APPENDIX A

UNION ELECTRIC COMPANY
CONTRACT WORK LIMITATIONS - POWER PLANTS

WORK LIMITATIONS

A. No explosives may be used without written permission from the Company.

B. Care must be exercised at all times to maintain safe clearances and safe working practices, both for equipment and personnel, in order to avoid injury or service interruption. With a recognition of this condition, no serious construction space limitation is foreseen. All job personnel must be made thoroughly acquainted w.th hazards involved. It shall be the Contractor's responsibility, working with the Construction Supervisor, to make this condition clear to all Contractor's personnel.

C. Perform all work to conform with the Company's safety practices and operating procedures. If outages are required, the Contractor shall obtain all outages and releases in accordance with the Company's "Workman's Protection Assurance Procedure for Construction Personnel" dated February 1, 1981. This procedure, based on the Operating Manual for the Union Electric System will be made available at the start of the construction phase of the job.

D. The following are a number of specific requirements that must be adhered to by the Contractor:

1. Job Working Rules - The Contractor will insure that all of his personnel will read and sign the document entitled "Job Working Rules" (a copy of which is included in the Appendix of this specification). Refusal to sign the document will automatically constitute revocation of that individual's permission to enter upon Company property. The Contractor will also be responsible for enforcing these work rules for the duration of the job.

2. Identification - The Contractor will provide each employee with an identification badge which will be inscribed with the Contractor's name and the employee's assigned number. The Contractor shall maintain a list of the employee's names and badge numbers, a copy of which will be given to the Construction Supervisor and gate watchman on a daily basis. Identification badges will be worn permanently on each employee's outer jacket while on the job site and when entering the Construction personnel gate.

   In addition to the badges, the Contractor will provide all of his employees with hard hats of the same color and marked with the Contractor's name or trade mark. Also, the employee's name and badge number will be affixed to the

front of the hard hat, above the visor, in 1/2" or larger letters. The badge number shall be placed above the name. (Adhesive plastic label tape will be satisfactory for this service.) Hard hats must be worn by each employee while on the job site and when entering the Construction personnel gate.

3. Gate Security - All of the Contractor's employees and visitors will enter the project site through the Construction personnel gate. Upon entering and leaving site, employees will open all lunch boxes, packages, etc., for inspection by the gate watchman.

   Alcoholic beverages, drugs which are illegal to possess, firearms or other weapons will be prohibited from being brought on site.

   Any tools or materials brought on or off the site must be accompanied by a pass, on an approved form, listing the materials or tools being transferred. The form must be signed by the Contractor's Superintendent. The passes will be collected by the gate watchman.

   All employees entering the site at times other than the beginning or end of a shift, will be required to sign the gate register. A copy of the previous day's gate register will be forwarded to the Contractor's Superintendent each day. The Contractor will station responsible supervision at gate during shift changes to enforce gate security.

   All visitors of the Contractor will be held at the gate until cleared by the Contractor's Superintendent. At that time, each visitor will be issued a visitor's badge and hard hat.

   No Contractor's vehicles will be brought on the site except for work vehicles approved by the Construction Supervisor. All work vehicles leaving through the vehicle gate will be inspected by the watchman and must have a manifest listing all cargo and tools which are on board. All of the manifests must be signed by the Contractor's Superintendent and will be collected by the watchman.

   Upon entering the site, if a work vehicle does not have a pass, it will be held at the gate until cleared by the Construction Supervisor.

   All work vehicle drivers will sign the register at the vehicle gate and all persons entering site on work vehicles will be subject to same badge regulations as the Construction personnel gate.

4. Parking - All of the Contractor's employees and visitors will park on the construction parking lot outside of the Construction personnel gate.

Upon entering Company property, the Contractor's personnel will drive on roads which are specifically designated as being for Construction use only.

5. Use of Plant Facilities - Contractor will instruct his employees not to use plant cafeteria facilities, locker rooms, toilet and wash facilities, telephones, tools or equipment.

