

ReUse Technology, Inc.

Fac/Perm/Co ID #	Date	Doc ID#
CCB0019	9/16/11	DIN 15170

390-D BARRETT PARKWAY/SUITE 187

KENNESAW, GEORGIA 30144

TELEPHONE (404) 924-0453

April 19, 1989

Mr. William L. Meyer, Chief
Solid Waste Management Section
P.O. Box 2091
Raleigh, North Carolina 27602-2091

Dear Mr. Meyer

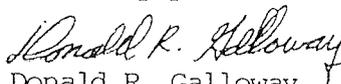
In reference to my conversation with Jim Coffey of your staff, I wish to inform your office of our intent to utilize coal ash by-products in the Phase I site development of the Fountain Industrial Park, Edgecombe County, North Carolina. In cooperation with the Edgecombe County Development Corporation we propose the use of coal ash as structural fill in the development of a 13± acre tract (lot #1, see enclosed information). The coal ash to be used in the initial development of Phase I will be obtained from existing Cogentrix's fossil plants; and coal ash to be used in the development of Phase II will be obtained from Cogentrix's Rocky Mount Plant when it becomes operational in 1990. The coal ash will also be used for the roadbed base, pipe bedding material and aesthetic landscaping filler medium. All ash will be conditioned to 15% moisture and loaded into tarped dump trucks for transportation to the site, placed and compacted to meet specifications for specific applications. To facilitate compaction of the material during construction the moisture of the ash will be adjusted at the site using a water wagon. All coal ash structural fill within the development area will be capped with a minimum 6 inch earth cover; the slopes will receive 12 inch minimum compacted earth and 6 inches topsoil. Site development will be in accordance with an approved erosion control plan. Diversion ditches and positive gradient drainage control will be adhered to at all times. All fill and disturbed areas will be soil conditioned, seeded and mulched as required to establish vegetation.

This planned use of coal ash is consistent with the Asheville, Charlotte and Leland projects recently approved by the Division of Environmental Management, Solid and Hazardous Waste Management Branch, Environmental Health Section, State of North Carolina.

Please be advised that Edgecombe County has funded the access road project and construction is to begin July 1, 1989 (see attached drawings). Also enclosed is the soil investigation data for the park project.

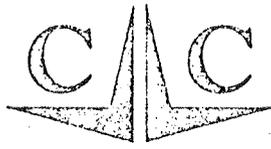
Your early review of using coal ash for this project would be greatly appreciated. We will be glad to furnish any additional information upon request.

Sincerely yours,


Donald R. Galloway
Lead Civil Engineer

Enclosures

cc: Mr. Arthur Mouberry



CENTRAL VIRGINIA
LABORATORIES & CONSULTANTS

Water and Wastewater
Sampling and Analysis



December 7, 1987

Cogentrix
2 Parkway Plaza, Suite 290
Charlotte, NC 28217

Attention: Bill Campbell

Subject: Sample received 12-1-87 for Method 1310 Extraction
Procedure (EP) Toxicity Method

Sample Identification: Roxboro CVLC #1026

Sample Weight..... 101.09 grams
Initial pH..... 6.64
0.5N Acetic Acid added. 5.0 ml
Final pH..... 4.19

<u>Parameter</u>	<u>Results</u>	<u>Limits</u>
Arsenic.....	<0.001 ppm	5.0 ppm
Barium.....	<1.0 ppm	100.0 ppm
Cadmium.....	<0.05 ppm	1.0 ppm
Chromium.....	<0.05 ppm	5.0 ppm
Lead.....	<0.200 ppm	5.0 ppm
Mercury.....	<0.002 ppm	0.2 ppm
Selenium.....	<0.001 ppm	1.0 ppm
Silver.....	<0.05 ppm	5.0 ppm

Sincerely,

Janet I. Molek
Laboratory Manager



Gould Energy 30 Clairmont Avenue, Thornwood, New York 10594 914/769 7200
 Warner Laboratories Division Goltzin Road, P.O. Box 214, Cresson, Pennsylvania 16630 814/836 7400
 Warner Laboratories of West Virginia Division Route 50 East, P.O. Box 98, Cramerton, West Virginia 26720 304/693 7613
 Fuel Engineering Division 30 Clairmont Avenue, Thornwood, New York 10594 914/769 7200
 St. Louis Energy Division 11591 Page Service Drive, St. Louis, Missouri 63146 314/132 0414
 Weighing and Control Services, Inc. P.O. Box 1483, Brandon, Florida 33511 813/681 5733

Sample Identification:

Date: 02-12-88

Fly Ash Sample
01-22-88

Laboratory Report No.: 398487

Date Received: 01-26-88

Purchase Order No.:

Cogentrix Leasing Corp.

Date Sampled:

P.O. Box 1063

Lumberton, NC

Sampled by: Customer

28359

Attention: Mr. Baker Wilson

ID01778

Silicon Dioxide	46.74%
Aluminum Oxide	27.47%
Iron Oxide	13.96%
Titanium Dioxide	1.61%
Calcium Oxide	1.76%
Magnesium Oxide	0.75%
Sodium Oxide	0.51%
Potassium Oxide	0.78%
Phosphorus Pentoxide	1.76%
Sulfur Trioxide	0.25%
Loss On Ignition	%

Russell



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AMERICAN SOCIETY OF TESTING AND MATERIALS

energy

Energy 30 Clarmont Avenue, Thornwood, New York 10594 914/769-7900
Warner Laboratories Division Gallitzin Road, P.O. Box 214, Crosson, Pennsylvania 16630 814/886-7400
Warner Laboratories of West Virginia Division Route 50 East, P.O. Box 98, Gorman, West Virginia 26720 304/693-7613
Fuel Engineering Division 30 Clarmont Avenue, Thornwood, New York 10594 914/769-7900
St. Louis Energy Division 11521 Page Service Drive, St. Louis, Missouri 63146 314/432-0114
Weighing and Control Services, Inc. P.O. Box 1483, Brandon, Florida 33511 813/681-5733

Sample Identification:

F.A.-01-11
B- BAB HOUSE

Date: 03-25-88

Laboratory Report No.: 400065

Date Received: 3-23-88

Purchase Order No.:

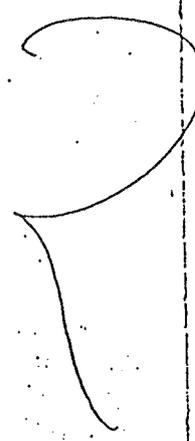
Date Sampled: 3-17-88

Sampled by: Customer

	% As Recd	% Dry
Moisture	0.30	
Ash	23.24	23.30
Volatile		
Fixed Carbon		
Sulfur	0.47	0.47
Btu/lb.	10078	10108



carbon 72%



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Gould Energy 30 Clairmont Avenue, Thornwood, New York 10594 914/762 7001
 Warner Laboratories Division Collins Road, P.O. Box 214, Crosson, Pennsylvania 16630 814/396 2400
 Warner Laboratories of West Virginia Division Route 501 East, P.O. Box 28, Germantown, West Virginia 26420 204/623 7613
 Fuel Engineering Division 30 Clairmont Avenue, Thornwood, New York 10594 914/762 7001
 St. Louis Energy Division 11591 Page Service Drive, St. Louis, Missouri 63146 314/432 0414
 Weighing and Control Services, Inc. P.O. Box 1483, Bonifay, Florida 33511 813/681 5733

Sample Identification:

F.A. 01-11
 A-BAG HOUSE

Date: 03-25-88

Laboratory Report No.: 400068

Date Received: 3-23-88

Purchase Order No.:

Date Sampled: 3-17-88

Sampled by: Customer

	% As Recd	% Dry
Moisture	0.20	
Ash	33.54	33.61
Volatile		
Fixed Carbon		
Sulfur	0.45	0.45
Btu/lb.	8627	8645

Carbon 16%



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 OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING
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REPORT OF: MOISTURE-DENSITY RELATIONSHIP

Project: PHYSICAL TESTS OF STOKER BOILER ASH

Date: 4/11/89

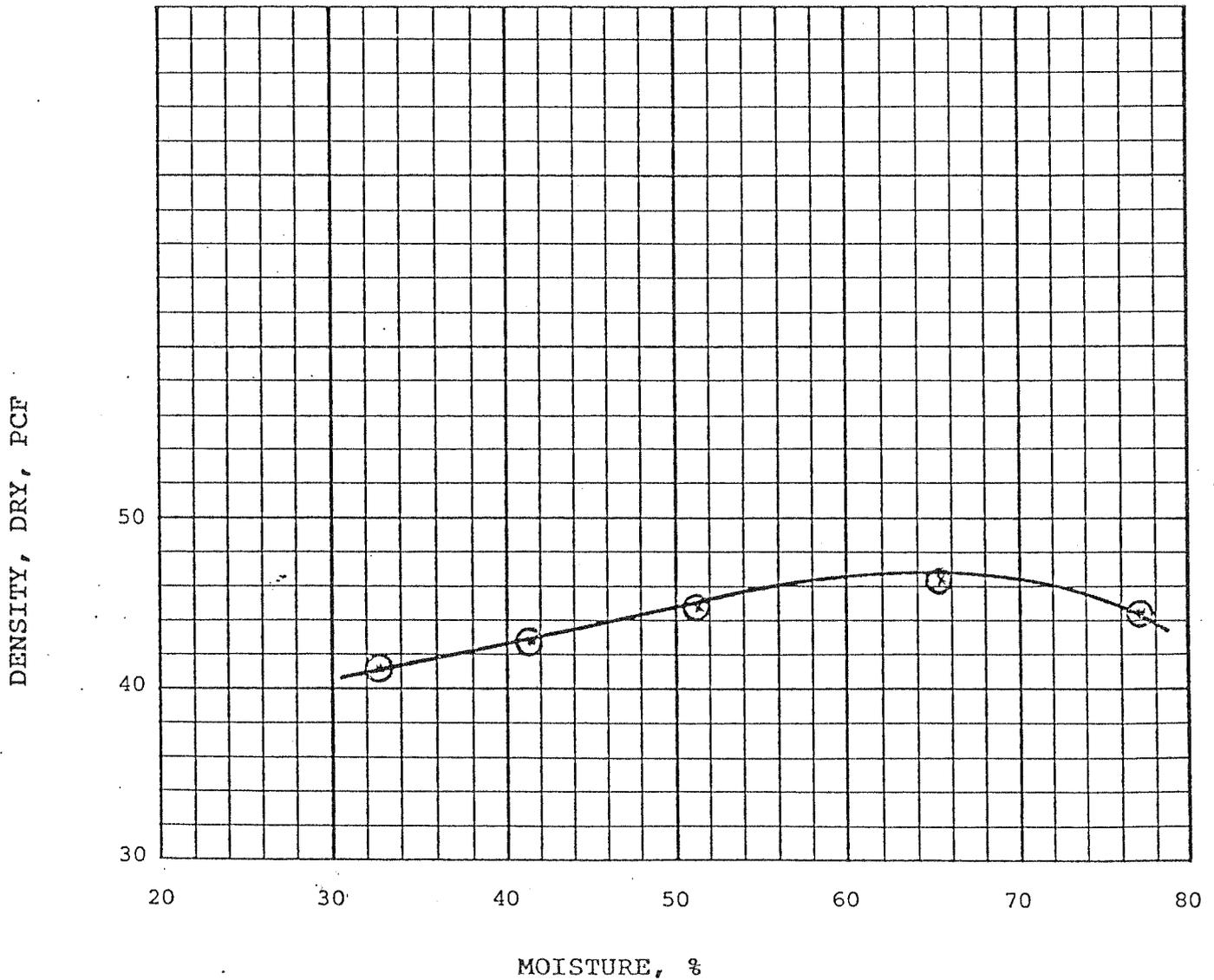
Client: ReUse Technology, Inc.

Job No.: 32-92063

TEST: ASTM D-698, Method A.

MATERIAL: Flyash

MAXIMUM DRY DENSITY: 46.8 pcf at Optimum Moisture of 65.0%.



REPORT OF: MOISTURE-DENSITY RELATIONSHIP

Project: PHYSICAL TESTS OF STOKER BOILER ASH

Date: 4/11/89

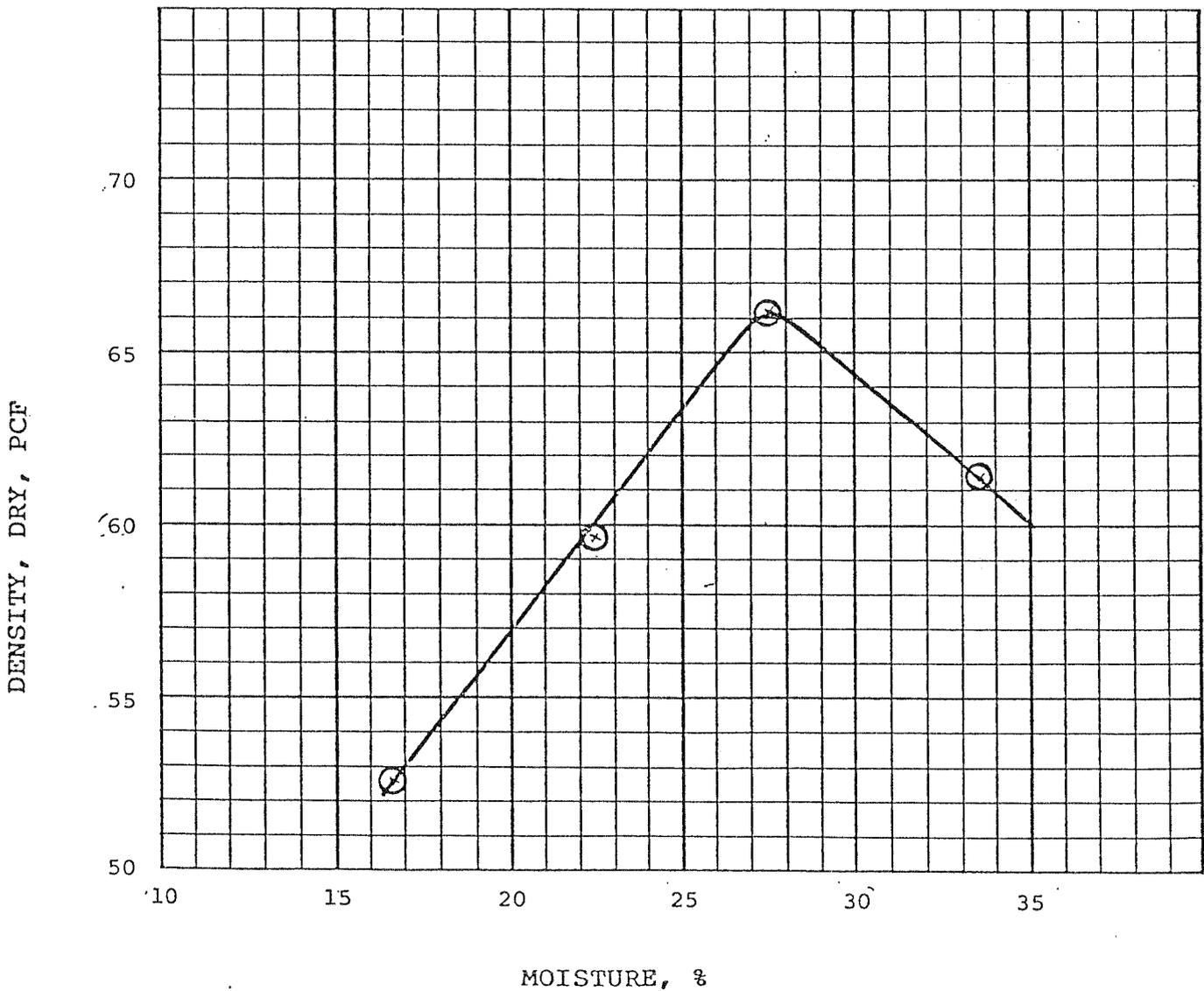
Client: ReUse Technology, Inc.

Job No.: 32-92063

TEST: ASTM D-698, Method A.

MATERIAL: Bottom Ash.

MAXIMUM DRY DENSITY: 66.1 pcf at Optimum Moisture of 27.5%.



REPORT OF: MOISTURE-DENSITY RELATIONSHIP

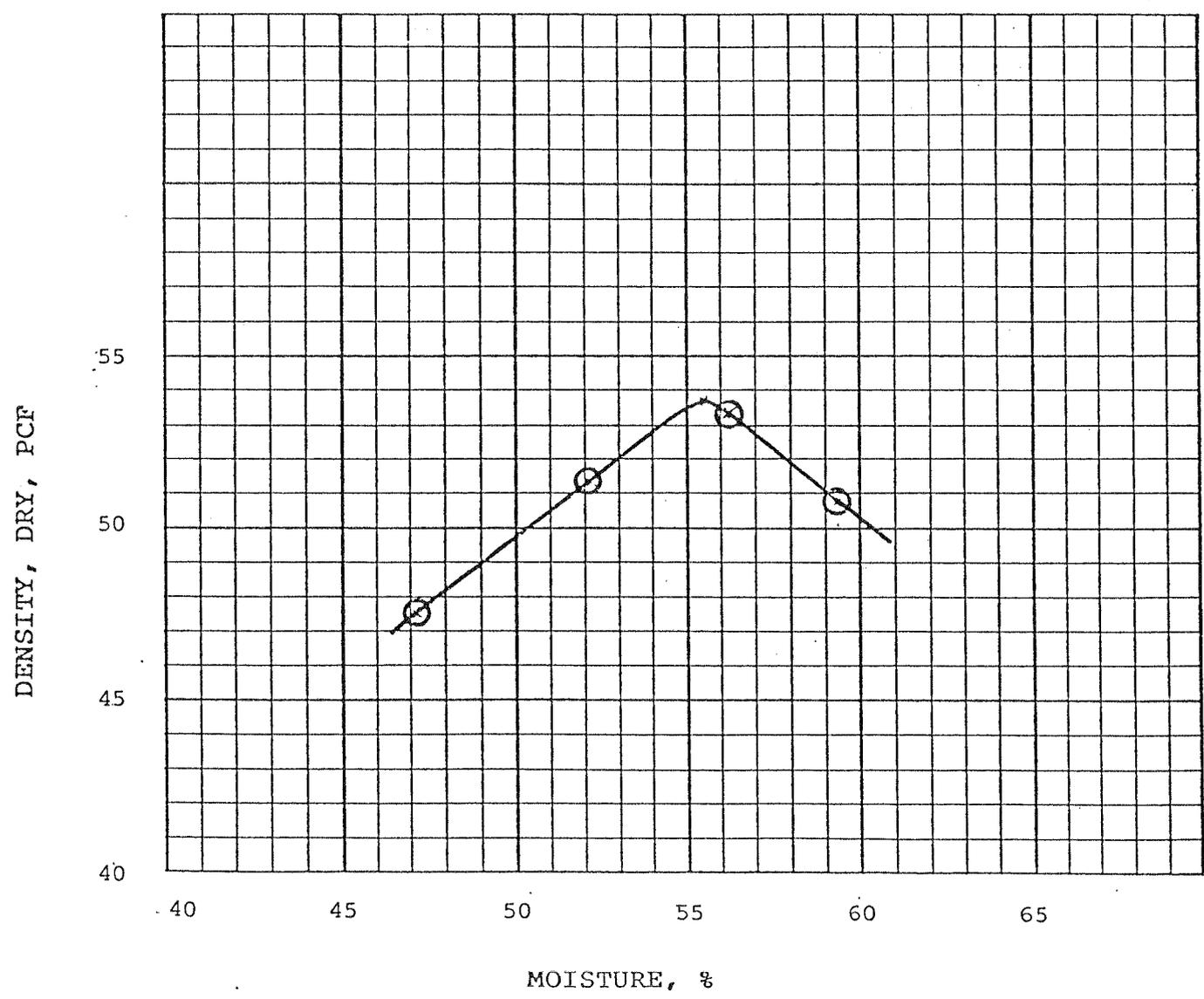
Project: PHYSICAL TESTS OF STOKER BOILER ASH

Date: 4/7/89

Client: ReUse Technology, Inc.

Job No.: 32-92063

TEST: ASTM D-698, Method A.
MATERIAL: 2/3 Flyash, 1/3 Bottom ash.
MAXIMUM DRY DENSITY: 53.7 pcf at Optimum Moisture of 55.5%.



REPORT OF: CALIFORNIA BEARING RATIO TEST

Project: PHYSICAL TESTS OF STOKER BOILER ASH

Date: 4/13/89

Client: ReUse Technology, Inc.

Job No.: 32-92063

ASTM: D-1883

COMPACTION METHOD: HAMMER WEIGHT 5.5 LB., NUMBER OF LAYERS 3 *.

CONDITION OF SPECIMENS: SOAKED, UNSOAKED, SURCHARGE WEIGHT 15 LB.

MATERIAL: A, Flyash
B, Bottom Ash
C, 2/3 Flyash, 1/3 Bottom Ash

SPECIMEN NO. NUMBER OF BLOWS/LAYER *	A	B	C
	55	55	55
INITIAL: % COMPACTION **	101.3	101.1	100.0
DRY DENSITY, PCF	47.4	66.8	53.7
WATER CONTENT, %	67.6	28.6	55.9
SOAKED: % COMPACTION	101.3	101.1	100.0
DRY DENSITY, PCF	47.4	66.8	53.7
WATER CONTENT, %	70.1	33.0	59.5
TOP ONE INCH, %	67.8	31.9	53.5
PERCENT SWELL	0.0	0.0	0.0
BEARING RATIO: 0.1 INCH	12	17	14
0.2 INCH	17	23	18

Respectfully Submitted,

A TEC Associates, Inc.

James W. Bellah

James W. Bellah, Sr. NICET
Lab Manager

JWB/kb

PERCENT OF MAXIMUM DRY DENSITY, SEE PROCTOR CURVES.

ATEC Associates, Inc.

1300 Williams Drive
Marietta, Georgia 30066
404/427-9456

REPORT OF: PERMEABILITY TESTS

Project: PHYSICAL TESTS OF STOKER BOILER ASH

Date: 4/11/89

Client: ReUse Technology, Inc.

Job No.: 32-92063

TYPE TEST: Falling head, specimen's remolded*, and back pressure saturated to achieve a saturated condition prior to test. Reference, U.S. Army Corps of Engineers Manual EM 1110-2-1906, Appendix VII, Permeability tests, and EPA Method 9100, Permeability testing.

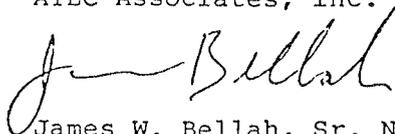
MATERIAL: Test A, Flyash
Test B, 2/3 Flyash and 1/3 Bottom Ash.

<u>TEST</u>	<u>MOISTURE</u> <u>%</u>	<u>DENSITY</u> <u>DRY, PCF</u>	<u>VOID</u> <u>RATIO</u>	<u>SATURATION</u> <u>INITIAL, %</u>	<u>COEFFICIENT OF</u> <u>PERMEABILITY, CM/SEC</u>
A	66.0	44.1	1.970	66.8	9.96×10^{-4}
B	54.8	50.9	1.576	73.0	1.02×10^{-3}

*Specimen's remolded to approximately 95% Standard Proctor (ASTM D 698) maximum dry density.

Respectfully Submitted,

ATEC Associates, inc.



James W. Bellah, Sr. NICET
Lab Manager

JWB/kb

BORING NO. _

DESCRIPTION Flyash

NOTE: Sample remolded to approximately 95% Standard Proctor and tested "Flooded".

