# **GEOTECHNICAL INVESTIGATION**

# **Terminal Apron Reconstruction**

# MSCAA Project 08-1259-02

Note: The Geotechnical Investigation consists of seven (7) documents, as follows:

Document 1: Section C - Geotechnical Investigation from Planning Study for Terminal Apron Reconstruction MSCAA Project 08-1259-00, August 25, 2010, by Tri-State Testing, Inc.

Appendix C – Geotechnical Investigation

Document 2: Section D - Subsurface Environmental Investigation from Planning Study for Terminal Apron Reconstruction MSCAA Project 08-1259-00, August 25, 2010, by Tri-State Testing, Inc.

Appendix D – Subsurface Environmental Investigation

Document 3: ASR Investigation, February 28, 2011, by American Petrographic Services, Inc.

Document 4: Letter, August 13, 2011, by Arun Wagh, Inc.

Document 5: Letter, August 18, 2011, by Arun Wagh, Inc.

Document 6: Letter, August 19, 2011, by Arun Wagh, Inc.

Document 7: Concrete Core Strength Tests, September 12, 2011, by B&W Engineering Laboratories, Inc.

# DOCUMENT 1: SECTION C – GEOCTECHNICAL INVESTIGATION

# SECTION C. GEOTECHNICAL INVESTIGATION

# C.1 Introduction

The purpose of this section is to determine the general subsurface conditions by obtaining subsurface samples of the existing subgrade soils and evaluating these with respect to the apron pavement reconstruction criteria for the proposed project. Refer to **Appendix C** for the exhibits referred to in this section.

# C.2 Site Investigation

In the following discussion we have referred to the fifteen soil borings, which were drilled in conjunction with the Standard Penetration Test (SPT), as the **geotechnical borings**, and the eighty-five soil borings conducted with macro core sampling as the **direct push technology borings**. The direct push borings are further discussed in **Section D. Subsurface Environmental Investigation**.

Fifteen (15) soil test borings – B-1 through B-15 - were drilled on the existing apron during March 17 through 19, 2010. All borings were drilled to a depth of 15 feet. The borings were spread over the apron area. These borings were drilled with a truckmounted drill rig. The boring locations are shown on the boring location plan labeled **Exhibit C.1** in **Appendix C**. Split-spoon samples were obtained by the Standard Penetration Test (SPT) method in all of the borings. Samples were obtained at an interval of one foot in the top ten feet and then between the depth range of 13.5 to 15.0.

Logs of borings with groundwater level observations have been included in **Appendix C** of this report. The logs show visual description of the soil strata encountered.



Definitions of the terms and symbols used on the logs and explanations of the SPT procedure are included in **Appendix C**.

The split-spoon samples were inspected and reclassified by the project geotechnical engineer and the boring logs were edited as necessary. To aid in classifying the soils and to determine general soil characteristics, natural moisture contents were determined for all the split-spoon samples and Atterberg Limits tests were performed on selected split-spoon samples. Some of the intact split-spoon samples were also tested for unconfined compressive strength. We recognize that the split-spoon samples are disturbed and the results would not be accurate; however, the results are anticipated to be conservative and sufficient to give some indication of the shear strengths of the soils. The results of moisture content determination tests on split-spoon samples are included on the boring logs and the results of the Atterberg Limits tests along with the results of the Fractional Organic Carbon tests are presented on a summary sheet in **Appendix C**.

# C.3 Site Conditions

The site is located in a belt of loess (a finely ground rock flour resulting from glacial erosion) that extends back of the east bank of the Mississippi River across the states of Tennessee and Kentucky. Loess rests on river terrace deposits of Pleistocene age. Under these are hard marine clays and dense sands of Eocene age. Some of the borings at the site, however, showed a few feet of manmade fill.

The earthquake hazard map from the United States Geologic Survey (USGS) indicates that the area of the site has an effective peak velocity-related acceleration coefficient  $(A_v)$  of about 0.20 and effective peak acceleration (Aa) of also 0.20. The soil profile type, as defined by the Unified Building Code, is typically S2, for which the corresponding site coefficient is 1.2. Only locally, though, the soil profile type is inferred to be S3, for which



Memphis International Airport

the corresponding site coefficient is 1.5. However, after implementing site preparation and earthwork construction as recommended later in this report, the entire soil profile is expected to be S2. A review of the groundwater level data, soil type, and consistencies/relative densities that are reflected by the SPT tests indicate that there is no potential for liquefaction in the soils investigated at this site in the event of a major earthquake.

Existing pavement, which consists of a concrete pavement, underlain by a cement treated base (CTB) course and soil-cement sub base course, was cored through in all borings. While the CTB base course could be drilled through in the larger diameter geotechnical borings, it was difficult to separate the CTB base course from the soil-cement sub base course in the smaller diameter direct push technology borings. We have presented the pavement thicknesses as measured in the geotechnical borings in a tabular form in **Appendix C**, as well as noted on the boring logs.

In the cores obtained from the geotechnical borings the concrete thickness varied from a minimum of 10.5 inches to a maximum of 18 inches. Typically, though, the average concrete thickness was 13 inches. The CTB course was found to be consistently 12 inches thick in these borings. Soil-cement course thickness could be obtained in some of the borings and they are noted on the appropriate boring logs.

In the cores obtained from the direct push technology borings the concrete thickness varied from a minimum of 10.5 inches to a maximum of 21 inches. Typically, though, the average concrete thickness was 13.5 inches. The CTB plus soil-cement courses were found to vary considerably in these borings – from 1 to 18 inches. We attribute these erratic results to the fact that the direct push technology diameter is smaller and, therefore, it is very difficult to obtain good cores in CTB and soil-cement. While in some cases no cores could be obtained in CTB and soil-cement, in other cases it was difficult to delineate the CTB and soil-cement interface. It is our opinion that while the CTB core results from geotechnical borings are essentially dependable, only the concrete thicknesses are meaningful in direct push technology borings. Compressive strength tests



were preformed on selected samples from the cement treated base. The results of these tests are in **Appendix C**.

Since the direct push technology borings were not performed with SPT sampling, and they were primarily to detect the presence of jet fuel, we present the following discussion based only on the geotechnical borings. Refer to **Section D. Subsurface Environmental Investigation** for a further discussion of the direct push technology borings.

Based on visual observations, some of the borings were entirely in natural soils, some of the borings were entirely in fill, and the other borings were partially in fill and partially in natural soils. The following **TABLE C.1** presents extents of fill soils in the geotechnical borings as inferred from our sample inspection:

Boring Number	Inferred Depth Of Fill Soils	Boring Number	Inferred Depth of Fill Soils
1	None	9	None
2	None	10	15'
3	15'	11	8'
4	None	12	8'
5	5'	13	5'
6	None	14	15'
7	15'	15	None
8	5'		

# TABLE C.1

# TABLE C.1 NOTES:

- 1. All borings were terminated at a depth of 15'. Thus, when the inferred depth of fill is given as 15', it implies to the depth extent of the boring.
- 2. The depths given in the above table are with reference to the existing surface. Thus, the pavement is included in the depths given.

3. Although no fill is mentioned in B-2, a small amount of sand and gravel was noted at the top of the first sample at 3.5' - 5.0'.