APPENDIX B

UNION ELECTRIC COMPANY

CONSTRUCTION JOB WORKING RULES - POWER PLANTS

PROJECT _____

1. Working hours will be established by the Project's requirements. All employees are to be at their work station during their assigned work periods.
2. All employees will be supplied a hard hat with their last name in 1/2-inch letters taped on the front and the contractor's name on either side. This is a HARD HAT JOB -- wear them at all times.
3. All employees will be required to wear safety glasses with side shields when on plant premises except in exempted areas such as parking lots and offices.
4. All employees will be required to sign in daily at the Guard House. When signing in they will be issued a Badge. The Badge is to be worn while on the job site and turned in to Guard when your shift is over.
5. All employees must check in and out of Project with their immediate Foreman or General Foreman and enter and leave through the construction gate and on the road posted for construction or contractor's employees. Unauthorized absence from jobsite will result in loss of pay for such time absent.
6. No automobile or other vehicle other than commercial and contract carriers will be permitted on the project unless specifically required to conduct the work. Those required will be issued a gate pass by Union Electric.
7. All Lunch Boxes, Bags, Tool Boxes, Coolers, Cartons and other similar items will be opened for inspection by the Gate Guard on entering or leaving the job.
8. At times, certain areas within the Project, to include Plant Cafeteria, Locker Rooms and Washrooms, will be posted as off-limits, or limited admittance. All employees shall honor these notices.
9. The use of plant phones, other than public pay phones, plant equipment and tools without written permission from Union Electric is prohibited.
10. No alcoholic beverages will be carried onto or consumed on the jobsite.
11. No firearms permitted on the job.
12. Drugs, Stimulants, "Pep Pills", Tranquilizers and similar materials shall not be used on the job unless prescribed by a doctor.
13. No gambling permitted.
14. Horseplay, wrestling and fighting are strictly prohibited.
15. Damaging, mutilating or willful misuse of equipment or tools is not permitted.
16. Willful violation of safety rules or safe working practices are strictly prohibited.
17. We want this to be a Safe Job. YOU CAN HELP. Report all unsafe conditions to your supervisor.

I, the undersigned, have read and understand all of the above rules, and have read the "Workman's Protection Assurance Procedure," and acknowledge that a violation of any of these provisions will be grounds for removal from the Project.

EMPLOYEE'S SIGNATURE _____ DATE _____

CONTRACTOR _____

Appendix "C"

LINER PROPERTIES	TEST METHOD	THICKNESS (Minimum) 40 mil	60 mil
Density g/cc (Min)	ASTM D1505	0.94	0.94
Melt Flow Index g/10 min (Max)	ASTM D1238 Condition E (190 C, 2.16 kg)	0.30	0.30
Tensile Properties (Typical)	ASTM D 638 Type IV		
1. Tensile Strength At Break (Pounds/inch width)	Dumb-bell at 2 ipm	160	240
2. Tensile Strength At Yield (Pounds/inch width)		95	140
3. Elongation at Break (Percent)		700	700
4. Elongation at Yield (Percent)		13	13
Tear Resistance Initiation lbs (Typical)	ASTM D1004 Die C	30	45
Low Temperature Brittleness Deg F (Typical)	ASTM D746 Procedure B	-112	-112
Dimensional Stability % Change Each Direction (Max)	ASTM D1204 212 Deg F 1 Hr	+- 2	+- 2
Resistance To Soil Burial Percent change in original value. (Typical)	ASTM D3083 using ASTM D638 Type IV		
Tensile Strength at Break & Yield	% Change	+- 10	+- 10
Elongation at Break & Yield	% Change	+- 10	+- 10
Environmental Stress Crack Hours (Min)	ASTM D1693 (10% Igepal, 50 Deg C)	1500	1500
Puncture Resistance Pounds (Min)	FTMS 101 Method 2065	52	80
Coefficient of Linear Thermal Expansion	ASTM D696	1.2	1.2
Thermal Stability Oxidative Induction Time, Minutes (Min)	ASTM D3895 130 Deg C, 800 psi	2000	2000
Ozone Resistance	ASTM D1149 7 Days 100 pphm, 104 Deg F	No Cracks	No Cracks
	Magnification	1000	1000

February 1, 1981

Procedure Issued By Power Service
Power Operations

UNION ELECTRIC COMPANY

POWER PLANTS
WORKMAN'S PROTECTION ASSURANCE
PROCEDURE FOR CONSTRUCTION PERSONNEL

(Based on the Operating Manual
for the Union Electric System)

Throughout the construction of new system equipment it is necessary to assure the safety of personnel and equipment. The following is a brief outline of procedures and definitions designed to guide construction personnel in dealing with Union Electric operating authorities for Workman's Protection Assurances.

NOTE: A Union Electric operating authority is the dispatcher or operator who has authority over the operation of system equipment and as such issues all Workman's Protection Assurances on equipment under his authority.

DEFINITION

Workman's Protection Assurance is the operating authority's assurance to the person obtaining Workman's Protection Assurance that either 1) the equipment covered by the Workman's Protection Assurance has been completely isolated from energy sources (see Out of Service below), or 2) the equipment is placed in a special status requested by the person receiving the Workman's Protection Assurance (see Local Control below). The operating authority records all pertinent data concerning each Workman's Protection Assurance, and orders the equipment covered tagged in order to make known its status. The status of equipment under a Workman's Protection Assurance can only be changed after the Workman's Protection Assurance is removed.