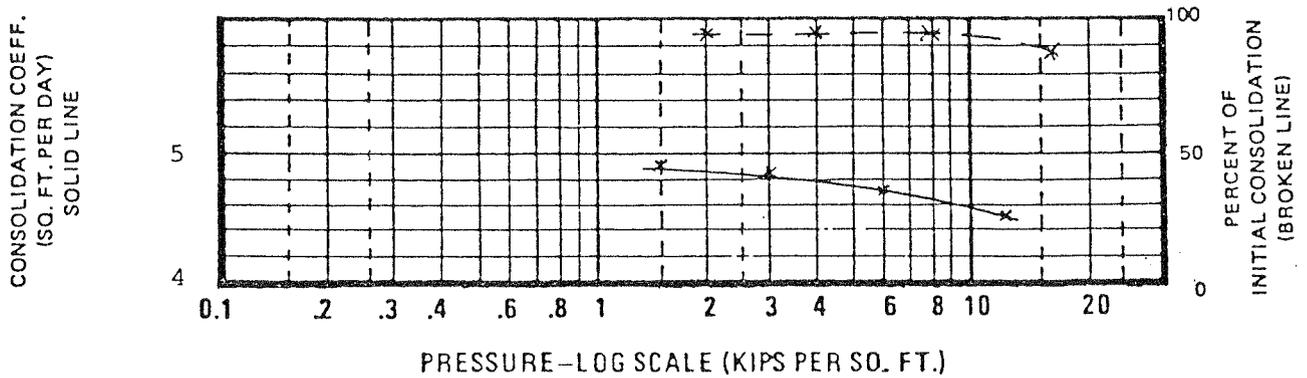
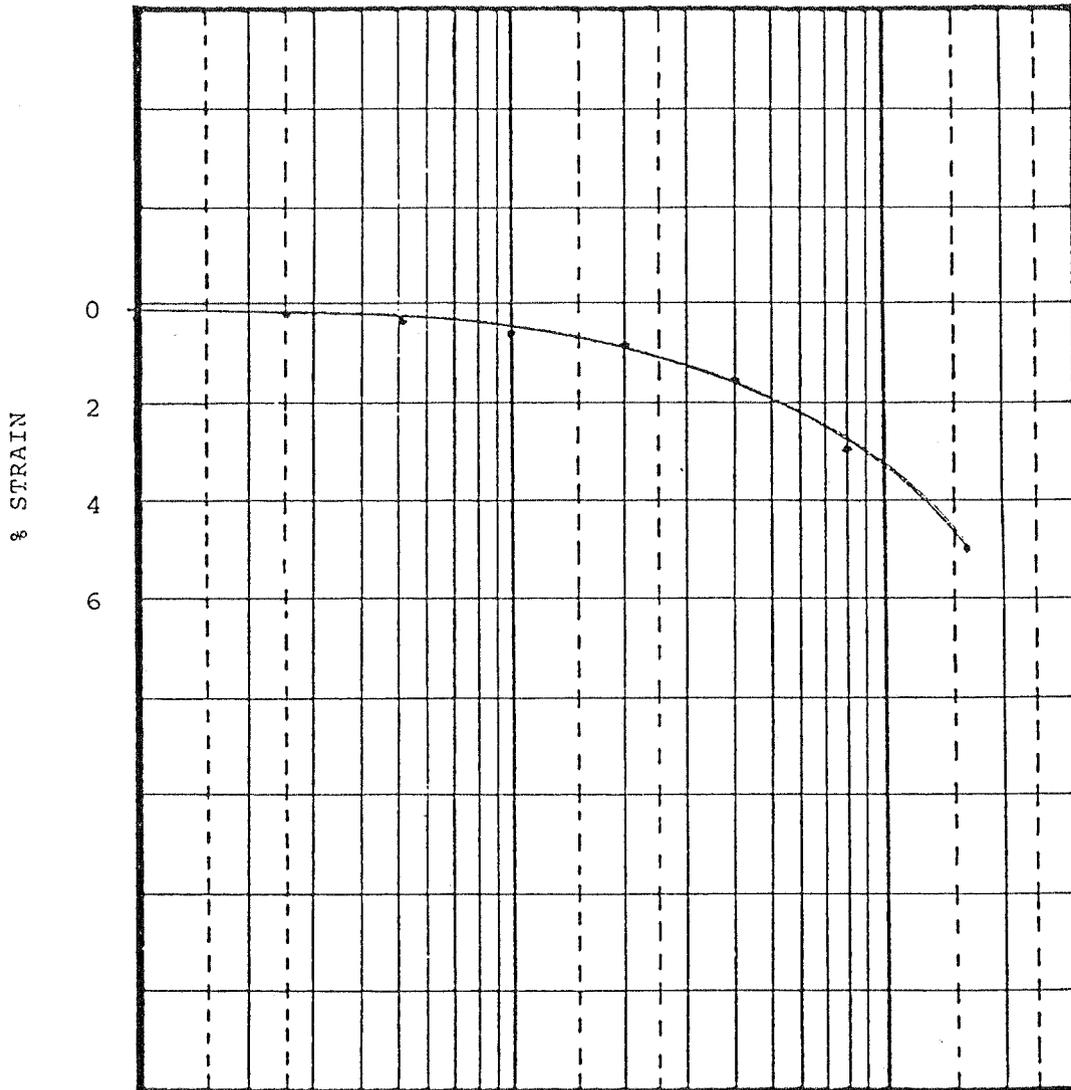
DRY UNIT WEIGHT (PCF) 45.0

WATER CONTENT (%) 62.9

SATURATION (%) 69.1

LIQUID LIMIT -

PLASTIC LIMIT -

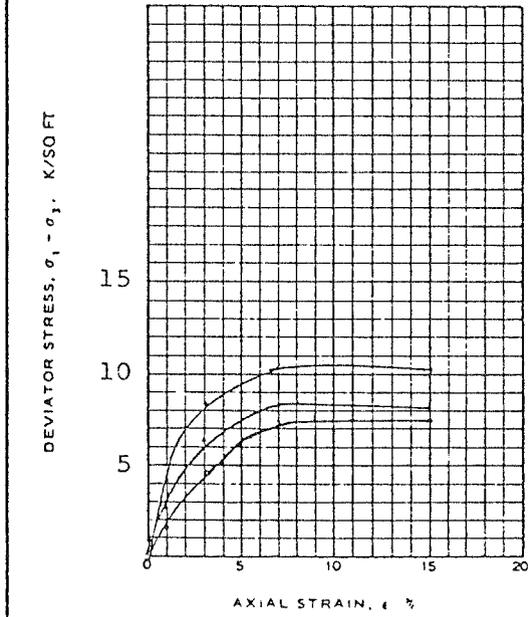
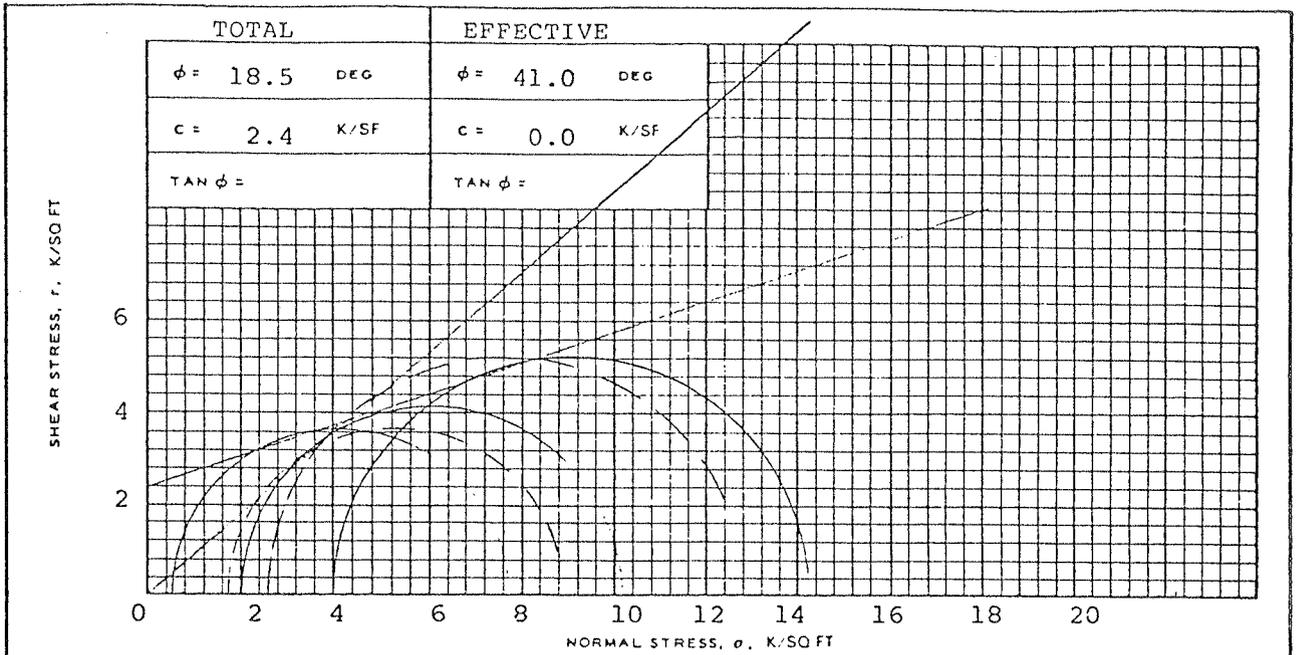


CONSOLIDATION TEST RESULTS

Physical Tests of Stoker Boiler Ash

ATEC ASSOCIATES, INC.



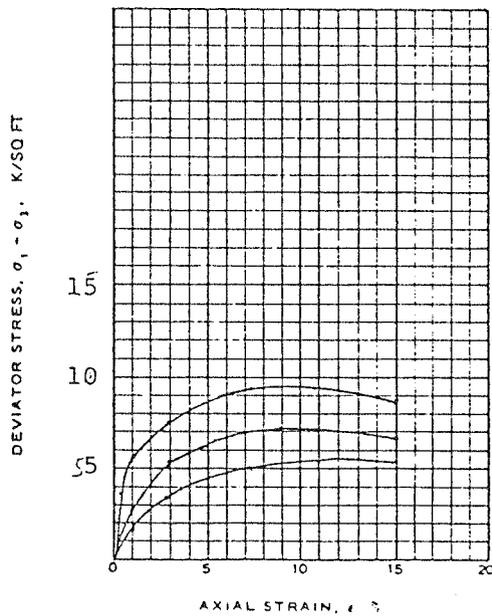
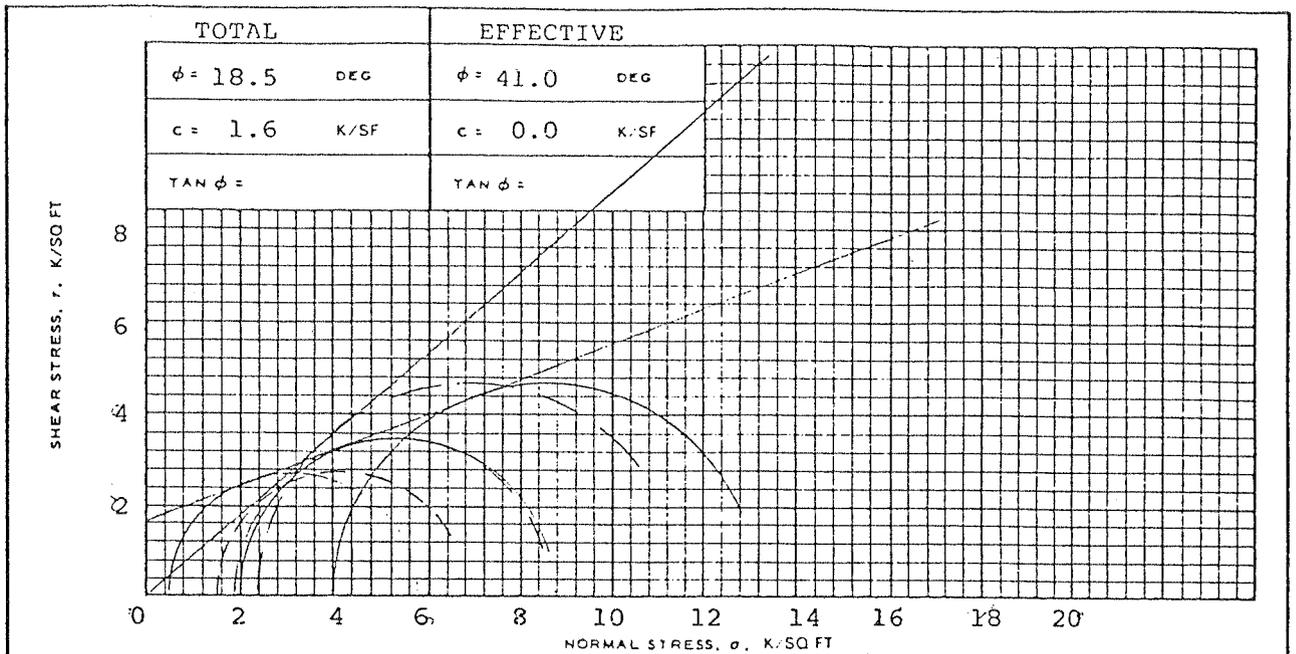


SPECIMEN NO.		1	2	3
INITIAL	WATER CONTENT, %	w_o 64.3	64.5	64.7
	DRY DENSITY LB./CU FT	γ_d 43.9	43.7	44.1
	SATURATION %	s_o 68.1	67.8	69.0
VOID RATIO		e_o 1.983	1.996	1.971
BEFORE SHEAR	WATER CONTENT, %	w_c 92.4	91.4	88.4
	DRY DENSITY LB./CU FT	γ_{d_c} 44.6	44.9	45.9
	SATURATION, %	s_c 100	100	100
	VOID RATIO	e_c 1.941	1.919	1.856
	FINAL BACK PRESSURE, PSI	u_o 98.0	98.0	98.0
MINOR PRINCIPAL STRESS, K/SQ FT		σ_3 0.50	2.00	4.00
MAXIMUM DEVIATOR STRESS, K/SQ FT		$(\sigma_1 - \sigma_3)_{MAX}$ 7.42	8.31	10.43
ULTIMATE DEVIATOR STRESS, K/SQ FT		$(\sigma_1 - \sigma_3)_{ULT}$ 7.16	8.05	10.02
INITIAL DIAMETER, IN.		D_o 1.4	1.4	1.4
INITIAL HEIGHT, IN.		H_o 3.0	3.0	3.0

CONTROLLED- Strain, 0.1% / Min.

DESCRIPTION OF SPECIMENS Flyash

LL -	PL -	PI -	TYPE OF SPECIMEN Remolded*	TYPE OF TEST \bar{R} , Sat.		
REMARKS * Specimen's remolded to approximately 95% Standard Proctor (ASTM D 698) maximum dry density.			PROJECT Physical tests of Stoker Boiler			
			Ash		PROJECT NO 32-92063	
			BORING NO -			
			DEPTH/LEV -			
			SAMPLE NO -		DATE 4/19/89	
TRIAxIAL COMPRESSION TEST REPORT						



SPECIMEN NO.		1	2	3
INITIAL	WATER CONTENT, %	w_o 54.3	55.5	55.2
	DRY DENSITY LB/ CU FT	γ_{d_o} 51.3	51.2	51.4
	SATURATION %	s_o 73.3	74.7	74.7
	VOID RATIO	e_o 1.554	1.560	1.552
BEFORE SHEAR	WATER CONTENT, %	w_c 71.6	71.5	69.6
	DRY DENSITY LB/ CU FT	γ_{d_c} 52.1	52.4	53.2
	SATURATION, %	s_c 100	100	100
	VOID RATIO	e_c 1.516	1.501	1.461
	FINAL BACK PRESSURE, PSI	u_o 118.0	118.0	118.0
MINOR PRINCIPAL STRESS, K/SQ FT	σ_3	0.50	2.00	4.00
MAXIMUM DEVIATOR STRESS, K/SQ FT	$(\sigma_1 - \sigma_3)_{MAX}$	5.46	7.08	9.47
ULTIMATE DEVIATOR STRESS, K/SQ FT	$(\sigma_1 - \sigma_3)_{ULT}$	5.22	5.82	8.69
INITIAL DIAMETER IN.	D_o	2.8	2.8	2.8
INITIAL HEIGHT, IN.	H_o	6.2	6.2	6.2

CONTROLLED- Strain, 0.1% / Min.

DESCRIPTION OF SPECIMENS 2/3 Flyash and 1/3 bottom ash.

LL -	PL -	PI -		TYPE OF SPECIMEN Remolded	TYPE OF TEST R Sat.	
REMARKS * Specimen's remolded to approximately 95% Standard Proctor (ASTM D 698) maximum dry density.				PROJECT Physical tests of Stoker Boiler		
				Ash.		PROJECT NO 32-92063
				BORING NO -		
				DEPTH/ELEV -		
				SAMPLE NO -		DATE 4/21.89
TRIAXIAL COMPRESSION TEST REPORT						

ATEC Associates, Inc.

1300 Williams Drive
Marietta, Georgia 30066
404/427-9456

REPORT OF: L.O.I. TESTS

Project: PHYSICAL TESTS OF STOKER BOILER ASH

Date: 4/13/89

Client: ReUse Technology, Inc.

Job No.: 32-92063

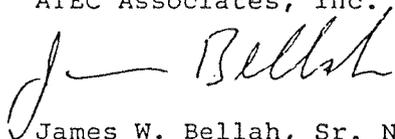
TEST: ASTM D-2974, Lost on Ignition (organic content).

MATERIAL: Fly Ash.

U.S. SIEVE:	20	40	60	100	200
% RETAINED:	2	17	12	9	12
LOI %:	323	455	168	104	81

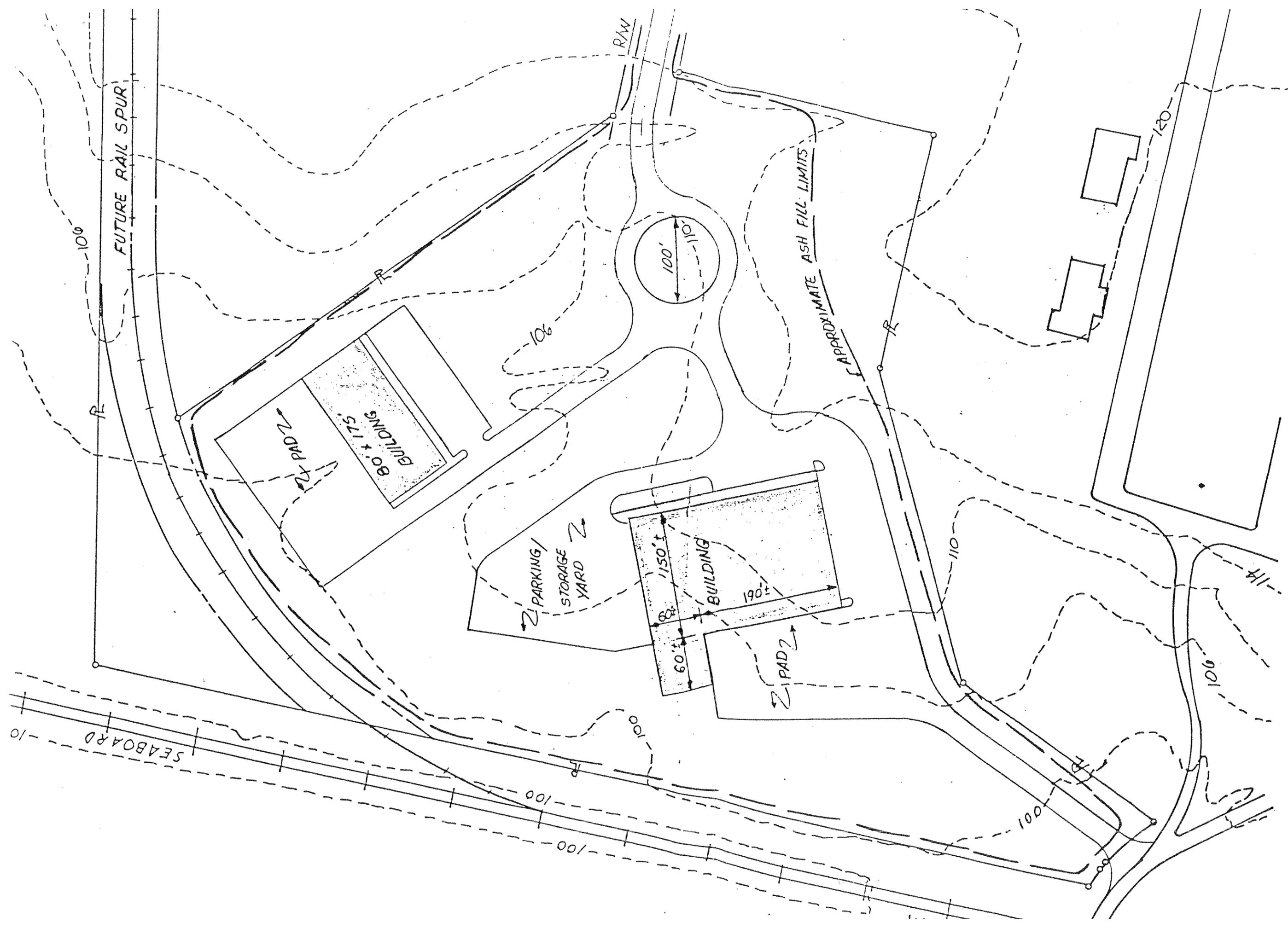
Respectfully Submitted,

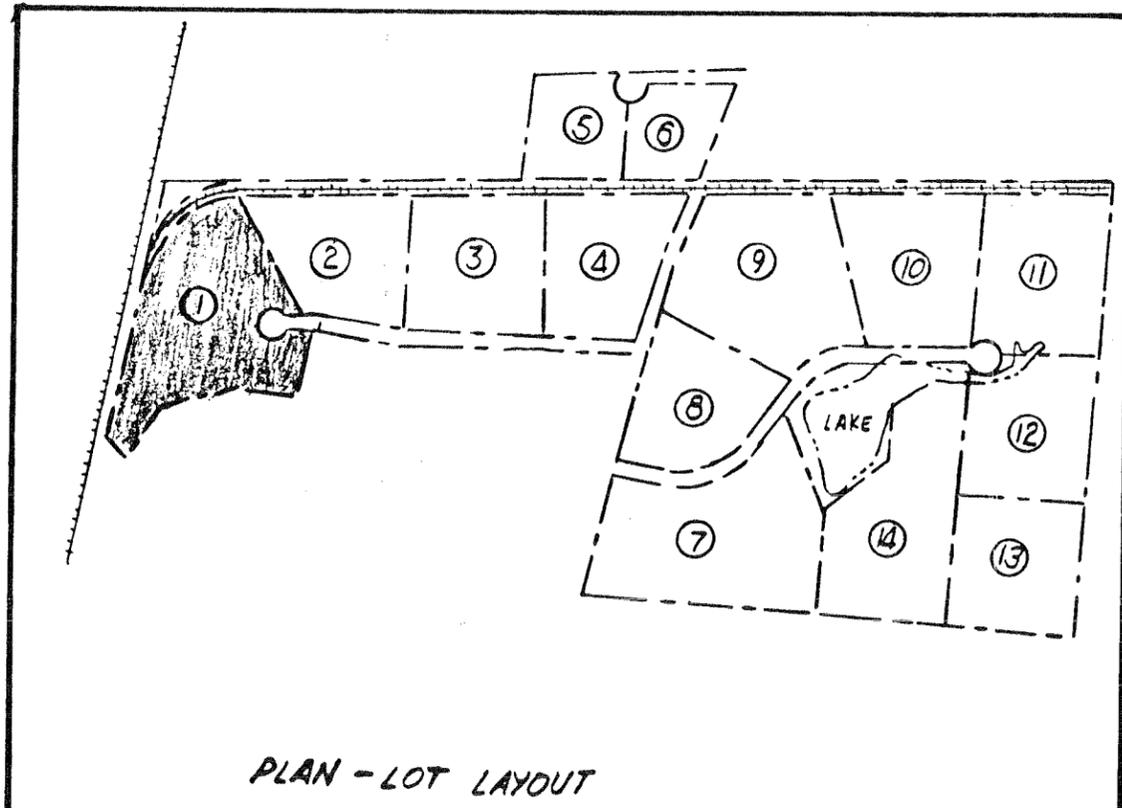
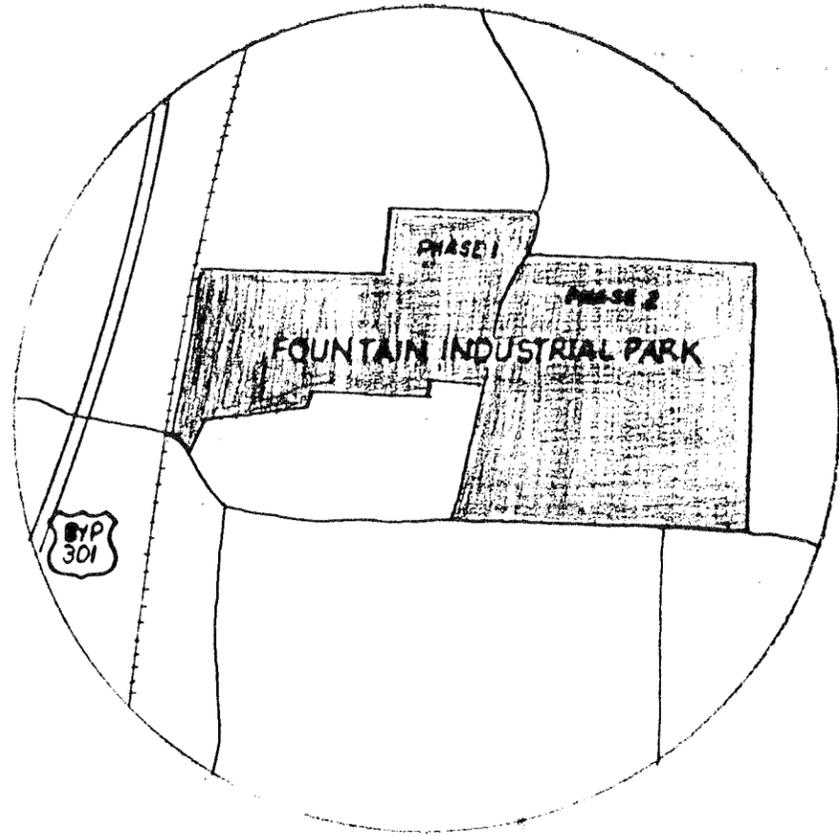
ATEC Associates, Inc.



