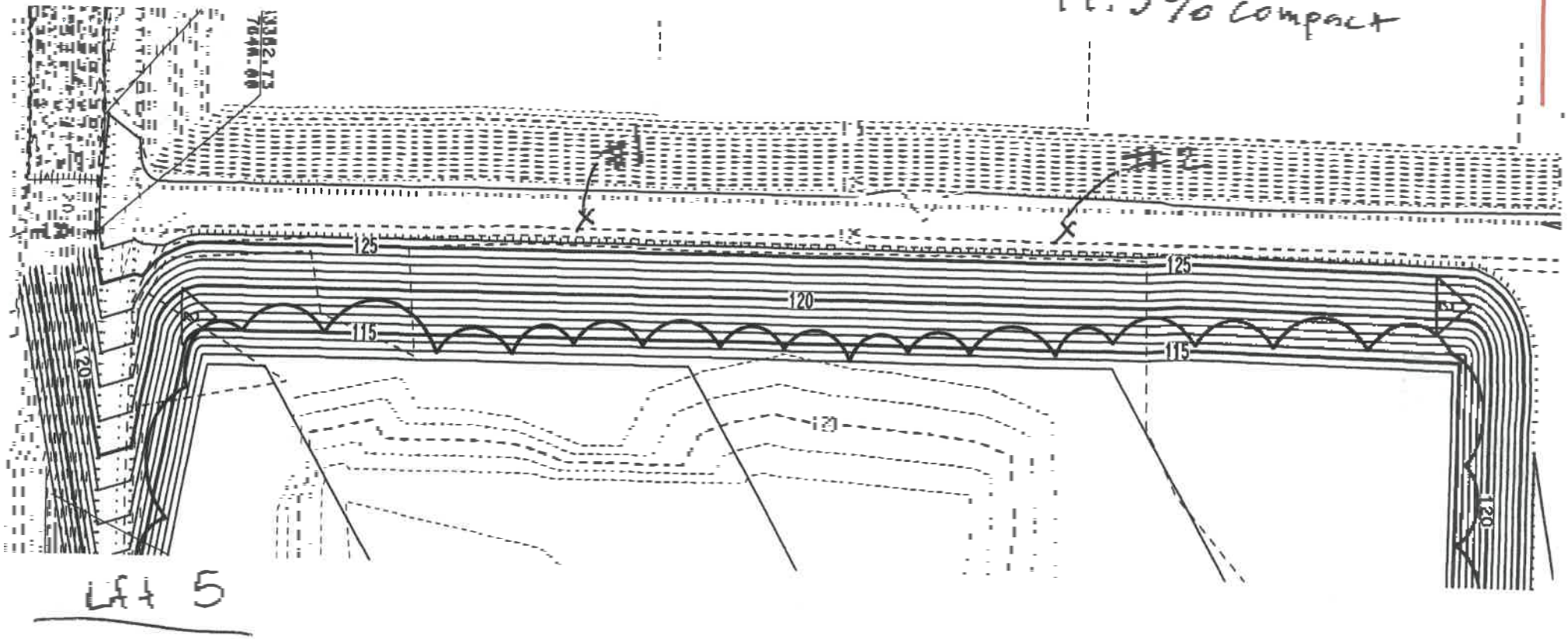
Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

West Basin North Road Compaction Locations

6/22/17 #1 14.4 moist.
97.9% compact.
#2 16.2 moiste
99.3% compact



Lift 5

8-22-17 202

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Report No.:	T18-BB22		
Date Issued:	July 10, 2018		
Date & Time of Test:	July 10, 2018 (7:30 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Sandy Clay (North Road West Basin 2)

Proctor Density-Optimum Moisture: 119.5 pcf / 16.3% (mod.)

Test No.	1							
Course Level	Lift 6							
Area to Be	North road							
Dry Density In-Place	117.8							
% Proctor Density	98.6							
Moisture Content	15.9							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

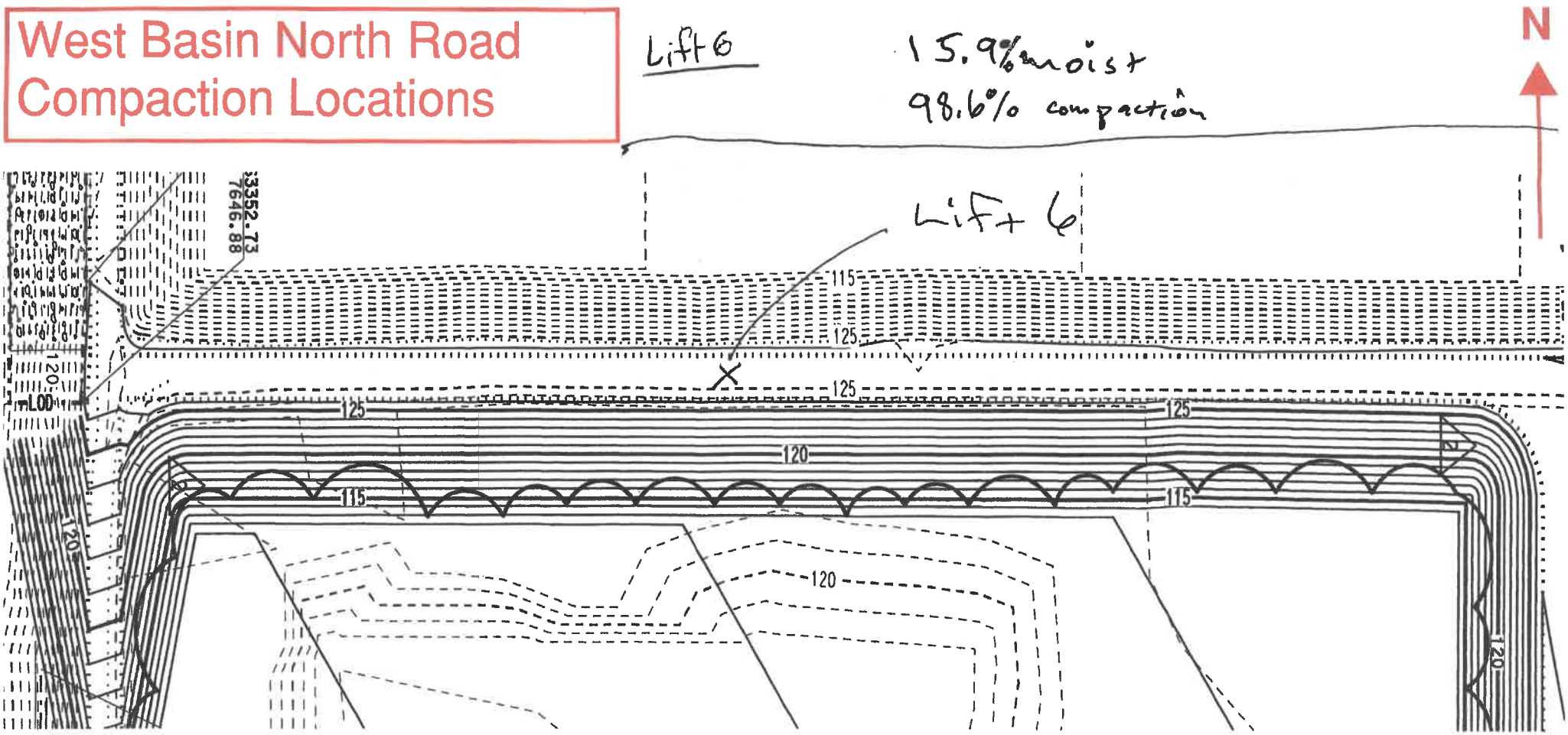
Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

West Basin North Road Compaction Locations



T18-BB22
7-10-18

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No.:	T18-BB40		
Date Issued:	July 10, 2018		
Date & Time of Test:	July 10, 2018 (2:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Hot	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Sandy Clay (North Road West Basin #2)

Proctor Density-Optimum Moisture: 119.5 pcf / 16.3% (mod.)

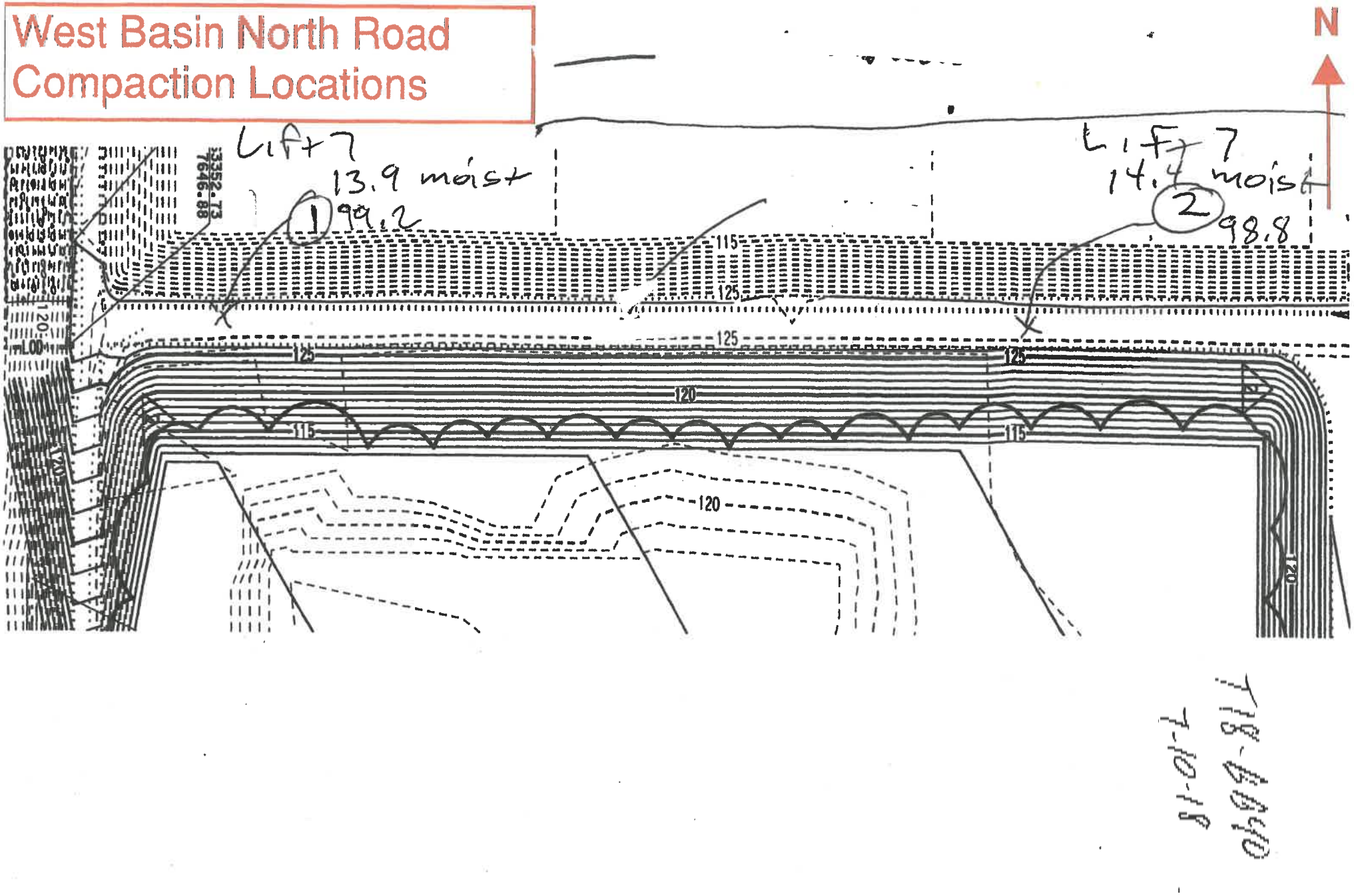
Test No.	1	2						
Course Level	Lift 7							
Area to Be	North road	West basin						
Dry Density In-Place	118.6	118.1						
% Proctor Density	99.2	98.8						
Moisture Content	13.9	14.4						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer


West Basin North Road
Compaction Locations
N
Lift 7
13.9 moist
1
99.2
Lift 7
14.4 moist
2
98.8
3352.73
7646.88
115
125
120
LOD
T8-B40
T-10-18

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No.:	T18-BB59
Date Issued:	July 12, 2018
Date & Time of Test:	July 11, 2018 (10:00 am)

Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Hot	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Dark Brownish-Tan Sandy Clay (North Road West Basin #3)

Proctor Density-Optimum Moisture: 117.7 pcf / 17.6% (mod.)

Test No.	1							
Course Level	Lift 8							
Area to Be	North road							
Dry Density In-Place	115.9							
% Proctor Density	98.5							
Moisture Content	16.2							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: Please see attached map.

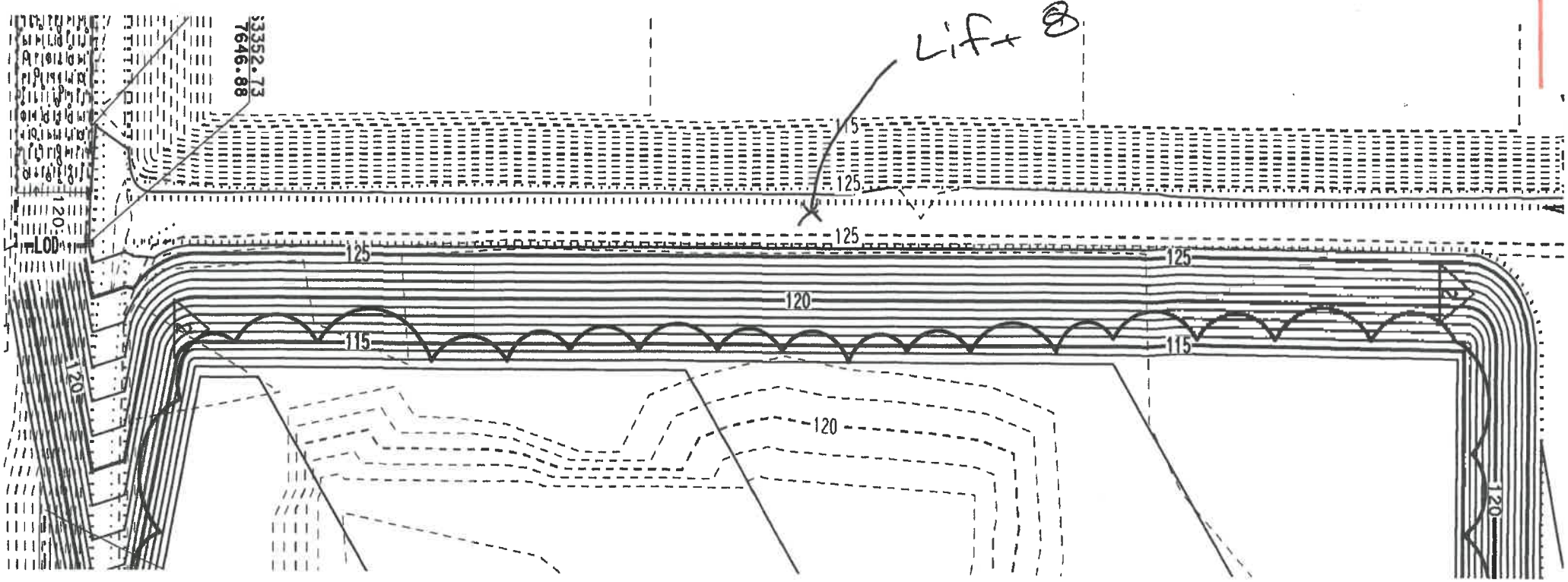
Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

West Basin North Road Compaction Locations

98.5% compaction
16.2% moist
7/11/18



T18-845
7-11-18

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No.:	T18-DD11
Date Issued:	July 23, 2018
Date & Time of Test:	July 12, 2018 (1:00 pm)

Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Warm	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Tannish-Brown Coarse Sand (BA-2-W1)

Proctor Density-Optimum Moisture: 113.5 pcf / 8.7% (mod.)

Test No.	1							
Course Level	Lift 9							
Area to Be	Roadway							
Dry Density In-Place	111.5							
% Proctor Density	98.2							
Moisture Content	9.3							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

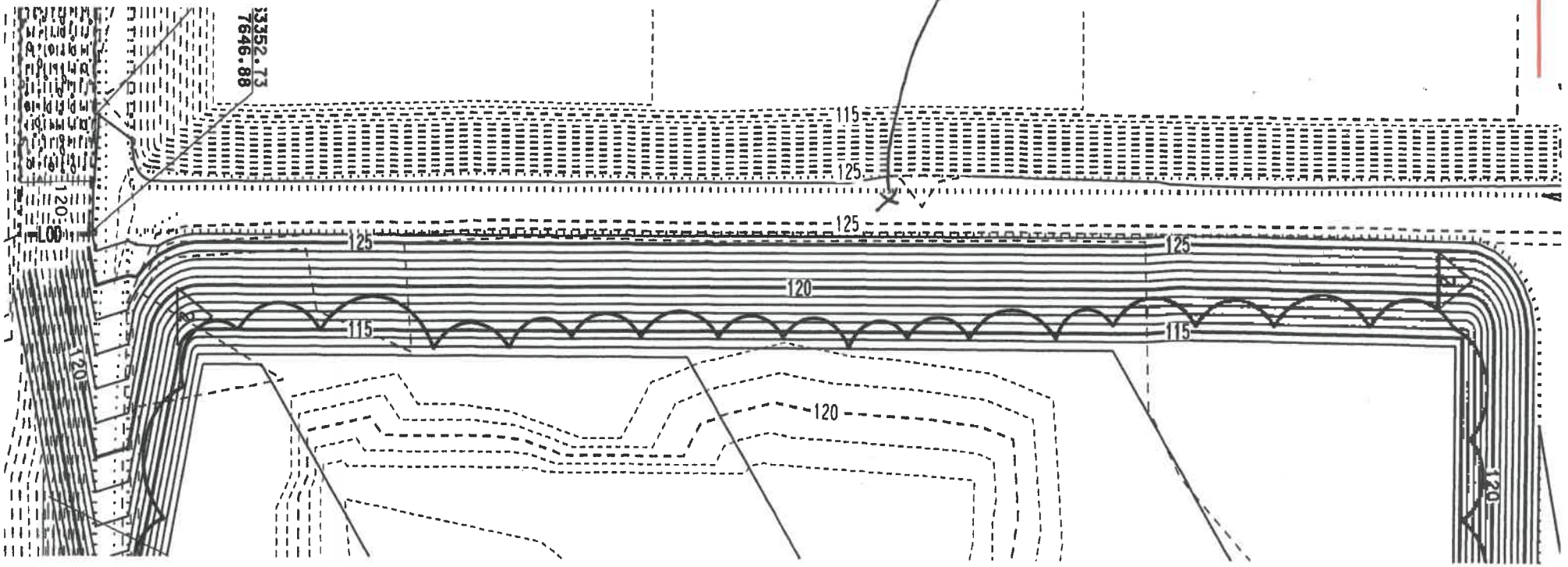
James M. Pope, P.E., Reviewer

West Basin North Road Compaction Locations

98.2% compact 7/12/18
9.3% moist

Lift #9

N



T18-M11
7-12-18

csra TESTING & ENGINEERING CO., INC.
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Report No.: T18-V03
Date Issued: August 10, 2018
Date & Time of Test: August 9, 2018 (1:00 pm)

Client: Envirocon, Inc.
Project Title: 488-1D Ash Basin & 489-D CPRB Closure
Project No.: C-SPP-D-00002
Weather: Sunny and Warm
Address: Missoula, Montana
Location: SRS, Aiken Co., South Carolina
SRNS PO#: 258194
Activity: Compaction

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Brownish-Tan Slightly Silty Sand (TC-20-10)
*Dark Brownish-Tan Sandy Clay (North Road West Basin #3)

Proctor Density-Optimum Moisture: 116.3 pcf / 7.5% (mod.)/*117.7 pcf / 17.6% (mod.)

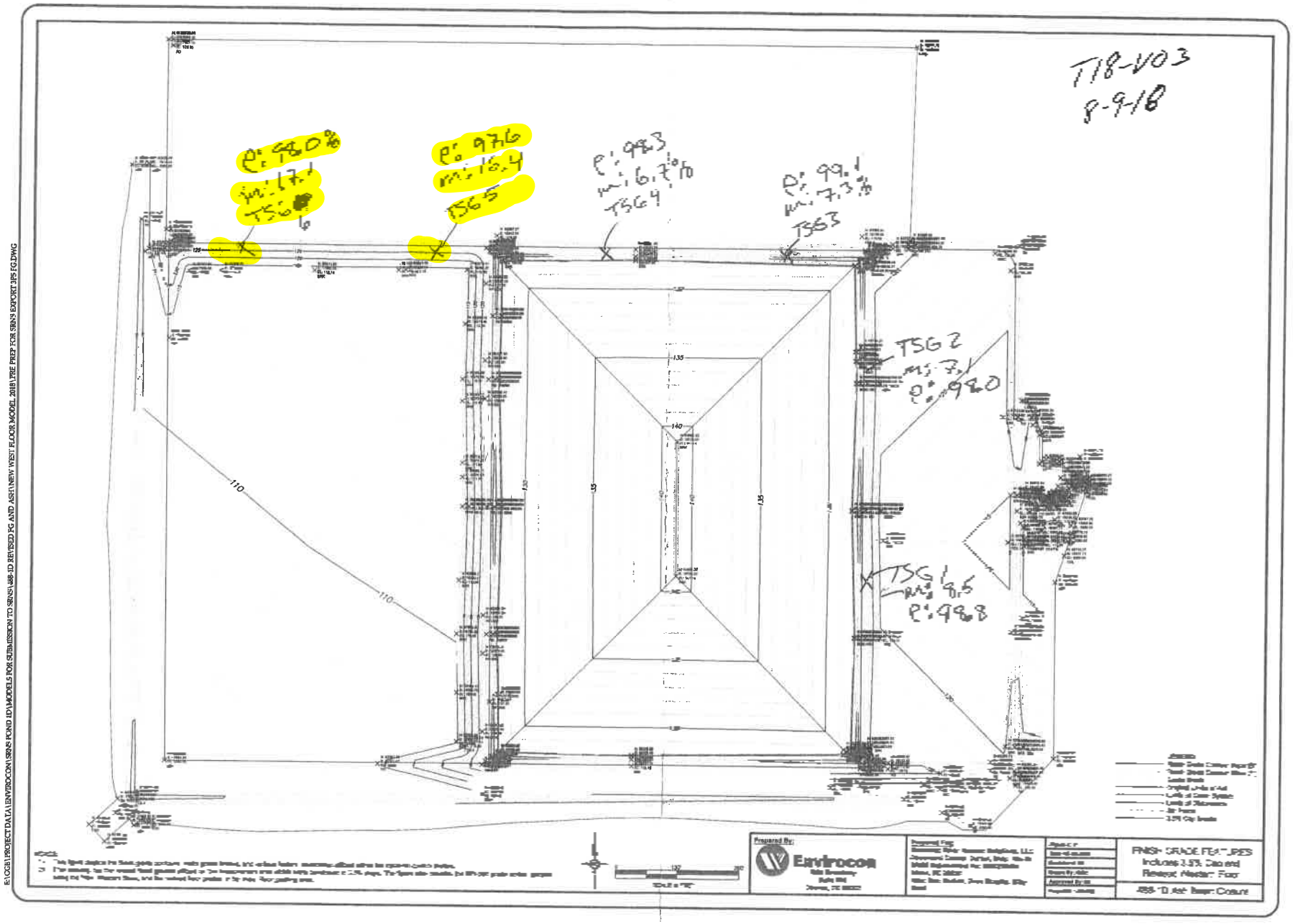
Test No.	1	2	3	4	*5	*6		
Course Level	Final lift							
Area to Be	TSG-1	TSG-2	TSG-3	TSG-4	TSG-5	TSG-6		
Dry Density In-Place	114.9	114.0	115.3	114.3	114.9	115.4		
% Proctor Density	98.8	98.0	99.1	98.3	97.6	98.0		
Moisture Content	8.5	7.1	7.3	6.7	16.4	17.1		
% Compaction Required	95.0	95.0	95.0	95.0	95.0	95.0		
Conformance	✓	✓	✓	✓	✓	✓		
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer


T18-V03
8-9-18
P: 48.0%
M: 17.1
TSG 6
P: 97.6
M: 16.4
TSG 5
P: 98.3
M: 6.7%
TSG 4
P: 99.1
M: 7.3%
TSG 3
TSG 2
M: 7.1
P: 98.0
TSG 1
M: 8.5
P: 98.8
110
135
140
E:\CGS\PROJECT DATA\ENVIROCON\SRNS POND 1D\MODELS FOR SUBMISSION TO SRNS\488-1D REVISED FG AND ASS\NEW WEST FLOOR MODEL 2018\TRE PREP FOR SRNS EXPORT 3PS FG.DWG
Prepared By:
Envirocon
FINISH GRADE FEATURES
Includes 3.5% Dia and
Riverpt Header Floor
488-1D Ash Basin Closure

Envirocon

Excavation Inspection Report

Date: January 17, 2017 to January 19, 2017	
Project Title: SRNS 488-1D Ash Landfill	**Location:** Jackson, SC

Observations of Fill Placement & Compaction Activities – Installation of culvert FES-14 and FES-15:

- January 17, 2017: Envirocon excavates the channel to install the FES-14 and FES-15 culvert.
- January 18, 2017: Envirocon installs FES-14 and FES-15 culvert on west side of CPRB.
- Location of culvert marked by GEL surveyor. After reaching proper depth, 4 inches of #57 stone base installed for culvert. FES-14 pipe set and invert elevations checked by surveyor. Three eight foot sections of 24 inch diameter RCP pipe installed and invert elevations checked by surveyor. FES-15 pipe set and invert elevations checked by surveyor. Initial backfill placed around pipe and compacted with a plate-type tamper.
- Britt Baynham (CSRA Testing) on site to perform compaction testing on the initial and final backfill around FES-14 and FES-15 culvert. The first two one foot lifts are placed and compacted. The initial and final backfill is compacted with a plate-type tamper. Backfill is compacted to a minimum of 95% compaction in the roadway and 90% compaction outside of the roadway. All compaction tests pass. The third one foot lift is placed and compacted.
- January 19, 2017: The third lift of backfill is tested by Britt Baynham (CSRA Testing). All compaction tests pass.
- The west berm of the CPRB where the spillway was removed is backfilled in one foot lifts. The backfill is compacted with a smooth drum roller to a minimum of 85% compaction. Britt Baynham performs the compaction testing on each lift and all compaction tests pass.

Additional Comments:

- None.

Attachments:

- CSRA Testing Report for FES-14 and FES-15 dated January 19, 2017 (t17-c60).
- CSRA Testing Report for western berm dated January 19, 2017 (t17-c61).

Envirocon

Excavation Inspection Report

Date:	Time:	Direction of View / Location:
Tuesday, January 17	1459	East / CPRB

Subject:

Ditch for culvert FES-14 and FES-15 is excavated.

Date:	Time:	Direction of View / Location:
Wednesday, January 18	0908	West / CPRB

Subject:

Four inch stone base for culvert.

Envirocon

Excavation Inspection Report

Date:	Time:	Direction of View / Location:
Wednesday, January 18	1028	South / CPRB

Subject:

Surveyor checking invert elevations on RCP piping.

Date:	Time:	Direction of View / Location:
Wednesday, January 18	1121	East / CPRB

Subject:

FES-14 and FES-15 culvert installed.

Envirocon

Excavation Inspection Report

Date:	Time:	Direction of View / Location:
Wednesday, January 18	1528	East / CPRB

Subject:
Compacting backfill with tamper.

Date:	Time:	Direction of View / Location:
Wednesday, January 18	1619	East / CPRB

Subject:
Compaction of final backfill over culvert.

Envirocon

Excavation Inspection Report

Date:	Time:	Direction of View / Location:
Thursday, January 19	1005	East / CPRB

Subject:

Placing and compacting backfill in the west berm of the CPRB. Compacted with a smooth drum roller.

Date:	Time:	Direction of View / Location:
Thursday, January 19	1129	East / CPRB

Subject:

Compaction of final backfill of the west berm in CPRB.

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-C60		
Date Issued:	January 19, 2017		
Date & Time of Test:	January 18, 2017 (AM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand

Proctor Density-Optimum Moisture: 115.1 pcf / 14.9% (mod.)

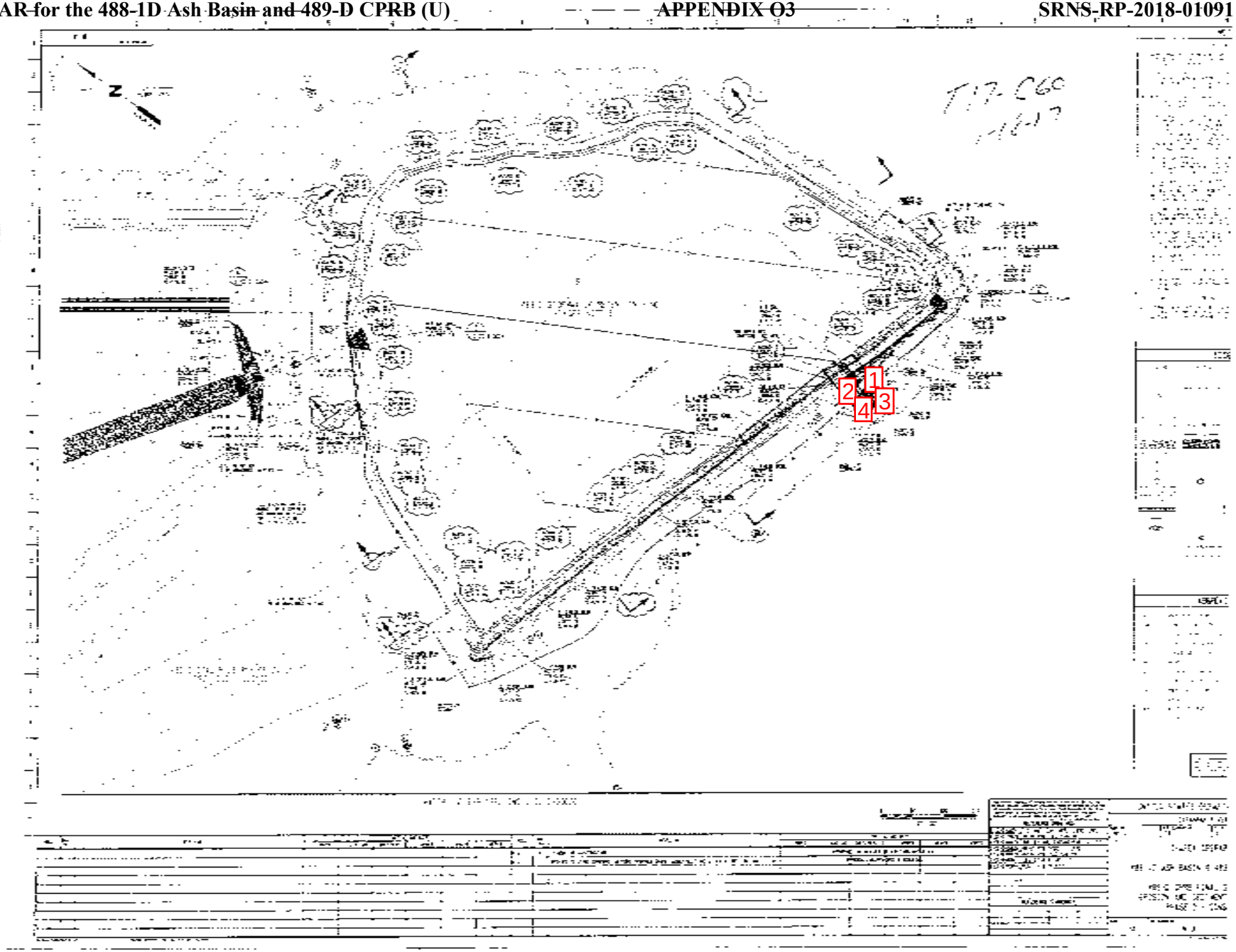
Test No.	1	2	3	4				
Course Level	1st lift		2nd lift					
Area to Be	CPRB 24" RCP spillway pipe							
Dry Density In-Place	114.0	114.5	112.5	113.2				
% Proctor Density	99.0	99.4	97.7	98.3				
Moisture Content	14.5	15.2	14.8	14.5				
% Compaction Required	95.0	95.0	95.0	95.0				
Conformance	✓	✓	✓	✓				
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer


N
1
2
3
4

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-C61		
Date Issued:	January 19, 2017		
Date & Time of Test:	January 19, 2017 (AM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand

Proctor Density-Optimum Moisture: 115.1 pcf / 14.9% (mod.)

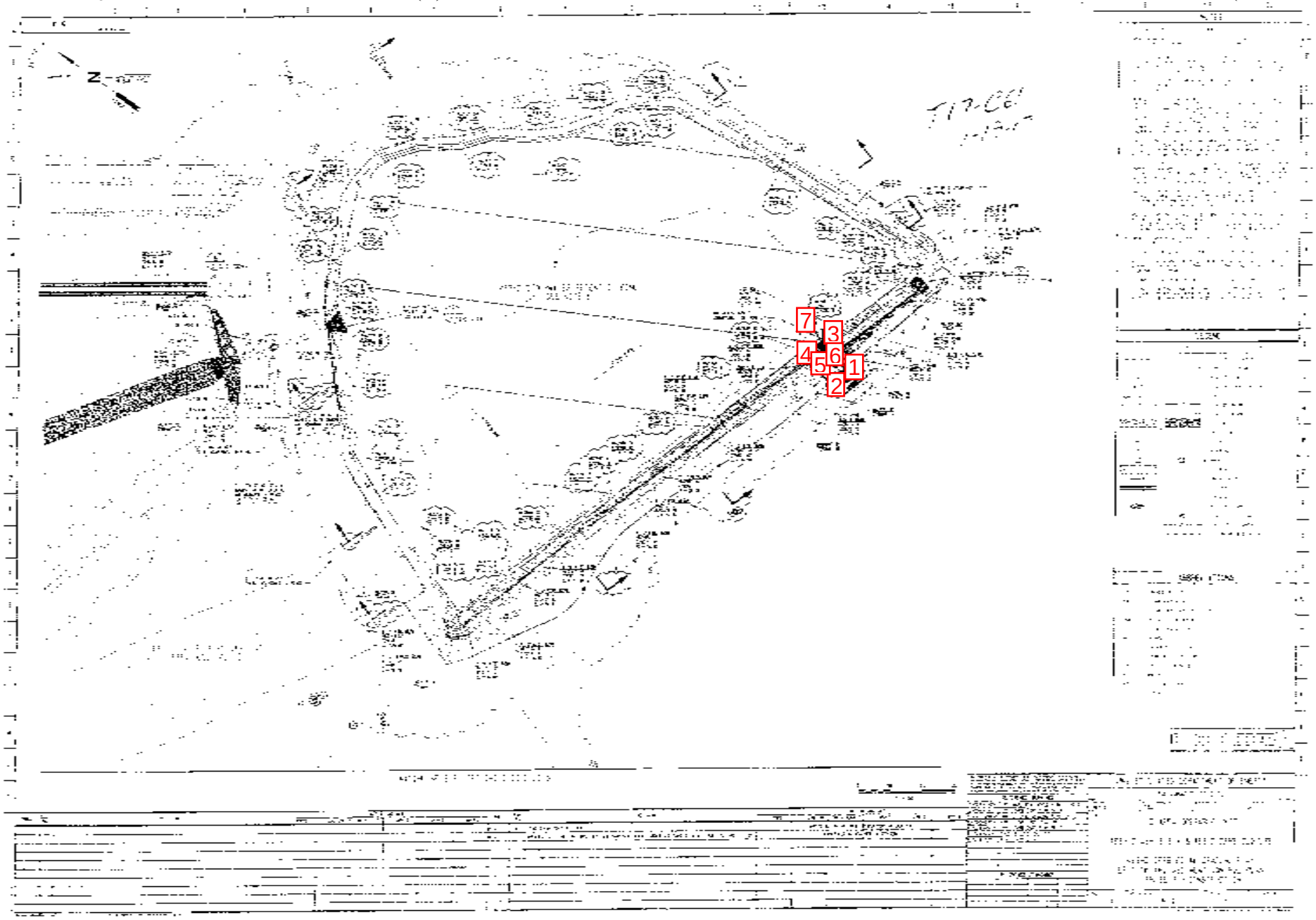
Test No.	1	2	3	4	5	6	7	
Course Level	3rd lift		1st lift	2nd lift	3rd lift	4th lift	5th lift	
Area to Be	CPRB 24" RCP spillway pipe		Western berm					
Dry Density In-Place	114.7	114.5	109.4	113.1	113.5	114.5	115.0	
% Proctor Density	99.6	99.4	95.0	98.2	98.6	99.4	99.9	
Moisture Content	14.3	15.0	16.6	15.6	15.3	13.8	14.6	
% Compaction Required	95.0	95.0	95.0	95.0	95.0	95.0	95.0	
Conformance	✓	✓	✓	✓	✓	✓	✓	
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer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csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-C60		
Date Issued:	January 19, 2017		
Date & Time of Test:	January 18, 2017 (AM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand

Proctor Density-Optimum Moisture: 115.1 pcf / 14.9% (mod.)

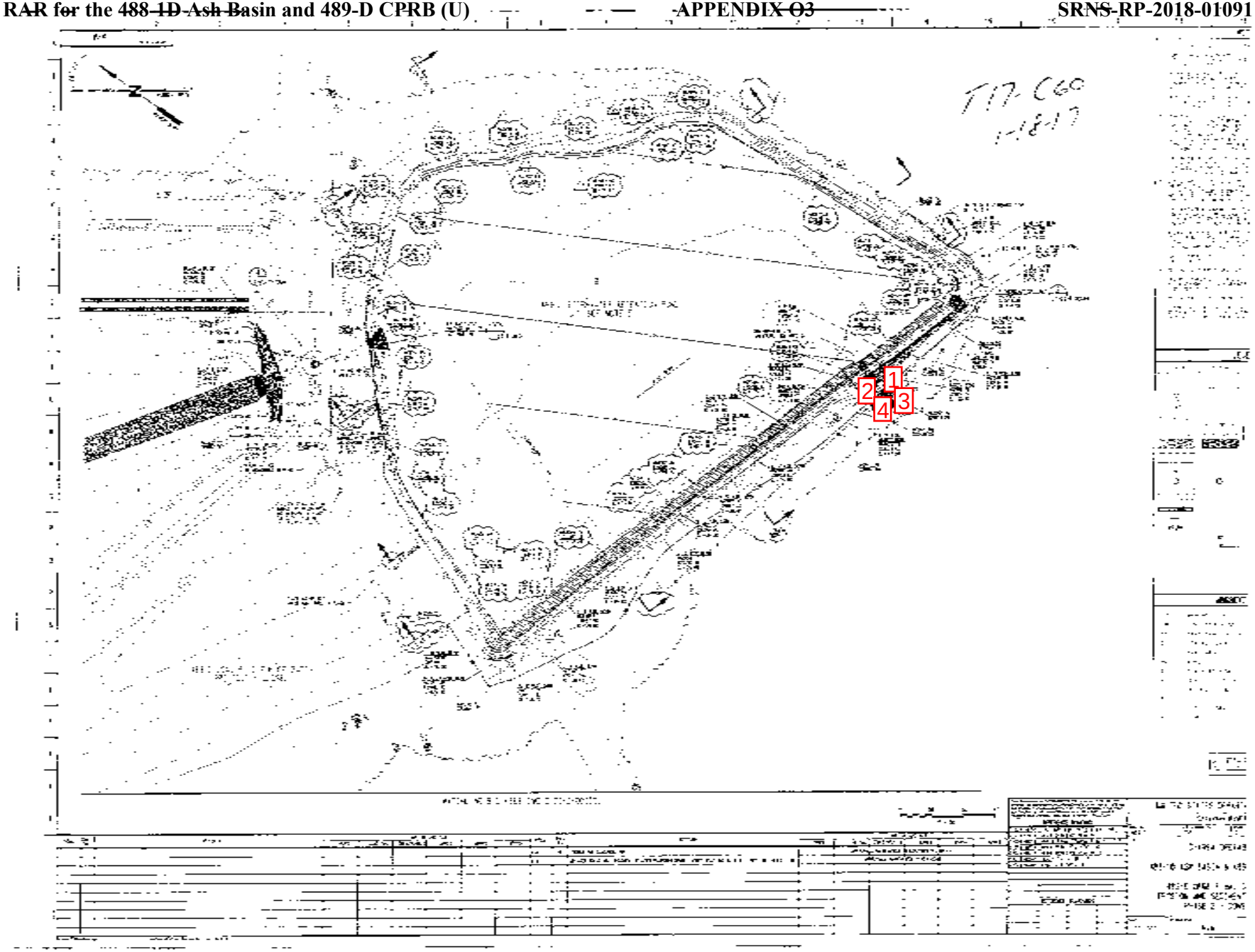
Test No.	1	2	3	4				
Course Level	1st lift		2nd lift					
Area to Be	CPRB 24" RCP spillway pipe							
Dry Density In-Place	114.0	114.5	112.5	113.2				
% Proctor Density	99.0	99.4	97.7	98.3				
Moisture Content	14.5	15.2	14.8	14.5				
% Compaction Required	95.0	95.0	95.0	95.0				
Conformance	✓	✓	✓	✓				
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer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Augusta, Georgia 30904
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Fax (706) 737-0629

Report No.:	T17-C61
Date Issued:	January 19, 2017
Date & Time of Test:	January 19, 2017 (AM)

Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand

Proctor Density-Optimum Moisture: 115.1 pcf / 14.9% (mod.)

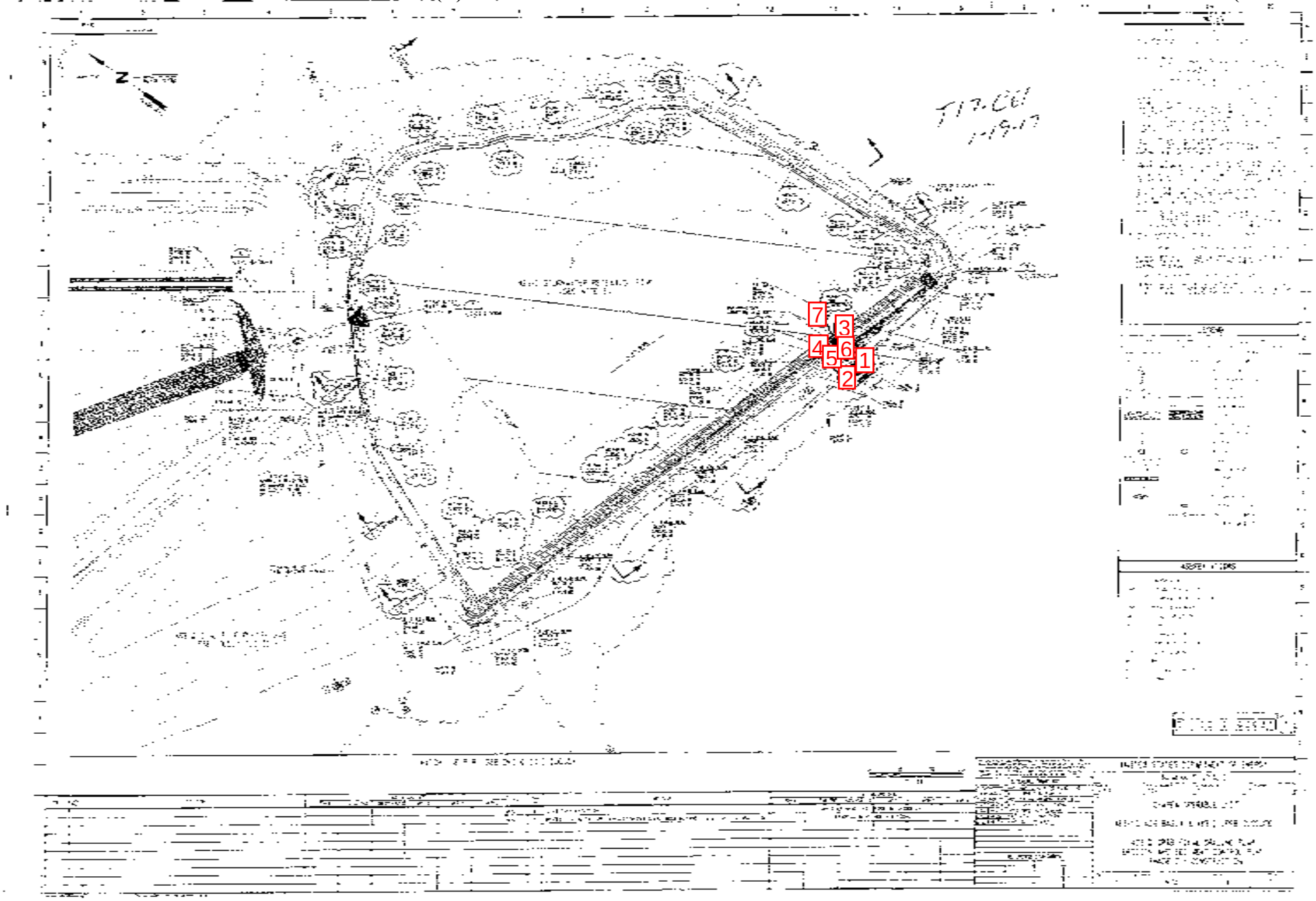
Test No.	1	2	3	4	5	6	7	
Course Level	3rd lift		1st lift	2nd lift	3rd lift	4th lift	5th lift	
Area to Be	CPRB 24" RCP spillway pipe		Western berm					
Dry Density In-Place	114.7	114.5	109.4	113.1	113.5	114.5	115.0	
% Proctor Density	99.6	99.4	95.0	98.2	98.6	99.4	99.9	
Moisture Content	14.3	15.0	16.6	15.6	15.3	13.8	14.6	
% Compaction Required	95.0	95.0	95.0	95.0	95.0	95.0	95.0	
Conformance	✓	✓	✓	✓	✓	✓	✓	
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer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csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(705) 733-6960
Fax (706) 737-0629

Report No.:	T17-U76		
Date Issued:	May 17, 2017		
Date & Time of Test:	May 16, 2017 (3:15 PM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand

Proctor Density-Optimum Moisture: 123.8 pcf / 12.4% (mod.)

Test No.	1	2						
Course Level	Lift 0							
Area to Be	CPRB manhole							
Dry Density In-Place	123.6	122.5						
% Proctor Density	99.8	98.9						
Moisture Content	12.2	12.4						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations:
1. West side of CPRB manhole
2. East side of CPRB manhole

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-U53		
Date Issued:	May 16, 2017		
Date & Time of Test:	May 16, 2017 (AM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand

Proctor Density-Optimum Moisture: 123.8 pcf / 12.4% (mod.)

Test No.	1	2						
Course Level	Lift 1							
Area to Be	Fill over pipe and around manhole							
Dry Density In-Place	122.0	119.3						
% Proctor Density	98.5	96.3						
Moisture Content	14.4	13.8						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: 1. West side of CPRB manhole
2. East side of CPRB manhole

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
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Fax (706) 737-0629

Report No.:	T17-U78 (Page 1 of 2)
Date Issued:	May 18, 2017
Date & Time of Test:	May 17, 2017 (All Day)

Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Hot	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand

Proctor Density-Optimum Moisture: 123.8 pcf / 12.4% (mod.)

Test No.	1	2	3	4	5	6	7	8
Course Level	1st lift		2nd lift				3rd lift	
Area to Be	Pipe and structure backfill							
Dry Density In-Place	121.8	122.9	120.5	119.7	121.2	119.4	121.1	120.0
% Proctor Density	98.4	99.3	97.7	96.7	97.9	96.4	97.8	96.9
Moisture Content	10.2	10.7	13.3	14.7	13.8	13.0	12.8	13.2
% Compaction Required	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0
Conformance	✓	✓	✓	✓	✓	✓	✓	✓
Non Conformance								
Sand Cone								

Locations:
1. North pipe east side
2. South pipe west side
3. 60" MH north side
4. North pipe east side
5. 96" MH southwest side
6. South pipe west side
7. North pipe west side
8. South pipe east side

Serial No. of Troxler: 25265

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-U78 (Page 2 of 2)
Date Issued:	May 18, 2017
Date & Time of Test:	May 17, 2017 (All Day)

Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Hot	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand

Proctor Density-Optimum Moisture: 123.8 pcf / 12.4% (mod.)

Test No.	9	10	11	12	13	14	15	
Course Level	4th lift				5th lift		6th lift	
Area to Be	Pipe and structure backfill							
Dry Density In-Place	122.1	120.0	120.4	121.4	122.6	117.7	118.3	
% Proctor Density	98.6	96.9	97.3	98.1	99.0	95.1	95.6	
Moisture Content	13.9	14.0	13.8	13.2	14.1	14.4	15.1	
% Compaction Required	95.0	95.0	95.0	95.0	95.0	95.0	95.0	
Conformance	✓	✓	✓	✓	✓	✓	✓	
Non Conformance								
Sand Cone								

Locations:
9. 60" MH south side
10. North pipe east side
11. 96" MH north side
12. South pipe west side
13. South pipe east side
14. North pipe west side under road
15. South pipe west side

Serial No. of Troxler: 25265

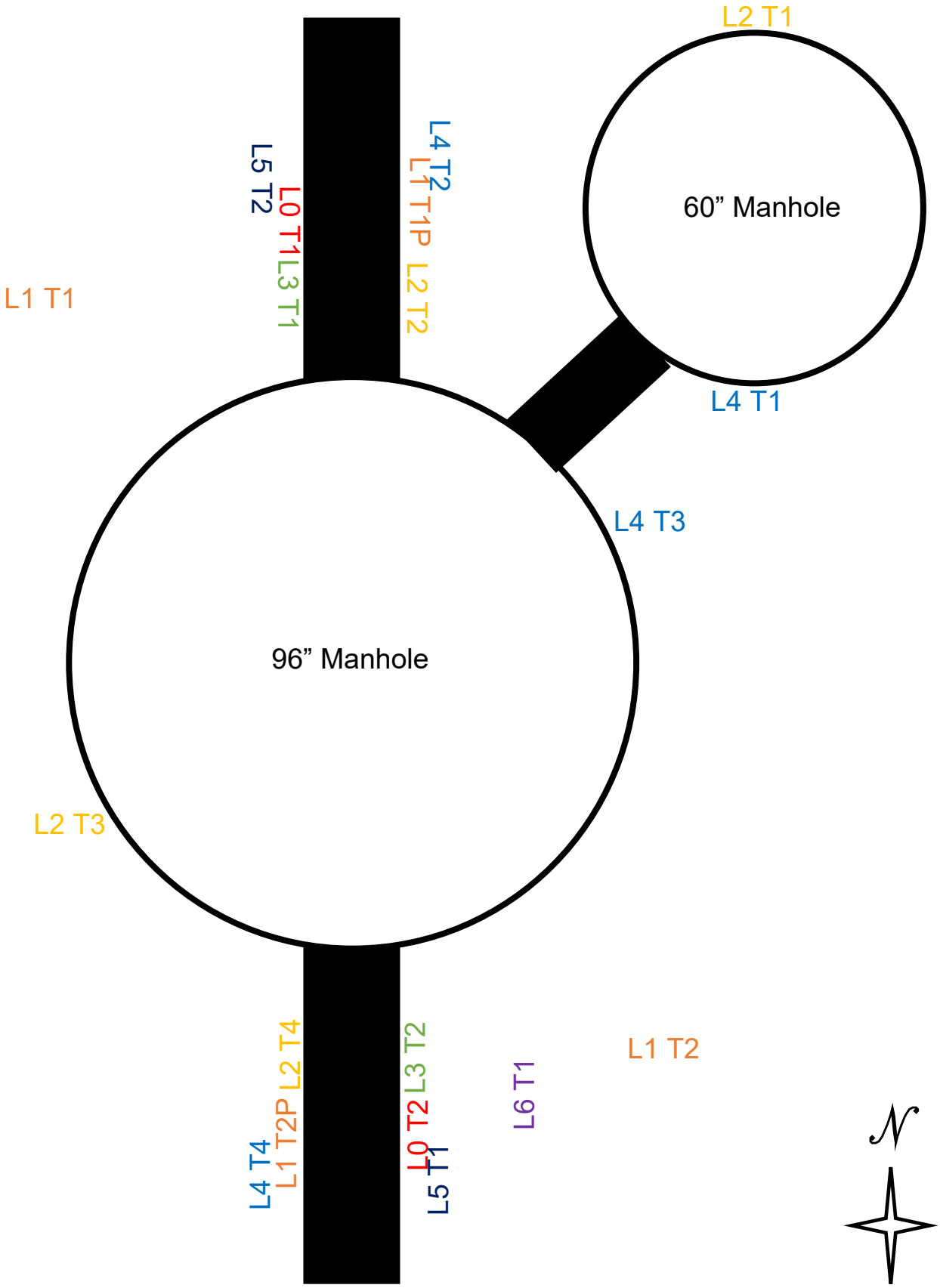
David Turner, Technician

James M. Pope, P.E., Reviewer

LIFT COMPACTION TEST SUMMARY TABLE

Test ID	Relative Density (%)	Moisture Content (%)	Lift	Location
L0 T1	99.8	12.2	0	North Pipe West Side
L0 T2	98.9	12.4	0	South Pipe East Side
L1 T1	98.5	14.4	1	West Side of 96" MH
L1 T2	96.3	13.8	1	East Side of 96" MH
L1 T1P	98.4	10.2	1	North Pipe East Side
L1 T2P	99.3	10.7	1	South Pipe West Side
L2 T1	97.7	13.3	2	60" MH North Side
L2 T2	96.7	14.7	2	North Pipe East Side
L2 T3	97.9	13.8	2	96" MH SW Side
L2 T4	96.4	13.0	2	South Pipe West Side
L3 T1	97.8	12.8	3	North Pipe West Side
L3 T2	96.9	13.2	3	South Pipe East Side
L4 T1	98.6	13.9	4	60" MH South Side
L4 T2	96.9	14.0	4	North Pipe East Side
L4 T3	97.3	13.8	4	96" MH North Side
L4 T4	98.1	13.2	4	South Pipe West Side
L5 T1	99.0	14.1	5	South Pipe East Side
L5 T2	95.1	15.4	5	North Pipe West Side Under Road
L6 T1	95.6	15.1	6	South Pipe West Side

TEST LOCATION MAP


L2 T1
60” Manhole
L4 T2
L1 T1P
L2 T2
L5 T2
L0 T1
L3 T1
L1 T1
L4 T1
L4 T3
96” Manhole
L2 T3
L1 T2
L6 T1
L4 T4
L1 T2P
L2 T4
L0 T2
L3 T2
L5 T1

Envirocon

Excavation Inspection Report

Date: May 23, 2017	
Project Title: SRNS 488-1D Ash Landfill	**Location:** Jackson, SC

Observations of Fill Placement & Compaction Activities: CPRB 96" Manhole

Trotter Site Prep excavated the area and demolished the 120" existing manhole and left in place the existing 60" manhole. The 60" manhole was modified by filling the bottom outlet (36") with concrete. Then a new 36" outlet was cut into the manhole to tie into the new 96" manhole. During demolition of the 120" existing manhole, removal extended down to approximately 3 feet below the elevation for the bottom of the new manhole. The other 36" outgoing pipe was cutback out of the way of the new manhole footprint and plugged with 2' of concrete. Next Controlled Low Strength Material (CLSM) was placed in the footprint of the old 120" manhole. The CLSM was cured for 24 hours before disturbance. Next, one (1) foot of #57 stone was placed upon the CLSM. This stone was graded to ensure the inverts would stack out correctly in the new 96" manhole. After finish grading and leveling the stone, GEL Surveying verified the grade and laid out the location for the new 96" manhole to be set. Next, Southway Crane and Trotter Site Prep placed the new 96" manhole upon the #57 stone. Trotter Site prep then adjusted the new manhole as necessary to maintain proper drainage while tying in an existing 48" inlet Corrugated Plastic Pipe (CPP), a 36" inlet CPP between the 60" manhole and 96" manhole, and an existing 48" outlet CPP to drain to the CPRB. While installing the CPPs the pipes were bed with #57 stone. There was a leak into the excavation area that came from an upgradient source that flowed water along the existing 36" pipe and it bypassed along the south side of the existing 60" manhole and into the excavation. This water source caused concern that backfill placement would be problematic because it would saturate and not properly compact. As such, approximately a 2' lift of CLSM was placed around the 96" manhole up to the midpoint of the CPPs, extending approximately 4' laterally outward from the 96" manhole. Lift 0 was approximately 1' below the top of this CLSM, collected at pipe "haunches" to ensure the pipes had a sturdy foundation to prevent them from bowing once the load was placed over them. Lift 1 was at approximately the top of the CLSM level and was taken on the soil "forms" used to confine the CLSM, 1' above Lift 0 in the pipe haunches. From here the lifts were brought up in 1' thicknesses the top the excavation, with 7 lifts tested. Each layer was compacted using a jumping jack in the areas around and directly against the pipes and manholes and a remote controller vibratory sheep's foot trench compactor for the rest of the area.

- May 01, 2017: Trotter Site Prep completes the demolition of the existing 120" CPRB manhole.
- May 03, 2017: CLSM is poured in the footprint of the former 120" CPRB manhole to create a solid foundation upon which to work.
- May 03, 2017: Concrete is poured into the 60" manhole and the existing 36" inlet CPPs to create 2' plugs.
- May 04, 2017: The existing 60" manhole is modified by cutting in a 48" hole for a new 36" outlet CPP.
- May 08, 2017: #57 stone is placed 1' thick upon the CLSM. The stone is graded level for placement of the new 96" manhole.
- May 09, 2017: GEL surveying verifies the top of #57 stone elevation and then sets the layout for the new 96" manhole. Southway Crane and Trotter Site Prep then place the 96" manhole atop the #57 stone.
- May 10 – 11, 2017: Trotter Site Prep fits the CPPs into the new 96" manhole. The manhole is modified to accommodate proper drainage. The pipes are bed with #57 stone, and then with the inverts adjusted correctly and all pipe joints made correctly, the pipes were grouted into place in the manholes.

Envirocon

Excavation Inspection Report

- May 15, 2017: CLSM placed to the midpoint of the pipes extending laterally approximately 4' from around the 96" manhole. CLSM also placed around the 96" and 60" manholes.
- May 16, 2017: Lift 0 along the pipe haunches was constructed and tested. Lift 1 outside the pipe areas (structure areas) was tested. Testing conducted by CSRA with all results were in compliance with the specifications (greater than 95% of modified proctor).
- May 17, 2017: Lifts 1 – 6 were placed and compacted. Compaction was achieved using both a jumping jack and a vibratory sheep's foot trench compactor. CSRA Testing completed the testing and all results passed.

Attachments:

- CSRA Compaction Testing Reports
- CSRA Gradation and Proctor Reports
- Lift Compaction Test Summary Table
- Test Location Sketch

Most tests were witnessed by Mike Beardsley, PE. I certify that the placement of the fills described were in compliance with the plans and specifications.

Mike Beardsley, PE

05/23/2017

Project Engineer

488-1D Ash Basin Closure Project

(720) 838 – 7107

Mbeardsley@greenglobeinc.com

Envirocon

Excavation Inspection Report

Date:	Time:	Direction of View / Location:
Monday, May 1, 2017	0907	North / CPRB MH

Subject:

Demo footprint of 120” manhole making way for new 96” manhole.

Date:	Time:	Direction of View / Location:
Wednesday, May 3, 2017	1002	East / CPRB MH

Subject:

CLSM placement in the demo area from the 120” manhole.

Envirocon

Excavation Inspection Report

Date:	Time:	Direction of View / Location:
Wednesday, May 3, 2017	1644	West / CPRB MH

Subject:

36” outlet CPP plugged with 2” of concrete.

Date:	Time:	Direction of View / Location:
Wednesday, May 3, 2017	1645	N/A / CPRB MH

Subject:

Existing 60” manhole being modified. Existing 36” outlet hole and bottom of manhole filled with concrete.