EQUIPMENT COVERED BY WORKMAN'S PROTECTION ASSURANCES

All system equipment under the jurisdiction of an operating authority must be covered by Workman's Protection Assurance when it is to be worked on or tested.

The only equipment that can be covered by Workman's Protection Assurance is equipment under an operating authority's jurisdiction.

NOTE: Equipment connected to energy sources but not released to the jurisdiction of an operating authority can only be protected by Workman's Protection Assurance on the isolating device (or devices) between the energy source and the equipment. In this case it is only possible for the operating authority to assure the person receiving Workman's Protection Assurance that the particular isolating device (or devices) connecting the new equipment to his energy sources is protected and he cannot assure the person receiving the Workman's Protection Assurance that the equipment is completely isolated. Therefore, it is better for all new equipment to be released to the jurisdiction of an operating authority as soon as possible.

TYPES OF WORKMAN'S PROTECTION ASSURANCES

The following two types of Workman's Protection Assurances are issued during construction.

1. Out of Service

Purpose - To provide the person (or persons) to whom Workman's Protection Assurance is issued the operating authority's assurance that the equipment has been properly isolated from all known energy sources and that this isolation will continue until the Out of Service is released. This does not relieve the person obtaining the protection of the responsibility of making prescribed tests or observations to assure himself that the equipment is safe to work on.

Persons Covered - Any eligible person may obtain an Out of Service. A supervisor's Out of Service will cover all persons working on the job he directs. As many Out of Service's can be issued on a piece of equipment as necessary.

Tags - All points of isolation for the equipment covered will be tagged by the Out of Service - Construction tag (Form 1780).

2. Local Control

Purpose - To delegate to one person the authority to operate or direct the operation of a given piece of system equipment (subject to the limitations imposed by the operating authority) for trial or test.

Persons Covered - Only one person may obtain a Local Control at a time. While this person holds a Local Control no other Workman's Protection Assurance may be issued.

Tags - All control locations for the equipment covered will be tagged by the Local Control - Construction tag (Form 1781).

Time Limitation - The Local Control must be released by the holder before he goes off duty.

EXCEPTION: If the equipment in question is in the process of being tested prior to the initial acceptance by the company operating forces and the test requires more than one working shift, the Local Control may be held overnight or as required until the test is concluded.

Equipment Condition - The person taking the Local Control must specify the status he wishes the equipment to be in when the Local Control is issued to him.

PERSONS ELIGIBLE FOR WORKMAN'S PROTECTION ASSURANCES

Only those qualified persons (as mutually agreed by Union Electric Company and the Contractor) may receive Workman's Protection Assurance. A list of all persons eligible to receive Workman's Protection Assurance (both Contractor and Union Electric Company personnel) must be presented by the Union Electric Company Construction Supervisor to the supervisors of all operating authorities who will issue Workman's Protection Assurance.

OBTAINING AND RELEASING WORKMAN'S PROTECTION ASSURANCE

A person receiving a Workman's Protection Assurance will obtain from and release his Workman's Protection Assurance to the same operating authority. The Union Electric Company Construction Supervisor will furnish the Contractor with information on what operating authorities to contact for Workman's Protection Assurances.

The person who obtains the Workman's Protection Assurance must release it.

EXCEPTION: If a person holding Workman's Protection Assurance on a piece of equipment is not available and it is necessary because of plant or system emergency to place that piece of equipment in service, the Workman's Protection Assurance can be released to the operating authority by the Supervisor of the holder of the Workman's Protection Assurance provided 1) every attempt has been made to contact the holder of the Workman's Protection Assurance and, 2) a thorough examination by the person releasing the equipment reveals the equipment to be in proper operating order.

FILLING OUT TAGS

All construction tags are serial numbered and are provided with stubs. When Workman's Protection Assurance is issued, the person to whom it is issued will receive the stub portion. When the Workman's Protection Assurance is released, the stub, signed by the person to whom the Workman's Protection Assurance was issued (or his Supervisor as provided for in the EXCEPTION above), must be returned to the operating authority.