The natural as well as the fill soils consist of silty clays (CL) or clayey silts (ML). The natural soils frequently consisted of higher plasticity silty clays. Rarely the fill soils contained gravel pieces. The symbols within the above parenthesis are as per the Unified Soil Classification System. The classification is either based on actual tests or inferred from sample inspection.

The SPT blow counts in the fill as well as natural soils were generally indicative of stiff to very stiff consistencies, indicating natural soils with relatively high shear strengths and well-compacted and also of relatively high shear strength fill soils. The only exception to this statement is the natural soils in boring B-9. Soil samples in this boring were consistently very moist and appeared to be of mediocre strength. As far as the SPT blow counts are concerned, they depicted a stiff consistency in sample 1 at 3.5' - 5.0' and sample 4 at 13.5' - 15.0'. The two in between samples reflected a medium stiff consistency.

# C.4 Groundwater

Groundwater levels were noted at time of drilling and at completion of drilling. No water was encountered in any of the fifteen geotechnical borings, either during drilling or at completion of drilling. In the direct push technology borings, water was encountered in nine of the boring locations.

The depth of water is shown on the boring logs. All of the borings where water was encountered are in the area of Concourse "A". Specifically, borings P10, P71, P72, P73, P74, P75, P76, P77, and P83. We believe this water is not naturally occurring ground water, and may be from a leak in an underground water supply pipe in the area.



# C.5 Discussion And Recommendations

In general, this investigation shows that the soils in the project area are competent enough to support the apron pavement after some site work as per the recommendations given later in this section. Even so, the following two geotechnical issues revealed by this investigation should be addressed during the design phase of the project:

- 1. Fill is indicated to be present in several borings, and the fill thickness varies from minor to 15+ feet. We note that the borings were terminated at 15 feet.
- 2. As discussed above, boring B-9 exhibited questionable conditions in what appear to be natural soils.

As far as the first issue is concerned, we note that it would not be feasible to completely characterize these soils based on the data from our investigation consisting of small diameter soil test borings that were spaced several feet apart. However, borings consistently indicated well-compacted fill. We still recommend that these soils should be carefully reviewed after the existing pavement is removed.

Regarding the second issue we recommend one or more test pits in the area represented by boring B-9. The purpose of these test pits would be to observe the field conditions with a better perspective and decide upon the vertical and lateral extents of undercutting needed to remove the questionable soils depicted by B-9.

# C.6 Site Preparation and Earthwork

We recommend that after all lifts of the existing pavement are removed, the subgrade should be excavated to proposed subgrade and then inspected by a qualified soils engineer. At the same time, the subgrade should be proof rolled with a loaded dump truck weighing at least 25 tons. Additionally, test pits should be excavated randomly in the fill areas (soil borings should be used as guide for this) and specifically in the boring



B-9 area. Based on the soil borings, we anticipate well-compacted fill, but field conditions may dictate some undercutting. Based on the inspection, proof rolling, and observation of the test pits all soft, wet, loose, organics, and miscellaneous materials should be completely removed from the site and replaced with well-compacted material as recommended below.

Since the proposed pavement section is slightly thicker than the existing pavement section, it should be noted that apron reconstruction will require minimal, if any, fill. Nevertheless, if any areas require fill, then said fill should be brought to grade using a clean, select, non-expansive fill, free of wet material, organics, debris or other deleterious matter and having a plasticity index between 10 and 20 and a liquid limit less than 45. Fill should be placed at moisture contents within two percentage points of optimum in no more than 8-inch thick loose-depth lifts. Each lift should be compacted to a minimum dry density of 95 percent of the maximum dry density with the exception of the top twelve inches, which should be compacted to 98 percent of the maximum dry density as obtained by the Modified Moisture-Density relationship (Modified Proctor) (ASTM D-1557). The compaction obtained and soil materials provided for each lift should be inspected and approved by a geotechnical engineer before another lift is added. Backfill of utility trenches should also comply with these recommendations. These requirements are in conformance with AC 150/5320-6C Chapter 3, Section 3 of the Federal Aviation Administration's *Standards for Airport Construction*.

Some of the soils at this site are very silty and low to moderate plasticity materials that are prone to losing appreciable amount of shear strength due to disturbances. Every attempt should be made to minimize disturbances to the very silty soils when they are exposed at subgrade or exist near surface.

# C.7 Apron Pavement Design Recommendations

We evaluated the subgrade conditions based on the soil borings and laboratory tests consisting of moisture content determinations, Atterberg limits, and unconfined



Memphis International Airport

compression tests. We gave due weight to the fact that there is significant quantity of fill at this project site. For any additional or replacement fill we assumed silty clay/clayey silt type of fill material and degree of fill compaction as per the previous recommendations. The field and laboratory data obtained was empirically correlated to bearing capacity and CBR, which can also be correlated to the modulus of subgrade reaction. In addition to the unconfined compression strength tests conducted on some of the samples, SPT blow counts and liquidity index (natural moisture content - plastic limit/plasticity index) were used to estimate unconfined compressive strengths, which were correlated to the bearing capacities and CBR values. In our opinion, this method allows us to get an overview of the soils in the entire project area to a "significant" depth.

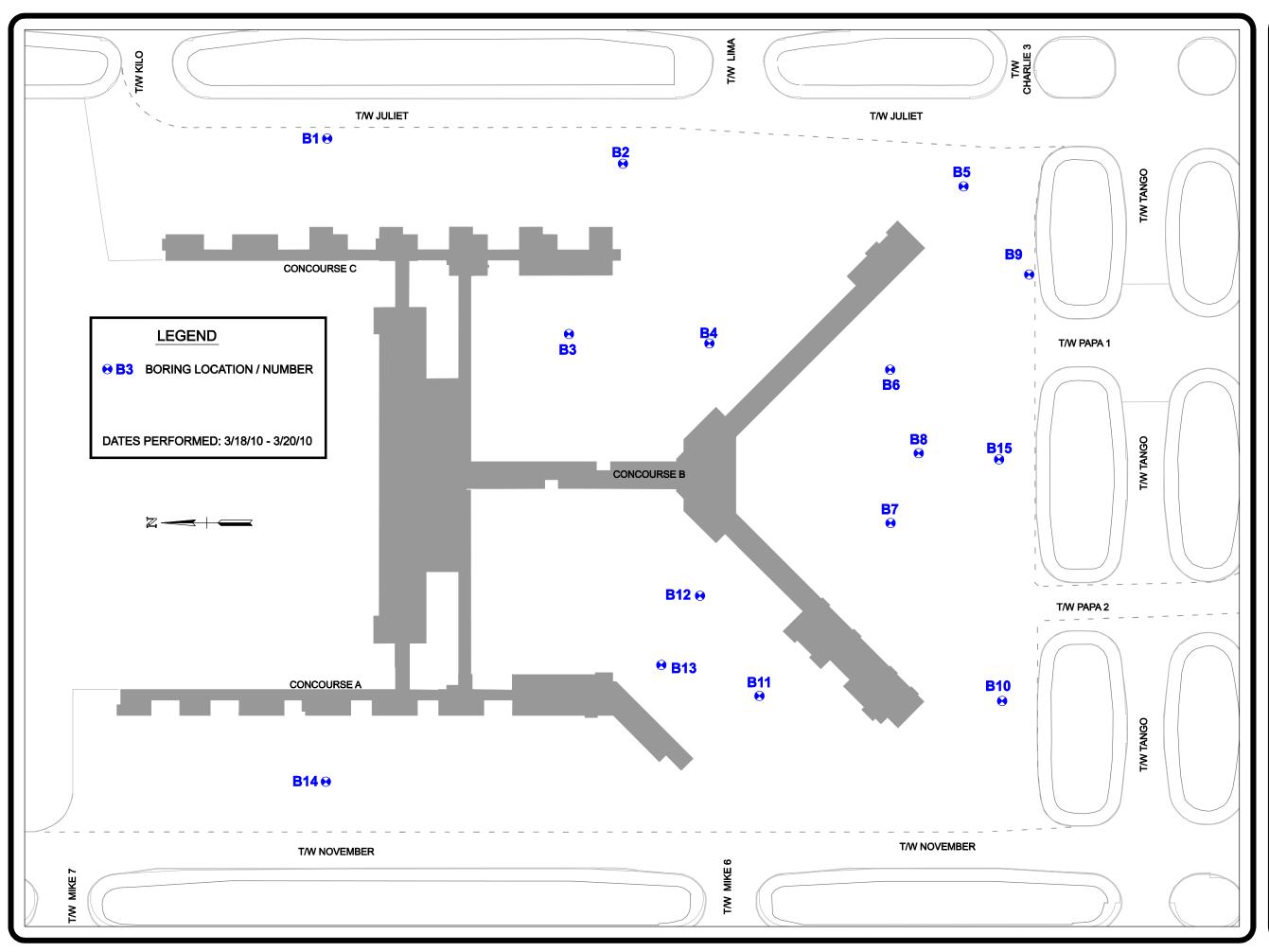
Subject to site preparation and earthwork under controlled conditions as previously recommended, we recommend for the pavement subgrade a CBR value of 6 or a modulus of subgrade reaction value of 160 pci.