Envirocon

Excavation Inspection Report

Date:	Time:	Direction of View / Location:
Thursday, May 4, 2017	1456	East / CPRB MH

Subject:

New 48” hole cut into existing 60” manhole to accommodate a 36” CPP.

Date:	Time:	Direction of View / Location:
Monday, May 8, 2017	15:02	West / CPRB MH

Subject:

#57 stone being placed to grade for the new 96” manhole.

Envirocon

Excavation Inspection Report

Date:	Time:	Direction of View / Location:
Tuesday, May 09, 2017	13:19	Southwest / CPRB MH

Subject:

Southway Crane and Trotter Site Prep set the new 96” manhole upon the 1’ thick #57 stone.

Date:	Time:	Direction of View / Location:
Thursday, May 11, 2017	09:09	West / CPRB MH

Subject:

CPP tie-ins are being completed and grouted.

Envirocon

Excavation Inspection Report

Date:	Time:	Direction of View / Location:
Monday, May 15, 2017	10:27	East / CPRB MH

Subject:

Soil “forms” in place for CLSM to be poured around the 96” manhole.

Date:	Time:	Direction of View / Location:
Monday, May 15, 2017	16:47	Northeast / CPRB MH

Subject:

2 Loads of CLSM placed around the pipes and the 60” manhole and portions of the 96” manhole.

Envirocon

Excavation Inspection Report

Date:	Time:	Direction of View / Location:
Monday, May 15, 2017	16:45	South / CPRB MH

Subject:

2 Loads of CLSM placed around the pipes and the 60” manhole and portions of the 96” manhole.

Date:	Time:	Direction of View / Location:
Tuesday May 16, 2017	14:25	North / CPRB MH

Subject:

Lift 0 along south 48” CPP pipe haunches.

Envirocon

Excavation Inspection Report

Date:	Time:	Direction of View / Location:
Tuesday, May 16, 2017	1427	South / CPRB MH

Subject:

Lift 0 along north 48” CPP pipe haunches.

Date:	Time:	Direction of View / Location:
Wednesday May 17, 2017	14:59	N/A / CPRB MH

Subject:

Compaction of a 1’ lift with the vibratory sheep’s foot trench compactor.

Envirocon

Excavation Inspection Report

Date:	Time:	Direction of View / Location:
Wednesday, May 17, 2017	07:16	West / CPRB MH

Subject:

CSRA testing technician performing a compaction test on a lift.

Date:	Time:	Direction of View / Location:
Monday, May 22, 2017	12:50	South / CPRB MH

Subject:

Completely backfilled 96” CPRB manhole.

Envirocon

Excavation Inspection Report

CSRA COMPACTION TEST REPORTS

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(705) 733-6960
Fax (706) 737-0629

Report No.:	T17-U76		
Date Issued:	May 17, 2017		
Date & Time of Test:	May 16, 2017 (3:15 PM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand

Proctor Density-Optimum Moisture: 123.8 pcf / 12.4% (mod.)

Test No.	1	2						
Course Level	Lift 0							
Area to Be	CPRB manhole							
Dry Density In-Place	123.6	122.5						
% Proctor Density	99.8	98.9						
Moisture Content	12.2	12.4						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations:
1. West side of CPRB manhole
2. East side of CPRB manhole

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-U53		
Date Issued:	May 16, 2017		
Date & Time of Test:	May 16, 2017 (AM)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand

Proctor Density-Optimum Moisture: 123.8 pcf / 12.4% (mod.)

Test No.	1	2						
Course Level	Lift 1							
Area to Be	Fill over pipe and around manhole							
Dry Density In-Place	122.0	119.3						
% Proctor Density	98.5	96.3						
Moisture Content	14.4	13.8						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: 1. West side of CPRB manhole
2. East side of CPRB manhole

Serial No. of Troxler: 25941

Britt Baynham, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
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csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-U78 (Page 1 of 2)		
Date Issued:	May 18, 2017		
Date & Time of Test:	May 17, 2017 (All Day)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Hot	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand

Proctor Density-Optimum Moisture: 123.8 pcf / 12.4% (mod.)

Test No.	1	2	3	4	5	6	7	8
Course Level	1st lift		2nd lift				3rd lift	
Area to Be	Pipe and structure backfill							
Dry Density In-Place	121.8	122.9	120.5	119.7	121.2	119.4	121.1	120.0
% Proctor Density	98.4	99.3	97.7	96.7	97.9	96.4	97.8	96.9
Moisture Content	10.2	10.7	13.3	14.7	13.8	13.0	12.8	13.2
% Compaction Required	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0
Conformance	✓	✓	✓	✓	✓	✓	✓	✓
Non Conformance								
Sand Cone								

Locations:
1. North pipe east side
2. South pipe west side
3. 60" MH north side
4. North pipe east side
5. 96" MH southwest side
6. South pipe west side
7. North pipe west side
8. South pipe east side

Serial No. of Troxler: 25265

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T17-U78 (Page 2 of 2)		
Date Issued:	May 18, 2017		
Date & Time of Test:	May 17, 2017 (All Day)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Hot	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand

Proctor Density-Optimum Moisture: 123.8 pcf / 12.4% (mod.)

Test No.	9	10	11	12	13	14	15	
Course Level	4th lift				5th lift		6th lift	
Area to Be	Pipe and structure backfill							
Dry Density In-Place	122.1	120.0	120.4	121.4	122.6	117.7	118.3	
% Proctor Density	98.6	96.9	97.3	98.1	99.0	95.1	95.6	
Moisture Content	13.9	14.0	13.8	13.2	14.1	14.4	15.1	
% Compaction Required	95.0	95.0	95.0	95.0	95.0	95.0	95.0	
Conformance	✓	✓	✓	✓	✓	✓	✓	
Non Conformance								
Sand Cone								

Locations:
9. 60" MH south side
10. North pipe east side
11. 96" MH north side
12. South pipe west side
13. South pipe east side
14. North pipe west side under road
15. South pipe west side

Serial No. of Troxler: 25265

David Turner, Technician

James M. Pope, P.E., Reviewer

CSRA GRADATION & PROCTOR REPORT

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No. T17-U34
Date Sampled May 8, 2017
Date of Test May 10, 2017
Date Issued May 15, 2017

CLIENT: Envirocon, Inc.
PROJECT: 488-1D Ash Basin and 489-D CPRB Closure, SRNS PO# 258194
LOCATION: Savannah River Site, Aiken County, SC
REQUEST: **Gradation (ASTM D-422)**
SOIL DESCRIPTION: Reddish-Brown Clayey Sand

Sieve No.	% Passing
⅜"	100.0%
4	96.0%
10	94.0%
20	90.0%
40	65.5%
60	38.0%
140	15.0%
200	12.0%

1 cc: Envirocon, Inc.; Trip Winfree (via email)
1 cc: Green Globe, Inc.; Mike Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1035 EMMETT STREET, SUITE A
AUGUSTA, GEORGIA 30904
(706) 733-6959
FAX (706) 737-0529

Report No. T17-U33

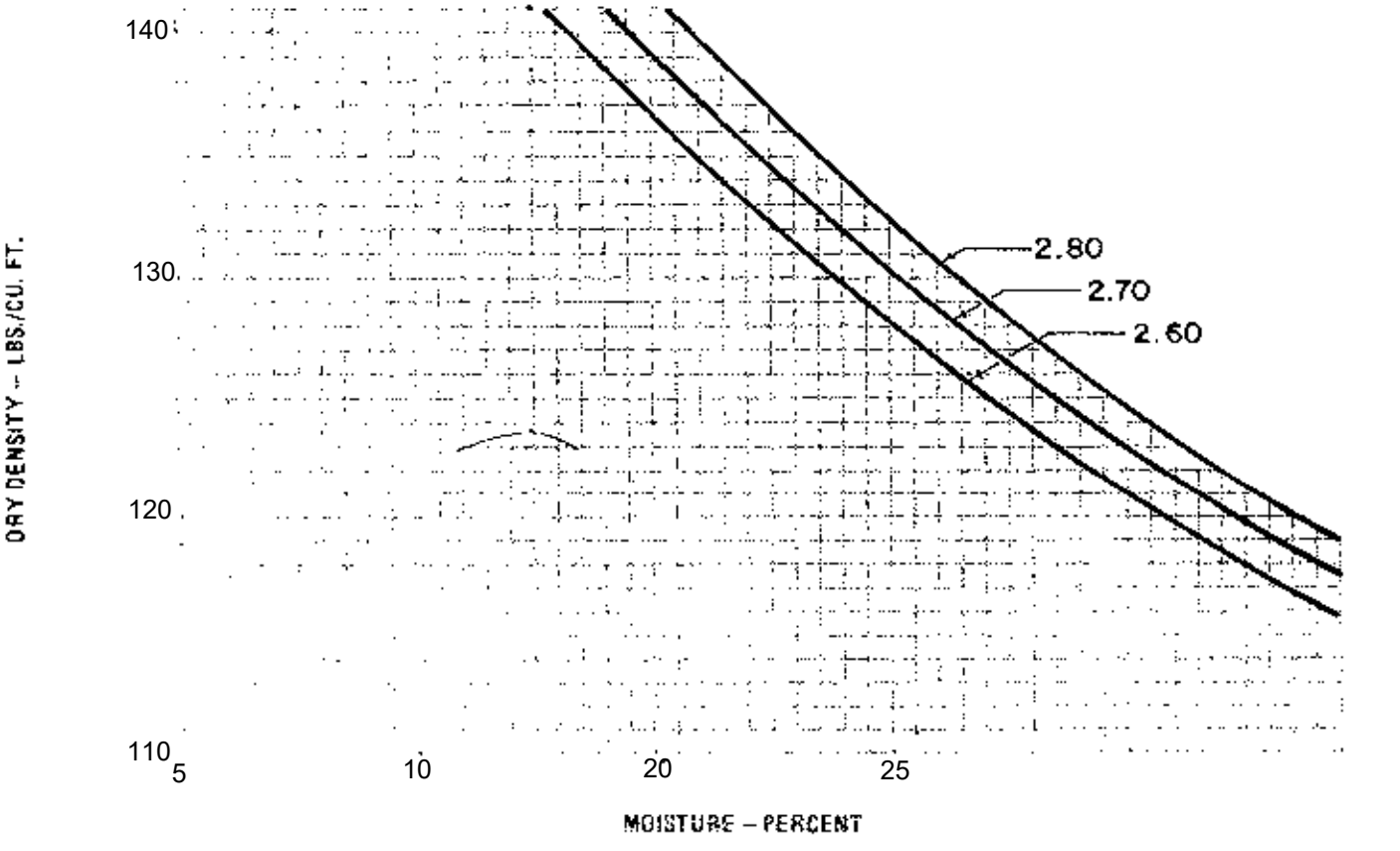
Date May 12, 2017

CLIENT: Envirocon, Inc. ADDRESS: Missoula, Montana

PROJECT: 488-1D Ash Basin & 489-D CPRB Closure LOCATION: Savannah River Site, Aiken Co., SC
Project No.: C-SPP-D-00002, SRNS PO: 258194

SOIL PROCTOR TEST

Maximum Dry Density	—	123.8 pcf
Optimum Moisture Content	—	12.4%
Soil Description	—	Reddish-Brown Clayey Sand



ASTM D - 1557 Method A

Technician: Justin Walling

Envirocon

Backfill Inspection Report

LIFT COMPACTION TEST SUMMARY TABLE

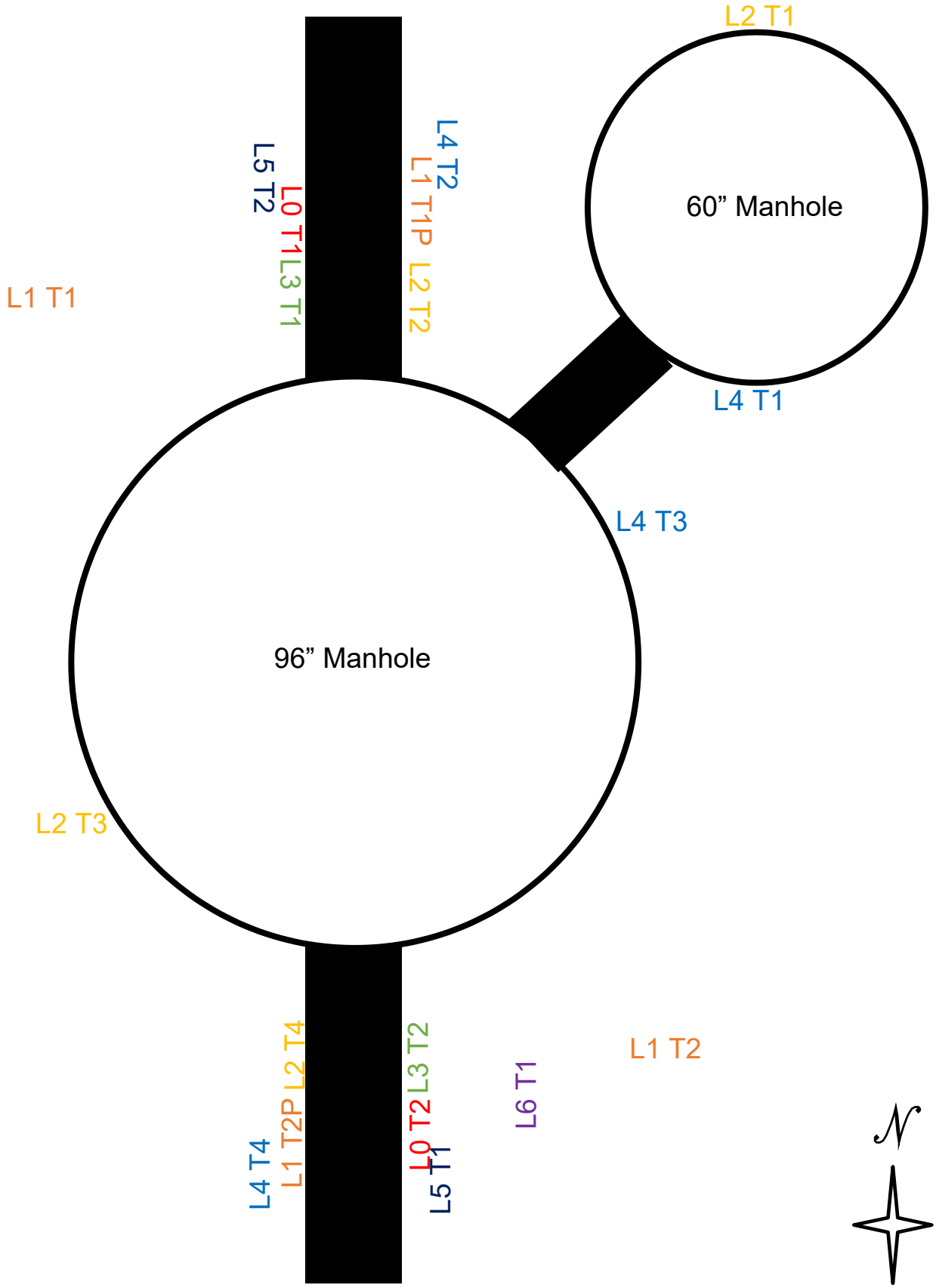
Envirocon

Test ID	Relative Density (%)	Moisture Content (%)	Lift	Location
L0 T1	99.8	12.2	0	North Pipe West Side
L0 T2	98.9	12.4	0	South Pipe East Side
L1 T1	98.5	14.4	1	West Side of 96" MH
L1 T2	96.3	13.8	1	East Side of 96" MH
L1 T1P	98.4	10.2	1	North Pipe East Side
L1 T2P	99.3	10.7	1	South Pipe West Side
L2 T1	97.7	13.3	2	60" MH North Side
L2 T2	96.7	14.7	2	North Pipe East Side
L2 T3	97.9	13.8	2	96" MH SW Side
L2 T4	96.4	13.0	2	South Pipe West Side
L3 T1	97.8	12.8	3	North Pipe West Side
L3 T2	96.9	13.2	3	South Pipe East Side
L4 T1	98.6	13.9	4	60" MH South Side
L4 T2	96.9	14.0	4	North Pipe East Side
L4 T3	97.3	13.8	4	96" MH North Side
L4 T4	98.1	13.2	4	South Pipe West Side
L5 T1	99.0	14.1	5	South Pipe East Side
L5 T2	95.1	15.4	5	North Pipe West Side Under Road
L6 T1	95.6	15.1	6	South Pipe West Side

96” CPRB Compaction Test Summary Table

TEST LOCATION MAP

Envirocon



96” CPRB Manhole Compaction Test Locations

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No.:	T18-CC89		
Date Issued:	September 28, 2018		
Date & Time of Test:	September 27, 2018 (3:30 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Warm	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Slightly Silty Sand (TC-20-11)

Proctor Density-Optimum Moisture: 119.1 pcf / 6.4% (mod.)

Test No.	1							
Course Level	Lift 1							
Area to Be	Pipe at CPRB							
Dry Density In-Place	117.3							
% Proctor Density	98.5							
Moisture Content	9.1							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: Please see attached map.

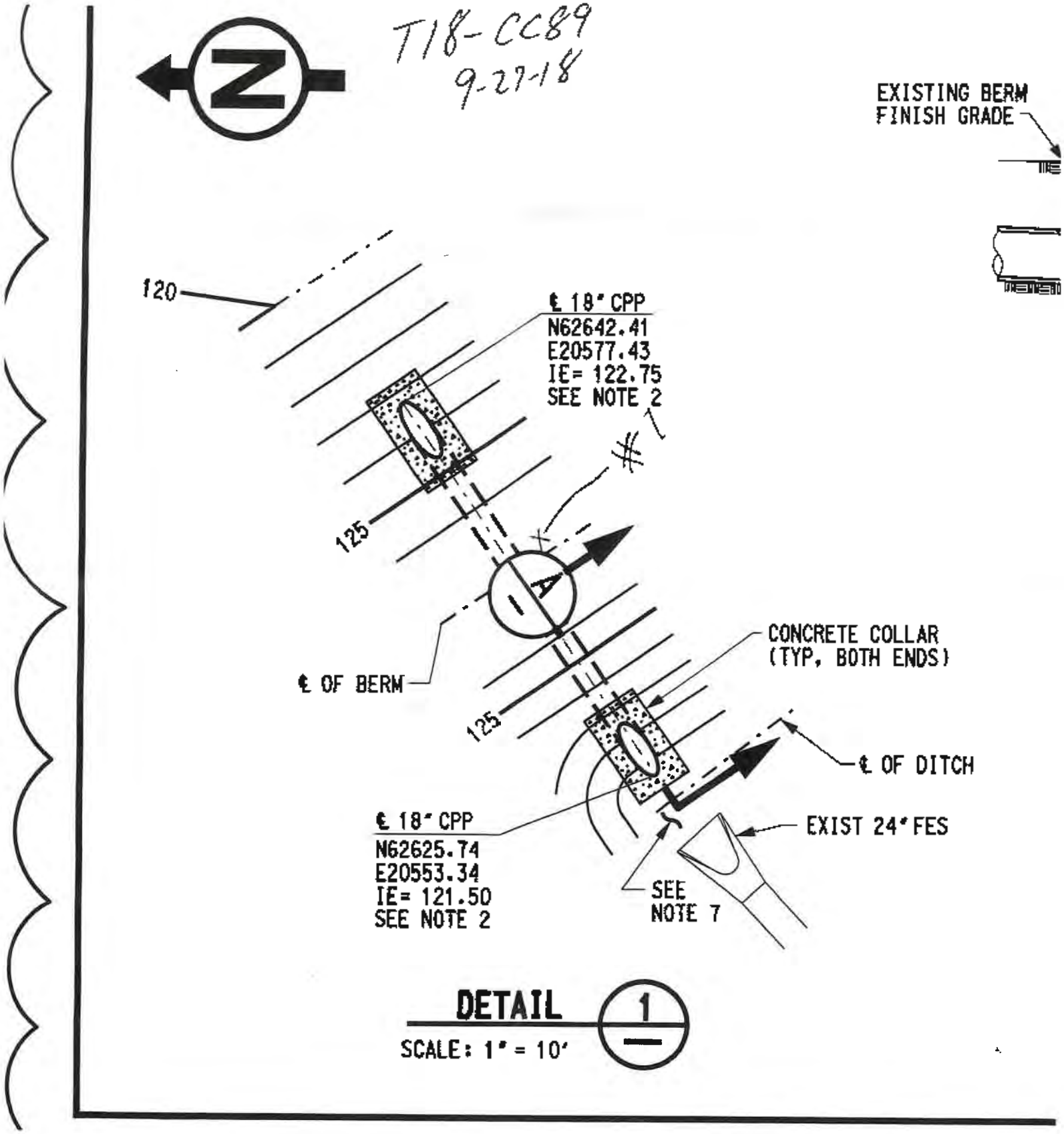
Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

9/27/18 #1 moist 9.1 Compaction 98.5%

T18-CC89 9-27-18



csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No.:	T18-DD02		
Date Issued:	October 1, 2018		
Date & Time of Test:	September 28, 2018 (9:00 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Warm	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Brownish-Tan Silty Clayey Sand (SIB Stockpile #4)

Proctor Density-Optimum Moisture: 116.7 pcf / 12.4% (mod.)

Test No.	2	3						
Course Level	Subgrade							
Area to Be	Over pipe							
Dry Density In-Place	113.0	113.3						
% Proctor Density	96.8	97.1						
Moisture Content	10.5	9.8						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer

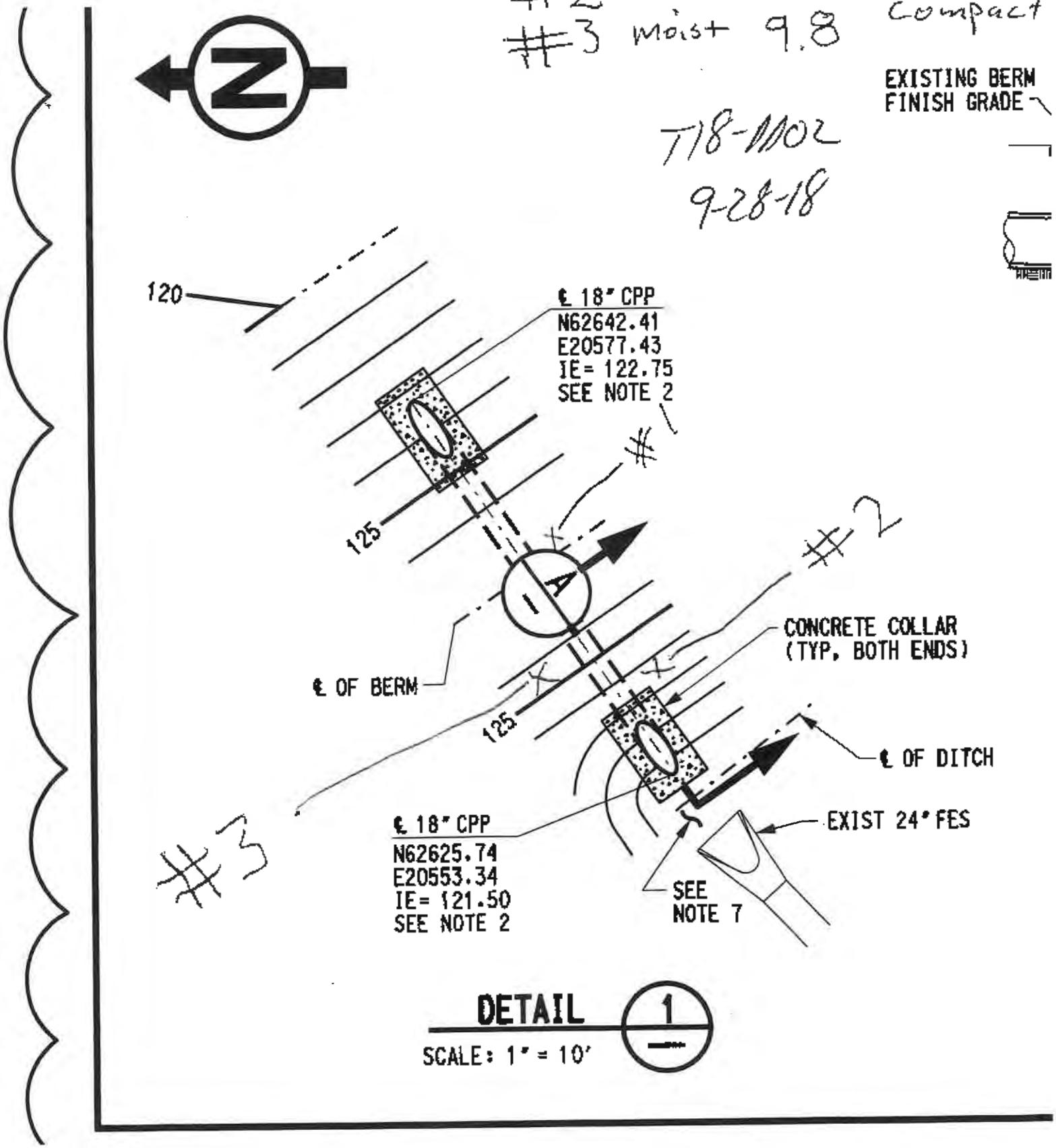
#1 moist 9.1 compacti

#2 moist 10.5 compacti

#3 moist 9.8 compact

T18-1102

9-28-18



DETAIL 1

SCALE: 1" = 10'

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No.:	T18-DD05
Date Issued:	October 1, 2018
Date & Time of Test:	September 28, 2018 (3:00 pm)

Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Warm	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Slightly Clayey Sand (SIB #1)

Proctor Density-Optimum Moisture: 122.1 pcf / 11.1% (mod.)

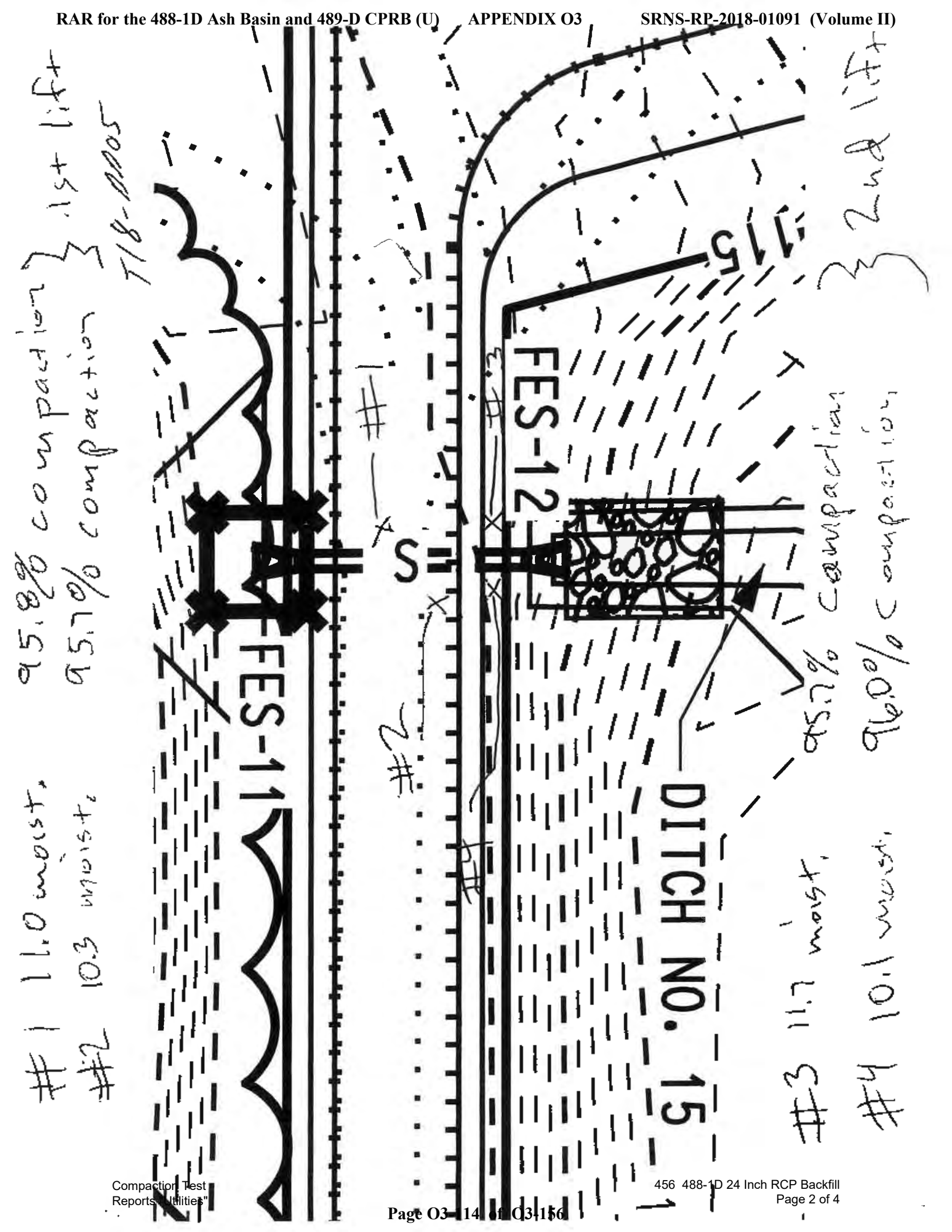
Test No.	1	2	3	4				
Course Level	1st lift		2nd lift					
Area to Be	Roadway							
Dry Density In-Place	117.0	116.8	116.8	117.2				
% Proctor Density	95.8	95.7	95.7	96.0				
Moisture Content	11.0	10.3	11.7	10.1				
% Compaction Required	95.0	95.0	95.0	95.0				
Conformance	✓	✓	✓	✓				
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer


FES-11
FES-12
DITCH NO. 15
#1 11.0 moist,
#2 10.3 moist,
95.8% compaction
95.7% compaction
T/B-Mod
1st lift
#3 11.7 moist,
#4 10.1 moist,
95.2% Compaction
96.0% Compaction
2nd lift

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No.:	T18-DD04
Date Issued:	October 1, 2018
Date & Time of Test:	September 29, 2018 (9:30 am) Saturday

Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Cloudy and Warm	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Slightly Clayey Sand (SIB #1)

Proctor Density-Optimum Moisture: 122.1 pcf / 11.1% (mod.)

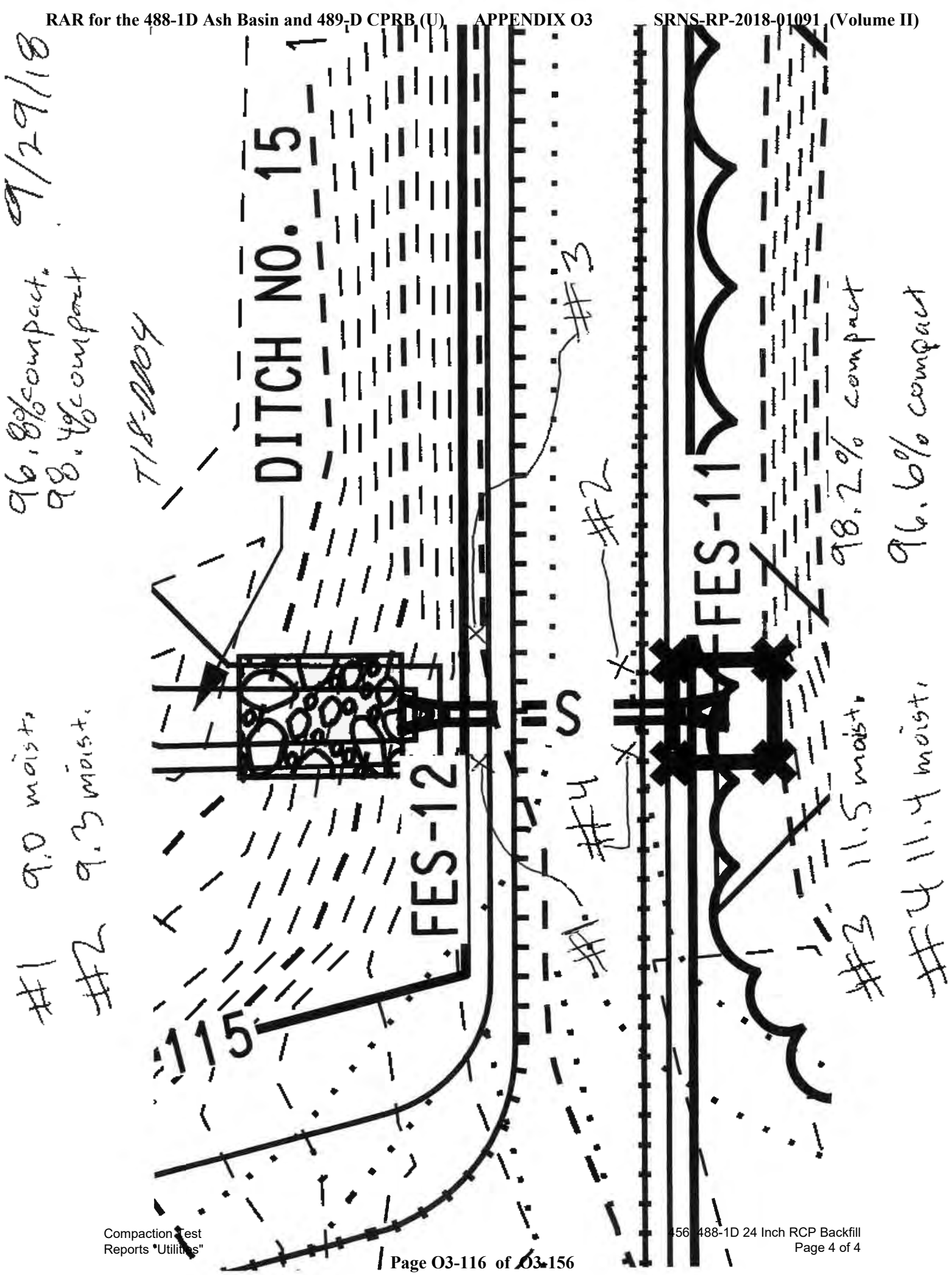
Test No.	1	2	3	4				
Course Level	3rd lift		4th lift					
Area to Be	Roadway							
Dry Density In-Place	118.2	120.1	119.9	117.9				
% Proctor Density	96.8	98.4	98.2	96.6				
Moisture Content	9.0	9.3	11.5	11.4				
% Compaction Required	95.0	95.0	95.0	95.0				
Conformance	✓	✓	✓	✓				
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer


DITCH NO. 15
FES-12
FES-11
115
#1 9.0 moist.
#2 9.3 moist.
#3 11.5 moist.
#4 11.4 moist.
96.8% compact.
98.4% compact
98.2% compact
96.6% compact
7/27/18

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No.:	T18-FF02
Date Issued:	October 4, 2018
Date & Time of Test:	October 3, 2018 (12:30 pm)

Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Hot	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (Processed West and South Material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1	2	3	4	5	6		
Course Level	1st lift		2nd lift		3rd lift			
Area to Be	RCP at southwest corner							
Dry Density In-Place	125.1	124.6	125.8	126.2	124.9	126.7		
% Proctor Density	97.5	97.1	98.1	98.4	97.3	98.8		
Moisture Content	12.4	13.8	12.5	10.4	10.0	9.8		
% Compaction Required	95.0	95.0	95.0	95.0	95.0	95.0		
Conformance	✓	✓	✓	✓	✓	✓		
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

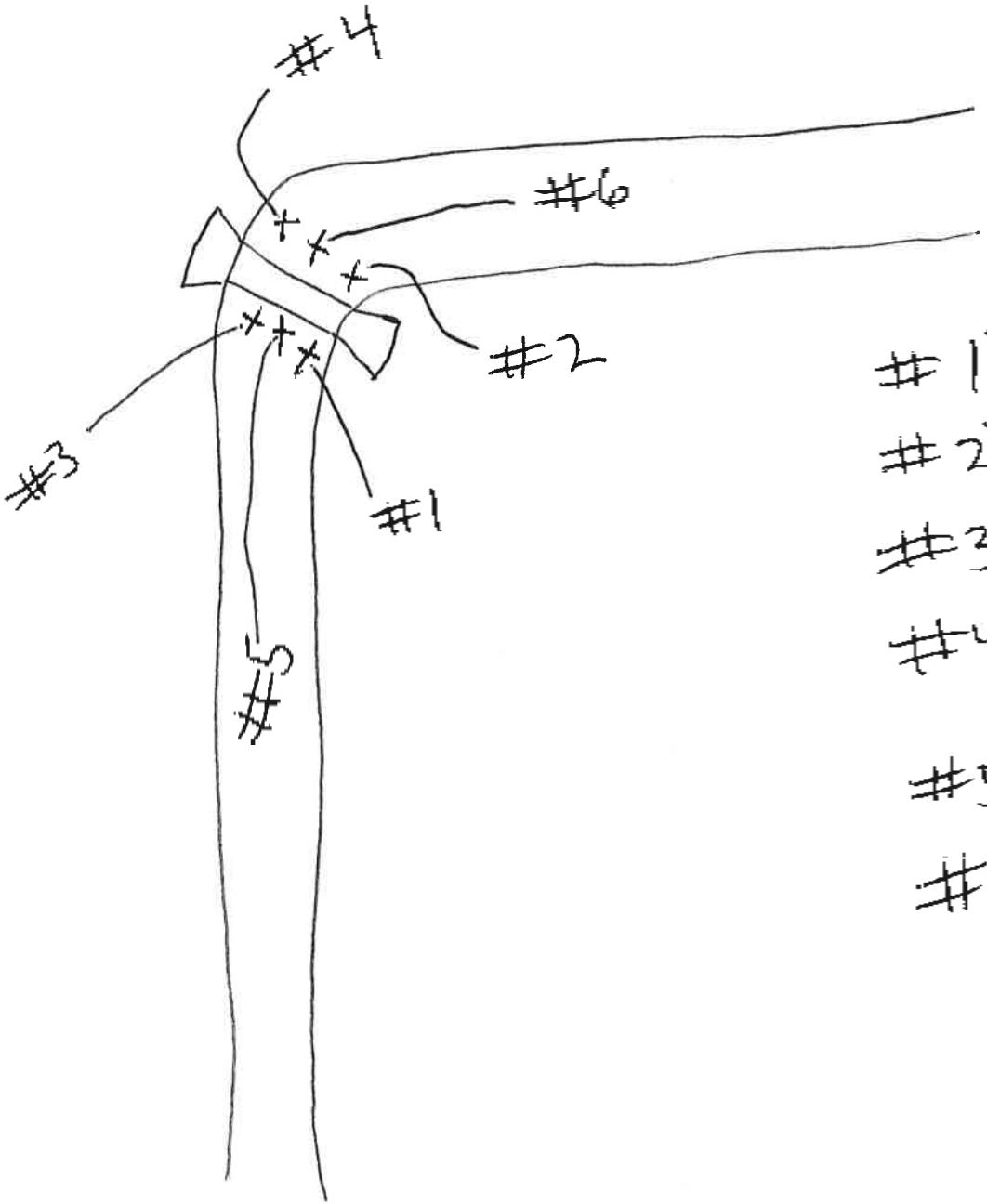
Chip Stewart, Technician

James M. Pope, P.E., Reviewer

36" RCP AT SW CORNER

10/3/18

Z →



		Compaction	
#1)	12.4 moist.	97.5%	1st lift
#2)	13.8 moist.	97.1%	
#3)	12.5 moist.	98.1%	2nd lift
#4)	10.4 moist.	98.4%	
#5)	10.0 moist.	97.3%	3rd lift
#6)	9.8 moist.	98.8%	

csra TESTING & ENGINEERING CO., INC.
1005 Emmett Street, Suite A, Augusta, Georgia 30904 • (706) 733-6960 • Fax (706) 737-0629

Report No.:	T18-FF23		
Date Issued:	October 5, 2018		
Date & Time of Test:	October 4, 2018 (9:30 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Warm	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (WB #1)

Proctor Density-Optimum Moisture: 125.7 pcf / 9.1% (mod.)

Test No.	7	8						
Course Level	4th lift							
Area to Be	Backfill over pipe-roadway							
Dry Density In-Place	122.8	125.1						
% Proctor Density	97.7	99.5						
Moisture Content	9.8	9.2						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

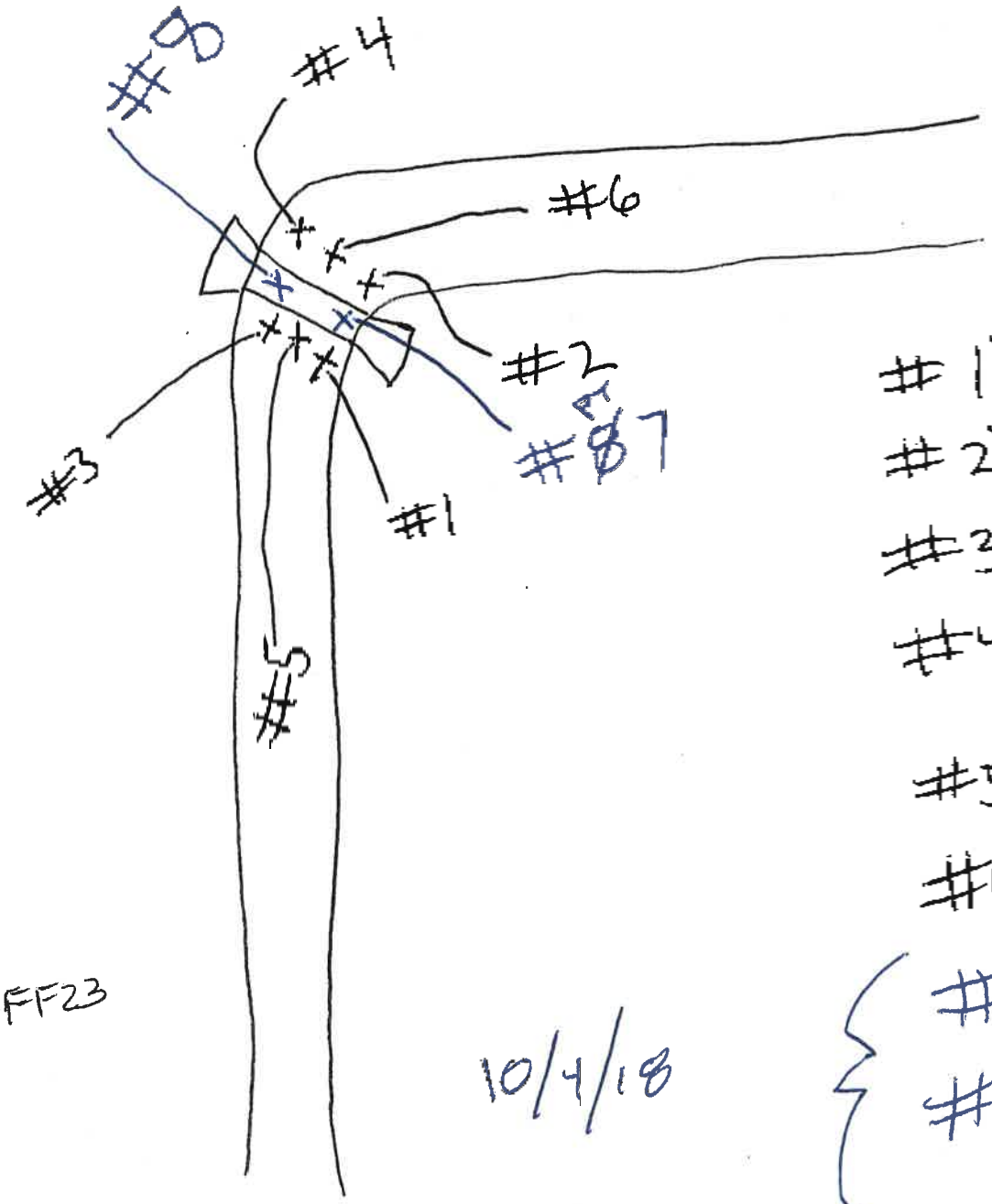
Branon Mitchell, Technician

James M. Pope, P.E., Reviewer

36" RCP AT SW CORNER

10/3/18

Z →



		Compaction	
#1)	12.4 moist.	97.5%	1st lift
#2)	13.8 moist	97.1%	
#3)	12.5 moist,	98.1%	2nd lift
#4)	10.4 moist.	98.4%	
#5)	10.0 moist.	97.3%	3rd lift
#6)	9.8 moist.	98.8%	
#7)	9.8 moist.	97.7%	4th lift over pipe
#8)	9.2 moist.	99.5%	

T18-FF23

10/4/18

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-J93		
Date Issued:	March 8, 2018		
Date & Time of Test:	March 5, 2018 (2:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1	2	3	4				
Course Level	Lift 1		Lift 2					
Area to Be	CB10 pipe							
Dry Density In-Place	126.2	127.3	126.2	127.5				
% Proctor Density	98.4	99.2	98.4	99.4				
Moisture Content	10.1	9.8	10.1	11.9				
% Compaction Required	95.0	95.0	95.0	95.0				
Conformance	✓	✓	✓	✓				
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Remarks: Technician observed an empty water truck proofroll location PR2 on PRLW. Area observed was firm and stable with no signs of pumping.

Serial No. of Troxler: 25694

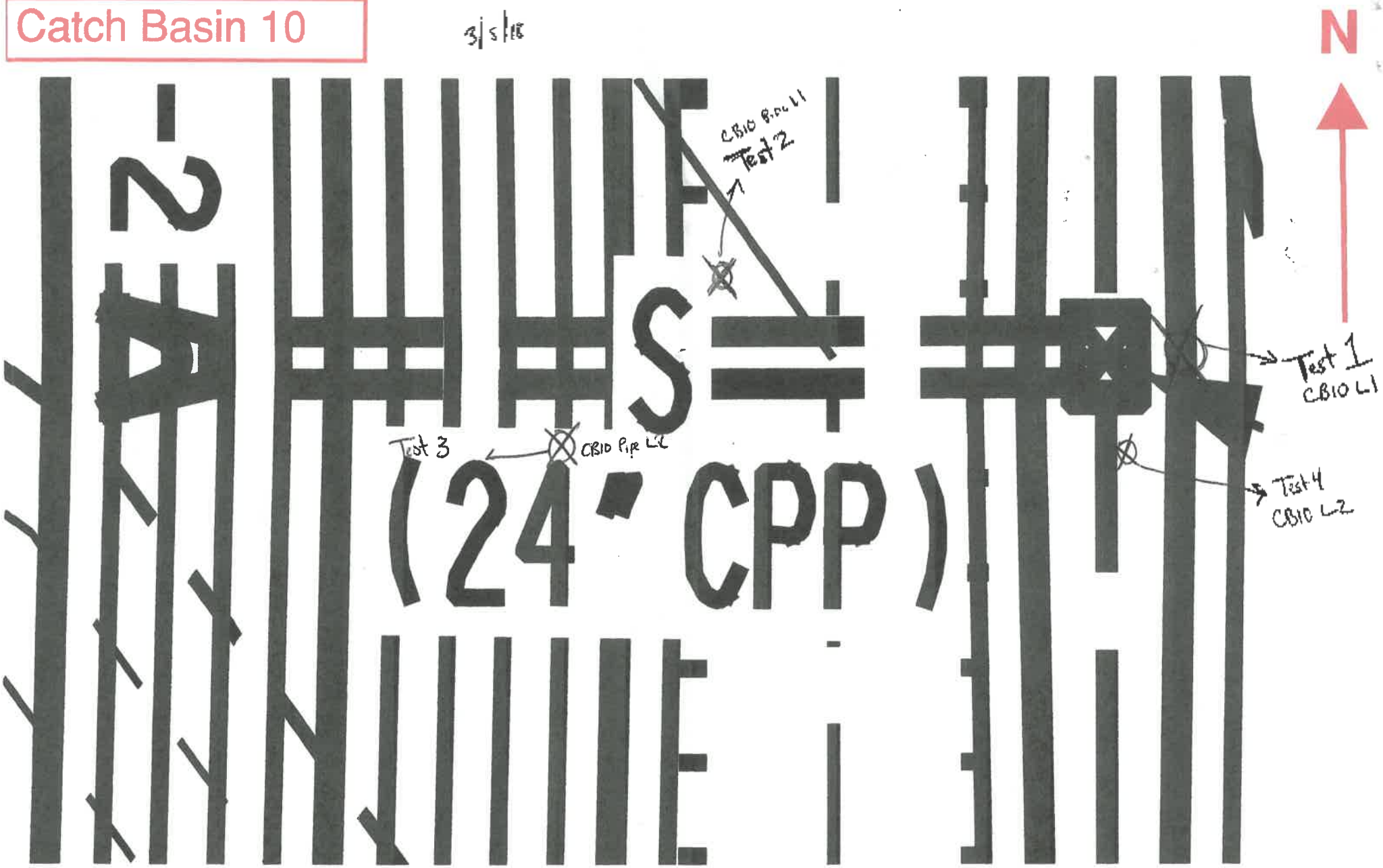
Branon Mitchell, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

Catch Basin 10

3/5/18



Test 1
CB10 L1
ρ: 98.4% M: 10.1%

Test 2
CB10 Pipe L1
ρ: 99.2% M: 9.8%

Test 3
CB10 Pipe L2
ρ: 98.4% M: 10.1%

Test 4
CB10 L2
ρ: 99.4% M: 11.9%

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-J89		
Date Issued:	March 8, 2018		
Date & Time of Test:	March 6, 2018 (8:30 am & 9:30 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

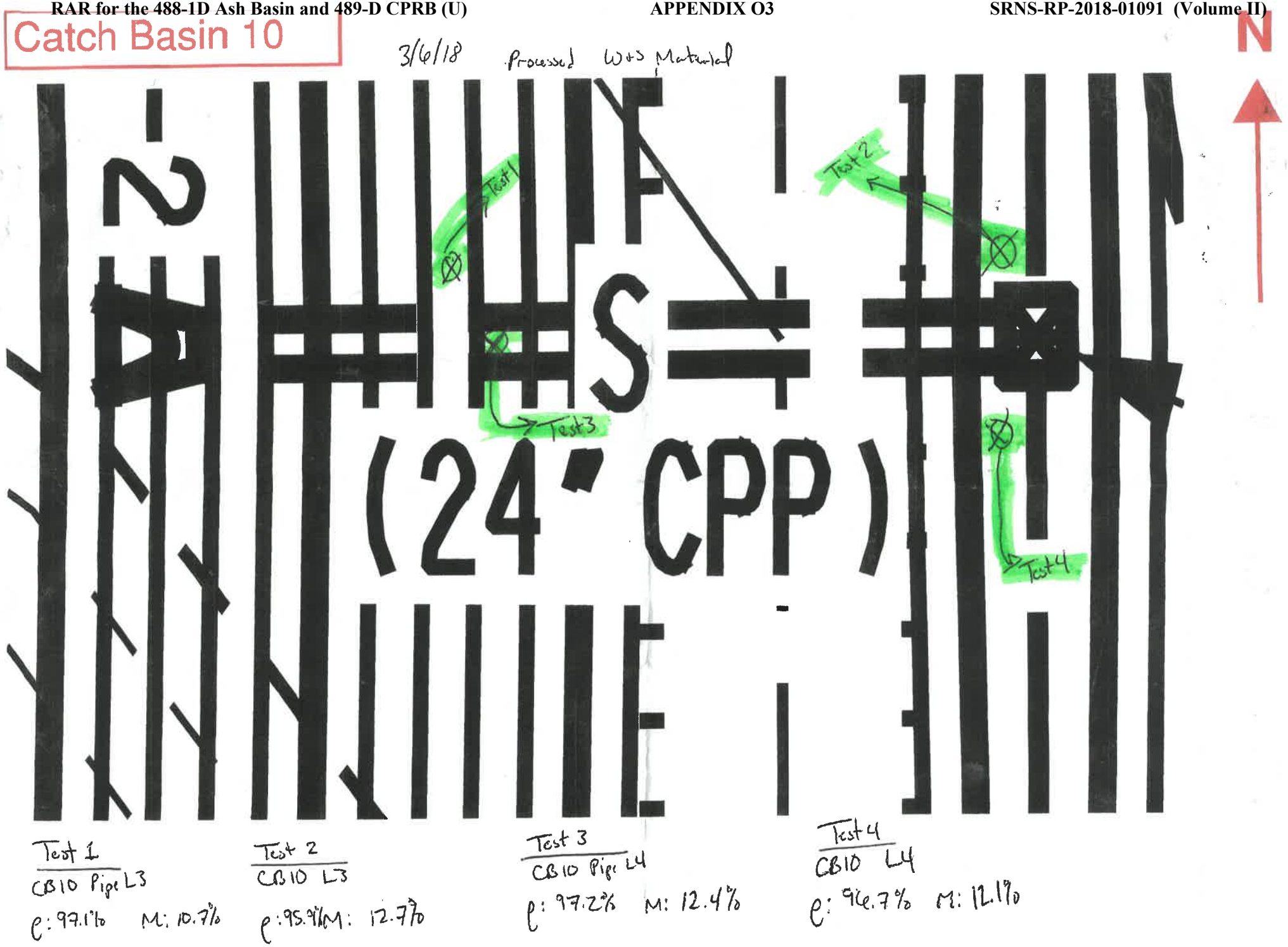
Test No.	1	2	3	4				
Course Level	Lift 3		Lift 4					
Area to Be	CB 10 pipe	CB 10	CB 10 pipe	CB 10				
Dry Density In-Place	124.8	123.2	124.9	124.2				
% Proctor Density	97.1	95.9	97.2	96.7				
Moisture Content	10.7	12.7	12.4	12.1				
% Compaction Required	95.0	95.0	95.0	95.0				
Conformance	✓	✓	✓	✓				
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer


Catch Basin 10
3/6/18 Processed W+S Material
N
Test 1
Test 2
Test 3
Test 4
(24" CPP)
Test 1
CB10 Pipe L3
ρ: 97.1% M: 10.7%
Test 2
CB10 L3
ρ: 95.9% M: 12.7%
Test 3
CB10 Pipe L4
ρ: 97.2% M: 12.4%
Test 4
CB10 L4
ρ: 96.7% M: 12.1%

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-K54		
Date Issued:	March 12, 2018		
Date & Time of Test:	March 8, 2018 (1:00 pm - 5:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1	2	3					
Course Level	Lift 5		Lift 6					
Area to Be	CB10	CB10 pipe	CB10					
Dry Density In-Place	127.0	126.4	126.4					
% Proctor Density	99.1	98.5	98.5					
Moisture Content	12.3	10.1	10.3					
% Compaction Required	95.0	95.0	95.0					
Conformance	✓	✓	✓					
Non Conformance								
Sand Cone								

Locations: Please see attached map.

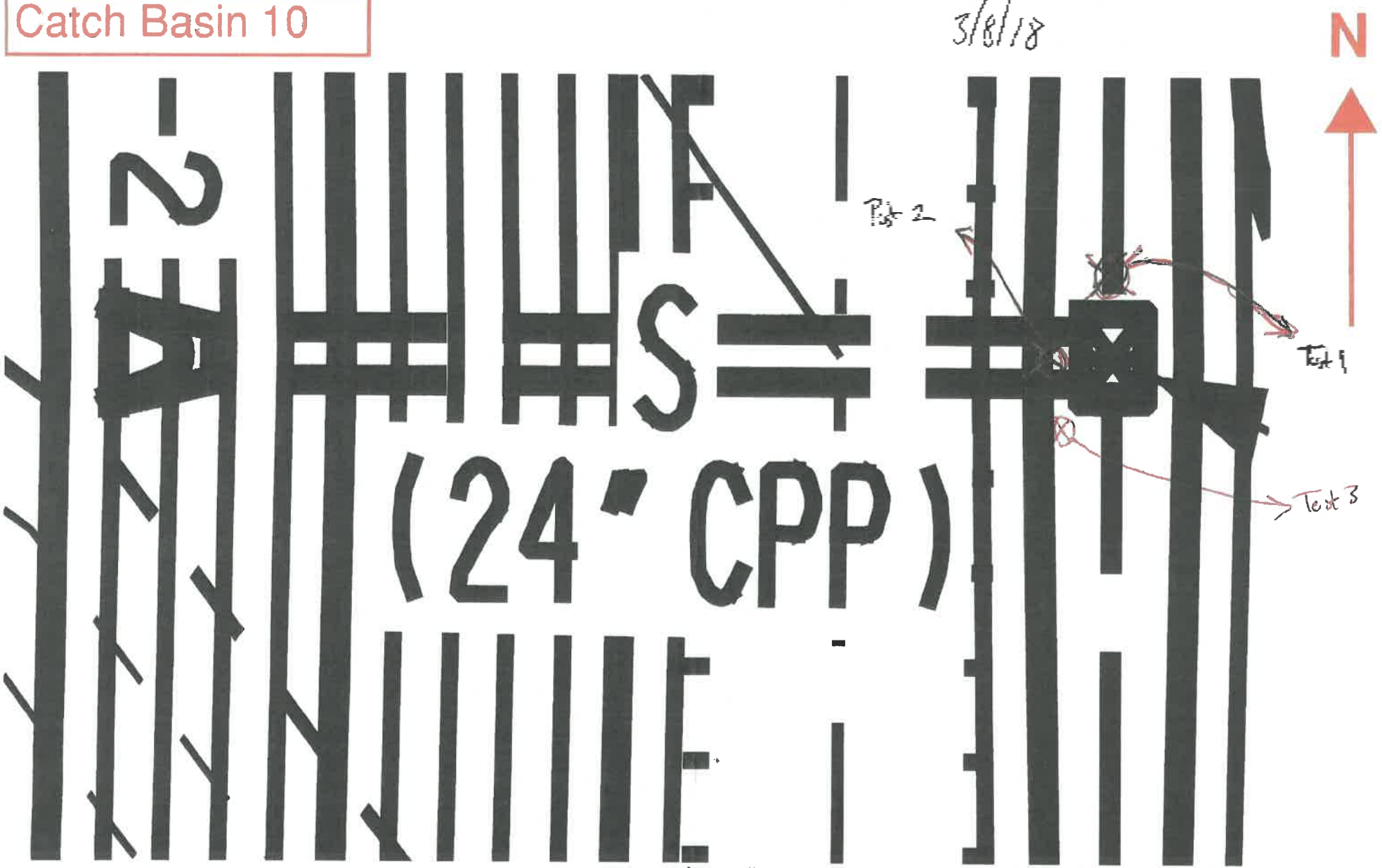
Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Catch Basin 10

3/8/18



Test 1
CB10 ~~C4~~ L5
ρ: 99.1 M: 12.3%

Test 2
CB10 Pipe L5
ρ: 98.5 M: 10.1%

Test 3
CB10 L6
ρ: 98.5 M: 10.3%

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Fax (706) 737-0629

Report No.:	T18-L06		
Date Issued:	March 16, 2018		
Date & Time of Test:	March 15, 2018 (8:00 am - 5:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

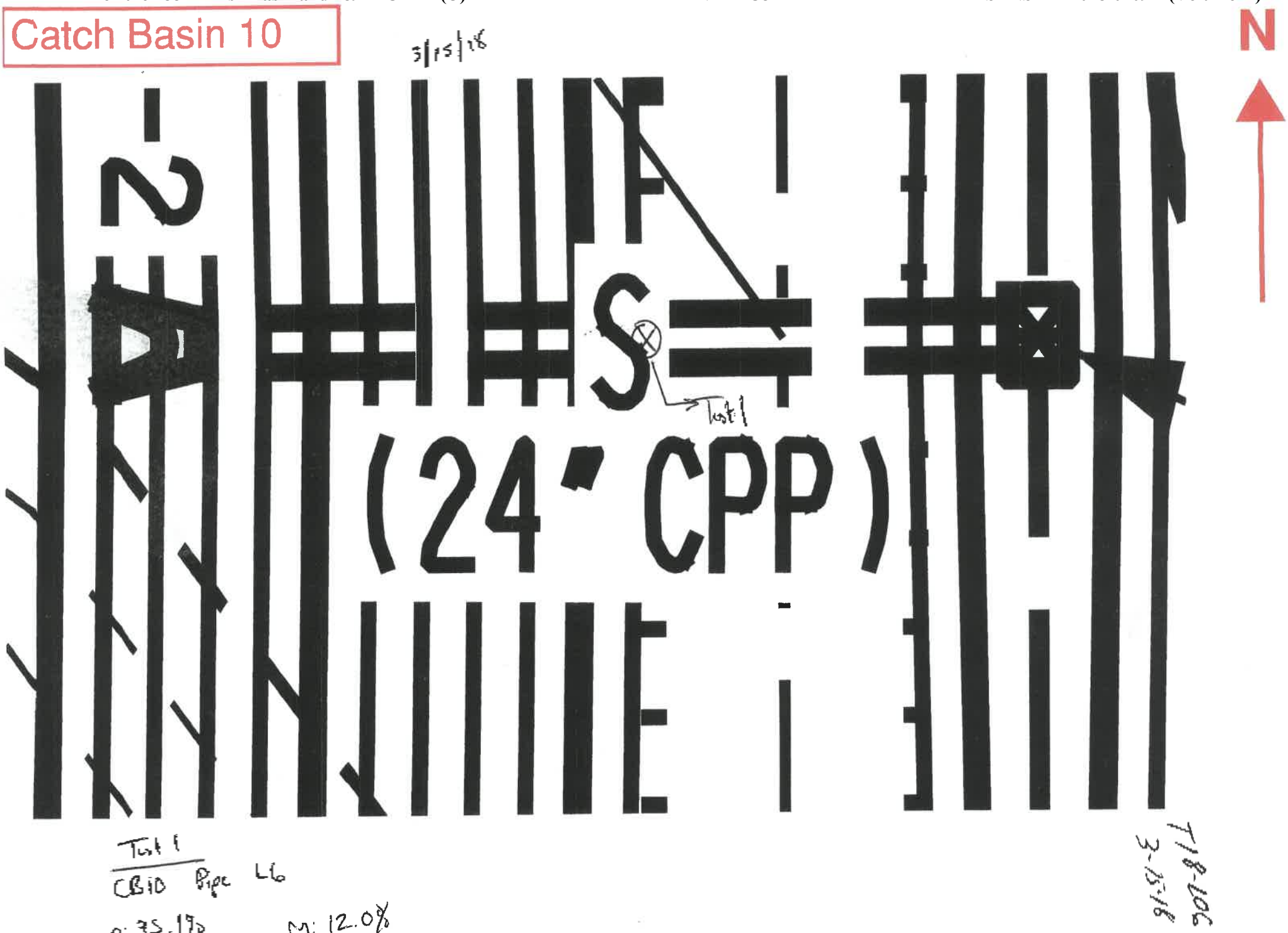
Test No.	1							
Course Level	Lift 6							
Area to Be	CB 10							
Dry Density In-Place	122.0							
% Proctor Density	95.1							
Moisture Content	12.0							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer



Compaction Test Reports "Utilities"

463-488-1D Catch Basin 10 Backfill
Page 8 of 8

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Fax (706) 737-0629

Report No.:	T18-K55		
Date Issued:	March 12, 2018		
Date & Time of Test:	March 8, 2018 (1:00 pm - 5:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1							
Course Level	Lift 1							
Area to Be	CB 11 pipe							
Dry Density In-Place	123.4							
% Proctor Density	96.2							
Moisture Content	9.1							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: Please see attached map.