Approved by H N McCoy
H. N. McCoy
Director
Engineering & Construction

Approved by E J Telthorst
E.J. Telthorst
Vice-President
Power Operations

Approved by _____
G. J. Haven
Vice-President
Transmission & Distribution

PROJECT: U. E. LABADIE PLANT NEW ASH POND NO. 1953.01.1111

Surface Elevation 469 Datum MSL

Completion Date 10-2-91

DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT SPT VALUE	SAMPLES
	Medium stiff, brown, very silty CLAY, trace sand - (CL)		SS
5	Medium stiff, tan, sandy SILT - ML 59 and 57 percent finer than 0.074 mm (#200) at 3.5 to 5 and 6 to 7.5 feet, respectively.		SS
			SS
10	Loose to medium dense, tan, fine to medium SAND, trace silt - SP		SS
			SS
15			SS
			SS
20	Boring terminated at 20 feet		SS
25			
30			
35			

SHEAR STRENGTH, tsf
△-UU/2 ○-QU/2 ◇-SV
0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE
(ASTM D 1586)
▲- BLOWS PER FOOT
WATER CONTENT, %
PL LL
10 20 30 40 50

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

GROUNDWATER DATA

ENCOUNTERED AT 11.5 FEET
AT ____ FEET AFTER ____ HOURS
AT ____ FEET AFTER ____ HOURS
____ FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

____ AUGER 3 3/4" HOLLOW STEM
____ WASH BORING FROM ____ FEET
CC DRILLER TK LOGGER
CME 55 DRILL RIG

REMARKS:
N5460 E9660

SEE NOTATION SHEET FOR DESCRIPTION OF ABBREVIATIONS

LOG OF BORING

B-1

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

PLATE 1

PROJECT: U. E. LABADIE PLANT NEW ASH POND NO. 1953.01.1111

Surface Elevation 468
Datum MSL
Completion Date 10-2-91

DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT SPT VALUE	SAMPLES
	Medium stiff, tan and gray, silty CLAY, trace sand - (CL)		ST
	Loose, tan, silty SAND, trace clay - SM		SS
5	40 percent finer than 0.074 mm (#200) at 3.5 to 5 feet.		SS
	Loose to medium dense, tan, fine SAND - SP		SS
10			SS
			SS
15			SS
	Loose, blue and gray, fine SAND with silt - SP or SM		SS
20	Boring terminated at 20 feet		
25			
30			
35			

SHEAR STRENGTH, tsf
△-UU/2 ○-QU/2 ◇-SV
0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE
(ASTM D 1586)
▲- BLOWS PER FOOT
WATER CONTENT, %
PL LL
10 20 30 40 50

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

GROUNDWATER DATA

ENCOUNTERED AT 12.5 FEET
AT ____ FEET AFTER ____ HOURS
AT ____ FEET AFTER ____ HOURS
____ FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

____ AUGER 3 3/4" HOLLOW STEM
____ WASH BORING FROM ____ FEET
CC DRILLER TK LOGGER
CME 550 DRILL RIG

REMARKS:
N5580 E9080

SEE NOTATION SHEET FOR DESCRIPTION OF ABBREVIATIONS

LOG OF BORING

B-2

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

PLATE 2

PROJECT: U. E. LABADIE PLANT NEW ASH POND NO 1953.01.1111

Surface Elevation 468
Datum MSL
Completion Date 10-2-91

DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT SPT VALUE	SAMPLES
	Medium stiff. brown. silty CLAY - (CL)		
5	Loose . tan. very fine SAND. some silt - SM 24 percent finer than 0.074 mm (#200) at 3.5 to 5 feet.		SS SS
10	Medium dense. tan. fine SAND. trace clay - SP		SS SS
15			SS SS
20	Medium dense. brown. fine to medium SAND - SP Boring terminated at 20 feet		SS SS
25			
30			
35			

SHEAR STRENGTH, tsf
△ - UU/2 ○ - QU/2 ◇ - SV
0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE
(ASTM D 1586)
▲ - BLOWS PER FOOT

WATER CONTENT, %
PL LL
10 20 30 40 50

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

GROUNDWATER DATA

ENCOUNTERED AT 11.0 FEET
AT ____ FEET AFTER ____ HOURS
AT ____ FEET AFTER ____ HOURS
____ FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

____ AUGER 3 3/4" HOLLOW STEM
____ WASH BORING FROM ____ FEET
CC DRILLER TK LOGGER
CME 550 DRILL RIG

REMARKS:
N4720 E9150

SEE NOTATION SHEET FOR DESCRIPTION OF ABBREVIATIONS

LOG OF BORING

B-3

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

PLATE 3

PROJECT: U. E. LABADIE PLANT NEW ASH POND NO. 1953.01.1111

Surface Elevation 468 Datum MSL

Completion Date 10-2-91

DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT SPT VALUE	SAMPLES
	Medium stiff, brown, silty CLAY -CL		SS
	Soft, brown and gray SILT with clay - ML		SS
5			SS
	Soft to medium stiff, gray SILT - (ML) 82 percent finer than 0.074 mm (#200) at 8.5 to 10 feet.		SS
10			ST
			SS
15	Loose to medium dense, gray, medium SAND, some to trace silt - SP to SM		SS
			SS
20	Boring terminated at 20 feet		
25			
30			
35			