Refer to Section H. Pavement Evaluation and Design for further information regarding pavement designs. Also, refer to Section D. Subsurface Environmental Investigation for a further discussion of the direct push boring results.

Refer to Appendix C. for the exhibits referred to in this section.



**APPENDIX C – GEOTECHNICAL INVESTIGATION** 





# TERMINAL APRON RECONSTRUCTION STUDY MSCAA PROJ. 08-1259-00 MEMPHIS INTERNATIONAL AIRPORT

EXHIBIT C.1 GEOTECHNICAL BORINGS SCALE: 1" = 250'



### STANDARD LEGEND

While the borings are representative of subsurface conditions at their respective locations and for their respective vertical reaches, local variations characteristic of the subsurface materials of the region may be encountered.

Consistency of cohesive soils on boring logs is based on driller's log and visual examination and is approximate, except within those vertical reaches of borings where shear strengths from compression tests are shown.

N - Driving resistances in blows per foot determined with a standard split spoon sampler (1-3/8" I.D., 2" O.D.) and a 140 LB driving hammer with a 30" drop.

PPR - Pocket penetrometer readings in tons per square foot. (These readings are not allowable bearing values.)

Ground-water elevations shown on boring logs represent ground-water surfaces encountered at the times shown. Absence of water surface data on certain borings implies no ground-water data is available, but does not necessarily mean ground water will not be encountered at the locations or within the vertical reaches of these borings.

If any of the following tests are included in this report, the tests were performed in accordance with the following standards without exception: ASTM C136, ASTM D140, ASTM D1586, ASTM D2216, ASTM D2487, ASTM D2488, and ASTM D4318. If individual exceptions were made, they are noted on the individual test report.

COLOR	2
COLOR	SYMBOL
TAN	Т
YELLOW	Y
RED	R
BLACK	BK
GRAY	GR
LIGHT GRAY	LGR
DARK GRAY	DGR
BROWN	BR
LIGHT BROWN	LBR
DARK BROWN	DBR
BROWNISH-GRAY	BRGR
GRAYISH-BROWN	GYBR
GREENISH-GRAY	GNGR
GRAYISH-GREEN	GYGN
GREEN	GN
BLUE	BL
BLUE-GREEN	BLGN
WHITE	WH
MOTTLED	MOT

### **DESCRIPTIVE SYMBOLS**

MODIFICATION	S
MODIFICATION	SYMBOL
TRACES	TR
FINE	F
MEDIUM	М
COARSE	С
CONCRETIONS	CC
ROOTLETS	RT
LIGNITE FRAGMENTS	LG
SHALE FRAGMENTS	SH
SANDSTONE FRAGMENTS	SDS
SHELL FRAGMENTS	SLF
ORGANIC MATTER	0
CLAY STRATA OR LENSES	CS
SILT STRATA OR LENSES	SIS
SAND STRATA OR LENSES	SS
SANDY	S
GRAVELLY	G
BOULDERS	В
SLICKENSIDES	SL
WOOD	WD
OXIDIZED	OX

CONSISTENCY	COHESION IN LBS./SQ.FT. FROM UNCONFINED COMPRESSION TEST	SYMBOL
VERY SOFT	< 250	VSO
SOFT	250 - 500	SO
MEDIUM	500 - 1000	М
STIFF	1000 - 2000	ST
VERY STIFF	2000 - 4000	VST
HARD	> 4000	н



BORING NUMBER B1

PAGE	1	OF	1

LIENT										gation				
			PROJEC										-	
			GROUND ELEVATION HOLE SIZE _7"											
DRILLIN	IG CC		LATITUDE <u>35.04491834</u> LONGITUDE <u>89.97860125</u>											
			GROUND WATER LEVELS:											
OGGE	DBY	B.W. CHECKED BY D.M.												
IOTES	Wea	ather - Cool & Cloudy	AF	TER	RDRI	LLING								_
				L	J	%				~	ATT	TERBE		5
O UEPTH (ft) GRAPHIC	FOG	MATERIAL DESCRIPTION		SAMPLE TVD	NUMBER	RECOVERY ; (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID		>	FINES CONTENT
1.4		Concrete		Π		100								
		Soil Cement/Cement Treated Base		Η		100								
				Н										
5		Brown and Gray Silty Clay		М	SS 1	100	4-6-8 (14)	1.5		22	37	22	15	
		Brown and Gray Silty Clay		М	SS 2	100	5-7-9	1.0		19				
				ΥN	2		(16)							
11	111	Brown and Gray Silty Clay			SS		5-7-8							
0	//			M	3	100	(15)	1.0	100	21				
15		Brown Silty Clay Bottom of hole at 15.0 feet.		X	SS 4	100	4-5-7 (12)	2.0	101	21				
					-									



**BORING NUMBER B2** 

PAGE	1	OF	1
		<b>U</b> .	