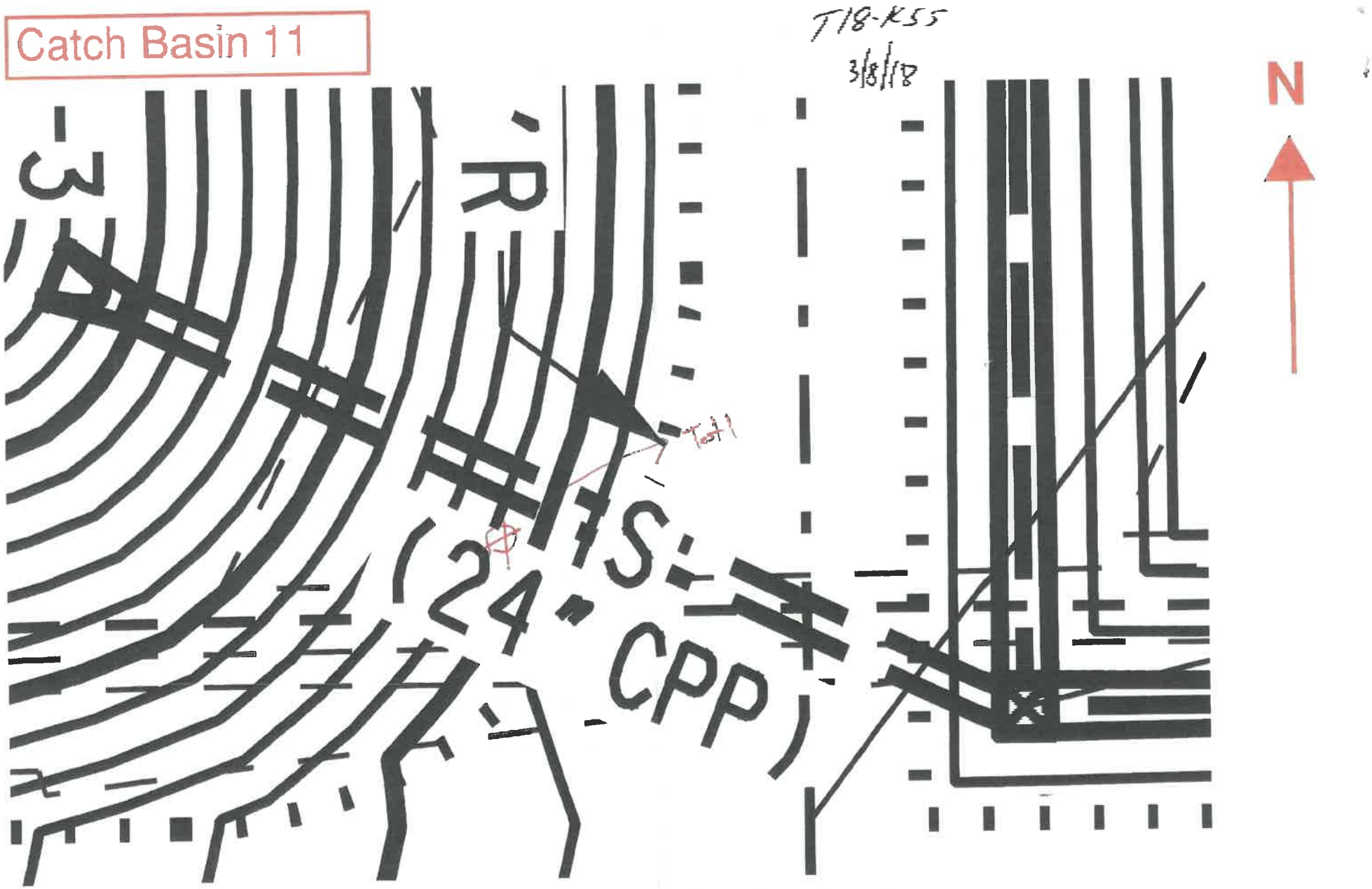
Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Catch Basin 11

T18-K55
3/8/18



Test 1
CB 11 Backfill
S: 96.2 M: 7.1 %

Compaction Test Reports "Utilities"

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Report No.:	T18-K51		
Date Issued:	March 12, 2018		
Date & Time of Test:	March 9, 2018 (8:00 am - 4:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1	2	3	4	5	6		
Course Level	Lift 1	Lift 2		Lift 3		Lift 4		
Area to Be	CB11		CB11 pipe	CB11	CB11 pipe	CB11		
Dry Density In-Place	126.0	127.1	126.3	125.7	124.4	123.8		
% Proctor Density	98.2	99.1	98.4	98.1	97.1	96.5		
Moisture Content	10.3	10.0	10.4	12.9	12.9	12.5		
% Compaction Required	95.0	95.0	95.0	95.0	95.0	95.0		
Conformance	✓	✓	✓	✓	✓	✓		
Non Conformance								
Sand Cone								

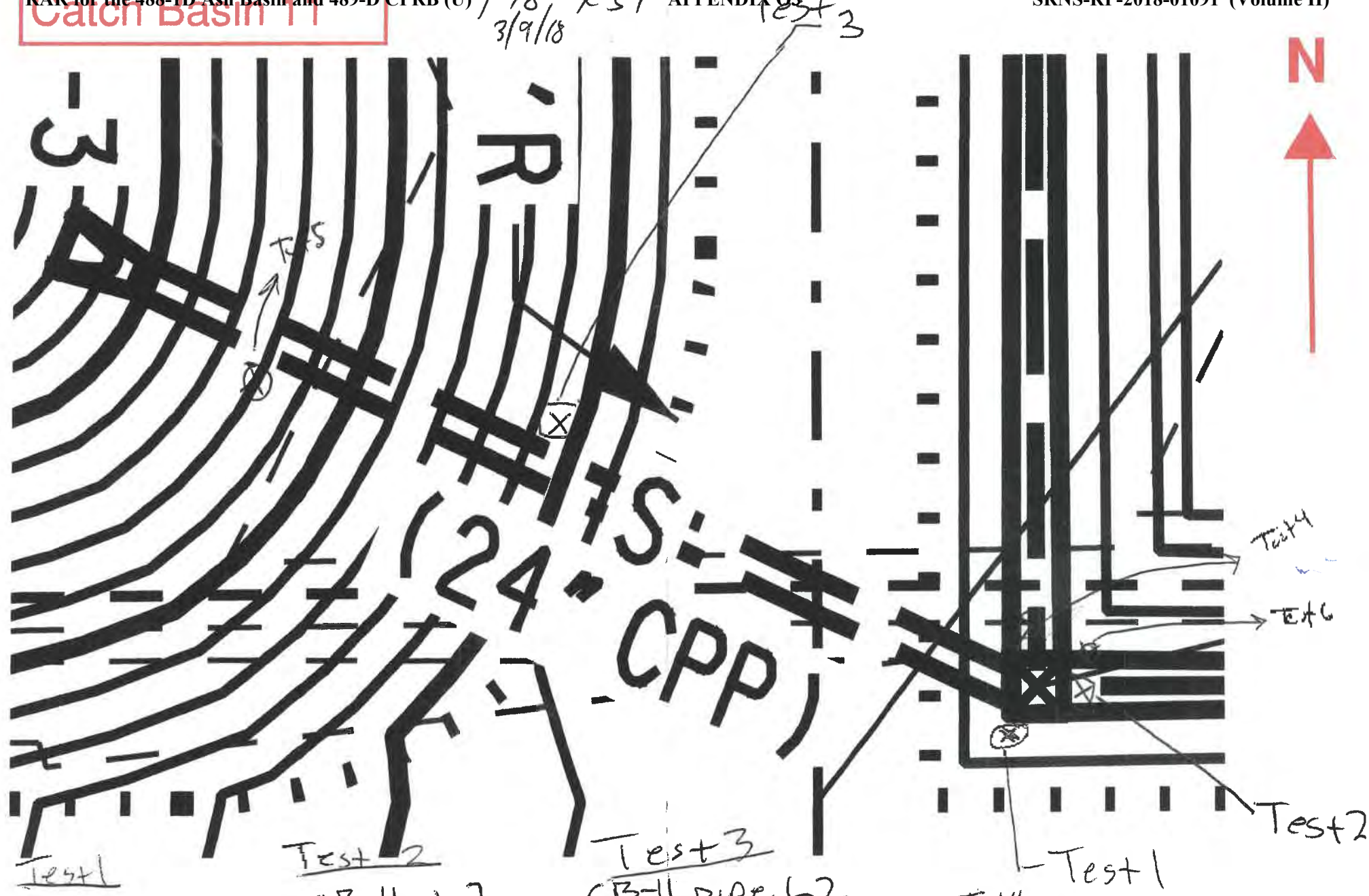
Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Catch Basin 11



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Fax (706) 737-0629

Report No.:	T18-L04		
Date Issued:	March 16, 2018		
Date & Time of Test:	March 15, 2018 (8:00 am - 5:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

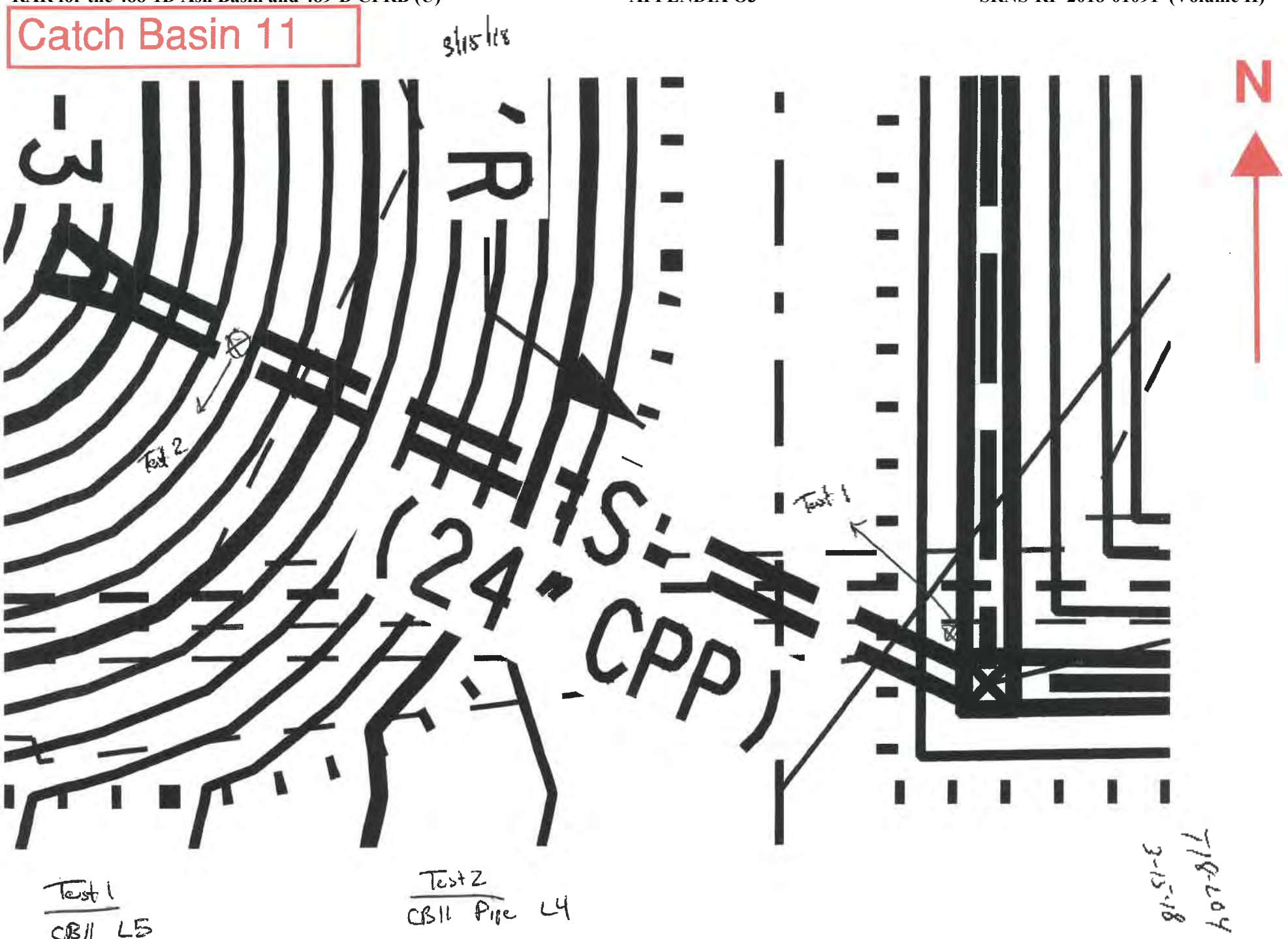
Test No.	1	2						
Course Level	Lift 5	Lift 4						
Area to Be	CB 11							
Dry Density In-Place	123.7	122.0						
% Proctor Density	96.4	95.1						
Moisture Content	12.3	10.2						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer


Catch Basin 11
3/15/18
N
Test 2
Test 1
(24" CPP)
Test 1
CB11 L5
ρ: 96.4% M: 12.3%
Test 2
CB11 Pipe L4
ρ: 95.1% M: 10.2%
T18-004
3-15-18

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Report No.:	T18-M74 (Page 1 of 2)		
Date Issued:	March 30, 2018		
Date & Time of Test:	March 28, 2018 (8:00 am - 5:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Warm	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1	2	3	4	5	6	7	8
Course Level	Lift 5	Lift 6	Lift 7	Lift 6	Lift 8	Lift 7	Lift 9	Lift 8
Area to Be	CB 11 pipe	CB 11		CB 11 pipe	CB 11	CB 11 pipe	CB 11	CB 11 pipe
Dry Density In-Place	126.1	126.9	125.7	126.4	125.4	125.1	124.4	125.6
% Proctor Density	98.3	98.9	98.0	98.5	97.7	97.5	97.0	97.9
Moisture Content	9.9	11.1	13.2	12.7	13.0	12.9	12.8	12.3
% Compaction Required	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0
Conformance	✓	✓	✓	✓	✓	✓	✓	✓
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

csra TESTING AND ENGINEERING CO., INC.

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Report No.:	T18-M74 (Page 2 of 2)
Date Issued:	March 30, 2018
Date & Time of Test:	March 28, 2018 (8:00 am - 5:00 pm)

Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Warm	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	9	10						
Course Level	Lift 10	Lift 9						
Area to Be	CB 11	CB 11 pipe						
Dry Density In-Place	124.8	123.6						
% Proctor Density	97.3	96.3						
Moisture Content	11.1	13.6						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

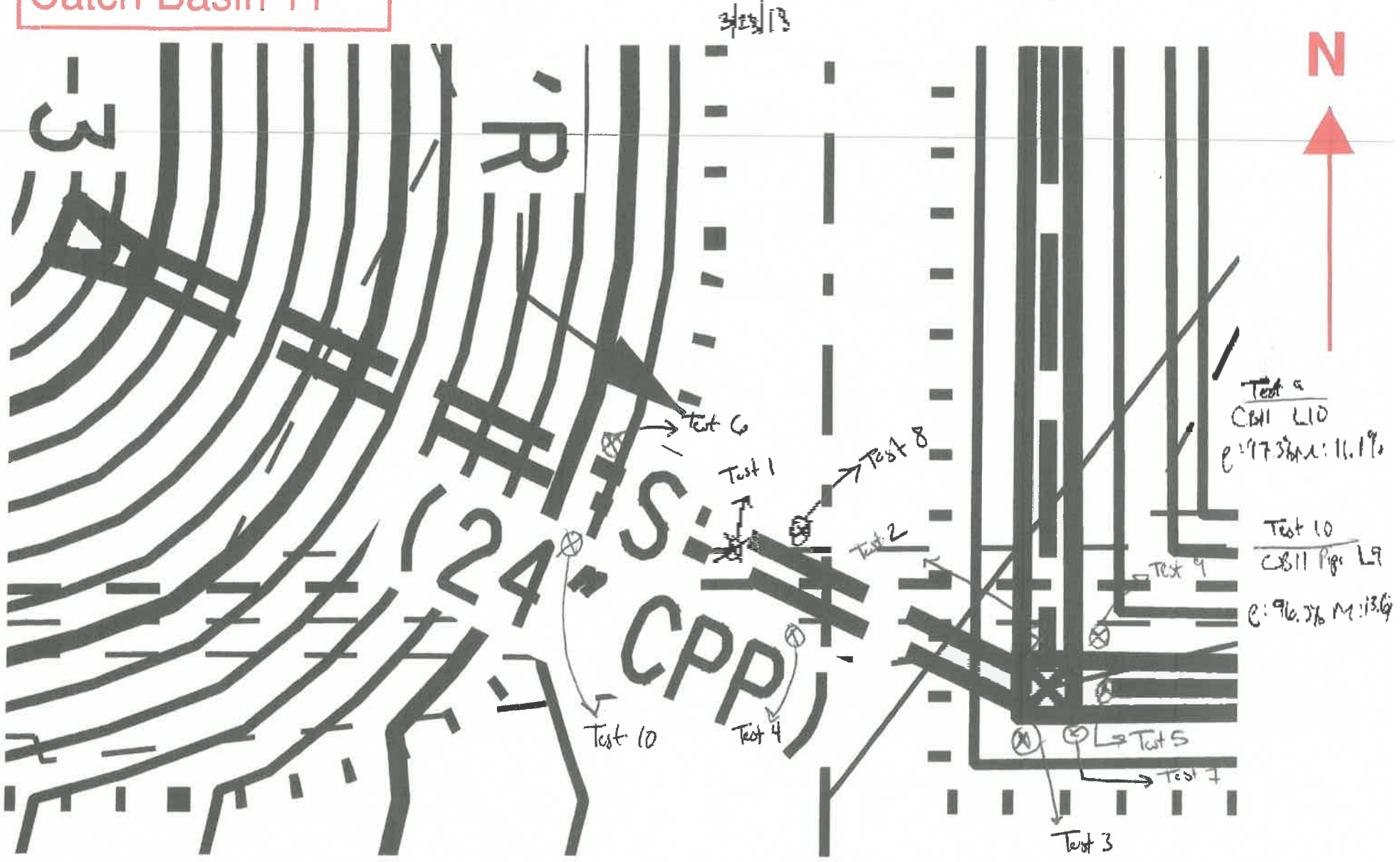
Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Catch Basin 11



Test 1
CB11 Pipe L5
ρ: 98.3% M: 9.9%

Test 2
CB11 L6
ρ: 98.9% M: 11.1%

Test 3
CB11 L7
ρ: 98.0% M: 13.2%

Test 4
CB11 Pipe L6
ρ: 98.5% M: 12.7%

Test 7.
CB11 L9
ρ: 97.0% M: 12.8%

Test 5
CB11 L8
ρ: 97.7% M: 13.0%

Test 6
CB11 Pipe L7
ρ: 97.5% M: 12.9%

Test 8 CB11 Pipe L8
ρ: 97.9% M: 13.0%

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Report No.:	T18-Q53		
Date Issued:	April 19, 2018		
Date & Time of Test:	April 18, 2018 (1:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1	2	3	4	5			
Course Level	Lift 1	Lift 2	Lift 3	Lift 4	Lift 5			
Area to Be	CB11 R							
Dry Density In-Place	123.2	122.6	123.8	125.4	126.9			
% Proctor Density	96.0	95.6	96.5	97.7	98.9			
Moisture Content	13.9	13.9	13.5	11.9	13.3			
% Compaction Required	95.0	95.0	95.0	95.0	95.0			
Conformance	✓	✓	✓	✓	✓			
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

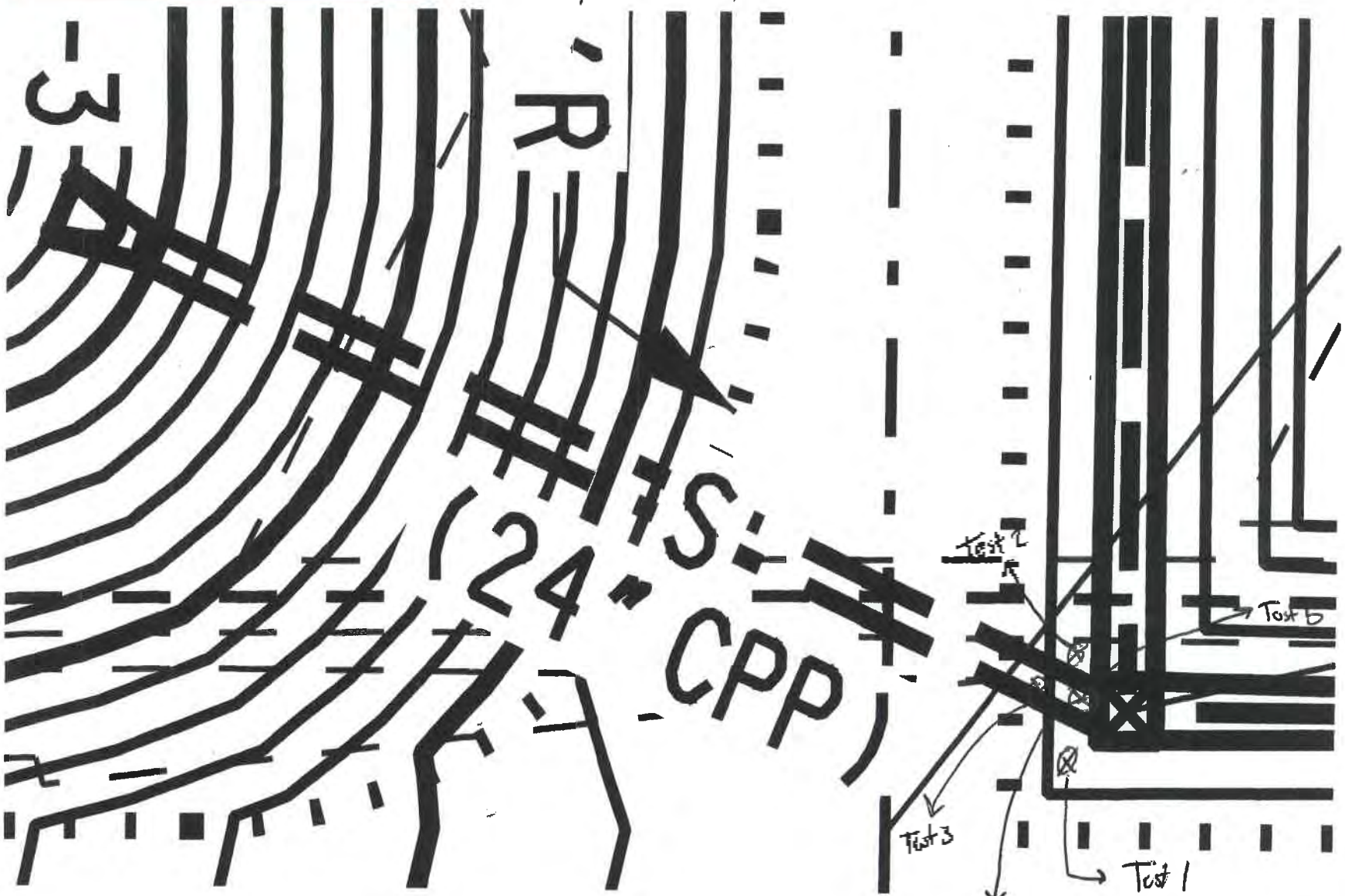
Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Catch Basin 11

4/18/18

T18-Q53



CB11 L1 R1

ρ: 96.0% M: 13.9%

CB11 L2 R1

ρ: 95.6% M: 13.9%

CB11 L5 R1

ρ: 98.9% M: 13.3%

CB11 L3 R1

ρ: 97.8% M: 13.5%

CB11 L4 R1

ρ: 97.7% M: 11.9%

csra TESTING AND ENGINEERING CO., INC.

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Report No.:	T18-Q91		
Date Issued:	April 20, 2018		
Date & Time of Test:	April 19, 2018 (3:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1							
Course Level	Lift 6							
Area to Be	CBR 11 R1							
Dry Density In-Place	122.4							
% Proctor Density	95.4							
Moisture Content	11.9							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: Please see attached map.

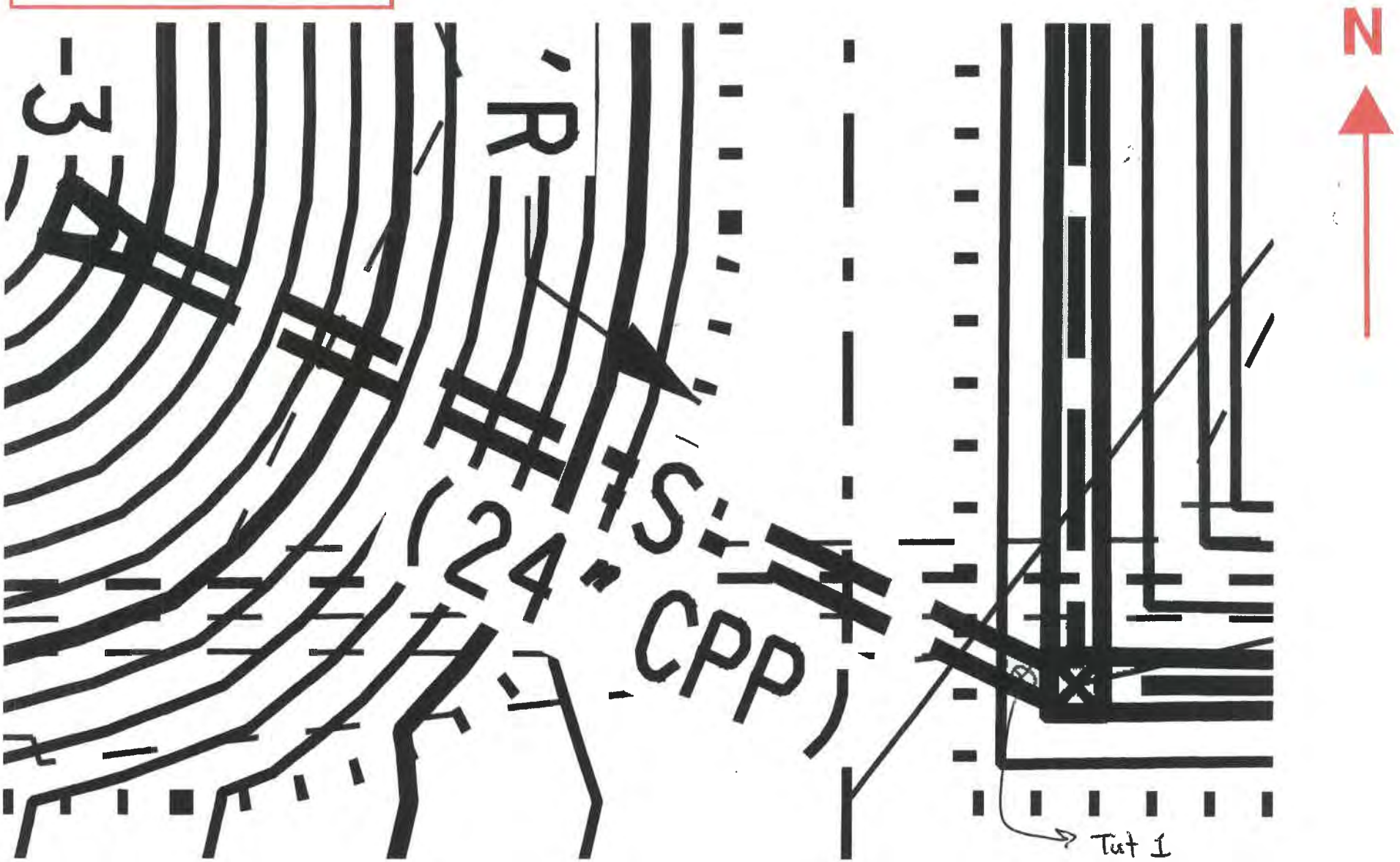
Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

Catch Basin 11



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Report No.:	T18-K52 (Page 1 of 2)		
Date Issued:	March 12, 2018		
Date & Time of Test:	March 9, 2018 (8:00 am - 4:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1	2	3	4	5	6	7	8
Course Level	Lift 1		Lift 2		Lift 3		Lift 4	
Area to Be	CB12 pipe	CB12	CB12 pipe	CB12		CB12 pipe	CB12	CB12 pipe
Dry Density In-Place	125.4	126.7	126.3	126.9	125.1	126.8	125.8	125.4
% Proctor Density	97.7	98.8	98.4	98.9	97.5	98.8	98.1	97.7
Moisture Content	12.6	10.9	12.5	12.5	9.7	10.7	10.9	11.5
% Compaction Required	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0
Conformance	✓	✓	✓	✓	✓	✓	✓	✓
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

csra TESTING AND ENGINEERING CO., INC.

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(706) 733-6960
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Report No.:	T18-K52 (Page 2 of 2)
Date Issued:	March 12, 2018
Date & Time of Test:	March 9, 2018 (8:00 am - 4:00 pm)

Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

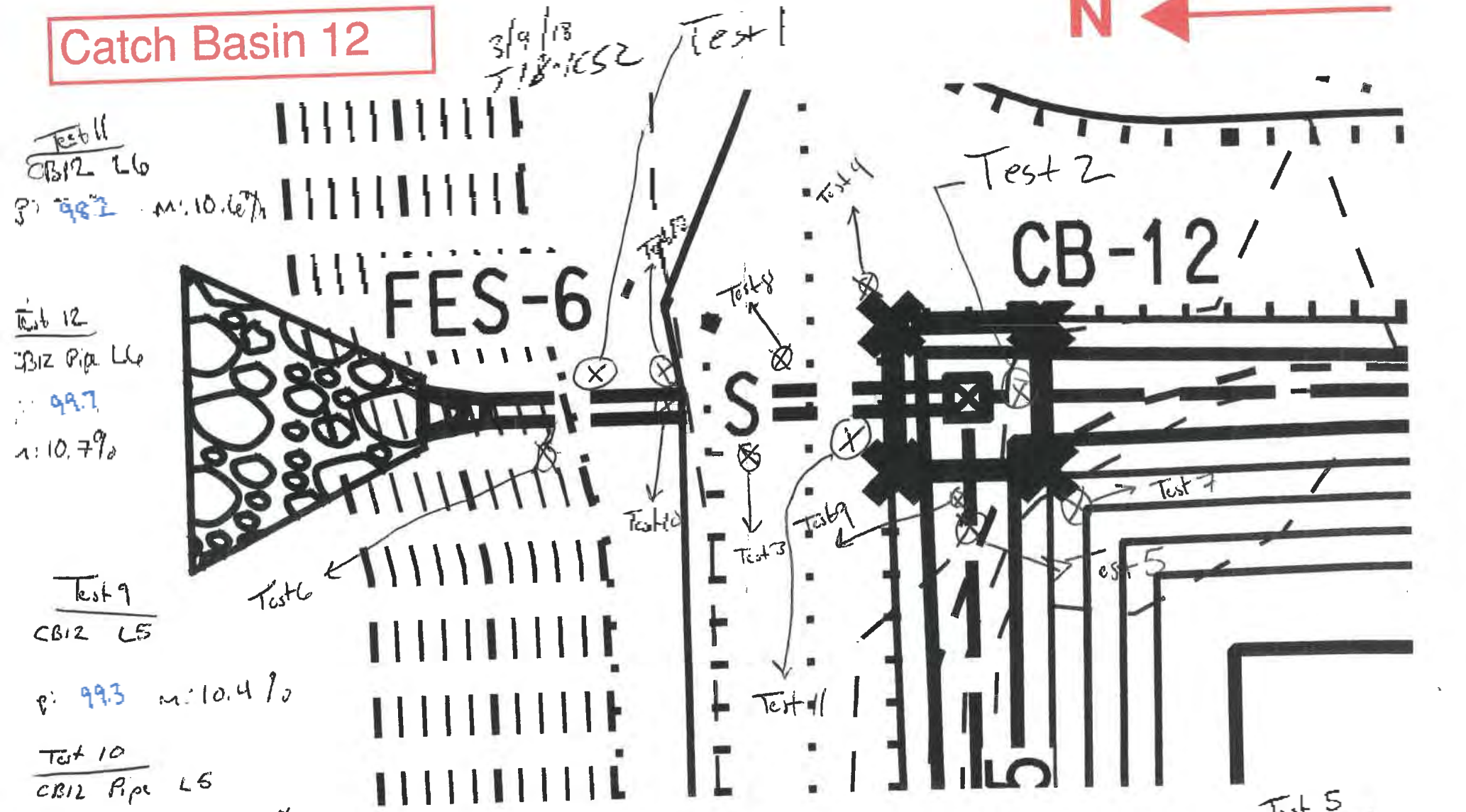
Test No.	9	10	11	12				
Course Level	Lift 5		Lift 6					
Area to Be	CB12	CB12 pipe	CB12	CB12 pipe				
Dry Density In-Place	127.4	126.7	126.0	127.9				
% Proctor Density	99.3	98.8	98.2	99.7				
Moisture Content	10.4	12.2	10.6	10.7				
% Compaction Required	95.0	95.0	95.0	95.0				
Conformance	✓	✓	✓	✓				
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer



Test 12
CB12 Pipe L6
ρ: 99.7
M: 10.7%

Test 11
CB12 L6
ρ: 98.2 M: 10.6%

Test 9
CB12 L5
ρ: 99.3 M: 10.4%

Test 10
CB12 Pipe L6
ρ: 98.8 M: 12.2%

Test 1
CB12 Pipe L1
ρ 97.7 M 12.6%

Test 2
CB12 L1
ρ 98.8% M 10.9%

Test 6
CB12
ρ: 98.8 M: 10.7%

Test 3
CB12 Pipe L2
ρ: 98.4 M: 12.5%

Test 7
CB12 L4
ρ: 98.1 M: 10.9%

Test 4
CB12 L2
ρ: 98.9 M: 12.5%

Test 8
CB12 Pipe L4
ρ: 97.7 M: 11.5%

Test 5
CB12 L3
ρ: 97.5 M: 9.7%

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Report No.:	T18-L02		
Date Issued:	March 16, 2018		
Date & Time of Test:	March 15, 2018 (1:00 pm - 4:30 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

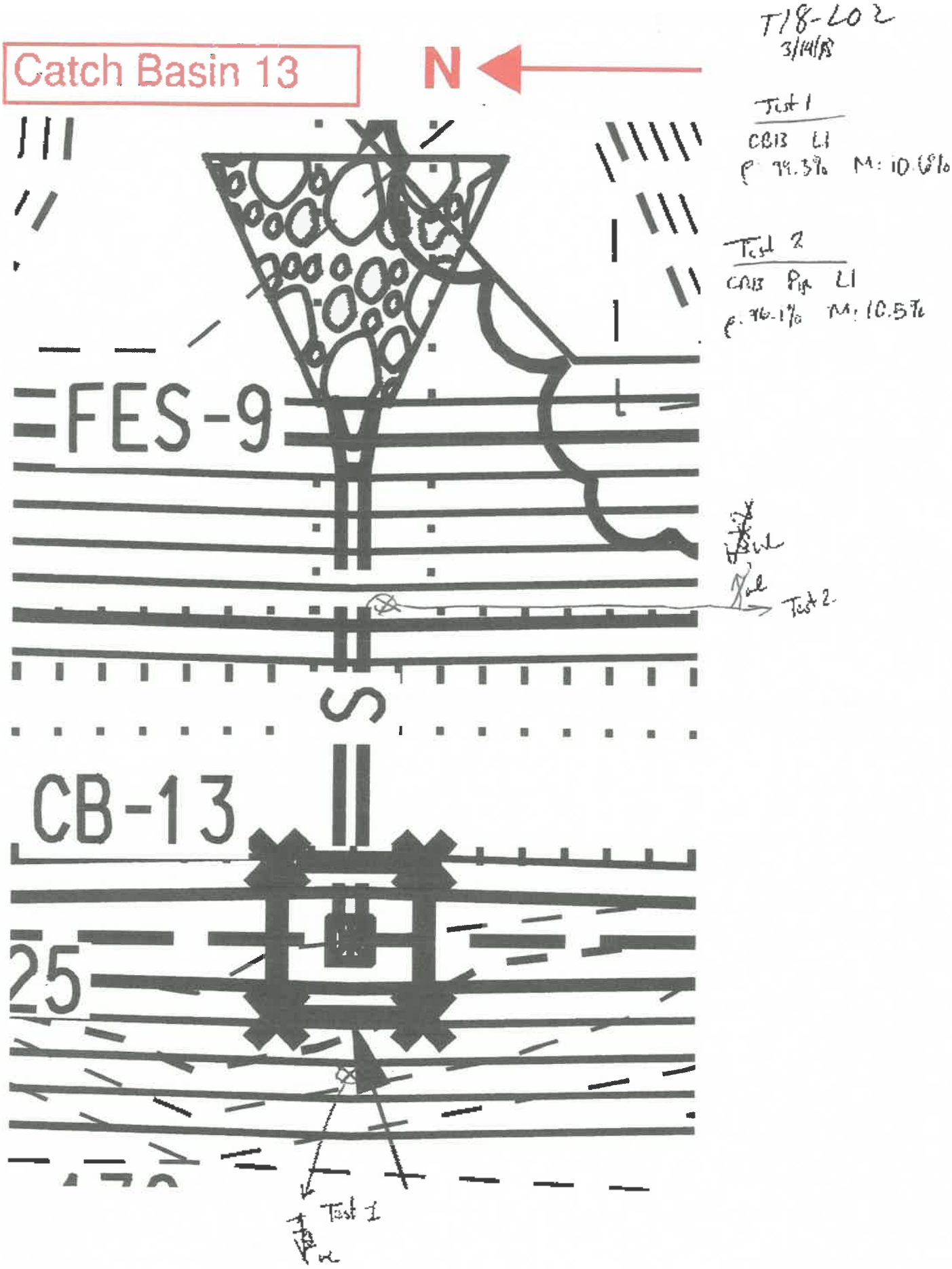
Test No.	1	2	3	4				
Course Level	Lift 1							
Area to Be	CB 13		CB 14					
Dry Density In-Place	127.4	123.3	125.9	125.1				
% Proctor Density	99.3	96.1	98.1	97.5				
Moisture Content	10.6	10.5	10.3	10.6				
% Compaction Required	95.0	95.0	95.0	95.0				
Conformance	✓	✓	✓	✓				
Non Conformance								
Sand Cone								

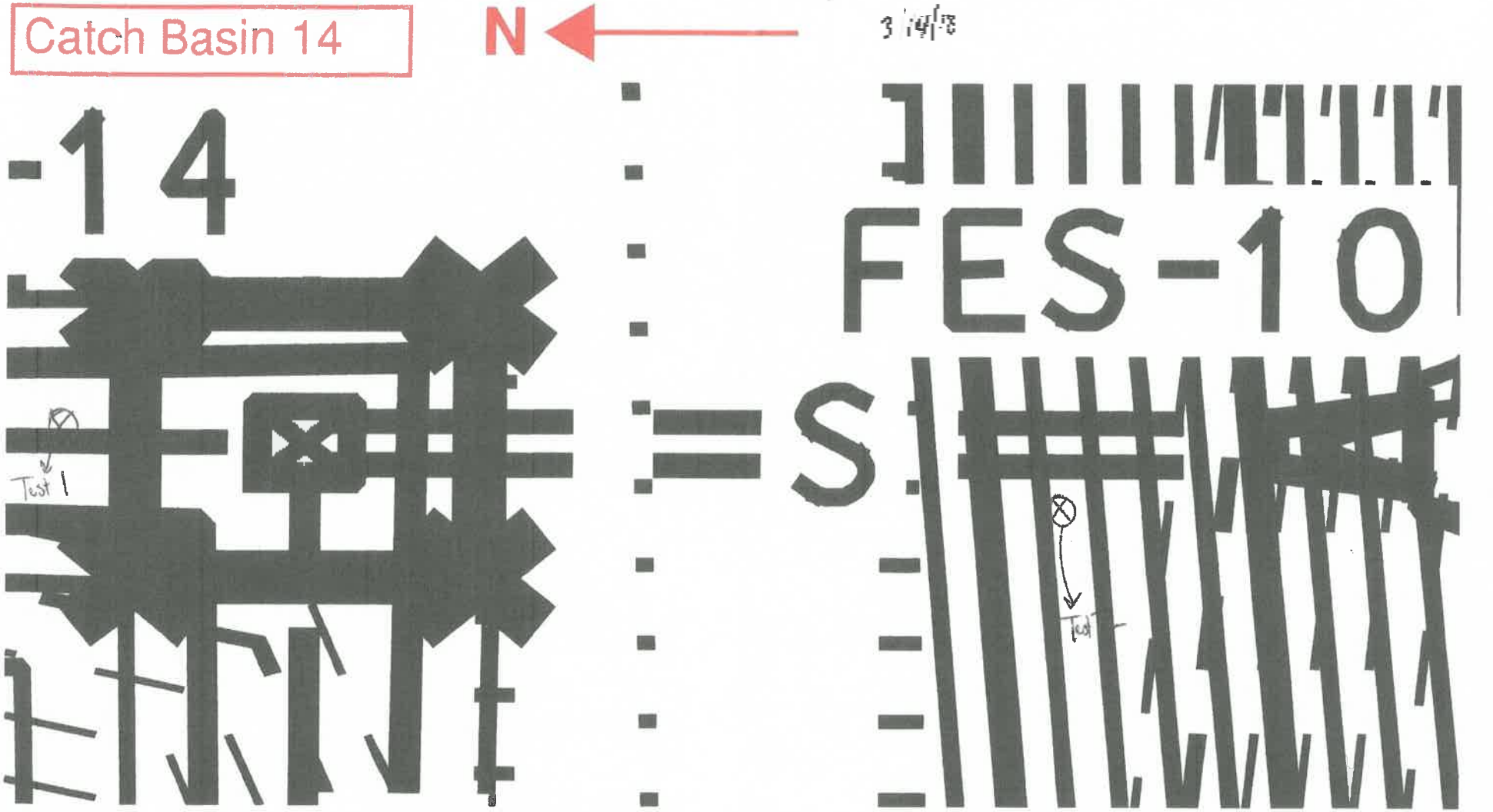
Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer


T18-L02
3/14/18
Catch Basin 13
N
Test 1
CB13 LI
ρ: 99.3% M: 10.6%
Test 2
CB13 PIA LI
ρ: 96.1% M: 10.5%
FES-9
S
CB-13
25
Test 2
Test 1



Test 1
CB14 L1
e: 98.1% M: 10.3%

Test 2
CB14 Pipe L1
e: 97.5% M: 10.6%

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Fax (706) 737-0629

Report No.:	T18-L02		
Date Issued:	March 16, 2018		
Date & Time of Test:	March 15, 2018 (1:00 pm - 4:30 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	Compaction

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

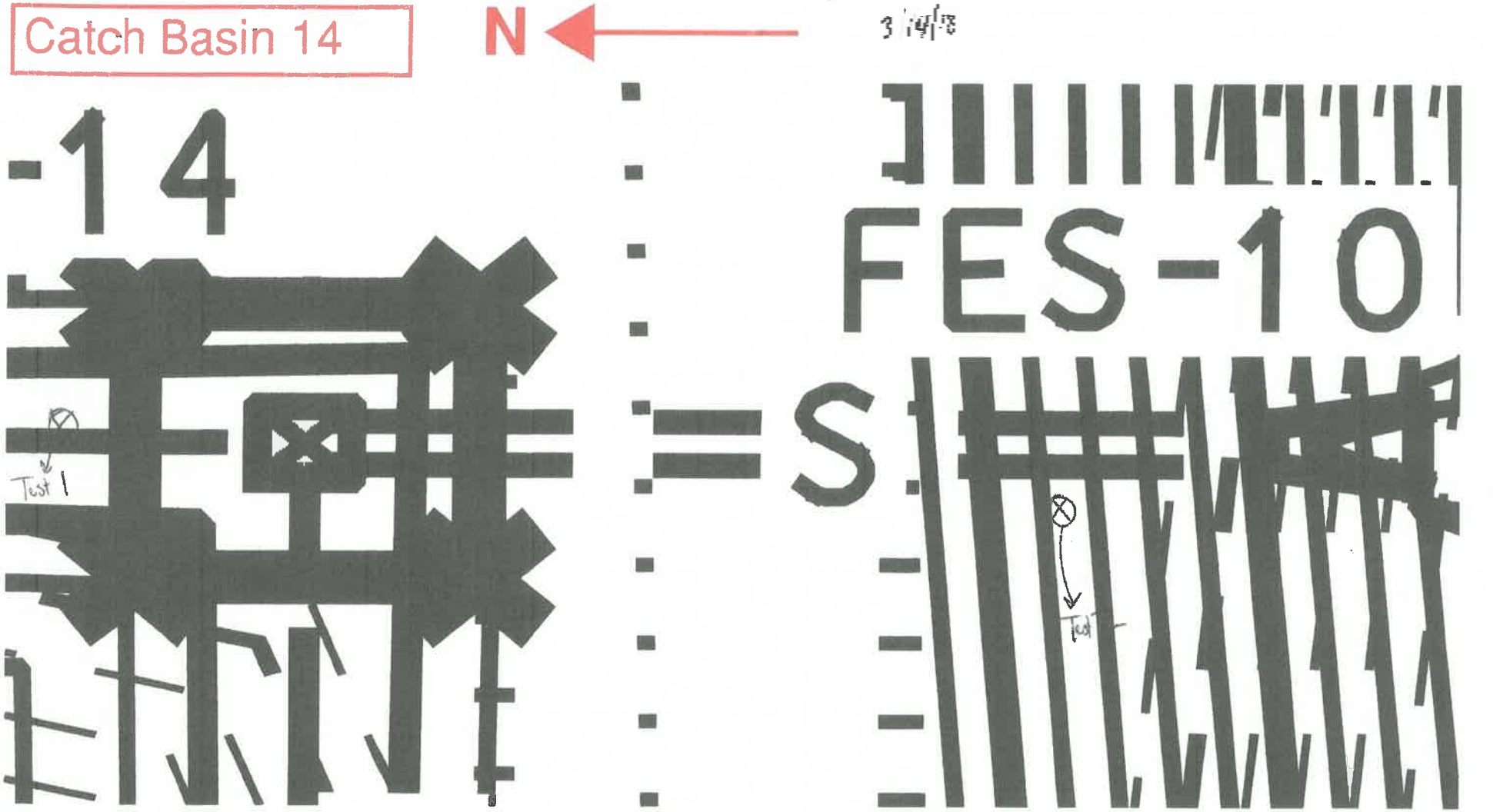
Test No.	1	2	3	4				
Course Level	Lift 1							
Area to Be	CB 13		CB 14					
Dry Density In-Place	127.4	123.3	125.9	125.1				
% Proctor Density	99.3	96.1	98.1	97.5				
Moisture Content	10.6	10.5	10.3	10.6				
% Compaction Required	95.0	95.0	95.0	95.0				
Conformance	✓	✓	✓	✓				
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer



Test 1
CB14 L1
e: 98.1% M: 10.3%

Test 2
CB14 Pipe L1
e: 97.5% M: 10.6%

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-L05 (Page 1 of 2)		
Date Issued:	March 16, 2018		
Date & Time of Test:	March 15, 2018 (8:00 am - 5:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1	2	3	4	5	6	7	8
Course Level	Lift 2		Lift 3		Lift 4		Lift 5	
Area to Be	CB 14							
Dry Density In-Place	122.3	123.7	125.6	126.2	123.6	126.8	123.0	122.1
% Proctor Density	95.3	96.4	97.9	98.4	96.3	98.8	95.9	95.2
Moisture Content	10.3	10.6	10.2	9.8	10.1	10.8	9.7	12.9
% Compaction Required	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0
Conformance	✓	✓	✓	✓	✓	✓	✓	✓
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-L05 (Page 2 of 2)		
Date Issued:	March 16, 2018		
Date & Time of Test:	March 15, 2018 (8:00 am - 5:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	9	10						
Course Level	Lift 6							
Area to Be	CB 14							
Dry Density In-Place	124.7	122.4						
% Proctor Density	97.2	95.4						
Moisture Content	11.8	10.5						
% Compaction Required	95.0	95.0						
Conformance	✓	✓						
Non Conformance								
Sand Cone								

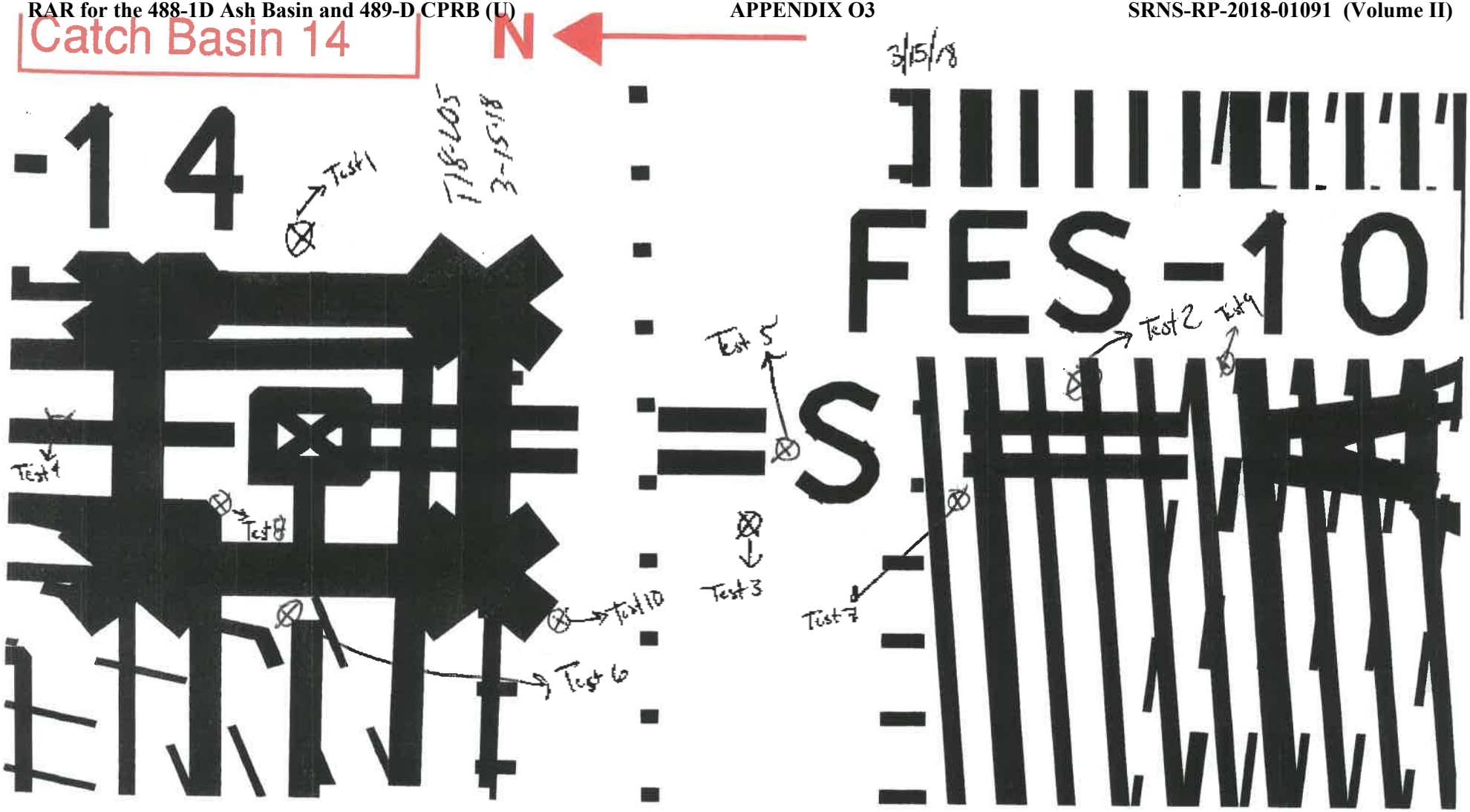
Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer

Catch Basin 14



Test 1
CB14 L2
ρ: 95.3% M: 10.3%

Test 2
CB14 Pipe L2
ρ: 96.4% M: 10.6%

Test 3
CB14 Pipe L3
ρ: 97.9% M: 10.2%

Test 4
CB14 L3
ρ: 98.4% M: 9.8%

Test 5
CB14 Pipe L4
ρ: 96.3% M: 10.1%

Test 6
CB14 L4
ρ: 98.8% M: 10.8%

Test 7
CB14 Pipe L5
ρ: 95.9% M: 9.7%

Test 8
CB14 L5
ρ: 95.2% M: 12.9%

Test 9
CB14 Pipe L6
ρ: 97.2% M: 11.8%

Test 10
CB14 L6
ρ: 95.4% M: 10.5%

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-L41		
Date Issued:	March 20, 2018		
Date & Time of Test:	March 16, 2018 (3:00 pm)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Cool	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT

Test Method ASTM D-6938

Soil Description: Reddish-Brown Clayey Sand (processed west and south material)

Proctor Density-Optimum Moisture: 128.3 pcf / 11.1% (mod.)

Test No.	1							
Course Level	Lift 7							
Area to Be	CB 14 pipe							
Dry Density In-Place	125.4							
% Proctor Density	97.7							
Moisture Content	9.6							
% Compaction Required	95.0							
Conformance	✓							
Non Conformance								
Sand Cone								

Locations: Please see attached map.

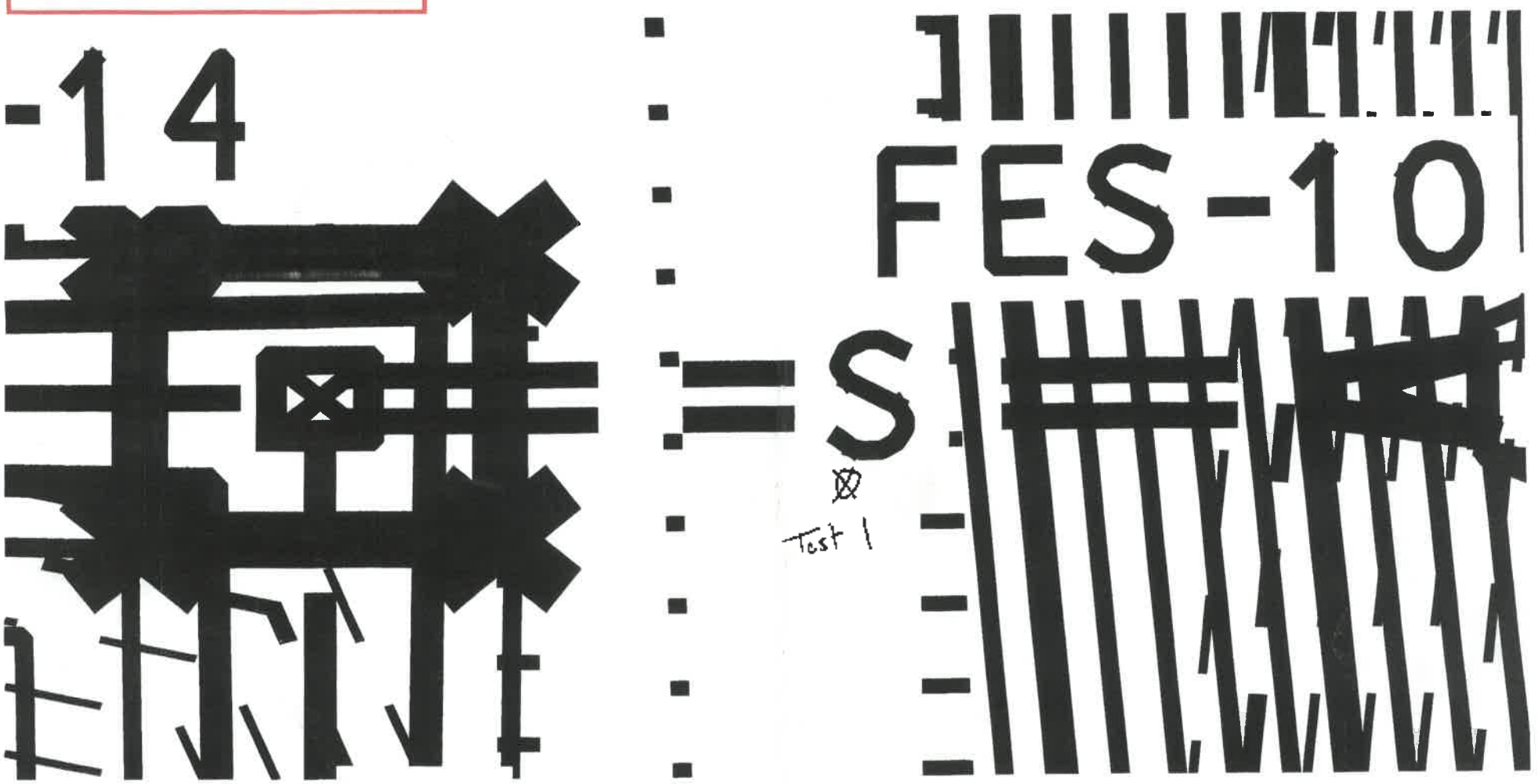
Serial No. of Troxler: 65585

Chip Stewart, Technician

James M. Pope, P.E., Reviewer

Catch Basin 14

N



Test 1
CB14 Pipe L7
ℓ: 97.7% Mi 9.6%
T18-L11

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

Report No.:	T18-J92 rev.		
Date Issued:	March 8, 2018		
Date & Time of Test:	March 1, 2018 (10:00 am)		
Client:	Envirocon, Inc.	**Address:**	Missoula, Montana
Project Title:	488-1D Ash Basin & 489-D CPRB Closure	**Location:**	SRS, Aiken Co., South Carolina
Project No.:	C-SPP-D-00002	**SRNS PO#:**	258194
Weather:	Sunny and Mild	**Activity:**	**Compaction**

FIELD DENSITY AND MOISTURE CONTENT
Test Method ASTM D-6938

Soil Description: Light Reddish-Brown Clayey Sand (CB9)

Proctor Density-Optimum Moisture: 130.2 pcf / 9.9% (mod.)