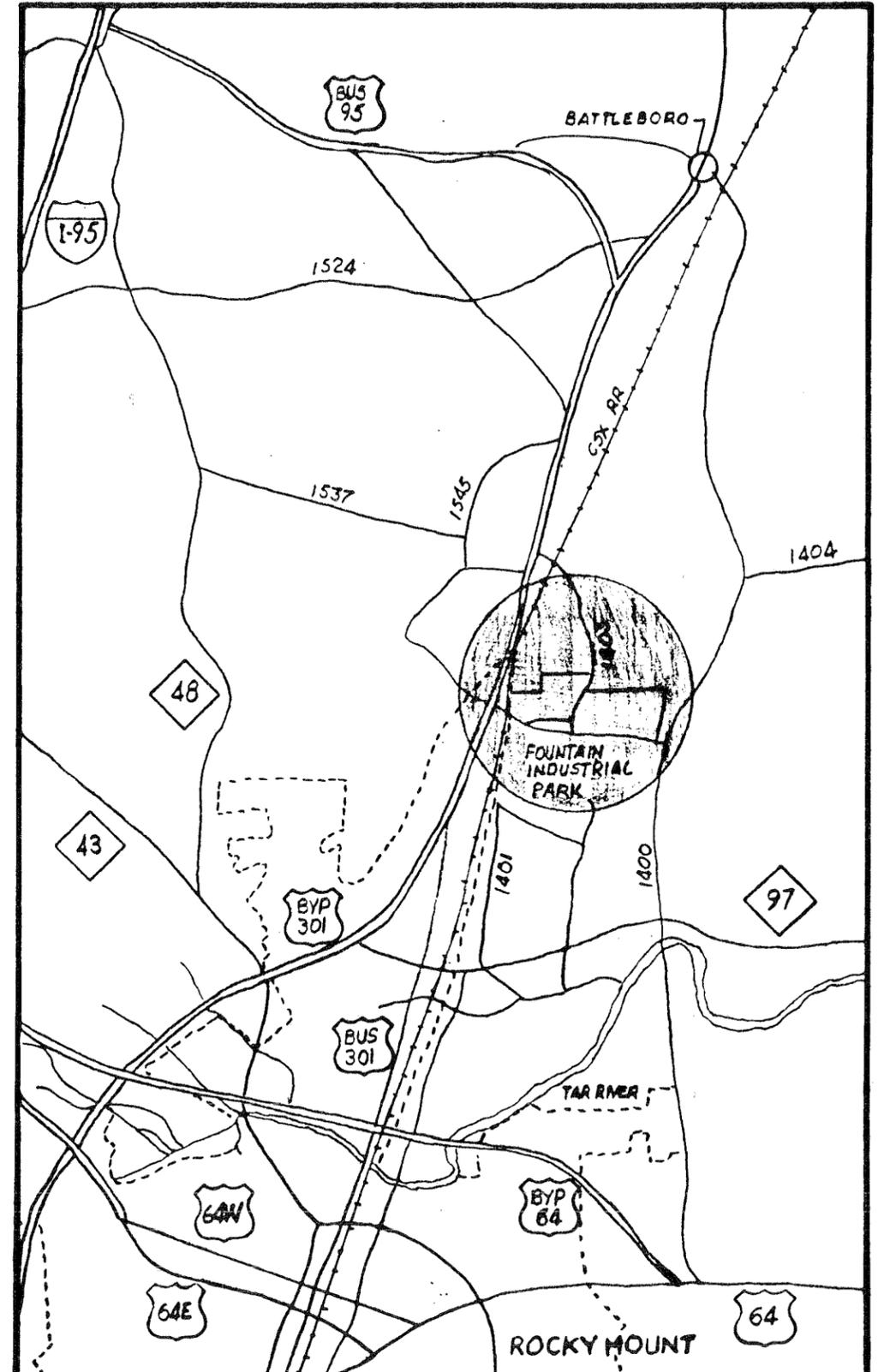
James W. Bellah, Sr. NICET
Lab Manager

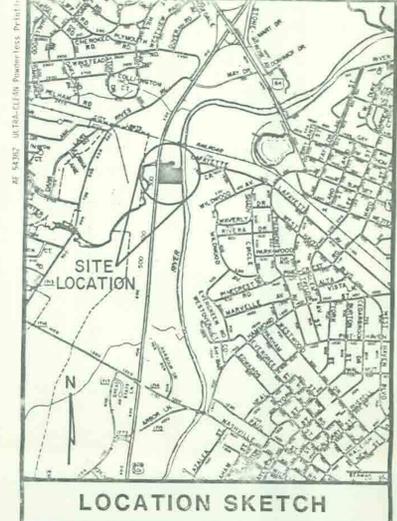
JWB/kb





PLAN - LOT LAYOUT

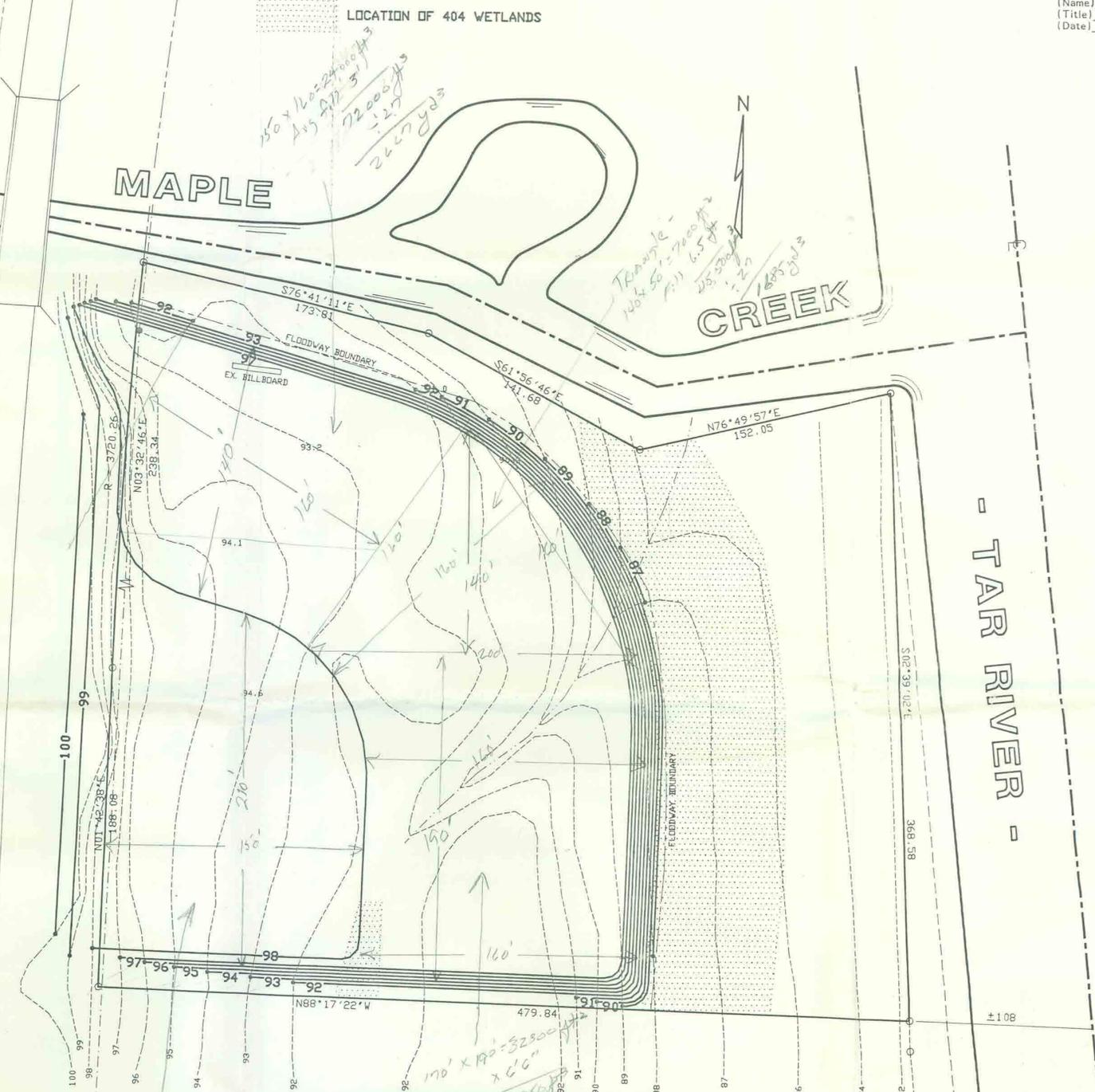




"This certifies that this copy of this plat accurately depicts the boundary of the jurisdiction of Section 404 of the Clean Water Act under the present law and regulations as determined by the undersigned on this date. Unless, there is a change in the law or our published regulations, this determination of Section 404 jurisdiction may be relied upon for a period not to exceed two years from this date."

(Name) _____
 (Title) _____
 (Date) _____

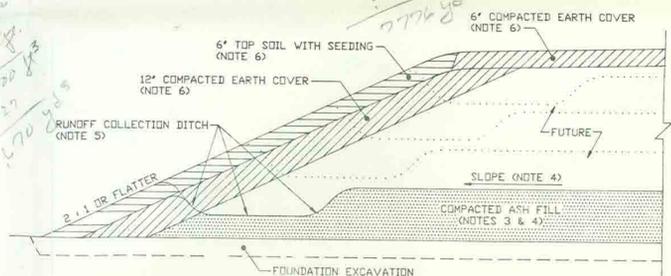
U.S. 301 BY-PASS - SOUTH WESLEYAN BLVD.



4670 yd³
 2667 yd³
 1685 yd³
 7776 yd³
 16798

GENERAL NOTES FOR TYPICAL ASH FILL PLACEMENT

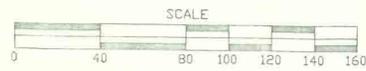
- Excavate and stockpile topsoil and adequate quantities of earth for cover material in progression with ash fill placement.
- All organic material, unsuitable fill or soft material shall be removed and the exposed subgrade compacted with a vibratory roller (10 ton minimum). Where heaving is observed, over excavation will be required at the direction of the Engineer or Project Manager before the placement of ash fill.
- Ash shall be bladed in 8 inch layers and compacted with a smooth steel wheeled vibratory roller, (10 ton minimum), to a minimum 95% of the maximum dry density at its optimum moisture content per ASTM D-698. Field compaction test shall be taken for each 5000 cubic yards placed.
- During construction the ash fill shall be graded (max. 5%) and a smooth surface maintained to provide for sheet flow run-off and prevent dusting.
- Run-off from the ash fill shall be contained by ditch and/or sump to prevent discharge. Sump water may be pumped into a water truck for use in conditioning ash.
- All exterior slopes shall be covered with 12" compacted earth and 6" of topsoil. Other surface areas shall be covered with 6" min. earth pending final development. Seeding shall be in accordance with schedule provided on erosion control plan. With permission of the Owner, excess on-site material may be placed in fill slope.
- This grading plan computes out as follows:
 - Stripping 6" 2320 CY
 - Undercut along Maple Creek 310 CY
 - Net Fill 22600 CY
- Finished grades shown as proposed is finished grade exclusive of 6" earth cover.
- Owner may elect to extend top of slope on south side of property, to the property line. Consult with Owner. Fill slope may then extend outside property line into Rose-Mullens easement.



TYPICAL ASH FILL SECTION
 NOT TO SCALE

These plans are for bidding purposes only and are not to be used as Construction drawings unless initialed and dated as approved for Construction below by the Engineer.

Approved for Construction: _____
 Date: _____



ReUse Technology Inc.
 100 Chatham Center Boulevard, Suite 105
 Kennesaw, Georgia 30144
 Telephone (404) 425-7676
 Fax (404) 425-7881

APPIAN
 CONSULTING ENGINEERS, P.A.
 CIVIL AND MUNICIPAL ENGINEERS
 P.O. Box 7866 • Rocky Mount, NC 27804
 (919) 937-4729
 ENGINEER 11



GRADING PLAN - Developed By: RANDY VANN
 SOUTH WESLEYAN BLVD. - ROCKY MOUNT, N.C.

CONSTRUCTION SCHEDULE

1. Obtain copy of approval of Erosion Control Plan and final approved plans before starting.
2. Construct the stone tire cleaning facility at the entrance.
3. Install silt fence along limits of disturbance. (Proposed Toe of Fill)
4. Install Rip Rap/Gravel Sediment Pits. Set clean out stakes at clean out elevation.
5. Begin Fill.
6. Maintain temporary diversion swales along top of slopes on a daily basis to divert the run-off through sediment basins.
7. As fill is being placed the berm around the rip rap/gravel filter basin will need to be extended. At no time during fill should run-off be able to escape without first going through the filter basin.
8. Permanently seed each disturbed area. Do not allow any disturbed area to remain undisturbed longer than is necessary and do not remove protection devices until an adequate ground cover has been achieved.
9. Inspect all erosion control devices weekly and after each rainfall event, make repairs immediately, if needed.
10. After site is stabilized and the project complete remove all temporary measures and install permanent vegetation on the disturbed areas.

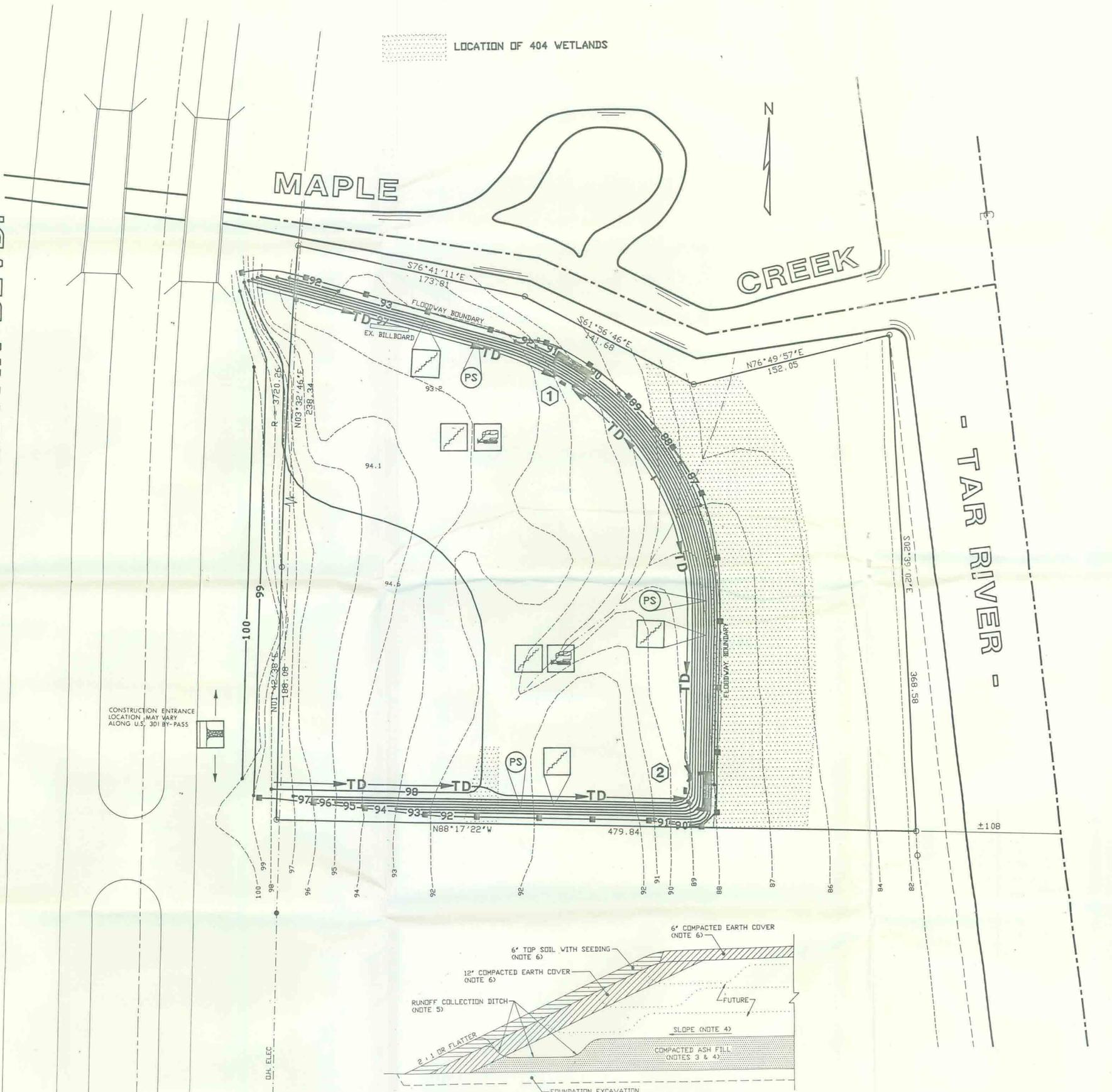
STRUCTURE SCHEDULE

Struct. ID	Qn (CFS)	Disturbed Area (AC)	Basin Vol (CF)	Structural Description	Detail #
1	6.35	1.16	1083	19'x19'x3' Deep Sediment Pit w/Rip Rap/Gravel weir 1'x8'	Sd-12
2	6.44	1.32	1200	20'x20'x3' Deep Sediment Pit w/Rip Rap/Gravel weir 1'x8'	Sd-12

LEGEND

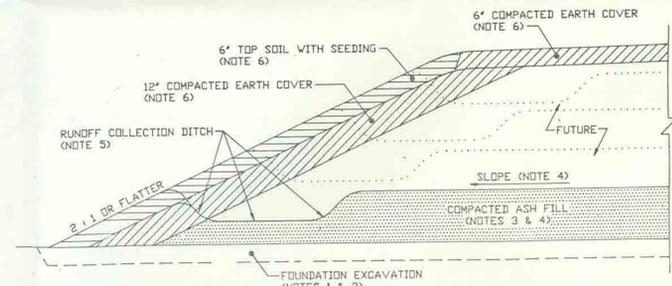
- Sd-1
- Sd-12
- Sd-17
- Sd-18
- Sd-19
- Perm. Seeding
- Grading - Ash Fill Placement

U.S. 301 BY-PASS - SOUTH WESLEYAN BLVD.

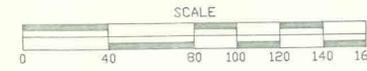


LOCATION OF 404 WETLANDS

CONSTRUCTION ENTRANCE LOCATION MAY VARY ALONG U.S. 301 BY-PASS



TYPICAL ASH FILL SECTION
NOT TO SCALE



These plans are for bidding purposes only and are not to be used as Construction drawings unless initialed and dated as approved for Construction below by the Engineer.

Approved for Construction: _____ Date: _____

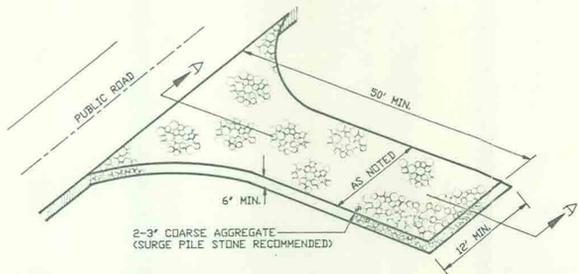
EROSION & SEDIMENTATION CONTROL PLAN
GRADING PLAN - Developed By: RANDY VANN
SOUTH WESLEYAN BLVD. - ROCKY MOUNT, N.C.

ReUse Technology, Inc.
 100 Old Highway 105
 Kernersville, Georgia 30144
 Telephone (404) 425-7676
 Fax (404) 425-7681

SCALE	1" = 40'
DATE	JULY, 1990
DESIGN	JMS
DRAWN BY	TJM - CAD
CHECKED BY	BJ

APRIAN
 CONSULTING ENGINEERS, P.A.
 CIVIL AND MUNICIPAL ENGINEERS
 P.O. Box 7966 • Rocky Mount, NC 27804
 (919) 937-4729
 GENESIS 1:1



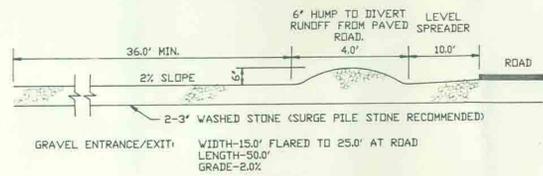


CONSTRUCTION SPECIFICATIONS:

1. CLEAR THE ENTRANCE/EXIT AREA OF ALL VEGETATION, ROOTS, AND OTHER OBJECTIONABLE MATERIAL.
2. GRADE THE ROAD FOUNDATION SO THAT THE ENTRANCE/EXIT WILL HAVE A CROSS SLOPE TO THE SOUTH AND ALL RUNOFF WILL DRAIN TO THE BLOCK AND GRAVEL DROP INLET PROTECTION STRUCTURE.
3. PLACE STONE TO THE DIMENSIONS, GRADE AND ELEVATION SHOWN.
4. USE WASHED STONE 2' TO 3' IN SIZE.

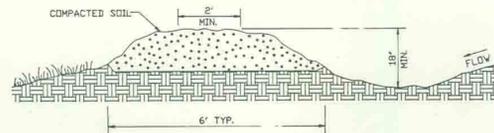
NOTE: MAINTAIN THE GRAVEL PAD IN A CONDITION TO PREVENT MUD OR SEDIMENT FROM LEAVING THE SITE. SHOULD MUD BE TRACKED OR WASHED ONTO ROAD, IT MUST BE REMOVED IMMEDIATELY.

TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT Sd-17
NOT TO SCALE



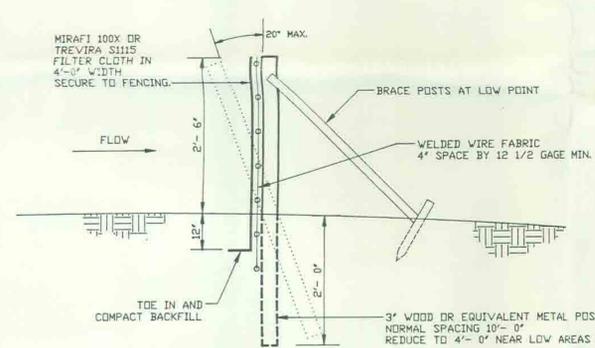
SECTION A-A

Sd-17



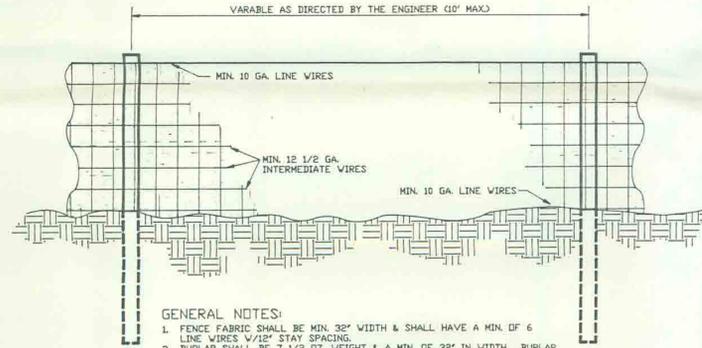
TEMPORARY DIVERSION RIDGE OR CHANNEL Sd-18
NOT TO SCALE

Sd-18



SILT FENCE Sd-1

SCALE: 3/4" = 1' - 0"



GENERAL NOTES:

1. FENCE FABRIC SHALL BE MIN. 32" WIDTH & SHALL HAVE A MIN. OF 6 LINE WIRES 1/2" STAY SPACING.
2. BURLAP SHALL BE 7 1/2 OZ. WEIGHT & A MIN. OF 32" IN WIDTH. BURLAP SHALL BE FASTENED ADEQUATELY TO THE FABRIC AS DIRECTED BY THE ENGINEER. MIRAF 100X OR EQUIVALENT MAY ALSO BE USED.
3. STEEL POSTS SHALL BE 3'-0" IN HEIGHT & BE OF THE SELF-FASTENER ANGLE STEEL TYPE.
4. WOOD POST SHALL BE 6 TO 7 FEET IN HEIGHT & 3 - 4 INCHES IN DIA. WIRE FABRIC SHALL BE FASTENED TO WOODEN POST WITH NOT LESS THAN 9 WIRE STAPLES 1 1/2" LONG.

Sd-1

EROSION AND SEDIMENTATION CONTROL NARRATIVE

I. PROJECT DESCRIPTION

The purpose of this project is to fill approximately 2.92 Ac for future commercial use. The facility is owned by Randy Vann of Rocky Mount, NC. The site contains approximately 4.23 acres and is located along US 301 By-Pass adjacent to Maple Creek and north of Harbour West Drive. The east property line is adjacent to the Tar River. The facility consists of a site that will be graded for future commercial use. Approximately 2.92 acres will be disturbed during construction. The maximum cut or fill will be 9 ft.

The project is scheduled to begin construction in August 1990 with project completion and final stabilization by August 1991. The erosion and sediment control program for this project will include the installation of a suitable construction entrance, Rip Rap/Gravel Sediment Basins, silt fence, temporary diversion berms/swales, surface roughening, with temporary seeding and permanent seeding of the site.

II. EXISTING SITE CONDITIONS

The proposed site is currently undeveloped cleared land and zoned B-5 (CU). The site drains to the north into Maple Creek and to the east into the Tar River.

III. ADJACENT PROPERTY

All adjacent property lines and property Owners are shown on the site plan.

IV. SOILS

The soil at this site is sandy clay.

V. EROSION AND SEDIMENT CONTROL MEASURES

All vegetative and structural erosion and sediment control practices shall be constructed and maintained by the Contractor according to these plans and specifications and the minimum standards of the Dept. of Environmental Management, Land Quality Section and the minimum requirements of the City of Rocky Mount's Manual of Specifications, Standards and Design, latest revision. The Contractor shall also follow any additional requirements as outlined by the City Engineer to contain sediment on-site.

A. Structural Practices

1. Vehicle wheels shall be clean when leaving the site to prevent the tracking of mud on paved roads.
2. Construction Road Stabilization: Construction traffic shall be limited to stabilized areas. At a minimum, a temporary gravel construction entrance shall be provided as shown on this drawing.
3. Silt Fence: Silt fences shall be provided where shown and as needed on the site plan. These barriers shall be used to contain sediment.
4. Rip Rap/Gravel Filter Sediment Basins: Construct basin to the shape and dimensions shown in the details. The basin is to be placed below the existing ditch flow line by 2' with the berm built above as dimensioned.
5. Slope Surface Roughening: On all slopes designated, surface roughening shall be employed by dozer tracking in the direction of top to bottom to aid in preventing rutting, rivlets, etc. Landscaping shall then be done on the roughened surface.

B. Vegetative Practices

1. Temporary Seeding: All denuded area or areas to be graded during the construction phases are not to be brought to final grade within 30 days shall receive temporary seeding within 15 days of completing initial earthwork. Temporary seeding shall also be used to stabilize finished grade areas if the time of year is outside the specified permanent seeding periods. Temporary seeding shall be in accordance with paragraph V D below.

C. Management Strategies

Perimeter measures are to be installed prior to grubbing or grading.

Stock pile and/or waste areas must be maintained within the limits of the areas protected by the proposed measures and otherwise temporarily seeded if to be left stockpiled over 30 days.

Construction shall be planned so that grading operations can begin and end as quickly as possible.

Silt Fences shall also be installed prior to or as a first step in construction.

The Contractor shall be responsible for the installation and maintenance of all erosion and sediment control practices.

D. Vegetative Ground Cover

Immediately following grading, all areas shall receive either permanent temporary seeding, as applicable, as follows:

	Feb-May	June-Oct	Nov-Jan
Permanent Seed:	K-31 Fescue @ 5#/1000 SF	K-31 Fescue @ 5#/1000 SF plus Brown Top Millet @ 35#/Ac	K-31 Fescue @ 5#/1000 SF plus Winter Rye Grain @ 25#/Ac

Temporary Seed:	K-31 Fescue @ 2#/1000 SF plus Winter Rye @ 25#/Ac	K-31 Fescue @ 5#/1000 SF	Winter Rye @ 50#/Ac
-----------------	---	--------------------------	---------------------

Fertilizer:	10-10-10 @ 25#/1000 SF
Lime:	100#/1000 SF
Mulch:	Straw @ 75#/1000 SF
Tack:	200 gallons/Ac on all mulching

E. Maintenance

1. Reseed and mulch bare spots larger than 9 square feet (limited to 5% maximum of site area.)
2. Maintain all seeded areas until uniform stand is acceptable.
3. If growth is not established by final project inspection, continue specified attention until the stand is acceptable.
4. Correct and repair all undue settling and erosion within 1 year after final inspection.
5. Remove from the site, all erosion control structures after complete stabilization at end of construction period.
6. Remove silt from sediment pits and from behind check dams when silt is within half depth of the pit or spillway. Dispose of in an area where silt cannot re-enter pit/trap.
7. Place rock from rock check dams in ditch line as armor protection. Do not dispose of rock. All stone armor protection is to fit contour of channel. Do not dump but handspread.

F. Calculations

The practice utilized for the proposed site did require formal calculations. Calculations have been provided.

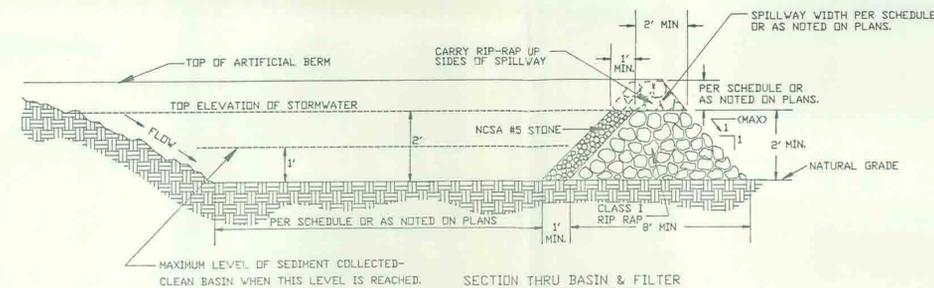
VI. OWNER'S ADDRESS

Randy Vann
Honey Vann, Bruton, Moody and Brown
P.O. Box 7545
Rocky Mount, NC 27804
(919) 443-0515 Work
(919) 443-5656 Home

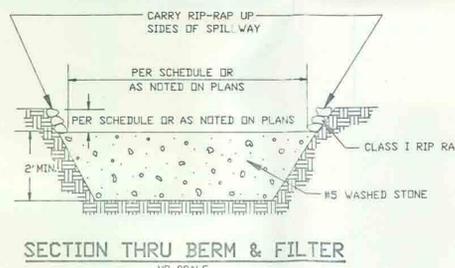
These plans are for bidding purposes only and are not to be used as Construction drawings unless initialed and dated as approved for Construction below by the Engineer.

Approved for Construction: _____

Date: _____

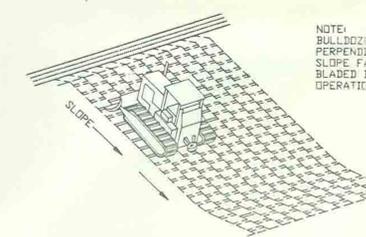


ABOVE GRADE GRAVEL & RIP-RAP FILTER BASIN DETAIL Sd-12



SECTION THRU BERM & FILTER
NOT TO SCALE

Sd-12



NOTE: BULLDOZER TREADS CREATE GROOVES PERPENDICULAR TO THE SLOPE. THE SLOPE FACE SHOULD NOT BE BACK-BLADED DURING THE FINAL GRADING OPERATION.