CLIEN	T Pic	kering	PROJECT	T N.	AME	MEM	Terminal /	Apron	Investi	igation				
PROJ	ECT N	UMBER	PROJECT	r Lo	OCAT		2491 Winc	hester						
		TED _3/17/10 COMPLETED _3/17/10												
RILL	ING CO	ONTRACTOR Tri-State Testing Services, Inc.	LATITUD	E _	35.04	27788	4	LC	ONGIT	UDE	89.97	88006	7	
RILL	ING M	ETHOD HSA	GROUND WATER LEVELS:											
.OGG	ED BY	B.W. CHECKED BY D.M.	AT TIME OF DRILLING											
IOTE	S We	ather - Cool & Cloudy										_		
											AT	TERB		E
E	₽			IVDI	Ř	۲۶ % (	S E	PEN	5	RE %	-			E
	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE 7	NUMBER	RECOVERY ( (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID	PLASTIC	PLASTICITY INDEX	FINES CONTENT
<u> </u>		Concrete		Т	-	100	0				-		-	
-		Soil Cement/Cement Treated Base		-		100								
						100								
-		Top - Brown Sand and Gravel, Bottom - Brown Silty Clay		M	SS	100	7-9-11	2.0	104	23				
5				1	1		(20)				1.1			
-		Brown and Gray Clay			SS		6-8-9		-					
-				X	2	100	(17)	3.0	103	22	48	24	24	
-														
0		Brown and Gray Clayey Silt		X	SS 3	100	6-7-10 (17)	1.5		23				
5		Brown and Gray Silty Clay Bottom of hole at 15.0 feet.			SS 4	100	3-4-6 (10)	0.5		26				

LIENT Pie	ckering	PROJEC	TN	AME	MEM	Terminal	Apron	Invest	igation	1			
ROJECT N	UMBERE-9-429	PROJEC	TL	OCAT		2491 Winc	hester						
		GROUND ELEVATION HOLE SIZE _7"											
RILLING C	ONTRACTOR Tri-State Testing Services, Inc.	LATITUDE <u>35.04315767</u> LONGITUDE <u>89.98034728</u>											
	ETHOD HSA		w.	ATER	LEVE	LS:							
	CHECKED BY D.M.					LING							
OIES WE	eather - Cool & Cloudy	AF	TER	RDRI	LLING								_
0			E C		%		Ľ.	Ę.	Е (%)	AI		S	ENT
GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPI E TV	NUMBER	RECOVERY (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID	PLASTIC	PLASTICITY INDEX	FINES CONTENT
	Concrete		Т		100							-	-
-	Soil Cement/Cement Treated Base				100								
	Brown and Gray Silty Clay with Gravel		М	SS 1	100	9-7-9	3.0	107	17	39	22	17	
5				-		(16)		-					
	Brown and Gray Silty Clay		Х	SS 2	100	6-8-8 (16)	4.0	112	17				
0	Brown and Gray Silt		X	SS 3	100	6-8-9 (17)	3.0		17				
5	Brown and Gray Silty Clay		X	SS 4	100	6-10-13 (23)	3.5		20				
	Bottom of hole at 15.0 feet.	Í				(20)							

	Tri-State Testing Ser 6756 Buckles Cove Memphis, Tennessee Tel: 901.385.1199; F	38133 ax: 901.386						DRI				<b>ER</b>	
LIENT Pic									igation				
	IUMBER E-9-429								0175				_
		GROUND ELEVATION         HOLE SIZE         7"           LATITUDE         35.04211376         LONGITUDE         89.9804103										-	
	IETHOD_HSA							JNGIT	UDE _	89.98	04103		-
	CHECKED BY D.M.					LING							
	eather - Cool & Cloudy												
(ft) (ft) CRAPHIC LOG	MATERIAL DESCRIPTION		PLE TYPE	NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				EINES CONTENT
			SAM	N	REC	"OZ	POC	DRY	CON	LIQUID	PLASTIC	IND	UNITO
0	Concrete			-	100		-			_			
	Soil Cement/Cement Treated Base				100								
	Brown and Gray Silty Clay		М	SS	100	7-9-10	4.0		19				
5			Μ	1	100	(19)	4.0		19				
-111	Brown and Gray Clayey Silt		Х	SS 2	100	7-11-11 (22)	3.0	104	20				
0 	Brown and Gray Clayey Silt		Х	SS 3	100	8-10-13 (23)	4.0		19	41	23	18	
- - 5	Brown Clayey Silt Bottom of hole at 15.0 feet.		X	SS 4	100	7-10-13 (23)	4.5	106	18				

TRI-S	TA	TE	Tri-State Testing Services 6756 Buckles Cove Memphis, Tennessee 38133 Testing Services, INC. Tel: 901.385.1199; Fax: 901.3	86.6	614			BC	DRI	NG	NU		<b>ER</b>	
CLIEN	IT.	Pic	kering PROJ	ЕСТ	NAME	MEM	Terminal	Apron	Invest	igation				
PROJ	EC	TN	UMBER E-9-429 PROJ	ЕСТ	LOCA		2491 Winc	hester						
			TED _3/17/10 COMPLETED _3/17/10 GROU							SIZE			_	
DRILL	INC	G C	ONTRACTOR Tri-State Testing Services, Inc.	LATITUDE <u>35.0402464</u> LONGITUDE <u>89.97895156</u>										
			ETHOD HSA GROU	IND V	VATER	RLEVE	LS:							
LOGG	ED	BY	B.W. CHECKED BY D.M.	AT T	ME O		LING							
NOTE	S_	We	ather - Cool & Cloudy	AFTE	RDR	LLING								
т	0				YPE R	۲% %	E)	PEN.	WT.	RE . (%)	AT	ATTERBERG		TENT
o DEPTH (ft)	GRAPHIC	POG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID	PLASTIC	PLASTICITY INDEX	FINES CONTENT (%)
			Concrete		1	100								
		151	Soil Cement/Cement Treated Base	+	1	100								
				+		100								
5			Dark Gray Silty Clay	X	SS 1	100	6-7-7 (14)	3.0	95	25				
_														
		Ц	Brown and Gray Clayey Silt	X	SS 2	100	7-8-9 (17)	2.0		23				
10			Brown Clayey Silt	X	SS 3	100	5-7-9 (16)	1.0	94	23				
15			Brown and Gray Silty Clay Bottom of hole at 15.0 feet.	X	SS 4	100	4-6-6 (12)	1.0		24	35	23	12	
							-							

GEOTECH BH COL J E-9-429 PICKERING MEM AIRPORT.GPJ PROJECT TEMPLATE.GDT 4/26/10

TRI-S	TATE	TESTING SERVICES, INC. Tri-State Testing Services 6756 Buckles Cove Memphis, Tennessee 38133 Tel: 901.385.1199; Fax: 901	3 1.386.	6614	L.		BC	ORI	NG	NU		<b>ER</b>	
CLIE	NT Pi	ckering PR	OJECT	NAM	E MEN	Terminal	Apron	Invest	igation	1			
PRO	ECT N	IUMBER <u>E-9-429</u> PR	OJECT	LOC		2491 Winc	hester						
DATE	STAR	TED 3/17/10 COMPLETED 3/17/10 GR	ROUND	ELEV	ATION			HOLE	SIZE	7"			
DRILI	ING C	CONTRACTOR Tri-State Testing Services, Inc.	LATITUDE LONGITUDE 89.98065091										
		IETHOD HSA GR		WATE	R LEVE	LS:							
LOGO	SED B	Y _B.W CHECKED BY _D.M.	AT	TIME (	OF DRIL	LING							
NOTE	S_We	eather - Cool & Cloudy	AFT	ER DI	RILLING								
т	IIC			LYPE ER	۲۶ % )	LE)	PEN.	WT.	RE Г (%)	AT		S	ITENT
o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID	PLASTIC	PLASTICITY INDEX	FINES CONTENT (%)
		Concrete			100								
		Soil Cement/Cement Treated Base			100								
_													
5		Brown and Gray Silty Clay			3 100	7-9-10 (19)	4.5	92	24				
		Brown and Gray Silty Clay		/ ss	3 100	7-8-10	2.0		00				
				2	100	(18)	2.0		23				
10		Brown and Gray Silty Clay		SS 3	100	5-7-8 (15)	1.5	99	23				
15		Brown and Gray Clayey Silt			100	4-5-5 (10)	1.0		24	32	24	8	
10		Bottom of hole at 15.0 feet.	ſ	N.		()							