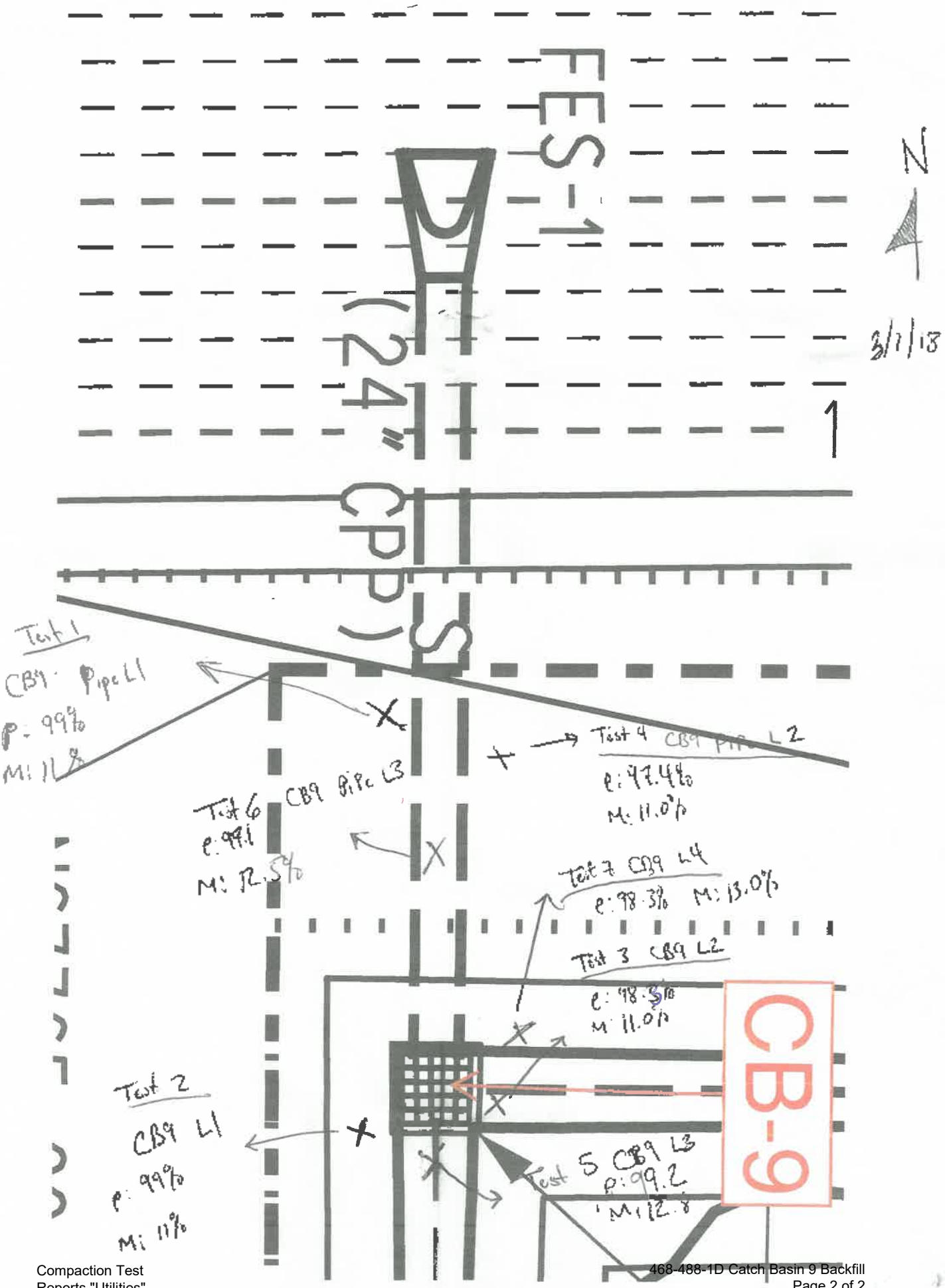
Test No.	1	2	3	4	5	6	7	
Course Level	Lift 1		Lift 2		Lift 3		Lift 4	
Area to Be	CB9 pipe							
Dry Density In-Place	126.8	127.1	126.1	125.0	127.3	124.6	126.1	
% Proctor Density	97.4	97.6	96.9	96.0	97.8	95.7	96.9	
Moisture Content	11.0	11.8	10.4	11.6	12.8	12.5	13.0	
% Compaction Required	95.0	95.0	95.0	95.0	95.0	95.0	95.0	
Conformance	✓	✓	✓	✓	✓	✓	✓	
Non Conformance								
Sand Cone								

Locations: Please see attached map.

Serial No. of Troxler: 25694

Branon Mitchell, Technician

James M. Pope, P.E., Reviewer


FES-1
CPP (S)
24"
N
3/1/18
1
Test 1
CB9 Pipe L1
P: 99%
M: 11%
Test 4 CB9 Pipe L2
P: 97.4%
M: 11.0%
Test 6
P: 99.1
M: 12.5%
CB9 Pipe L3
Test 7 CB9 L4
P: 98.3% M: 13.0%
Test 3 CB9 L2
P: 98.5%
M: 11.0%
Test 2
CB9 L1
P: 99%
M: 11%
Test 5 CB9 L3
P: 99.2
M: 12.8
CB-9

APPENDIX P

ASH PROOF ROLL ACCEPTANCE REPORTS

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Date: April 7, 2017	
Project Title: SRNS 488-1D Ash Impoundment	**Location: Jackson, SC**

488-1D East Placement Area Proof Rolls:

This report serves as cumulative documentation of the proof roll activities associated with the 488-1D Ash Impoundment Project. This report is a live document that is updated as the proof rolls occur, and is thus progressively expounded and re-submitted as needed. The required proof roll inspections have been identified in Attachment A, herein and are identified as Proof Roll Levels (PRLs) 1 – 7. In short:

- PRL1: Approximate elevation 127
- PRL2: Approximate elevations 127 - 131
- PRL3: Approximate elevations 131 - 135
- PRL4: Approximate elevations 135 - 139
- PRL5: Approximate elevations 139 - 143
- PRL6: Approximate elevations 143 - 147
- PRL7: Approximate elevations 147 – 150.4

The proof rolls are summarized below:

- March 01, 2017, Proof Roll #1: The southern 1/8th of the placement area in 488-1D east was proof roll tested. This was the first 4' lift, (PRL1) with the average lift elevation ranging from 127 – 129 feet. In attendance was Don Bastion, Tripp Winfree, Gerald McKee, Chris Lowry (CSRA), Steve Hoover, Mike Beardsley, and Clay Roark. The proof roll was conducted using a 3,500 – 4,000 gallon water truck, EI truck #3972. Per Chris, Tripp, and Don, the weight of this truck is sufficient to yield enough ground pressure that it need not be filled with water during the proof roll. The entire area was rolled with the truck stepping over 1 truck length each time, such that after the first pass, the driver's side tires traveled in the passenger's side tire tracks. The proof roll started on the south and worked north, covering approximately 2.5 Acres. The entire area passed, with the exception of a soft spot roughly 10' x 10' in size located on the east side near the center of the area. See sketch for further detail.
- March 17, 2017, Proof Roll #1 Repair: Envirocon "re-proof rolled" the 10' x 10' square that failed during Proof Roll #1. This proof roll was witnessed by Mike Beardsley and STR Steve Hoover. Envirocon allowed this area to dry for 16 days. They did not remove the material, but did drive upon it in static mode with an 84" smooth drum roller 4 times for compaction. For the proof roll, Envirocon water truck 3972 was utilized, empty as during the full proof roll. The water truck made two passes driving east and west, starting along the south side of the failed grid. The truck then moved over 1 truck width such that the driver side tires followed the wheel marks from the passenger tires on the previous pass. No deflection or pumping was observed by myself or STR.
- March 21, 2017, Proof Roll #2: Proof Roll #2 was conducted on approximately 2.1 Acres directly north and adjacent to the Proof Roll #1 area. This was a proof roll on Proof Roll Level 1 (~127 -128 FT elevation). The proof roll used Envirocon water truck 3972 and worked from south to north, stepping over 1 truck width each time such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area until a lane then had a failure. There was no small spots within the fill that failed. Upon reaching the failed lane, the boundary was then staked out with a survey lathe demarcating the area. The accepted area was taken as one full truck lane further to the south and there was the location of where the stakes were placed. For future proof rolls, these boundaries will be demarcated with white

ribbon, but for this test, green ribbon was used. The boundary was then surveyed in with GPS and the area topographically surveyed (in-house by Envirocon's engineering staff).

-

Attachments:

- Proof Roll Level Definition Figure
- Proof Roll #1 and #2 Figure
- CSRA Proof Roll Reports

The proof roll tests were witnessed by Mike Beardsley, PE, in accordance with the plans and specifications.

Mike Beardsley, PE

04/07/2017

Project Engineer

488-1D Ash Basin Closure Project

(720) 838 – 7107

Mbeardsley@greenglobeinc.com

Date:	Time:	Direction of View / Location:
Wednesday, March 1, 2017	1057	East / 488-1D East

Subject:

Proof Roll #1 underway.

Date:	Time:	Direction of View / Location:
Friday, March 17, 2017	1151	East / 488-1D East

Subject:

Proof Rolled Square, now passing, previously failed during Proof Roll #1.

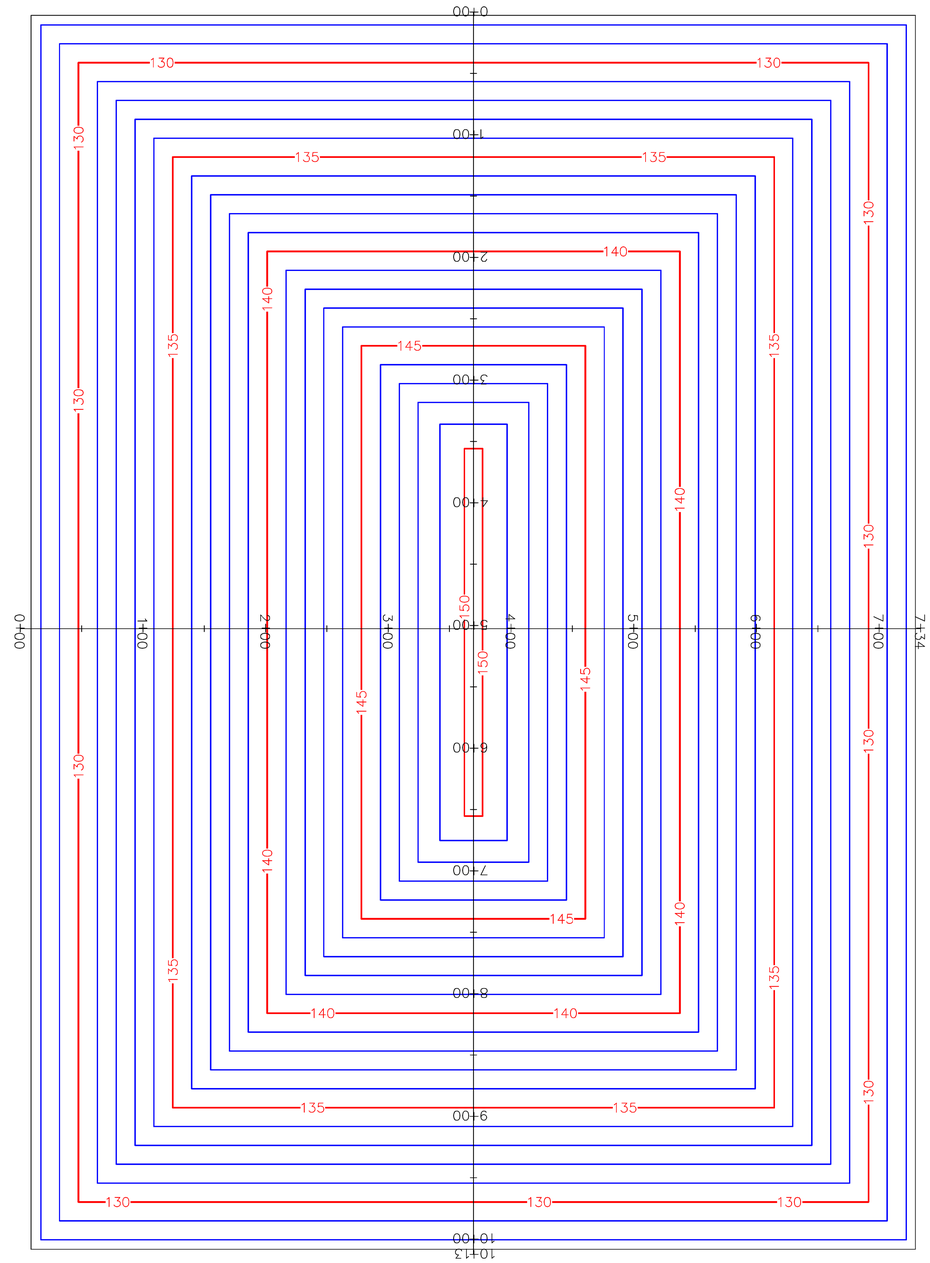
Date:	**Time:**	**Direction of View / Location:**
Tuesday, March 21, 2017	0807	N/A / 488-1D East

Subject:

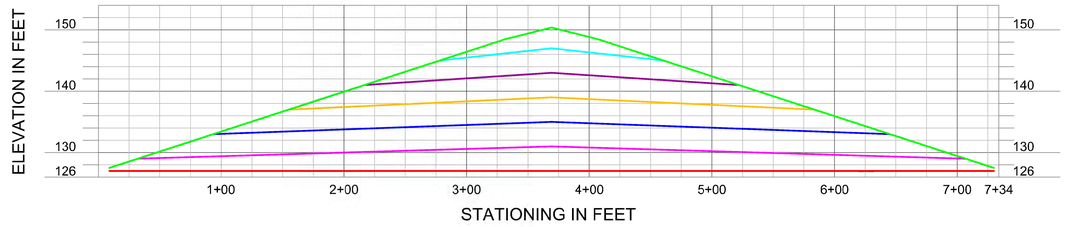
Proof Roll #2 underway.

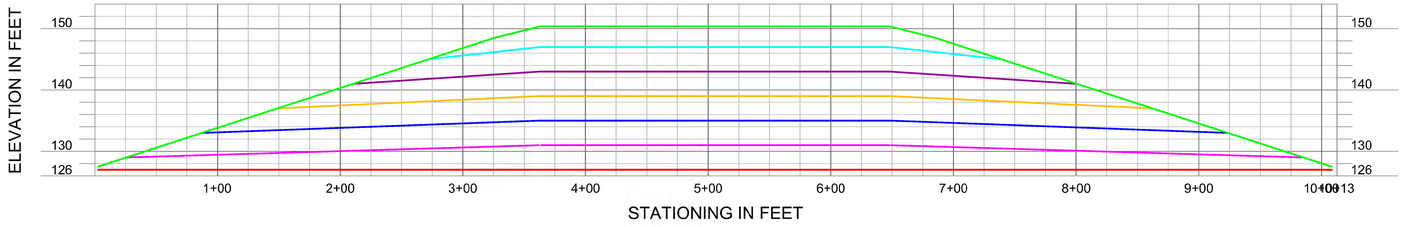
PROOF ROLL LEVEL DEFINITIONS

PLAN VIEW



PROFILE VIEW





0 100' HORIZONTAL SCALE

0 20' VERTICAL SCALE

LEGEND:

- Top of Proof Roll Level 1 (EL = 127)
- Top of Proof Roll Level 2
- Top of Proof Roll Level 3
- Top of Proof Roll Level 4
- Top of Proof Roll Level 5
- Top of Proof Roll Level 6
- Top of Proof Roll Level 7 (Ash FG)
- Ash FG Contour Major (5')
- Ash FG Contour Minor (1')

N

0 100' 200'
SCALE IN FEET

Prepared By:
Envirocon
7878 Wadsworth Blvd.
Suite 340
Arvada, CO 80003

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Nicanor Aguilar, Steve Hoover

Figure #: 01	
Date: 03/29/2017	
Revision #: 01	
Drawn By: GGE	
Approved By: EI	
Project #: 1495402	

488-1D East Ash Placement Proof Roll Levels

488-1D Ash Basin Closure

C:\ USERS\ MIKE BEARDSLEY\ DESKTOP\ REVISED PROOF ROLL LIFTS.DWG

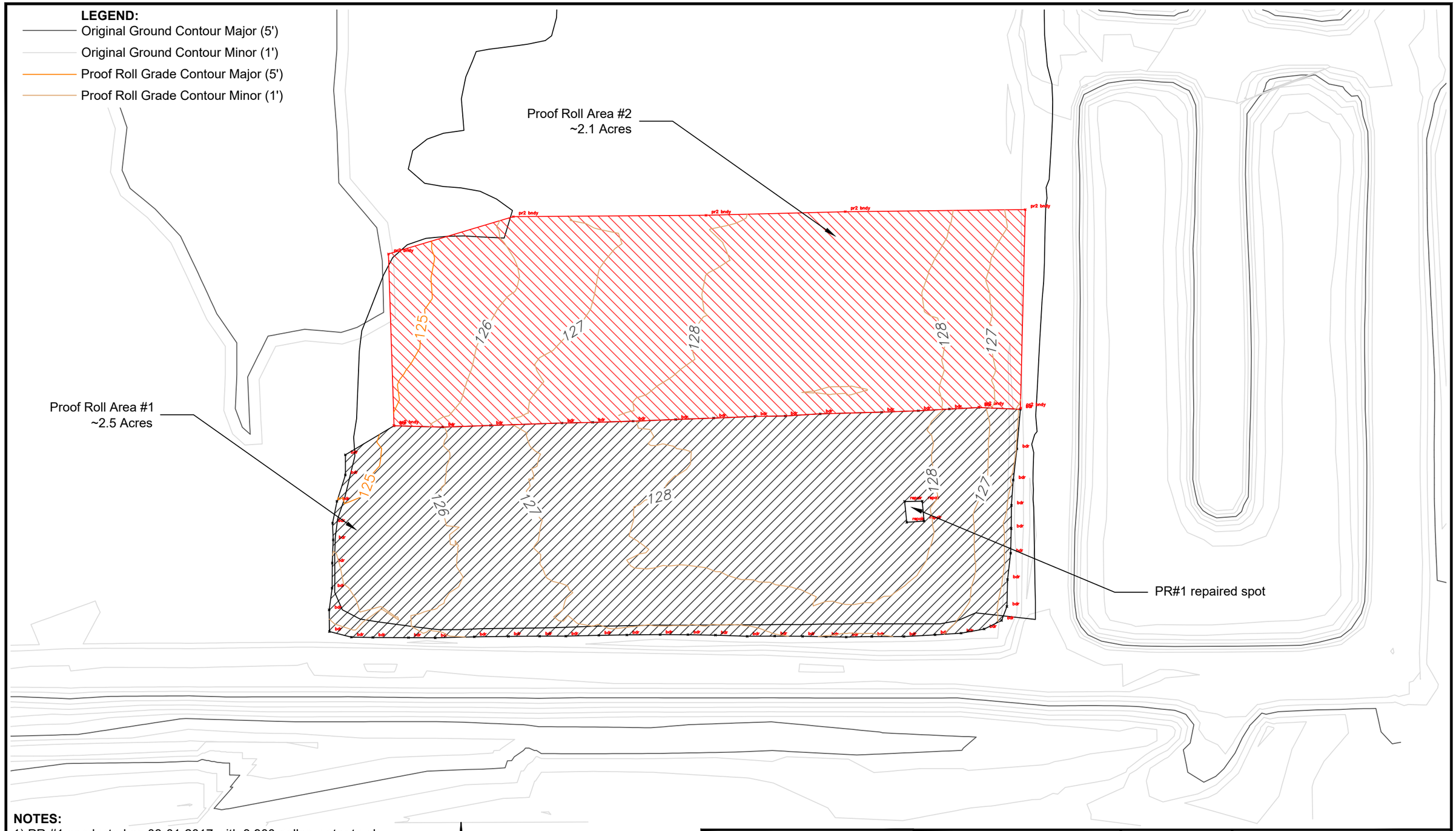
PROOF ROLL LOCATIONS

LEGEND:
- Original Ground Contour Major (5')
- Original Ground Contour Minor (1')
- Proof Roll Grade Contour Major (5')
- Proof Roll Grade Contour Minor (1')

Proof Roll Area #2
~2.1 Acres

Proof Roll Area #1
~2.5 Acres

PR#1 repaired spot



NOTES:
1) PR #1 conducted on 03-01-2017 with 3,900 gallon water truck.
2) PR #1 Failed Area passed on Proof Roll on 03-21-2017.
3) PR #2 conducted on 03-21-2017 with 3,900 gallon water truck.

N

0 80' 160'

SCALE IN FEET

Prepared By:
Envirocon
7878 Wadsworth Blvd
Suite 340
Arvada, CO 80003

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Nicanor Aguilar, Steve Hoover

Figure #: 01	Proof Roll 1 03/01/2017
Date: 03/02/2017	
Revision #: 0	
Drawn By: GGE	
Approved By: EI	488-1D Ash Basin Closure
Project #: 1495402	

E:\ GGE\ PROJECT DATA\ ENVIROCON\ SRNS POND 1D\ PE FILES\ 488-1D PROOF ROLLS\ 030117 PROOF ROLL 1.DWG

CSRA PROOF ROLL INSPECTION REPORTS

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T16-H95

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	As requested by client, technician observed an empty water truck proofroll the southeast section of Area 1 at elevations between 127.00 to 129.00. Area observed appeared to be firm and stable at this time.

TOTAL TIME:	3.0 hours		
DATE:	March 1, 2017	TECHNICIAN:	Chris Lowry

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-L66

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed a empty water truck (truck no. 3972) proofroll the two (2) acres of north and adjoining proofroll 1 area. All areas appeared to be firm and stable at this time. (Note: This is the second proofroll for this area; elevation 127-129.)

TOTAL TIME:	4.0 hours		
DATE:	March 21, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

Date: May 23, 2017	
Project Title: SRNS 488-1D Ash Impoundment	**Location: Jackson, SC**

488-1D East Placement Area Proof Rolls:

This report serves as cumulative documentation of the proof roll activities associated with the 488-1D Ash Impoundment Project. This report is a live document that is updated as the proof rolls occur, and is thus progressively expounded and re-submitted as needed. The required proof roll inspections have been identified in Attachment A, herein and are identified as Proof Roll Levels (PRLs) 1 – 7. In short:

- PRL1: Approximate elevation 127
- PRL2: Approximate elevations 127 - 131
- PRL3: Approximate elevations 131 - 135
- PRL4: Approximate elevations 135 - 139
- PRL5: Approximate elevations 139 - 143
- PRL6: Approximate elevations 143 - 147
- PRL7: Approximate elevations 147 – 150.4

The proof rolls are summarized below:

- March 01, 2017, Proof Roll #1: The southern 1/8th of the placement area in 488-1D east was proof roll tested. This was the first 4' lift, (PRL1) with the average lift elevation ranging from 127 – 129 feet. In attendance was Don Bastion, Tripp Winfree, Gerald McKee, Chris Lowry (CSRA), Steve Hoover, Mike Beardsley, and Clay Roark. The proof roll was conducted using a 3,500 – 4,000 gallon water truck, EI truck #3972. Per Chris, Tripp, and Don, the weight of this truck is sufficient to yield enough ground pressure that it need not be filled with water during the proof roll. The entire area was rolled with the truck stepping over 1 truck length each time, such that after the first pass, the driver's side tires traveled in the passenger's side tire tracks. The proof roll started on the south and worked north, covering approximately 2.5 Acres. The entire area passed, with the exception of a soft spot roughly 10' x 10' in size located on the east side near the center of the area. See sketch for further detail.
- March 17, 2017, Proof Roll #1 Repair: Envirocon "re-proof rolled" the 10' x 10' square that failed during Proof Roll #1. This proof roll was witnessed by Mike Beardsley and STR Steve Hoover. Envirocon allowed this area to dry for 16 days. They did not remove the material, but did drive upon it in static mode with an 84" smooth drum roller 4 times for compaction. For the proof roll, Envirocon water truck 3972 was utilized, empty as during the full proof roll. The water truck made two passes driving east and west, starting along the south side of the failed grid. The truck then moved over 1 truck width such that the driver side tires followed the wheel marks from the passenger tires on the previous pass. No deflection or pumping was observed by myself or STR.
- March 21, 2017, Proof Roll #2: Proof Roll #2 was conducted on approximately 2.1 Acres directly north and adjacent to the Proof Roll #1 area. This was a proof roll on Proof Roll Level 1 (~127 -128 FT elevation). The proof roll used Envirocon water truck 3972 and worked from south to north, stepping over 1 truck width each time such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area until a lane then had a failure. There was no small spots within the fill that failed. Upon reaching the failed lane, the boundary was then staked out with a survey lathe demarcating the area. The accepted area was taken as one full truck lane further to the south and there was the location of where the stakes were placed. For future proof rolls, these boundaries will be demarcated with white ribbon, but for this test,

green ribbon was used. The boundary was then surveyed in with GPS and the area topographically surveyed (in-house by Envirocon's engineering staff).

- April 11, 2017, Proof Roll #3: Proof Roll #3 was conducted on approximately 2.4 Acres, directly north and adjacent to the Proof Roll #2 area. The proof roll occurred on Proof Roll Level 1 (PRL 1, which is at elevation 127). Once again, the proof roll utilized Envirocon's empty water truck, equipment number 3972. The truck traveled in an east-west direction working from the south to the north, stepping over 1 truck width each pass, such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area that was prepared for the proof roll. There were no failures for this proof roll area. The area was then delineated with orange lathe with white ribbon and topographically surveyed with RTK enabled GPS. The underlying lifts of placed ash that comprised this PRL 1 were compacted using the following method. First, the west ash was dumped in a windrow with an articulating truck. Next the windrow was spread with a D6 LGP dozer. The spread ash was then disked with a rome disk to dry the material back to what appeared to compact well (moisture content ranges anywhere from 19 – 29% by dry weight). Once dried appropriately, the ash was then track walked with a D6 LGP dozer. Then an 84" smooth drum roller makes 1 pass in vibratory mode followed by 3 passes in static mode. Lastly, compaction is also achieved as the loaded articulated trucks traverse the surface to build the windrows.
- April 20, 2017: Proof Roll #4 on PRL 1 and Proof Roll #1 on PRL 2: PR1 on PRL2 was located approximately 4 feet atop PR1 on PRL1 on the south side of the 488-1D east placement pad, and was approximately 1.2 Acres. PR4 on PRL1 was directly adjacent to PR3 on PRL1 and was approximately 1.1 Acres. These proof rolls utilized Carolina Sod's empty water truck. As with Envirocon's water truck, this was a 3,900 gallon water truck. The truck traveled in an east-west direction working from the south to the north, stepping over 1 truck width each pass, such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area that was prepared for each of the proof rolls. There were two failure spots for PR1 on PRL2 approximately 10' x 10' each and 1 failure area approximately 10' x 40' for PR4 on PRL1. These failure locations were surveyed in using GNSS enabled RTK GPS, along with the boundaries of the areas and the topographic surface of each area. Compaction on Lift 4 for both of these areas was completed similar to past compaction efforts, by first track walking a D6 LGP dozer over the area. However, two passes were then made in vibratory mode using an 84" smooth drum roller instead of 1 pass vibratory with 3 passes static.
- April 21, 2017: The failure areas in PR3 on PRL1 and PR1 on PRL2 were disked as it was initially thought that these were wet spots. However, upon disking, significantly sized wood stumps were found in each of the failure spots. The wood stumps were removed, and the areas allowed to dry until it appeared the moisture was correct for compaction. At that time the areas were wheel rolled using a WA 450 Loader, followed by 2 passes in vibratory mode of an 84" smooth drum roller, followed by 2 passes in static mode of the 84" smooth drum roller. The areas have not yet been re-proof rolled.
- May 10, 2017: The failure areas in PR1 on PRL2 were proof rolled and passed. Envirocon's 3,900 gallon unloaded water truck (3972) was used to conduct the proof roll. The proof roll was witnessed by the Envirocon Project Engineer and the STR.
- May 15, 2017: The failure area on PR4 on PRL1 was proof rolled and passed. A 3,900 gallon unloaded water truck was used to conduct the proof roll. The proof roll was witnessed by the Envirocon Project Engineer and the STR.
- May 15, 2017: Proof Roll #2 on PRL2 was conducted. The area was directly north and adjacent to the PR1 on PRL2 proof roll area. The area was approximately 1.3 acres in size. There were no failure areas, the entire 1.3 Acre area passed. The test was conducted using Carolina Sod's 3,900 gallon water truck, unloaded. The truck traversed the area in an east-west direction working from the south to the north. Per the standard operating procedure, the truck stepped to the north 1 truck width each pass such that the driver's side tires drove

in the passenger tire marks each time the truck was offset. The proof roll was observed by the Envirocon Project Engineer, STR, and Don Baston. Compaction on the lifts of this area were achieved by first drying the material to a suitable moisture content with a Rome disk, then track walking the area with a D6 LGP dozer, followed by two vibratory passes and then two static passes of the 84" smooth drum roller.

- May 17, 2017: Three proof rolls were conducted. The proof rolls were observed by the Envirocon Project Engineer, STR, and Don Baston. The first proof roll of the day was Proof Roll #3 on PRL2. The area was approximately 0.24 acres in size. The proof roll used unloaded Envirocon water truck 3972, 3,900 gallons. The truck traversed the area north and south, starting from the east and working to the west. The truck stepped to the west 1 truck width each pass. The second proof roll of the day was Proof Roll #5 on PRL1. This area was the northern portion of the 488-1D East pad, which generally included the former CPRB clay stockpile area. Again empty Envirocon water truck 3972 (3,900 gallon) was used to conduct the proof roll. The proof roll worked from north to south traversing in an east-west direction, stepping over 1 truck width each time. The third proof roll was Proof Roll #4 on PRL2. This area was directly north and adjacent to PR#2 on PRL2. Again empty Envirocon water truck 3972 (3,900 gallon) was used to conduct the proof roll. The proof roll worked from north to south traversing in an east-west direction, stepping over 1 truck width each time. The lifts composing these proof roll levels gained compaction by first drying the material to a suitable moisture content with a Rome disk, then track walking the area with a D6 LGP dozer, followed by two vibratory passes and then two static passes of the 84" smooth drum roller.

Attachments:

- Proof Roll Level Definition Figure
- Cumulative Proof Roll Location Figure
- CSRA Proof Roll Reports

The proof roll tests were witnessed by Mike Beardsley, PE, in accordance with the plans and specifications.

Mike Beardsley, PE

04/24/2017

Project Engineer

488-1D Ash Basin Closure Project

(720) 838 – 7107

Mbeardsley@greenglobeinc.com

Date:	Time:	Direction of View / Location:
Wednesday, March 1, 2017	1057	East / 488-1D East

Subject:

Proof Roll #1 underway.

Date:	Time:	Direction of View / Location:
Friday, March 17, 2017	1151	East / 488-1D East

Subject:

Proof Rolled Square, now passing, previously failed during Proof Roll #1.

Date:	Time:	Direction of View / Location:
Tuesday, March 21, 2017	0807	N/A / 488-1D East

Subject:
Proof Roll #2 underway.

Date:	Time:	Direction of View / Location:
Tuesday, April 11, 2017	1316	East / 488-1D East

Subject:
Proof Roll #3 underway.

Date:	Time:	Direction of View / Location:
Thursday, April 20, 2017	1306	West / 488-1D East

Subject:

Carolina Sod 3,900 gallon water truck proof rolling PR1 on PRL2 and then PR4 on PRL1.

Date:	Time:	Direction of View / Location:
Thursday, April 20, 2017	1309	N/A / 488-1D East

Subject:

Proof Roll #1 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Wednesday, May 10, 2017	08:14	South / 488-1D East

Subject:
Proof Roll of repairs in PR#1 on PRL2. Areas passed.

Date:	Time:	Direction of View / Location:
Monday, May 15, 2017	10:52	West / 488-1D East

Subject:
Proof Roll #2 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Monday, May 15, 2017	16:09	West / 488-1D East

Subject:
Proof Roll on repair of PR#4 on PRL1. Area passed.

Date:	Time:	Direction of View / Location:
Wednesday, May 17, 2017	08:00	South / 488-1D East

Subject:
Proof Roll #3 on PRL2 underway.

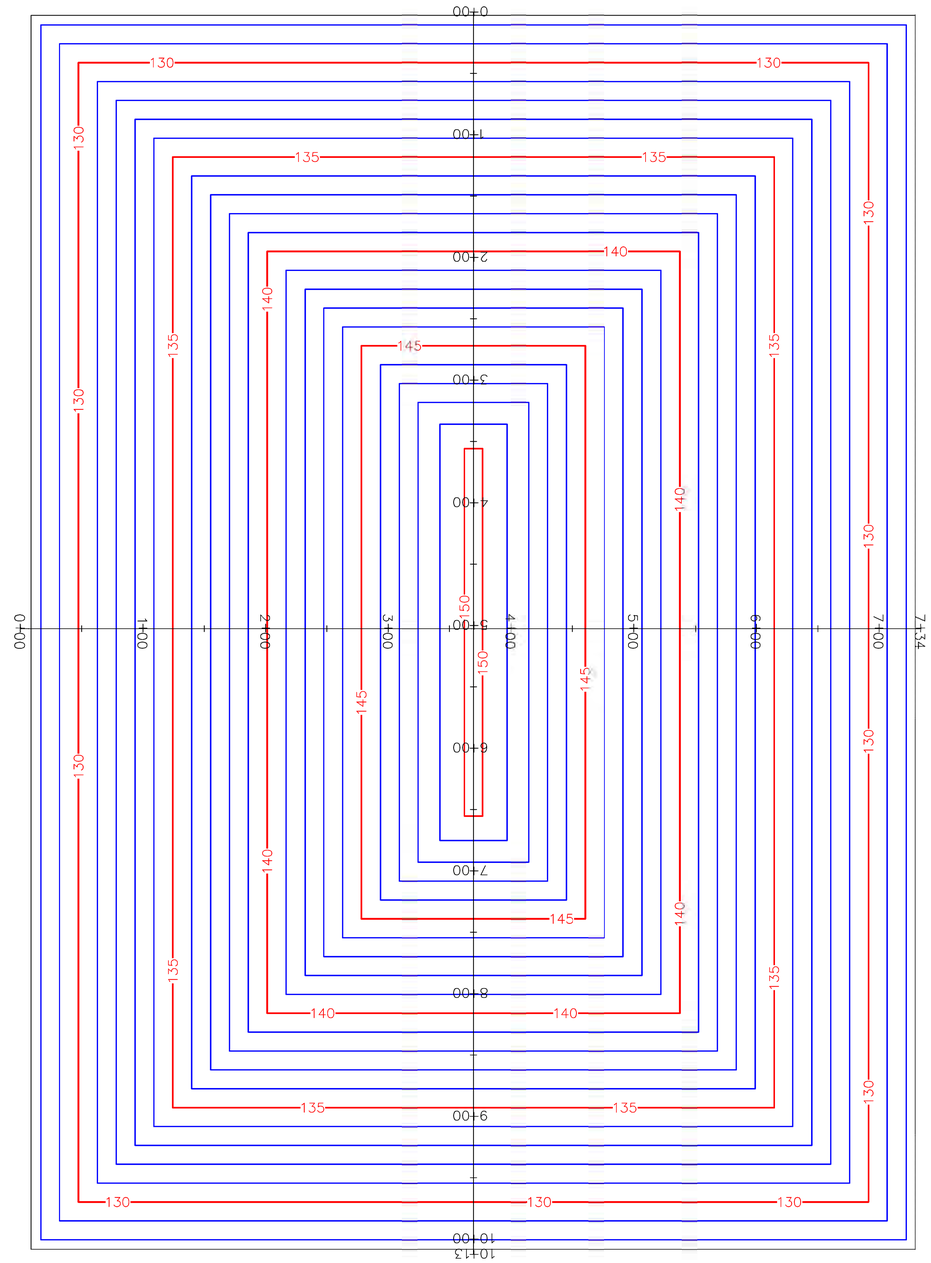
Date:	Time:	Direction of View / Location:
Wednesday, May 17, 2017	11:09	N/A / 488-1D East

Subject:

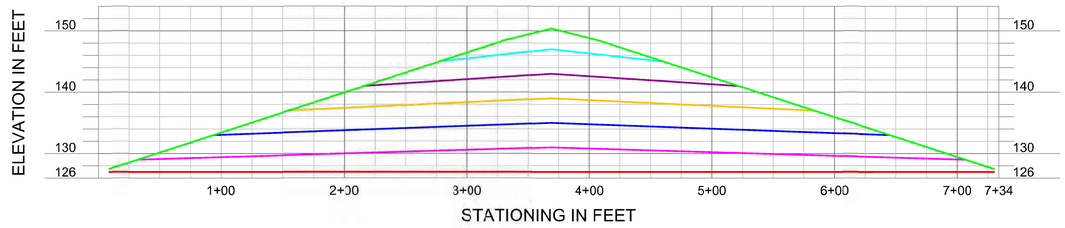
Proof Roll on PR#5 on PRL1 underway.

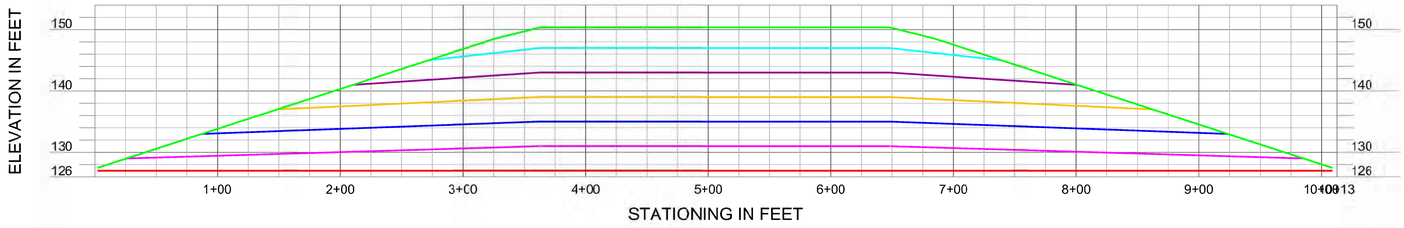
PROOF ROLL LEVEL DEFINITIONS

PLAN VIEW



PROFILE VIEW





0 100' HORIZONTAL SCALE

0 20' VERTICAL SCALE

LEGEND:

- Top of Proof Roll Level 1 (EL = 127)
- Top of Proof Roll Level 2
- Top of Proof Roll Level 3
- Top of Proof Roll Level 4
- Top of Proof Roll Level 5
- Top of Proof Roll Level 6
- Top of Proof Roll Level 7 (Ash FG)
- Ash FG Contour Major (5')
- Ash FG Contour Minor (1')

N

0 100' 200'
SCALE IN FEET

C:\ USERS\ MIKE BEARDSLEY \ DESKTOP \ REVISED PROOF ROLL LIFTS.DWG

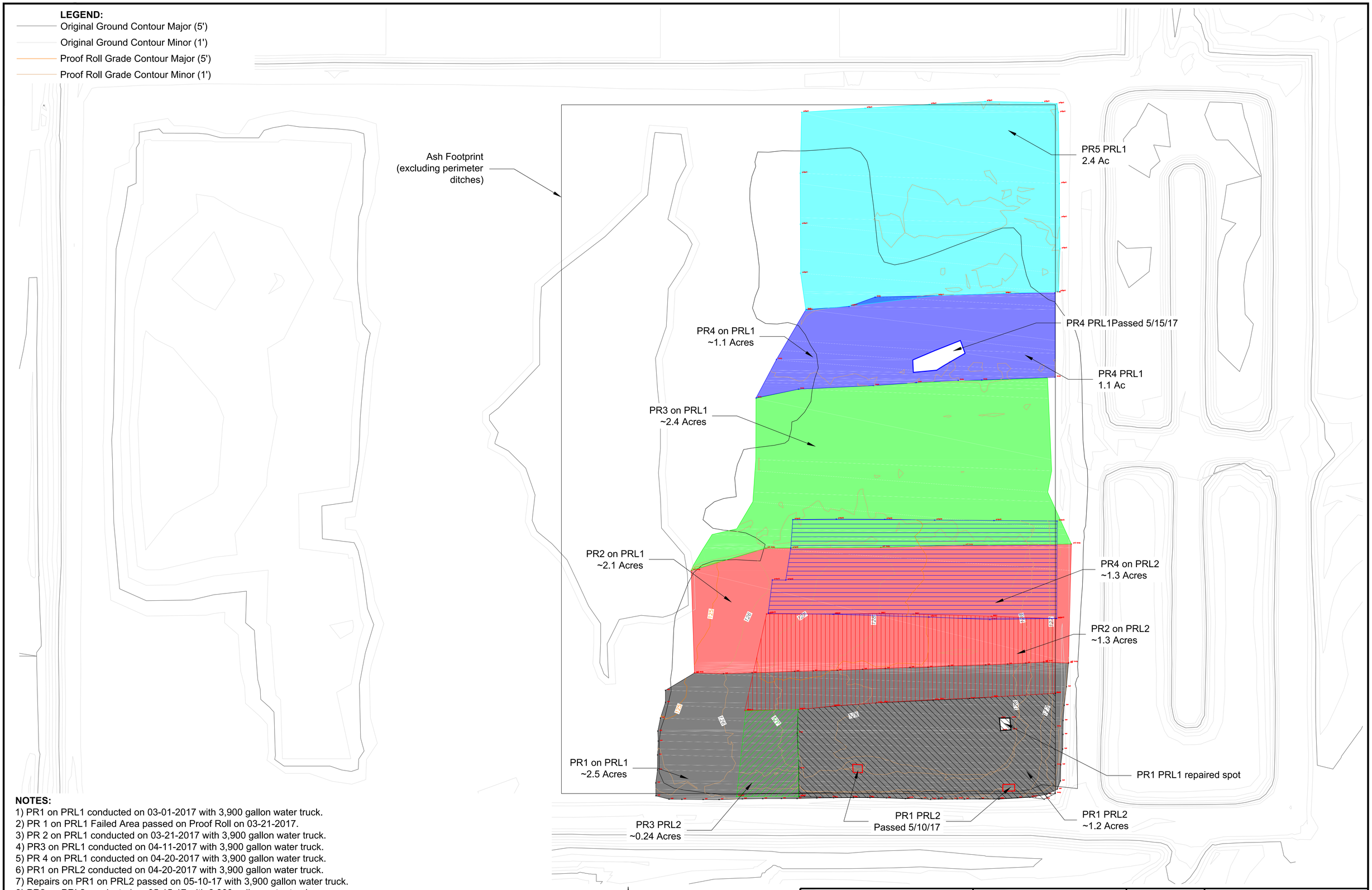
Prepared By:
Envirocon
7878 Wadsworth Blvd.
Suite 340
Arvada, CO 80003

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Nicanor Aguilar, Steve Hoover

Figure #: 01	488-1D East Ash Placement Proof Roll Levels
Date: 03/29/2017	
Revision #: 01	
Drawn By: GGE	
Approved By: EI	488-1D Ash Basin Closure
Project #: 1495402	

PROOF ROLL LOCATIONS

LEGEND:
- Original Ground Contour Major (5')
- Original Ground Contour Minor (1')
- Proof Roll Grade Contour Major (5')
- Proof Roll Grade Contour Minor (1')



NOTES:
1) PR1 on PRL1 conducted on 03-01-2017 with 3,900 gallon water truck.
2) PR 1 on PRL1 Failed Area passed on Proof Roll on 03-21-2017.
3) PR 2 on PRL1 conducted on 03-21-2017 with 3,900 gallon water truck.
4) PR3 on PRL1 conducted on 04-11-2017 with 3,900 gallon water truck.
5) PR 4 on PRL1 conducted on 04-20-2017 with 3,900 gallon water truck.
6) PR1 on PRL2 conducted on 04-20-2017 with 3,900 gallon water truck.
7) Repairs on PR1 on PRL2 passed on 05-10-17 with 3,900 gallon water truck.
8) PR2 on PRL2 conducted on 05-15-17 with 3,900 gallon water truck.
9) Repairs on PR4 PRL1 passed on 05-15-17 with 3,900 gallon water truck.
10) PR3 and PR4 on PRL2 conducted on 05-17-2017 with 3,900 gallon water truck.
11) PR5 on PRL1 conducted on 05-17-2017 with 3,900 gallon water truck.

N

0 100' 200'
SCALE IN FEET

Prepared By:
Envirocon
7878 Wadsworth Blvd.
Suite 340
Arvada, CO 80003

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Nicanor Aguilar, Steve Hoover

Figure #:	01
Date:	05/23/17
Revision #:	0
Drawn By:	GGE
Approved By:	EI
Project #:	1495402

Cumulative Proof Roll Figure
488-1D East

488-1D Ash Basin Closure

E:\GGE\PROJECT DATA\ENVIROCON\SRNS POND 1D\PE FILES\488-1D PROOF ROLLS\030117 PROOF ROLL 1.DWG

CSRA PROOF ROLL INSPECTION REPORTS

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T16-H95

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	As requested by client, technician observed an empty water truck proofroll the southeast section of Area 1 at elevations between 127.00 to 129.00. Area observed appeared to be firm and stable at this time.

TOTAL TIME:	3.0 hours		
DATE:	March 1, 2017	TECHNICIAN:	Chris Lowry

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

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Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-L66

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed a empty water truck (truck no. 3972) proofroll the two (2) acres of north and adjoining proofroll 1 area. All areas appeared to be firm and stable at this time. (Note: This is the second proofroll for this area; elevation 127-129.)

TOTAL TIME:	4.0 hours		
DATE:	March 21, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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Augusta, Georgia 30904
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Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-P35

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck (truck no. 3972) proofroll #3 on PRL1. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	April 11, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Q67

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck proofroll #1 on PRL2. All areas appeared to be firm and stable at this time with the exception of an area measuring 10' x 10' in two (2) separate areas. A proofroll was also observed for #4 on PRL1. All areas appeared to be firm and stable with the exception of an area measuring 10' x 30'. In both cases, contractor will scarify areas and allow to dry before re-compacting. Further observation for these isolated areas should resume when areas are firm and stable.

TOTAL TIME:	5.0 hours		
DATE:	April 20, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-U51

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#2 (proofroll #2). All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	May 15, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-U78SI

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty tandem axle water truck proofroll three (3) areas at PR-3 on PRL-2, PR-5 on PRL-1, and PR-4 on PRL-2. All areas were firm and stable at this time. Technician also performed fifteen (15) field density tests. Please see report T17-U78FD for test results and locations.

DATE:	May 17, 2017	TECHNICIAN:	David Turner

David Turner
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

Date: June 19, 2017	
Project Title: SRNS 488-1D Ash Impoundment	**Location: Jackson, SC**

488-1D East Placement Area Proof Rolls:

This report serves as cumulative documentation of the proof roll activities associated with the 488-1D Ash Impoundment Project. This report is a live document that is updated as the proof rolls occur, and is thus progressively expounded and re-submitted as needed. The required proof roll inspections have been identified in Attachment A, herein and are identified as Proof Roll Levels (PRLs) 1 – 7. In short:

- PRL1: Approximate elevation 127
- PRL2: Approximate elevations 127 - 131
- PRL3: Approximate elevations 131 - 135
- PRL4: Approximate elevations 135 - 139
- PRL5: Approximate elevations 139 - 143
- PRL6: Approximate elevations 143 - 147
- PRL7: Approximate elevations 147 – 150.4

The proof rolls are summarized below:

- March 01, 2017, Proof Roll #1: The southern 1/8th of the placement area in 488-1D east was proof roll tested. This was the first 4' lift, (PRL1) with the average lift elevation ranging from 127 – 129 feet. In attendance was Don Bastion, Tripp Winfree, Gerald McKee, Chris Lowry (CSRA), Steve Hoover, Mike Beardsley, and Clay Roark. The proof roll was conducted using a 3,500 – 4,000 gallon water truck, EI truck #3972. Per Chris, Tripp, and Don, the weight of this truck is sufficient to yield enough ground pressure that it need not be filled with water during the proof roll. The entire area was rolled with the truck stepping over 1 truck length each time, such that after the first pass, the driver's side tires traveled in the passenger's side tire tracks. The proof roll started on the south and worked north, covering approximately 2.5 Acres. The entire area passed, with the exception of a soft spot roughly 10' x 10' in size located on the east side near the center of the area. See sketch for further detail.
- March 17, 2017, Proof Roll #1 Repair: Envirocon "re-proof rolled" the 10' x 10' square that failed during Proof Roll #1. This proof roll was witnessed by Mike Beardsley and STR Steve Hoover. Envirocon allowed this area to dry for 16 days. They did not remove the material, but did drive upon it in static mode with an 84" smooth drum roller 4 times for compaction. For the proof roll, Envirocon water truck 3972 was utilized, empty as during the full proof roll. The water truck made two passes driving east and west, starting along the south side of the failed grid. The truck then moved over 1 truck width such that the driver side tires followed the wheel marks from the passenger tires on the previous pass. No deflection or pumping was observed by myself or STR.
- March 21, 2017, Proof Roll #2: Proof Roll #2 was conducted on approximately 2.1 Acres directly north and adjacent to the Proof Roll #1 area. This was a proof roll on Proof Roll Level 1 (~127 -128 FT elevation). The proof roll used Envirocon water truck 3972 and worked from south to north, stepping over 1 truck width each time such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area until a lane then had a failure. There was no small spots within the fill that failed. Upon reaching the failed lane, the boundary was then staked out with a survey lathe demarcating the area. The accepted area was taken as one full truck lane further to the south and there was the location of where the stakes were placed. For future proof rolls, these boundaries will be demarcated with white ribbon, but for this test,

green ribbon was used. The boundary was then surveyed in with GPS and the area topographically surveyed (in-house by Envirocon's engineering staff).

- April 11, 2017, Proof Roll #3: Proof Roll #3 was conducted on approximately 2.4 Acres, directly north and adjacent to the Proof Roll #2 area. The proof roll occurred on Proof Roll Level 1 (PRL 1, which is at elevation 127). Once again, the proof roll utilized Envirocon's empty water truck, equipment number 3972. The truck traveled in an east-west direction working from the south to the north, stepping over 1 truck width each pass, such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area that was prepared for the proof roll. There were no failures for this proof roll area. The area was then delineated with orange lathe with white ribbon and topographically surveyed with RTK enabled GPS. The underlying lifts of placed ash that comprised this PRL 1 were compacted using the following method. First, the west ash was dumped in a windrow with an articulating truck. Next the windrow was spread with a D6 LGP dozer. The spread ash was then disked with a rome disk to dry the material back to what appeared to compact well (moisture content ranges anywhere from 19 – 29% by dry weight). Once dried appropriately, the ash was then track walked with a D6 LGP dozer. Then an 84" smooth drum roller makes 1 pass in vibratory mode followed by 3 passes in static mode. Lastly, compaction is also achieved as the loaded articulated trucks traverse the surface to build the windrows.
- April 20, 2017: Proof Roll #4 on PRL 1 and Proof Roll #1 on PRL 2: PR1 on PRL2 was located approximately 4 feet atop PR1 on PRL1 on the south side of the 488-1D east placement pad, and was approximately 1.2 Acres. PR4 on PRL1 was directly adjacent to PR3 on PRL1 and was approximately 1.1 Acres. These proof rolls utilized Carolina Sod's empty water truck. As with Envirocon's water truck, this was a 3,900 gallon water truck. The truck traveled in an east-west direction working from the south to the north, stepping over 1 truck width each pass, such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area that was prepared for each of the proof rolls. There were two failure spots for PR1 on PRL2 approximately 10' x 10' each and 1 failure area approximately 10' x 40' for PR4 on PRL1. These failure locations were surveyed in using GNSS enabled RTK GPS, along with the boundaries of the areas and the topographic surface of each area. Compaction on Lift 4 for both of these areas was completed similar to past compaction efforts, by first track walking a D6 LGP dozer over the area. However, two passes were then made in vibratory mode using an 84" smooth drum roller instead of 1 pass vibratory with 3 passes static.
- April 21, 2017: The failure areas in PR3 on PRL1 and PR1 on PRL2 were disked as it was initially thought that these were wet spots. However, upon disking, significantly sized wood stumps were found in each of the failure spots. The wood stumps were removed, and the areas allowed to dry until it appeared the moisture was correct for compaction. At that time the areas were wheel rolled using a WA 450 Loader, followed by 2 passes in vibratory mode of an 84" smooth drum roller, followed by 2 passes in static mode of the 84" smooth drum roller. The areas have not yet been re-proof rolled.
- May 10, 2017: The failure areas in PR1 on PRL2 were proof rolled and passed. Envirocon's 3,900 gallon unloaded water truck (3972) was used to conduct the proof roll. The proof roll was witnessed by the Envirocon Project Engineer and the STR.
- May 15, 2017: The failure area on PR4 on PRL1 was proof rolled and passed. A 3,900 gallon unloaded water truck was used to conduct the proof roll. The proof roll was witnessed by the Envirocon Project Engineer and the STR.
- May 15, 2017: Proof Roll #2 on PRL2 was conducted. The area was directly north and adjacent to the PR1 on PRL2 proof roll area. The area was approximately 1.3 acres in size. There were no failure areas, the entire 1.3 Acre area passed. The test was conducted using Carolina Sod's 3,900 gallon water truck, unloaded. The truck traversed the area in an east-west direction working from the south to the north. Per the standard operating procedure, the truck stepped to the north 1 truck width each pass such that the driver's side tires drove

in the passenger tire marks each time the truck was offset. The proof roll was observed by the Envirocon Project Engineer, STR, and Don Baston. Compaction on the lifts of this area were achieved by first drying the material to a suitable moisture content with a Rome disk, then track walking the area with a D6 LGP dozer, followed by two vibratory passes and then two static passes of the 84" smooth drum roller.

- May 17, 2017: Three proof rolls were conducted. The proof rolls were observed by the Envirocon Project Engineer, STR, and Don Baston. The first proof roll of the day was Proof Roll #3 on PRL2. The area was approximately 0.24 acres in size. The proof roll used unloaded Envirocon water truck 3972, 3,900 gallons. The truck traversed the area north and south, starting from the east and working to the west. The truck stepped to the west 1 truck width each pass. The second proof roll of the day was Proof Roll #5 on PRL1. This area was the northern portion of the 488-1D East pad, which generally included the former CPRB clay stockpile area. Again empty Envirocon water truck 3972 (3,900 gallon) was used to conduct the proof roll. The proof roll worked from north to south traversing in an east-west direction, stepping over 1 truck width each time. The third proof roll was Proof Roll #4 on PRL2. This area was directly north and adjacent to PR#2 on PRL2. Again empty Envirocon water truck 3972 (3,900 gallon) was used to conduct the proof roll. The proof roll worked from north to south traversing in an east-west direction, stepping over 1 truck width each time. The lifts composing these proof roll levels gained compaction by first drying the material to a suitable moisture content with a Rome disk, then track walking the area with a D6 LGP dozer, followed by two vibratory passes and then two static passes of the 84" smooth drum roller.

- June 12, 2017: Proof Roll #5 on PRL2 was conducted. The area was directly north and adjacent to PR#4 on PRL2. The area was approximately 1.3 acres in size. Empty Envirocon water truck 3972 was used to conduct the proof roll. David with CSRA, Derek Evans with SRNS, Steve Hoover (STR) and Mike Beardsley witnessed the proof roll. The truck traversed the area in an east-west direction, starting on the south and working to the north. The truck moved over 1 truck width each pass such that the driver's side tires followed in the passenger side of the tires' marks on the subsequent pass. The ash placed in this area gained compaction by being disked to a suitable moisture content, then track walked with a D6 dozer, and then compacted two times in vibratory mode with an 84" smooth drum roller, followed by 1 pass in static mode with an 84" smooth drum roller. There was no failing or required re-work areas in this proof roll. There were no pictures taken during this proof roll event.

- June 15, 2017: Proof Roll #6 on PRL1 was conducted. The area was the western side of PRL1 on the southern half. The area was approximately 1 acre in size. Empty Envirocon water truck 3972 was used to conduct the proof roll. David with CSRA, Derek Evans with SRNS, and Mike Beardsley witnessed the proof roll. The truck traversed the area in a north-south direction, starting on the west and working to the east. The truck moved over 1 truck width each pass such that the driver's side tires followed in the passenger side of the tires' marks on the subsequent pass. The ash placed in this area gained compaction by being disked to a suitable moisture content, then track walked with a D6 dozer, and then compacted two times in vibratory mode with an 84" smooth drum roller, followed by 1 pass in static mode with an 84" smooth drum roller. There was 1 failing spot (isolated to about a 2' radius). It appears there was a buried stump here and it will be repaired in the future.

Attachments:

- Proof Roll Level Definition Figure
- Cumulative Proof Roll Location Figure
- CSRA Proof Roll Reports

The proof roll tests were witnessed by Mike Beardsley, PE, in accordance with the plans and specifications.

Mike Beardsley, PE

06/19/2017

Project Engineer

488-1D Ash Basin Closure Project

(720) 838 – 7107

Mbeardsley@greenglobeinc.com

Date:	Time:	Direction of View / Location:
Wednesday, March 1, 2017	1057	East / 488-1D East

Subject:

Proof Roll #1 underway.

Date:	Time:	Direction of View / Location:
Friday, March 17, 2017	1151	East / 488-1D East

Subject:

Proof Rolled Square, now passing, previously failed during Proof Roll #1.

Date:	Time:	Direction of View / Location:
Tuesday, March 21, 2017	0807	N/A / 488-1D East

Subject:
Proof Roll #2 underway.

Date:	Time:	Direction of View / Location:
Tuesday, April 11, 2017	1316	East / 488-1D East

Subject:
Proof Roll #3 underway.

Date:	Time:	Direction of View / Location:
Thursday, April 20, 2017	1306	West / 488-1D East

Subject:

Carolina Sod 3,900 gallon water truck proof rolling PR1 on PRL2 and then PR4 on PRL1.

Date:	Time:	Direction of View / Location:
Thursday, April 20, 2017	1309	N/A / 488-1D East

Subject:

Proof Roll #1 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Wednesday, May 10, 2017	08:14	South / 488-1D East

Subject:
Proof Roll of repairs in PR#1 on PRL2. Areas passed.

Date:	Time:	Direction of View / Location:
Monday, May 15, 2017	10:52	West / 488-1D East

Subject:
Proof Roll #2 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Monday, May 15, 2017	16:09	West / 488-1D East

Subject:
Proof Roll on repair of PR#4 on PRL1. Area passed.