SURFACE ROUGHENING BY TRACKING Sd-19
NOT TO SCALE



ReUse Technology, Inc.
PERMITTING • DISPOSAL PLANNING • REUSE
100 Chestnut Center Boulevard - Suite 155
Kennesaw, Georgia 30144
Telephone (404) 425-7676
Fax (404) 425-7681

Sd-19

**EROSION & SEDIMENTATION CONTROL DETAILS
SOUTH WESLEYAN BLVD. - ROCKY MOUNT, N.C.**

SCALE	AS NOTED
DATE	JULY, 1990
DESIGN	JMS
DRAWN BY	TIM-CAD
CHECK	BJ

APPIAN
CONSULTING ENGINEERS, P.A.
CIVIL AND MUNICIPAL ENGINEERS
P.O. Box 7966 • ROCKY MOUNT, NC 27804
919-853-8333
GENESIS 1.1



Date 4/27/89

From the office of;

P.P.S. MAILING SERVICES

TO: WILLIAM MEYER
Solid Waste Management Section

PHONE (919)-733-4811

FROM: CAROL DILLARD
REUSE Technology

PHONE (904)-964-0453

OF PAGES: 2

April 25, 1989

Mr. Jerry W. Chumley
ReUse Technology, Inc.
390D Barrett Parkway
Suite 187
Kennesaw, Georgia 30144

Dear Mr. Chumley;

We appreciated the update you presented to us in our meeting of April 27 relative to plans being developed for the beneficial reuse of coal ash generated at the various cogeneration plants being operated by Cogentrix. It is encouraging to see the commitment being made to develop reuse applications for the coal ash as opposed to the continued use of county landfills. The Solid Waste Management Section has and will continue to support the reuse and recycling of waste materials when performed in a manner consistent with the environment.

In reviewing your plans for the use of coal ash in construction related projects within the Fountain Industrial Park, we agree that the proposed use of coal ash represents a beneficial reuse of the ash. As such, the use of coal ash within the Park does not require formal permitting so long as the coal ash is hauled directly from the generating plant to the construction project in compliance with the attached General Conditions. The use of such coal ash shall include the following reuse applications:

Structural Fills,
Backfills,
Piping Bedding,
Dry-bed Material.

We appreciate your efforts to reuse coal ash and look forward to working with you on other projects.

Sincerely,

William L. Meyer, Chief
Solid Waste Management Section

**GENERAL CONDITIONS
FOR
COAL ASH REUSE**

1. Construction activities shall be properly maintained at all times.
2. All ash utilization on roadways shall be performed by the N.C. Department of Transportation or its contractor.
3. Construction activities shall be effectively maintained and operated as a non-discharge system to prevent the discharge of any wastewater resulting from operations.
4. Adequate records of the ash use shall be maintained for review. These records shall include but are not necessarily limited to the following:
 - a. date of ash application,
 - b. type of ash used,
 - c. type of application,
 - d. volume of ash applied in tons,
 - e. location of use, and
 - f. ash receiver.
5. No ash shall be placed within fifty feet of any water supply well.
6. No ash shall be placed within one foot of the mean season high water table.
7. An ash analysis shall be provided to all users.
8. The following buffers shall be maintained:
 - a. 500 feet between application area and any residence, place of business, or place of public assembly, unless permission is first obtained.
 - b. 100 feet between application area and any stream, creek, lake, pond or other natural drainageway or other surface water body.
 - c. 100 feet between application area and property lines unless permission is first obtained from adjacent property owners.
9. Adequate provisions shall be taken to prevent wind erosion and surface runoff from conveying pollutants from the ash application area onto the adjacent property or into the surface waters.



North Carolina Department of Human Resources
Division of Health Services
P.O. Box 2091 • Raleigh, North Carolina 27602-2091

James G. Martin, Governor
David T. Flaherty, Secretary

Ronald H. Levine, M.D., M.P.H.
State Health Director

June 15, 1989

Jerry W. Chumley, President
Reuse Technology, Inc.
100 Chastain Center Blvd.
Suite 155
Kennesaw, Ga. 30144

RE: Approved reuse of coal ash, Fountain Industrial Park, Edgecombe
County

Dear Mr. Chumley:

The Solid Waste Branch hereby approves the reuse of coal ash at the referenced industrial site under the conditions specified in the enclosed letter.

The Branch acknowledges by this approval that the proposed reuse represents a beneficial use of the coal ash and therefore will not require a solid waste permit as long as the ash is transported directly from the generating plant to the construction site.

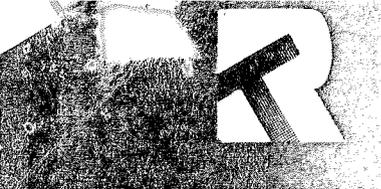
The Branch encourages and supports reuse and recycling of solid waste when conducted in such a manner as to protect the public health and environment.

Sincerely,

A handwritten signature in cursive script that reads "J. Gordon Layton".

J. Gordon Layton, Supervisor
Solid Waste Branch
Solid Waste Management Section

JGL/mj



ReUse Technology, Inc.

PERMITTING · DISPOSAL PLANNING · REUSE

100 Chastain Center Blvd.
Suite 155
Kennesaw, Georgia 30144
Phone (404) 425-7676
Fax (404) 425-7681

June 14, 1989



Mr. Jim Coffey
North Carolina Department Of Human Resources
Solid Waste Management Section
401 Oberlin Building
Raleigh, North Carolina 27602

APPROVED
SOLID WASTE MANAGEMENT SECTION
6/15/89

Dear Mr. Coffey:

In reference to your conversation with Bob Waldrop of June 13, 1989, we are seeking approval to utilize coal ash in the Phase I site development of the Fountain Industrial Park, Edgecombe County, North Carolina. In cooperation with Edgecombe County Development Corporation, we propose the use of coal ash as structural fill in the development of a 13+ acre tract (lot #1, see enclosed site plan). The coal ash to be used in the initial development of Phase I will be obtained from existing Cogentrix's fossil plants; and coal ash to be used in the development of Phase II will be obtained from Cogentrix's Rocky Mount Plant when it becomes operational in late 1990.

To prevent dusting, all ash will be conditioned to 15% moisture and transported in tarped dump trucks. To facilitate compaction, the moisture of the ash will be adjusted at the site by use of a water wagon. All coal ash structural fill within the development area will be capped with a minimum 6-inch earth cover. Slopes will receive 12 inches minimum compacted earth and 6 inches of topsoil. Site development will be in accordance with an approved erosion and sediment control plan.

As part of the approval for this specific project we will agree to the following special conditions:

1. Approval for use of coal ash shall become voidable unless the facilities are constructed in accordance with the approved plans, specifications, and other supporting data.
2. Approval is subject to the nature and volume of wastes discussed and other supporting data.
3. The facilities shall be properly maintained and operated at all times.

(Continued On Page 2)

4. This approval is not transferable.
5. In the event that the facilities fail to perform satisfactorily, including the creation of nuisance conditions, ReUse Technology (RT) shall take such immediate corrective action as may be required by this Section including the construction of additional or replacement wastewater treatment or disposal facilities.
6. Approval may be rescinded unless the reuse program is carried out in a manner which will protect the assigned water quality and groundwater quality standard.
7. All ash utilization on roadways shall be performed in accordance with N.C. Department of Transportation specifications.
8. The facilities shall be effectively maintained and operated as a non-discharge system to prevent the discharge of any wastewater resulting from the operation of this facility.
9. The issuance of this approval shall not relieve RT of the responsibility for damages to surface of groundwaters resulting from the operation of this facility.
10. Adequate records of the ash use program shall be maintained by RT. These records shall include but are not necessarily limited to the following:
 - a. date of ash application,
 - b. type of ash used,
 - c. type of application,
 - d. volume of ash applied in tons,
 - e. location of use, and
 - f. ash receiver.
11. No ash shall be placed within 100 feet of any water supply well.
12. No ash shall be placed within one foot of the mean season high water table. (A soils exploration report for this site is attached).
13. RT shall provide an ash analysis to all users.

(Continued On Page 3)

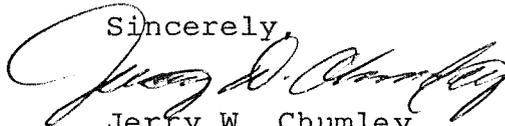
Mr. Jim Coffey
June 14, 1989
Page 3

14. The following buffers shall be maintained:
 - a. 100 feet between application area and any residence, place of business, or place of public assembly, unless permission is first obtained from the property owner.
 - b. 100 feet between application area and any stream, creek, lake, pond or other natural drainageway or other surface water body.
 - c. 100 feet between application area and property lines unless permission is first obtained from adjacent property owners.
15. Adequate provisions shall be taken to prevent wind erosion and surface runoff from conveying pollutants from the ash application area onto the adjacent property or into the surface waters.
16. The following uses of ash are hereby authorized:
 - a. Fly ash and bottom ash may be used for structural fills such as roadway embankments and foundations.
 - b. Fly ash and bottom ash may be used for backfill materials around water, sewer and storm drain piping.
 - c. Bottom ash may be used for secondary road overlay.

As we discussed, an individual approval for this specific project is acceptable. We have commitments to begin receiving ash on July 1, 1989; therefore, your prompt attention to this matter would be greatly appreciated.

Please also continue to review our previous request for a general approval to cover the reuse of coal ash in other applications. Your cooperation in this matter is greatly appreciated. If there are any questions please call Bob Waldrop, Environmental Manager at (404) 425-7676.

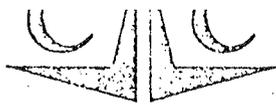
Sincerely,



Jerry W. Chumley
President

JWC:cmd

Attachment



CENTRAL VIRGINIA LABORATORIES & CONSULTANTS

Water and Wastewater
Sampling and Analysis



December 7, 1987

Cogentrix
2 Parkway Plaza, Suite 290
Charlotte, NC 28217

Attention: Bill Campbell

Subject: Sample received 12-1-87 for Method 1310 Extraction
Procedure (EP) Toxicity Method

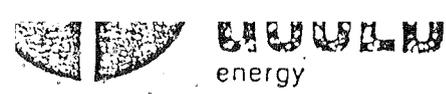
Sample Identification: Roxboro CVLC #1026

Sample Weight.....	101.09 grams
Initial pH.....	6.64
0.5N Acetic Acid added.	5.0 ml
Final pH.....	4.19

<u>Parameter</u>	<u>Results</u>	<u>DW</u>	<u>LF</u>	<u>Limits</u>
Arsenic.....	<0.001 ppm	✓	✓	5.0 ppm
Barium.....	<1.0 ppm	✓	✓	100.0 ppm
Cadmium.....	<0.05 ppm	?	✓	1.0 ppm
Chromium.....	<0.05 ppm	✓	✓	5.0 ppm
Lead.....	<0.200 ppm	?	✓	5.0 ppm
Mercury.....	<0.002 ppm	✓	✓	0.2 ppm
Selenium.....	<0.001 ppm	✓	✓	1.0 ppm
Silver.....	<0.05 ppm	✓	✓	5.0 ppm

Sincerely,

Janet I. Molek
Laboratory Manager



Sample Identification:

Date: 02-12-88

Fly Ash Sample
01-22-88

Laboratory Report No.: 398487

Date Received: 01-26-88

Purchase Order No.:

Cogentrix Leasing Corp.
P.O. Box 1063
Lumberton, NC
28359

Date Sampled:

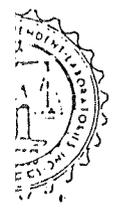
Attention: Mr. Baker Wilson

Sampled by: Customer

ID01778

Silicon Dioxide	46.74%
Aluminum Oxide	27.47%
Iron Oxide	13.96%
Titanium Dioxide	1.61%
Calcium Oxide	1.76%
Magnesium Oxide	0.75%
Sodium Oxide	0.51%
Potassium Oxide	0.78%
Phosphorus Pentoxide	1.76%
Sulfur Trioxide	0.25%
Loss On Ignition	%

Revere



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Sample Identifications:

Date: 03-25-88

F.A.-01-11
B- BAG HOUSE

Laboratory Report No.: 400065

Date Received: 3-23-88

Purchase Order No.:

Date Sampled: 3-17-88

Sampled by: Customer



	% As Recd	% Dry
Moisture	0.30	
Ash	23.24	23.30
Volatile		
Fixed Carbon		
Sulfur	0.47	0.47
Btu/lb.	10078	10108

Carbon 72%



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MITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZA /
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SERVED PENDING OUR WRITTEN APPROVAL.



REPORT OF: MOISTURE-DENSITY RELATIONSHIP

Project: PHYSICAL TESTS OF STOKER BOILER ASH

Date: 4/11/89

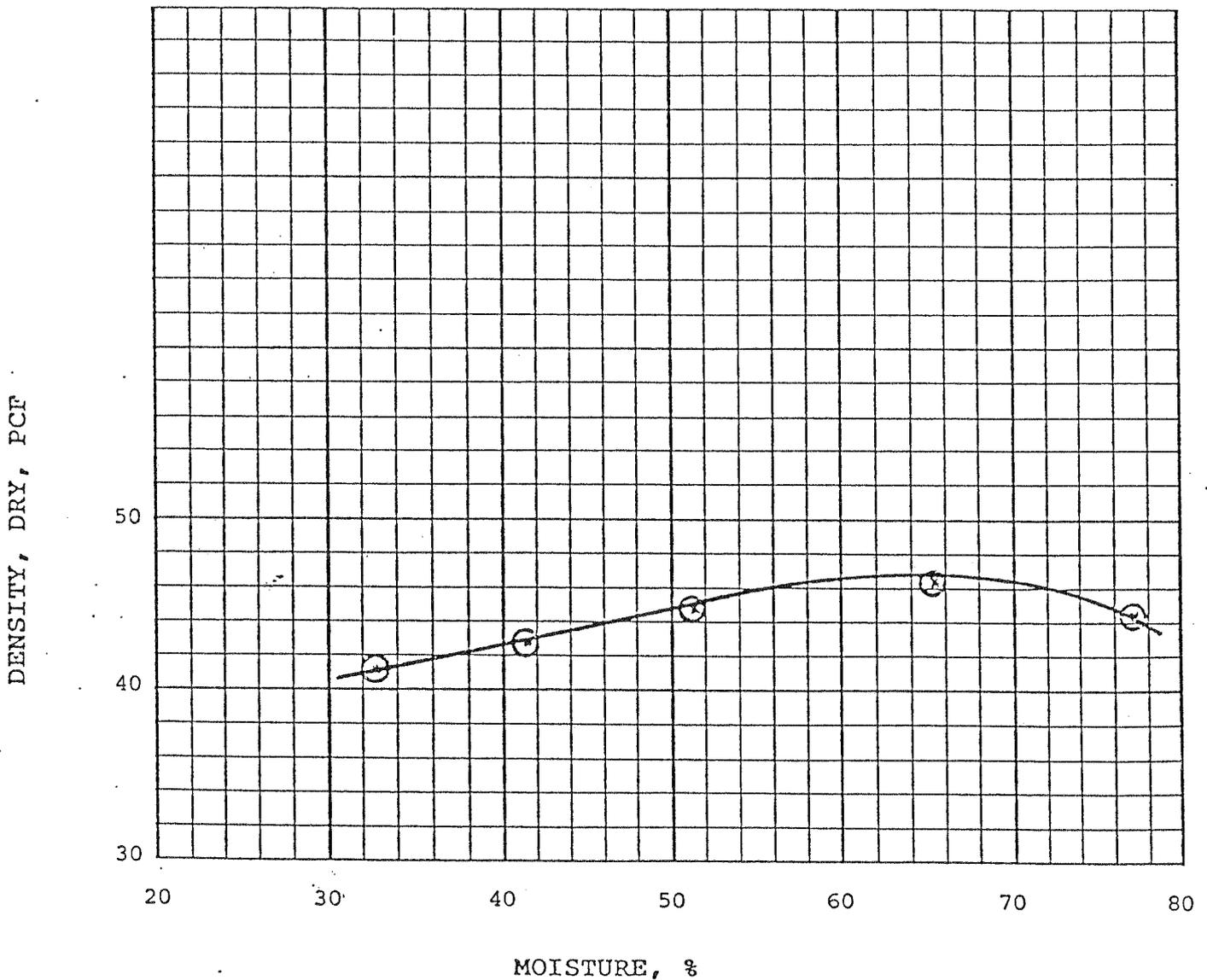
Client: ReUse Technology, Inc.

Job No.: 32-92063

TEST: ASTM D-698, Method A.

MATERIAL: Flyash

MAXIMUM DRY DENSITY: 46.8 pcf at Optimum Moisture of 65.0%.



REPORT OF: MOISTURE-DENSITY RELATIONSHIP

Project: PHYSICAL TESTS OF STOKER BOILER ASH

Date: 4/11/89

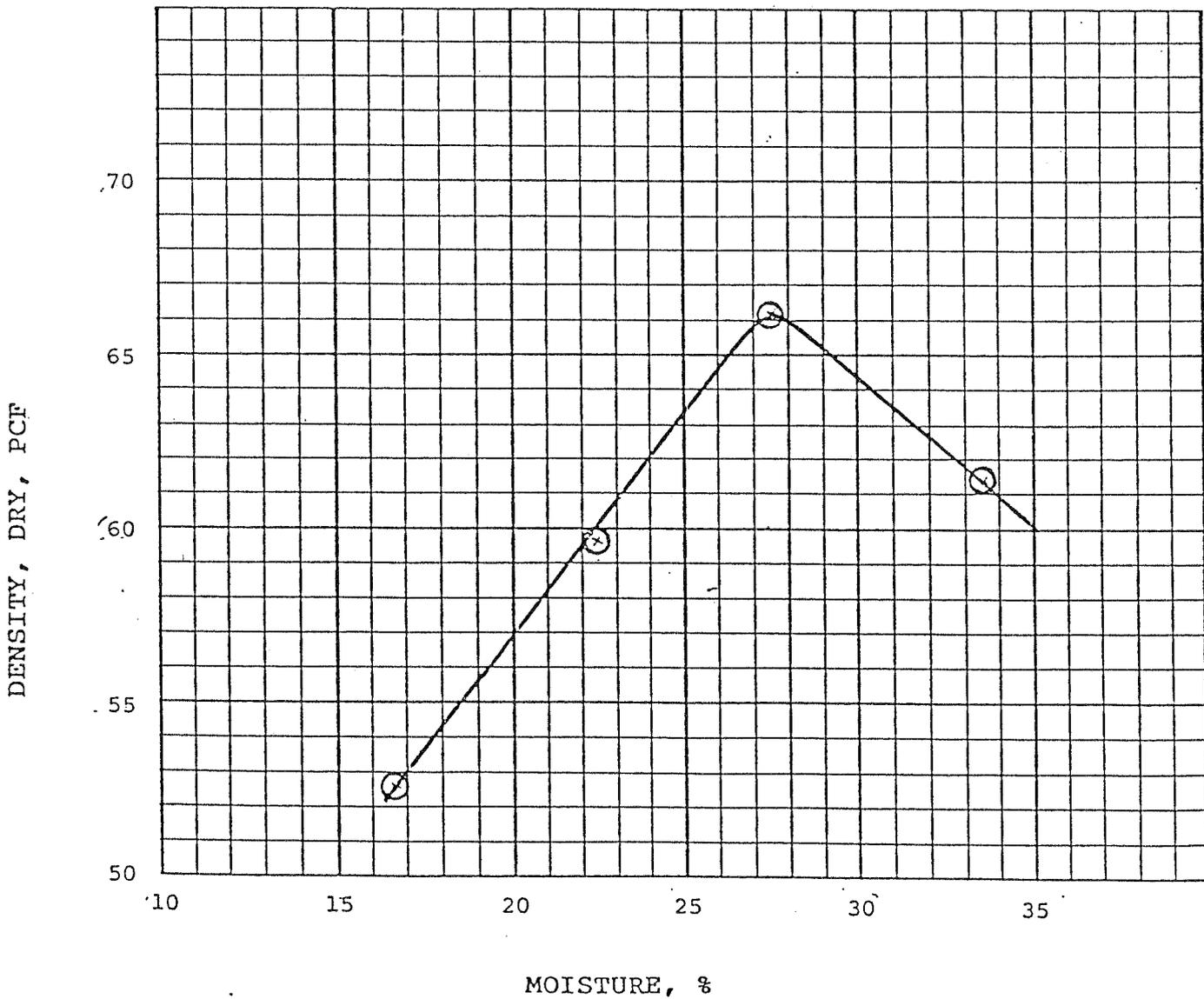
Client: ReUse Technology, Inc.

Job No.: 32-92063

TEST: ASTM D-698, Method A.

MATERIAL: Bottom Ash.

MAXIMUM DRY DENSITY: 66.1 pcf at Optimum Moisture of 27.5%.



Sample Identifications:

F.A. 01-11
A-BAG HOUSE

Date: 03-25-88

Laboratory Report No.: 40006B

Date Received: 3-23-88

Purchase Order No.:

Date Sampled: 3-17-88

Sampled by: Customer

	% As Recd	% Dry
--	-----------	-------

Moisture	0.20	
Ash	33.54	33.61
Volatile		
Fixed Carbon		
Sulfur	0.45	0.45
Btu/lb.	8627	8645

Carbon 16%



AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL INFORMATION CONTAINED HEREIN IS HEREBY DECLARED TO BE THE CONFIDENTIAL PROPERTY OF CLIENTS, AND AUTHORIZATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING THE SAME IS HEREBY DENIED UNLESS PREVIOUSLY SERVED PENDING OUR WRITTEN APPROVAL.

REPORT OF: CALIFORNIA BEARING RATIO TEST

Object: PHYSICAL TESTS OF STOKER BOILER ASH

Date: 4/13/89

Client: ReUse Technology, Inc.

Job No.: 32-92063

ITEM: D-1883

COMPACTION METHOD: HAMMER WEIGHT 5.5 LB., NUMBER OF LAYERS 3 *.

CONDITION OF SPECIMENS: SOAKED, UNSOAKED, SURCHARGE WEIGHT 15 LB.

MATERIAL: A, Flyash
B, Bottom Ash
C, 2/3 Flyash, 1/3 Bottom Ash

SPECIMEN NO. NUMBER OF BLOWS/LAYER *	A	B	C
	55	55	55
INITIAL: % COMPACTION **	101.3	101.1	100.0
DRY DENSITY, PCF	47.4	66.8	53.7
WATER CONTENT, %	67.6	28.6	55.9
SOAKED: % COMPACTION	101.3	101.1	100.0
DRY DENSITY, PCF	47.4	66.8	53.7
WATER CONTENT, %	70.1	33.0	59.5
TOP ONE INCH, %	67.8	31.9	53.5
PERCENT SWELL	0.0	0.0	0.0
BEARING RATIO: 0.1 INCH	12	17	14
0.2 INCH	17	23	18

Respectfully Submitted,

A TEC Associates, Inc.

James W. Bellah, Sr. NICET
Lab Manager

JWB/kb

PERCENT OF MAXIMUM DRY DENSITY, SEE PROCTOR CURVES.

REPORT OF: PERMEABILITY TESTS

Project: PHYSICAL TESTS OF STOKER BOILER ASH

Date: 4/11/89

Client: ReUse Technology, Inc.

Job No.: 32-92063

TYPE TEST: Falling head, specimen's remolded*, and back pressure saturated to achieve a saturated condition prior to test. Reference, U.S. Army Corps of Engineers Manual EM 1110-2-1906, Appendix VII, Permeability tests, and EPA Method 9100, Permeability testing.

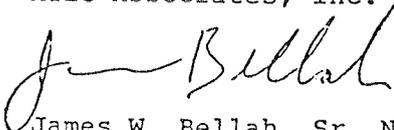
MATERIAL: Test A, Flyash
Test B, 2/3 Flyash and 1/3 Bottom Ash.

<u>TEST</u>	<u>MOISTURE</u> <u>%</u>	<u>DENSITY</u> <u>DRY, PCF</u>	<u>VOID</u> <u>RATIO</u>	<u>SATURATION</u> <u>INITIAL, %</u>	<u>COEFFICIENT OF</u> <u>PERMEABILITY, CM/SEC</u>
A	66.0	44.1	1.970	66.8	9.96×10^{-4}
B	54.8	50.9	1.576	73.0	1.02×10^{-3}

*Specimen's remolded to approximately 95% Standard Proctor (ASTM D 698) maximum dry density.

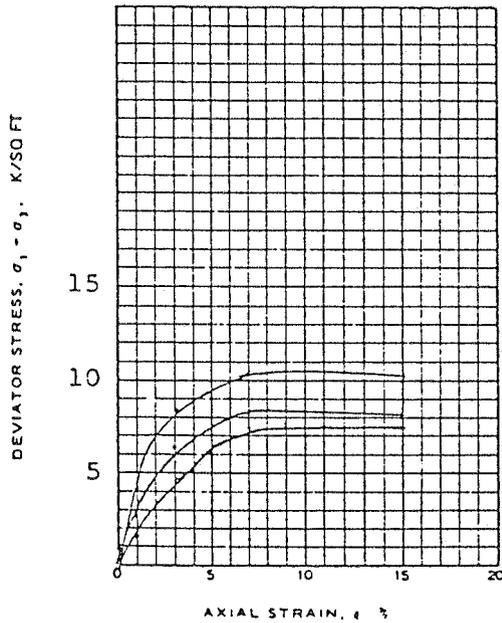
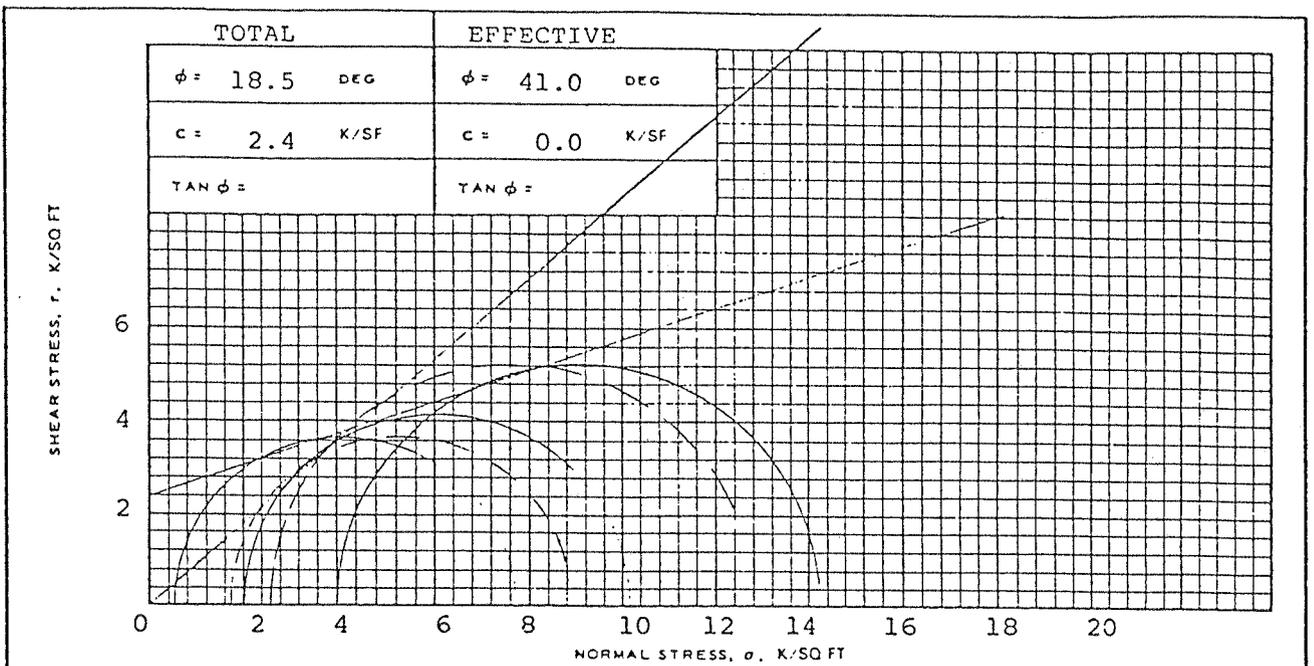
Respectfully Submitted,

ATEC Associates, inc.