GEOTECH BH COL J E-9-429 PICKERING MEM AIRPORT.GPJ PROJECT TEMPLATE.GDT 4/26/10

1

TRI-S	TATE	6756 Buckles Cove Memphis, Tennessee TESTING SERVICES, INC. Tel: 901.385.1199; F	38133 ax: 901.38	5.6	514							PAG	E 1 0	DF 1
	T Pic					MEN	Terminal	Apron	Invest	igatior	1			
PROJ	ECT NU		PROJEC											
DATE	START	COMPLETED 3/18/10								SIZE	7"			
		ONTRACTOR Tri-State Testing Services, Inc.											8	
		ETHOD HSA												
LOGG	ED BY	B.C. CHECKED BY D.M.	A1	TIM	IE OI		LING							
NOTE	S Wea	ather - Cool & Clear				LLING								
				L	ц	%		÷	Ŀ.		AT			Ł
	GRAPHIC LOG	MATERIAL DESCRIPTION			NUMBER	RECOVERY ( (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID		>	FINES CONTENT
0	3 4 4	Concrete				100							۵.	ш
-		Soil Cement/Cement Treated Base		H		100								
1				٢										
5		Brown Silty Clay		X	SS 1	100	5-10-11 (21)	3.0	98	19				
							()							
		Brown Silty Clay		X	SS 2	100	7-5-8 (13)	2.0		18	33	23	10	
10		Brown Silty Clay		М	SS 3	100	9-10-11 (21)	3.0		26				
		Brown and Gray Silty Clay Bottom of hole at 15.0 feet.		X	SS 4	100	4-6-7 (13)	1.5	100	17				

٦		Tri-State Testing Servi 6756 Buckles Cove Memphis, Tennessee						BC	DRI	NG	NU		<b>ER</b>	
		TESTING SERVICES, INC. Tel: 901.385.1199; Fai	x: 901.386			MEN	Terminal		Invest	a a ti a a				
		kering UMBER E-9-429								igation	1			
							2491 Winc			0175	78		_	-
		TED 3/18/10 COMPLETED 3/18/10												
		ONTRACTOR Tri-State Testing Services, Inc.						_ LO	ONGIT	UDE -	89.98	13680	2	
			GROUND											
		B.C. CHECKED BY D.M.					LING							
OTES	S_We	ather - Cool & Clear	AF	TEF	RDRI	LLING						_		_
(ft)	GRAPHIC LOG	MATERIAL DESCRIPTION			NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES CONTENT
0	°			CAN	NAC NAC	REC	υĘ	POC	DR	₹0	22	PL	PLAS	FINE
		Concrete				99		-						
-		Soil Cement/Cement Treated Base				100								
1														
		Brown and Gray Silty Clay		M	SS	400	6-11-14							
5				Ň	1	100	(25)	4.0	112	17				
-		Brown Silty Clay			SS		8-11-11							
				Ň	2	100	(22)	2.5	95	24				
0		Brown Silty Clay		Х	SS 3	100	7-11-11 (22)	1.5		20	37	23	14	1
5		Brown Silty Clay Bottom of hole at 15.0 feet.			SS 4	100	10-8-12 (20)	0.5		17				



# TRI-STATE TESTING SERVICES, INC. Tri-State Testing Services 6756 Buckles Cove Memphis, Tennessee 38133 Tel: 901.385.1199; Fax: 901.386.6614

BORING NUMBER B9 PAGE 1 OF 1

PROJECT	NUMBER _ E-9-429	PROJEC	TLO	OCAT		2491 Winc	hester	-					
DATE STA	RTED 3/18/10 COMPLETED 3/18/10	GROUNE	EL	EVA				HOLE	SIZE	7"			
DRILLING	CONTRACTOR Tri-State Testing Services, Inc.						_ LC	ONGIT	UDE _	89.97	95582	2	
	METHOD HSA		w/	ATER	LEVE	LS:							
	BY B.C. CHECKED BY D.M.	AT	TIM	IE OF	DRILI	ING							
NOTES _V	/eather - Cool & Clear	AF	TER	R DRI	LLING						_		
			ц	L	%		ż	E	(%)				NT
O UEPTH (ft) GRAPHIC	MATERIAL DESCRIPTION	2	SAMPLE TY	NUMBER	RECOVERY (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID	PLASTIC	PLASTICITY INDEX	FINES CONTENT
	Concrete				100								5
	Soil Cement/Cement Treated Base				100								
5	Brown Silty Clay		Х	SS 1	100	5-5-5 (10)	1.5	98	25				
	Brown Silty Clay			SS	100	3-3-4	0.5		17	33	23	10	
-				2	100	(7)	0.0			55	25	10	
10	Brown Silty Clay		Х	SS 3	100	2-3-3 (6)	1.0		27	36	22	14	
15	Brown Silty Clay Bottom of hole at 15.0 feet.			SS 4	100	4-4-6 (10)	2.0	96	28				



# Tri-State Testing Services 6756 Buckles Cove Memphis, Tennessee 38133 Tel: 901.385.1199; Fax: 901.386.6614

BORING NUMBER B10 PAGE 1 OF 1

	ECT NU	kering UMBER E-9-429					2491 Winc			gation				
		TED _3/18/10 COMPLETED _3/18/10			-					SIZE	7"			_
		ONTRACTOR Tri-State Testing Services, Inc.												
DRILL	ING MI	ETHOD HSA	GROUNE											
		B.C. CHECKED BY D.M.					LING							
NOTE	S Wea	ather - Cool & Clear	AF	TER	DRI	LLING								_
				Шd	1	%	-	z	4	ш(%	AT		S	ENT
o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TY	NUMBER	RECOVERY 9 (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID	PLASTIC	PLASTICITY INDEX	FINES CONTENT
0		Concrete		T		100							-	-
-		Soil Cement/Cement Treated Base				100								
5		Brown and Gray Silty Clay		Х	SS 1	100	9-10-10 (20)	3.0		19	35	23	12	
-		Brown Silty Clay		X	SS 2	100	7-9-10 (19)	3.0	105	20				
10		Brown and Gray Silty Clay		Х	SS 3	100	8-9-8 (17)	3.5		20				
15		Brown Silty Clay Bottom of hole at 15.0 feet.			SS 4	100	8-8-10 (18)	2.5	101	20				