Date:	Time:	Direction of View / Location:
Wednesday, May 17, 2017	08:00	South / 488-1D East

Subject:
Proof Roll #3 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Wednesday, May 17, 2017	11:09	N/A / 488-1D East

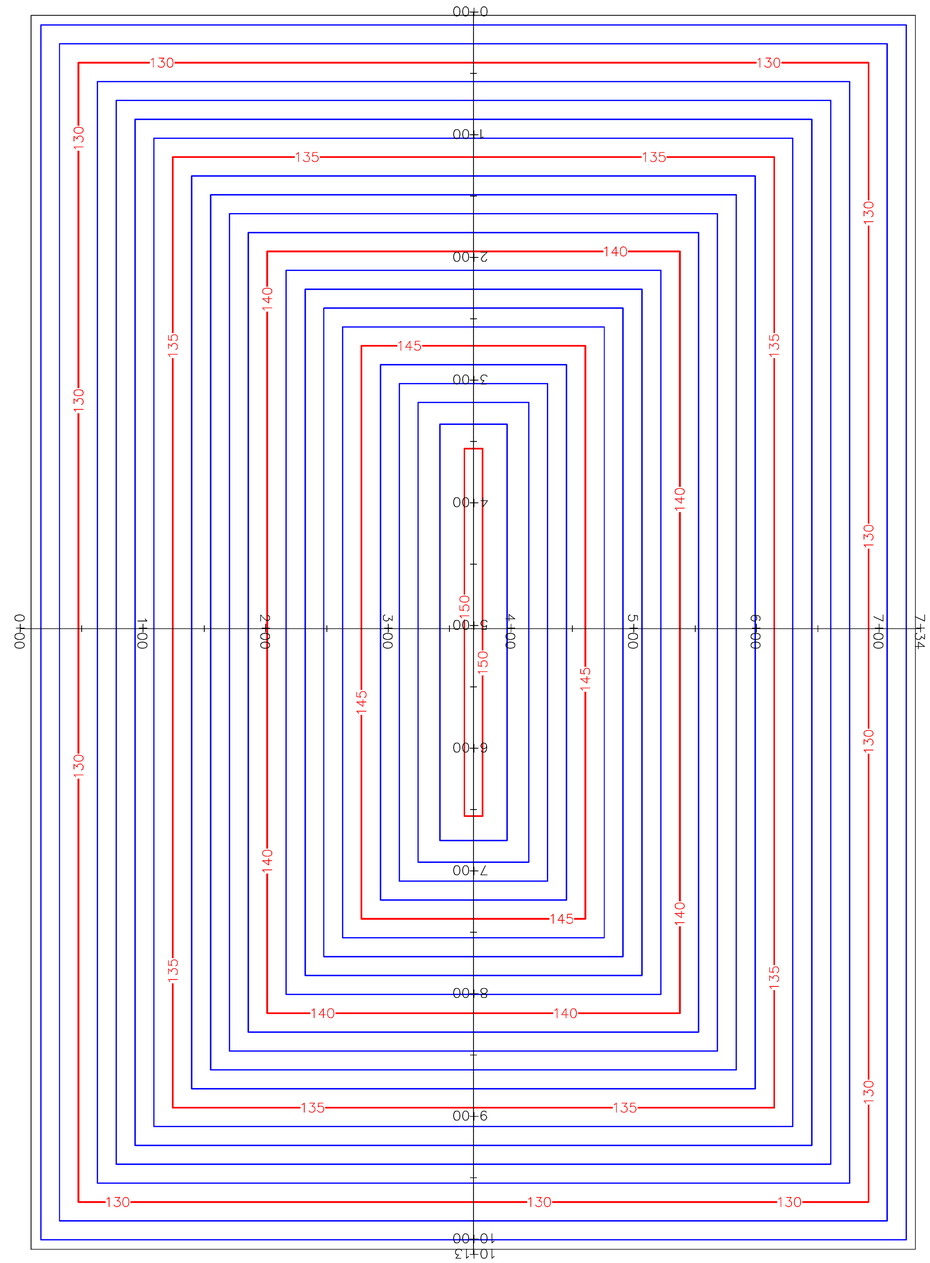
Subject:
Proof Roll on PR#5 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, June 15, 2017	09:34	South / 488-1D East

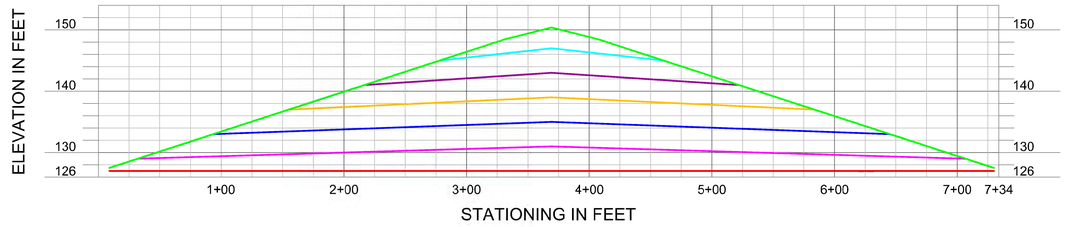
Subject:
Proof Roll on PR#6 on PRL1 underway.

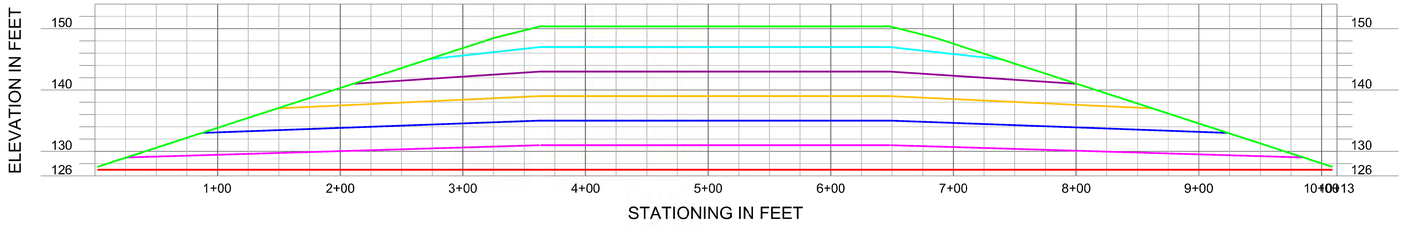
PROOF ROLL LEVEL DEFINITIONS

PLAN VIEW



PROFILE VIEW





0 100' HORIZONTAL SCALE

0 20' VERTICAL SCALE

LEGEND:

- Top of Proof Roll Level 1 (EL = 127)
- Top of Proof Roll Level 2
- Top of Proof Roll Level 3
- Top of Proof Roll Level 4
- Top of Proof Roll Level 5
- Top of Proof Roll Level 6
- Top of Proof Roll Level 7 (Ash FG)
- Ash FG Contour Major (5')
- Ash FG Contour Minor (1')

N

0 100' 200'
SCALE IN FEET

Prepared By:
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7878 Wadsworth Blvd.
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Arvada, CO 80003

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Nicanor Aguilar, Steve Hoover

Figure #: 01	
Date: 03/29/2017	
Revision #: 01	
Drawn By: GGE	
Approved By: EI	
Project #: 1495402	

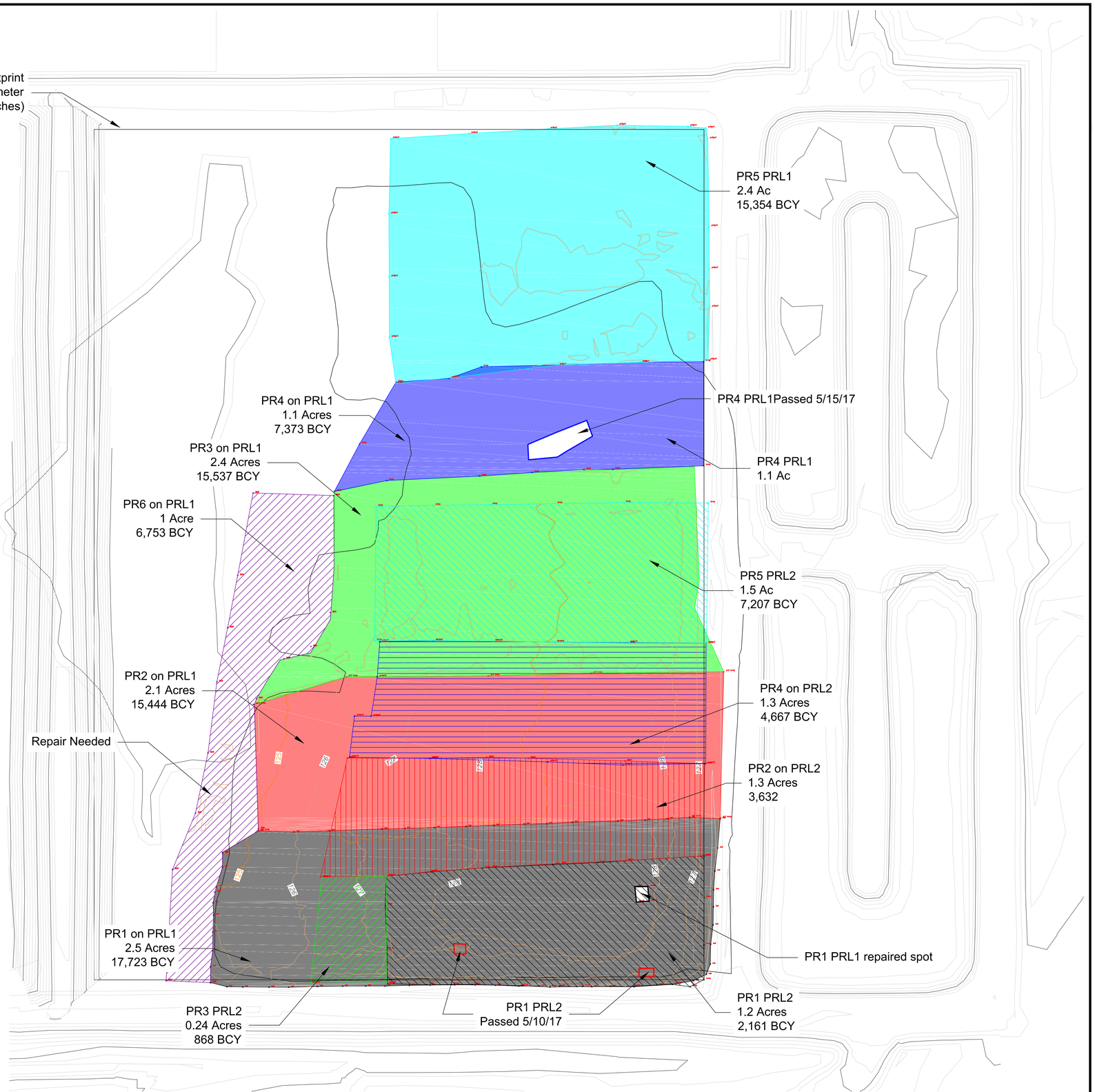
488-1D East Ash Placement Proof Roll Levels

488-1D Ash Basin Closure

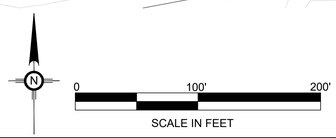
C:\ USERS\ MIKE BEARDSLEY\ DESKTOP\ REVISED PROOF ROLL LIFTS.DWG

PROOF ROLL LOCATIONS

LEGEND:
- Original Ground Contour Major (5')
- Original Ground Contour Minor (1')
- Proof Roll Grade Contour Major (5')
- Proof Roll Grade Contour Minor (1')



NOTES:
1) PR1 on PRL1 conducted on 03-01-2017 with 3,900 gallon water truck.
2) PR 1 on PRL1 Failed Area passed on Proof Roll on 03-21-2017.
3) PR 2 on PRL1 conducted on 03-21-2017 with 3,900 gallon water truck.
4) PR3 on PRL1 conducted on 04-11-2017 with 3,900 gallon water truck.
5) PR 4 on PRL1 conducted on 04-20-2017 with 3,900 gallon water truck.
6) PR1 on PRL2 conducted on 04-20-2017 with 3,900 gallon water truck.
7) Repairs on PR1 on PRL2 passed on 05-10-17 with 3,900 gallon water truck.
8) PR2 on PRL2 conducted on 05-15-17 with 3,900 gallon water truck.
9) Repairs on PR4 PRL1 passed on 05-15-17 with 3,900 gallon water truck.
10) PR3 and PR4 on PRL2 conducted on 05-17-2017 with 3,900 gallon water truck.
11) PR5 on PRL1 conducted on 05-17-2017 with 3,900 gallon water truck.
12) PR5 on PRL2 conducted on 06-12-2017 with 3,900 gallon water truck.
13) PR6 on PRL1 conducted on 06-15-2017 with 3,900 gallon water truck.



Prepared By:	Envirocon 7878 Wadsworth Blvd. Suite 340 Arvada, CO 80003
Prepared For:	Savannah River Nuclear Solutions, LLC Document Control Center, Bldg. 704-1N SRNS Subcontract No: 0000258194 Aiken, SC 29808 Attn: Don Baston, Nicanor Aguilar, Steve Hoover
Figure #: 01	
Date: 06/19/17	
Revision #: 0	
Drawn By: GGE	
Approved By: EI	
Project #: 1495402	

Cumulative Proof Roll Figure
488-1D East

488-1D Ash Basin Closure

E:\GGE\PROJECT DATA\ENVIROCON\SRNS POND 1D\PE FILES\488-1D PROOF ROLLS\CUMMULATIVE PROOF ROLLS.DWG

CSRA PROOF ROLL INSPECTION REPORTS

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T16-H95

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	As requested by client, technician observed an empty water truck proofroll the southeast section of Area 1 at elevations between 127.00 to 129.00. Area observed appeared to be firm and stable at this time.

TOTAL TIME:	3.0 hours		
DATE:	March 1, 2017	TECHNICIAN:	Chris Lowry

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-L66

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed a empty water truck (truck no. 3972) proofroll the two (2) acres of north and adjoining proofroll 1 area. All areas appeared to be firm and stable at this time. (Note: This is the second proofroll for this area; elevation 127-129.)

TOTAL TIME:	4.0 hours		
DATE:	March 21, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-P35

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck (truck no. 3972) proofroll #3 on PRL1. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	April 11, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Q67

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck proofroll #1 on PRL2. All areas appeared to be firm and stable at this time with the exception of an area measuring 10' x 10' in two (2) separate areas. A proofroll was also observed for #4 on PRL1. All areas appeared to be firm and stable with the exception of an area measuring 10' x 30'. In both cases, contractor will scarify areas and allow to dry before re-compacting. Further observation for these isolated areas should resume when areas are firm and stable.

TOTAL TIME:	5.0 hours		
DATE:	April 20, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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Augusta, Georgia 30904
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Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-U51

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#2 (proofroll #2). All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	May 15, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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Fax (708) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-U78SI

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty tandem axle water truck proofroll three (3) areas at PR-3 on PRL-2, PR-5 on PRL-1, and PR-4 on PRL-2. All areas were firm and stable at this time. Technician also performed fifteen (15) field density tests. Please see report T17-U78FD for test results and locations.

DATE:	May 17, 2017	TECHNICIAN:	David Turner

David Turner
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Y24

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#2 proofroll #5. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	June 12, 2017	TECHNICIAN:	David Turner

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Y95

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#1 proofroll #6. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	June 15, 2017	TECHNICIAN:	David Turner

David Turner DET
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

Date: August 08, 2017	
Project Title: SRNS 488-1D Ash Impoundment	**Location: Jackson, SC**

488-1D East Placement Area Proof Rolls:

This report serves as cumulative documentation of the proof roll activities associated with the 488-1D Ash Impoundment Project. This report is a live document that is updated as the proof rolls occur, and is thus progressively expounded and re-submitted as needed. The required proof roll inspections have been identified in Attachment A, herein and are identified as Proof Roll Levels (PRLs) 1 – 7. In short:

- PRL1: Approximate elevation 127
- PRL2: Approximate elevations 127 - 131
- PRL3: Approximate elevations 131 - 135
- PRL4: Approximate elevations 135 - 139
- PRL5: Approximate elevations 139 - 143
- PRL6: Approximate elevations 143 - 147
- PRL7: Approximate elevations 147 – 150.4

The proof rolls are summarized below:

- March 01, 2017, Proof Roll #1: The southern 1/8th of the placement area in 488-1D east was proof roll tested. This was the first 4' lift, (PRL1) with the average lift elevation ranging from 127 – 129 feet. In attendance was Don Bastion, Tripp Winfree, Gerald McKee, Chris Lowry (CSRA), Steve Hoover, Mike Beardsley, and Clay Roark. The proof roll was conducted using a 3,500 – 4,000 gallon water truck, EI truck #3972. Per Chris, Tripp, and Don, the weight of this truck is sufficient to yield enough ground pressure that it need not be filled with water during the proof roll. The entire area was rolled with the truck stepping over 1 truck length each time, such that after the first pass, the driver's side tires traveled in the passenger's side tire tracks. The proof roll started on the south and worked north, covering approximately 2.5 Acres. The entire area passed, with the exception of a soft spot roughly 10' x 10' in size located on the east side near the center of the area. See sketch for further detail.
- March 17, 2017, Proof Roll #1 Repair: Envirocon "re-proof rolled" the 10' x 10' square that failed during Proof Roll #1. This proof roll was witnessed by Mike Beardsley and STR Steve Hoover. Envirocon allowed this area to dry for 16 days. They did not remove the material, but did drive upon it in static mode with an 84" smooth drum roller 4 times for compaction. For the proof roll, Envirocon water truck 3972 was utilized, empty as during the full proof roll. The water truck made two passes driving east and west, starting along the south side of the failed grid. The truck then moved over 1 truck width such that the driver side tires followed the wheel marks from the passenger tires on the previous pass. No deflection or pumping was observed by myself or STR.
- March 21, 2017, Proof Roll #2: Proof Roll #2 was conducted on approximately 2.1 Acres directly north and adjacent to the Proof Roll #1 area. This was a proof roll on Proof Roll Level 1 (~127 -128 FT elevation). The proof roll used Envirocon water truck 3972 and worked from south to north, stepping over 1 truck width each time such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area until a lane then had a failure. There was no small spots within the fill that failed. Upon reaching the failed lane, the boundary was then staked out with a survey lathe demarcating the area. The accepted area was taken as one full truck lane further to the south and there was the location of where the stakes were placed. For future proof rolls, these boundaries will be demarcated with white ribbon, but for this test,

green ribbon was used. The boundary was then surveyed in with GPS and the area topographically surveyed (in-house by Envirocon's engineering staff).

- April 11, 2017, Proof Roll #3: Proof Roll #3 was conducted on approximately 2.4 Acres, directly north and adjacent to the Proof Roll #2 area. The proof roll occurred on Proof Roll Level 1 (PRL 1, which is at elevation 127). Once again, the proof roll utilized Envirocon's empty water truck, equipment number 3972. The truck traveled in an east-west direction working from the south to the north, stepping over 1 truck width each pass, such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area that was prepared for the proof roll. There were no failures for this proof roll area. The area was then delineated with orange lathe with white ribbon and topographically surveyed with RTK enabled GPS. The underlying lifts of placed ash that comprised this PRL 1 were compacted using the following method. First, the west ash was dumped in a windrow with an articulating truck. Next the windrow was spread with a D6 LGP dozer. The spread ash was then disked with a rome disk to dry the material back to what appeared to compact well (moisture content ranges anywhere from 19 – 29% by dry weight). Once dried appropriately, the ash was then track walked with a D6 LGP dozer. Then an 84" smooth drum roller makes 1 pass in vibratory mode followed by 3 passes in static mode. Lastly, compaction is also achieved as the loaded articulated trucks traverse the surface to build the windrows.
- April 20, 2017: Proof Roll #4 on PRL 1 and Proof Roll #1 on PRL 2: PR1 on PRL2 was located approximately 4 feet atop PR1 on PRL1 on the south side of the 488-1D east placement pad, and was approximately 1.2 Acres. PR4 on PRL1 was directly adjacent to PR3 on PRL1 and was approximately 1.1 Acres. These proof rolls utilized Carolina Sod's empty water truck. As with Envirocon's water truck, this was a 3,900 gallon water truck. The truck traveled in an east-west direction working from the south to the north, stepping over 1 truck width each pass, such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area that was prepared for each of the proof rolls. There were two failure spots for PR1 on PRL2 approximately 10' x 10' each and 1 failure area approximately 10' x 40' for PR4 on PRL1. These failure locations were surveyed in using GNSS enabled RTK GPS, along with the boundaries of the areas and the topographic surface of each area. Compaction on Lift 4 for both of these areas was completed similar to past compaction efforts, by first track walking a D6 LGP dozer over the area. However, two passes were then made in vibratory mode using an 84" smooth drum roller instead of 1 pass vibratory with 3 passes static.
- April 21, 2017: The failure areas in PR3 on PRL1 and PR1 on PRL2 were disked as it was initially thought that these were wet spots. However, upon disking, significantly sized wood stumps were found in each of the failure spots. The wood stumps were removed, and the areas allowed to dry until it appeared the moisture was correct for compaction. At that time the areas were wheel rolled using a WA 450 Loader, followed by 2 passes in vibratory mode of an 84" smooth drum roller, followed by 2 passes in static mode of the 84" smooth drum roller. The areas have not yet been re-proof rolled.
- May 10, 2017: The failure areas in PR1 on PRL2 were proof rolled and passed. Envirocon's 3,900 gallon unloaded water truck (3972) was used to conduct the proof roll. The proof roll was witnessed by the Envirocon Project Engineer and the STR.
- May 15, 2017: The failure area on PR4 on PRL1 was proof rolled and passed. A 3,900 gallon unloaded water truck was used to conduct the proof roll. The proof roll was witnessed by the Envirocon Project Engineer and the STR.
- May 15, 2017: Proof Roll #2 on PRL2 was conducted. The area was directly north and adjacent to the PR1 on PRL2 proof roll area. The area was approximately 1.3 acres in size. There were no failure areas, the entire 1.3 Acre area passed. The test was conducted using Carolina Sod's 3,900 gallon water truck, unloaded. The truck traversed the area in an east-west direction working from the south to the north. Per the standard operating procedure, the truck stepped to the north 1 truck width each pass such that the driver's side tires drove

in the passenger tire marks each time the truck was offset. The proof roll was observed by the Envirocon Project Engineer, STR, and Don Baston. Compaction on the lifts of this area were achieved by first drying the material to a suitable moisture content with a Rome disk, then track walking the area with a D6 LGP dozer, followed by two vibratory passes and then two static passes of the 84" smooth drum roller.

- May 17, 2017: Three proof rolls were conducted. The proof rolls were observed by the Envirocon Project Engineer, STR, and Don Baston. The first proof roll of the day was Proof Roll #3 on PRL2. The area was approximately 0.24 acres in size. The proof roll used unloaded Envirocon water truck 3972, 3,900 gallons. The truck traversed the area north and south, starting from the east and working to the west. The truck stepped to the west 1 truck width each pass. The second proof roll of the day was Proof Roll #5 on PRL1. This area was the northern portion of the 488-1D East pad, which generally included the former CPRB clay stockpile area. Again empty Envirocon water truck 3972 (3,900 gallon) was used to conduct the proof roll. The proof roll worked from north to south traversing in an east-west direction, stepping over 1 truck width each time. The third proof roll was Proof Roll #4 on PRL2. This area was directly north and adjacent to PR#2 on PRL2. Again empty Envirocon water truck 3972 (3,900 gallon) was used to conduct the proof roll. The proof roll worked from north to south traversing in an east-west direction, stepping over 1 truck width each time. The lifts composing these proof roll levels gained compaction by first drying the material to a suitable moisture content with a Rome disk, then track walking the area with a D6 LGP dozer, followed by two vibratory passes and then two static passes of the 84" smooth drum roller.
- June 12, 2017: Proof Roll #5 on PRL2 was conducted. The area was directly north and adjacent to PR#4 on PRL2. The area was approximately 1.3 acres in size. Empty Envirocon water truck 3972 was used to conduct the proof roll. David with CSRA, Derek Evans with SRNS, Steve Hoover (STR) and Mike Beardsley witnessed the proof roll. The truck traversed the area in an east-west direction, starting on the south and working to the north. The truck moved over 1 truck width each pass such that the driver's side tires followed in the passenger side of the tires' marks on the subsequent pass. The ash placed in this area gained compaction by being disked to a suitable moisture content, then track walked with a D6 dozer, and then compacted two times in vibratory mode with an 84" smooth drum roller, followed by 1 pass in static mode with an 84" smooth drum roller. There was no failing or required re-work areas in this proof roll. There were no pictures taken during this proof roll event.
- June 15, 2017: Proof Roll #6 on PRL1 was conducted. The area was the western side of PRL1 on the southern half. The area was approximately 1 acre in size. Empty Envirocon water truck 3972 was used to conduct the proof roll. David with CSRA, Derek Evans with SRNS, and Mike Beardsley witnessed the proof roll. The truck traversed the area in a north-south direction, starting on the west and working to the east. The truck moved over 1 truck width each pass such that the driver's side tires followed in the passenger side of the tires' marks on the subsequent pass. The ash placed in this area gained compaction by being disked to a suitable moisture content, then track walked with a D6 dozer, and then compacted two times in vibratory mode with an 84" smooth drum roller, followed by 1 pass in static mode with an 84" smooth drum roller. There was 1 failing spot (isolated to about a 2' radius). It appears there was a buried stump here and it will be repaired in the future.
- July 06, 2017: Proof Roll #6 on PRL2 was conducted. Attendees included: Derek Evans (SRNS), Steve Hoover (STR), Brandon Mitchell (CSRA), Mike Beardsley (EI/GGE), and Melvin Butler (EI). Empty water truck 3972 was used to conduct the test. The area is the north 1/3rd of the 488-1D east pad. The truck travelled in an East-West direction starting at the south side of the pad and working north. The area was approximately 3.3 acres in size. There were 3 failure locations in this proof roll. The first was a spot about 30' x 60' on the south side of the area. The second was a 2' diameter spot about 50' northeast of the first failure spot. The final failure location was an area about 20' x 50' on the eastern side of the

test area. All other areas passed with no observed pumping. The failure areas were staked and will be repaired in the future. The area was surveyed in (laterally and topographically). The compactive technique used throughout this PRL was track walking with a D6 LGP dozer, followed by two vibratory passes of an 84" smooth drum roller, followed by 1 static pass. The average moisture content of the upper 1' of the PRL was approximately 25% by dry weight.

- July 07, 2017: Envirocon repaired the 3 failed areas in PR6 on PRL2. All three repairs passed. To repair, Envirocon dug 1 foot out of the areas with an excavator and allowed the removed material and the excavation to dry throughout the day. Then the crew compacted the floor of the excavation with an 84" smooth drum compactor in static mode. They then filled the excavation back in using a D6 LGP dozer. Next they track walked the filled in excavation. Then the rolled the area with the 84" smooth drum roller using 2 vibratory and 1 static pass over each filled in repair area. Then empty water truck 3972 drove over each repair area and Steve Hoover and Mike Beardsley observed the test. No soil pumping was witnessed.
- July 10, 2017: Envirocon repaired the failed area in PR6 on PRL1. This was a location that contained a tree / wood debris, causing a pumping area of about a 2' diameter. The repaired area passed. To repair, the crew removed the wood with a D6 LGP dozer. Then the hole was backfilled and compacted. Compacting consisted of track walking with a LGP dozer and then pneumatic compaction via heavy equipment wheel rolling. Then empty water truck 3972 drove over the repair area and Steve Hoover and Mike Beardsley observed the test. No soil pumping was witnessed.
- July 27, 2017: Proof Roll #7 on PRL1 was conducted in the northwest corner of 488-1D East. The proof roll was attended by Don Baston (SRNS), Mike Beardsley (EI/GGE), William Livingston (EI), Brandon Mitchell (CSRA), Steve Hoover (STR), and Brandon C. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the west edge of the area and working to the east. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. All areas passed, with no re-work needed and no pumping observed. It was observed that the northwest corner was slightly "spongier" than the rest of the area, but no areas pumped.

Attachments:

- Proof Roll Level Definition Figure
- Cumulative Proof Roll Location Figure
- CSRA Proof Roll Reports

The proof roll tests were witnessed by Mike Beardsley, PE, in accordance with the plans and specifications.

Mike Beardsley, PE

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 34106
MICHAEL K. BEARDSLEY

08/08/2017

Project Engineer

488-1D Ash Basin Closure Project

(720) 838 – 7107

Mbeardsley@greenglobeinc.com

Date:	Time:	Direction of View / Location:
Wednesday, March 1, 2017	1057	East / 488-1D East

Subject:

Proof Roll #1 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Friday, March 17, 2017	1151	East / 488-1D East

Subject:

Proof Rolled Square, now passing, previously failed during PR1 on PRL1.

Date:	Time:	Direction of View / Location:
Tuesday, March 21, 2017	0807	N/A / 488-1D East

Subject:
Proof Roll #2 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Tuesday, April 11, 2017	1316	East / 488-1D East

Subject:
Proof Roll #3 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, April 20, 2017	1306	West / 488-1D East

Subject:
Carolina Sod 3,900 gallon water truck proof rolling PR1 on PRL2 and then PR4 on PRL1.

Date:	Time:	Direction of View / Location:
Thursday, April 20, 2017	1309	N/A / 488-1D East

Subject:
Proof Roll #1 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Wednesday, May 10, 2017	08:14	South / 488-1D East

Subject:
Proof Roll of repairs in PR#1 on PRL2. Areas passed.

Date:	Time:	Direction of View / Location:
Monday, May 15, 2017	10:52	West / 488-1D East

Subject:
Proof Roll #2 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Monday, May 15, 2017	16:09	West / 488-1D East

Subject:
Proof Roll on repair of PR#4 on PRL1. Area passed.

Date:	Time:	Direction of View / Location:
Wednesday, May 17, 2017	08:00	South / 488-1D East

Subject:
Proof Roll #3 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Wednesday, May 17, 2017	11:09	N/A / 488-1D East

Subject:
Proof Roll PR#5 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, June 15, 2017	09:34	South / 488-1D East

Subject:
Proof Roll PR#6 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, July 06, 2017	09:22	Northwest / 488-1D East

Subject:
Proof Roll PR#6 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Friday, July 07, 2017	16:17	North / 488-1D East

Subject:
Proof Roll on Repairs in PR#6 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Monday, July 10, 2017	10:57	N/A / 488-1D East

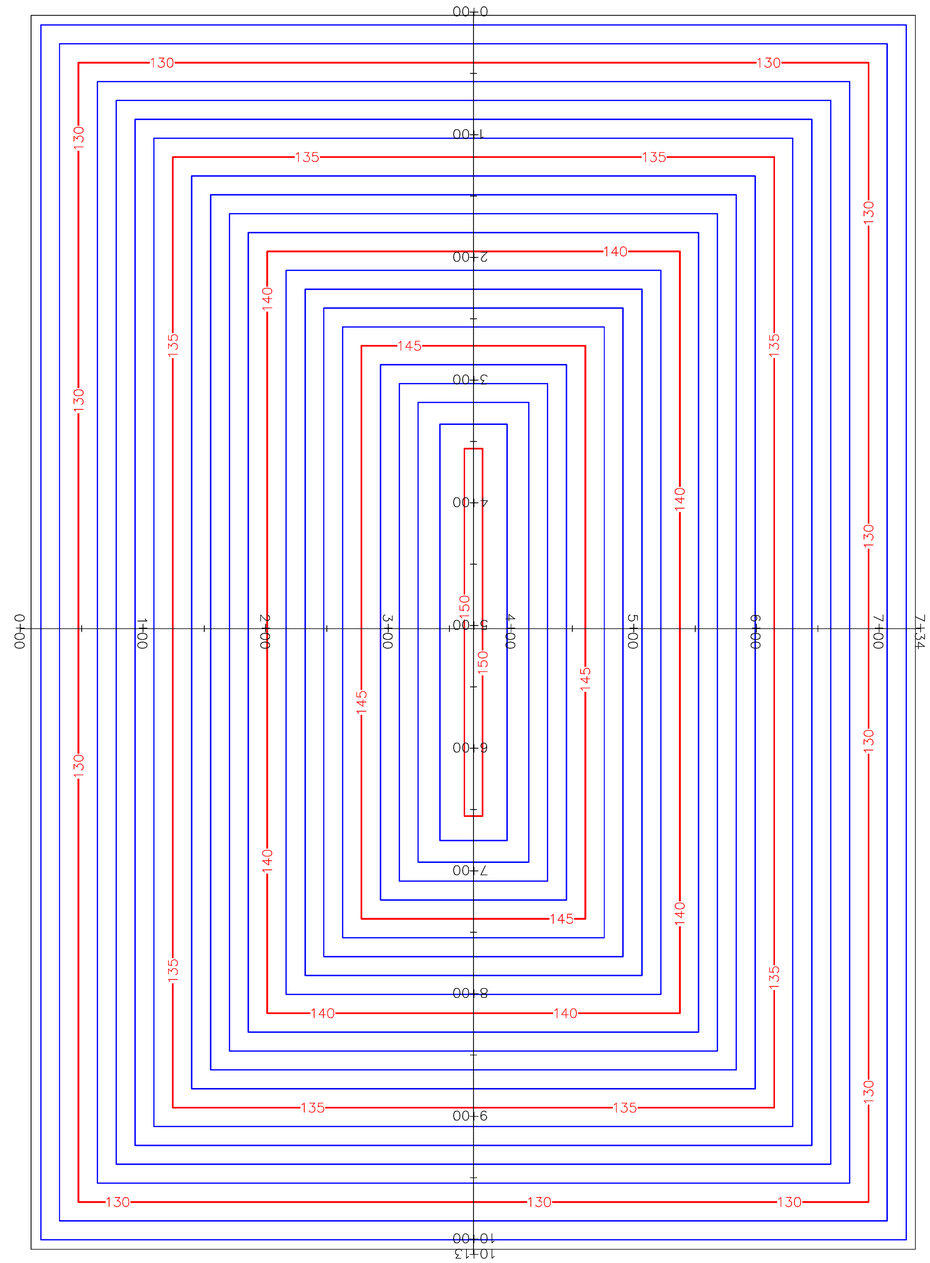
Subject:
Proof Roll on Repair in PR#6 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, July 27, 2017	08:02	North / 488-1D East

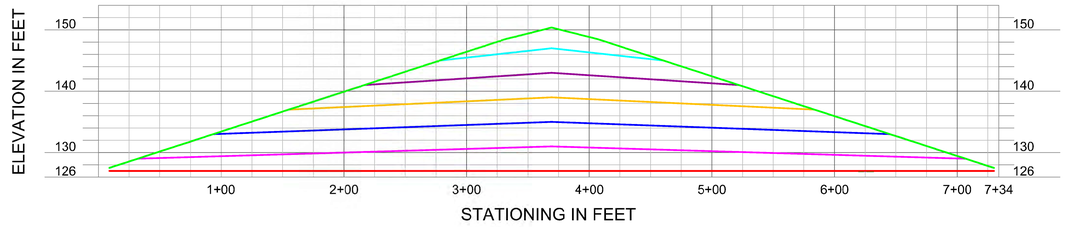
Subject:
Proof Roll PR#7 on PRL1 underway.

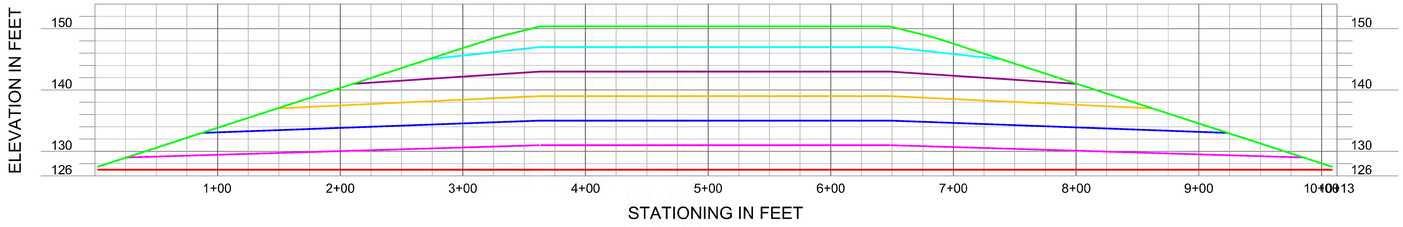
PROOF ROLL LEVEL DEFINITIONS

PLAN VIEW



PROFILE VIEW





0 100' HORIZONTAL SCALE

0 20' VERTICAL SCALE

LEGEND:

- Top of Proof Roll Level 1 (EL = 127)
- Top of Proof Roll Level 2
- Top of Proof Roll Level 3
- Top of Proof Roll Level 4
- Top of Proof Roll Level 5
- Top of Proof Roll Level 6
- Top of Proof Roll Level 7 (Ash FG)
- Ash FG Contour Major (5')
- Ash FG Contour Minor (1')

N

0 100' 200'
SCALE IN FEET

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Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Nicanor Aguilar, Steve Hoover

Figure #: 01	
Date: 03/29/2017	
Revision #: 01	
Drawn By: GGE	
Approved By: EI	
Project #: 1495402	

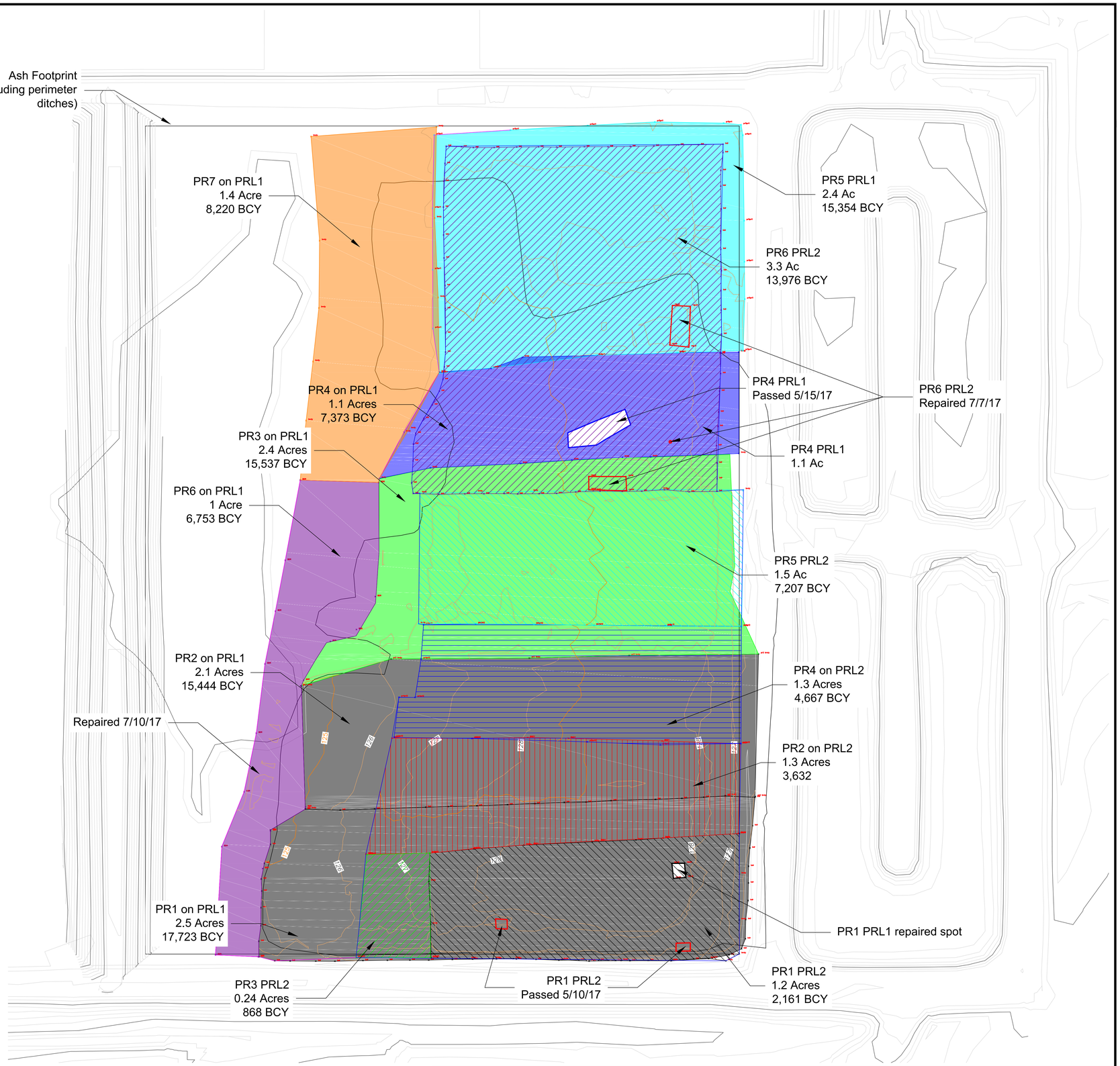
488-1D East Ash Placement Proof Roll Levels

488-1D Ash Basin Closure

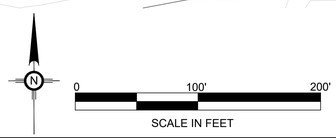
C:\ USERS\ MIKE BEARDSLEY\ DESKTOP\ REVISED PROOF ROLL LIFTS.DWG

PROOF ROLL LOCATIONS

LEGEND:
- Original Ground Contour Major (5')
- Original Ground Contour Minor (1')
- Proof Roll Grade Contour Major (5')
- Proof Roll Grade Contour Minor (1')



NOTES:
1) PR1 on PRL1 conducted on 03-01-2017 with 3,900 gallon water truck.
2) PR 1 on PRL1 Failed Area passed on Proof Roll on 03-21-2017.
3) PR 2 on PRL1 conducted on 03-21-2017 with 3,900 gallon water truck.
4) PR3 on PRL1 conducted on 04-11-2017 with 3,900 gallon water truck.
5) PR 4 on PRL1 conducted on 04-20-2017 with 3,900 gallon water truck.
6) PR1 on PRL2 conducted on 04-20-2017 with 3,900 gallon water truck.
7) Repairs on PR1 on PRL2 passed on 05-10-17 with 3,900 gallon water truck.
8) PR2 on PRL2 conducted on 05-15-17 with 3,900 gallon water truck.
9) Repairs on PR4 PRL1 passed on 05-15-17 with 3,900 gallon water truck.
10) PR3 and PR4 on PRL2 conducted on 05-17-2017 with 3,900 gallon water truck.
11) PR5 on PRL1 conducted on 05-17-2017 with 3,900 gallon water truck.
12) PR5 on PRL2 conducted on 06-12-2017 with 3,900 gallon water truck.
13) PR6 on PRL1 conducted on 06-15-2017 with 3,900 gallon water truck.
14) PR6 on PRL2 conducted on 07-06-2017 with 3,900 gallon water truck.
15) Repairs on PR6 on PRL2 passed on 07/07/17 with 3,900 gallon water truck.
16) Repair on PR6 on PRL1 passed on 07/10/17 with 3,900 gallon water truck.
17) PR7 on PRL1 conducted on 07-27-17 with 3,900 gallon water truck.



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Aiken, SC 29808
Attn: Don Baston, Drew Murphy, Steve Hoover

Figure #: 01	Cumulative Proof Roll Figure 488-1D East
Date: 08/08/17	
Revision #: 0	
Drawn By: GGE	
Approved By: EI	488-1D Ash Basin Closure
Project #: 1495402	

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CSRA PROOF ROLL INSPECTION REPORTS

csra TESTING AND ENGINEERING CO., INC.

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Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T16-H95

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	As requested by client, technician observed an empty water truck proofroll the southeast section of Area 1 at elevations between 127.00 to 129.00. Area observed appeared to be firm and stable at this time.

TOTAL TIME:	3.0 hours		
DATE:	March 1, 2017	TECHNICIAN:	Chris Lowry

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-L66

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed a empty water truck (truck no. 3972) proofroll the two (2) acres of north and adjoining proofroll 1 area. All areas appeared to be firm and stable at this time. (Note: This is the second proofroll for this area; elevation 127-129.)

TOTAL TIME:	4.0 hours		
DATE:	March 21, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-P35

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck (truck no. 3972) proofroll #3 on PRL1. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	April 11, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Q67

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck proofroll #1 on PRL2. All areas appeared to be firm and stable at this time with the exception of an area measuring 10' x 10' in two (2) separate areas. A proofroll was also observed for #4 on PRL1. All areas appeared to be firm and stable with the exception of an area measuring 10' x 30'. In both cases, contractor will scarify areas and allow to dry before re-compacting. Further observation for these isolated areas should resume when areas are firm and stable.

TOTAL TIME:	5.0 hours		
DATE:	April 20, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-U51

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#2 (proofroll #2). All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	May 15, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-U78SI

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty tandem axle water truck proofroll three (3) areas at PR-3 on PRL-2, PR-5 on PRL-1, and PR-4 on PRL-2. All areas were firm and stable at this time. Technician also performed fifteen (15) field density tests. Please see report T17-U78FD for test results and locations.

DATE:	May 17, 2017	TECHNICIAN:	David Turner

David Turner
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

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PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Y24

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#2 proofroll #5. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	June 12, 2017	TECHNICIAN:	David Turner

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Y95

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#1 proofroll #6. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	June 15, 2017	TECHNICIAN:	David Turner

David Turner DET
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-BB12

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL #6 at elevation PRL #2. Material was firm and stable with the exception of two (2) areas: 1) location east side approximately 30' x 60' to a depth of 12 inches was saturated; 2) location on south side approximately 30' x 60' to a depth of 12 inches was saturated. Technician suggested to remove saturated material and allow areas to dry before replacing.

TOTAL TIME:	4.0 hours		
DATE:	July 6, 2017	TECHNICIAN:	Branon Mitchell

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-EE70

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck proofroll location PRL1-Proofroll #7. All areas were firm and stable with no signs of pumping. Technician also picked up soil sampled for modified proctor test (N1B-sample 1).

TOTAL TIME:	4.0 hours		
DATE:	July 27, 2017	TECHNICIAN:	Branon Mitchell

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

Date: August 23, 2017	
Project Title: SRNS 488-1D Ash Impoundment	**Location: Jackson, SC**

488-1D East Placement Area Proof Rolls:

This report serves as cumulative documentation of the proof roll activities associated with the 488-1D Ash Impoundment Project. This report is a live document that is updated as the proof rolls occur, and is thus progressively expounded and re-submitted as needed. The required proof roll inspections have been identified in Attachment A, herein and are identified as Proof Roll Levels (PRLs) 1 – 7. In short:

- PRL1: Approximate elevation 127
- PRL2: Approximate elevations 127 - 131
- PRL3: Approximate elevations 131 - 135
- PRL4: Approximate elevations 135 - 139
- PRL5: Approximate elevations 139 - 143
- PRL6: Approximate elevations 143 - 147
- PRL7: Approximate elevations 147 – 150.4

The proof rolls are summarized below:

- March 01, 2017, Proof Roll #1: The southern 1/8th of the placement area in 488-1D east was proof roll tested. This was the first 4' lift, (PRL1) with the average lift elevation ranging from 127 – 129 feet. In attendance was Don Bastion, Tripp Winfree, Gerald McKee, Chris Lowry (CSRA), Steve Hoover, Mike Beardsley, and Clay Roark. The proof roll was conducted using a 3,500 – 4,000 gallon water truck, EI truck #3972. Per Chris, Tripp, and Don, the weight of this truck is sufficient to yield enough ground pressure that it need not be filled with water during the proof roll. The entire area was rolled with the truck stepping over 1 truck length each time, such that after the first pass, the driver's side tires traveled in the passenger's side tire tracks. The proof roll started on the south and worked north, covering approximately 2.5 Acres. The entire area passed, with the exception of a soft spot roughly 10' x 10' in size located on the east side near the center of the area. See sketch for further detail.
- March 17, 2017, Proof Roll #1 Repair: Envirocon "re-proof rolled" the 10' x 10' square that failed during Proof Roll #1. This proof roll was witnessed by Mike Beardsley and STR Steve Hoover. Envirocon allowed this area to dry for 16 days. They did not remove the material, but did drive upon it in static mode with an 84" smooth drum roller 4 times for compaction. For the proof roll, Envirocon water truck 3972 was utilized, empty as during the full proof roll. The water truck made two passes driving east and west, starting along the south side of the failed grid. The truck then moved over 1 truck width such that the driver side tires followed the wheel marks from the passenger tires on the previous pass. No deflection or pumping was observed by myself or STR.
- March 21, 2017, Proof Roll #2: Proof Roll #2 was conducted on approximately 2.1 Acres directly north and adjacent to the Proof Roll #1 area. This was a proof roll on Proof Roll Level 1 (~127 -128 FT elevation). The proof roll used Envirocon water truck 3972 and worked from south to north, stepping over 1 truck width each time such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area until a lane then had a failure. There was no small spots within the fill that failed. Upon reaching the failed lane, the boundary was then staked out with a survey lathe demarcating the area. The accepted area was taken as one full truck lane further to the south and there was the location of where the stakes were placed. For future proof rolls, these boundaries will be demarcated with white ribbon, but for this test,

green ribbon was used. The boundary was then surveyed in with GPS and the area topographically surveyed (in-house by Envirocon's engineering staff).

- April 11, 2017, Proof Roll #3: Proof Roll #3 was conducted on approximately 2.4 Acres, directly north and adjacent to the Proof Roll #2 area. The proof roll occurred on Proof Roll Level 1 (PRL 1, which is at elevation 127). Once again, the proof roll utilized Envirocon's empty water truck, equipment number 3972. The truck traveled in an east-west direction working from the south to the north, stepping over 1 truck width each pass, such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area that was prepared for the proof roll. There were no failures for this proof roll area. The area was then delineated with orange lathe with white ribbon and topographically surveyed with RTK enabled GPS. The underlying lifts of placed ash that comprised this PRL 1 were compacted using the following method. First, the west ash was dumped in a windrow with an articulating truck. Next the windrow was spread with a D6 LGP dozer. The spread ash was then disked with a rome disk to dry the material back to what appeared to compact well (moisture content ranges anywhere from 19 – 29% by dry weight). Once dried appropriately, the ash was then track walked with a D6 LGP dozer. Then an 84" smooth drum roller makes 1 pass in vibratory mode followed by 3 passes in static mode. Lastly, compaction is also achieved as the loaded articulated trucks traverse the surface to build the windrows.
- April 20, 2017: Proof Roll #4 on PRL 1 and Proof Roll #1 on PRL 2: PR1 on PRL2 was located approximately 4 feet atop PR1 on PRL1 on the south side of the 488-1D east placement pad, and was approximately 1.2 Acres. PR4 on PRL1 was directly adjacent to PR3 on PRL1 and was approximately 1.1 Acres. These proof rolls utilized Carolina Sod's empty water truck. As with Envirocon's water truck, this was a 3,900 gallon water truck. The truck traveled in an east-west direction working from the south to the north, stepping over 1 truck width each pass, such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area that was prepared for each of the proof rolls. There were two failure spots for PR1 on PRL2 approximately 10' x 10' each and 1 failure area approximately 10' x 40' for PR4 on PRL1. These failure locations were surveyed in using GNSS enabled RTK GPS, along with the boundaries of the areas and the topographic surface of each area. Compaction on Lift 4 for both of these areas was completed similar to past compaction efforts, by first track walking a D6 LGP dozer over the area. However, two passes were then made in vibratory mode using an 84" smooth drum roller instead of 1 pass vibratory with 3 passes static.
- April 21, 2017: The failure areas in PR3 on PRL1 and PR1 on PRL2 were disked as it was initially thought that these were wet spots. However, upon disking, significantly sized wood stumps were found in each of the failure spots. The wood stumps were removed, and the areas allowed to dry until it appeared the moisture was correct for compaction. At that time the areas were wheel rolled using a WA 450 Loader, followed by 2 passes in vibratory mode of an 84" smooth drum roller, followed by 2 passes in static mode of the 84" smooth drum roller. The areas have not yet been re-proof rolled.
- May 10, 2017: The failure areas in PR1 on PRL2 were proof rolled and passed. Envirocon's 3,900 gallon unloaded water truck (3972) was used to conduct the proof roll. The proof roll was witnessed by the Envirocon Project Engineer and the STR.
- May 15, 2017: The failure area on PR4 on PRL1 was proof rolled and passed. A 3,900 gallon unloaded water truck was used to conduct the proof roll. The proof roll was witnessed by the Envirocon Project Engineer and the STR.
- May 15, 2017: Proof Roll #2 on PRL2 was conducted. The area was directly north and adjacent to the PR1 on PRL2 proof roll area. The area was approximately 1.3 acres in size. There were no failure areas, the entire 1.3 Acre area passed. The test was conducted using Carolina Sod's 3,900 gallon water truck, unloaded. The truck traversed the area in an east-west direction working from the south to the north. Per the standard operating procedure, the truck stepped to the north 1 truck width each pass such that the driver's side tires drove

in the passenger tire marks each time the truck was offset. The proof roll was observed by the Envirocon Project Engineer, STR, and Don Baston. Compaction on the lifts of this area were achieved by first drying the material to a suitable moisture content with a Rome disk, then track walking the area with a D6 LGP dozer, followed by two vibratory passes and then two static passes of the 84" smooth drum roller.

- May 17, 2017: Three proof rolls were conducted. The proof rolls were observed by the Envirocon Project Engineer, STR, and Don Baston. The first proof roll of the day was Proof Roll #3 on PRL2. The area was approximately 0.24 acres in size. The proof roll used unloaded Envirocon water truck 3972, 3,900 gallons. The truck traversed the area north and south, starting from the east and working to the west. The truck stepped to the west 1 truck width each pass. The second proof roll of the day was Proof Roll #5 on PRL1. This area was the northern portion of the 488-1D East pad, which generally included the former CPRB clay stockpile area. Again empty Envirocon water truck 3972 (3,900 gallon) was used to conduct the proof roll. The proof roll worked from north to south traversing in an east-west direction, stepping over 1 truck width each time. The third proof roll was Proof Roll #4 on PRL2. This area was directly north and adjacent to PR#2 on PRL2. Again empty Envirocon water truck 3972 (3,900 gallon) was used to conduct the proof roll. The proof roll worked from north to south traversing in an east-west direction, stepping over 1 truck width each time. The lifts composing these proof roll levels gained compaction by first drying the material to a suitable moisture content with a Rome disk, then track walking the area with a D6 LGP dozer, followed by two vibratory passes and then two static passes of the 84" smooth drum roller.
- June 12, 2017: Proof Roll #5 on PRL2 was conducted. The area was directly north and adjacent to PR#4 on PRL2. The area was approximately 1.3 acres in size. Empty Envirocon water truck 3972 was used to conduct the proof roll. David with CSRA, Derek Evans with SRNS, Steve Hoover (STR) and Mike Beardsley witnessed the proof roll. The truck traversed the area in an east-west direction, starting on the south and working to the north. The truck moved over 1 truck width each pass such that the driver's side tires followed in the passenger side of the tires' marks on the subsequent pass. The ash placed in this area gained compaction by being disked to a suitable moisture content, then track walked with a D6 dozer, and then compacted two times in vibratory mode with an 84" smooth drum roller, followed by 1 pass in static mode with an 84" smooth drum roller. There was no failing or required re-work areas in this proof roll. There were no pictures taken during this proof roll event.
- June 15, 2017: Proof Roll #6 on PRL1 was conducted. The area was the western side of PRL1 on the southern half. The area was approximately 1 acre in size. Empty Envirocon water truck 3972 was used to conduct the proof roll. David with CSRA, Derek Evans with SRNS, and Mike Beardsley witnessed the proof roll. The truck traversed the area in a north-south direction, starting on the west and working to the east. The truck moved over 1 truck width each pass such that the driver's side tires followed in the passenger side of the tires' marks on the subsequent pass. The ash placed in this area gained compaction by being disked to a suitable moisture content, then track walked with a D6 dozer, and then compacted two times in vibratory mode with an 84" smooth drum roller, followed by 1 pass in static mode with an 84" smooth drum roller. There was 1 failing spot (isolated to about a 2' radius). It appears there was a buried stump here and it will be repaired in the future.
- July 06, 2017: Proof Roll #6 on PRL2 was conducted. Attendees included: Derek Evans (SRNS), Steve Hoover (STR), Brandon Mitchell (CSRA), Mike Beardsley (EI/GGE), and Melvin Butler (EI). Empty water truck 3972 was used to conduct the test. The area is the north 1/3rd of the 488-1D east pad. The truck travelled in an East-West direction starting at the south side of the pad and working north. The area was approximately 3.3 acres in size. There were 3 failure locations in this proof roll. The first was a spot about 30' x 60' on the south side of the area. The second was a 2' diameter spot about 50' northeast of the first failure spot. The final failure location was an area about 20' x 50' on the eastern side of the

test area. All other areas passed with no observed pumping. The failure areas were staked and will be repaired in the future. The area was surveyed in (laterally and topographically). The compactive technique used throughout this PRL was track walking with a D6 LGP dozer, followed by two vibratory passes of an 84" smooth drum roller, followed by 1 static pass. The average moisture content of the upper 1' of the PRL was approximately 25% by dry weight.

- July 07, 2017: Envirocon repaired the 3 failed areas in PR6 on PRL2. All three repairs passed. To repair, Envirocon dug 1 foot out of the areas with an excavator and allowed the removed material and the excavation to dry throughout the day. Then the crew compacted the floor of the excavation with an 84" smooth drum compactor in static mode. They then filled the excavation back in using a D6 LGP dozer. Next they track walked the filled in excavation. Then the rolled the area with the 84" smooth drum roller using 2 vibratory and 1 static pass over each filled in repair area. Then empty water truck 3972 drove over each repair area and Steve Hoover and Mike Beardsley observed the test. No soil pumping was witnessed.
- July 10, 2017: Envirocon repaired the failed area in PR6 on PRL1. This was a location that contained a tree / wood debris, causing a pumping area of about a 2' diameter. The repaired area passed. To repair, the crew removed the wood with a D6 LGP dozer. Then the hole was backfilled and compacted. Compacting consisted of track walking with a LGP dozer and then pneumatic compaction via heavy equipment wheel rolling. Then empty water truck 3972 drove over the repair area and Steve Hoover and Mike Beardsley observed the test. No pumping was witnessed.
- July 27, 2017: Proof Roll #7 on PRL1 was conducted in the northwest corner of 488-1D East. The proof roll was attended by Don Baston (SRNS), Mike Beardsley (EI/GGE), William Livingston (EI), Brandon Mitchell (CSRA), Steve Hoover (STR), and Brandon C. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the west edge of the area and working to the east. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. All areas passed, with no re-work needed and no pumping observed. It was observed that the northwest corner was slightly "spongier" than the rest of the area, but no areas pumped.
- August 16, 2017: Proof Roll #7 on PRL2 was conducted in the southwest corner of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), William Livingston (EI), Brandon Mitchell (CSRA), Steve Hoover (STR), and Brandon C. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the East edge of the area and working to the West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. There was 1 failure spot in the center of the proof roll, approximately 15' x 15' in size. All other areas demonstrated a firm base without pumping. The 1' layers comprising PRL 2 in this proof roll area were track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller. This process was used for each of the four 1' lifts making the proof roll level.
- August 17, 2017: Envirocon repaired the failed area in PR7 on PRL2. This area was just barely a soft spot and barely pumped. It appeared likely due being slightly over wet on the moisture content. Rather than ripping out the area, the 84" vibratory roller was brought over on 8-16-17 and the area vibrated moving north and south and then tangentially going east and west. The purpose of this vibration was to bring the entrained water to the top. The area was then allowed to dry back overnight. The next day, on 08-17-17, Steve Hoover (STR) and Mike Beardsley (EI/GGE) observed the empty 3,900 gallon Carolina Sod water truck drive over the repair area. No pumping was observed and the area passed and is now repaired.

Attachments:

- Proof Roll Level Definition Figure
- Cumulative Proof Roll Location Figure
- CSRA Proof Roll Reports

The proof roll tests were witnessed by Mike Beardsley, PE, in accordance with the plans and specifications.

Mike Beardsley, PE

08/24/2017

Project Engineer

488-1D Ash Basin Closure Project

(720) 838 – 7107

Mbeardsley@greenglobeinc.com

Date:	Time:	Direction of View / Location:
Wednesday, March 1, 2017	1057	East / 488-1D East

Subject:

Proof Roll #1 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Friday, March 17, 2017	1151	East / 488-1D East

Subject:

Proof Rolled Square, now passing, previously failed during PR1 on PRL1.