James W. Bellah, Sr. NICET
Lab Manager

JWB/kb



SPECIMEN NO.		1	2	3
INITIAL	WATER CONTENT, %	w_o 64.3	64.5	64.7
	DRY DENSITY LB/ CU FT	γ_d 43.9	43.7	44.1
	SATURATION %	s_o 68.1	67.8	69.0
	VOID RATIO	e_o 1.983	1.996	1.971
BEFORE SHEAR	WATER CONTENT, %	w_c 92.4	91.4	88.4
	DRY DENSITY LB/ CU FT	γ_{d_c} 44.6	44.9	45.9
	SATURATION %	s_c 100	100	100
	VOID RATIO	e_c 1.941	1.919	1.856
	FINAL BACK PRESSURE, PSI	u_o 98.0	98.0	98.0
MINOR PRINCIPAL STRESS, K/SQ FT	σ_3	0.50	2.00	4.00
MAXIMUM DEVIATOR STRESS, K/SQ FT	$(\sigma_1 - \sigma_3)_{MAX}$	7.42	8.31	10.43
ULTIMATE DEVIATOR STRESS, K/SQ FT	$(\sigma_1 - \sigma_3)_{ULT}$	7.16	8.05	10.02
INITIAL DIAMETER, IN.	D_o	1.4	1.4	1.4
INITIAL HEIGHT, IN.	H_o	3.0	3.0	3.0

CONTROLLED- Strain, 0.1% / Min.

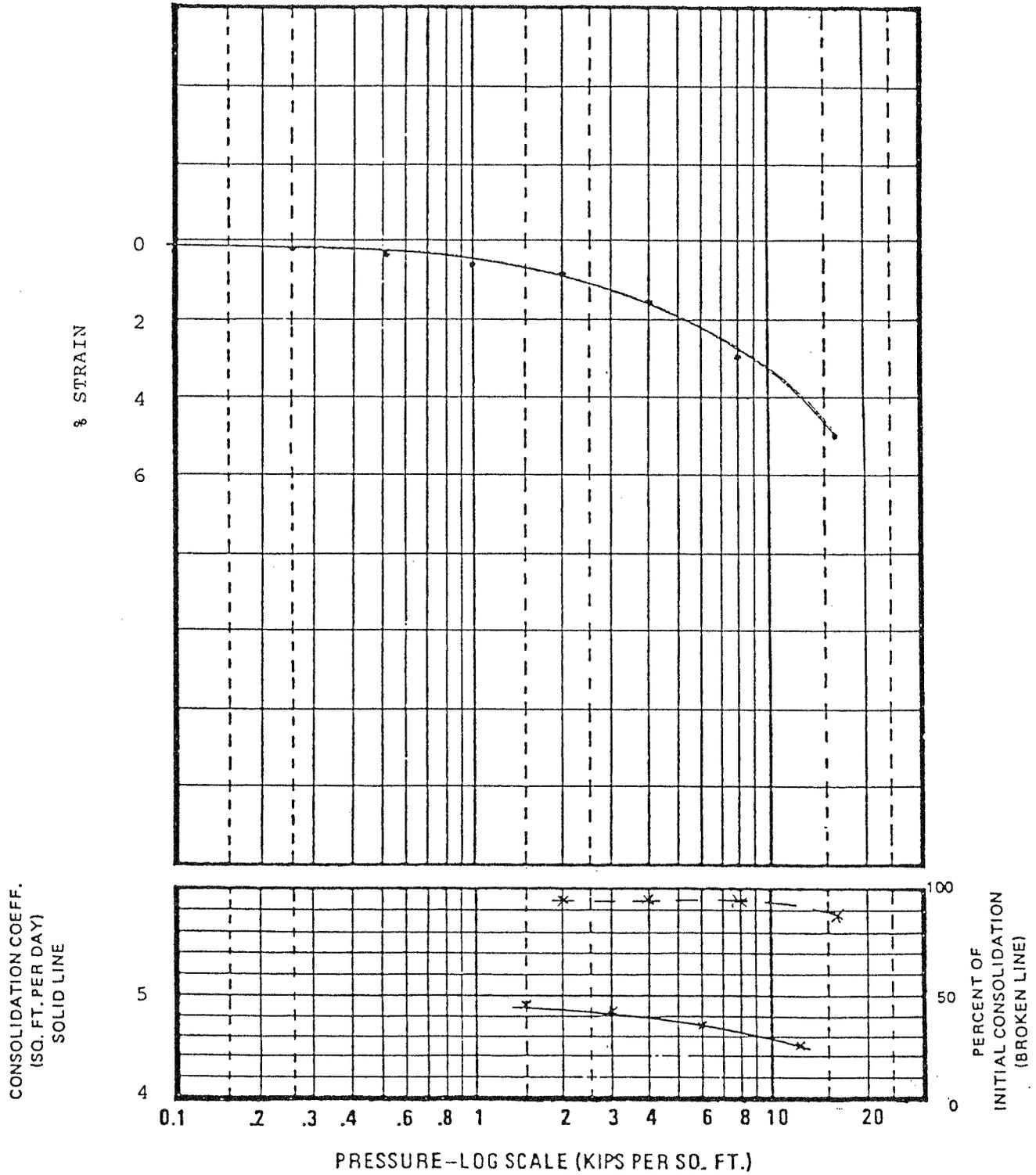
DESCRIPTION OF SPECIMENS Flyash

LL	PL	PI	TYPE OF SPECIMEN	TYPE OF TEST
-	-	-	Remolded*	\bar{R} , Sat.
REMARKS			PROJECT	Physical tests of Stoker Boiler
*Specimen's remolded to approximately 95% Standard Proctor (ASTM D 698) maximum dry density.			Ash	PROJECT NO 32-92063
			BORING NO	-
			DEPTH/FLEV	-
			SAMPLE NO	-
			DATE	4/19/89
TRIAxIAL COMPRESSION TEST REPORT				

DESCRIPTION Flyash

WATER CONTENT (%)	<u>62.9</u>
SATURATION (%)	<u>69.1</u>
LIQUID LIMIT	<u>-</u>
PLASTIC LIMIT	<u>-</u>

NOTE: Sample remolded to approximately 95% Standard Proctor and tested "Flooded".

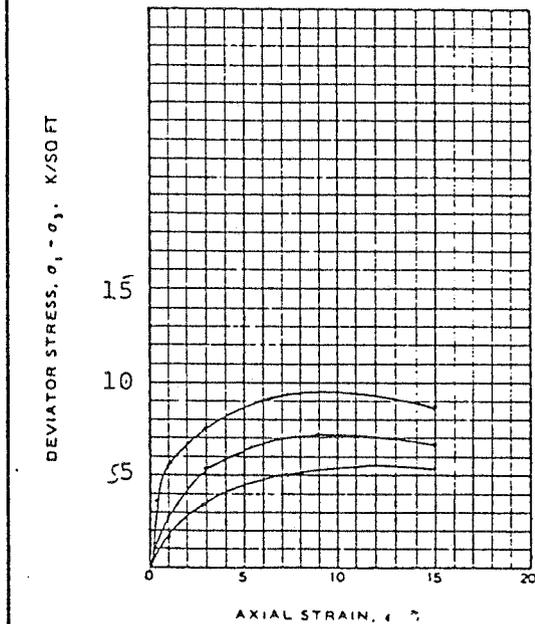
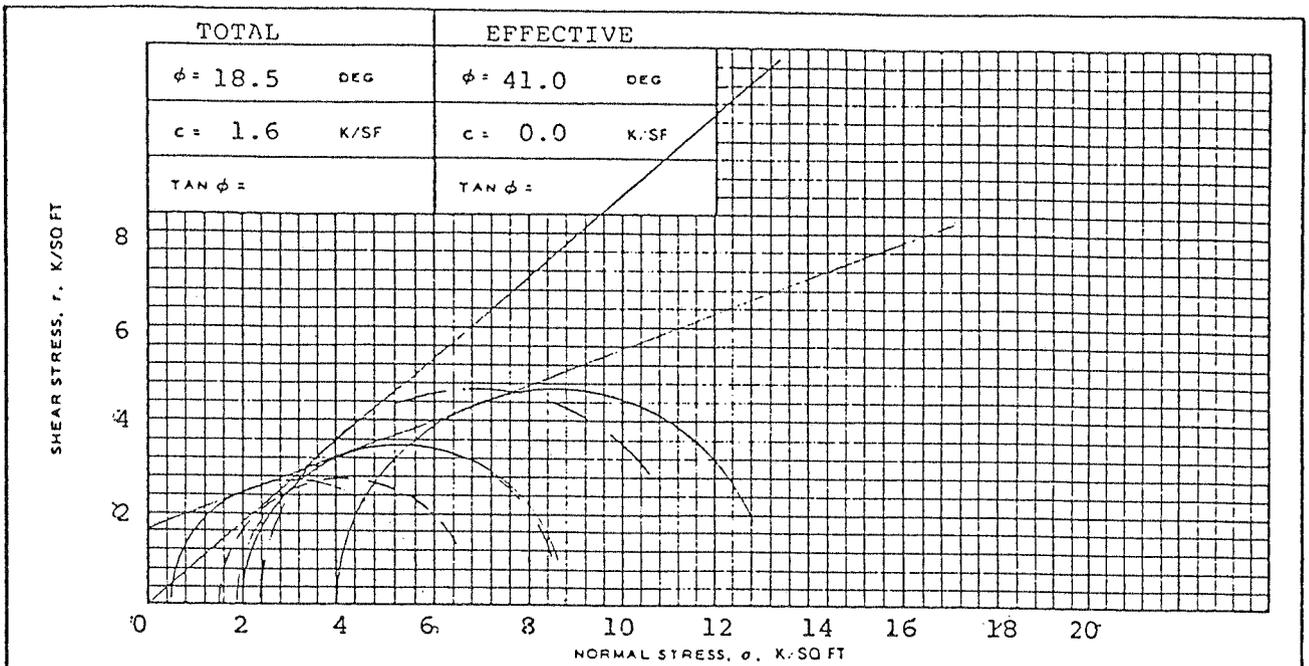


CONSOLIDATION TEST RESULTS

Physical Tests of Stoker Boiler Ash

ATEC
ASSOCIATES, INC.





SPECIMEN NO.		1	2	3
INITIAL	WATER CONTENT, %	w_o 54.3	55.5	55.2
	DRY DENSITY LB./CU FT	γ_{d_o} 51.3	51.2	51.4
	SATURATION %	s_o 73.3	74.7	74.7
	VOID RATIO	e_o 1.554	1.560	1.552
BEFORE SHEAR	WATER CONTENT, %	w_c 71.6	71.5	69.6
	DRY DENSITY LB./CU FT	γ_{d_c} 52.1	52.4	53.2
	SATURATION, %	s_c 100	100	100
	VOID RATIO	e_c 1.516	1.501	1.461
	FINAL BACK PRESSURE, PSI	u_o 118.0	118.0	118.0
MINOR PRINCIPAL STRESS, K/SQ FT		σ_3 0.50	2.00	4.00
MAXIMUM DEVIATOR STRESS, K/SQ FT		$(\sigma_1 - \sigma_3)_{MAX}$ 5.46	7.08	9.47
ULTIMATE DEVIATOR STRESS, K/SQ FT		$(\sigma_1 - \sigma_3)_{ULT}$ 5.22	5.82	8.69
INITIAL DIAMETER IN.		D_o 2.8	2.8	2.8
INITIAL HEIGHT, IN.		H_o 6.2	6.2	6.2

CONTROLLED- Strain, 0.1% / Min.

DESCRIPTION OF SPECIMENS 2/3 Flyash and 1/3 bottom ash.

LL - PL - PI - TYPE OF SPECIMEN Remolded TYPE OF TEST R Sat.

REMARKS *Specimen's remolded to approximately 95% Standard Proctor (ASTM D 698) maximum dry density.

PROJECT Physical tests of Stoker Boiler Ash. PROJECT NO 32-92063

BORING NO -

DEPTH/FEET -

SAMPLE NO -

DATE 4/21.89

TRIAxIAL COMPRESSION TEST REPORT

REPORT OF: MOISTURE-DENSITY RELATIONSHIP

Project: PHYSICAL TESTS OF STOKER BOILER ASH

Date: 4/7/89

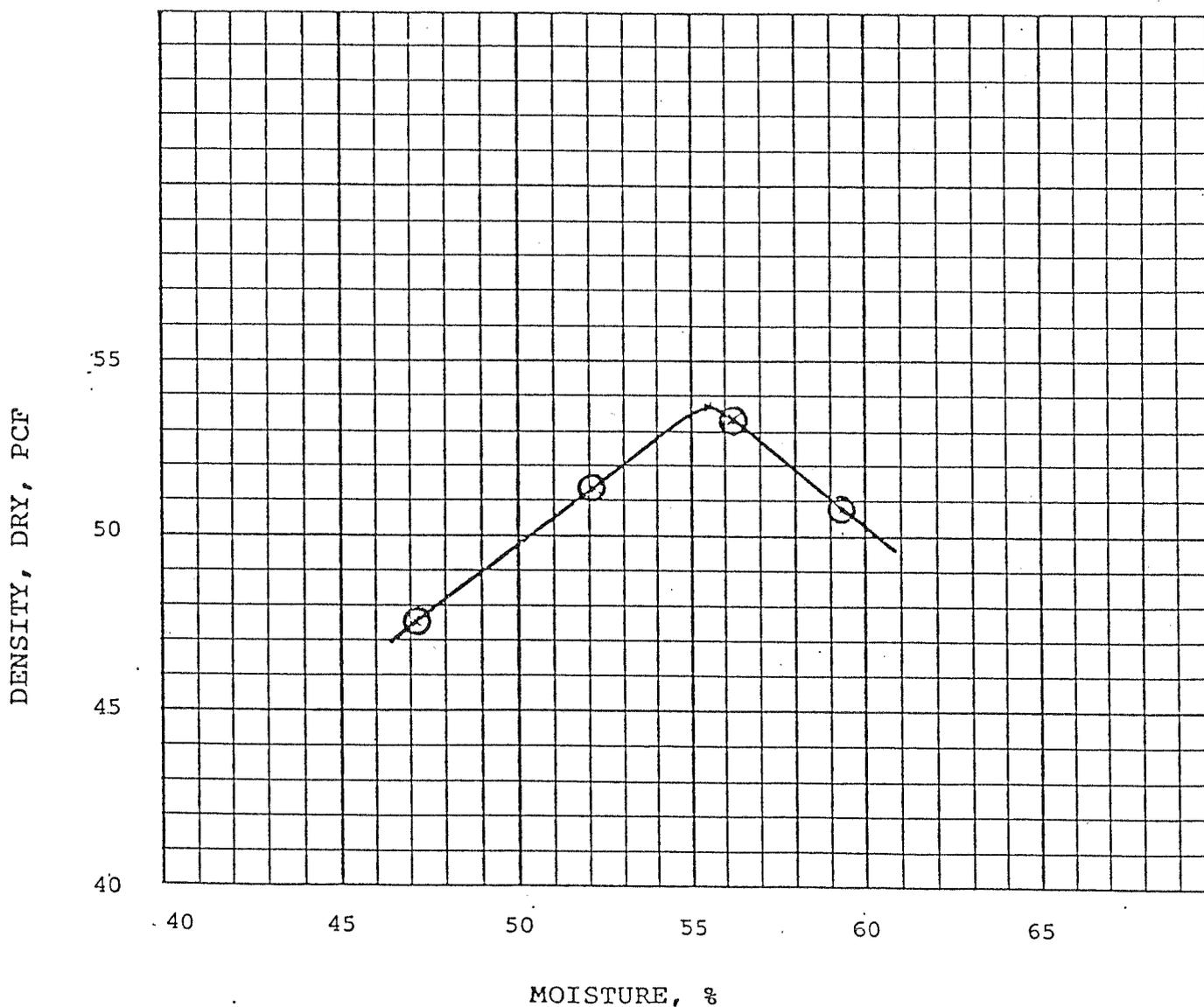
Client: ReUse Technology, Inc.

Job No.: 32-92063

TEST: ASTM D-698, Method A.

MATERIAL: 2/3 Flyash, 1/3 Bottom ash.

MAXIMUM DRY DENSITY: 53.7 pcf at Optimum Moisture of 55.5%.



REPORT OF: L.O.I. TESTS

Project: PHYSICAL TESTS OF STOKER BOILER ASH

Date: 4/13/89

Client: ReUse Technology, Inc.

Job No.: 32-92063

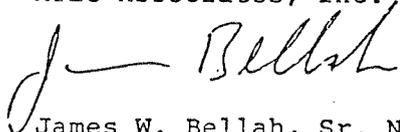
TEST: ASTM D-2974, Lost on Ignition (organic content).

MATERIAL: Fly Ash.

U.S. SIEVE:	20	40	60	100	200
% RETAINED:	2	17	12	9	12
LOI %:	323	455	168	104	81

Respectfully Submitted,

A TEC Associates, Inc.



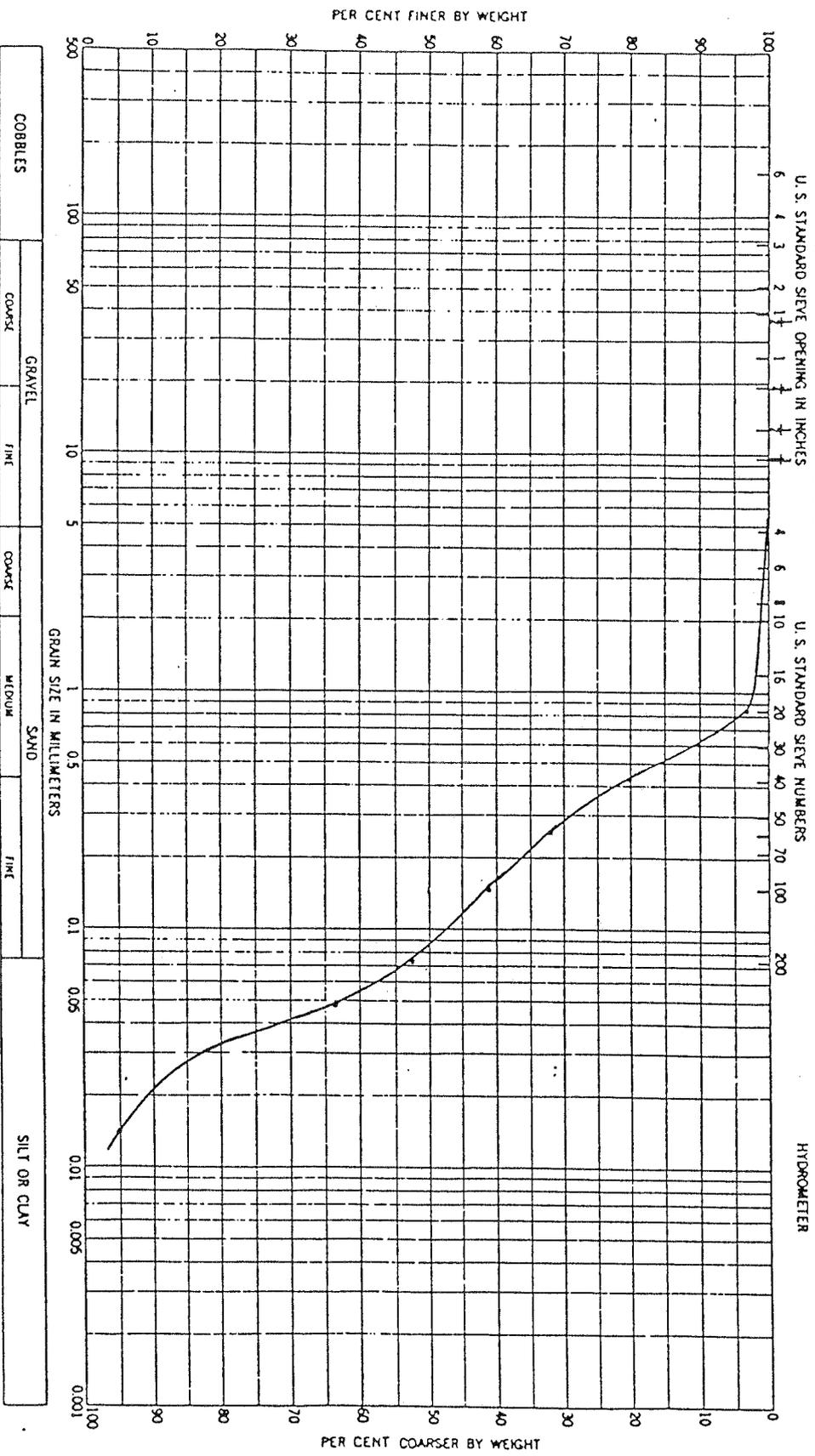
James W. Bellah, Sr. NICET
Lab Manager

JWB/kb

Project PHYSICAL TESTS OF STOKER BOILER ASH

Job No. 32-92063

Date 3/23/89



Boring No.	Sample No.	Elev or Depth	Classification	Net w %	LL	PL	PI
-	-	-	Flyash.	-	-	-	-

GRADATION CURVES

ATEC Associates, Inc.
 of Georgia
 1190 Hayes Industrial Drive, NE
 Marietta, Georgia 30062
 404-427-9456



ReUse Technology, Inc.

PERMITTING · DISPOSAL PLANNING · REUSE

100 Chastain Center Blvd.
Suite 155
Kennesaw, Georgia 30144
Phone (404) 425-7676
Fax (404) 425-7681



July 17, 1990

Mr. Jim Coffey
North Carolina Department of Environment,
Health, and Natural Resources
Solid Waste Management Section
401 Oberlin Building
Raleigh, North Carolina 27602

Dear Mr. Coffey:

We are seeking approval to utilize coal ash on approximately 3 acres of commercial property located in Rocky Mount, North Carolina. We propose the use of coal ash as structural fill in the development of this tract (see enclosed site plan). The coal ash to be used in this development will be obtained from Cogentrix's fossil plants. The results of EP Toxicity tests performed on representative samples of coal ash are also enclosed. This placement will be conducted in the same manner as approved by your office in the development of the Fountain Industrial Park in Edgecombe County, North Carolina, June 1989.

To prevent dusting, all ash will be conditioned to 15% moisture and transported in tarped dump trucks. To facilitate compaction, the moisture of the ash will be adjusted at the site by use of a water wagon. All coal ash structural fill within the development area will be capped with a minimum 6-inch earth cover. Slopes will receive 12 inches minimum compacted earth and 6 inches of topsoil. Site development will be in accordance with an approved erosion and sediment control plan.

As part of the approval for this specific project we will agree to the following special conditions:

1. Approval for use of coal ash shall become voidable unless the facilities area constructed in accordance with the approved plans, specifications, and other supporting data.
2. Approval is subject to the nature and a volume

of wastes discussed and other supporting data.

3. The facilities shall be properly maintained and operated at all times.
4. This approval is not transferable.
5. In the event that the facilities fail to perform satisfactorily, including the creation of nuisance conditions, ReUse Technology (RT) shall take such immediate corrective action as may be required by this Section including the construction of additional or replacement wastewater treatment or disposal facilities.
6. Approval may be rescinded unless the reuse program is carried out in a manner which will protect the assigned water quality and groundwater quality standard.
7. All ash utilization on roadways shall be performed in accordance with N.C. Department of Transportation specifications.
8. The facilities shall be effectively maintained and operated as a non-discharge system to prevent the discharge of any wastewater resulting from the operation of this facility.
9. The issuance of this approval shall not relieve RT of the responsibility for damages to surface of groundwaters resulting from the operation of this facility.
10. Adequate records of the ash use program shall be maintained by RT. These records shall include but are not necessarily limited to the following:
 - a. date of ash application,
 - b. type of ash used,
 - c. type of application,
 - d. volume of ash applied in tons,
 - e. location of use, and
 - f. ash receiver.
11. No ash shall be placed within 100 feet of any water supply well.
12. No ash shall be placed within one foot of the mean season high water table.
13. RT shall provide an ash analysis to all users.

14. The following buffers shall be maintained:
 - a. 100 feet between application area and any residence, place of business, or place of public assembly, unless permission is first obtained from the property owner.
 - b. 50 feet between application area and any stream, creek, lake, pond or other surface water body.
 - c. 100 feet between application area and property lines unless permission is first obtained from adjacent property owners.
15. Adequate provisions shall be taken to prevent wind erosion and surface runoff from conveying pollutants from the ash application area onto the adjacent property or into the surface waters.
16. The following uses of ash are hereby authorized:
 - a. Fly ash and bottom ash may be used for structural fills such as roadway embankments and foundations.
 - b. Fly ash and bottom ash may be used for backfill materials around water, sewer and storm drain piping.
 - c. Bottom ash may be used for secondary road overlay.

Your prompt attention to this request would be greatly appreciated. To support the needs of our client, we would like to begin this project on August 1, 1990. If there are any questions please call Bob Waldrop at (404) 425-7676.