SHEAR STRENGTH, tsf
△-UU/2 ○-QU/2 ◇-SV
0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE (ASTM D 1586)
▲- BLOWS PER FOOT
WATER CONTENT, %
PL LL
10 20 30 40 50

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

GROUNDWATER DATA

ENCOUNTERED AT 16.0 FEET
AT ____ FEET AFTER ____ HOURS
AT ____ FEET AFTER ____ HOURS
____ FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

____ AUGER 3 3/4" HOLLOW STEM
____ WASH BORING FROM ____ FEET
CC DRILLER TK LOGGER
CME 550 DRILL RIG

REMARKS:
N4880 E8450

SEE NOTATION SHEET FOR DESCRIPTION OF ABBREVIATIONS

LOG OF BORING

B-4

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

PLATE 4

PROJECT: U. E. LABADIE PLANT NEW ASH POND NO. 1953.01.1111

Surface Elevation 466 Datum MSL Completion Date 10-2-91

DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT SPT VALUE	SAMPLES
	Medium stiff, tan and brown, very silty CLAY - (CL)		SS
5	Medium stiff, brown SILT to silty SAND - (ML to SM) 37 percent finer than 0.074 mm (#200) at 8.5 to 10 feet.		SS
			SS
10	Soft, dark gray SILT, trace clay and fine sand - ML		SS
15			SS
	Soft, dark gray SILT, with organics and sand - ML		SS
20	Medium dense, dark gray, silty SAND - SM		SS
	Boring terminated at 20 feet		
25			
30			
35			

SHEAR STRENGTH, tsf
△-UU/2 ○-QU/2 ◇-SV
0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE
(ASTM D 1586)
▲- BLOWS PER FOOT
WATER CONTENT, %
PL LL
10 20 30 40 50

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

GROUNDWATER DATA

ENCOUNTERED AT 13.0 FEET
AT ____ FEET AFTER ____ HOURS
AT ____ FEET AFTER ____ HOURS
____ FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

____ AUGER 3 3/4" HOLLOW STEM
____ WASH BORING FROM ____ FEET
CC DRILLER TK LOGGER
CME 550 DRILL RIG

REMARKS: N4095 E8060

SEE NOTATION SHEET FOR DESCRIPTION OF ABBREVIATIONS

LOG OF BORING

B-5

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

PLATE 5

PROJECT: U. E. LABADIE PLANT NEW ASH POND NO. 1953.01.1111

Surface Elevation 466 Datum MSL

Completion Date 10-4-91

DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT SPT VALUE	SAMPLES
	Medium stiff, brown SILT, with clay and sand - ML or CL		SS, SS
5	Medium stiff, tan, sandy SILT - ML or SM		
	Soft, brown CLAY, trace silt - (CH)		SS
	Soft, gray, lean CLAY with very fine sand - (CL) 71 percent finer than 0.074 mm (#200) at 11 to 12.5 feet.		SS, SS, SS, SS
20	Boring terminated at 20 feet		
25			
30			
35			

SHEAR STRENGTH, tsf
△-UU/2 ○-QU/2 ◇-SV
0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE (ASTM D 1586)
▲- BLOWS PER FOOT

WATER CONTENT, %
PL ——— LL
10 20 30 40 50

70 →

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

GROUNDWATER DATA

ENCOUNTERED AT 14.0 FEET
AT ____ FEET AFTER ____ HOURS
AT ____ FEET AFTER ____ HOURS
____ FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

____ AUGER 3 3/4" HOLLOW STEM
____ WASH BORING FROM ____ FEET
CC DRILLER TK LOGGER
CME 550 DRILL RIG

REMARKS: N3240 E7880

SEE NOTATION SHEET FOR DESCRIPTION OF ABBREVIATIONS

LOG OF BORING

B-6

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

PLATE 6

PROJECT: U. E. LABADIE PLANT NEW ASH POND NO. 1953. 01. 1111

Surface Elevation _____ Datum _____ Completion Date 10-4-91

DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT SPT VALUE	SAMPLES
	BASE COURSE		
	FILL: Black CINDERS and SAND, with brown, silty clay - SM		SS
5	Medium stiff, brown, silty CLAY, with sand - CL		SS
	Loose, tan, medium SAND - SP		SS
10	Stiff, brown SILT, with sand - ML to SM		SS
	Loose, brown, fine SAND, with silt - SM		SS
15	Stiff, gray, SILT and medium dense, gray, fine SAND interbedded - SM to ML to SP		SS
20	Medium dense to loose, brown, medium SAND - SP		SS
	Medium dense, gray, fine SAND, with silt - SP		SS
25	Medium dense, gray, fine to medium SAND - SP		SS
30	Medium dense, gray, fine to medium SAND, with subrounded to rounded gravel - SP		SS
35			SS