Date:	Time:	Direction of View / Location:
Tuesday, March 21, 2017	0807	N/A / 488-1D East

Subject:
Proof Roll #2 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Tuesday, April 11, 2017	1316	East / 488-1D East

Subject:
Proof Roll #3 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, April 20, 2017	1306	West / 488-1D East

Subject:

Carolina Sod 3,900 gallon water truck proof rolling PR1 on PRL2 and then PR4 on PRL1.

Date:	Time:	Direction of View / Location:
Thursday, April 20, 2017	1309	N/A / 488-1D East

Subject:

Proof Roll #1 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Wednesday, May 10, 2017	08:14	South / 488-1D East

Subject:
Proof Roll of repairs in PR#1 on PRL2. Areas passed.

Date:	Time:	Direction of View / Location:
Monday, May 15, 2017	10:52	West / 488-1D East

Subject:
Proof Roll #2 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Monday, May 15, 2017	16:09	West / 488-1D East

Subject:
Proof Roll on repair of PR#4 on PRL1. Area passed.

Date:	Time:	Direction of View / Location:
Wednesday, May 17, 2017	08:00	South / 488-1D East

Subject:
Proof Roll #3 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Wednesday, May 17, 2017	11:09	N/A / 488-1D East

Subject:
Proof Roll PR#5 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, June 15, 2017	09:34	South / 488-1D East

Subject:
Proof Roll PR#6 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, July 06, 2017	09:22	Northwest / 488-1D East

Subject:
Proof Roll PR#6 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Friday, July 07, 2017	16:17	North / 488-1D East

Subject:
Proof Roll on Repairs in PR#6 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Monday, July 10, 2017	10:57	N/A / 488-1D East

Subject:
Proof Roll on Repair in PR#6 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, July 27, 2017	08:02	North / 488-1D East

Subject:
Proof Roll PR#7 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Wednesday, August 16, 2017	11:15	South / 488-1D East

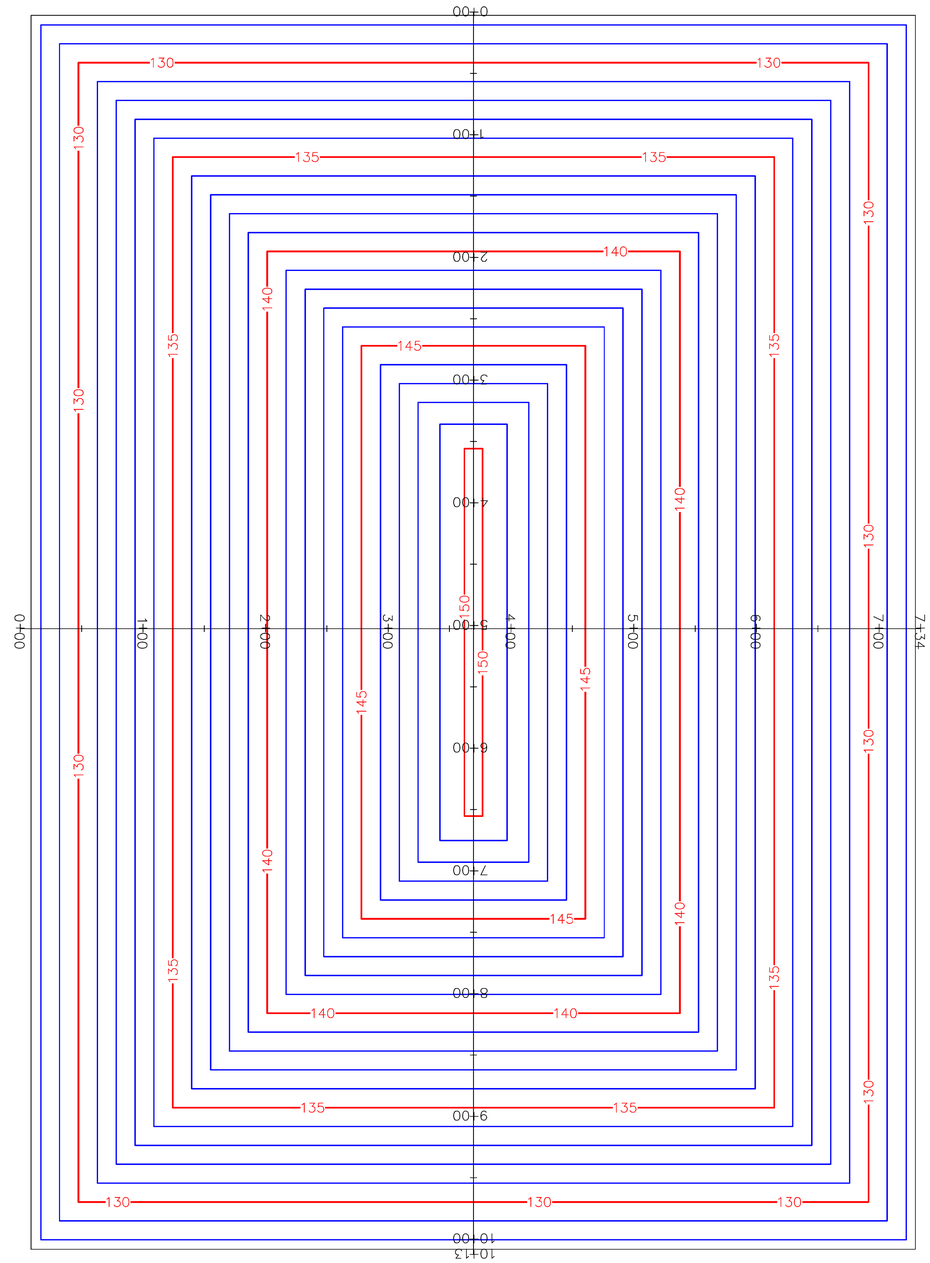
Subject:
Proof Roll #7 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Thursday, August 17, 2017	11:19	N/A / 488-1D East

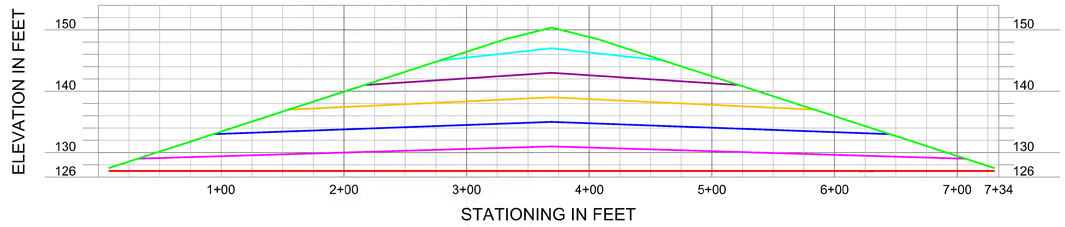
Subject:
Proof Roll of Repair in PR#7 on PRL2 underway.

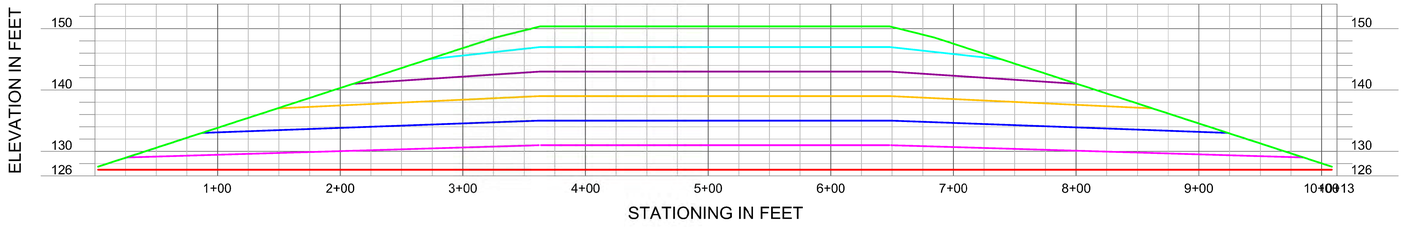
PROOF ROLL LEVEL DEFINITIONS

PLAN VIEW



PROFILE VIEW





0 100' HORIZONTAL SCALE

0 20' VERTICAL SCALE

LEGEND:

- Top of Proof Roll Level 1 (EL = 127)
- Top of Proof Roll Level 2
- Top of Proof Roll Level 3
- Top of Proof Roll Level 4
- Top of Proof Roll Level 5
- Top of Proof Roll Level 6
- Top of Proof Roll Level 7 (Ash FG)
- Ash FG Contour Major (5')
- Ash FG Contour Minor (1')

N

0 100' 200'
SCALE IN FEET

Prepared By:
Envirocon
7878 Wadsworth Blvd.
Suite 340
Arvada, CO 80003

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Nicanor Aguilar, Steve Hoover

Figure #: 01	
Date: 03/29/2017	
Revision #: 01	
Drawn By: GGE	
Approved By: EI	
Project #: 1495402	

488-1D East Ash Placement Proof Roll Levels

488-1D Ash Basin Closure

C:\ USERS\ MIKE BEARDSLEY\ DESKTOP\ REVISED PROOF ROLL LIFTS.DWG

PROOF ROLL LOCATIONS

LEGEND:
- Original Ground Contour Major (5')
- Original Ground Contour Minor (1')
- Proof Roll Grade Contour Major (5')
- Proof Roll Grade Contour Minor (1')

NOTES:
1) PR1 on PRL1 conducted on 03-01-2017 with 3,900 gallon water truck.
2) PR 1 on PRL1 Failed Area passed on Proof Roll on 03-21-2017.
3) PR 2 on PRL1 conducted on 03-21-2017 with 3,900 gallon water truck.
4) PR3 on PRL1 conducted on 04-11-2017 with 3,900 gallon water truck.
5) PR 4 on PRL1 conducted on 04-20-2017 with 3,900 gallon water truck.
6) PR1 on PRL2 conducted on 04-20-2017 with 3,900 gallon water truck.
7) Repairs on PR1 on PRL2 passed on 05-10-17 with 3,900 gallon water truck.
8) PR2 on PRL2 conducted on 05-15-17 with 3,900 gallon water truck.
9) Repairs on PR4 PRL1 passed on 05-15-17 with 3,900 gallon water truck.
10) PR3 and PR4 on PRL2 conducted on 05-17-2017 with 3,900 gallon water truck.
11) PR5 on PRL1 conducted on 05-17-2017 with 3,900 gallon water truck.
12) PR5 on PRL2 conducted on 06-12-2017 with 3,900 gallon water truck.
13) PR6 on PRL1 conducted on 06-15-2017 with 3,900 gallon water truck.
14) PR6 on PRL2 conducted on 07-06-2017 with 3,900 gallon water truck.
15) Repairs on PR6 on PRL2 passed on 07-07-17 with 3,900 gallon water truck.
16) Repair on PR6 on PRL1 passed on 07-10-17 with 3,900 gallon water truck.
17) PR7 on PRL1 conducted on 07-27-17 with 3,900 gallon water truck.
18) PR7 on PRL2 conducted on 08-16-17 with 3,900 gallon water truck.
19) Repair on PR7 on PRL2 passes on 08-17-17 with 3,900 gallon water truck.

N

0 100' 200'
SCALE IN FEET

Prepared By:
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7878 Wadsworth Blvd.
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Arvada, CO 80003

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Drew Murphy, Steve Hoover

Figure #:	01
Date:	08/24/17
Revision #:	0
Drawn By:	GGE
Approved By:	EI
Project #:	1495402

Cumulative Proof Roll Figure
488-1D East

488-1D Ash Basin Closure

E:\GGE\PROJECT DATA\ENVIROCON\SRNS POND 1D\PE FILES\488-1D PROOF ROLLS\CUMMULATIVE PROOF ROLLS.DWG

CSRA PROOF ROLL INSPECTION REPORTS

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T16-H95

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	As requested by client, technician observed an empty water truck proofroll the southeast section of Area 1 at elevations between 127.00 to 129.00. Area observed appeared to be firm and stable at this time.

TOTAL TIME:	3.0 hours		
DATE:	March 1, 2017	TECHNICIAN:	Chris Lowry

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-L66

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed a empty water truck (truck no. 3972) proofroll the two (2) acres of north and adjoining proofroll 1 area. All areas appeared to be firm and stable at this time. (Note: This is the second proofroll for this area; elevation 127-129.)

TOTAL TIME:	4.0 hours		
DATE:	March 21, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-P35

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck (truck no. 3972) proofroll #3 on PRL1. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	April 11, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Q67

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck proofroll #1 on PRL2. All areas appeared to be firm and stable at this time with the exception of an area measuring 10' x 10' in two (2) separate areas. A proofroll was also observed for #4 on PRL1. All areas appeared to be firm and stable with the exception of an area measuring 10' x 30'. In both cases, contractor will scarify areas and allow to dry before re-compacting. Further observation for these isolated areas should resume when areas are firm and stable.

TOTAL TIME:	5.0 hours		
DATE:	April 20, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-U51

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#2 (proofroll #2). All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	May 15, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-U78SI

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty tandem axle water truck proofroll three (3) areas at PR-3 on PRL-2, PR-5 on PRL-1, and PR-4 on PRL-2. All areas were firm and stable at this time. Technician also performed fifteen (15) field density tests. Please see report T17-U78FD for test results and locations.

DATE:	May 17, 2017	TECHNICIAN:	David Turner

David Turner
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Y24

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#2 proofroll #5. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	June 12, 2017	TECHNICIAN:	David Turner

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Y95

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#1 proofroll #6. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	June 15, 2017	TECHNICIAN:	David Turner

David Turner QC1
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-BB12

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL #6 at elevation PRL #2. Material was firm and stable with the exception of two (2) areas: 1) location east side approximately 30' x 60' to a depth of 12 inches was saturated; 2) location on south side approximately 30' x 60' to a depth of 12 inches was saturated. Technician suggested to remove saturated material and allow areas to dry before replacing.

TOTAL TIME:	4.0 hours		
DATE:	July 6, 2017	TECHNICIAN:	Branon Mitchell

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-EE70

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck proofroll location PRL1-Proofroll #7. All areas were firm and stable with no signs of pumping. Technician also picked up soil sampled for modified proctor test (N1B-sample 1).

TOTAL TIME:	4.0 hours		
DATE:	July 27, 2017	TECHNICIAN:	Branon Mitchell

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-FF97

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck proofroll location PRL2-Proofroll #7. All areas were firm and stable with no signs of pumping with the exception of a 15' x 15' area (area marked on site map provided by client).

TOTAL TIME:	4.0 hours		
DATE:	August 16, 2017	TECHNICIAN:	Branon Mitchell

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

Date: October 25, 2017	
Project Title: SRNS 488-1D Ash Impoundment	**Location: Jackson, SC**

488-1D East Placement Area Proof Rolls:

This report serves as cumulative documentation of the proof roll activities associated with the 488-1D Ash Impoundment Project. This report is a live document that is updated as the proof rolls occur, and is thus progressively expounded and re-submitted as needed. The required proof roll inspections have been identified in Attachment A, herein and are identified as Proof Roll Levels (PRLs) 1 – 7. In short:

- PRL1: Approximate elevation 127
- PRL2: Approximate elevations 127 - 131
- PRL3: Approximate elevations 131 - 135
- PRL4: Approximate elevations 135 - 139
- PRL5: Approximate elevations 139 - 143
- PRL6: Approximate elevations 143 - 147
- PRL7: Approximate elevations 147 – 150.4

The proof rolls are summarized below:

- March 01, 2017, Proof Roll #1: The southern 1/8th of the placement area in 488-1D east was proof roll tested. This was the first 4' lift, (PRL1) with the average lift elevation ranging from 127 – 129 feet. In attendance was Don Bastion, Tripp Winfree, Gerald McKee, Chris Lowry (CSRA), Steve Hoover, Mike Beardsley, and Clay Roark. The proof roll was conducted using a 3,500 – 4,000 gallon water truck, EI truck #3972. Per Chris, Tripp, and Don, the weight of this truck is sufficient to yield enough ground pressure that it need not be filled with water during the proof roll. The entire area was rolled with the truck stepping over 1 truck length each time, such that after the first pass, the driver's side tires traveled in the passenger's side tire tracks. The proof roll started on the south and worked north, covering approximately 2.5 Acres. The entire area passed, with the exception of a soft spot roughly 10' x 10' in size located on the east side near the center of the area. See sketch for further detail.
- March 17, 2017, Proof Roll #1 Repair: Envirocon "re-proof rolled" the 10' x 10' square that failed during Proof Roll #1. This proof roll was witnessed by Mike Beardsley and STR Steve Hoover. Envirocon allowed this area to dry for 16 days. They did not remove the material, but did drive upon it in static mode with an 84" smooth drum roller 4 times for compaction. For the proof roll, Envirocon water truck 3972 was utilized, empty as during the full proof roll. The water truck made two passes driving east and west, starting along the south side of the failed grid. The truck then moved over 1 truck width such that the driver side tires followed the wheel marks from the passenger tires on the previous pass. No deflection or pumping was observed by myself or STR.
- March 21, 2017, Proof Roll #2: Proof Roll #2 was conducted on approximately 2.1 Acres directly north and adjacent to the Proof Roll #1 area. This was a proof roll on Proof Roll Level 1 (~127 -128 FT elevation). The proof roll used Envirocon water truck 3972 and worked from south to north, stepping over 1 truck width each time such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area until a lane then had a failure. There was no small spots within the fill that failed. Upon reaching the failed lane, the boundary was then staked out with a survey lathe demarcating the area. The accepted area was taken as one full truck lane further to the south and there was the location of where the stakes were placed. For future proof rolls, these boundaries will be demarcated with white ribbon, but for this test,

green ribbon was used. The boundary was then surveyed in with GPS and the area topographically surveyed (in-house by Envirocon's engineering staff).

- April 11, 2017, Proof Roll #3: Proof Roll #3 was conducted on approximately 2.4 Acres, directly north and adjacent to the Proof Roll #2 area. The proof roll occurred on Proof Roll Level 1 (PRL 1, which is at elevation 127). Once again, the proof roll utilized Envirocon's empty water truck, equipment number 3972. The truck traveled in an east-west direction working from the south to the north, stepping over 1 truck width each pass, such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area that was prepared for the proof roll. There were no failures for this proof roll area. The area was then delineated with orange lathe with white ribbon and topographically surveyed with RTK enabled GPS. The underlying lifts of placed ash that comprised this PRL 1 were compacted using the following method. First, the west ash was dumped in a windrow with an articulating truck. Next the windrow was spread with a D6 LGP dozer. The spread ash was then disked with a rome disk to dry the material back to what appeared to compact well (moisture content ranges anywhere from 19 – 29% by dry weight). Once dried appropriately, the ash was then track walked with a D6 LGP dozer. Then an 84" smooth drum roller makes 1 pass in vibratory mode followed by 3 passes in static mode. Lastly, compaction is also achieved as the loaded articulated trucks traverse the surface to build the windrows.
- April 20, 2017: Proof Roll #4 on PRL 1 and Proof Roll #1 on PRL 2: PR1 on PRL2 was located approximately 4 feet atop PR1 on PRL1 on the south side of the 488-1D east placement pad, and was approximately 1.2 Acres. PR4 on PRL1 was directly adjacent to PR3 on PRL1 and was approximately 1.1 Acres. These proof rolls utilized Carolina Sod's empty water truck. As with Envirocon's water truck, this was a 3,900 gallon water truck. The truck traveled in an east-west direction working from the south to the north, stepping over 1 truck width each pass, such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area that was prepared for each of the proof rolls. There were two failure spots for PR1 on PRL2 approximately 10' x 10' each and 1 failure area approximately 10' x 40' for PR4 on PRL1. These failure locations were surveyed in using GNSS enabled RTK GPS, along with the boundaries of the areas and the topographic surface of each area. Compaction on Lift 4 for both of these areas was completed similar to past compaction efforts, by first track walking a D6 LGP dozer over the area. However, two passes were then made in vibratory mode using an 84" smooth drum roller instead of 1 pass vibratory with 3 passes static.
- April 21, 2017: The failure areas in PR3 on PRL1 and PR1 on PRL2 were disked as it was initially thought that these were wet spots. However, upon disking, significantly sized wood stumps were found in each of the failure spots. The wood stumps were removed, and the areas allowed to dry until it appeared the moisture was correct for compaction. At that time the areas were wheel rolled using a WA 450 Loader, followed by 2 passes in vibratory mode of an 84" smooth drum roller, followed by 2 passes in static mode of the 84" smooth drum roller. The areas have not yet been re-proof rolled.
- May 10, 2017: The failure areas in PR1 on PRL2 were proof rolled and passed. Envirocon's 3,900 gallon unloaded water truck (3972) was used to conduct the proof roll. The proof roll was witnessed by the Envirocon Project Engineer and the STR.
- May 15, 2017: The failure area on PR4 on PRL1 was proof rolled and passed. A 3,900 gallon unloaded water truck was used to conduct the proof roll. The proof roll was witnessed by the Envirocon Project Engineer and the STR.
- May 15, 2017: Proof Roll #2 on PRL2 was conducted. The area was directly north and adjacent to the PR1 on PRL2 proof roll area. The area was approximately 1.3 acres in size. There were no failure areas, the entire 1.3 Acre area passed. The test was conducted using Carolina Sod's 3,900 gallon water truck, unloaded. The truck traversed the area in an east-west direction working from the south to the north. Per the standard operating procedure, the truck stepped to the north 1 truck width each pass such that the driver's side tires drove

in the passenger tire marks each time the truck was offset. The proof roll was observed by the Envirocon Project Engineer, STR, and Don Baston. Compaction on the lifts of this area were achieved by first drying the material to a suitable moisture content with a Rome disk, then track walking the area with a D6 LGP dozer, followed by two vibratory passes and then two static passes of the 84" smooth drum roller.

- May 17, 2017: Three proof rolls were conducted. The proof rolls were observed by the Envirocon Project Engineer, STR, and Don Baston. The first proof roll of the day was Proof Roll #3 on PRL2. The area was approximately 0.24 acres in size. The proof roll used unloaded Envirocon water truck 3972, 3,900 gallons. The truck traversed the area north and south, starting from the east and working to the west. The truck stepped to the west 1 truck width each pass. The second proof roll of the day was Proof Roll #5 on PRL1. This area was the northern portion of the 488-1D East pad, which generally included the former CPRB clay stockpile area. Again empty Envirocon water truck 3972 (3,900 gallon) was used to conduct the proof roll. The proof roll worked from north to south traversing in an east-west direction, stepping over 1 truck width each time. The third proof roll was Proof Roll #4 on PRL2. This area was directly north and adjacent to PR#2 on PRL2. Again empty Envirocon water truck 3972 (3,900 gallon) was used to conduct the proof roll. The proof roll worked from north to south traversing in an east-west direction, stepping over 1 truck width each time. The lifts composing these proof roll levels gained compaction by first drying the material to a suitable moisture content with a Rome disk, then track walking the area with a D6 LGP dozer, followed by two vibratory passes and then two static passes of the 84" smooth drum roller.
- June 12, 2017: Proof Roll #5 on PRL2 was conducted. The area was directly north and adjacent to PR#4 on PRL2. The area was approximately 1.3 acres in size. Empty Envirocon water truck 3972 was used to conduct the proof roll. David with CSRA, Derek Evans with SRNS, Steve Hoover (STR) and Mike Beardsley witnessed the proof roll. The truck traversed the area in an east-west direction, starting on the south and working to the north. The truck moved over 1 truck width each pass such that the driver's side tires followed in the passenger side of the tires' marks on the subsequent pass. The ash placed in this area gained compaction by being disked to a suitable moisture content, then track walked with a D6 dozer, and then compacted two times in vibratory mode with an 84" smooth drum roller, followed by 1 pass in static mode with an 84" smooth drum roller. There was no failing or required re-work areas in this proof roll. There were no pictures taken during this proof roll event.
- June 15, 2017: Proof Roll #6 on PRL1 was conducted. The area was the western side of PRL1 on the southern half. The area was approximately 1 acre in size. Empty Envirocon water truck 3972 was used to conduct the proof roll. David with CSRA, Derek Evans with SRNS, and Mike Beardsley witnessed the proof roll. The truck traversed the area in a north-south direction, starting on the west and working to the east. The truck moved over 1 truck width each pass such that the driver's side tires followed in the passenger side of the tires' marks on the subsequent pass. The ash placed in this area gained compaction by being disked to a suitable moisture content, then track walked with a D6 dozer, and then compacted two times in vibratory mode with an 84" smooth drum roller, followed by 1 pass in static mode with an 84" smooth drum roller. There was 1 failing spot (isolated to about a 2' radius). It appears there was a buried stump here and it will be repaired in the future.
- July 06, 2017: Proof Roll #6 on PRL2 was conducted. Attendees included: Derek Evans (SRNS), Steve Hoover (STR), Brandon Mitchell (CSRA), Mike Beardsley (EI/GGE), and Melvin Butler (EI). Empty water truck 3972 was used to conduct the test. The area is the north 1/3rd of the 488-1D east pad. The truck travelled in an East-West direction starting at the south side of the pad and working north. The area was approximately 3.3 acres in size. There were 3 failure locations in this proof roll. The first was a spot about 30' x 60' on the south side of the area. The second was a 2' diameter spot about 50' northeast of the first failure spot. The final failure location was an area about 20' x 50' on the eastern side of the

test area. All other areas passed with no observed pumping. The failure areas were staked and will be repaired in the future. The area was surveyed in (laterally and topographically). The compactive technique used throughout this PRL was track walking with a D6 LGP dozer, followed by two vibratory passes of an 84" smooth drum roller, followed by 1 static pass. The average moisture content of the upper 1' of the PRL was approximately 25% by dry weight.

- July 07, 2017: Envirocon repaired the 3 failed areas in PR6 on PRL2. All three repairs passed. To repair, Envirocon dug 1 foot out of the areas with an excavator and allowed the removed material and the excavation to dry throughout the day. Then the crew compacted the floor of the excavation with an 84" smooth drum compactor in static mode. They then filled the excavation back in using a D6 LGP dozer. Next they track walked the filled in excavation. Then the rolled the area with the 84" smooth drum roller using 2 vibratory and 1 static pass over each filled in repair area. Then empty water truck 3972 drove over each repair area and Steve Hoover and Mike Beardsley observed the test. No soil pumping was witnessed.
- July 10, 2017: Envirocon repaired the failed area in PR6 on PRL1. This was a location that contained a tree / wood debris, causing a pumping area of about a 2' diameter. The repaired area passed. To repair, the crew removed the wood with a D6 LGP dozer. Then the hole was backfilled and compacted. Compacting consisted of track walking with a LGP dozer and then pneumatic compaction via heavy equipment wheel rolling. Then empty water truck 3972 drove over the repair area and Steve Hoover and Mike Beardsley observed the test. No pumping was witnessed.
- July 27, 2017: Proof Roll #7 on PRL1 was conducted in the northwest corner of 488-1D East. The proof roll was attended by Don Baston (SRNS), Mike Beardsley (EI/GGE), William Livingston (EI), Brandon Mitchell (CSRA), Steve Hoover (STR), and Brandon C. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the west edge of the area and working to the east. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. All areas passed, with no re-work needed and no pumping observed. It was observed that the northwest corner was slightly "spongier" than the rest of the area, but no areas pumped.
- August 16, 2017: Proof Roll #7 on PRL2 was conducted in the southwest corner of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), William Livingston (EI), Brandon Mitchell (CSRA), Steve Hoover (STR), and Brandon C. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the East edge of the area and working to the West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. There was 1 failure spot in the center of the proof roll, approximately 15' x 15' in size. All other areas demonstrated a firm base without pumping. The 1' layers comprising PRL 2 in this proof roll area were track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller. This process was used for each of the four 1' lifts making the proof roll level.
- August 17, 2017: Envirocon repaired the failed area in PR7 on PRL2. This area was just barely a soft spot and barely pumped. It appeared likely due being slightly over wet on the moisture content. Rather than ripping out the area, the 84" vibratory roller was brought over on 8-16-17 and the area vibrated moving north and south and then tangentially going east and west. The purpose of this vibration was to bring the entrained water to the top. The area was then allowed to dry back overnight. The next day, on 08-17-17, Steve Hoover (STR) and Mike Beardsley (EI/GGE) observed the empty 3,900 gallon Carolina Sod water truck drive over the repair area. No pumping was observed and the area passed and is now repaired.

- October 19, 2017: Proof Roll #8 on PRL2 was conducted in the northwest area of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Chip Stewart (CSRA), Steve Hoover (STR), and Melvin Butler. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the East edge of the area and working to the West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. There was spot encountered containing a log in the center of the proof roll, approximately 2' x 4' in size, which was firm, but deflected as the log moved. All areas demonstrated a firm base without pumping. The 1' layers comprising PRL 2 in this proof roll area were track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller. This process was used for each of the four 1' lifts making the proof roll level. After the proof roll was conducted, Matt Hanson, removed the log with a D6 LGP dozer, which fixed the issue. This log removal was witnessed by Steve Hoover and Mike Beardsley.
- October 19, 2017: Proof Roll #8 on PRL1 was conducted on the northwest edge of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Chip Stewart (CSRA), Steve Hoover (STR), and Melvin Butler. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the East edge of the area and working to the West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. All areas demonstrated a firm base without pumping, with no repairs needed. This proof roll area was constructed using 1' lifts that were track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller.
- October 19, 2017: Proof Roll #9 on PRL1 was conducted in the southwest edge of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Chip Stewart (CSRA), Steve Hoover (STR), and Melvin Butler. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the West edge of the area and working to the East. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. There was spot encountered containing a small log in the center of the proof roll. The spot was firm, but deflected as the log moved. All areas demonstrated a firm base without pumping. The ash was placed in this proof roll area in 1' lifts and track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller. After the proof roll was conducted, Matt Hanson, removed the log with a D6 LGP dozer, which fixed the issue. This log removal was witnessed by Steve Hoover and Mike Beardsley.

Attachments:

- Proof Roll Level Definition Figure
- Cumulative Proof Roll Location Figure
- CSRA Proof Roll Reports

The proof roll tests were witnessed by Mike Beardsley, PE, in accordance with the plans and specifications.

Mike Beardsley, PE

10/25/2017

Project Engineer

488-1D Ash Basin Closure Project

(720) 838 – 7107

Mbeardsley@greenglobeinc.com

Date:	Time:	Direction of View / Location:
Wednesday, March 1, 2017	1057	East / 488-1D East

Subject:

Proof Roll #1 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Friday, March 17, 2017	1151	East / 488-1D East

Subject:

Proof Rolled Square, now passing, previously failed during PR1 on PRL1.

Date:	Time:	Direction of View / Location:
Tuesday, March 21, 2017	0807	N/A / 488-1D East

Subject:
Proof Roll #2 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Tuesday, April 11, 2017	1316	East / 488-1D East

Subject:
Proof Roll #3 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, April 20, 2017	1306	West / 488-1D East

Subject:

Carolina Sod 3,900 gallon water truck proof rolling PR1 on PRL2 and then PR4 on PRL1.

Date:	Time:	Direction of View / Location:
Thursday, April 20, 2017	1309	N/A / 488-1D East

Subject:

Proof Roll #1 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Wednesday, May 10, 2017	08:14	South / 488-1D East

Subject:
Proof Roll of repairs in PR#1 on PRL2. Areas passed.

Date:	Time:	Direction of View / Location:
Monday, May 15, 2017	10:52	West / 488-1D East

Subject:
Proof Roll #2 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Monday, May 15, 2017	16:09	West / 488-1D East

Subject:
Proof Roll on repair of PR#4 on PRL1. Area passed.

Date:	Time:	Direction of View / Location:
Wednesday, May 17, 2017	08:00	South / 488-1D East

Subject:
Proof Roll #3 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Wednesday, May 17, 2017	11:09	N/A / 488-1D East

Subject:
Proof Roll PR#5 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, June 15, 2017	09:34	South / 488-1D East

Subject:
Proof Roll PR#6 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, July 06, 2017	09:22	Northwest / 488-1D East

Subject:
Proof Roll PR#6 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Friday, July 07, 2017	16:17	North / 488-1D East

Subject:
Proof Roll on Repairs in PR#6 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Monday, July 10, 2017	10:57	N/A / 488-1D East

Subject:
Proof Roll on Repair in PR#6 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, July 27, 2017	08:02	North / 488-1D East

Subject:
Proof Roll PR#7 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Wednesday, August 16, 2017	11:15	South / 488-1D East

Subject:
Proof Roll #7 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Thursday, August 17, 2017	11:19	N/A / 488-1D East

Subject:
Proof Roll of Repair in PR#7 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Thursday, October 19, 2017	09:44	Northeast / 488-1D East

Subject:
Proof Roll #8 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Thursday, October 19, 2017	12:03	Southeast / 488-1D East

Subject:
Proof Roll of Repair in PR#8 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, October 19, 2017	12:22	North / 488-1D East

Subject:
Proof Roll #9 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, October 19, 2017	15:58	N/A / 488-1D East

Subject:
Log removed and repair made to PR8 on PRL2.

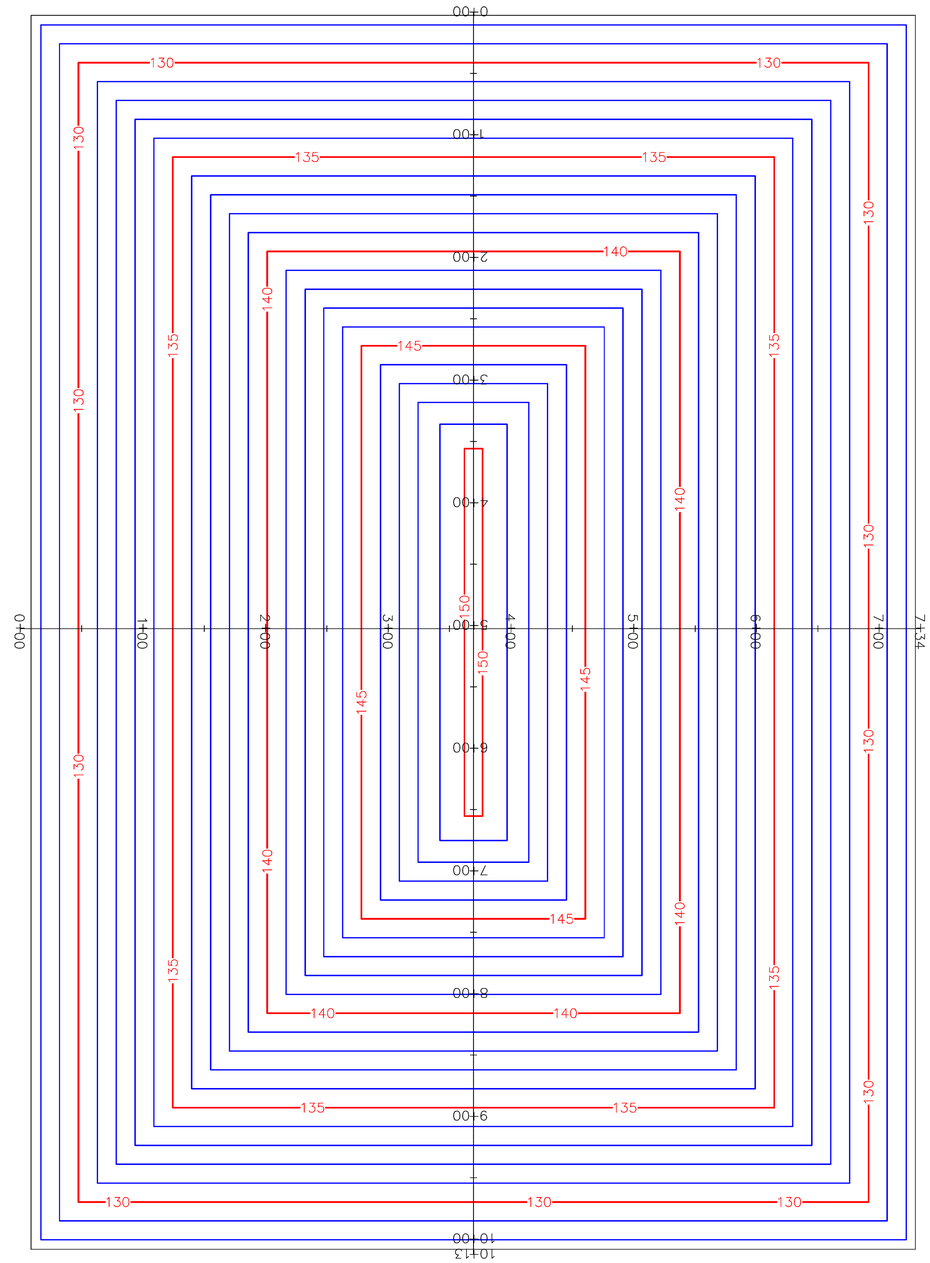
Date:	Time:	Direction of View / Location:
Thursday, October 19, 2017	16:01	N/A / 488-1D East

Subject:

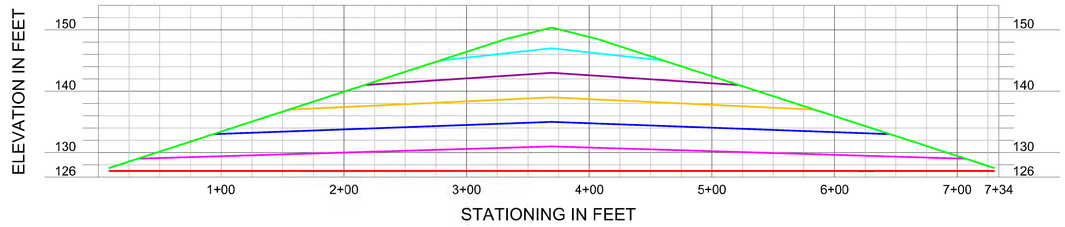
Log removed and repair made to PR9 on PRL1.

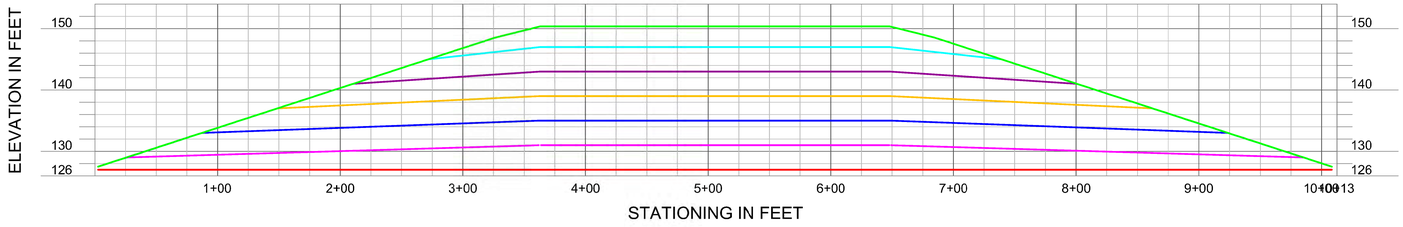
PROOF ROLL LEVEL DEFINITIONS

PLAN VIEW



PROFILE VIEW





0 100' HORIZONTAL SCALE

0 20' VERTICAL SCALE

LEGEND:

- Top of Proof Roll Level 1 (EL = 127)
- Top of Proof Roll Level 2
- Top of Proof Roll Level 3
- Top of Proof Roll Level 4
- Top of Proof Roll Level 5
- Top of Proof Roll Level 6
- Top of Proof Roll Level 7 (Ash FG)
- Ash FG Contour Major (5')
- Ash FG Contour Minor (1')

N

0 100' 200'
SCALE IN FEET

Prepared By:
Envirocon
7878 Wadsworth Blvd.
Suite 340
Arvada, CO 80003

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Nicanor Aguilar, Steve Hoover

Figure #: 01	
Date: 03/29/2017	
Revision #: 01	
Drawn By: GGE	
Approved By: EI	
Project #: 1495402	

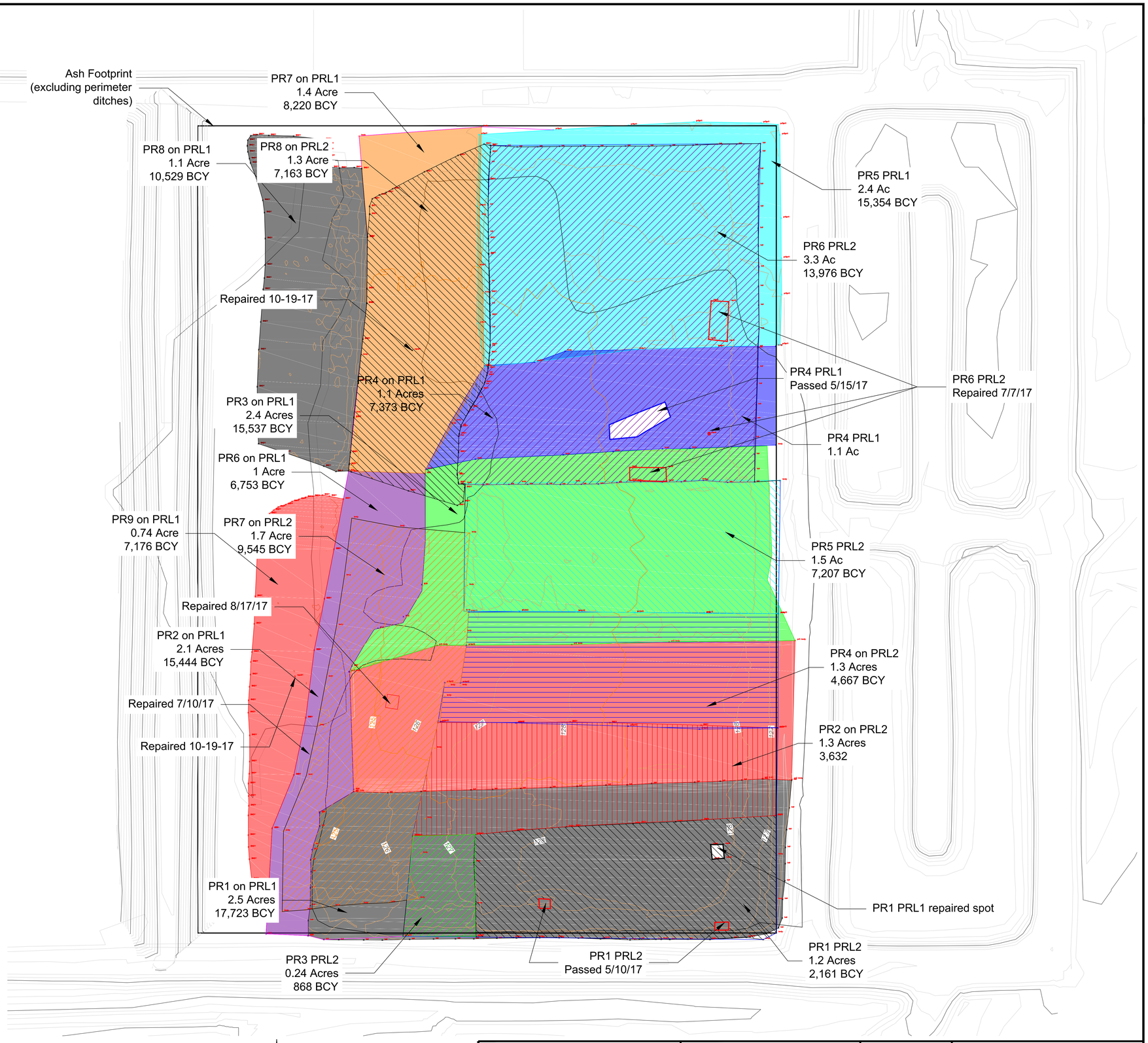
488-1D East Ash Placement Proof Roll Levels

488-1D Ash Basin Closure

C:\ USERS\ MIKE BEARDSLEY\ DESKTOP\ REVISED PROOF ROLL LIFTS.DWG

PROOF ROLL LOCATIONS

LEGEND:
- Original Ground Contour Major (5')
- Original Ground Contour Minor (1')
- Proof Roll Grade Contour Major (5')
- Proof Roll Grade Contour Minor (1')



NOTES:
1) PR1 on PRL1 conducted on 03-01-2017 with 3,900 gallon water truck.
2) PR 1 on PRL1 Failed Area passed on Proof Roll on 03-21-2017.
3) PR 2 on PRL1 conducted on 03-21-2017 with 3,900 gallon water truck.
4) PR3 on PRL1 conducted on 04-11-2017 with 3,900 gallon water truck.
5) PR 4 on PRL1 conducted on 04-20-2017 with 3,900 gallon water truck.
6) PR1 on PRL2 conducted on 04-20-2017 with 3,900 gallon water truck.
7) Repairs on PR1 on PRL2 passed on 05-10-17 with 3,900 gallon water truck.
8) PR2 on PRL2 conducted on 05-15-17 with 3,900 gallon water truck.
9) Repairs on PR4 PRL1 passed on 05-15-17 with 3,900 gallon water truck.
10) PR3 and PR4 on PRL2 conducted on 05-17-2017 with 3,900 gallon water truck.
11) PR5 on PRL1 conducted on 05-17-2017 with 3,900 gallon water truck.
12) PR5 on PRL2 conducted on 06-12-2017 with 3,900 gallon water truck.
13) PR6 on PRL1 conducted on 06-15-2017 with 3,900 gallon water truck.
14) PR6 on PRL2 conducted on 07-06-2017 with 3,900 gallon water truck.
15) Repairs on PR6 on PRL2 passed on 07-07-17 with 3,900 gallon water truck.
16) Repair on PR6 on PRL1 passed on 07-10-17 with 3,900 gallon water truck.
17) PR7 on PRL1 conducted on 07-27-17 with 3,900 gallon water truck.
18) PR7 on PRL2 conducted on 08-16-17 with 3,900 gallon water truck.
19) Repair on PR7 on PRL2 passes on 08-17-17 with 3,900 gallon water truck.
20) PR8 on PRL2 conducted on 10-19-17 with 3,900 gallon water truck.
21) PR8 on PRL1 conducted on 10-19-17 with 3,900 gallon water truck.
22) PR9 on PRL1 conducted on 10-19-17 with 3,900 gallon water truck.
23) Repairs on PR8 on PRL2 and PR9 on PRL1 conducted and passed on 10-19-17.

N

0 100' 200'
SCALE IN FEET

Prepared By:
Envirocon
1999 Broadway
Suite 800
Denver, CO 80203

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Drew Murphy, Steve Hoover

Figure #:	01
Date:	10/25/17
Revision #:	0
Drawn By:	GGE
Approved By:	EI
Project #:	1495402

Cumulative Proof Roll Figure
488-1D East

488-1D Ash Basin Closure

E:\GGE\PROJECT DATA\ENVIROCON\SRNS POND 1D\PE FILES\488-1D PROOF ROLLS\CUMMULATIVE PROOF ROLLS.DWG

CSRA PROOF ROLL INSPECTION REPORTS

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T16-H95

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	As requested by client, technician observed an empty water truck proofroll the southeast section of Area 1 at elevations between 127.00 to 129.00. Area observed appeared to be firm and stable at this time.

TOTAL TIME:	3.0 hours		
DATE:	March 1, 2017	TECHNICIAN:	Chris Lowry

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-L66

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed a empty water truck (truck no. 3972) proofroll the two (2) acres of north and adjoining proofroll 1 area. All areas appeared to be firm and stable at this time. (Note: This is the second proofroll for this area; elevation 127-129.)

TOTAL TIME:	4.0 hours		
DATE:	March 21, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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Fax (706) 737-0629

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CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-P35

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck (truck no. 3972) proofroll #3 on PRL1. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	April 11, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Q67

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck proofroll #1 on PRL2. All areas appeared to be firm and stable at this time with the exception of an area measuring 10' x 10' in two (2) separate areas. A proofroll was also observed for #4 on PRL1. All areas appeared to be firm and stable with the exception of an area measuring 10' x 30'. In both cases, contractor will scarify areas and allow to dry before re-compacting. Further observation for these isolated areas should resume when areas are firm and stable.

TOTAL TIME:	5.0 hours		
DATE:	April 20, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-U51

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#2 (proofroll #2). All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	May 15, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-U78SI

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty tandem axle water truck proofroll three (3) areas at PR-3 on PRL-2, PR-5 on PRL-1, and PR-4 on PRL-2. All areas were firm and stable at this time. Technician also performed fifteen (15) field density tests. Please see report T17-U78FD for test results and locations.

DATE:	May 17, 2017	TECHNICIAN:	David Turner

David Turner
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

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CONSTRUCTION TESTING/INSPECTION REPORT

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PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Y24

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#2 proofroll #5. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	June 12, 2017	TECHNICIAN:	David Turner

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Y95

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#1 proofroll #6. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	June 15, 2017	TECHNICIAN:	David Turner

David Turner DET
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-BB12

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL #6 at elevation PRL #2. Material was firm and stable with the exception of two (2) areas: 1) location east side approximately 30' x 60' to a depth of 12 inches was saturated; 2) location on south side approximately 30' x 60' to a depth of 12 inches was saturated. Technician suggested to remove saturated material and allow areas to dry before replacing.

TOTAL TIME:	4.0 hours		
DATE:	July 6, 2017	TECHNICIAN:	Branon Mitchell

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-EE70

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck proofroll location PRL1-Proofroll #7. All areas were firm and stable with no signs of pumping. Technician also picked up soil sampled for modified proctor test (N1B-sample 1).

TOTAL TIME:	4.0 hours		
DATE:	July 27, 2017	TECHNICIAN:	Branon Mitchell

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-FF97

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck proofroll location PRL2-Proofroll #7. All areas were firm and stable with no signs of pumping with the exception of a 15' x 15' area (area marked on site map provided by client).

TOTAL TIME:	4.0 hours		
DATE:	August 16, 2017	TECHNICIAN:	Branon Mitchell

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-QQ67

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed a empty water truck proofroll locations PR8 on PRL2, PR8 on PRL1, and PR9 on PRL1. All areas appeared to be firm and stable at the time of observation, with the exception of a 2' x 4' area on PR8 on PRL2 (stump to be removed). Proofroll was also observed by Derek Evans, Steve Hoover, and Mike Beardsley.

TOTAL TIME:	6.0 hours		
DATE:	October 19, 2017	TECHNICIAN:	Chip Stewart

Chip Stewart
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

Date: December 13, 2017	
Project Title: SRNS 488-1D Ash Impoundment	**Location: Jackson, SC**

488-1D East Placement Area Proof Rolls:

This report serves as cumulative documentation of the proof roll activities associated with the 488-1D Ash Impoundment Project. This report is a live document that is updated as the proof rolls occur, and is thus progressively expounded and re-submitted as needed. The required proof roll inspections have been identified in Attachment A, herein and are identified as Proof Roll Levels (PRLs) 1 – 7. In short:

- PRL1: Approximate elevation 127
- PRL2: Approximate elevations 127 - 131
- PRL3: Approximate elevations 131 - 135
- PRL4: Approximate elevations 135 - 139
- PRL5: Approximate elevations 139 - 143
- PRL6: Approximate elevations 143 - 147
- PRL7: Approximate elevations 147 – 150.4

The proof rolls are summarized below:

- March 01, 2017, Proof Roll #1: The southern 1/8th of the placement area in 488-1D east was proof roll tested. This was the first 4' lift, (PRL1) with the average lift elevation ranging from 127 – 129 feet. In attendance was Don Bastion, Tripp Winfree, Gerald McKee, Chris Lowry (CSRA), Steve Hoover, Mike Beardsley, and Clay Roark. The proof roll was conducted using a 3,500 – 4,000 gallon water truck, EI truck #3972. Per Chris, Tripp, and Don, the weight of this truck is sufficient to yield enough ground pressure that it need not be filled with water during the proof roll. The entire area was rolled with the truck stepping over 1 truck length each time, such that after the first pass, the driver's side tires traveled in the passenger's side tire tracks. The proof roll started on the south and worked north, covering approximately 2.5 Acres. The entire area passed, with the exception of a soft spot roughly 10' x 10' in size located on the east side near the center of the area. See sketch for further detail.
- March 17, 2017, Proof Roll #1 Repair: Envirocon "re-proof rolled" the 10' x 10' square that failed during Proof Roll #1. This proof roll was witnessed by Mike Beardsley and STR Steve Hoover. Envirocon allowed this area to dry for 16 days. They did not remove the material, but did drive upon it in static mode with an 84" smooth drum roller 4 times for compaction. For the proof roll, Envirocon water truck 3972 was utilized, empty as during the full proof roll. The water truck made two passes driving east and west, starting along the south side of the failed grid. The truck then moved over 1 truck width such that the driver side tires followed the wheel marks from the passenger tires on the previous pass. No deflection or pumping was observed by myself or STR.
- March 21, 2017, Proof Roll #2: Proof Roll #2 was conducted on approximately 2.1 Acres directly north and adjacent to the Proof Roll #1 area. This was a proof roll on Proof Roll Level 1 (~127 -128 FT elevation). The proof roll used Envirocon water truck 3972 and worked from south to north, stepping over 1 truck width each time such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area until a lane then had a failure. There was no small spots within the fill that failed. Upon reaching the failed lane, the boundary was then staked out with a survey lathe demarcating the area. The accepted area was taken as one full truck lane further to the south and there was the location of where the stakes were placed. For future proof rolls, these boundaries will be demarcated with white ribbon, but for this test,

green ribbon was used. The boundary was then surveyed in with GPS and the area topographically surveyed (in-house by Envirocon's engineering staff).

- April 11, 2017, Proof Roll #3: Proof Roll #3 was conducted on approximately 2.4 Acres, directly north and adjacent to the Proof Roll #2 area. The proof roll occurred on Proof Roll Level 1 (PRL 1, which is at elevation 127). Once again, the proof roll utilized Envirocon's empty water truck, equipment number 3972. The truck traveled in an east-west direction working from the south to the north, stepping over 1 truck width each pass, such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area that was prepared for the proof roll. There were no failures for this proof roll area. The area was then delineated with orange lathe with white ribbon and topographically surveyed with RTK enabled GPS. The underlying lifts of placed ash that comprised this PRL 1 were compacted using the following method. First, the west ash was dumped in a windrow with an articulating truck. Next the windrow was spread with a D6 LGP dozer. The spread ash was then disked with a rome disk to dry the material back to what appeared to compact well (moisture content ranges anywhere from 19 – 29% by dry weight). Once dried appropriately, the ash was then track walked with a D6 LGP dozer. Then an 84" smooth drum roller makes 1 pass in vibratory mode followed by 3 passes in static mode. Lastly, compaction is also achieved as the loaded articulated trucks traverse the surface to build the windrows.
- April 20, 2017: Proof Roll #4 on PRL 1 and Proof Roll #1 on PRL 2: PR1 on PRL2 was located approximately 4 feet atop PR1 on PRL1 on the south side of the 488-1D east placement pad, and was approximately 1.2 Acres. PR4 on PRL1 was directly adjacent to PR3 on PRL1 and was approximately 1.1 Acres. These proof rolls utilized Carolina Sod's empty water truck. As with Envirocon's water truck, this was a 3,900 gallon water truck. The truck traveled in an east-west direction working from the south to the north, stepping over 1 truck width each pass, such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area that was prepared for each of the proof rolls. There were two failure spots for PR1 on PRL2 approximately 10' x 10' each and 1 failure area approximately 10' x 40' for PR4 on PRL1. These failure locations were surveyed in using GNSS enabled RTK GPS, along with the boundaries of the areas and the topographic surface of each area. Compaction on Lift 4 for both of these areas was completed similar to past compaction efforts, by first track walking a D6 LGP dozer over the area. However, two passes were then made in vibratory mode using an 84" smooth drum roller instead of 1 pass vibratory with 3 passes static.
- April 21, 2017: The failure areas in PR3 on PRL1 and PR1 on PRL2 were disked as it was initially thought that these were wet spots. However, upon disking, significantly sized wood stumps were found in each of the failure spots. The wood stumps were removed, and the areas allowed to dry until it appeared the moisture was correct for compaction. At that time the areas were wheel rolled using a WA 450 Loader, followed by 2 passes in vibratory mode of an 84" smooth drum roller, followed by 2 passes in static mode of the 84" smooth drum roller. The areas have not yet been re-proof rolled.
- May 10, 2017: The failure areas in PR1 on PRL2 were proof rolled and passed. Envirocon's 3,900 gallon unloaded water truck (3972) was used to conduct the proof roll. The proof roll was witnessed by the Envirocon Project Engineer and the STR.
- May 15, 2017: The failure area on PR4 on PRL1 was proof rolled and passed. A 3,900 gallon unloaded water truck was used to conduct the proof roll. The proof roll was witnessed by the Envirocon Project Engineer and the STR.
- May 15, 2017: Proof Roll #2 on PRL2 was conducted. The area was directly north and adjacent to the PR1 on PRL2 proof roll area. The area was approximately 1.3 acres in size. There were no failure areas, the entire 1.3 Acre area passed. The test was conducted using Carolina Sod's 3,900 gallon water truck, unloaded. The truck traversed the area in an east-west direction working from the south to the north. Per the standard operating procedure, the truck stepped to the north 1 truck width each pass such that the driver's side tires drove

in the passenger tire marks each time the truck was offset. The proof roll was observed by the Envirocon Project Engineer, STR, and Don Baston. Compaction on the lifts of this area were achieved by first drying the material to a suitable moisture content with a Rome disk, then track walking the area with a D6 LGP dozer, followed by two vibratory passes and then two static passes of the 84" smooth drum roller.

- May 17, 2017: Three proof rolls were conducted. The proof rolls were observed by the Envirocon Project Engineer, STR, and Don Baston. The first proof roll of the day was Proof Roll #3 on PRL2. The area was approximately 0.24 acres in size. The proof roll used unloaded Envirocon water truck 3972, 3,900 gallons. The truck traversed the area north and south, starting from the east and working to the west. The truck stepped to the west 1 truck width each pass. The second proof roll of the day was Proof Roll #5 on PRL1. This area was the northern portion of the 488-1D East pad, which generally included the former CPRB clay stockpile area. Again empty Envirocon water truck 3972 (3,900 gallon) was used to conduct the proof roll. The proof roll worked from north to south traversing in an east-west direction, stepping over 1 truck width each time. The third proof roll was Proof Roll #4 on PRL2. This area was directly north and adjacent to PR#2 on PRL2. Again empty Envirocon water truck 3972 (3,900 gallon) was used to conduct the proof roll. The proof roll worked from north to south traversing in an east-west direction, stepping over 1 truck width each time. The lifts composing these proof roll levels gained compaction by first drying the material to a suitable moisture content with a Rome disk, then track walking the area with a D6 LGP dozer, followed by two vibratory passes and then two static passes of the 84" smooth drum roller.
- June 12, 2017: Proof Roll #5 on PRL2 was conducted. The area was directly north and adjacent to PR#4 on PRL2. The area was approximately 1.3 acres in size. Empty Envirocon water truck 3972 was used to conduct the proof roll. David with CSRA, Derek Evans with SRNS, Steve Hoover (STR) and Mike Beardsley witnessed the proof roll. The truck traversed the area in an east-west direction, starting on the south and working to the north. The truck moved over 1 truck width each pass such that the driver's side tires followed in the passenger side of the tires' marks on the subsequent pass. The ash placed in this area gained compaction by being disked to a suitable moisture content, then track walked with a D6 dozer, and then compacted two times in vibratory mode with an 84" smooth drum roller, followed by 1 pass in static mode with an 84" smooth drum roller. There was no failing or required re-work areas in this proof roll. There were no pictures taken during this proof roll event.
- June 15, 2017: Proof Roll #6 on PRL1 was conducted. The area was the western side of PRL1 on the southern half. The area was approximately 1 acre in size. Empty Envirocon water truck 3972 was used to conduct the proof roll. David with CSRA, Derek Evans with SRNS, and Mike Beardsley witnessed the proof roll. The truck traversed the area in a north-south direction, starting on the west and working to the east. The truck moved over 1 truck width each pass such that the driver's side tires followed in the passenger side of the tires' marks on the subsequent pass. The ash placed in this area gained compaction by being disked to a suitable moisture content, then track walked with a D6 dozer, and then compacted two times in vibratory mode with an 84" smooth drum roller, followed by 1 pass in static mode with an 84" smooth drum roller. There was 1 failing spot (isolated to about a 2' radius). It appears there was a buried stump here and it will be repaired in the future.
- July 06, 2017: Proof Roll #6 on PRL2 was conducted. Attendees included: Derek Evans (SRNS), Steve Hoover (STR), Brandon Mitchell (CSRA), Mike Beardsley (EI/GGE), and Melvin Butler (EI). Empty water truck 3972 was used to conduct the test. The area is the north 1/3rd of the 488-1D east pad. The truck travelled in an East-West direction starting at the south side of the pad and working north. The area was approximately 3.3 acres in size. There were 3 failure locations in this proof roll. The first was a spot about 30' x 60' on the south side of the area. The second was a 2' diameter spot about 50' northeast of the first failure spot. The final failure location was an area about 20' x 50' on the eastern side of the

test area. All other areas passed with no observed pumping. The failure areas were staked and will be repaired in the future. The area was surveyed in (laterally and topographically). The compactive technique used throughout this PRL was track walking with a D6 LGP dozer, followed by two vibratory passes of an 84" smooth drum roller, followed by 1 static pass. The average moisture content of the upper 1' of the PRL was approximately 25% by dry weight.