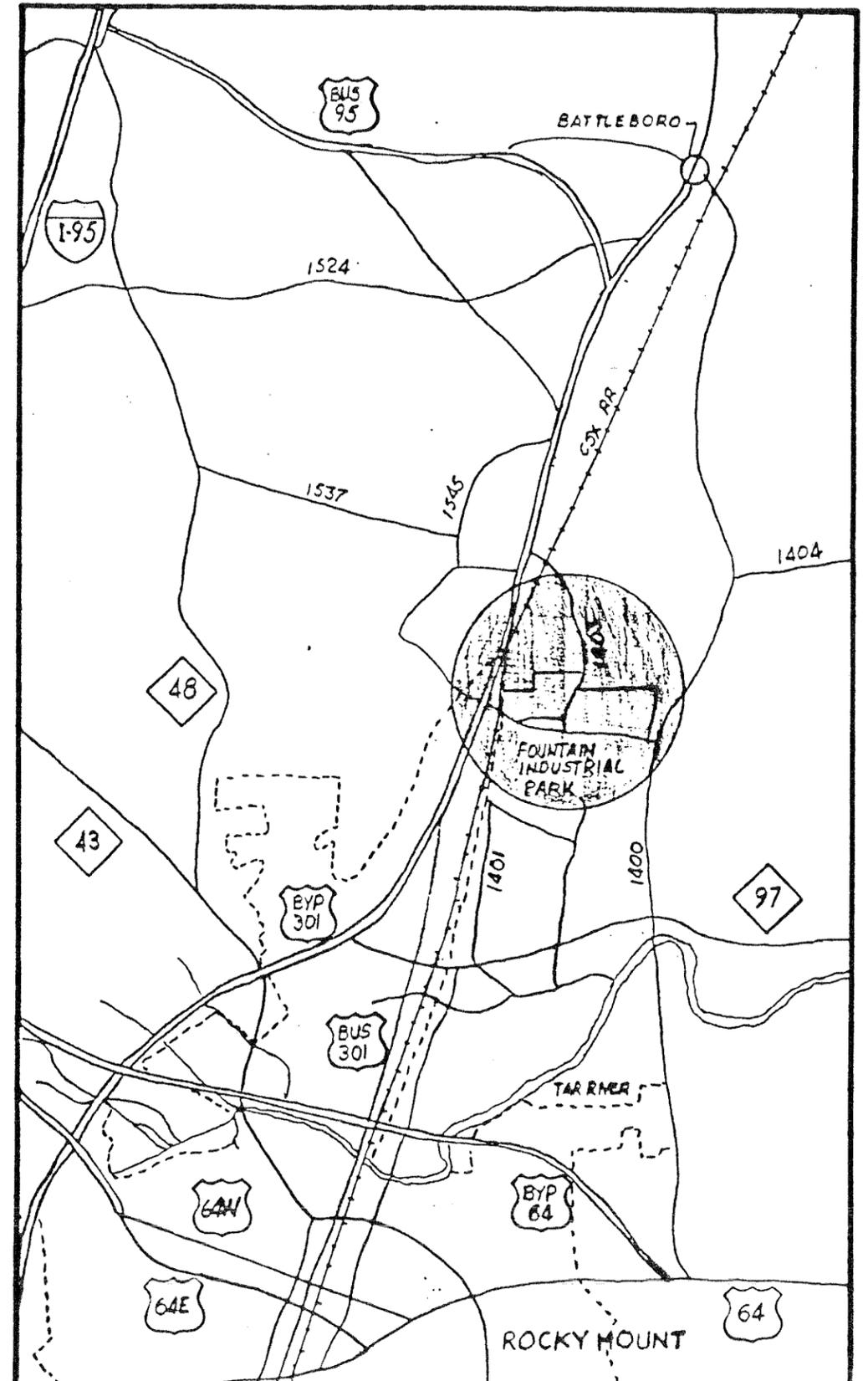
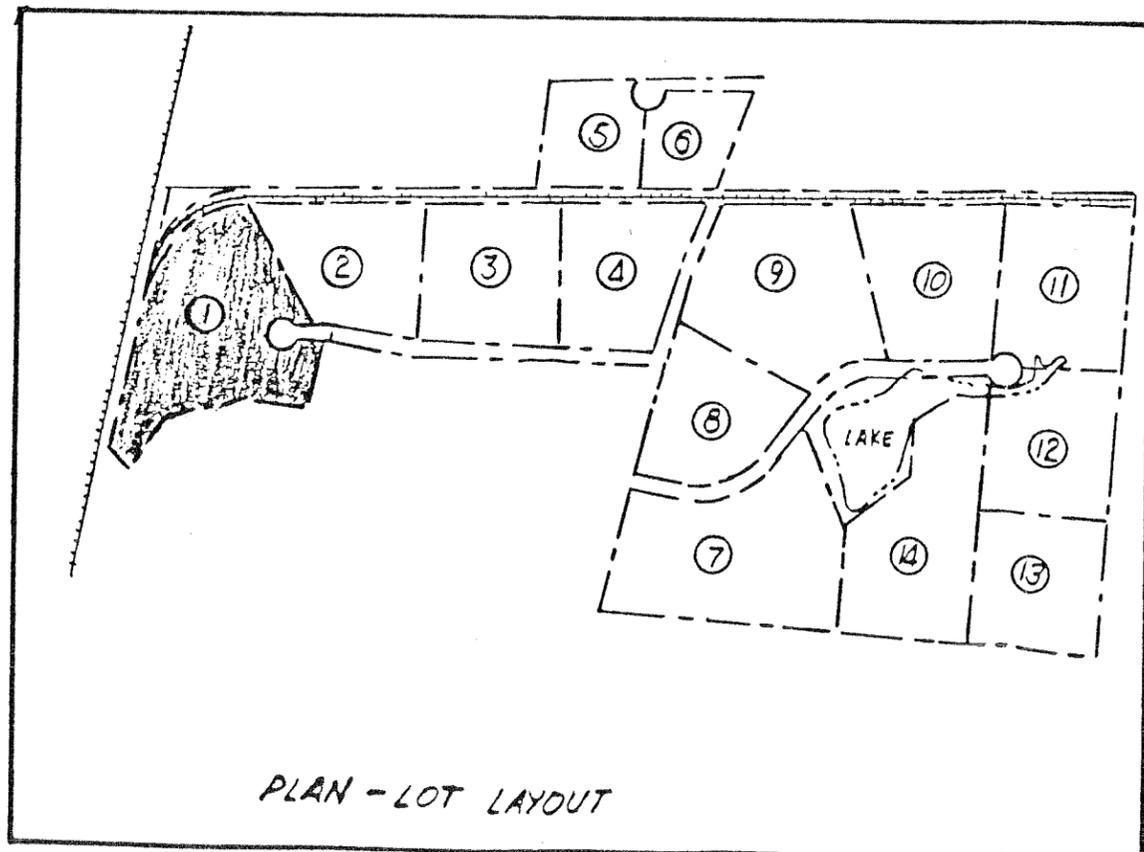
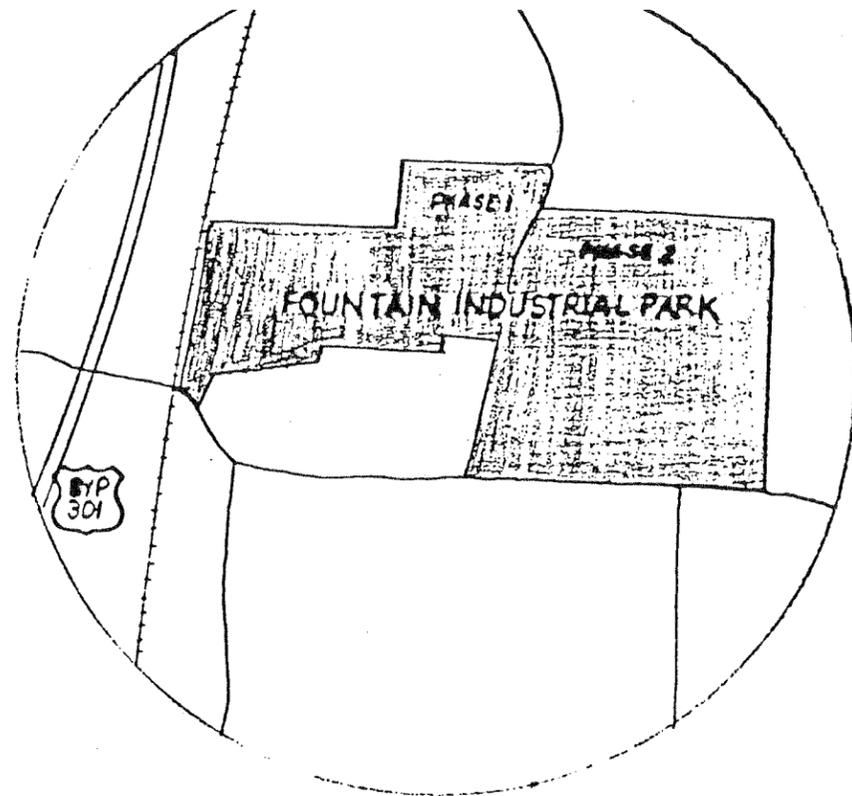
Sincerely,

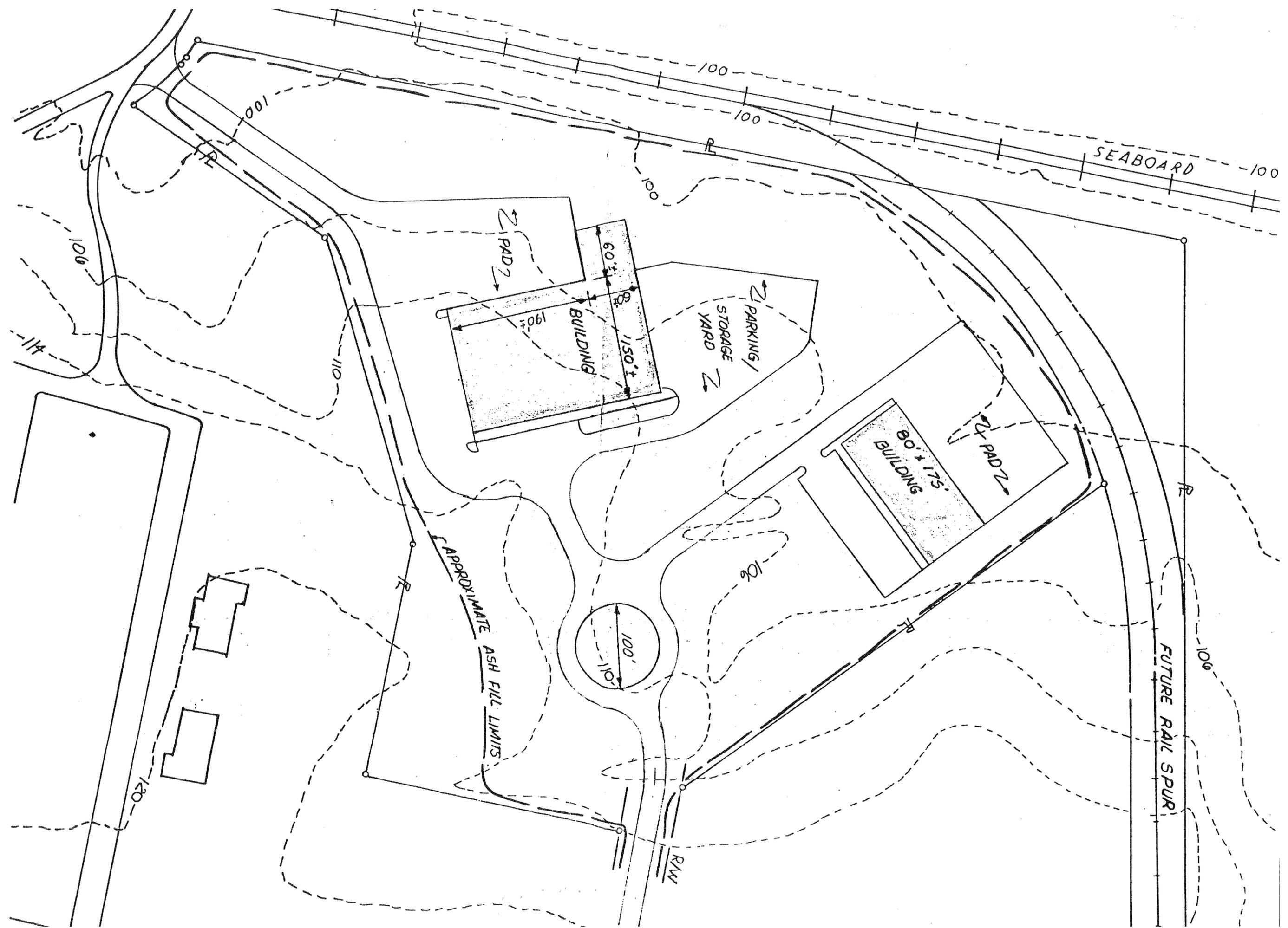


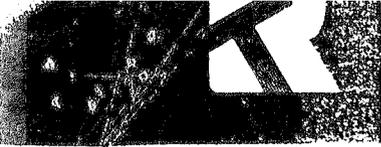
Robert J. Waldrop
Environmental Manager

RJW/dmn

Attachment







ReUse Technology, Inc.

PERMITTING • DISPOSAL PLANNING • REUSE

100 Chastain Center Blvd.
Suite 155
Kennesaw, Georgia 30144
Phone (404) 425-7676
Fax (404) 425-7681

RECEIVED

OCT 25 1991

SOLID WASTE MANAGEMENT
FAYETTEVILLE REGIONAL OFFICE

October 18, 1991

Mr. Terry F. Dover
North Carolina Department of Environment,
Health and Natural Resources
Solid Waste Section
225 Green Street
Wachovia Building; Suite 601
Fayetteville, North Carolina 28301

Re: Coal ash reuse projects

Dear Mr. Dover:

In our meeting at Boogle Bay Raceway on October 10, 1991, I promised to forward several pieces of information. Attached are the following:

1. NCDEHNR approval letter - On August 22, 1990, Gordon Layton approved the use of coal ash as structural fill on the Randy Vann property. This project is the 3 acre tract on Highway 301 in Rocky Mount adjacent to the project we are now operating. The Randy Vann project was completed in the spring of this year.
2. Updated Leachate Analysis - The attached TCLP analysis is for a composite sample of coal ash from the Cogentrix plants in Hopewell and Portsmouth, Virginia. The sample was taken from the Highway 301 - Randy Vann project. All leachate parameters were measured at detection limits at or below drinking water standards.

I am in the process of having similar TCLP analyses performed on ash from every plant we handle. I will forward to you the results of these analyses when they are completed. I will also be happy to update this data every second year as you requested.

3. Groundwater Monitoring Data - The attached data is from Lot 1 of Fountain Industrial Park in Rocky Mount. Well MW-1 is the background well. Wells



Printed on Recycled Paper

Mr. Terry Dover
October 18, 1991
Page 2

MW-2 and MW-3 are downgradient of the coal ash fill. The samples dated August 13, 1989 were taken prior to placing coal ash on the site. As we discussed, I will send future test results to you and the Raleigh regional groundwater office.

As you are aware, ReUse Technology is planning several land development projects in both Rocky Mount and Fayetteville. Prior to starting construction on these projects we will request your approval and submit our design and operational specification packages.

If there are any questions, please call Bob Waldrop at (404) 425-7676.

Sincerely,



Robert J. Waldrop
Environmental Manager

RJW/pce

Attachments



RT Environmental Services

A Division of ReUse Technology, Inc.

100 Chastain Center Blvd.
Suite 155
Kennesaw, Georgia 30144
Phone (404) 425-7878
Fax (404) 425-7881

June 20, 1991

The following TCLP analytical results have been obtained for the indicated sample which was submitted to this laboratory:

Sample I.D. - RT00137
Location: Cogentrix Hopewell and Portsmouth
Composite ash sample
Sample Collection Date: 01/07/91
Laboratory Submittal Date: 01/18/91

The first table gives a brief description of the AA method used, the minimum detection level and reporting units for each metal. The second table gives the actual analytical results expressed in the appropriate reporting units given in Table 1.

Table 1

	<u>AA Method</u>	<u>Minimum Detection Level</u>	<u>Reporting Units</u>
Arsenic	Furnace	0.001	mg/L (ppm)
Barium	Flame	0.5	mg/L (ppm)
Cadmium	Furnace	0.00002	mg/L (ppm)
Chromium	Furnace	0.0005	mg/L (ppm)
Lead	Furnace	0.0003	mg/L (ppm)
Mercury	Cold Vapor	0.00001	mg/L (ppm)
Selenium	Furnace	0.0025	mg/L (ppm)
Silver	Flame	0.01	mg/L (ppm)

Table 2

	<u>RT00137</u>	<u>Regulatory Limit</u>
Arsenic	0.0119	5.0
Barium	5.20	100.0
Cadmium	0.00193	1.0
Chromium	0.00516	5.0
Lead	0.0447	5.0
Mercury	<0.001	0.2
Selenium	0.0507	1.0
Silver	<0.1	5.0

Please feel free to call if you have any questions concerning these data.

Sincerely,

Gordon LaPean
Laboratory Manager

TABLE 2

Chronology of Analytical Results for RCRA Metals
 Fountain Industrial Park Site
 Rocky Mount, North Carolina
 Westinghouse Project No. REW-A-515

WELL ID	RCRA METAL	SAMPLING DATES/CONCENTRATION*							
		08/13/89	12/18/89	03/28/90	06/07/90	09/07/90	** 03/05/91	** 09/05/91	
MW-3	Arsenic	.02	.02	.010	.010	.010	<.01	<.01	
	Barium	.33	.39	.24	.14	.25	<.50	.37	
	Cadmium	<.01	<.01	<.01	<.01	<.01	<.01	.015	
	Chromium	.04	<.03	.05	<.03	.05	<.05	.078	
	Lead	.02	.02	.02	.03	.040	<.05	<.05	
	Mercury	<.0005	<.0005	<.0005	<.0005	<.0010	<.001	<.001	
	Selenium	<.01	<.01	<.01	<.01	<.01	<.01	<.01	
	Silver	<.05	<.05	<.05	<.05	<.05	<.05	<.005	

* Numbers listed represent concentration in mg/L, or parts per million (ppm).

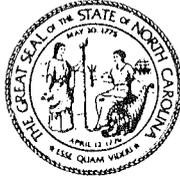
** Samples taken these dates analyzed by Westinghouse Lab in Charlotte, North Carolina.

TABLE 3

Analytical Results for Purgable Aromatics (EPA Method 602)
 September 5, 1991 Sampling Event
 Fountain Industrial Park
 Rock Mount, North Carolina
 Westinghouse Project No. REW-A-515

COMPOUND	MW-1	MW-2	MW-3
Benzene	BQL	BQL	BQL
Chlorobenzene	BQL	BQL	BQL
1,2-dichlorobenzene	BQL	BQL	BQL
1,3-dichlorobenzene	BQL	BQL	BQL
1,4-dichlorobenzene	BQL	BQL	BQL
Ethylbenzene	BQL	BQL	BQL
Toluene	4.2	BQL	BQL
Total Xylenes	BQL	BQL	BQL

BQL - Below Quantitation Limit (1.0 $\mu\text{g/L}$ for each compound).



State of North Carolina
Department of Environment, Health, and Natural Resources
Division of Solid Waste Management
P.O. Box 27687 · Raleigh, North Carolina 27611-7687

James G. Martin, Governor
William W. Cobey, Jr., Secretary

William L. Meyer
Director

April 23, 1992

Mr. Robert J. Waldrop
Environmental Manager
ReUse Technology, Inc.
100 Chastain Center Blvd., Suite 155
Kennesaw, Georgia 30144

RE: Coal Ash Utilization Demonstration Project
Fountain Industrial Park, Rocky Mount
Edgecombe County

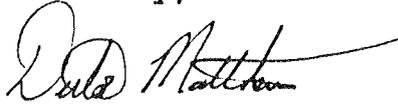
Dear Mr. Waldrop:

The Solid Waste Section has reviewed the referenced project to utilize coal ash from the cogeneration facility in Chapel Hill. This demonstration project, which would utilize approximately 200 tons of material, is to demonstrate the ability to harden ash for rail transportation.

As long as the material is re-used at the Fountain Industrial Park in accordance with our correspondence dated June 15, 1989 from Gordon Layton, your proposal will continue to meet the guidelines previously agreed upon.

If you have any question, please do not hesitate to contact our office at (919)733-0692.

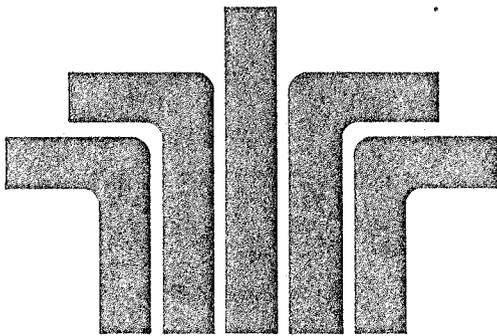
Sincerely,


Dexter Matthews
Section Chief
Solid Waste Section

cc: Terry Dover
Bryan Fisher
Mark Fry

RECEIVED
APR 21
SOLID WASTE MANAGEMENT SECTION

RECEIVED
APR 21 1989
SOLID WASTE MANAGEMENT SECTION



FOUNTAIN
Industrial Park

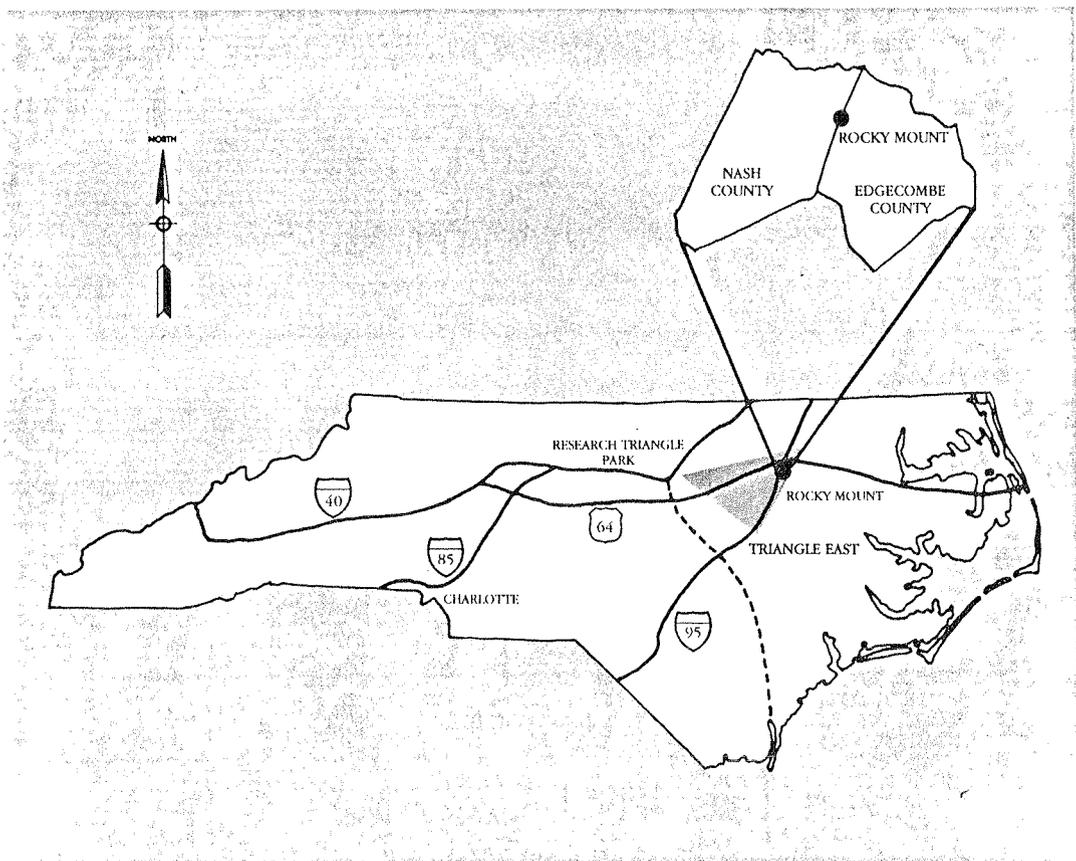


Fountain Industrial Park is the only project of its kind in the Rocky Mount area. It is designed specifically for companies that require prestigious, smaller sites with major highway access and rail line availability. Soon, you will realize that these are just a few of the many benefits awaiting you at Fountain.

Fountain Industrial Park is located northeast of Rocky Mount just off U.S. 301 Bypass. This location is near N.C. Wesleyan College and is adjacent to Rocky Mount's newest industrial corridor. It is just minutes away from I-95 and U.S. 64 and is adjacent to the CSX railway mainline from New York to Florida.

Sites are available up to 14 acres . . . all with ample water and wastewater lines provided. Many of the sites overlook a scenic six-acre lake and most are surrounded by tall pines. The building areas are already cleared and ready for development. The character of the park reflects the quality image of the companies that locate here. Protective covenants have been designed to enhance that image and to insure the future value of the property.

One of the features you'll like best about Fountain is the price. The park is being developed by a non-profit organization dedicated to the further development of Edgecombe County and the surrounding area. Thus, the lots are reasonably priced and can be tailored to meet your specific needs.





Rocky Mount, North Carolina is an exciting, dynamic community with a rich history and a predictably bright future.

Founded in 1750 on the falls of the Tar River, Rocky Mount has always been the retail and manufacturing hub for eastern North Carolina. Rocky Mount's first major industry was Rocky Mount Mills . . . the oldest cotton spinning mill still in operation in N.C.

More than 20 Fortune 500 companies are located in Rocky Mount, including the corporate headquarters for Hardee's Food Systems and manufacturing facilities for Abbott Laboratories, Allied Bendix, Burlington Industries and others. The diversity of the industrial base yields a wide variety of occupational and technical skills particularly since one third of the labor force is employed in manufacturing.

Generally speaking, all costs of living (and working) in Rocky Mount are well below the state and national averages. You'll be especially pleased with the average manufacturing wages, state & local taxes and utility costs. Specific data is available upon request.

A pro-business attitude among business and government leaders is also found throughout the area as evidenced by a number of public/private development projects.

Highlighting the area and Rocky Mount, "The City on the Rise," are the following:

Population (10th largest in N.C.)

- City—50,000
- 25 Mile labor draw area—200,000

Transportation

- Amtrak & CSX mainline . . . New York to Florida
- I-95 North/South
- US 64 East/West
- Rocky Mount-Wilson Airport . . . 15 minutes from the park . . . daily commercial commuter flights
- Raleigh-Durham airport . . . 70 minutes away . . . served by 10 major airlines
- Port facilities . . . only 2 1/2 hours away . . . Norfolk, VA; Wilmington, NC; Morehead City, NC.

Education

- North Carolina Wesleyan College, a 4-year accredited liberal arts college
- Edgecombe Community College and Nash Community College, 2 year institutions providing specialized training for industry
- The University of North Carolina, East Carolina University, N.C. State and Duke are approximately one hour away.