TRI-S	TATE	Tri-State Testing Services 6756 Buckles Cove Memphis, Tennessee 381 Tel: 901.385.1199; Fax: 9	133	.66	14			BO	RIN	G N	UN			
CLIE	NT Pic	kering	PROJECT	N.	AME	MEN	Terminal A	Apron	Invest	igation	1			
							2491 Wincl							
		TED 3/18/10 COMPLETED 3/18/10												
		ONTRACTOR Tri-State Testing Services, Inc.						_ L(	ONGIT	UDE _	89.98	35853	9	
			GROUND											
		B.C. CHECKED BY D.M.					LING	-		_				
NOTE		ather - Cool & Clear	AF	-	_	LLING		_		-	AT	TEDDI	-00	
	0			HE L	.~	%)		ż	5	ш%	AI		5	ENT
o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TY	NUMBER	RECOVERY (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID	PLASTIC	PLASTICITY INDEX	FINES CONTENT (%)
		Concrete		Т		100								_
	anadorie	Soil Cement/Cement Treated Base		-		100								
		Brown and Gray Silty Clay		M	SS	100	9-9-11	4.0	107	21				
5				Ν	1	100	(20)	4.0	107	21				
		Gray and Brown Silty Clay		Л	SS		10-10-10				1.1.1			
				Ň	2	100	(20)	2.0		15	34	20	14	
10		Brown Silty Clay		$\Lambda$	SS 3	100	5-6-8 (14)	1.5		20	49	26	23	
				N	-		(1.1)							
15		Brown Silty Clay		$\langle$	SS 4	100	6-6-8 (14)	1.5	92	22				
		Bottom of hole at 15.0 feet.												

GEOTECH BH COL , E-9-429 PICKERING MEM AIRPORT.GPJ PROJECT TEMPLATE.GDT 4/26/10

TRI-S	TATE	Tri-State Testing Servic 6756 Buckles Cove Memphis, Tennessee 3 Tel: 901.385.1199; Fax	8133	.6614			BO	RIN	GN	IUN		<b>R B</b>	
	NT Pic					Terminal /			igation	1		_	
		JMBER _E-9-429				2491 Winc							
		COMPLETED         3/18/10									-		
		ONTRACTOR Tri-State Testing Services, Inc.					_ L(	ONGIT	UDE	89.98	26901	7	
		ETHOD _ HSA											
		ather - Cool & Clear				LING							
										AT	TERBE	RG	
o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT		2	FINES CONTENT (%)
0		Concrete			100							-	
		Soil Cement/Cement Treated Base			100								
		No Recovery - Obstruction in Shoe		V ss		10-12-15							
5				1	0	(27)							
		Gray Silty Clay		SS 2	100	7-5-7 (12)	2.0	103	20	31	22	9	
10		Brown and Gray Silty Clay		X ss	100	5-7-8 (15)	1.5		24	42	23	19	
  15		Bottom of hole at 15.0 feet.		SS 4	100	7-9-11 (20)	1.0	97	21				

GEOTECH BH COL 3 E-9-429 PICKERING MEM AIRPORT.GPJ PROJECT TEMPLATE.GDT 4/26/10

1

0.000									igation	1			-
	JMBER _ E-9-429           FED _3/18/10         COMPLETED _3/18/10	PROJE							SITE	7"			
	ONTRACTOR Tri-State Testing Services, Inc.												
	ETHOD HSA	GROUN	ND W	ATER	LEVE	LS:		onom	UDL _	00.00	00010	0	-
GGED BY	B.C. CHECKED BY _D.M.					LING							
DTES Wea	ather - Cool & Clear	A	FTE	R DRI	LLING							_	_
(ft) GRAPHIC LOG	MATERIAL DESCRIPTION			SAMPLE IYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)			S >	FINES CONTENT
				N	RE	05	РО	DR	≥ö		P	PLAS	FINE
_	Concrete				100								
	Soil Cement/Cement Treated Base				100								
	Brown Silty Clay		X	SS 1	100	10-12-14 (26)	2.5	110	15				
	Brown Silty Clay		X	SS 2	100	8-8-9 (17)	3.5		24				
	Brown Silty Clay		X	SS 3	100	5-6-8 (14)	2.0	95	25	49	26	23	
	Brown Silty Clay Bottom of hole at 15.0 feet.		X	SS 4	100	4-4-5 (9)	1.5		23				

TRI-S	TATE	Tri-State Testing Service 6756 Buckles Cove Memphis, Tennessee 38 Tel: 901.385.1199; Fax:	133	.66	514			BO	RIN	G N	UM		<b>R B</b>	
CLIE	NT Pic	kering	PROJEC	TN	AME	MEM	Terminal /	Apron	Invest	igation				
		UMBER					2491 Wincl							
DATE	STAR	TED _3/19/10 COMPLETED _3/18/10	GROUND	EL	EVA	TION			HOLE	SIZE	7"			
		ONTRACTOR Tri-State Testing Services, Inc.						_ L(	ONGIT	UDE _	89.98	44286	6	
LOG	GED BY	B.W.     CHECKED BY _D.M.       ather - Cool & Clear	AT	TIN	IE OF		LING							
o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPI E TVDE	NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES CONTENT (%)
		Concrete		Τ		100							_	-
		Soil Cement/Cement Treated Base				100								
5		Brown and Gray Silty Clay		X	SS 1	100	7-8-10 (18)	4.0		17				
		Brown and Gray Silty Clay		X	SS 2	100	10-10-11 (21)	3.0	106	18	36	22	14	
10		Brown and Gray Silty Clay		X	SS 3	100	6-8-9 (17)	2.5		18				
15		Brown and Gray Silty Clay Bottom of hole at 15.0 feet.		X	SS 4	100	5-7-13 (20)	2.0	103	23				

GEOTECH BH COL 3 E-9-429 PICKERING MEM AIRPORT.GPJ PROJECT TEMPLATE.GDT 4/26/10



# TRI-STATE TESTING SERVICES, INC. Tri-State Testing Services Memphis, Tennessee 38133 Tel: 901.385.1199; Fax: 901.386.6614

BORING NUMBER B15 PAGE 1 OF 1

PRO	JECT N	UMBER _E-9-429	PROJEC											
DATE	STAR	TED 3/18/10 COMPLETED 3/18/10								SIZE	7"			
DRILI	LING C	ONTRACTOR Tri-State Testing Services, Inc.	LATITUD	E_	35.03	399471	4	LC	ONGIT	UDE	89.98	14113	4	
		ETHOD HSA												
LOGO	GED B	CHECKED BY D.M.					LING							
NOTE	S We	eather - Cool & Clear				LLING								
											ATT	TERBE		F
T	Q				NUMBER	Υ%	ŚШ	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES CONTENT
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		L	ABE -	RECOVERY (RQD)	BLOW COUNTS (N VALUE)	Sf) sf)	Cf)	DT I	0_	2	Ex	NO
2	R R			Idw		Ś.Ψ	N COL	NS.E	2 Z	IOI SIOI	LIQUID	PLASTIC	STIC	S
0.				N O	20	R	.5	PO	DR	≥S	5-	2	PLASTICITY INDEX	INE
0.		Concrete			-	100					-		LL.	
-	- Decarded	Soil Cement/Cement Treated Base		-		100								
				_		100								
-														
		Gray and Brown Clayey Silt		М	SS	100	7-9-10	3.0	108	20	33	22	11	
5				1	1		(19)							
-		Brown Silty Clay			00		770							
-				X	SS 2	100	7-7-9 (16)	2.0	94	25				
-														
-		Brown and Gray Silty Clay		V	SS	100	4-6-8	1.5		24				
10					3		(14)		6.					
15		Bottom of hole at 15.0 feet.			SS 4	100	6-8-11 (19)	1.0		21				