- July 07, 2017: Envirocon repaired the 3 failed areas in PR6 on PRL2. All three repairs passed. To repair, Envirocon dug 1 foot out of the areas with an excavator and allowed the removed material and the excavation to dry throughout the day. Then the crew compacted the floor of the excavation with an 84" smooth drum compactor in static mode. They then filled the excavation back in using a D6 LGP dozer. Next they track walked the filled in excavation. Then the rolled the area with the 84" smooth drum roller using 2 vibratory and 1 static pass over each filled in repair area. Then empty water truck 3972 drove over each repair area and Steve Hoover and Mike Beardsley observed the test. No soil pumping was witnessed.
- July 10, 2017: Envirocon repaired the failed area in PR6 on PRL1. This was a location that contained a tree / wood debris, causing a pumping area of about a 2' diameter. The repaired area passed. To repair, the crew removed the wood with a D6 LGP dozer. Then the hole was backfilled and compacted. Compacting consisted of track walking with a LGP dozer and then pneumatic compaction via heavy equipment wheel rolling. Then empty water truck 3972 drove over the repair area and Steve Hoover and Mike Beardsley observed the test. No pumping was witnessed.
- July 27, 2017: Proof Roll #7 on PRL1 was conducted in the northwest corner of 488-1D East. The proof roll was attended by Don Baston (SRNS), Mike Beardsley (EI/GGE), William Livingston (EI), Brandon Mitchell (CSRA), Steve Hoover (STR), and Brandon C. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the west edge of the area and working to the east. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. All areas passed, with no re-work needed and no pumping observed. It was observed that the northwest corner was slightly "spongier" than the rest of the area, but no areas pumped.
- August 16, 2017: Proof Roll #7 on PRL2 was conducted in the southwest corner of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), William Livingston (EI), Brandon Mitchell (CSRA), Steve Hoover (STR), and Brandon C. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the East edge of the area and working to the West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. There was 1 failure spot in the center of the proof roll, approximately 15' x 15' in size. All other areas demonstrated a firm base without pumping. The 1' layers comprising PRL 2 in this proof roll area were track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller. This process was used for each of the four 1' lifts making the proof roll level.
- August 17, 2017: Envirocon repaired the failed area in PR7 on PRL2. This area was just barely a soft spot and barely pumped. It appeared likely due being slightly over wet on the moisture content. Rather than ripping out the area, the 84" vibratory roller was brought over on 8-16-17 and the area vibrated moving north and south and then tangentially going east and west. The purpose of this vibration was to bring the entrained water to the top. The area was then allowed to dry back overnight. The next day, on 08-17-17, Steve Hoover (STR) and Mike Beardsley (EI/GGE) observed the empty 3,900 gallon Carolina Sod water truck drive over the repair area. No pumping was observed and the area passed and is now repaired.

- October 19, 2017: Proof Roll #8 on PRL2 was conducted in the northwest area of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Chip Stewart (CSRA), Steve Hoover (STR), and Melvin Butler. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the East edge of the area and working to the West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. There was spot encountered containing a log in the center of the proof roll, approximately 2' x 4' in size, which was firm, but deflected as the log moved. All areas demonstrated a firm base without pumping. The 1' layers comprising PRL 2 in this proof roll area were track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller. This process was used for each of the four 1' lifts making the proof roll level. After the proof roll was conducted, Matt Hanson, removed the log with a D6 LGP dozer, which fixed the issue. This log removal was witnessed by Steve Hoover and Mike Beardsley.
- October 19, 2017: Proof Roll #8 on PRL1 was conducted on the northwest edge of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Chip Stewart (CSRA), Steve Hoover (STR), and Melvin Butler. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the East edge of the area and working to the West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. All areas demonstrated a firm base without pumping, with no repairs needed. This proof roll area was constructed using 1' lifts that were track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller.
- October 19, 2017: Proof Roll #9 on PRL1 was conducted in the southwest edge of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Chip Stewart (CSRA), Steve Hoover (STR), and Melvin Butler. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the West edge of the area and working to the East. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. There was spot encountered containing a small log in the center of the proof roll. The spot was firm, but deflected as the log moved. All areas demonstrated a firm base without pumping. The ash was placed in this proof roll area in 1' lifts and track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller. After the proof roll was conducted, Matt Hanson, removed the log with a D6 LGP dozer, which fixed the issue. This log removal was witnessed by Steve Hoover and Mike Beardsley.
- November 08, 2017: Proof Roll #9 on PRL2 was conducted in the central haul road area of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Chip Stewart (CSRA), Billy West (STR), and Brandon (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in an East-West manner starting from the South and working to the North. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. All areas demonstrated a firm base without pumping, with no repairs needed. This proof roll area was constructed using 1' lifts that were track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller. Compaction was also gained due to extensive haul traffic over the area.
- November 08, 2017: Proof Roll #10 on PRL1 was conducted on a small northern square on the north side of 488-1D East. This area could not be previously tested because a pile of logs sat within this footprint. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Chip Stewart (CSRA), Billy West (STR), and Brandon (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in an East-West manner starting from the South and working to the North. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. All areas demonstrated a firm base without pumping, with no

repairs needed. This proof roll area was constructed using 1' lifts that were track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller.

- November 08, 2017: Proof Roll #11 on PRL1 was conducted in the central haul road area of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Chip Stewart (CSRA), Billy West (STR), and Brandon (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the East edge of the area and working to the West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. All areas demonstrated a firm base without pumping, with no repairs needed. This proof roll area was constructed using 1' lifts that were track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller. Compaction was also gained due to extensive haul traffic over the area.
- November 16, 2017: Proof Roll #10 on PRL2 was conducted on the southwest side of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Branon Mitchell (CSRA), Billy West (STR), Bruce Belding (STR) and Brandon (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck travelled in a North-South direction working from East to West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. This entire area exhibited pumping and therefore failed. There were several ideas as to the cause of this proof roll failing. First, the upper layer of ash contained large amounts of clay, removed from the floor of 488-1D West during the final visual ash removal in the floor areas. To account for this clay, Envirocon utilized an 84" vibratory sheep's foot for compaction. The layer was first track walked with a D6 LGP dozer. Then two passes in vibratory mode of the 84" sheep's foot compactor was made. Then the area was back dragged smooth with a D6 LGP dozer. The finally, an 84" smooth drum roller made two vibratory passes on the back dragged surface. However, upon inspection of the material it didn't appear that the clay and the ash were mixed into a heterogenous blend of the two. Rather it appeared that there were clay chunks with ash particles wedge in between, creating some voids spaces. Envirocon decided the best approach to repair this lift was to remove the upper 18" and re-blend and through disk the ash and clay together with a Rome disc. It appeared that the material required an additional 6 passes in each area to get the mixture to a homogenous consistency that would firmly compact. There entire PR 10 on PRL2 area is being re-worked and will be re-tested at a later date, identified as a new Proof Roll number.
- November 28, 2017: Proof Roll #11 on PRL2 was conducted in the failed PR 10 on PRL 2 area (southwest side of 488-1D East). The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Patrick Tinnes (EI), Chip Stewart (CSRA), Bruce Belding (STR), and Brandon (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove North-South working from the East to West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. All areas demonstrated a firm base without pumping, with no repairs needed. This proof roll area was constructed using 1' lifts that were track walked with a D6 LGP dozer, followed by 4 vibratory passes of the sheep's foot roller and then two vibratory passes of an 84" roller followed by two static passes of the 84" smooth drum roller.
- November 28, 2017: Proof Roll #12 on PRL2 was conducted in northwest side of 488-1D East, due north of PR11 on PRL2. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Patrick Tinnes (EI), Chip Stewart (CSRA), Bruce Belding (STR), and Brandon (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove North-South working from the East to West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. The vast majority of the area was firm without any pumping. However, four soft failure spots were observed. The first was a 2' radius zone in the North Central area of the test area. The second was a 4'x8' area in the south-central area of the test area. The third failure spot was a 10' x 10' area in the north-central area of the test are. The fourth and

final failure spot was a 10' x 10' area on the northwest side of the test area. These areas will be repaired at a later date. The remainder of the area all passed. This proof roll area was constructed using 1' lifts that were track walked with a D6 LGP dozer, followed by 4 vibratory passes of the sheep's foot roller and then two vibratory passes of an 84" roller followed by two static passes of the 84" smooth drum roller.

- November 28, 2017: Proof Roll #1 on PRL3 was conducted in the central west side of 488-1D East, near the middle of the impoundment. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Patrick Tinnes (EI), Chip Stewart (CSRA), Bruce Belding (STR), and Brandon (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove North-South working from the East to West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. The vast majority of the area was firm without any pumping. However, three soft failure spots were observed. The first was a 2' radius zone in the south-central area of the test area. The second was a 50'x30' area in the middle of the south side of the test area. The third and final failure spot was a 25' x 15' area in the haul road within the test area footprint. These areas will be repaired at a later date. The remainder of the area all passed. This proof roll area was constructed using 1' lifts that were track walked with a D6 LGP dozer, followed by 4 vibratory passes of the sheep's foot roller and then two vibratory passes of an 84" roller followed by two static passes of the 84" smooth drum roller.
- November 30, 2017: Repaired all failures in Proof Roll #12 on PRL2 and two of the repairs in PR#1 on PRL3. The only remaining area to repair from the proof rolls conducted on November 28th is the 50' x 30' large area. This area is still too wet and requires further dry back. For Proof Roll #12 on PRL2, 2' radius repair area, a "bar" of clay appeared to cause the pumping. It was removed and fill and compacted with ash and passed the proof roll. The ash was track walked in with a D6 LGP dozer and compacted with an 84" smooth drum roller making two passes in vibratory mode and two passes in static mode. A log was found buried in the 2' radius failure spot in PR 1 on PRL3, removal of the log repaired this spot. All other repair areas were caused due to the material being too wet. The areas in PR12 on PRL2 were removed and replaced with drier ash from a stockpile on the east side of 488-1D East. The ash was placed in two 9" lifts and track walked with a D6 LGP dozer and then compacted with an 84" smooth drum roller making two passes in vibratory mode followed by 1 pass in static mode. The failed area in the haul road of PR1 on PRL3 was due to overzealous watering associated with dust control. This area was allowed to dry and re-tested. It passed without the overwatering for dust control. The remaining 50'x30' area was windrowed ("corner bit" out) and allowed to dry further and will be re-tested at a later date.
- December 05, 2017: Repaired and re-tested the 50' x 30' failure spot in PR1 on PRL3. The material had been corner bit windrowed and allowed to dry back. The material was then spread with a D6 LGP dozer in two 9" thick lifts. The lifts were first track walked and then compacted with two vibratory followed by two static passes of an 84" smooth drum roller. There is no photo of the re-test on this square, but no pumping was observed.

Attachments:

- Proof Roll Level Definition Figure
- Cumulative Proof Roll Location Figure
- CSRA Proof Roll Reports

The proof roll tests were witnessed by Mike Beardsley, PE, in accordance with the plans and specifications.

Mike Beardsley, PE

12/13/2017

Project Engineer

488-1D Ash Basin Closure Project

(720) 838 – 7107

Mbeardsley@greenglobeinc.com

Date:	Time:	Direction of View / Location:
Wednesday, March 1, 2017	1057	East / 488-1D East

Subject:

Proof Roll #1 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Friday, March 17, 2017	1151	East / 488-1D East

Subject:

Proof Rolled Square, now passing, previously failed during PR1 on PRL1.

Date:	Time:	Direction of View / Location:
Tuesday, March 21, 2017	0807	N/A / 488-1D East

Subject:
Proof Roll #2 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Tuesday, April 11, 2017	1316	East / 488-1D East

Subject:
Proof Roll #3 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, April 20, 2017	1306	West / 488-1D East

Subject:

Carolina Sod 3,900 gallon water truck proof rolling PR1 on PRL2 and then PR4 on PRL1.

Date:	Time:	Direction of View / Location:
Thursday, April 20, 2017	1309	N/A / 488-1D East

Subject:

Proof Roll #1 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Wednesday, May 10, 2017	08:14	South / 488-1D East

Subject:
Proof Roll of repairs in PR#1 on PRL2. Areas passed.

Date:	Time:	Direction of View / Location:
Monday, May 15, 2017	10:52	West / 488-1D East

Subject:
Proof Roll #2 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Monday, May 15, 2017	16:09	West / 488-1D East

Subject:
Proof Roll on repair of PR#4 on PRL1. Area passed.

Date:	Time:	Direction of View / Location:
Wednesday, May 17, 2017	08:00	South / 488-1D East

Subject:
Proof Roll #3 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Wednesday, May 17, 2017	11:09	N/A / 488-1D East

Subject:
Proof Roll PR#5 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, June 15, 2017	09:34	South / 488-1D East

Subject:
Proof Roll PR#6 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, July 06, 2017	09:22	Northwest / 488-1D East

Subject:
Proof Roll PR#6 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Friday, July 07, 2017	16:17	North / 488-1D East

Subject:
Proof Roll on Repairs in PR#6 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Monday, July 10, 2017	10:57	N/A / 488-1D East

Subject:
Proof Roll on Repair in PR#6 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, July 27, 2017	08:02	North / 488-1D East

Subject:
Proof Roll PR#7 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Wednesday, August 16, 2017	11:15	South / 488-1D East

Subject:
Proof Roll #7 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Thursday, August 17, 2017	11:19	N/A / 488-1D East

Subject:
Proof Roll of Repair in PR#7 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Thursday, October 19, 2017	09:44	Northeast / 488-1D East

Subject:
Proof Roll #8 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Thursday, October 19, 2017	12:03	Southeast / 488-1D East

Subject:
Proof Roll of Repair in PR#8 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, October 19, 2017	12:22	North / 488-1D East

Subject:
Proof Roll #9 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, October 19, 2017	15:58	N/A / 488-1D East

Subject:
Log removed and repair made to PR8 on PRL2.

Date:	Time:	Direction of View / Location:
Thursday, October 19, 2017	16:01	N/A / 488-1D East

Subject:

Log removed and repair made to PR9 on PRL1.

Date:	Time:	Direction of View / Location:
Wednesday, November 08, 2017	14:14	West / 488-1D East

Subject:

Proof Roll #10 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Wednesday, November 8, 2017	14:48	South / 488-1D East

Subject:
Proof Roll #11 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Wednesday, November 08, 2017	14:27	West / 488-1D East

Subject:
Proof Roll #9 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Thursday, November 16, 2017	15:33	Southeast / 488-1D East

Subject:

Proof Roll #10 on PRL2 underway. This entire area was soft and pumping and the proof roll was failed. It was re-worked and re-tested as PR11 on PRL2.

Date:	Time:	Direction of View / Location:
Tuesday, November 28, 2017	10:44	South / 488-1D East

Subject:

Proof Roll #11 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Tuesday, November 28, 2017	12:22	South / 488-1D East

Subject:
Proof Roll #12 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Tuesday, November 28, 2017	14:03	North / 488-1D East

Subject:
Proof Roll #1 on PRL3 underway.

Date:	Time:	Direction of View / Location:
Thursday, November 30, 2017	08:46	N/A / 488-1D East

Subject:

Proof Roll #12 on PRL2 2' radius repair area. This "bar" of clay appeared to cause the pumping.

Date:	Time:	Direction of View / Location:
Thursday, November 30, 2017	14:19	N/A / 488-1D East

Subject:

Repair area in Proof Roll #12 on PRL2. Repair passed

Date:	Time:	Direction of View / Location:
Thursday, November 30, 2017	08:46	N/A / 488-1D East

Subject:

Proof Roll #1 on PRL3 2’ radius repair area. This log appeared to cause the pumping.

Date:	Time:	Direction of View / Location:
Thursday, November 30, 2017	14:19	N/A / 488-1D East

Subject:

Repair area in Proof Roll #12 on PRL2. Repair passed

Date:	Time:	Direction of View / Location:
Thursday, November 30, 2017	08:49	Southwest / 488-1D East

Subject:

Proof Roll #12 on PRL2: Wet ash removed to 18" and replaced with dry ash in failed areas.

Date:	Time:	Direction of View / Location:
Thursday, November 30, 2017	08:53	Northwest / 488-1D East

Subject:

Repair area in Proof Roll #12 on PRL2. Dry ash being placed and compacted in 9" lifts in repair area

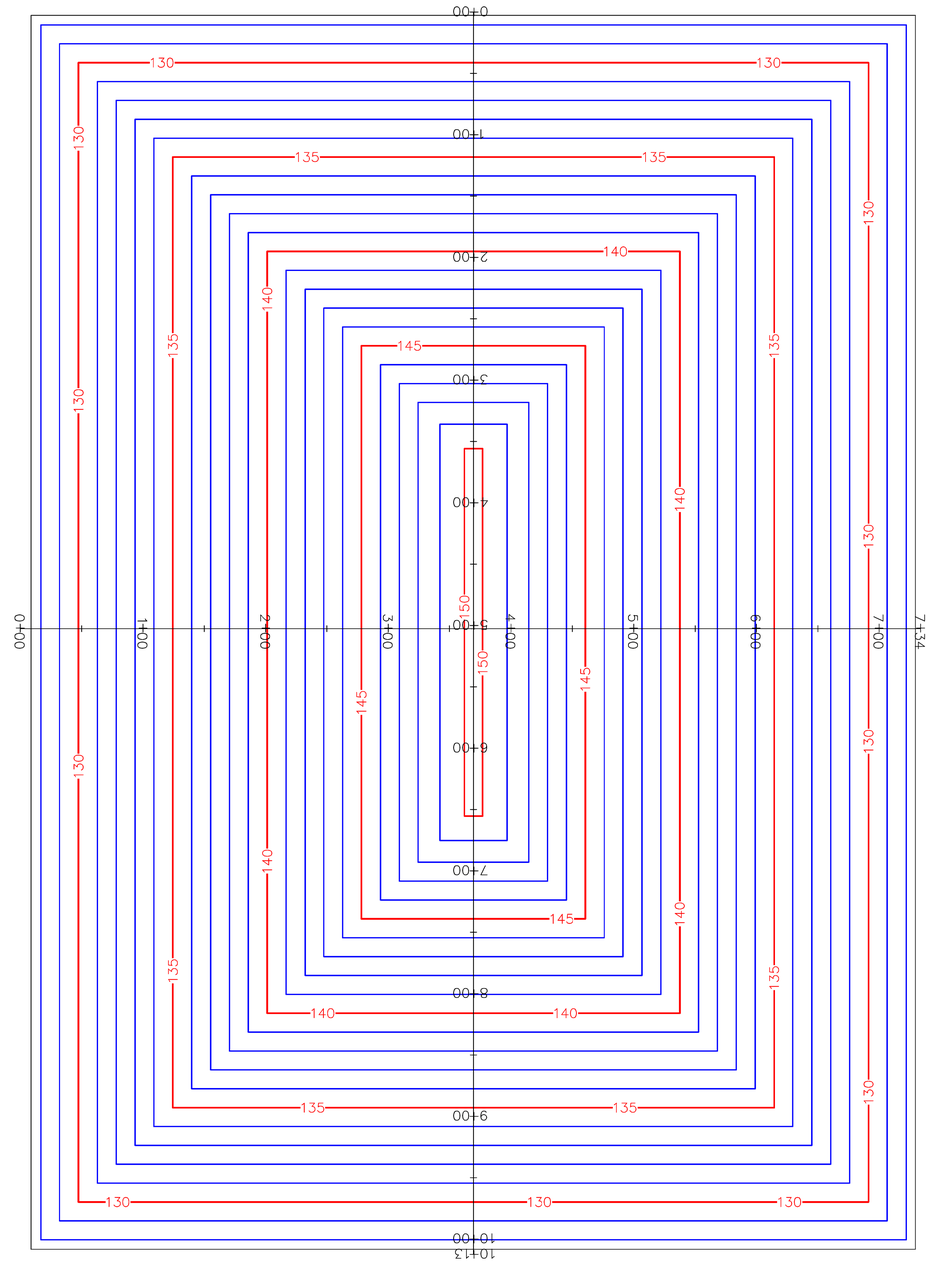
Date:	Time:	Direction of View / Location:
Thursday, November 30, 2017	14:31	East / 488-1D East

Subject:

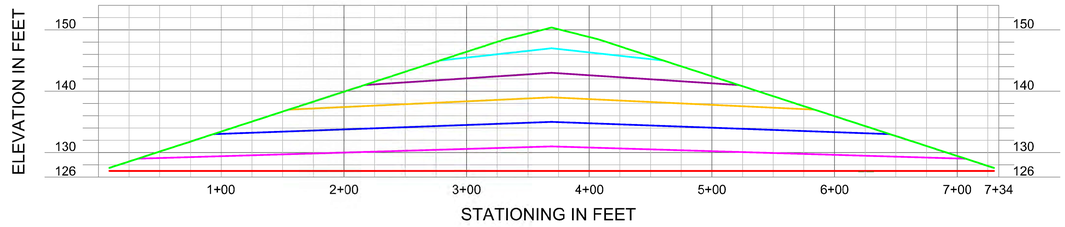
Proof Roll #1 on PRL3: Soft spot in the haul road passed proof roll after dry back from excessive dust control watering.

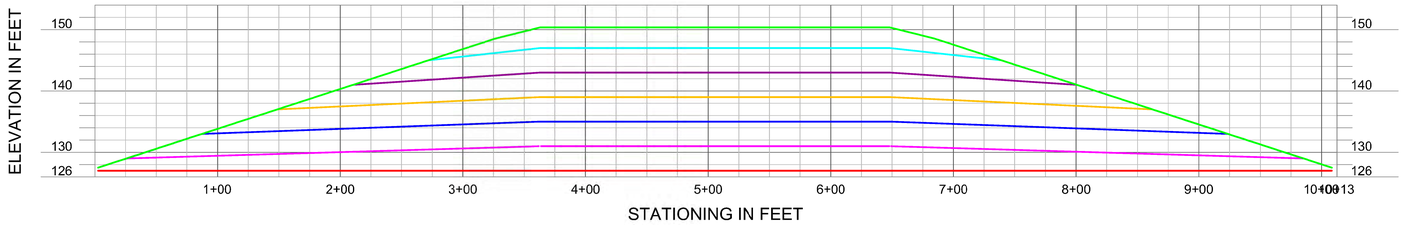
PROOF ROLL LEVEL DEFINITIONS

PLAN VIEW



PROFILE VIEW





0 100' HORIZONTAL SCALE

0 20' VERTICAL SCALE

LEGEND:

- Top of Proof Roll Level 1 (EL = 127)
- Top of Proof Roll Level 2
- Top of Proof Roll Level 3
- Top of Proof Roll Level 4
- Top of Proof Roll Level 5
- Top of Proof Roll Level 6
- Top of Proof Roll Level 7 (Ash FG)
- Ash FG Contour Major (5')
- Ash FG Contour Minor (1')

N

0 100' 200'
SCALE IN FEET

Prepared By:
Envirocon
7878 Wadsworth Blvd.
Suite 340
Arvada, CO 80003

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Nicanor Aguilar, Steve Hoover

Figure #: 01	
Date: 03/29/2017	
Revision #: 01	
Drawn By: GGE	
Approved By: EI	
Project #: 1495402	

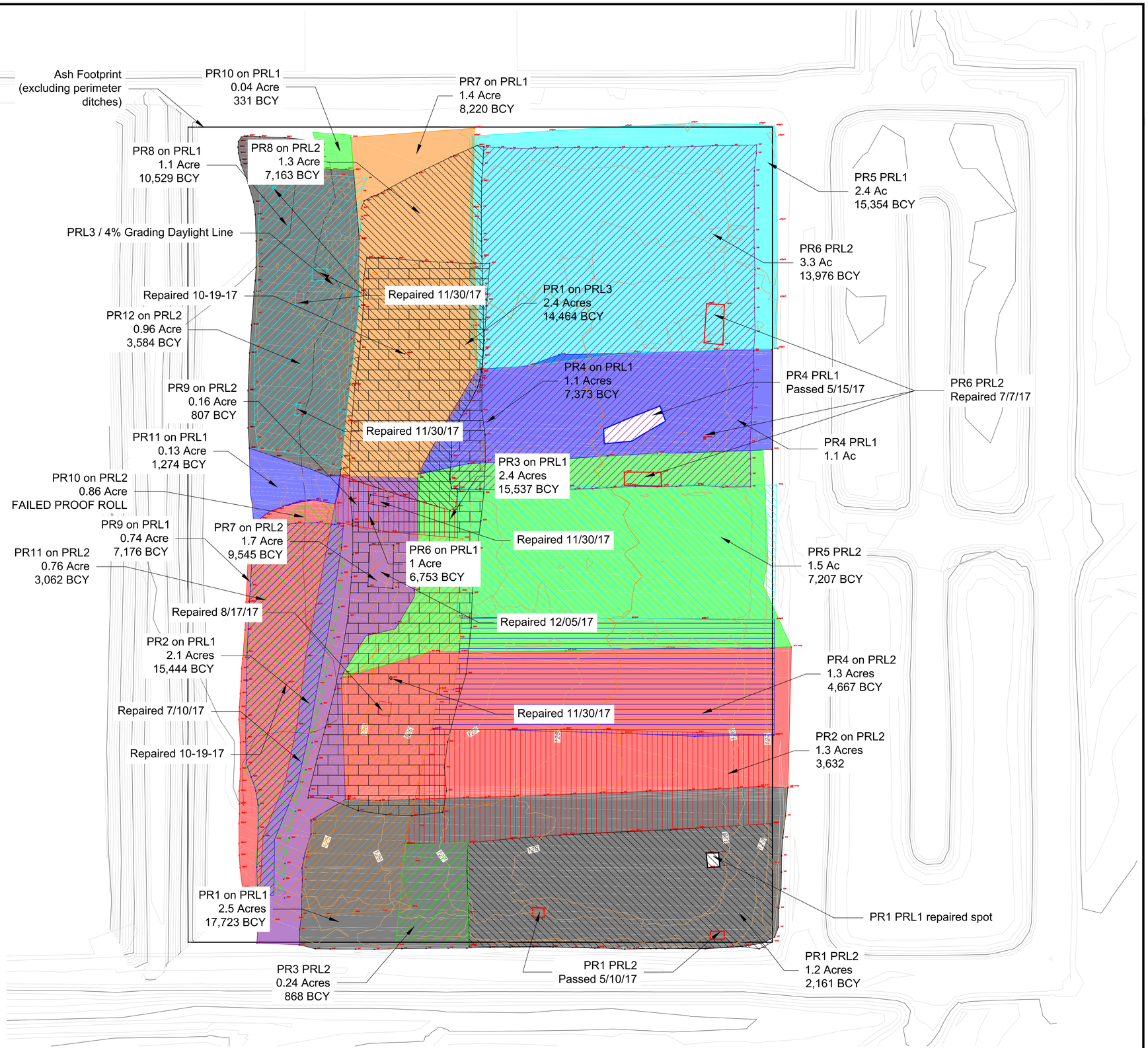
488-1D East Ash Placement Proof Roll Levels

488-1D Ash Basin Closure

C:\ USERS\ MIKE BEARDSLEY\ DESKTOP\ REVISED PROOF ROLL LIFTS.DWG

PROOF ROLL LOCATIONS

LEGEND:
- Original Ground Contour Major (5')
- Original Ground Contour Minor (1')
- Proof Roll Grade Contour Major (5')
- Proof Roll Grade Contour Minor (1')



NOTES:
1) PR1 on PRL1 conducted on 03-01-2017 with 3,900 gallon water truck.
2) PR 1 on PRL1 Failed Area passed on Proof Roll on 03-21-2017.
3) PR 2 on PRL1 conducted on 03-21-2017 with 3,900 gallon water truck.
4) PR3 on PRL1 conducted on 04-11-2017 with 3,900 gallon water truck.
5) PR 4 on PRL1 conducted on 04-20-2017 with 3,900 gallon water truck.
6) PR1 on PRL2 conducted on 04-20-2017 with 3,900 gallon water truck.
7) Repairs on PR1 on PRL2 passed on 05-10-17 with 3,900 gallon water truck.
8) PR2 on PRL2 conducted on 05-15-17 with 3,900 gallon water truck.
9) Repairs on PR4 PRL1 passed on 05-15-17 with 3,900 gallon water truck.
10) PR3 and PR4 on PRL2 conducted on 05-17-2017 with 3,900 gallon water truck.
11) PR5 on PRL1 conducted on 05-17-2017 with 3,900 gallon water truck.
12) PR5 on PRL2 conducted on 06-12-2017 with 3,900 gallon water truck.
13) PR6 on PRL1 conducted on 06-15-2017 with 3,900 gallon water truck.
14) PR6 on PRL2 conducted on 07-06-2017 with 3,900 gallon water truck.
15) Repairs on PR6 on PRL2 passed on 07-07-17 with 3,900 gallon water truck.
16) Repair on PR6 on PRL1 passed on 07-10-17 with 3,900 gallon water truck.
17) PR7 on PRL1 conducted on 07-27-17 with 3,900 gallon water truck.
18) PR7 on PRL2 conducted on 08-16-17 with 3,900 gallon water truck.
19) Repair on PR7 on PRL2 passes on 08-17-17 with 3,900 gallon water truck.
20) PR8 on PRL2 conducted on 10-19-17 with 3,900 gallon water truck.
21) PR8 on PRL1 conducted on 10-19-17 with 3,900 gallon water truck.
22) PR9 on PRL1 conducted on 10-19-17 with 3,900 gallon water truck.
23) Repairs on PR8 on PRL2 and PR9 on PRL1 conducted and passed on 10-19-17.
24) PR9 on PRL2 conducted on 11-08-17 with 3,900 gallon water truck.
25) PR10 on PRL1 conducted on 11-08-17 with 3,900 gallon water truck.
26) PR11 on PRL1 conducted on 11-08-17 with 3,900 gallon water truck.
27) PR10 on PRL2 conducted on 11-16-17 with 3,900 gallon water truck. FAILED. Area will be re-worked and then re-tested at a future date.
28) PR11 on PRL2 conducted on 11-28-17 with 3,900 gallon water truck.
29) PR12 on PRL2 conducted on 11-28-17 with 3,900 gallon water truck.
30) PR1 on PRL3 conducted on 11-28-17 with 3,900 gallon water truck.
31) Repairs on PR12 on PRL2 and PR1 on PRL3 conducted and passed on 11-30-17.
32) Repair on PR1 on PRL3 conducted and passed on 12-05-17.

N

0 100' 200'
SCALE IN FEET

Prepared By:
Envirocon
1999 Broadway
Suite 800
Denver, CO 80203

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Drew Murphy, Billy West

Figure #:	01
Date:	12/13/17
Revision #:	0
Drawn By:	GGE
Approved By:	EI
Project #:	1495402

Cumulative Proof Roll Figure
488-1D East

488-1D Ash Basin Closure

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LEGEND:
- Original Ground Contour Major (5')
- Original Ground Contour Minor (1')
- Proof Roll Grade Contour Major (5')
- Proof Roll Grade Contour Minor (1')

Ash Footprint (excluding perimeter ditches)

PRX on PRL0
X.X Acre
XXX BCY

PRX on PRL0
X.X Acre
XXX BCY

PLACEHOLDER

NOTES:
1) PR1 on PRL0 conducted on XX-XX-201X with 3,900 gallon water truck.
2) PR2 on PRL0 conducted on XX-XX-201X with 3,900 gallon water truck.

N

0 100' 200'

SCALE IN FEET

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Denver, CO 80203

Prepared For:
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Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
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Attn: Don Baston, Drew Murphy, Bruce Belding

Figure #: 02	PRL0 Proof Roll Figure 488-1D East
Date: 12/13/17	
Revision #: 0	
Drawn By: GGE	
Approved By: EI	488-1D Ash Basin Closure
Project #: 1495402	

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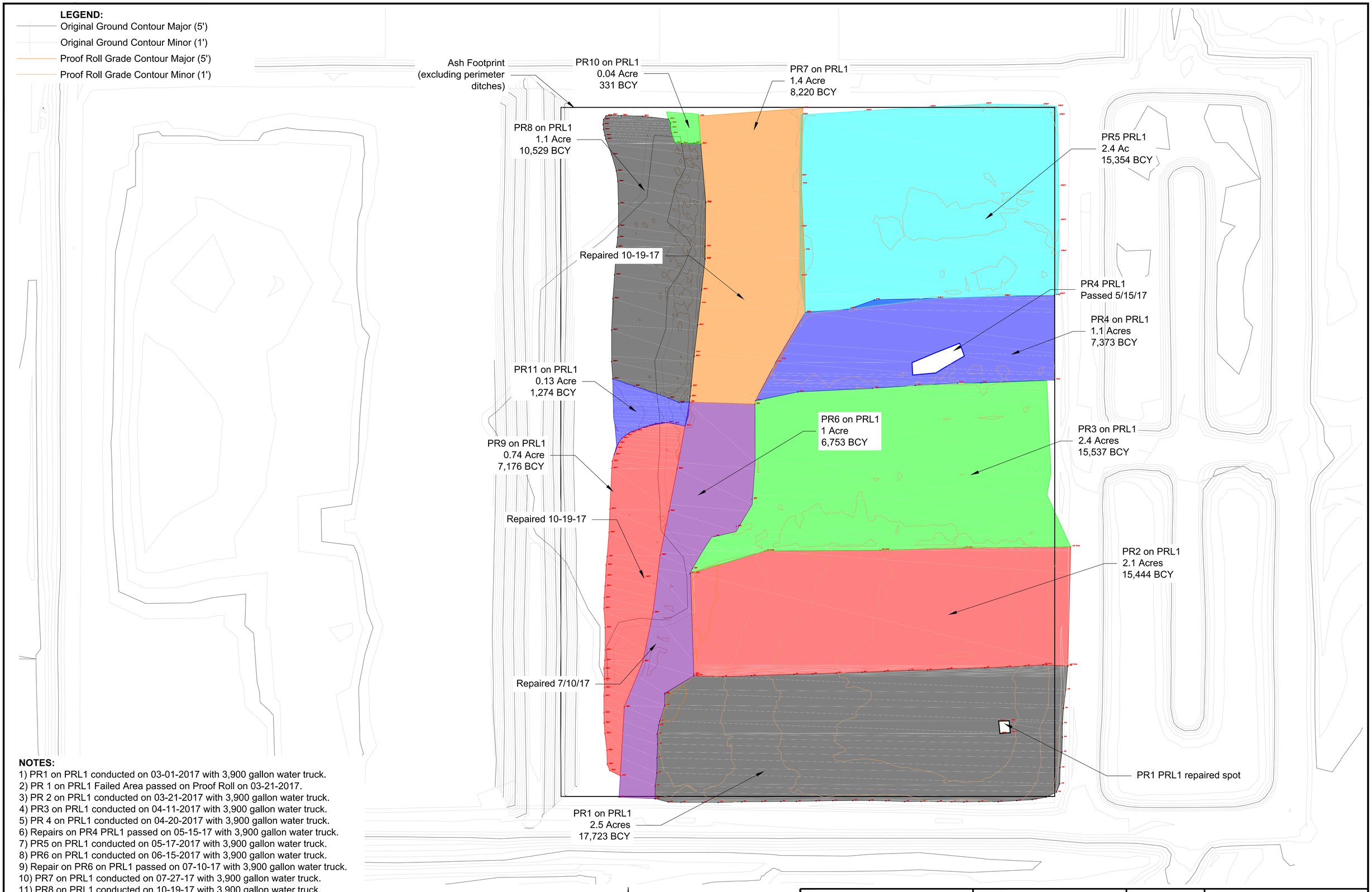
LEGEND:
- Original Ground Contour Major (5')
- Original Ground Contour Minor (1')
- Proof Roll Grade Contour Major (5')
- Proof Roll Grade Contour Minor (1')



NOTES:
1) PR1 on PRL1 conducted on 03-01-2017 with 3,900 gallon water truck.
2) PR 1 on PRL1 Failed Area passed on Proof Roll on 03-21-2017.
3) PR 2 on PRL1 conducted on 03-21-2017 with 3,900 gallon water truck.
4) PR3 on PRL1 conducted on 04-11-2017 with 3,900 gallon water truck.
5) PR 4 on PRL1 conducted on 04-20-2017 with 3,900 gallon water truck.
6) Repairs on PR4 PRL1 passed on 05-15-17 with 3,900 gallon water truck.
7) PR5 on PRL1 conducted on 05-17-2017 with 3,900 gallon water truck.
8) PR6 on PRL1 conducted on 06-15-2017 with 3,900 gallon water truck.
9) Repair on PR6 on PRL1 passed on 07-10-17 with 3,900 gallon water truck.
10) PR7 on PRL1 conducted on 07-27-17 with 3,900 gallon water truck.
11) PR8 on PRL1 conducted on 10-19-17 with 3,900 gallon water truck.
12) PR9 on PRL1 conducted on 10-19-17 with 3,900 gallon water truck.
13) Repairs on PR9 on PRL1 conducted and passed on 10-19-17.
14) PR10 on PRL1 conducted on 11-08-17 with 3,900 gallon water truck.
15) PR11 on PRL1 conducted on 11-08-17 with 3,900 gallon water truck.

N

0 100' 200'
SCALE IN FEET

Prepared By:
Envirocon
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Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Drew Murphy, Billy West

Figure #: 03	
Date: 11/17/17	
Revision #: 0	
Drawn By: GGE	
Approved By: EI	
Project #: 1495402	

PRL0 Proof Roll Figure
488-1D East

488-1D Ash Basin Closure

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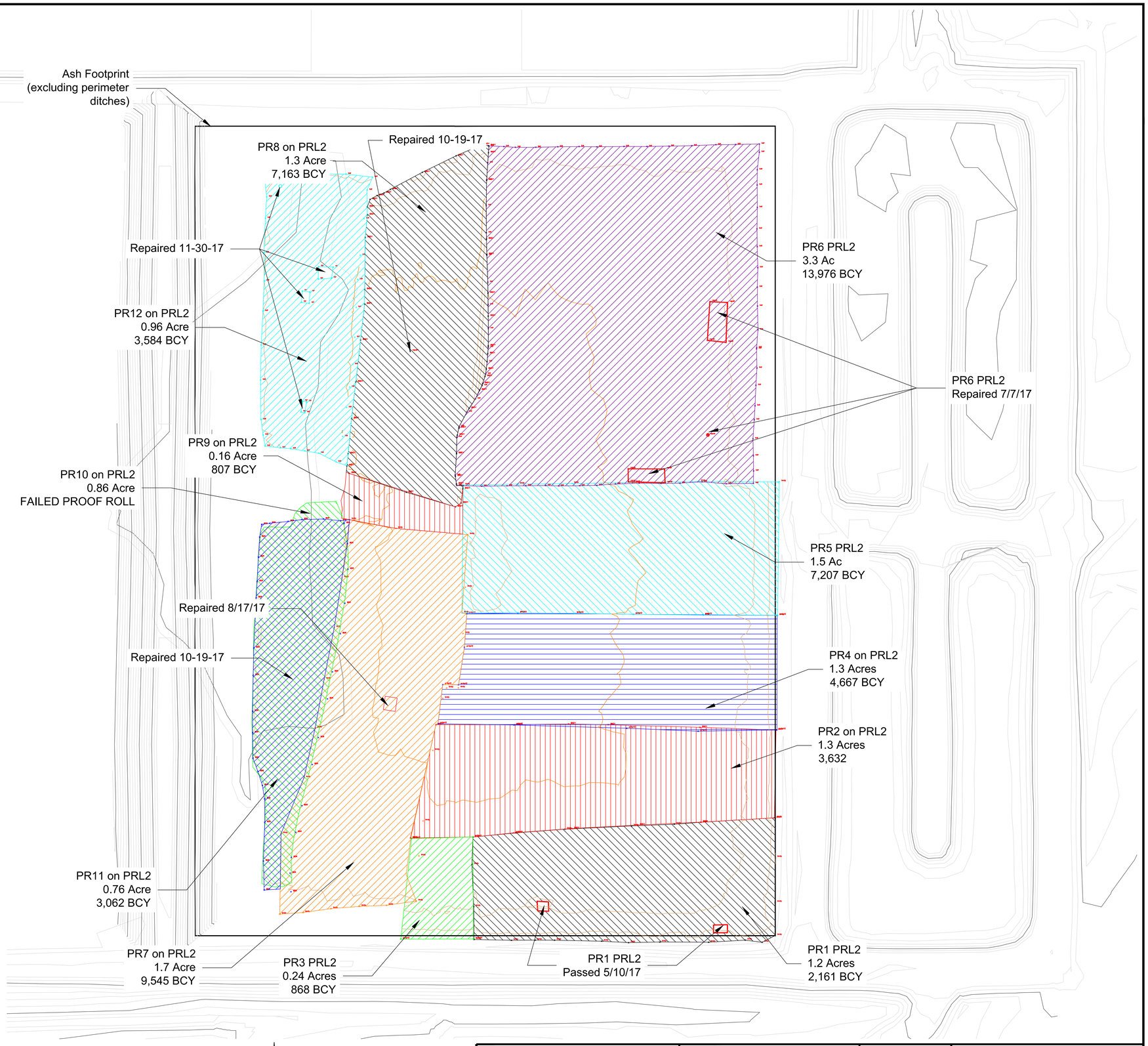
LEGEND:
- Original Ground Contour Major (5')
- Original Ground Contour Minor (1')
- Proof Roll Grade Contour Major (5')
- Proof Roll Grade Contour Minor (1')



NOTES:
1) PR1 on PRL2 conducted on 04-20-2017 with 3,900 gallon water truck.
2) Repairs on PR1 on PRL2 passed on 05-10-17 with 3,900 gallon water truck.
3) PR2 on PRL2 conducted on 05-15-17 with 3,900 gallon water truck.
4) PR3 and PR4 on PRL2 conducted on 05-17-2017 with 3,900 gallon water truck.
5) PR5 on PRL2 conducted on 06-12-2017 with 3,900 gallon water truck.
6) PR6 on PRL2 conducted on 07-06-2017 with 3,900 gallon water truck.
7) Repairs on PR6 on PRL2 passed on 07-07-17 with 3,900 gallon water truck.
8) PR7 on PRL2 conducted on 08-16-17 with 3,900 gallon water truck.
9) Repair on PR7 on PRL2 passes on 08-17-17 with 3,900 gallon water truck.
10) PR8 on PRL2 conducted on 10-19-17 with 3,900 gallon water truck.
11) Repair on PR8 on PRL2 conducted and passed on 10-19-17.
12) PR9 on PRL2 conducted on 11-08-17 with 3,900 gallon water truck.
13) PR10 on PRL2 conducted on 11-16-17 with 3,900 gallon water truck. FAILED. Area will be re-worked and then re-tested at a future date.
14) PR11 and PR12 on PRL2 conducted on 11-28-2017 with 3,900 gallon water truck.
15) Repairs on PR12 on PRL12 passed on 11-30-2017 with 3,900 gallon water truck.

N

0 100' 200'
SCALE IN FEET

Prepared By:
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Aiken, SC 29808
Attn: Don Baston, Drew Murphy, Bruce Belding

Figure #:	04
Date:	12/13/17
Revision #:	0
Drawn By:	GGE
Approved By:	EI
Project #:	1495402

PRL2 Proof Roll Figure
488-1D East

488-1D Ash Basin Closure

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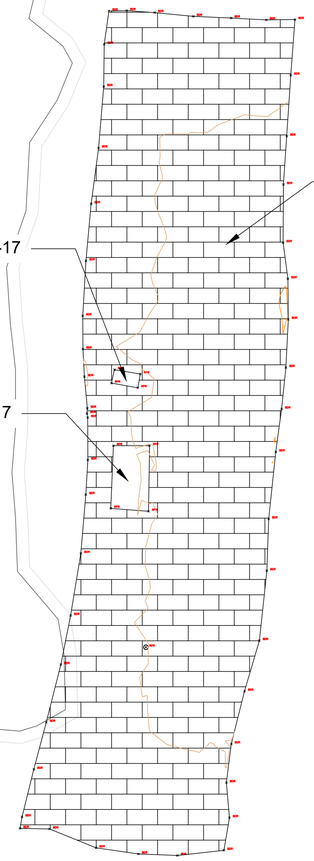
LEGEND:
- Original Ground Contour Major (5')
- Original Ground Contour Minor (1')
- Proof Roll Grade Contour Major (5')
- Proof Roll Grade Contour Minor (1')

Ash Footprint (excluding perimeter ditches)



NOTES:
1) PR1 on PRL3 conducted on 11-28-2017 with 3,900 gallon water truck.
2) Repair on PR1 on PRL3 passed on 11-30-17 with 3,900 gallon water truck.
3) Repair on PR1 on PRL3 passed on 12-05-17 with 3,900 gallon water truck.

N

0 100' 200'

SCALE IN FEET

Prepared By:
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Denver, CO 80203

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Drew Murphy, Bruce Belding

Figure #:	05
Date:	12/13/17
Revision #:	0
Drawn By:	GGE
Approved By:	EI
Project #:	1495402

PRL3 Proof Roll Figure
488-1D East

488-1D Ash Basin Closure

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PLACEHOLDER

LEGEND:
- Original Ground Contour Major (5')
- Original Ground Contour Minor (1')
- Proof Roll Grade Contour Major (5')
- Proof Roll Grade Contour Minor (1')

Ash Footprint (excluding perimeter ditches)

PR1 on PRL4
X.X Acre
XXX BCY

NOTES:
1) PR1 on PRL4 conducted on XX-XX-201X with 3,900 gallon water truck.

N

0 100' 200'

SCALE IN FEET

Prepared By:
Envirocon
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Suite 800
Denver, CO 80203

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Drew Murphy, Bruce Belding

Figure #: 06	
Date: 12/13/17	
Revision #: 0	
Drawn By: GGE	
Approved By: EI	
Project #: 1495402	

PRL4 Proof Roll Figure
488-1D East

488-1D Ash Basin Closure

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LEGEND:
- Original Ground Contour Major (5')
- Original Ground Contour Minor (1')
- Proof Roll Grade Contour Major (5')
- Proof Roll Grade Contour Minor (1')

Ash Footprint (excluding perimeter ditches)

PR1 on FG
X.X Acre
XXX BCY

PLACEHOLDER

NOTES:
1) PR1 on PRLFG conducted on XX-XX-201X with 3,900 gallon water truck.

N

0 100' 200'

SCALE IN FEET

Prepared By:
Envirocon
1999 Broadway
Suite 800
Denver, CO 80203

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Drew Murphy, Bruce Belding

Figure #: 07	
Date: 12/13/17	
Revision #: 0	
Drawn By: GGE	
Approved By: EI	
Project #: 1495402	

Finish Grade Proof Roll Figure
488-1D East

488-1D Ash Basin Closure

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CSRA PROOF ROLL INSPECTION REPORTS

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T16-H95

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	As requested by client, technician observed an empty water truck proofroll the southeast section of Area 1 at elevations between 127.00 to 129.00. Area observed appeared to be firm and stable at this time.

TOTAL TIME:	3.0 hours		
DATE:	March 1, 2017	TECHNICIAN:	Chris Lowry

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-L66

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed a empty water truck (truck no. 3972) proofroll the two (2) acres of north and adjoining proofroll 1 area. All areas appeared to be firm and stable at this time. (Note: This is the second proofroll for this area; elevation 127-129.)

TOTAL TIME:	4.0 hours		
DATE:	March 21, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-P35

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck (truck no. 3972) proofroll #3 on PRL1. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	April 11, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Q67

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck proofroll #1 on PRL2. All areas appeared to be firm and stable at this time with the exception of an area measuring 10' x 10' in two (2) separate areas. A proofroll was also observed for #4 on PRL1. All areas appeared to be firm and stable with the exception of an area measuring 10' x 30'. In both cases, contractor will scarify areas and allow to dry before re-compacting. Further observation for these isolated areas should resume when areas are firm and stable.

TOTAL TIME:	5.0 hours		
DATE:	April 20, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-U51

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#2 (proofroll #2). All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	May 15, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmelt St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-U78SI

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty tandem axle water truck proofroll three (3) areas at PR-3 on PRL-2, PR-5 on PRL-1, and PR-4 on PRL-2. All areas were firm and stable at this time. Technician also performed fifteen (15) field density tests. Please see report T17-U78FD for test results and locations.

DATE:	May 17, 2017	TECHNICIAN:	David Turner

David Turner
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Y24

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#2 proofroll #5. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	June 12, 2017	TECHNICIAN:	David Turner

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

Member of American Society for Testing and Materials
Accredited by AASHTO Accreditation Program (AAP)

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
Augusta, Georgia 30904
(706) 733-6960
Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Y95

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#1 proofroll #6. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	June 15, 2017	TECHNICIAN:	David Turner

David Turner DET
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-BB12

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL #6 at elevation PRL #2. Material was firm and stable with the exception of two (2) areas: 1) location east side approximately 30' x 60' to a depth of 12 inches was saturated; 2) location on south side approximately 30' x 60' to a depth of 12 inches was saturated. Technician suggested to remove saturated material and allow areas to dry before replacing.

TOTAL TIME:	4.0 hours		
DATE:	July 6, 2017	TECHNICIAN:	Branon Mitchell

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-EE70

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck proofroll location PRL1-Proofroll #7. All areas were firm and stable with no signs of pumping. Technician also picked up soil sampled for modified proctor test (N1B-sample 1).

TOTAL TIME:	4.0 hours		
DATE:	July 27, 2017	TECHNICIAN:	Branon Mitchell

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-FF97

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck proofroll location PRL2-Proofroll #7. All areas were firm and stable with no signs of pumping with the exception of a 15' x 15' area (area marked on site map provided by client).

TOTAL TIME:	4.0 hours		
DATE:	August 16, 2017	TECHNICIAN:	Branon Mitchell

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-QQ67

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed a empty water truck proofroll locations PR8 on PRL2, PR8 on PRL1, and PR9 on PRL1. All areas appeared to be firm and stable at the time of observation, with the exception of a 2' x 4' area on PR8 on PRL2 (stump to be removed). Proofroll was also observed by Derek Evans, Steve Hoover, and Mike Beardsley.

TOTAL TIME:	6.0 hours		
DATE:	October 19, 2017	TECHNICIAN:	Chip Stewart

Chip Stewart
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Overcast and Cool	REPORT NO:	T17-TT72

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed a an empty water truck proofroll three (3) areas. Proofroll #1 was performed on PR10 PRL1. Proofroll #2 was performed on PR9 PRL2. Proofroll #3 was performed on PR11 PRL1. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	November 8, 2017	TECHNICIAN:	Chip Stewart

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Overcast and Cool	REPORT NO:	T17-UU67

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed a an empty water truck proofroll at locations PR-10 and PRL-2. Pumping was observed in several areas.

TOTAL TIME:	4.0 hours		
DATE:	November 16, 2017	TECHNICIAN:	Branon Mitchell

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Cool	REPORT NO:	T17-WW52

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed a a water truck (truck #3972) proofroll at locations PR11/PRL2, PR12/PRL2, and PR1/PRL3. Most areas appeared to be firm and stable at time of observation with the exception of PR12/PRL2: in the north center (2' radius), south central (4' x 8'), northwest side (10' x 10'), another area in north center (10' x 10'); and in PR1/PRL3: middle south side of pad (50' x 30') and in the haul area (25' x 15'). Technician suggested to excavate to firm and stable material and allow saturated material to dry. If time is a factor, replace with a drier, more suitable material.

TOTAL TIME:	8.0 hours		
DATE:	November 28, 2017	TECHNICIAN:	Chip Stewart

Chip Stewart
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

Date: December 13, 2017	
Project Title: SRNS 488-1D Ash Impoundment	**Location: Jackson, SC**

488-1D East Placement Area Proof Rolls:

This report serves as cumulative documentation of the proof roll activities associated with the 488-1D Ash Impoundment Project. This report is a live document that is updated as the proof rolls occur, and is thus progressively expounded and re-submitted as needed. The required proof roll inspections have been identified in Attachment A, herein and are identified as Proof Roll Levels (PRLs) 1 – 7. In short:

- PRL1: Approximate elevation 127
- PRL2: Approximate elevations 127 - 131
- PRL3: Approximate elevations 131 - 135
- PRL4: Approximate elevations 135 - 139
- PRL5: Approximate elevations 139 - 143
- PRL6: Approximate elevations 143 - 147
- PRL7: Approximate elevations 147 – 150.4

The proof rolls are summarized below:

- March 01, 2017, Proof Roll #1: The southern 1/8th of the placement area in 488-1D east was proof roll tested. This was the first 4' lift, (PRL1) with the average lift elevation ranging from 127 – 129 feet. In attendance was Don Bastion, Tripp Winfree, Gerald McKee, Chris Lowry (CSRA), Steve Hoover, Mike Beardsley, and Clay Roark. The proof roll was conducted using a 3,500 – 4,000 gallon water truck, EI truck #3972. Per Chris, Tripp, and Don, the weight of this truck is sufficient to yield enough ground pressure that it need not be filled with water during the proof roll. The entire area was rolled with the truck stepping over 1 truck length each time, such that after the first pass, the driver's side tires traveled in the passenger's side tire tracks. The proof roll started on the south and worked north, covering approximately 2.5 Acres. The entire area passed, with the exception of a soft spot roughly 10' x 10' in size located on the east side near the center of the area. See sketch for further detail.
- March 17, 2017, Proof Roll #1 Repair: Envirocon "re-proof rolled" the 10' x 10' square that failed during Proof Roll #1. This proof roll was witnessed by Mike Beardsley and STR Steve Hoover. Envirocon allowed this area to dry for 16 days. They did not remove the material, but did drive upon it in static mode with an 84" smooth drum roller 4 times for compaction. For the proof roll, Envirocon water truck 3972 was utilized, empty as during the full proof roll. The water truck made two passes driving east and west, starting along the south side of the failed grid. The truck then moved over 1 truck width such that the driver side tires followed the wheel marks from the passenger tires on the previous pass. No deflection or pumping was observed by myself or STR.
- March 21, 2017, Proof Roll #2: Proof Roll #2 was conducted on approximately 2.1 Acres directly north and adjacent to the Proof Roll #1 area. This was a proof roll on Proof Roll Level 1 (~127 -128 FT elevation). The proof roll used Envirocon water truck 3972 and worked from south to north, stepping over 1 truck width each time such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area until a lane then had a failure. There was no small spots within the fill that failed. Upon reaching the failed lane, the boundary was then staked out with a survey lathe demarcating the area. The accepted area was taken as one full truck lane further to the south and there was the location of where the stakes were placed. For future proof rolls, these boundaries will be demarcated with white ribbon, but for this test,

green ribbon was used. The boundary was then surveyed in with GPS and the area topographically surveyed (in-house by Envirocon's engineering staff).

- April 11, 2017, Proof Roll #3: Proof Roll #3 was conducted on approximately 2.4 Acres, directly north and adjacent to the Proof Roll #2 area. The proof roll occurred on Proof Roll Level 1 (PRL 1, which is at elevation 127). Once again, the proof roll utilized Envirocon's empty water truck, equipment number 3972. The truck traveled in an east-west direction working from the south to the north, stepping over 1 truck width each pass, such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area that was prepared for the proof roll. There were no failures for this proof roll area. The area was then delineated with orange lathe with white ribbon and topographically surveyed with RTK enabled GPS. The underlying lifts of placed ash that comprised this PRL 1 were compacted using the following method. First, the west ash was dumped in a windrow with an articulating truck. Next the windrow was spread with a D6 LGP dozer. The spread ash was then disked with a rome disk to dry the material back to what appeared to compact well (moisture content ranges anywhere from 19 – 29% by dry weight). Once dried appropriately, the ash was then track walked with a D6 LGP dozer. Then an 84" smooth drum roller makes 1 pass in vibratory mode followed by 3 passes in static mode. Lastly, compaction is also achieved as the loaded articulated trucks traverse the surface to build the windrows.
- April 20, 2017: Proof Roll #4 on PRL 1 and Proof Roll #1 on PRL 2: PR1 on PRL2 was located approximately 4 feet atop PR1 on PRL1 on the south side of the 488-1D east placement pad, and was approximately 1.2 Acres. PR4 on PRL1 was directly adjacent to PR3 on PRL1 and was approximately 1.1 Acres. These proof rolls utilized Carolina Sod's empty water truck. As with Envirocon's water truck, this was a 3,900 gallon water truck. The truck traveled in an east-west direction working from the south to the north, stepping over 1 truck width each pass, such that the driver's side tires drove in the passenger tire marks each time the truck was offset. The process was repeated over the entire area that was prepared for each of the proof rolls. There were two failure spots for PR1 on PRL2 approximately 10' x 10' each and 1 failure area approximately 10' x 40' for PR4 on PRL1. These failure locations were surveyed in using GNSS enabled RTK GPS, along with the boundaries of the areas and the topographic surface of each area. Compaction on Lift 4 for both of these areas was completed similar to past compaction efforts, by first track walking a D6 LGP dozer over the area. However, two passes were then made in vibratory mode using an 84" smooth drum roller instead of 1 pass vibratory with 3 passes static.
- April 21, 2017: The failure areas in PR3 on PRL1 and PR1 on PRL2 were disked as it was initially thought that these were wet spots. However, upon disking, significantly sized wood stumps were found in each of the failure spots. The wood stumps were removed, and the areas allowed to dry until it appeared the moisture was correct for compaction. At that time the areas were wheel rolled using a WA 450 Loader, followed by 2 passes in vibratory mode of an 84" smooth drum roller, followed by 2 passes in static mode of the 84" smooth drum roller. The areas have not yet been re-proof rolled.
- May 10, 2017: The failure areas in PR1 on PRL2 were proof rolled and passed. Envirocon's 3,900 gallon unloaded water truck (3972) was used to conduct the proof roll. The proof roll was witnessed by the Envirocon Project Engineer and the STR.
- May 15, 2017: The failure area on PR4 on PRL1 was proof rolled and passed. A 3,900 gallon unloaded water truck was used to conduct the proof roll. The proof roll was witnessed by the Envirocon Project Engineer and the STR.
- May 15, 2017: Proof Roll #2 on PRL2 was conducted. The area was directly north and adjacent to the PR1 on PRL2 proof roll area. The area was approximately 1.3 acres in size. There were no failure areas, the entire 1.3 Acre area passed. The test was conducted using Carolina Sod's 3,900 gallon water truck, unloaded. The truck traversed the area in an east-west direction working from the south to the north. Per the standard operating procedure, the truck stepped to the north 1 truck width each pass such that the driver's side tires drove

in the passenger tire marks each time the truck was offset. The proof roll was observed by the Envirocon Project Engineer, STR, and Don Baston. Compaction on the lifts of this area were achieved by first drying the material to a suitable moisture content with a Rome disk, then track walking the area with a D6 LGP dozer, followed by two vibratory passes and then two static passes of the 84" smooth drum roller.