Location

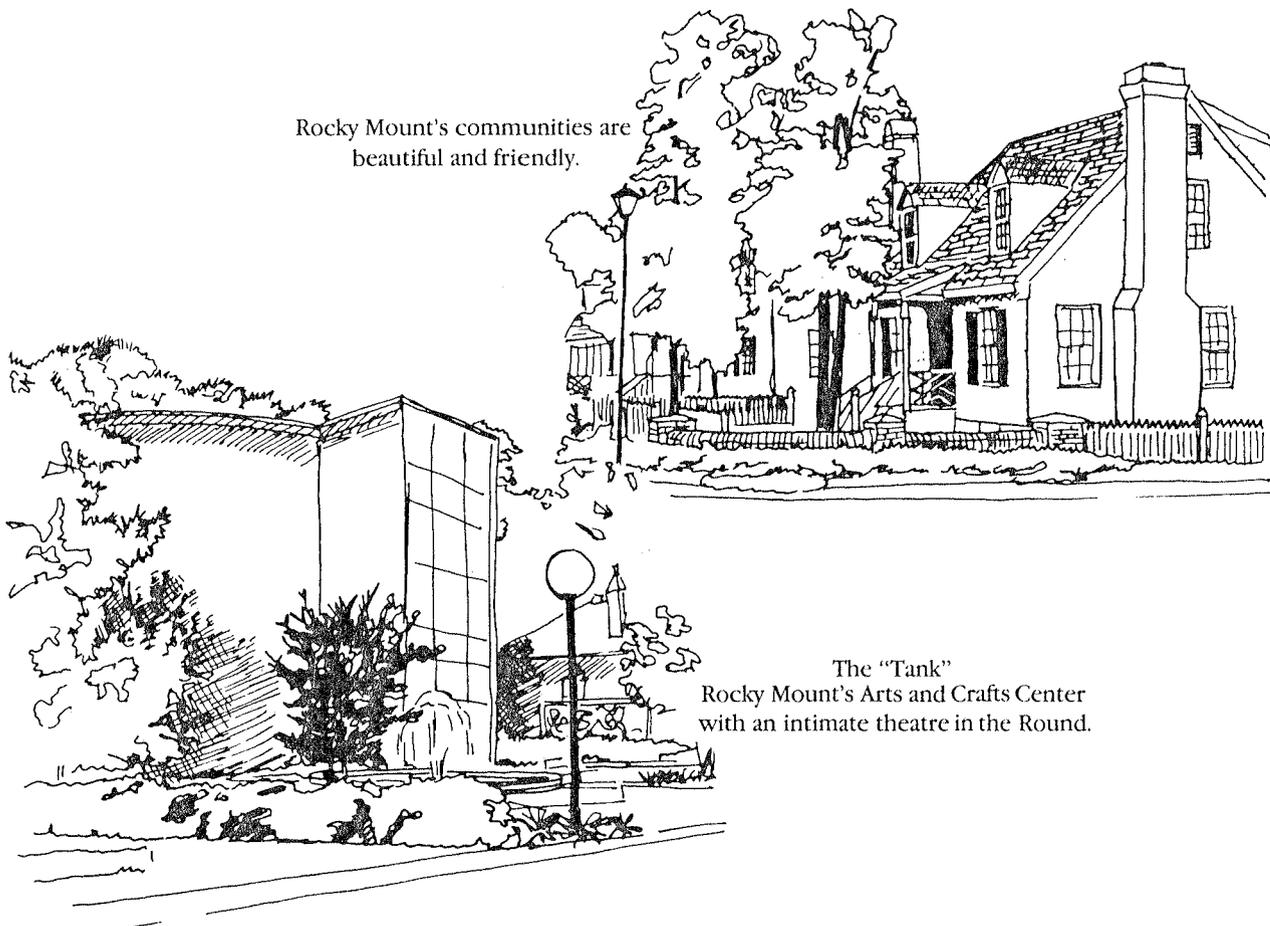
- Rocky Mount is shared by Edgecombe and Nash Counties in North Central North Carolina
- One hour east of Raleigh, NC
- Two hours south of Richmond, VA
- Less than one day's truck drive from New York, Atlanta and Jacksonville, FL

Health Care

- Two hospitals, Nash General and Community Hospital are located within the city limits
- An alcohol & drug rehabilitation center and head trauma center in the immediate area



Rocky Mount's communities are
beautiful and friendly.



The "Tank"
Rocky Mount's Arts and Crafts Center
with an intimate theatre in the Round.

Rocky Mount is a Great Place to Live!

In addition to the outstanding "pro-business" climate, you'll find the Quality of Life in Rocky Mount and the surrounding area to be exceptional. The Blue Ridge Mountains and the Atlantic Ocean are just a few hours away and our mild climate gives you ample opportunity to enjoy all the benefits of each.

The Tar River Choral & Orchestral Society, the NEW Performing Arts Series, the Tank Theater and the N.C. Symphony bring "world-class" talent and exciting performances to Rocky Mount for those seeking cultural fare. Nearby, the Town of Tarboro has an extensive historic district and Hobson Pittman Art Museum. And for the rest of us there is always the Breeze Band, the annual Hot Dog Party and Trax Tavern & Oyster Bar.

For the "younger" generation, Rocky Mount offers a variety of activities. The Rocky Mount Senior High Marching Band consistently wins national and regional band competitions and has been ranked #1 in the nation for several years. Another popular attraction for children and students throughout the state is the Rocky Mount Children's Museum.

The highlight of the year is our annual Downeast Festival of the Arts which features local and regional crafts, many events and national celebrities. The festival is pure entertainment and fun for people of all ages, proving that there's something in Rocky Mount for everyone.



SIZE: 140.8 Total Acres

PHASE I -51.5 ac. incl. common areas

- Proposed tract sizes
- Tract 1- 11.4 ac.
- Tract 2- 9.2 ac.
- Tract 3- 8.0 ac.
- Tract 4- 7.6 ac. (Sold Ossid Corp.)
- Tract 5- 4.3 ac.
- Tract 6- 3.9 ac.

PHASE II -89.3 ac. incl. common areas

- Proposed tract sizes
- Tract 7- 13.9 ac. plus 6 ac. lake
- Tract 8- 7.4 ac.
- Tract 9- 11.8 ac.
- Tract 10- 8.8 ac.
- Tract 11- 9.0 ac.
- Tract 12- 8.0 ac.
- Tract 13- 7.8 ac.
- Tract 14- 10.6 ac.

DESCRIPTION: Topography is generally flat to gently rolling. Elevations range from 100 to 125 ft. Soil borings are available upon request. All sites are cleared and ready for construction. Phase II has 5 sites with frontage on a 6 ac. lake.

ZONING: City of Rocky Mount zoning jurisdiction, zoned I-2 for light to heavy industry and related facilities.

ELECTRIC POWER: Supplied by NC Power. Rates available upon request.

NATURAL GAS: Supplied by the City of Rocky Mount. Rates available upon request.

WATER: Supplied by the City of Rocky Mount.
Present treatment capacity: 23,000,000 gpd.
Excess capacity: 6,500,000 gpd.
Rates available upon request.
Water quality analysis available upon request.

WASTE TREATMENT: Supplied by the City of Rocky Mount.
Present treatment capacity: 14,000,000 gpd.
Excess capacity: 2,000,000 gpd.
Rates available upon request.

TRANSPORTATION: Rail: available to most sites.
Provided by CSX Transportation.
Major highways: Access to the park from US 301 Bypass is via College Road or Fountain School Road. Interstate 95 is approximately 5 minutes to the west via 4-laned US 301 Bypass (I-95 Bus).

PROTECTIVE COVENANTS

1. The land in the Park shall be used for industrial and related purposes. The property is intended for manufacturing, warehouse, distribution, service or research and development.
2. The land in the Park shall not be used for residential purposes nor any purpose which constitutes a nuisance or danger to persons on the property or the adjoining property.
3. Building, site development, signs and landscaping will be subject to approval by the Edgecombe County Development Corporation or a designated Board of Design.
4. No development, other than ingress or egress, may be located closer than 100 feet on the front or 30 feet from side or rear property lines.
5. Brick, concrete or metal paneling may be used for exterior finishes subject to approval. Colors must be compatible.
6. Outside storage, waste containers and front loading docks must be screened. Stored vehicles must be screened from view.
7. The Development Corporation reserves the right to repurchase land on which planned construction is not completed within 24 months. Extensions may be given.
8. Signs must be for identification only. No promotional or advertising signs will be permitted.
9. Utilities, lighting, etc. shall not be placed in such a manner that they interfere with the Park or with any adjoining property.

Subject: Fountain Industrial Park Temp Housing Site

Date: Thu, 08 Jun 2000 16:55:45 -0400

From: PJ Prete <phil.prete@ncmail.net>

To: dboyd@ncem.oorg - *Doug Boyd (Temporary housing for NC Emergency Management)*

CC: bill.pate@ncmail.net, mike.a.kelly@ncmail.net, dexter.matthews@ncmail.net

Dear Mr. Boyd:

As we discussed on the phone this afternoon, our Division recommends that you contact the Occupational and Environmental Epidemiology Division of the Department of Health and Human Services for the purpose of requesting their evaluation of the subject site in Edgecombe County. At issue is the potential for exposure to exposed coal ash on the temporary housing site at the Fountain Industrial Park. While much of the site appears to be covered with gravel or grass, as we discussed, the ash was apparently not covered with soil when previous operations at the site ceased before installing the temporary housing. My understanding is that there remains exposed coal ash directly under many of the travel trailers. While this may not be a problem or may be easily remedied, it would be prudent to have an evaluation and recommendations from DHHS.

I contacted Mr. Bill Pate, Director of the Occupational and Environmental Epidemiology Section and left a detailed voice mail message for him about the site and our concern and advised him that you would be calling him. His phone number is 919-715-6432. I also gave him your number. This will resolve our immediate concerns regarding the site.

If you can, please advise us of the time table for taking that operation out of service, as we will need to address final closure requirements once it is no longer a residential site. Thank you so much for your service to these people and your interest in protecting their health and well-being. As you are very aware, they have already been through so much.

Sincerely,
Philip J. Prete

cc: Bill Pate, DHHS Occupational and Environmental Health
Dexter Matthews, DENR Waste Management
Mike Kelly, DENR Disaster Response Center

July 12, 2000

Ken-

Here is a copy of the paper that Steve Wing discussed with you. I am leaving to go out of the country for the year on Friday, so please direct any questions to Steve. Thank you for your help and good luck with your investigation.

Sincerely,

A handwritten signature in cursive script that reads "Aaron".

Aaron Pulver
UNC School of Public Health
Duke School of Medicine

FEMAville: Rocky Mount's Temporary Housing Facility
Are its residents at risk?

By

Aaron Pulver

PUBH 392

July 12, 2000

A master's paper submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirement for the degree of Master of Public Health in the School of Public Health, Public Health Leadership Program.

Approved by

Dr. Bill Sollecito
Advisor

Dr. Steve Wing
Second Reader

Date

Full disclosure is an important part of
people's democratic right to know about
the conditions of the places they live and
work.

Saladin Muhammad
Black Worker's for Justice

Abstract

Background: Following Hurricane Floyd in September of 1999, residents from damaged communities in eastern North Carolina were placed in temporary housing facilities. One of these facilities, located outside Rocky Mount, North Carolina, was suspected by community members and facility residents to be located on land previously used as a landfill. These individuals were concerned about public health issues resulting from possible toxic exposures and continuing practices of discrimination related to environmental justice.

Materials/Methods: Questions aimed at determining reasons for such concerns, finding evidence to validate concerns, and elucidating facts to determine health risks should the temporary housing facility be found to be located on land previously used as a landfill were drawn up with the help of UNC School of Public Health faculty and concerned community members. Personal, telephone, and electronic mail interviews were performed and government-authorized studies were collected and analyzed in an attempt to answer these questions.

Findings: Information collected from interviews and government-authorized studies indicated that the temporary housing facility is located on land previously used as an industrial landfill. Contaminants on the facility from this activity include coal ash, wood fibers, cotton motes, and gypsum molds. Although the examined environmental review and site assessment of the facility site found no health risks to facility residents, its contents are incomplete. Constituents of some of the contaminants, particularly of coal ash, could present health risks to residents depending on the level of soil contamination.

Discussion/Conclusion: The temporary housing facility outside Rocky Mount, North Carolina is located within a site previously used as an industrial landfill. The resources necessary to determine both this and possible health risks to residents secondary to prior uses of the site required concerned citizens and residents to enlist the help of university faculty and graduate students. Further information regarding soil contents at the facility must be obtained in a timely manner to determine any health risks present to residents from toxic substances that might be present at the site.

Introduction

Hurricane Floyd hit eastern North Carolina on September 16, 1999, dropping fifteen inches of rain on communities already feeling the effects of being left behind in the “boom economy of the 1990s”. While the enormous rains were not solely responsible for disaster-like situations that developed in this area, they acted as a powerful catalyst to already underlying pathological social conditions to transform the area into one of unmitigated catastrophe. Most of the crisis situations exacerbated by the flood already previously existed, such as lack of jobs, food, transportation, health care, appalling working conditions, environmental degradation, and particularly, deficient adequate housing.¹ All in all, numbers totaled 57,000 damaged homes, with 17,000 judged to be uninhabitable and 7,000 more beyond repair.² To help residents of affected communities deal with this housing crisis, seven temporary housing sites, consisting of travel trailers and mobile homes, were constructed in eastern North Carolina. These sites, constructed in Edgecombe, Pitt, Lenoir, and Wayne counties, were founded with the objective “to provide safe, sanitary housing” for North Carolina residents displaced from their homes by the flood. To date, site requests for travel trailers and mobile homes have reached 2,900 with additional requests coming in each day.²

Background

Concerns possessed by residents of Edgecombe county’s temporary housing facility first came to my attention in March of this year, when Saladin

Muhammad, a Rocky Mount resident and active force within the Edgecombe County African-American community currently struggling for labor, social, and racial justice, came to speak at the UNC School of Public Health about environmental justice issues existing in his part of the state. During this discussion, Mr. Muhammad indicated that concerns had been expressed to him, both by residents of Edgecombe county's temporary housing facility and Rocky Mount community members, that the temporary housing facility had been constructed on top of a landfill. The facility is located at the Fountain Industrial Park in Rocky Mount. Currently, it contains 207 travel trailers and 64 mobile homes, an average of two and a half to three people living in each trailer, placed on soil that has been covered with grass in undisturbed areas.³ In particular, the facility contains a significant portion of residents from Princeville, the oldest incorporated African-American town in North Carolina, founded by emancipated slaves. In Mr. Muhammad's opinion, the residents of Princeville had already faced a large deal of discrimination in the disaster relief provided following the flood, such as being forced to stay in shelters, while their white counterparts were housed in hotels, and receiving the last opportunities for donations, as they were first distributed at establishments frequented by Caucasians, such as white churches in the neighboring town of Tarboro. If the housing facility was found to be located on top of a landfill, Mr. Muhammad felt that this would substantiate the perception of discrimination directed toward Princeville residents, as well as illuminate the possibility that residents might be facing daily exposure to substantial health hazards. Unlike neighboring Tarboro, Princeville had been

completely destroyed and although officials state that residents are expected to vacate the temporary housing facility eighteen months after its establishment, similar facilities with comparable requirements located in North Dakota following that area's recent floods lasted three years, as residents struggled to find alternative housing.⁴

Materials and Methods

After deciding to investigate these concerns raised by Mr. Muhammad, I met with Dr. Steve Wing, a professor at the UNC School of Public Health specializing in environmental justice issues, to draw up a set of questions to guide my investigation. Mr. Muhammad approved this list of questions as appropriately targeting the information desired by residents of the temporary housing facility and Rocky Mount community members. The list contained the following questions:

1. Why do people believe the temporary housing facility to be located on a landfill?
2. Can it be shown that the temporary housing facility is not located on a landfill?
3. If the temporary housing facility is located on a landfill,
 - a. When was the landfill opened?
 - b. When was the landfill closed?
 - c. What materials were deposited in the landfill?
 - d. What engineering methods were used?
 - e. What parts of the facility are involved?
 - f. Have any studies been done on the land?
 - g. What documentation exists to substantiate information obtained in answering the above questions?
 - h. Does the information obtained from the answers to these questions indicate that the residents of the housing facility might be at risk for any particular health problems?

Findings

Interviews

To attempt to answer the question of “Why do people believe the temporary housing facility to be located on a landfill?”, I began by further questioning Mr. Muhammad. He indicated that longtime employees of the Fountain Correctional Facility, located next to the housing facility, were the first to come to him with concerns that the housing facility was located on top of a landfill. Several employees of the correctional facility, while on duty, had, for many years, noticed industrial-sized trucks using the land upon which the housing facility is located as a “dumping ground” for large quantities of unidentified materials. Also, according to Mr. Muhammad, both a local television report and community members raised concerns similar to those expressed by the workers at the correctional facility, that the land housing the facility had been formerly used as a landfill, and questioned whether such previous activities at the site might present health risks to the new residents.⁴ Interviews with other community activists familiar with both the housing facility and Rocky Mount area confirmed that numerous individuals had observed the land housing the temporary facility being used to receive large deposits of unspecified matter for many years and that because of this many of these individuals were concerned about potential health risks that these deposits might pose to the facility’s residents. These individuals included Ida Bodie (Black Workers for Justice), Joan Sharpe (Black Workers for Justice), Gini Webb (North Carolina Student Rural Health Coalition), Gary Grant (Concerned Citizens of Tillery), as well as residents of the housing facility.

These interviews were followed by a discussion with Jim Bayliss, the Edgecombe County health director. Mr. Bayliss indicated that the site at the Fountain Industrial Park had appeared ideal to state officials as a potential housing facility since it could provide water and sewage access for a large number of temporary households. He stated that anytime such a site was to be considered for human habitation, a Phase I Environmental Evaluation would be required to evaluate any health risks to future residents. While fairly certain that such an evaluation had been performed in the case of the Fountain Industrial Park, in his opinion, the site was seemingly constructed “overnight” and a lot of questions had been left unanswered, such as who was to govern the facility’s residents and where residents would receive health care.⁵

After speaking with Mr. Bayliss, I sought to identify how I might obtain records as to the history of the land at the Fountain Industrial Park. In an effort to do so, I was referred to John Cooper, a city and regional planning student at the University of North Carolina at Chapel Hill. Mr. Cooper suggested that I look for an Office of Planning and Zoning within Edgecombe county, as well as local government officials to help me obtain this information. Mr. Cooper seemed excited about the project and offered to do some research on his own regarding the concerns posed to us by Mr. Muhammad as to prior activities on the Fountain Industrial Park land on which the temporary housing facility was built.⁶

After speaking with Mr. Cooper, I identified the chairman of the Edgecombe County Commissioners, Charlie Harrell, as a likely source of information regarding the history of land use at the Fountain Industrial Park. Mr.

Harrell stated that, to his knowledge, the property was originally part of the Fountain Correctional Facility, owned by the state. However, according to Mr. Harrell, 15 to 20 years ago, the property was given to the Edgecombe County Development Association for the purposes of development. During the 1990s, part of the land had been leased to ReUse Technology for storage of ash produced in a steam-making process that they performed for Abbott Labs, before being leased back to the state in the fall of 1999 for development of the temporary housing facility. Mr. Harrell suggested that I contact Oppie Jordan, the Edgecombe County Development Officer, to search for any documentation of this history.⁷

A phone interview with Ms. Jordan confirmed the history of the housing facility land as described by Mr. Harrell. Ms. Jordan stated that environmental studies of the land had been performed prior to construction of the temporary housing facility. According to Ms. Jordan, a private company, Appian Consulting Engineers, had performed one of these environmental studies at the request of the Edgecombe County Development Association. The other study, she indicated, had been a Phase I Environmental Evaluation performed by the state under the supervision of Doug Boyd, the North Carolina Temporary Housing Director. Although initially cooperative, when asked if she could provide me with a copy of the study performed on behalf of the Development Association, Ms. Jordan quickly became defensive, asking why I would need such a document if she could assure me that the land containing the housing facility was “perfectly safe”. Despite my reassurances that such documentation is necessary in compiling a

report for the purpose of educating a group of individuals whose struggles have instilled in them a distrust in guarantees unsupported by factual data, she continued to deny my requests for documentation. Ms. Jordan ended our conversation stating that she would be in touch with me after speaking to the chairman of the county's Development Board to determine the acceptability of providing me with the requested documentation. To this date, despite repeated attempts, Ms. Jordan has failed to provide me with a copy of the study or provide me with any explanation as to why this is not possible.⁸

Following this discussion with Ms. Jordan, I contacted Doug Boyd at the North Carolina Office of Temporary Housing. Mr. Boyd confirmed that a Phase I Environmental Evaluation had been performed on the housing facility land. He stated that he possessed a copy of this evaluation and assured me that there is "no problem with the site." However, when asked if he could provide me with a copy of the evaluation, he denied my request, stating that he did not deem graduate work a suitable reason for the document's release.⁹

Aware that, under the North Carolina Public Records Statute, Mr. Boyd was required to provide a copy of the evaluation, I employed the help of Dr. Wing. After speaking with Mr. Boyd, Dr. Wing felt it reasonable to contact some of his colleagues within the state government. After these individuals spoke with either Mr. Boyd or his superiors, I was able to obtain a copy of the desired document from Tom Hegele, the Emergency Information Section Chief for the North Carolina Department of Emergency Management. Mr. Hegele provided me with a copy of the Environmental Review for the Fountain Industrial Park site,

including a Phase I Environmental Site Assessment. He also provided me with some further statistical data regarding the housing facility, included previously in this paper.

Documentation

The Environmental Review consists of two portions and is in the form of a checklist. The first portion asserts that the plan for the temporary housing facility is in compliance with all environmental laws, including the:

- National Preservation Act
- Clean Water Act
- Endangered Species Act
- Fish and Wildlife Coordination Act
- Wild and Scenic Rivers Act
- Coastal Zone Management Act
- Clean Air Act
- Hazardous and Toxic Waste Regulations (Comprehensive Environmental Response, Compensation and Liability Act, Resource Conservation and Recovery Act, Superfund Amendments and Reauthorization Act, and the Hazardous and Solid Waste Amendments)

While asserting that the plans for the site are in compliance with all of these laws, however, the review, in most cases, fails to cite evidence for these assertions.

Even more importantly, however, in the section regarding compliance with Hazardous and Toxic Waste Regulations, despite the fact that evidence is cited in

the form of the entry “See ESA (Environmental Site Assessment)—11/1/99”, this document was seemingly not attached to the report.

The second portion of the review asserts that the plans for the temporary housing facility are in compliance with executive orders, particularly those regarding flood plains, wetlands, and environmental justice. Under the section pertaining to environmental justice, the report states that “the principal population using the temporary housing is minority and low income. However, provision of this housing is beneficial to them and does not impact any populations in the vicinity of the site.”⁹ Although this is seemingly accurate, the document’s ignorance of possible environmental justice issues surrounding the location of the housing facility are strikingly ironic, as it fails to acknowledge that the location of the facility could be viewed as an environmental justice issue by the very group of people it is meant to serve.

The Phase I Environmental Site Assessment was performed by Titan Atlantic Group, Inc. of Winterville, NC for Appian Consulting Engineers, Inc. of Rocky Mount, NC. Titan states the purpose and scope of its work as involving the following:

- Site reconnaissance to verify what is discovered by research of documents and to look for any evidence of waste-handling or storage activities
- Review of selected lists (e.g. of state and federal agencies) for records or comments pertaining to past or present environmental concerns
- Review of selected historical information, including aerial photographs and topographic maps
- Evaluation of site topographic, hydrologic, and hydrogeologic conditions based on readily available information¹⁰

Examination of the assessment provides several important observations.

These include:

- The site visit for the assessment was not performed until after half of the temporary housing site was constructed and the other half was already being developed. While such a time frame might be considered reasonable given the urgency placed on construction secondary to the flood, the scope of the assessment and site reconnaissance were completed a month after Hurricane Floyd hit eastern North Carolina.

- The assessment confirms the history of the site as a “landfill” for ReUse Technologies. It is registered on the Solid and Hazardous Waste Management Division of the North Carolina Department of Environment, Health, and Natural Resources List of active and closed demolition landfills. According to the assessment, since the “1990’s, the site has been used for composting and coal storage by ReUse Technology. The site grades have been raised using coal ash as fill. In addition, the site was used for composting of wood fiber and cotton motes. A portion of the site was used for storage of gypsum molds that were also recycled.”¹⁰

- Soil samples analyzed from the site were taken “from several locations”. No metals were found to be above threshold regulatory limits. However, the exact location from which the samples were taken from is not indicated. In particular, it is not evident whether or not samples were taken from the mounds of coal ash on the eastern end of the site.

Despite this, Titan’s conclusions read

Based on our site observations and evaluation of the data obtained...we did not observe evidence of potential environmental contamination of the subject property. Based on our findings, Titan does not recommend additional environmental assessment of the subject site.¹⁰

Repeated requests, in the form of telephone calls and written letters to the North Carolina Department of Emergency Management, were initially unsuccessful in allowing procurement of the document, “ESA 11/1/99”, or further information regarding sampling methods used in the provided site assessment. However, after relating my difficulties in obtaining this information to government officials within the Office of

Minority Health, Barbara Pullen-Smith and Chris Hoke, a response from Mr. Hegele was finally provided. According to Mr. Hegele, the “ESA 11/1/99” is actually the Environmental Site Assessment that had already been provided to me as part of the Phase I assessment that had been performed on the site. Mr. Hegele explained that the reason for the discrepancy in the Environmental Review citation of the document appeared to stem from the faxed cover memo on the ESA when it was received on 11/1/99 by the individuals preparing the review. Also, Mr. Hegele informed me that the Department of Emergency Management had no further information on soil sampling at the site and suggested contacting Carl Bonner at the Titan Atlantic Group, Inc. to obtain further information regarding sampling methods.¹¹

A discussion with Mr. Bonner revealed that the only information that the Titan Atlantic Group, Inc. possessed regarding soil sampling at the temporary housing facility site was contained in two pages of lab reports that the group had used during preparation of the Environmental Site Assessment. While he agreed to provide me with copies of these documents, he did not feel that they would provide me with any information regarding sampling methods and suggested that I call Bobby Joyner at Appian Consulting Engineers, Inc., who he believed to have been involved with the actual sampling.¹²

The documents given to me by Mr. Bonner provided no further information than what had been discussed in the Environmental Site

Assessment, except to reveal that the soil sampling described in the assessment had taken place in 1998, rather than in October of 1999, when the site assessment was carried out.¹³ Further shortcomings of this testing were indicated to me during a telephone conversation with Mr. Joyner, who informed me that the soil sampling recorded in the Environmental Site Assessment had only involved areas of the site on which recent composting activities had taken place and had, purposely, not involved areas where coal ash was located. He explained that this was because the coal ash at the site had been tested prior to transport from the ReUse Technologies facility and suggested that I contact Bob Waldrop at ReUse Technologies, who had been involved with the coal ash testing.¹⁴

Mr. Waldrop informed me that ReUse Technologies had been using the temporary housing facility site to store coal ash from 1990 until the time of Hurricane Floyd. He indicated that, from his recollection, the majority of the testing performed on the coal ash was not designed to provide information that would allow a determination as to the amounts of hazardous metals in the coal ash to which residents of the temporary housing facility might be exposed to by routes of ingestion or inhalation. Rather, according to Mr. Waldrop, most of the testing performed on the coal ash was to determine what groundwater might pickup from the ash should it be exposed. However, Mr. Waldrop agreed to review the tests performed on the coal before it left ReUse Technologies to be stored at the

temporary housing facility site and provide me with any pertinent results.¹⁵ I am currently waiting for these results from Mr. Waldrop.

Evaluation of health risks to facility residents

Without thorough soil sampling of the site, the health risks to facility residents cannot adequately be assessed. However, review of the toxicology literature and recent environmental health initiatives can identify possible health risks that facility residents might be exposed to secondary to contaminants that the Titan Site Assessment indicates are present on the site.