SHEAR STRENGTH, tsf
△ - UU/2 ○ - QU/2 ◇ - SV
0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE
(ASTM D 1586)
▲ - BLOWS PER FOOT
WATER CONTENT, %
PL ——— LL
10 20 30 40 50

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

GROUNDWATER DATA

ENCOUNTERED AT 18.0 FEET
AT _____ FEET AFTER _____ HOURS
AT _____ FEET AFTER _____ HOURS
____ FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

____ AUGER 3 3/4" HOLLOW STEM
____ WASH BORING FROM ____ FEET
CC DRILLER TK LOGGER
CME 750 DRILL RIG

REMARKS: _____

SEE NOTATION SHEET FOR DESCRIPTION OF ABBREVIATIONS

LOG OF BORING

B-7

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

PLATE 7

PROJECT: U. E. LABADIE PLANT NEW ASH POND NO. 1953.01.1111

CONTINUATION OF BORING B-7

SURFACE ELEVATION _____

DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT SPT VALUE	SAMPLES
	Medium dense, gray, fine to medium SAND, with subrounded to rounded gravel - SP		SS
45	Medium dense to dense, gray, fine and coarse SAND, with reverse grading - SW		SS
50			SS
55	Dense, gray, fine to coarse SAND, with gravel - SP		SS
	Medium dense to dense, gray, medium to coarse SAND, with subrounded to rounded gravel - SP		SS
60			SS
65			SS
70			SS
75			SS
80			SS
85			SS

SHEAR STRENGTH, tsf
△ - UU/2 ○ - QU/2 ◇ - SV
0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE
(ASTM D 1586)
▲ - BLOWS PER FOOT

WATER CONTENT, %
PL LL
10 20 30 40 50

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

SEE NOTATION SHEET FOR DESCRIPTION OF ABBREVIATIONS

GEOTECHNOLOGY
ENGINEERING AND ENVIRONMENTAL SERVICES
SAINT LOUIS, MISSOURI

PLATE 8

PROJECT: U. E. LABADIE PLANT NEW ASH POND NO. 1953.01.1111

CONTINUATION OF BORING B-7 | SURFACE ELEVATION _____

DEPTH IN FEET	DESCRIPTION OF MATERIAL	UNIT DRY WEIGHT SPT VALUE	SAMPLES
95	Medium dense to dense, gray, medium to coarse SAND, with subrounded to rounded gravel - SP		SS
100			SS
105			SS
110			SS
115	Very dense, gray, medium and coarse SAND - SP		SS
120	Boring terminated at 118.7 feet due to cave in at 75 feet.		SS
125			
130			
135			

SHEAR STRENGTH, tsf
△-UU/2 ○-QU/2 ◇-SV
0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE
(ASTM D 1586)
▲- BLOWS PER FOOT

WATER CONTENT, %
PL ——— LL
10 20 30 40 50

2"

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

SEE NOTATION SHEET FOR DESCRIPTION OF ABBREVIATIONS

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PLATE 9

BORING LOG: TERMS AND SYMBOLS

GENERAL NOTES

1. *Information on each boring log is a compilation of subsurface conditions based on soil or rock classifications obtained from the field as well as from laboratory testing of samples. The strata lines on the logs may be approximate or the transition between the stata may be gradual rather than distinct. Water level measurements refer only to those observed at the times and places indicated, and may vary with time, geologic condition or construction activity.*
2. *Relative composition and Unified Soil Classification designations are based on visual estimates and are approximate only. If laboratory tests were performed to classify the soil, the unified designation is shown in parenthesis.*
3. *Value given in Unit Dry Weight/SPT Column is either a unit dry weight in pounds per cubic foot, if adjacent to a ST sample designation, or blows per 6-inch increment if adjacent to a SS sample designation.*

ABBREVIATIONS

UU/2	*Shear Strength from Unconsolidated - Undrained Triaxial Test (ASTM D2850)*
QU/2	*Shear Strength from Unconfined Compression Test (ASTM D2166)*
SV	*Shear Strength from Field Vane (ASTM D2573)*
PL	*Plastic Limit (ASTM D4318)*
LL	*Liquid Limit (ASTM D4318)*

LEGEND

CS	Continuous Sampler
GB	Grab Sample Taken From Auger Cuttings Or Wash Water Return
NX 100 42	NX Rock Core with Percent Recovery/R.Q.D. Given in Adjacent Column
PST	Three Inch Diameter Piston Tube Sample
SS	Split Spoon Sample (Standard Penetration Test)
ST	Three Inch Diameter Shelby Tube Sample
*	Sample Not Recovered
SV	Field Vane Test