- May 17, 2017: Three proof rolls were conducted. The proof rolls were observed by the Envirocon Project Engineer, STR, and Don Baston. The first proof roll of the day was Proof Roll #3 on PRL2. The area was approximately 0.24 acres in size. The proof roll used unloaded Envirocon water truck 3972, 3,900 gallons. The truck traversed the area north and south, starting from the east and working to the west. The truck stepped to the west 1 truck width each pass. The second proof roll of the day was Proof Roll #5 on PRL1. This area was the northern portion of the 488-1D East pad, which generally included the former CPRB clay stockpile area. Again empty Envirocon water truck 3972 (3,900 gallon) was used to conduct the proof roll. The proof roll worked from north to south traversing in an east-west direction, stepping over 1 truck width each time. The third proof roll was Proof Roll #4 on PRL2. This area was directly north and adjacent to PR#2 on PRL2. Again empty Envirocon water truck 3972 (3,900 gallon) was used to conduct the proof roll. The proof roll worked from north to south traversing in an east-west direction, stepping over 1 truck width each time. The lifts composing these proof roll levels gained compaction by first drying the material to a suitable moisture content with a Rome disk, then track walking the area with a D6 LGP dozer, followed by two vibratory passes and then two static passes of the 84" smooth drum roller.
- June 12, 2017: Proof Roll #5 on PRL2 was conducted. The area was directly north and adjacent to PR#4 on PRL2. The area was approximately 1.3 acres in size. Empty Envirocon water truck 3972 was used to conduct the proof roll. David with CSRA, Derek Evans with SRNS, Steve Hoover (STR) and Mike Beardsley witnessed the proof roll. The truck traversed the area in an east-west direction, starting on the south and working to the north. The truck moved over 1 truck width each pass such that the driver's side tires followed in the passenger side of the tires' marks on the subsequent pass. The ash placed in this area gained compaction by being disked to a suitable moisture content, then track walked with a D6 dozer, and then compacted two times in vibratory mode with an 84" smooth drum roller, followed by 1 pass in static mode with an 84" smooth drum roller. There was no failing or required re-work areas in this proof roll. There were no pictures taken during this proof roll event.
- June 15, 2017: Proof Roll #6 on PRL1 was conducted. The area was the western side of PRL1 on the southern half. The area was approximately 1 acre in size. Empty Envirocon water truck 3972 was used to conduct the proof roll. David with CSRA, Derek Evans with SRNS, and Mike Beardsley witnessed the proof roll. The truck traversed the area in a north-south direction, starting on the west and working to the east. The truck moved over 1 truck width each pass such that the driver's side tires followed in the passenger side of the tires' marks on the subsequent pass. The ash placed in this area gained compaction by being disked to a suitable moisture content, then track walked with a D6 dozer, and then compacted two times in vibratory mode with an 84" smooth drum roller, followed by 1 pass in static mode with an 84" smooth drum roller. There was 1 failing spot (isolated to about a 2' radius). It appears there was a buried stump here and it will be repaired in the future.
- July 06, 2017: Proof Roll #6 on PRL2 was conducted. Attendees included: Derek Evans (SRNS), Steve Hoover (STR), Brandon Mitchell (CSRA), Mike Beardsley (EI/GGE), and Melvin Butler (EI). Empty water truck 3972 was used to conduct the test. The area is the north 1/3rd of the 488-1D east pad. The truck travelled in an East-West direction starting at the south side of the pad and working north. The area was approximately 3.3 acres in size. There were 3 failure locations in this proof roll. The first was a spot about 30' x 60' on the south side of the area. The second was a 2' diameter spot about 50' northeast of the first failure spot. The final failure location was an area about 20' x 50' on the eastern side of the

test area. All other areas passed with no observed pumping. The failure areas were staked and will be repaired in the future. The area was surveyed in (laterally and topographically). The compactive technique used throughout this PRL was track walking with a D6 LGP dozer, followed by two vibratory passes of an 84" smooth drum roller, followed by 1 static pass. The average moisture content of the upper 1' of the PRL was approximately 25% by dry weight.

- July 07, 2017: Envirocon repaired the 3 failed areas in PR6 on PRL2. All three repairs passed. To repair, Envirocon dug 1 foot out of the areas with an excavator and allowed the removed material and the excavation to dry throughout the day. Then the crew compacted the floor of the excavation with an 84" smooth drum compactor in static mode. They then filled the excavation back in using a D6 LGP dozer. Next they track walked the filled in excavation. Then the rolled the area with the 84" smooth drum roller using 2 vibratory and 1 static pass over each filled in repair area. Then empty water truck 3972 drove over each repair area and Steve Hoover and Mike Beardsley observed the test. No soil pumping was witnessed.
- July 10, 2017: Envirocon repaired the failed area in PR6 on PRL1. This was a location that contained a tree / wood debris, causing a pumping area of about a 2' diameter. The repaired area passed. To repair, the crew removed the wood with a D6 LGP dozer. Then the hole was backfilled and compacted. Compacting consisted of track walking with a LGP dozer and then pneumatic compaction via heavy equipment wheel rolling. Then empty water truck 3972 drove over the repair area and Steve Hoover and Mike Beardsley observed the test. No pumping was witnessed.
- July 27, 2017: Proof Roll #7 on PRL1 was conducted in the northwest corner of 488-1D East. The proof roll was attended by Don Baston (SRNS), Mike Beardsley (EI/GGE), William Livingston (EI), Brandon Mitchell (CSRA), Steve Hoover (STR), and Brandon C. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the west edge of the area and working to the east. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. All areas passed, with no re-work needed and no pumping observed. It was observed that the northwest corner was slightly "spongier" than the rest of the area, but no areas pumped.
- August 16, 2017: Proof Roll #7 on PRL2 was conducted in the southwest corner of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), William Livingston (EI), Brandon Mitchell (CSRA), Steve Hoover (STR), and Brandon C. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the East edge of the area and working to the West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. There was 1 failure spot in the center of the proof roll, approximately 15' x 15' in size. All other areas demonstrated a firm base without pumping. The 1' layers comprising PRL 2 in this proof roll area were track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller. This process was used for each of the four 1' lifts making the proof roll level.
- August 17, 2017: Envirocon repaired the failed area in PR7 on PRL2. This area was just barely a soft spot and barely pumped. It appeared likely due being slightly over wet on the moisture content. Rather than ripping out the area, the 84" vibratory roller was brought over on 8-16-17 and the area vibrated moving north and south and then tangentially going east and west. The purpose of this vibration was to bring the entrained water to the top. The area was then allowed to dry back overnight. The next day, on 08-17-17, Steve Hoover (STR) and Mike Beardsley (EI/GGE) observed the empty 3,900 gallon Carolina Sod water truck drive over the repair area. No pumping was observed and the area passed and is now repaired.

- October 19, 2017: Proof Roll #8 on PRL2 was conducted in the northwest area of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Chip Stewart (CSRA), Steve Hoover (STR), and Melvin Butler. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the East edge of the area and working to the West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. There was spot encountered containing a log in the center of the proof roll, approximately 2' x 4' in size, which was firm, but deflected as the log moved. All areas demonstrated a firm base without pumping. The 1' layers comprising PRL 2 in this proof roll area were track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller. This process was used for each of the four 1' lifts making the proof roll level. After the proof roll was conducted, Matt Hanson, removed the log with a D6 LGP dozer, which fixed the issue. This log removal was witnessed by Steve Hoover and Mike Beardsley.
- October 19, 2017: Proof Roll #8 on PRL1 was conducted on the northwest edge of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Chip Stewart (CSRA), Steve Hoover (STR), and Melvin Butler. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the East edge of the area and working to the West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. All areas demonstrated a firm base without pumping, with no repairs needed. This proof roll area was constructed using 1' lifts that were track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller.
- October 19, 2017: Proof Roll #9 on PRL1 was conducted in the southwest edge of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Chip Stewart (CSRA), Steve Hoover (STR), and Melvin Butler. (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the West edge of the area and working to the East. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. There was spot encountered containing a small log in the center of the proof roll. The spot was firm, but deflected as the log moved. All areas demonstrated a firm base without pumping. The ash was placed in this proof roll area in 1' lifts and track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller. After the proof roll was conducted, Matt Hanson, removed the log with a D6 LGP dozer, which fixed the issue. This log removal was witnessed by Steve Hoover and Mike Beardsley.
- November 08, 2017: Proof Roll #9 on PRL2 was conducted in the central haul road area of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Chip Stewart (CSRA), Billy West (STR), and Brandon (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in an East-West manner starting from the South and working to the North. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. All areas demonstrated a firm base without pumping, with no repairs needed. This proof roll area was constructed using 1' lifts that were track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller. Compaction was also gained due to extensive haul traffic over the area.
- November 08, 2017: Proof Roll #10 on PRL1 was conducted on a small northern square on the north side of 488-1D East. This area could not be previously tested because a pile of logs sat within this footprint. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Chip Stewart (CSRA), Billy West (STR), and Brandon (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in an East-West manner starting from the South and working to the North. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. All areas demonstrated a firm base without pumping, with no

repairs needed. This proof roll area was constructed using 1' lifts that were track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller.

- November 08, 2017: Proof Roll #11 on PRL1 was conducted in the central haul road area of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Chip Stewart (CSRA), Billy West (STR), and Brandon (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove in a North-South manner starting from the East edge of the area and working to the West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. All areas demonstrated a firm base without pumping, with no repairs needed. This proof roll area was constructed using 1' lifts that were track walked with a D6 LGP dozer, followed by two vibratory and then two static passes of an 84" roller. Compaction was also gained due to extensive haul traffic over the area.
- November 16, 2017: Proof Roll #10 on PRL2 was conducted on the southwest side of 488-1D East. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Branon Mitchell (CSRA), Billy West (STR), Bruce Belding (STR) and Brandon (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck travelled in a North-South direction working from East to West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. This entire area exhibited pumping and therefore failed. There were several ideas as to the cause of this proof roll failing. First, the upper layer of ash contained large amounts of clay, removed from the floor of 488-1D West during the final visual ash removal in the floor areas. To account for this clay, Envirocon utilized an 84" vibratory sheep's foot for compaction. The layer was first track walked with a D6 LGP dozer. Then two passes in vibratory mode of the 84" sheep's foot compactor was made. Then the area was back dragged smooth with a D6 LGP dozer. The finally, an 84" smooth drum roller made two vibratory passes on the back dragged surface. However, upon inspection of the material it didn't appear that the clay and the ash were mixed into a heterogenous blend of the two. Rather it appeared that there were clay chunks with ash particles wedge in between, creating some voids spaces. Envirocon decided the best approach to repair this lift was to remove the upper 18" and re-blend and through disk the ash and clay together with a Rome disc. It appeared that the material required an additional 6 passes in each area to get the mixture to a homogenous consistency that would firmly compact. There entire PR 10 on PRL2 area is being re-worked and will be re-tested at a later date, identified as a new Proof Roll number.
- November 28, 2017: Proof Roll #11 on PRL2 was conducted in the failed PR 10 on PRL 2 area (southwest side of 488-1D East). The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Patrick Tinnes (EI), Chip Stewart (CSRA), Bruce Belding (STR), and Brandon (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove North-South working from the East to West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. All areas demonstrated a firm base without pumping, with no repairs needed. This proof roll area was constructed using 1' lifts that were track walked with a D6 LGP dozer, followed by 4 vibratory passes of the sheep's foot roller and then two vibratory passes of an 84" roller followed by two static passes of the 84" smooth drum roller.
- November 28, 2017: Proof Roll #12 on PRL2 was conducted in northwest side of 488-1D East, due north of PR11 on PRL2. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Patrick Tinnes (EI), Chip Stewart (CSRA), Bruce Belding (STR), and Brandon (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove North-South working from the East to West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. The vast majority of the area was firm without any pumping. However, four soft failure spots were observed. The first was a 2' radius zone in the North Central area of the test area. The second was a 4'x8' area in the south-central area of the test area. The third failure spot was a 10' x 10' area in the north-central area of the test are. The fourth and

final failure spot was a 10' x 10' area on the northwest side of the test area. These areas will be repaired at a later date. The remainder of the area all passed. This proof roll area was constructed using 1' lifts that were track walked with a D6 LGP dozer, followed by 4 vibratory passes of the sheep's foot roller and then two vibratory passes of an 84" roller followed by two static passes of the 84" smooth drum roller.

- November 28, 2017: Proof Roll #1 on PRL3 was conducted in the central west side of 488-1D East, near the middle of the impoundment. The proof roll was attended by Derek Evans (SRNS), Mike Beardsley (EI/GGE), Patrick Tinnes (EI), Chip Stewart (CSRA), Bruce Belding (STR), and Brandon (EI). Empty water truck 3972 (Envirocon's) was used to conduct the test. The truck drove North-South working from the East to West. Each pass the truck "stepped" over 1 truck width such that the passenger tires then traveled in the previous path of the driver's side tires. The vast majority of the area was firm without any pumping. However, three soft failure spots were observed. The first was a 2' radius zone in the south-central area of the test area. The second was a 50'x30' area in the middle of the south side of the test area. The third and final failure spot was a 25' x 15' area in the haul road within the test area footprint. These areas will be repaired at a later date. The remainder of the area all passed. This proof roll area was constructed using 1' lifts that were track walked with a D6 LGP dozer, followed by 4 vibratory passes of the sheep's foot roller and then two vibratory passes of an 84" roller followed by two static passes of the 84" smooth drum roller.
- November 30, 2017: Repaired all failures in Proof Roll #12 on PRL2 and two of the repairs in PR#1 on PRL3. The only remaining area to repair from the proof rolls conducted on November 28th is the 50' x 30' large area. This area is still too wet and requires further dry back. For Proof Roll #12 on PRL2, 2' radius repair area, a "bar" of clay appeared to cause the pumping. It was removed and fill and compacted with ash and passed the proof roll. The ash was track walked in with a D6 LGP dozer and compacted with an 84" smooth drum roller making two passes in vibratory mode and two passes in static mode. A log was found buried in the 2' radius failure spot in PR 1 on PRL3, removal of the log repaired this spot. All other repair areas were caused due to the material being too wet. The areas in PR12 on PRL2 were removed and replaced with drier ash from a stockpile on the east side of 488-1D East. The ash was placed in two 9" lifts and track walked with a D6 LGP dozer and then compacted with an 84" smooth drum roller making two passes in vibratory mode followed by 1 pass in static mode. The failed area in the haul road of PR1 on PRL3 was due to overzealous watering associated with dust control. This area was allowed to dry and re-tested. It passed without the overwatering for dust control. The remaining 50'x30' area was windrowed ("corner bit" out) and allowed to dry further and will be re-tested at a later date.
- December 05, 2017: Repaired and re-tested the 50' x 30' failure spot in PR1 on PRL3. The material had been corner bit windrowed and allowed to dry back. The material was then spread with a D6 LGP dozer in two 9" thick lifts. The lifts were first track walked and then compacted with two vibratory followed by two static passes of an 84" smooth drum roller. There is no photo of the re-test on this square, but no pumping was observed.

Attachments:

- Proof Roll Level Definition Figure
- Cumulative Proof Roll Location Figure
- CSRA Proof Roll Reports

The proof roll tests were witnessed by Mike Beardsley, PE, in accordance with the plans and specifications.

Mike Beardsley, PE

12/13/2017

Project Engineer

488-1D Ash Basin Closure Project

(720) 838 – 7107

Mbeardsley@greenglobeinc.com

Envirocon

Proof Roll Report

Date: January 12, 2018	
Project Title: SRNS 488-1D Ash Impoundment	**Location: Jackson, SC**

488-1 East Placement Area Proof Rolls:

This report serves as a continuation of the cumulative documentation of the proof roll activities associated with the 488- 1D Ash Impoundment Project. This report is a live document that is updated as the proof rolls occur, and is thus progressively expounded and re-submitted as needed. The required proof roll inspections have been identified in Attachment A, herein and are identified as Proof Roll Levels (PRLs) 1 – 7. In short:

- PRL1: Approximate elevation 127
- PRL2: Approximate elevations 127 - 131
- PRL3: Approximate elevations 131 - 135
- PRL4: Approximate elevations 135 - 139
- PRL5: Approximate elevations 139 - 143
- PRL6: Approximate elevations 143 - 147
- PRL7: Approximate elevations 147 – 150.4

The proof rolls under Patrick Tinnes' responsible charge are summarized below:

- January 11, 2018, Proof Roll #2 of PRL3: The northeastern 1/4th of the placement area in 488-1D east was proof roll tested. This was the third 4' lift, (PRL3) with the average lift elevation ranging from 131 – 135 feet. In attendance were Derek Evans (SRNS), Bruce Belding (STR), Chip Stewart (CSRA) and Patrick Tinnes (EI). The proof roll was conducted using an empty 4,000 gallon water truck, Envirocon truck #3972. This vehicle has been used for previous proof rolls in this condition. The entire area was rolled with the truck stepping over one truck width each time, such that after the first pass, the driver's side tires traveled in the passenger's side tire tracks. The proof roll started on the west edge and worked towards the east, covering approximately 1.6 acres. The entire area passed. See sketch for further detail.

Date:	Time:	Direction of View / Location:
Wednesday, March 1, 2017	1057	East / 488-1D East

Subject:

Proof Roll #1 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Friday, March 17, 2017	1151	East / 488-1D East

Subject:

Proof Rolled Square, now passing, previously failed during PR1 on PRL1.

Date:	Time:	Direction of View / Location:
Tuesday, March 21, 2017	0807	N/A / 488-1D East

Subject:
Proof Roll #2 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Tuesday, April 11, 2017	1316	East / 488-1D East

Subject:
Proof Roll #3 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, April 20, 2017	1306	West / 488-1D East

Subject:

Carolina Sod 3,900 gallon water truck proof rolling PR1 on PRL2 and then PR4 on PRL1.

Date:	Time:	Direction of View / Location:
Thursday, April 20, 2017	1309	N/A / 488-1D East

Subject:

Proof Roll #1 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Wednesday, May 10, 2017	08:14	South / 488-1D East

Subject:
Proof Roll of repairs in PR#1 on PRL2. Areas passed.

Date:	Time:	Direction of View / Location:
Monday, May 15, 2017	10:52	West / 488-1D East

Subject:
Proof Roll #2 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Monday, May 15, 2017	16:09	West / 488-1D East

Subject:
Proof Roll on repair of PR#4 on PRL1. Area passed.

Date:	Time:	Direction of View / Location:
Wednesday, May 17, 2017	08:00	South / 488-1D East

Subject:
Proof Roll #3 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Wednesday, May 17, 2017	11:09	N/A / 488-1D East

Subject:
Proof Roll PR#5 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, June 15, 2017	09:34	South / 488-1D East

Subject:
Proof Roll PR#6 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, July 06, 2017	09:22	Northwest / 488-1D East

Subject:
Proof Roll PR#6 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Friday, July 07, 2017	16:17	North / 488-1D East

Subject:
Proof Roll on Repairs in PR#6 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Monday, July 10, 2017	10:57	N/A / 488-1D East

Subject:
Proof Roll on Repair in PR#6 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, July 27, 2017	08:02	North / 488-1D East

Subject:
Proof Roll PR#7 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Wednesday, August 16, 2017	11:15	South / 488-1D East

Subject:
Proof Roll #7 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Thursday, August 17, 2017	11:19	N/A / 488-1D East

Subject:
Proof Roll of Repair in PR#7 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Thursday, October 19, 2017	09:44	Northeast / 488-1D East

Subject:
Proof Roll #8 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Thursday, October 19, 2017	12:03	Southeast / 488-1D East

Subject:
Proof Roll of Repair in PR#8 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, October 19, 2017	12:22	North / 488-1D East

Subject:
Proof Roll #9 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Thursday, October 19, 2017	15:58	N/A / 488-1D East

Subject:
Log removed and repair made to PR8 on PRL2.

Date:	Time:	Direction of View / Location:
Thursday, October 19, 2017	16:01	N/A / 488-1D East

Subject:

Log removed and repair made to PR9 on PRL1.

Date:	Time:	Direction of View / Location:
Wednesday, November 08, 2017	14:14	West / 488-1D East

Subject:

Proof Roll #10 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Wednesday, November 8, 2017	14:48	South / 488-1D East

Subject:
Proof Roll #11 on PRL1 underway.

Date:	Time:	Direction of View / Location:
Wednesday, November 08, 2017	14:27	West / 488-1D East

Subject:
Proof Roll #9 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Thursday, November 16, 2017	15:33	Southeast / 488-1D East

Subject:

Proof Roll #10 on PRL2 underway. This entire area was soft and pumping and the proof roll was failed. It was re-worked and re-tested as PR11 on PRL2.

Date:	Time:	Direction of View / Location:
Tuesday, November 28, 2017	10:44	South / 488-1D East

Subject:

Proof Roll #11 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Tuesday, November 28, 2017	12:22	South / 488-1D East

Subject:
Proof Roll #12 on PRL2 underway.

Date:	Time:	Direction of View / Location:
Tuesday, November 28, 2017	14:03	North / 488-1D East

Subject:
Proof Roll #1 on PRL3 underway.

Date:	Time:	Direction of View / Location:
Thursday, November 30, 2017	08:46	N/A / 488-1D East

Subject:

Proof Roll #12 on PRL2 2' radius repair area. This "bar" of clay appeared to cause the pumping.

Date:	Time:	Direction of View / Location:
Thursday, November 30, 2017	14:19	N/A / 488-1D East

Subject:

Repair area in Proof Roll #12 on PRL2. Repair passed

Date:	Time:	Direction of View / Location:
Thursday, November 30, 2017	08:46	N/A / 488-1D East

Subject:

Proof Roll #1 on PRL3 2’ radius repair area. This log appeared to cause the pumping.

Date:	Time:	Direction of View / Location:
Thursday, November 30, 2017	14:19	N/A / 488-1D East

Subject:

Repair area in Proof Roll #12 on PRL2. Repair passed

Date:	Time:	Direction of View / Location:
Thursday, November 30, 2017	08:49	Southwest / 488-1D East

Subject:

Proof Roll #12 on PRL2: Wet ash removed to 18" and replaced with dry ash in failed areas.

Date:	Time:	Direction of View / Location:
Thursday, November 30, 2017	08:53	Northwest / 488-1D East

Subject:

Repair area in Proof Roll #12 on PRL2. Dry ash being placed and compacted in 9" lifts in repair area

Date:	Time:	Direction of View / Location:
Thursday, November 30, 2017	14:31	East / 488-1D East

Subject:

Proof Roll #1 on PRL3: Soft spot in the haul road passed proof roll after dry back from excessive dust control watering.

Envirocon

Proof Roll Report

Date:	Time:	Direction of View / Location:
Thursday, January 11, 2018	10:41	West / 488-1D East

Subject:

Proof Roll #2 on PRL3 underway.

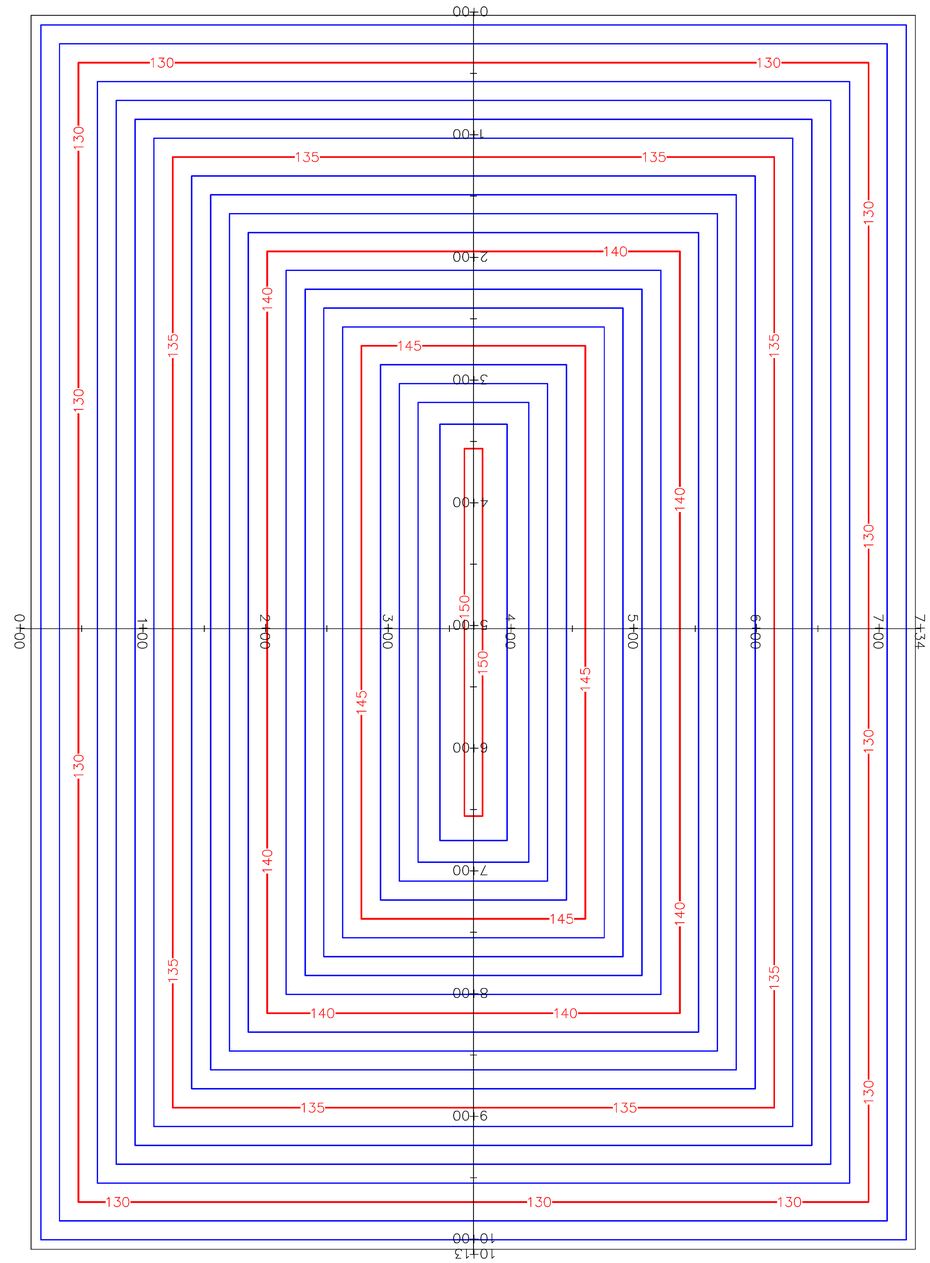
Date:	Time:	Direction of View / Location:
Thursday, January 11, 2018	11:48	Southeast / 488-1D East

Subject:

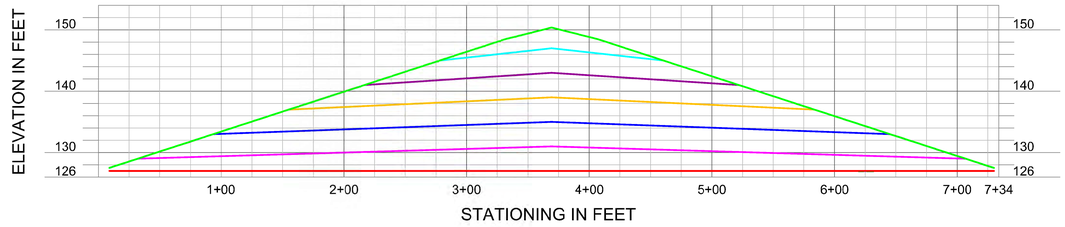
Proof Roll Continues on PRL3 in NE area of 488-1D east

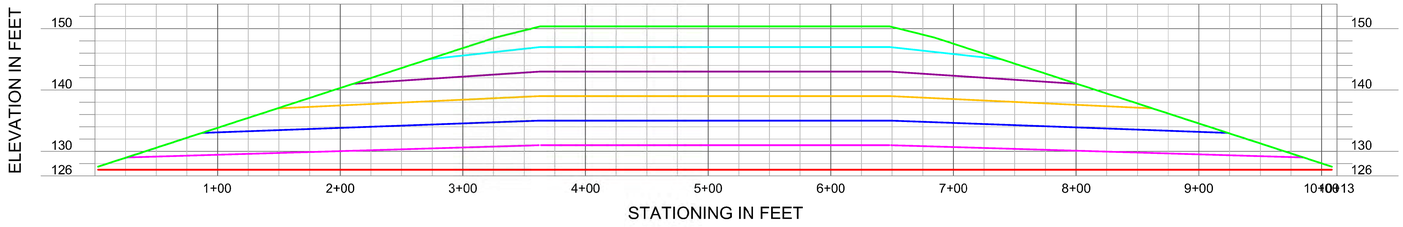
PROOF ROLL LEVEL DEFINITIONS

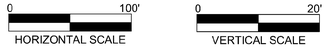
PLAN VIEW



PROFILE VIEW

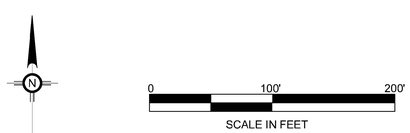






LEGEND:

- Top of Proof Roll Level 1 (EL = 127)
- Top of Proof Roll Level 2
- Top of Proof Roll Level 3
- Top of Proof Roll Level 4
- Top of Proof Roll Level 5
- Top of Proof Roll Level 6
- Top of Proof Roll Level 7 (Ash FG)
- Ash FG Contour Major (5')
- Ash FG Contour Minor (1')



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Attn: Don Baston, Nicanor Aguilar, Steve Hoover

Figure #: 01	488-1D East Ash Placement Proof Roll Levels
Date: 03/29/2017	
Revision #: 01	
Drawn By: GGE	
Approved By: EI	
Project #: 1495402	488-1D Ash Basin Closure

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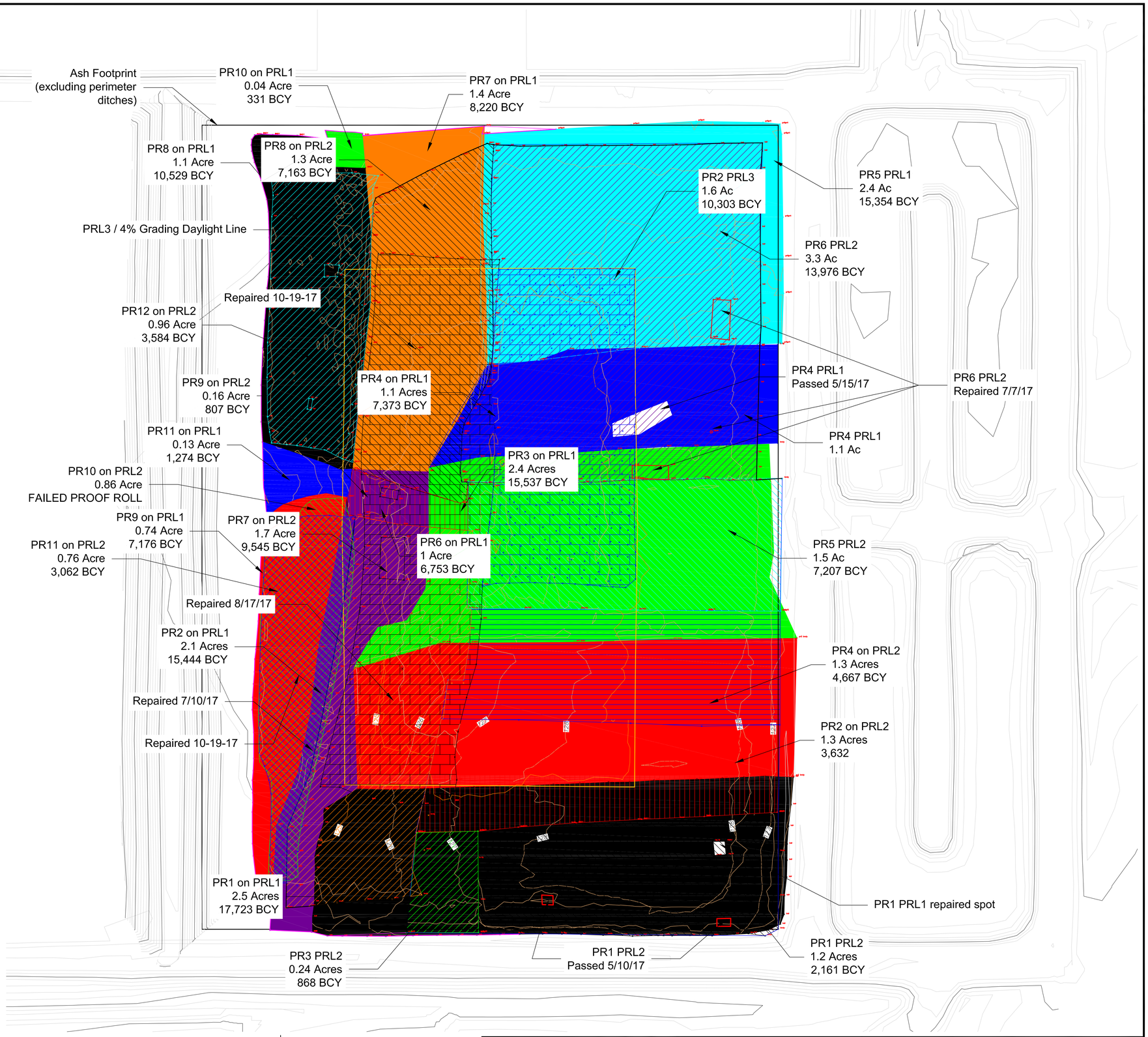
PROOF ROLL LOCATIONS

LEGEND:
- Original Ground Contour Major (5')
- Original Ground Contour Minor (1')
- Proof Roll Grade Contour Major (5')
- Proof Roll Grade Contour Minor (1')



NOTES:
1) PR1 on PRL1 conducted on 03-01-2017 with 3,900 gallon water truck.
2) PR 1 on PRL1 Failed Area passed on Proof Roll on 03-21-2017.
3) PR 2 on PRL1 conducted on 03-21-2017 with 3,900 gallon water truck.
4) PR3 on PRL1 conducted on 04-11-2017 with 3,900 gallon water truck.
5) PR 4 on PRL1 conducted on 04-20-2017 with 3,900 gallon water truck.
6) PR1 on PRL2 conducted on 04-20-2017 with 3,900 gallon water truck.
7) Repairs on PR1 on PRL2 passed on 05-10-17 with 3,900 gallon water truck.
8) PR2 on PRL2 conducted on 05-15-17 with 3,900 gallon water truck.
9) Repairs on PR4 PRL1 passed on 05-15-17 with 3,900 gallon water truck.
10) PR3 and PR4 on PRL2 conducted on 05-17-2017 with 3,900 gallon water truck.
11) PR5 on PRL1 conducted on 05-17-2017 with 3,900 gallon water truck.
12) PR5 on PRL2 conducted on 06-12-2017 with 3,900 gallon water truck.
13) PR6 on PRL1 conducted on 06-15-2017 with 3,900 gallon water truck.
14) PR6 on PRL2 conducted on 07-06-2017 with 3,900 gallon water truck.
15) Repairs on PR6 on PRL2 passed on 07-07-17 with 3,900 gallon water truck.
16) Repair on PR6 on PRL1 passed on 07-10-17 with 3,900 gallon water truck.
17) PR7 on PRL1 conducted on 07-27-17 with 3,900 gallon water truck.
18) PR7 on PRL2 conducted on 08-16-17 with 3,900 gallon water truck.
19) Repair on PR7 on PRL2 passes on 08-17-17 with 3,900 gallon water truck.
20) PR8 on PRL2 conducted on 10-19-17 with 3,900 gallon water truck.
21) PR8 on PRL1 conducted on 10-19-17 with 3,900 gallon water truck.
22) PR9 on PRL1 conducted on 10-19-17 with 3,900 gallon water truck.
23) Repairs on PR8 on PRL2 and PR9 on PRL1 conducted and passed on 10-19-17.
24) PR9 on PRL2 conducted on 11-08-17 with 3,900 gallon water truck.
25) PR10 on PRL1 conducted on 11-08-17 with 3,900 gallon water truck.
26) PR11 on PRL1 conducted on 11-08-17 with 3,900 gallon water truck.
27) PR10 on PRL2 conducted on 11-16-17 with 3,900 gallon water truck. FAILED. Area will be re-worked and then re-tested at a future date.
28) No proof rolls above PRL2 required outside the PRL3 / 4% Slope Daylight Line.
29) PR11 on PRL2 conducted on 11-28-17 with 3,900 gallon water truck.
30) PR12 on PRL2 conducted on 11-28-17 with 3,900 gallon water truck.
31) PR1 on PRL3 conducted on 11-28-17 with 3,900 gallon water truck.
32) Repairs on PR12 on PRL2 passed on 11-30-17 with 3,900 gallon water truck.
33) Repair on PR1 on PRL3 passed on 12-05-17 with 3,900 gallon water truck.
34) PR2 on PRL3 conducted on 01-11-18 with 3,900 gallon water truck.

N

0 100' 200'
SCALE IN FEET

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Attn: Don Baston, Drew Murphy, Billy West

Figure #: 01	Cumulative Proof Roll Figure 488-1D East
Date: 01/12/18	
Revision #: 0	
Drawn By: WEL	
Approved By: EI	
Project #: 1495402	488-1D Ash Basin Closure

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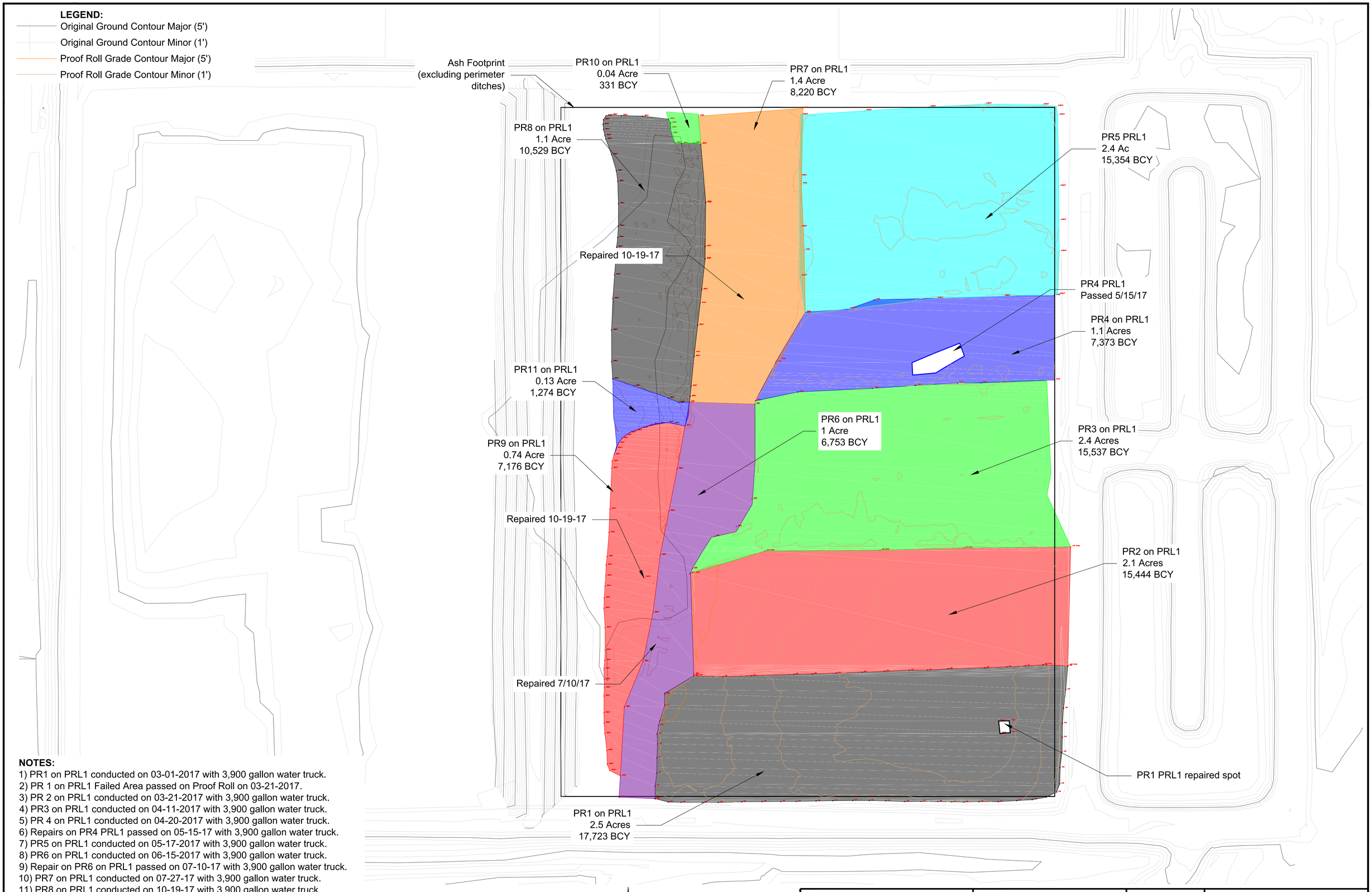
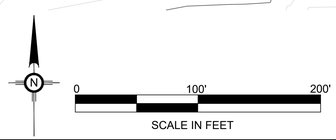
LEGEND:
- Original Ground Contour Major (5')
- Original Ground Contour Minor (1')
- Proof Roll Grade Contour Major (5')
- Proof Roll Grade Contour Minor (1')



NOTES:
1) PR1 on PRL1 conducted on 03-01-2017 with 3,900 gallon water truck.
2) PR 1 on PRL1 Failed Area passed on Proof Roll on 03-21-2017.
3) PR 2 on PRL1 conducted on 03-21-2017 with 3,900 gallon water truck.
4) PR3 on PRL1 conducted on 04-11-2017 with 3,900 gallon water truck.
5) PR 4 on PRL1 conducted on 04-20-2017 with 3,900 gallon water truck.
6) Repairs on PR4 PRL1 passed on 05-15-17 with 3,900 gallon water truck.
7) PR5 on PRL1 conducted on 05-17-2017 with 3,900 gallon water truck.
8) PR6 on PRL1 conducted on 06-15-2017 with 3,900 gallon water truck.
9) Repair on PR6 on PRL1 passed on 07-10-17 with 3,900 gallon water truck.
10) PR7 on PRL1 conducted on 07-27-17 with 3,900 gallon water truck.
11) PR8 on PRL1 conducted on 10-19-17 with 3,900 gallon water truck.
12) PR9 on PRL1 conducted on 10-19-17 with 3,900 gallon water truck.
13) Repairs on PR9 on PRL1 conducted and passed on 10-19-17.
14) PR10 on PRL1 conducted on 11-08-17 with 3,900 gallon water truck.
15) PR11 on PRL1 conducted on 11-08-17 with 3,900 gallon water truck.



Prepared By:
Envirocon
1999 Broadway
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Denver, CO 80203

Prepared For:
Savannah River Nuclear Solutions, LLC
Document Control Center, Bldg. 704-1N
SRNS Subcontract No: 0000258194
Aiken, SC 29808
Attn: Don Baston, Drew Murphy, Billy West

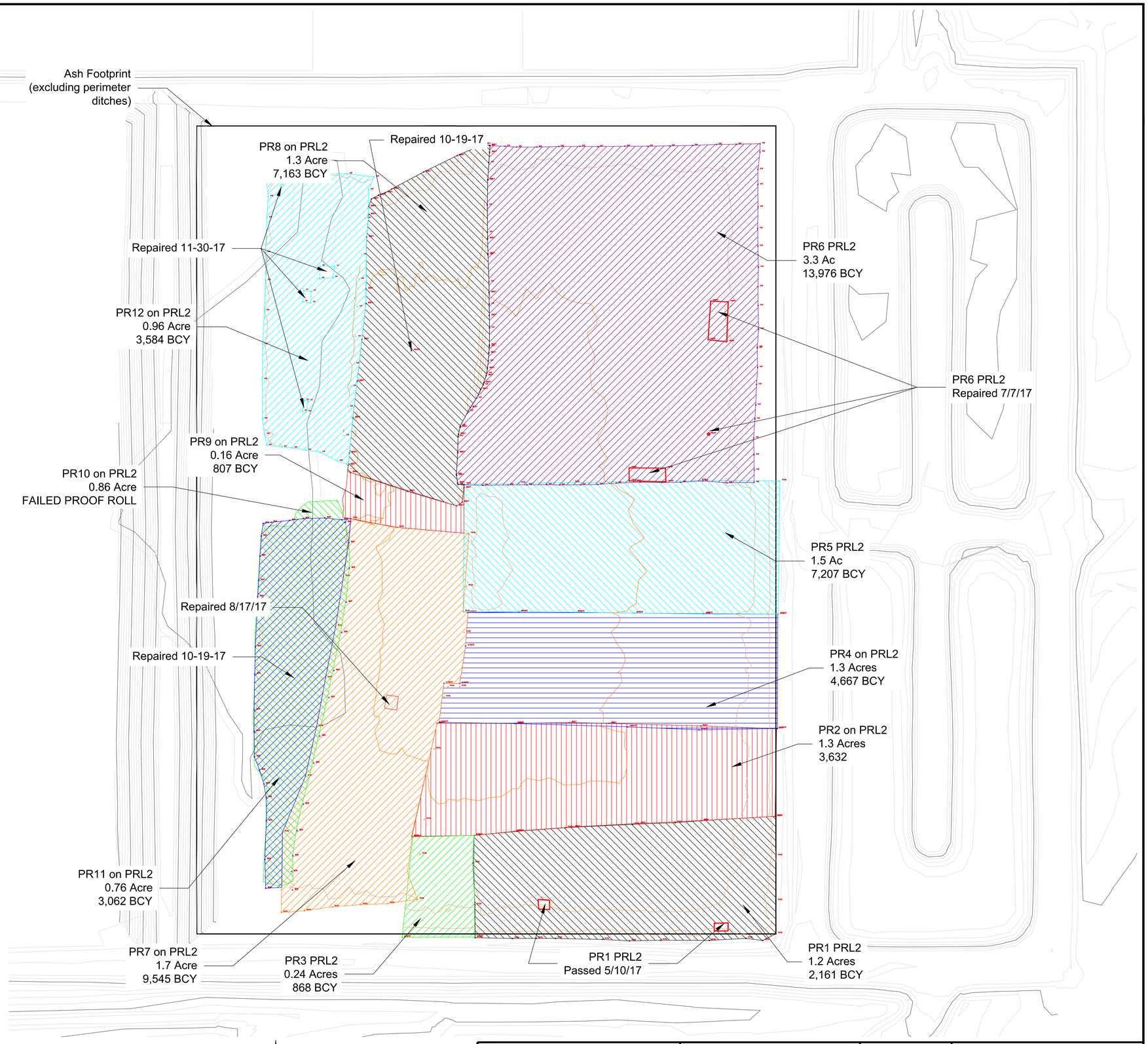
Figure #: 03	
Date: 11/17/17	
Revision #: 0	
Drawn By: GGE	
Approved By: EI	
Project #: 1495402	

PRL0 Proof Roll Figure
488-1D East

488-1D Ash Basin Closure

E:\GGE\PROJECT DATA\ENVIROCON\SRNS POND 1D\PE FILES\488-1D PROOF ROLLS\CUMMULATIVE PROOF ROLLS.DWG

LEGEND:
- Original Ground Contour Major (5')
- Original Ground Contour Minor (1')
- Proof Roll Grade Contour Major (5')
- Proof Roll Grade Contour Minor (1')



NOTES:
1) PR1 on PRL2 conducted on 04-20-2017 with 3,900 gallon water truck.
2) Repairs on PR1 on PRL2 passed on 05-10-17 with 3,900 gallon water truck.
3) PR2 on PRL2 conducted on 05-15-17 with 3,900 gallon water truck.
4) PR3 and PR4 on PRL2 conducted on 05-17-2017 with 3,900 gallon water truck.
5) PR5 on PRL2 conducted on 06-12-2017 with 3,900 gallon water truck.
6) PR6 on PRL2 conducted on 07-06-2017 with 3,900 gallon water truck.
7) Repairs on PR6 on PRL2 passed on 07-07-17 with 3,900 gallon water truck.
8) PR7 on PRL2 conducted on 08-16-17 with 3,900 gallon water truck.
9) Repair on PR7 on PRL2 passes on 08-17-17 with 3,900 gallon water truck.
10) PR8 on PRL2 conducted on 10-19-17 with 3,900 gallon water truck.
11) Repair on PR8 on PRL2 conducted and passed on 10-19-17.
12) PR9 on PRL2 conducted on 11-08-17 with 3,900 gallon water truck.
13) PR10 on PRL2 conducted on 11-16-17 with 3,900 gallon water truck. FAILED. Area will be re-worked and then re-tested at a future date.
14) PR11 and PR12 on PRL2 conducted on 11-28-2017 with 3,900 gallon water truck.
15) Repairs on PR12 on PRL12 passed on 11-30-2017 with 3,900 gallon water truck.

N

0 100' 200'
SCALE IN FEET

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Figure #:	04
Date:	12/13/17
Revision #:	0
Drawn By:	GGE
Approved By:	EI
Project #:	1495402

PRL2 Proof Roll Figure
488-1D East

488-1D Ash Basin Closure

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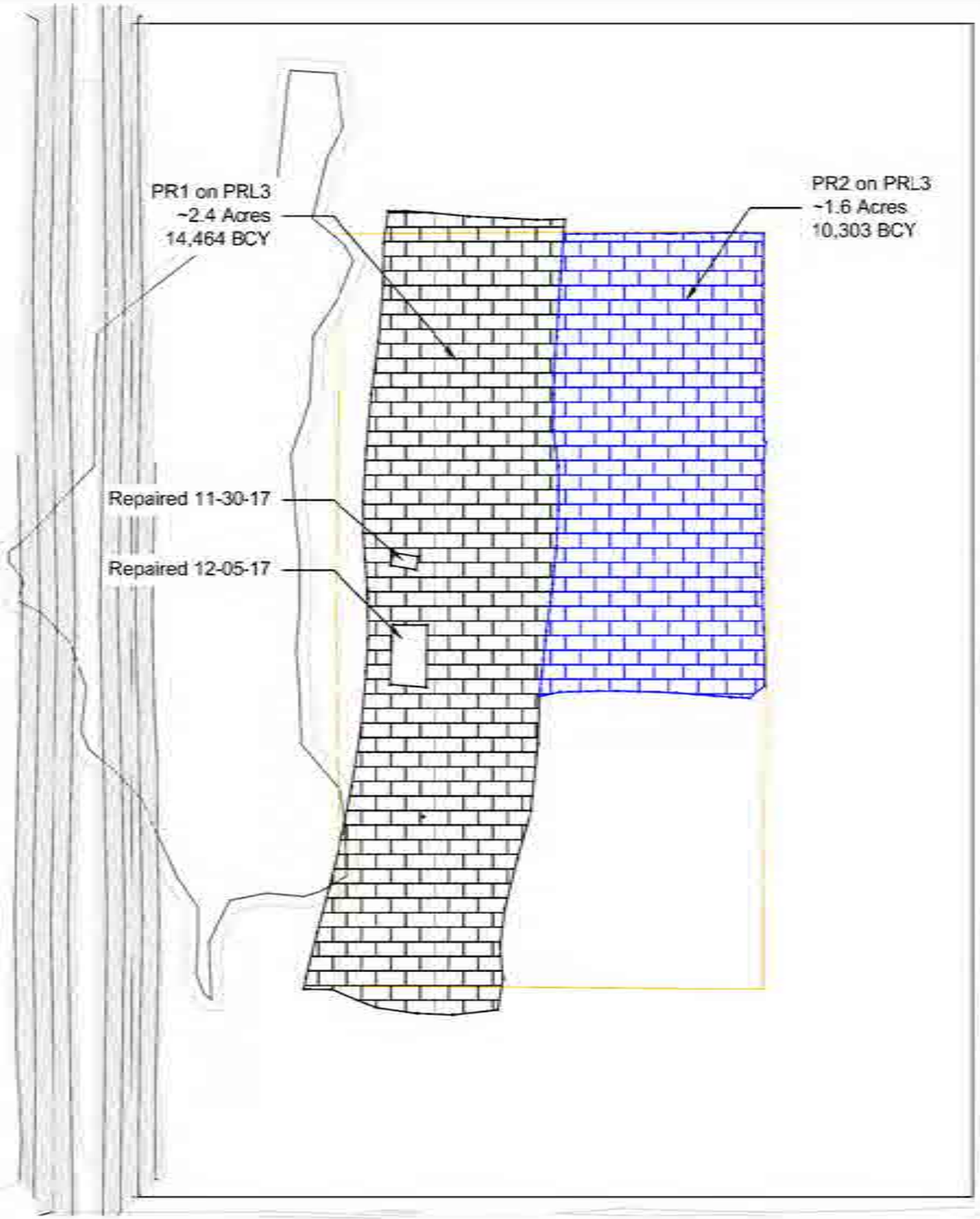
LEGEND:
- Original Ground Contour Major (5')
- Original Ground Contour Minor (1')
- Proof Roll Grade Contour Major (5')
- Proof Roll Grade Contour Minor (1')



NOTES:
1) PR1 on PRL3 conducted on 11-28-17 with 3,900 gallon water truck.
2) Repair on PR1 on PRL3 passed on 11-30-17 with 3,900 gallon water truck.
3) Repair on PR1 on PRL3 passed on 12-05-17 with 3,900 gallon water truck.
4) PR2 on PRL3 conducted on 01-11-18 with 3,900 gallon water truck.

0 80' 160'
SCALE IN FEET

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Figure #: 01	
Date: 01/22/18	
Revision #: 0	
Drawn By: WEL	
Approved By: EI	
Project #: 1495402	

Cumulative Proof Roll Figure
488-1D East

488-1D Ash Basin Closure

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CSRA PROOF ROLL INSPECTION REPORTS

csra TESTING AND ENGINEERING CO., INC.

1005 Emmett St., Suite A
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(706) 733-6960
Fax (706) 737-0629

CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T16-H95

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	As requested by client, technician observed an empty water truck proofroll the southeast section of Area 1 at elevations between 127.00 to 129.00. Area observed appeared to be firm and stable at this time.

TOTAL TIME:	3.0 hours		
DATE:	March 1, 2017	TECHNICIAN:	Chris Lowry

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-L66

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed a empty water truck (truck no. 3972) proofroll the two (2) acres of north and adjoining proofroll 1 area. All areas appeared to be firm and stable at this time. (Note: This is the second proofroll for this area; elevation 127-129.)

TOTAL TIME:	4.0 hours		
DATE:	March 21, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-P35

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck (truck no. 3972) proofroll #3 on PRL1. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	April 11, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Q67

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll inspection
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck proofroll #1 on PRL2. All areas appeared to be firm and stable at this time with the exception of an area measuring 10' x 10' in two (2) separate areas. A proofroll was also observed for #4 on PRL1. All areas appeared to be firm and stable with the exception of an area measuring 10' x 30'. In both cases, contractor will scarify areas and allow to dry before re-compacting. Further observation for these isolated areas should resume when areas are firm and stable.

TOTAL TIME:	5.0 hours		
DATE:	April 20, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-U51

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#2 (proofroll #2). All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	May 15, 2017	TECHNICIAN:	Britt Baynham

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-U78SI

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty tandem axle water truck proofroll three (3) areas at PR-3 on PRL-2, PR-5 on PRL-1, and PR-4 on PRL-2. All areas were firm and stable at this time. Technician also performed fifteen (15) field density tests. Please see report T17-U78FD for test results and locations.

DATE:	May 17, 2017	TECHNICIAN:	David Turner

David Turner
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Y24

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#2 proofroll #5. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	June 12, 2017	TECHNICIAN:	David Turner

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-Y95

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL#1 proofroll #6. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	June 15, 2017	TECHNICIAN:	David Turner

David Turner DET
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-BB12

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL #6 at elevation PRL #2. Material was firm and stable with the exception of two (2) areas: 1) location east side approximately 30' x 60' to a depth of 12 inches was saturated; 2) location on south side approximately 30' x 60' to a depth of 12 inches was saturated. Technician suggested to remove saturated material and allow areas to dry before replacing.

TOTAL TIME:	4.0 hours		
DATE:	July 6, 2017	TECHNICIAN:	Branon Mitchell

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-EE70

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck proofroll location PRL1-Proofroll #7. All areas were firm and stable with no signs of pumping. Technician also picked up soil sampled for modified proctor test (N1B-sample 1).

TOTAL TIME:	4.0 hours		
DATE:	July 27, 2017	TECHNICIAN:	Branon Mitchell

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Hot	REPORT NO:	T17-FF97

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an empty water truck proofroll location PRL2-Proofroll #7. All areas were firm and stable with no signs of pumping with the exception of a 15' x 15' area (area marked on site map provided by client).

TOTAL TIME:	4.0 hours		
DATE:	August 16, 2017	TECHNICIAN:	Branon Mitchell

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Mild	REPORT NO:	T17-QQ67

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed a empty water truck proofroll locations PR8 on PRL2, PR8 on PRL1, and PR9 on PRL1. All areas appeared to be firm and stable at the time of observation, with the exception of a 2' x 4' area on PR8 on PRL2 (stump to be removed). Proofroll was also observed by Derek Evans, Steve Hoover, and Mike Beardsley.

TOTAL TIME:	6.0 hours		
DATE:	October 19, 2017	TECHNICIAN:	Chip Stewart

Chip Stewart
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Overcast and Cool	REPORT NO:	T17-TT72

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed a an empty water truck proofroll three (3) areas. Proofroll #1 was performed on PR10 PRL1. Proofroll #2 was performed on PR9 PRL2. Proofroll #3 was performed on PR11 PRL1. All areas appeared to be firm and stable at this time.

TOTAL TIME:	4.0 hours		
DATE:	November 8, 2017	TECHNICIAN:	Chip Stewart

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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CONSTRUCTION TESTING/INSPECTION REPORT

CLIENT:	Envirocon, Inc.	ADDRESS:	Missoula, MT
PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Overcast and Cool	REPORT NO:	T17-UU67

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed a an empty water truck proofroll at locations PR-10 and PRL-2. Pumping was observed in several areas.

TOTAL TIME:	4.0 hours		
DATE:	November 16, 2017	TECHNICIAN:	Branon Mitchell

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Sunny and Cool	REPORT NO:	T17-WW52

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed a a water truck (truck #3972) proofroll at locations PR11/PRL2, PR12/PRL2, and PR1/PRL3. Most areas appeared to be firm and stable at time of observation with the exception of PR12/PRL2: in the north center (2' radius), south central (4' x 8'), northwest side (10' x 10'), another area in north center (10' x 10'); and in PR1/PRL3: middle south side of pad (50' x 30') and in the haul area (25' x 15'). Technician suggested to excavate to firm and stable material and allow saturated material to dry. If time is a factor, replace with a drier, more suitable material.

TOTAL TIME:	8.0 hours		
DATE:	November 28, 2017	TECHNICIAN:	Chip Stewart

Chip Stewart
SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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PROJECT:	488-1D Ash Basin & 489-D CPRB Closure C-SPP-D-00002	LOCATION:	Savannah River Site Aiken County, SC
SRNS PO#:	258194		
WEATHER:	Overcast and Cool	REPORT NO:	T18-B33

WORK IN PROGRESS:	See General Comments
TEST PERFORMED AND RESULTS:	Proofroll observation
INSTRUCTIONS RECEIVED:	Technician on site
GENERAL COMMENTS:	Technician arrived on site as requested by client. Technician observed an unloaded tandem water truck proofroll PRL2/PRL3 (truck #3972). All areas appear to be firm and stable at time of observation. Please see attached map for locations.

TOTAL TIME:	3.0 hours		
DATE:	January 11, 2018	TECHNICIAN:	Chip Stewart

SIGNATURE

1 cc: Envirocon, Inc.; Tripp Winfree (via email)
1 cc: Green Globe, Inc.; Michael Beardsley (via email)

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