Coal Ash

Of the contaminants found on the site, the presence of coal ash is the most worrisome. As defined by the CCB (Coal Combustion By-Products) Information Network, coal ash refers to “any materials or residues produced from the combustion of coal” including specifically “fly ash, bottom ash, boiler slag, fluidized combustion ash, and flue gas desulfurization material.”¹⁶ Coal ash has recently been under scrutiny by the United States Environmental Protection Agency (EPA) for its possible adverse effects on human health and the environment. In the May 22, 2000 issue of the Federal Register, the EPA explains that while coal ash does not warrant regulation as hazardous waste under Subtitle C of the Resource Conservation and Recovery Act (RCRA), national non-

hazardous waste regulations under RCRA Subtitle D are needed for coal ash disposed in surface impoundments and landfills. The agency deems that some form of national regulation for coal ash disposal is necessary given their conclusion that “the composition of these wastes has the potential to present danger to human health...”. Furthermore, eleven cases of proven injury to human health by improper management of the wastes when disposed of in landfills are identified.¹⁷ Ironically, concerns presented by the EPA relate to the health of humans in areas located near disposal sites for coal ash, as affected by the consumption of contaminated drinking water or inhalation of tainted air.¹⁸ The document ignores the possibility of habitation upon a site used for coal ash disposal, such as in the case of the Rocky Mount temporary housing facility, in which residents would be even more likely to be exposed to contaminants through inhalation or, as might be particularly likely with children, direct consumption.¹⁸

The constituents of coal ash that give rise to health concerns are hazardous metals, such as arsenic, chromium (VI), lead, mercury, cadmium, barium, and thallium.^{17, 18} In particular, the EPA comments on the fact that leachates from wastes generated at coal combustion facilities have been found, on occasion, to exceed hazardous waste toxicity levels for the first five of these metals.¹⁷ On examining just one of the constituents of coal ash, fly ash, Sanders writes

Experiments with animals have shown that coal fly ash is cleared from the lungs as a double

exponential...alveolar macrophages rapidly phagocytize inhaled ash particles, greatly increasing the elemental concentration of toxic metal in individual cells.

Sanders continues, citing increased lung concentrations of 80-fold with respect to arsenic, 25-fold with respect to lead, and 40-fold with respect to barium.¹⁹ While few studies have been done to examine the long-term effects of chronic exposure to coal ash, sizable research elucidates the possible adverse health effects of coal ash constituents.

As described in Casarett and Doull's Toxicology: The Basic Science of Poisons, as well as other sources, chronic exposure to arsenic compounds can adversely affect humans in a number of ways. Peripheral and central nervous system toxicity can manifest beginning with sensory changes, paresthesia, and muscle tenderness, followed with weakness that progresses from proximal to distal muscle groups. Liver injury, particularly characteristic of chronic arsenic exposure, initially manifests as jaundice, often progressing to cirrhosis. Peripheral vascular disease, in the form of acrocyanosis, Raynaud's phenomenon, endarteritis obliterans, and gangrene, has been observed in chronic exposure to arsenic in drinking water in Taiwan and Chile. Arsenic carcinogenic effects can be seen in its association with various skin cancers, lung cancer, hemangiosarcomas of the liver, lymphomas, leukemia, nasopharyngeal cancer, and urinary tract malignancies.²⁰⁻²⁵ Except for arsenic, in its report to Congress, the EPA noted no risks of cancer from the ingestion exposure route with respect to coal ash to be greater than 10^{-6} (or larger than a

hazard quotient of one) for levels and durations of exposure used in modeling exposure to coal ash constituents. For arsenic, however, the cancer risk was found to be substantially larger, up to 5×10^{-5} , or fifty times greater than the government-indicated acceptable level of 10^{-6} .¹⁸ Arsenic exposure has also been shown to be a risk factor for diabetes mellitus, stillbirths, and cerebrovascular disease.²⁶⁻²⁸

Most studies linking arsenic exposure to human disease are based on exposure to arsenic-contaminated drinking water. Because of this, some authors criticize the elucidation of health risks from inhalation of airborne arsenic particles or ingestion of arsenic in soil, such as to residents living on a site previously used as a landfill for coal ash might be exposed, based on toxicity derived from such studies of arsenic in drinking water. In particular, Valberg et al. write that

...the toxicity of arsenic in drinking water cannot be directly extrapolated to toxicity of soil arsenic because of differences in chemical form, bioavailability, and excretion kinetics. Because of the differences between soil arsenic and water arsenic, we conclude that risks from arsenic in soil are lower than what would be calculated using default toxicity values for arsenic in drinking water.²⁹

However, the association of lung cancer and stillbirths with arsenic has been shown to be through an airborne exposure route, indicating that although health risks to arsenic exposure via non-soluble routes might be less, they are hardly negligible.^{25,27} Furthermore, the relevance of such arguments can be questioned in view of studies such as that by Hwang et

al., that have shown elevated urinary arsenic levels in children to be statistically significantly related to soil arsenic levels in bare areas of their respective residential yards.³⁰ Lastly, it should be noted a number of diseases for which arsenic exposure places populations at risk are diseases that many of the residents of the temporary housing facility are already at risk for, including diabetes, peripheral vascular disease, cerebrovascular disease, and in particular for those who smoke, lung cancer. In fact, a synergism between arsenic exposure via inhalation and smoking in the induction of lung cancer has been shown in the literature.³¹

The other metal found commonly in coal ash that the EPA cites as exhibiting a carcinogenic risk in the [10^{-6} range] in their described models of exposure to coal ash is chromium (VI).¹⁸ Unlike the model for arsenic used by the EPA, this value for chromium was established by modeling inhalation exposure. Accordingly, hexavalent chromium is currently classified as a Group A inhalation carcinogen by the EPA.³² As the editors of Casarett and Doull's Toxicology: The Basic Science of Poisons write, "Chromium in ambient air originates from...combustion of fossil fuels...Exposure to chromium is associated with cancer of the respiratory tract."²⁰

Although not singled out in the EPA's report to Congress as causing coal ash to exhibit significant health risks to humans, the other metal constituents of coal ash have been noted to cause health risks independently. The most widely described of these are lead, mercury, and

cadmium. The toxic effects of lead were noted as early as the 18th century in medical writings and the decline in the prevalence of childhood lead poisoning has been heralded as one of America's greatest public health success stories.³³ Chronic exposure to the substance can lead to encephalopathy, hearing deficiency, IQ deficiency, epilepsy, mental retardation, optic neuropathy, blindness, peripheral neuropathy, anemia, nephropathy, decreased vitamin D metabolism, elevated blood pressure, male sterility, cancer, particularly of the respiratory, digestive, and urinary systems, and even death.²⁰ Lead's principal route of exposure for humans is oral consumption, traditionally from exposure to lead-based indoor paint in old dwellings, lead in contaminated drinking water, lead in air from combustion of lead-containing industrial emissions, lead-glazed pottery, or as is most applicable in possible exposure of residents to any lead contained in coal ash waste contained on the housing facility's grounds, lead in dust from environmental sources, hand-to-mouth activities of children living in polluted environments, and lead dust brought home by industrial workers on their clothes and shoes.²⁰ Pica is the exposure route frequently responsible for pediatric cases of lead toxicity, particularly among children in lower socioeconomic classes.³⁴ Despite numerous epidemiologic studies demonstrating associations between lead exposure and a wide range of adverse health outcomes, including quantitative dose-response relationships, a review of the literature by Jin, Teschke, and Copes failed to identify any studies specifically examining established

human health effects in association with soil lead levels. However, the authors were able to identify a number of studies indicating

that, compared to children exposed to soil lead levels of 100 ppm, those exposed to levels of 1000 ppm had mean blood lead concentrations 1.10-1.86 times higher and those exposed to soil lead levels of 2000 ppm had blood lead concentrations 1.13-2.25 times higher.³⁵

Clinically-observed health effects have been noted at blood lead concentrations as low as 10 micrograms/dL.²⁰

Health effects from exposure to mercury differ to a degree, depending on the form to which a person is exposed. With respect to inhalation of mercury vapor, health effects are predominantly related to central nervous system pathology. Early symptoms are non-specific and form a complex referred to as asthenic-vegetative syndrome that includes findings such as tremor, thyroid enlargement, labile pulse, tachycardia, dermatographism, gingivitis, and hematologic changes. Increasing exposure to inhaled mercury leads to more characteristic symptoms, such as intentional tremors of muscles that perform fine-motor functions progressing to generalized trembling of the entire body and violent chronic spasms of the extremities. This is often accompanied by personality and behavior changes, decreased memory function, increased excitability, depression, delirium, and hallucinations. Consumption of methyl mercury can lead to neurotoxic effects as well. However, these effects are manifested in findings such as paresthesias, ataxia, difficulty swallowing

and articulating words, neurasthenia, vision and hearing loss, spasticity, tremor, and eventually, should the exposure continue, coma and death.²⁰ Fetuses are particularly susceptible to the toxic effects of mercury, as the metal readily crosses the placenta and has been associated with psychomotor retardation and congenital anomalies in infants.^{36, 37} Furthermore, evidence has suggested that breast milk contaminated with metals such as mercury, lead, and/or cadmium, secondary to maternal exposure, can serve as a potential health risk to recipient infants in certain populations.³⁸

The principal long-term effects of low-level exposure to airborne cadmium are numerous. Studies have shown such exposure to result in chronic obstructive pulmonary disease leading to emphysema, as well as in chronic renal tubular disease.²⁰ Similarly, exposure to environmental cadmium, even at low-levels, has been associated with skeletal demineralization and changes, leading to bone pain, osteomalacia, and osteoporosis, increasing bone fragility and the risk of fractures.³⁹ Furthermore, epidemiological studies suggest cadmium to be a causative agent for essential hypertension.⁴⁰ Other studies have found increased risks of lung and prostate cancer with exposure to inhaled cadmium.²⁰ Hence, cadmium has recently been named by the International Agency for Research on Cancer as a Category 1 (human) carcinogen.

Although not typically considered as toxic as their fellow coal ash constituents, barium and thallium exposure can present health risks to

humans as well. Ingestion of soluble forms of barium can result in gastroenteritis, muscular paralysis, decreased pulse rate, ventricular fibrillation, and extra-systolic heart rhythms, while inhalation of barium sulfate or barium carbonate can cause a benign pneumoconiosis.^{20, 34} Long-term thallium intake has been reported to result in liver necrosis, nephritis, gastroenteritis, pulmonary edema, degenerative adrenal changes, degeneration of the both the peripheral and central nervous systems, alopecia, cataracts, and, even, death.^{20, 34}

Other site contaminants

Although arguably not as worrisome as some of the constituents typically found within coal ash, there may be adverse health risks related to other site contaminants. As described in William and Burson's book, Industrial Toxicology: Safety and Health Applications in the Workplace, exposure to wood dusts can produce asthma in various individuals. Symptoms are similar to commonly encountered extrinsic atopic asthma and, in the United States, are most often associated with exposure to western red cedar dust, widely used in the construction industry.⁴¹ With respect to health risks secondary to cotton dust exposure, William and Burson discuss byssinosis, an occupational lung disease seen in textile workers exposed to cotton. Symptoms include chest tightness, wheezing, and shortness of breath that typically resolve with removal of the individual from the cotton dust-laden environment. However, cotton dust

concentrations in the general environment at the temporary housing facility are probably not high enough to warrant concern for byssinosis. A review of pertinent texts, journals, and internet sites revealed no studies or information related to exposure to gypsum molds.

Discussion

What types of conclusions can be drawn from this research? First, while concerns posed by residents of both the Rocky Mount community and temporary housing facility that the housing facility is constructed within a landfill have been confirmed, it is still not known if such a relationship poses any health concerns to the residents of the facility. Further evaluation of the site, in particular through more thorough soil sampling methods, will likely be critical to this effort. Once the exact nature and amounts of contaminants are determined, possible health risks to the housing facility community can begin to be assessed.

The urgency of the situation requires expediency in data collection. As indicated in the reviewed literature, a number of health risks exist with chronic exposure to such contaminants, however, data on short-term exposure to low or moderate levels of contaminants is lacking. The investigation has found no evidence of adequate testing for toxic agents at the site, and there is no evidence to show that there has been testing to determine if anyone has been exposed to toxins should they exist. If the residents at the housing facility are being subjected to any toxic exposures,

the longer they remain at site the more likely they are to be placed at risk for related diseases. Although the North Carolina Office of Emergency Management states that residents of the temporary housing facility will only be allowed to utilize the facility until the spring of 2001 (allowing for a maximum possible duration of exposure of 18 months), similar statements were made with regard to temporary housing facilities after flooding in the state of North Dakota before residents eventually utilized the facilities for three years.⁴ Should a positive identification of significant levels of toxic contaminants in the land housing the facility be identified, the need for research examining the effects of short-term exposure to relevant levels of pertinent toxic constituents would be indicated.

Second, while concerns raised by any community as to the nature of the conditions in which they live are valid, such concerns can be viewed as particularly so in this case. Not only were the concerns of those in the Rocky Mount community and temporary housing facility dismissed by officials, they were dismissed even when residents had the most firm of grounds upon which to stand. Officials knew, before placing residents in the temporary housing facility, that the facility was contained within a landfill and did not provide residents with this information.

Lastly, as a graduate student, I have access to many resources not available to those living in a place such as Rocky Mount's temporary housing facility. Even with access to time, money, long-distance phone

service, the internet, e-mail service, transportation, and a host of administrative connections, it has taken me three months to only begin to discern answers for concerns that constitute the most basic of rights in a democratic society--the right to know about the conditions in which one works and lives. This causes one to ask, if I must put in such extravagant effort to answer the most basic of questions, how could anyone with less resources, particularly those actually living on the land in question, be expected to obtain such information?

Conclusion

The next step for this research is two-fold. First, the information I have collected will be distributed to residents of Fountain Industrial Park temporary housing facility and general community in the form of a presentation given at the facility. Influential groups within both the Rocky Mount area and housing facility community, such as the Workers and Community Aid and Relief Project, the Southeast Halifax Environmental Reawakening Project, and the North Carolina Student Rural Health Coalition, will sponsor this presentation. Second, the land upon which the temporary housing facility exists needs to be further evaluated, to determine what, if any, toxic substances are located on the site. After such information is obtained, the potential health risks to residents at the facility can begin to be determined.

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Dear Fountain Trailer Park Resident,

In the past few days, you may have heard that Fountain Trailer Park is built on a hazardous waste site. I'm writing you today to tell you that's not the case.

Some people have raised concerns about the soil on which Fountain Trailer Park is built. As a result of those concerns, I asked my staff to sample soil from the trailer park. Staff took samples from across the park. We tested the soil at our state laboratory. Based on those tests, we find that there is no significant risk to you or your family.

As you may have heard, Fountain Trailer Park was built on top of a site where coal fly ash was placed. The site was properly closed years ago. In sampling the soil, we made sure to sample the coal fly ash. In some cases, coal fly ash can be hazardous, but that's not the situation at Fountain Trailer Park.

Even though the samples show no risk to you and your family's health, I have asked the Division of Emergency Management to cover any areas where the coal dust is exposed.

I'm sorry if you have been needlessly worried in the past few days. Life after Floyd has been very tough for your community, and these past few days have probably added to your stress. I can assure you that as state health director, I take your concerns seriously. I am committed to protecting you and your family's health. If you ever have concerns, please contact me directly at 919 733-4392. I will act quickly to check out any problems.

I plan to visit Fountain Trailer Park Thursday evening. I want to meet personally with you and your neighbors to answer any questions you may have. We will meet at 7 p.m. in front of the office trailer. I hope to see you there.

Sincerely,

Dennis McBride, MD
State Health Director



The Wilson Daily Times Online

Saturday, July 29, 2000

By Estes Thompson, Associated Press Writer

Trailer park soil samples being tested



Golden Leaf

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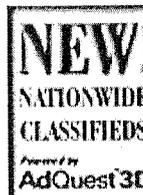
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□ RALEIGH — Scientists are testing soil samples from a Rocky Mount trailer park that houses Hurricane Floyd flooding victims after concerns were raised about arsenic and mercury contamination, state officials said Friday.

□ Test results for eight soil samples taken Wednesday are expected from the state lab on Tuesday at the earliest.

□ A 1998 chemical analysis of the site, performed a year before the 1999 flooding that made the park necessary, detected neither mercury nor arsenic, said Doug Boyd, who is in charge of temporary housing at the state Emergency Management Division.

□ "According to the results we got, there is no health risk," Boyd said. "We just want to go out there and validate the results."

□ Some residents of the park plan to be at a news conference Monday to discuss the landfill, said Joan Sharpe of the Hurricane Floyd Survivors Committee.

□ Concerns were raised by research done by a graduate student at the University of North Carolina School of Public Health in Chapel Hill. A report by the student said the site at Fountain Industrial Park had been used to dump coal ash, of which toxic arsenic and mercury are byproducts.

□ Epidemiology professor Steven Wing pointed the paper out this week to the state health director, Dr. Dennis McBride, who told his staff to look into it. McBride was not available for comment, his office said.

□ Wing said he has questions about whether children ate dirt and how much contamination might be in the soil.

□ "You can see stuff there that looks like coal ash there and you want to ask if they had their hands in it," Wing said. "Little children eat stuff off the ground."

□ Wing said he also was concerned about inhalation of dust from contaminated soil. Residents of the park have complained about dust raised by cars.

□ If the state "knew it was an industrial landfill that includes coal ash, and there was an alternative that would have been safer, I think there's a real problem," Wing said.

□ State officials said the tests were being done only as a precaution.

□ "There's no need for anybody to panic," said Debbie Crane, spokeswoman for the state Department of Health and Human Services.

□ "If there is a problem, we know it's not something people need to be terribly, terribly worried about."

□ Department scientists have looked at problems caused by coal ash, which was a common fill dirt, and determined that any risk would be from long-term exposure, Crane said.

□ When the park was built, ash was covered by six inches of soil, according to old requirements. New state rules require it to be covered with 18 inches to prevent

human contact, she said.

□ Boyd said about 370 families lived in the trailer park after it was established in late September following the flooding that inundated wide areas of eastern North Carolina. Now, about 172 families live there and the state is relocating some to a new park in Princeville.

□ The chemical testing done in 1998 was reported Oct. 19, 1999, as state and federal agencies were establishing the park, one of several in the flood zone, Boyd said.

□ Health officials will have meetings with park residents next week once the state lab results are known, Crane said.

□ Don Cavellini, who works with park residents on behalf of N.C. Student Rural Health Coalition, said his organization had been meeting with families in the park to see if they had health problems.

□ He said the organization also had learned about the graduate student's paper, dated July 12 and written by Aaron Pulver, who now is in Africa for a year.

□ "The authorities needed to let people know," Cavellini said. "We're not interested in alarming people. All we want to do is inform people. The people didn't know and they have a right to know."

□ Gov. Jim Hunt's office is aware of the testing, said spokesman Tad Boggs. Hunt is on vacation.

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James B. Hunt Jr.
Governor



H. David Bruton, M.D.
Secretary

State of North Carolina
Department of Health and Human Services

For Release: Immediate
Contact: Debbie Crane (919) 733-9190

Date: August 1, 2000

SOIL TESTS FIND NO PROBLEMS AT FOUNTAIN TRAILER PARK

RALEIGH -- N.C. State Health Director Dennis McBride today announced that soil samples from the Fountain Trailer Park in Edgecombe County showed no significant risk for residents of the trailer park.

The sampling was conducted after allegations that the trailer park, which houses victims of Hurricane Floyd, was sited on a hazardous waste landfill and that residents were in danger. The trailer park was built on top of a landfill that contained coal fly ash.

"We did worst case testing, deliberately sampling where the soil was darkest and looked as if it contained coal dust," said Dr. McBride. "Our sampling found no significant risk for residents of the trailer park. In fact, according to our risk analysis adults and children could have daily contact with the soil for up to 70 years without any adverse effects.

"We can assure the residents of Fountain Trailer Park that the soil is not a problem," he added. "Although we found nothing, I have asked the Division of Emergency Management to make sure that they keep any areas that look as if they contain coal fly ash covered."

The risk assessment was relayed in a letter to occupants of the trailer park. The letter from Dr. McBride, which was hand-delivered today, urged residents to contact him in the event of any health concerns. "I'm sorry if you have been needlessly worried in the past few days. Life after Floyd has been very tough for your community, and these past few days have probably added to your stress," the letter said. "I can assure you that that as state health director, I take your concerns seriously. I am committed to protecting you and your family's health."

McBride and officials with the Division of Emergency Management will meet with the residents 7 p.m. Thursday at the trailer park. "We want to sit down with the community and give them an opportunity to ask us any questions they may have," he said. "Our goal is to always protect the public health."

At peak operations, the Fountain Trailer Park had 370 units. Today it houses 168 units, many of them occupied by Princeville residents. The Division of Emergency Management plans to move many of the Princeville families to another mobile home park in Princeville by the end of the month.

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James B. Hunt Jr.
Governor



H. David Bruton, M.D.
Secretary

State of North Carolina
Department of Health and Human Services

For Release: Immediate
Contact: Debbie Crane (919) 733-9190

Date: August 1, 2000

MEDIA ADVISORY

STATE HEALTH DIRECTOR TO DISCUSS RESULTS OF FOUNTAIN TRAILER PARK SOIL TESTING

WHAT: State health director Dennis McBride will discuss findings from the soil testing at Fountain Trailer Park in Edgecombe County

WHEN: August 1, 2000, 4:30 p.m.

WHERE: Dorothea Dix Campus

In front of the Adams Building

101 Blair Drive, Raleigh

Recently, some people have said that the Fountain Trailer Park in Edgecombe County, which was built to house Hurricane Floyd victims, is contaminated. Questions have been raised regarding the trailer park soil. At State Health Director Dennis McBride's request, state health officials have tested the soil at the trailer park. McBride will discuss the results of these tests at this event.

DIRECTIONS:

From I-40, take exit 297 for Lake Wheeler Road/Farmer's Market. Turn toward Farmer's Market. Take a left at the first light on to Centennial Boulevard. Proceed up hill past Farmer's Market. Turn right at first light onto Blair Drive. Follow Blair Drive through one stop sign. The Adams Building is the first building on your left.

From downtown Raleigh, take Western Boulevard to Hunt Drive (across from Central Prison). Turn up Hunt Drive. At stop sign, turn right onto Umstead. At first intersection, take left onto Blair Drive. First Right into Adams Building visitor parking.

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August 1, 2000

MEMORANDUM

TO: A. Dennis McBride, M.D., M.P.H.
State Health Director

FROM: Luanne K. Williams, Pharm.D., Toxicologist
Medical Evaluation and Risk Assessment Unit
Occupational and Environmental Epidemiology Branch
North Carolina Division of Public Health
North Carolina Department of Health and Human Services

SUBJECT: Risk Assessment of Soil Sample Results Collected at the Fountain FEMA Trailer Park in Rocky Mount, North Carolina on July 27, 2000

I am writing in response to your request for a risk assessment of the soil sample results collected at the Fountain FEMA Trailer Park in Rocky Mount, North Carolina on July 27, 2000. A total of eight soil samples were collected from the trailer park in response to a site visit conducted by the Occupational and Environmental Epidemiology Branch (OEEB) on July 26, 2000. During the site visit, it was discovered that coal ash was applied to the soil several years ago and covered with additional soil. However, since this time, some of the topsoil had been removed possibly from the movement of the trailers or erosion and coal ash appeared to be exposed in certain areas of the park. Certain metals can be concentrated in coal ash. Because of the potential exposure of adult and child residents to the metals that may be present in the coal ash, the OEEB conducted soil sampling to determine the potential risk to the residents.

The eight soil samples were collected from within the trailer park in areas where the coal ash appeared to be most visible and in areas where children were reported to play by parents and children on the day of the sampling. Using appropriate chain of custody procedures, the soil samples were carried to the North Carolina Department of Health and Human Services State Laboratory of Public Health in Raleigh, North Carolina. The soil sampling results were faxed to OEEB on July 31, 2000. The soil sampling results were then compared to US EPA Region 9 Preliminary Remediation Goals (PRG) (October 1, 1999) or soil levels that are used as risk-based tools for evaluating and cleaning up contaminated sites. These preliminary remediation goals (or soil levels) were derived using standard US EPA equations, recommended doses, and exposure routes (i.e, adult and child resident ingestion of soil, adult and child resident skin contact with soil, and adult and child resident inhalation of soil). Daily contact (including ingestion, skin contact, and inhalation) with soil at the US EPA PRG soil metal levels listed in Table 1 over a lifetime (30 to 70 years) is not likely to result in adverse health effects. The soil metal levels reported for all eight locations are approximately equal to or less than the recommended US EPA PRG soil levels as shown in Table 1. Therefore, daily contact

A. Dennis McBride
 Memorandum
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 August 1, 2000

with the eight areas sampled for 30 to 70 years would not be expected to result in adverse health effects for adult or child residents that may come into contact with the soil in the areas sampled. Please do not hesitate to call me if you have any questions at 919-715-6429.

Table 1. Comparison of July 27, 2000 Metal Soil Sampling Results at Fountain FEMA Trailer Park in Rocky Mount to the Recommended US EPA Region 9 Soil Levels

<u>Metals</u>	<u>Soil Concentrations Reported at Park at Eight Locations Sampled (mg/kg) *</u>								<u>Recommended US EPA Region 9 Soil Levels (mg/kg)</u>
	Sample Locations								
	1	2	3	4	5	6	7	8	
Arsenic	25**	14	<4	16	<4	<4	<4	<4	22 ***
Barium	217	88	57	79	73	38	<6	59	5,400
Cadmium	<4	10	<4	<4	<4	<4	<4	<4	37
Chromium	31**	26	22	18	8	6	<4	10	30 (Chromium VI)
Lead	27	18	10	20	6	4	<4	8	400
Mercury	.24	<.10	<.10	<.10	<.10	<.10	<.10	<.10	6.1 (methyl mercury)
Selenium	23	4	4	10	<2	4	<2	4	390

*Sample locations were as follows:

- Sample 1 – on east berm towards the middle approximately 25% up the berm
- Sample 2 – in the edge of the yard near road and driveway of 356 Libba Lane
- Sample 3 – on inside lane of road at intersection near home of Stevens and Kimberly Lane
- Sample 4 – from center of lot 208 where travel trailer had been placed
- Sample 5 – from playground area between road and sand area
- Sample 6 – from area next to basketball court
- Sample 7 – sand area of playground
- Sample 8 – from edge of road at 204 Galina

**Arsenic concentration of 25 mg/kg is approximately equal to the recommended level of 22 mg/kg. There is no significant difference in these two levels. Chromium concentration of 31 mg/kg is approximately equal to the recommended level of 30 mg/kg. There is no significant difference in these two levels.

***The noncancer PRG is reported as the recommended PRG because the cancer PRG is typically below the naturally-occurring soil levels found nationwide. The average naturally-occurring arsenic soil level nationwide is approximately 5 mg/kg (Shacklette and Hansford, "Element Concentrations in Soils and Other Surficial Material of the Conterminous United States", USGS Professional Paper 1270, 1984). The noncancer PRG is the PRG that is routinely chosen by US EPA.