SPLIT - BARREL SAMPLER DRIVING RECORD

Blow Per Foot (N-Value)	*Description*
25	*25 blows drove sampler 12 inches after initial 6 inches of seating.*
75/10"	*75 blows drove sampler 10 inches after initial 6 inches of seating.*
50/S3"	*50 blows drove sampler 3 inches during initial 6 inch seating interval.*

NOTES: 1. To avoid damage to sampling tools, driving is limited to 50 blows during any six inch interval.
2. N-Value (Blow Count) is the standard penetration resistance based on the total number of blows, using a 140-lb. hammer with 30-inch free fall, required to drive a split spoon the last two of three, 6 inch drive increments. (Example: 4/7/9, N = 7 + 9 = 16). Values are shown as a summation on grid plot and may be shown as 4/7/9 in Unit Dry Weight -SPT column.

RELATIVE COMPOSITION

Trace	*0-10%*
With/Some	*11-35%*
Soil modifier such as silty, clayey, sandy, etc.	*› 35%*

DENSITY OF GRANULAR SOILS

Descriptive Term:	*N—Value*
Very Loose	*0-4*
Loose	*5-10*
Medium Dense	*11-30*
Dense	*31-50*
Very Dense	*› 50*

STRENGTH OF COHESIVE SOILS

Consistency	*Undrained Shear Strength Tons Per Sq. Ft.*	*Field Test*	*Approximate N-Value Range*
Very Soft	*less than 0.12*	*Thumb will penetrate soil more than 1".*	*0-1*
Soft	*0.13 to 0.25*	*Thumb will penetrate soil about 1".*	*2-4*
Medium Stiff	*0.26 to 0.50*	*Thumb will penetrate soil about ¼".*	*5-8*
Stiff	*0.51 to 1.00*	*Thumb hardly indents soil*	*9-15*
Very Stiff	*1.01 to 2.00*	*Thumb will not indent soil, but readily indented with thumbnail*	*16-30*
Hard	*greater than 2.00*	*Thumbnail will not indent soil*	*› 30*

SOIL GRAIN SIZE

U.S. STANDARD SIEVE

12"	3"	¾"	4	10	40	200		
BOULDERS	COBBLES	GRAVEL		SAND			SILT	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		
300	76.2	19.1	4.76	2.00	0.42	0.074	.002	

SOIL GRAIN SIZE IN MILLIMETERS

SOIL STRUCTURE

Calcareous — *Having appreciable quantities of carbonate.*

Fissured — *Containing shrinkage or relief cracks, often filled with fine sand or silt; usually more or less vertical.*

Slickensided — *Having planes of weakness that appear slick and glossy. The degree of slickensidedness depends upon the spacing of slickensides and the ease of breaking along these planes.*

Layer — *Inclusion greater than 3 inches thick.*

Seam — *Inclusion 1/8 inch to 3 inches thick extending through the sample.*

Parting — *Inclusion less than 1/8 inch thick.*

Pocket — *Inclusion of material of different texture that is smaller than the diameter of the sample.*

Interlayered — *Soil samples composed of alternating layers of different soil types.*

Intermixed — *Soil samples composed of pockets of different soil types and a layered or laminated structure is not evident.*

Laminated — *Soil sample composed of alternating partings or seams of different soil type.*

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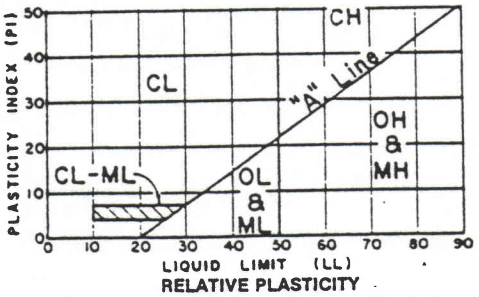
UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR		DIVISIONS	SYMBOL	DESCRIPTION
Coarse-Grained Soils (more than 50% Larger than No. 200 Sieve Size)	Gravel and Gravelly Soils	Clean Gravels Little or no Fines	GW	Well-Graded Gravel, Gravel-Sand Mixture
			GP	Poorly-Graded Gravel, Gravel-Sand Mixture
		Gravels with Appreciable Fines	GM	Silty Gravel, Gravel-Sand-Silt Mixture
			GC	Clayey-Gravel, Gravel-Sand-Clay Mixture
	Sand and Sandy Soils	Clean Sands Little or no Fines	SW	Well-Graded Sand, Gravelly Sand
			SP	Poorly-Graded Sand, Gravelly Sand
		Sands with Appreciable Fines	SM	Silty Sand, Sand-Silt Mixture
			SC	Clayey Sand, Sand-Clay Mixture
Fine-Grained Soils (more than 50% Smaller than No. 200 Sieve Size)	Silts and Clays	Liquid Limit Less than 50	ML	Silt, Clayey Silt, Silty or Clayey Very Fine Sand, Slight Plasticity
			CL	Clay, Sandy Clay, Silty Clay, Low to Medium Plasticity
			OL	Organic Silts or Silty Clays of Low Plasticity
	Silts and Clays	Liquid Limit More than 50	MH	Silt, Fine Sandy or Silty Soil with High Plasticity
			CH	Clay, High Plasticity
			OH	Organic Clay of Medium to High Plasticity
Highly Organic Soils			PT	Peat, Humus, Swamp Soil