**B14** 

**B14** 

**B14** 

3.5

6.0

8.5

36

22

14

### Tri-State Testing Services SUMMARY OF LABORATORY RESULTS **6756 Buckles Cove** PAGE 1 OF 2 Memphis, Tennessee 38133

Dry

Density

(pcf)

99.5

101.1

104.5

101.3

107.3

92.0

103.3

96.6

110.2

94.6

106.0

17.3

18.0

18.0

(%)

Satur-

ation

(%)

Void

Ratio

CLIENT Pickering PROJECT NAME MEM Terminal Apron Investigation **PROJECT NUMBER** E-9-429 PROJECT LOCATION 2491 Winchester Maximum Water Liquid Plastic Plasticity %<#200 Class-Borehole Depth Size Content Limit Limit Index Sieve ification (mm) **B1** 3.5 37 22 15 21.8 **B1** 6.0 19.2 **B1** 8.5 21.2 **B1** 13.5 20.7 **B10** 3.5 35 23 12 18.9 **B10** 6.0 19.7 **B10** 8.5 20.2 **B10** 13.5 20.0 **B11** 3.5 20.8 B11 6.0 34 20 14 14.7 B11 8.5 49 26 23 19.7 **B11** 13.5 22.1 **B12** 6.0 31 22 9 19.8 **B12** 8.5 42 23 19 23.8 **B12** 13.5 20.5 **B13** 3.5 15.4 **B13** 6.0 23.6 **B13** 8.5 49 26 23 25.0 **B13** 13.5 23.5

B14	13.5				22.9	102.9
B15	3.5	33	22	11	20.4	107.8
B15	6.0				24.5	93.8
B15	8.5				23.7	
B15	13.5				20.5	
B2	3.5				22.5	104.1
B2	6.0	48	24	24	22.4	102.7
B2	8.5				23.2	
B2	13.5				26.0	
B3	3.5	39	22	17	17.3	107.2
B3	6.0				17.4	111.5
B3	8.5				17.5	
B3	13.5				 20.4	
B4	3.5				18.5	
B4	6.0		1		19.5	104.3
B4	8.5	41	23	18	19.2	
B4	13.5				18.3	106.2
B5	3.5				25.0	95.1
B5	6.0				23.3	
B5	8.5				23.1	94.2
B5	13.5	35	23	12	23.8	

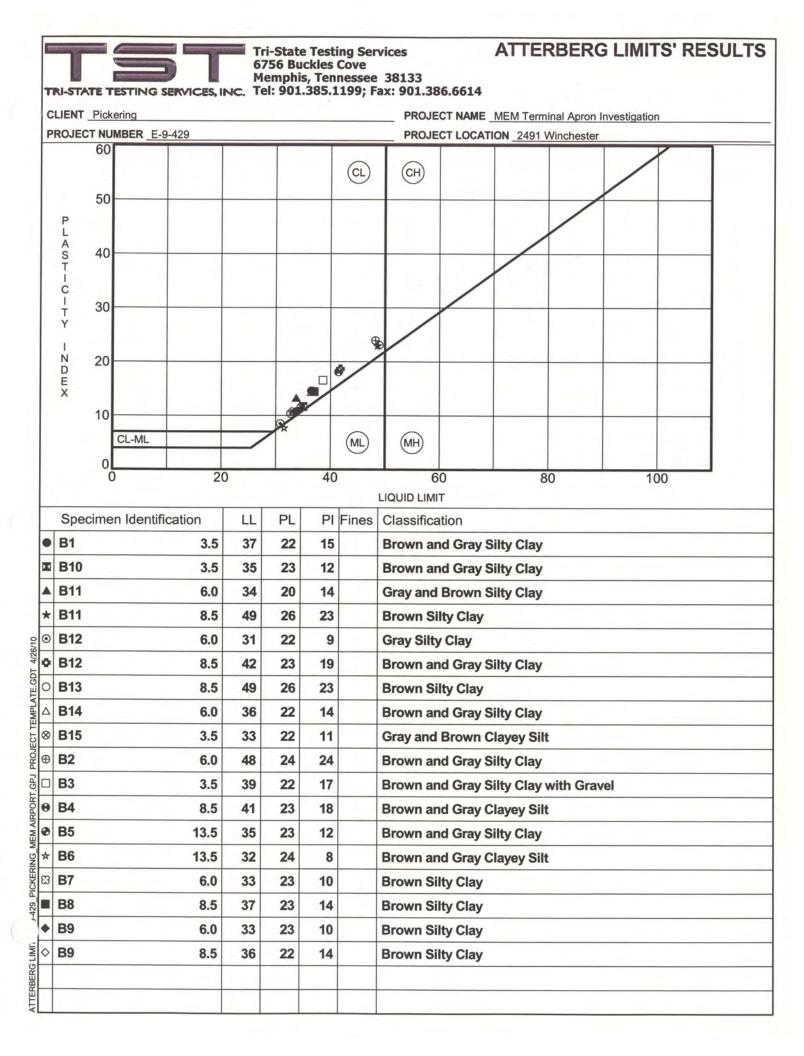


# Tri-State Testing Services SUMMARY OF LABORATORY RESULTS 6756 Buckles Cove Memphis, Tennessee 38133 TRI-STATE TESTING SERVICES, INC. Tel: 901.385.1199; Fax: 901.386.6614

CLIENT Pickering

PROJECT NAME MEM Terminal Apron Investigation

OJECT NUMBI	ER E-9-429				PRO.	JECT LOCA	TION 2491	Winchester			
Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class- ification	Water Content (%)	Dry Density (pcf)	Satur- ation (%)	Void Ratio
B6	3.5							24.2	91.9		
B6	6.0							22.7			
B6	8.5							22.6	98.6		
B6	13.5	32	24	8				24.3			
B7	3.5							18.7	98.1		
B7	6.0	33	23	10				18.2			
B7	8.5							26.0			
B7	13.5							16.5	100.1		
B8	3.5							16.7	111.8		
B8	6.0							23.8	95.3		
B8	8.5	37	23	14				19.8			
B8	13.5							17.5			
B9	3.5							25.5	97.9		
B9	6.0	33	23	10				16.9			
B9	8.5	36	22	14				26.5			
B9	13.5							27.7	96.1		