PLASTICITY CHART



RELATIVE PLASTICITY

Nonplastic	Cannot Roll into Ball
Trace Plasticity	Barely Roll into Ball
Medium Plastic	Can be Rolled into Ball
Highly Plastic	No Rupture by Kneading

VISUAL DESCRIPTION CRITERIA*

TABLE 1: CRITERIA FOR DESCRIBING ANGULARITY OF COARSE-GRAINED PARTICLES

Description	Criteria
Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular	Particles are similar to angular description but have rounded edges
Subrounded	Particles have nearly plane sides but have well-rounded corners and edges
Rounded	Particles have smoothly curved sides and no edges

TABLE 2: CRITERIA FOR DESCRIBING PARTICLE SHAPE

Description	Criteria
Flat	Particles with width/thickness X3
Elongated	Particles with length/width X3
Flat and Elongated	Particles meet criteria for both flat and elongated

TABLE 3: CRITERIA FOR DESCRIBING MOISTURE CONDITION

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

TABLE 4: CRITERIA FOR DESCRIBING REACTION WITH HCL

Description	Criteria
None	No visible reaction
Weak	Some reaction, with bubbles forming slowly
Strong	Violent reaction, with bubbles forming immediately

TABLE 6: CRITERIA FOR DESCRIBING CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

TABLE 8: CRITERIA FOR DESCRIBING DRY STRENGTH

Description	Criteria
None	The dry specimen crumbles into powder with mere pressure of handling
Low	The dry specimen crumbles into powder with some finger pressure
Medium	The dry specimen breaks into pieces or crumbles with considerable finger pressure
High	The dry specimen cannot be broken with finger pressure. Specimen will break into pieces between thumb and a hard surface
Very High	The dry specimen cannot be broken between the thumb and a hard surface

TABLE 9: CRITERIA FOR DESCRIBING DILATANCY

Description	Criteria
None	No visible change in the specimen
Slow	Water appears slowly on the surface of the specimen during shaking and does not disappear or disappears slowly upon squeezing
Rapid	Water appears quickly on the surface of the specimen during shaking and disappears quickly upon squeezing

TABLE 10: CRITERIA FOR DESCRIBING TOUGHNESS

Description	Criteria
Low	Only slight pressure is required to roll the thread near the plastic limit. The thread and the lump are weak and soft.
Medium	Medium pressure is required to roll the thread to near the plastic limit. The thread and the lump have medium stiffness
High	Considerable pressure is required to roll the thread to near the plastic limit. The thread and the lump have very high stiffness

TABLE 12: IDENTIFICATION OF INORGANIC FINE-GRAINED SOILS FROM MANUAL TESTS

Soil Symbol	Dry Strength	Dilatancy	Toughness
ML	None to low	Slow to rapid	Low or thread cannot be formed
CL	Medium to high	None to slow	Medium
MH	Low to medium	None to slow	Low to medium
CH	High to very high	None	High

*NOTES: 1. Tables adapted from ASTM D 2488 "Description and Identification of Soils" (Visual-Manual Procedure)
2. Tables 5, 7 and 11 incorporated into other information on this plate.

APPENDIX G
MATERIAL SAFETY DATA SHEETS
CONTRACTOR AFFIDAVIT-PURCHASE ORDER NO.

As the responsible party for the firm of _____, I do here state that I have requested, received, read, understand, and will abide by and enforce the guidelines and conditions set forth in the Material Safety Data (MSD) Sheets provided by the product manufacturer for each hazardous chemical product delivered to and/or used in conjunction with the preparation and execution of this project.

I further state that I am aware of, understand, and will fully implement the requirements of the OSHA Hazard Communication Standard (CFR 29, Part 1910.1200) and other worker's right-to-know laws.

I further state that I will maintain copies of the required MSD Sheets for each hazardous chemical in the workplace and will insure that the MSD Sheets are readily accessible during each workshift to employees when they are in their work areas.

I further state that the information contained within the MSD sheets has been disseminated to all parties who have a right or need to know, and that all workers and other effected parties have received adequate and appropriate training in the hazards, handling, and use of hazardous chemicals.

_____ _____
Contractor's Representative/Title Date

_____
Notary Public Signature & Seal