# MEMPHIS INTERNATIONAL AIRPORT MSCAA Project 09-1259-00 Terminal Apron Geotechnical Investigation

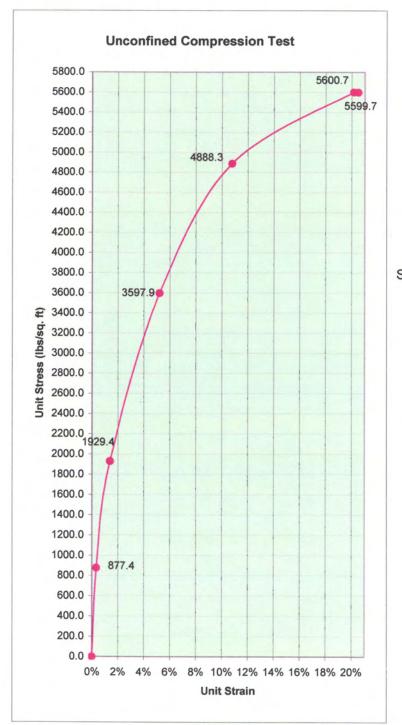
# Organic Carbon Content ASTM D2974

Boring No.	Sample No.	Depth	Fractional Organic Carbon (g-carbon/g-soil)
B-1	S-1	3.5'-5'	0.017
B-2	S-2	6'-7.5'	0.020
B-3	S-1	3.5'-5'	0.013
B-4	S-3	8.5'-10	0.011
B-5	S-4	13.5'-15'	0.015
B-6	S-4	13.5'-15'	0.008
B-7	S-2	6'-7.5'	0.009
B-8	S-3	8.5'-10	0.009
B-9	S-2	6'-7.5'	0.015
B-10	S-1	3.5'-5'	0.009
B-11	S-3	8.5'-10	0.012
B-12	S-2	6'-7.5'	0.013
B-13	S-3	8.5'-10	0.014
B-14	S-2	6'-7.5'	0.017
B-15	S-1	3.5'-5'	0.007



### Report of Unconfined Compressive Strength of Cohesive Soil ASTM D 2166

Job Name: MEM Terminal Apron Investigation			Job # E-9-429	
Client: Arun Wagh		Lab # P-10-015		
Boring # B-2	Sample # S-2	Tube Depth: 6' - 7.5'	Tested Sample Depth:	6' - 7.5'
Date Received: 03/18/10	Date Tested: 03/29/10		Lab Tech: J. Nuesch	ı
Sample Description: Brown	and Gray Clay			



UC Strength (Q <sub>u</sub> ):	5600.7	lbs / ft <sup>2</sup>
Shear Strength:	2800.4	lbs / ft <sup>2</sup>
Strain at Failure:	20.15%	
Average Strain Rate:	2.0	% / minute
Water Content:	22.7	%
Wet Density:	163.9	lbs / ft <sup>3</sup>
Dry Density:	133.6	lbs / ft <sup>3</sup>
Average Height:	2.878	in
Average Diameter:	1.369	in
Height/Diameter Ratio:	2.1	
Torvane Shear:	N/A	tons / ft <sup>2</sup>
Pocket Penetrometer:	3	tons / ft <sup>2</sup>
Liquid Limit:	48	
Plastic Limit:	25	
Plasticity Index:	23	
Soil Classification (USC):	CL	

Specimen Condition: SPT Water Content Specimen: Obtained from Sample After Shear

Remarks:

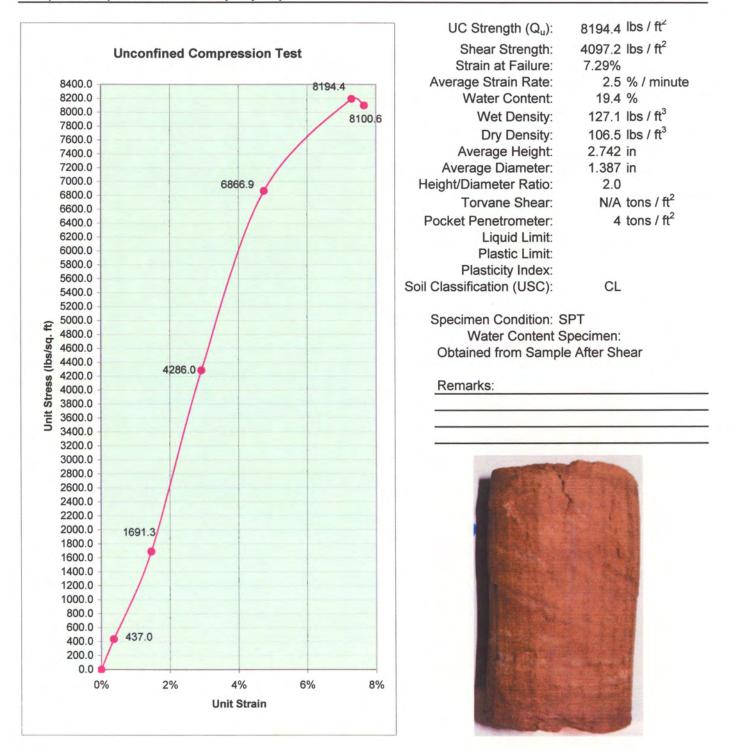




## **Report of Unconfined Compressive Strength of Cohesive Soil**

**ASTM D 2166** 

Job Name: MEM Terminal Apron Investigation			Job # E-9-429		
Client: Arun Wagh	ent: Arun Wagh		Lab # P-10-015		
Boring # B-3	Sample # S-2	Tube Depth: 6' - 7.5'	Tested Sample Depth:	6' - 7.5'	
Date Received: 03/18/10	Date Tested: 03/29/10		Lab Tech: J. Nuesch		
Sample Description: Brown	and Gray Silty Clay				



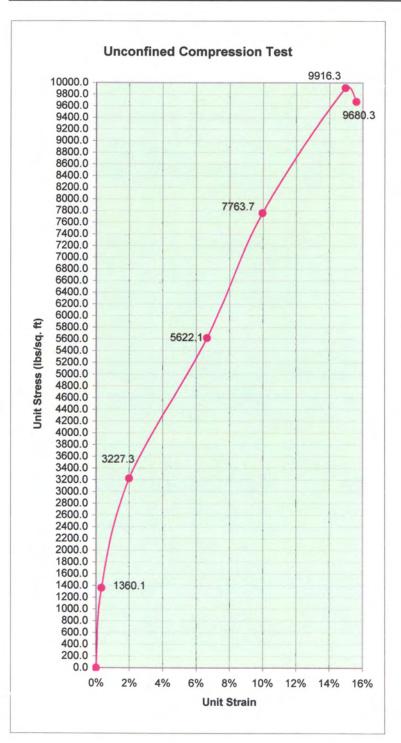


# **Report of Unconfined Compressive Strength of Cohesive Soil**

ASTM	D 21	66
------	------	----

Job Name: MEM Terminal	Apron Investigation	Job # E-9-429		
Client: Arun Wagh			Lab # P-10-015	
Boring # B-4	Sample # S-4	Tube Depth: 13.5' - 15'	Tested Sample Depth:	13.5' - 15'
Date Received: 03/18/10	Date Tested: 03/29/10		Lab Tech: J. Nuesch	
Sample Description: Brown	Clavey Silt			

inple D escriptio



UC Strength (Q <sub>u</sub> ):	9916.3	lbs / ft <sup>2</sup>
Shear Strength:	4958.2	lbs / ft <sup>2</sup>
Strain at Failure:	14.94%	
Average Strain Rate:	2.5	% / minute
Water Content:	21.1	%
Wet Density:	128.6	lbs / ft <sup>3</sup>
Dry Density:	106.2	lbs / ft <sup>3</sup>
Average Height:	3.011	in
Average Diameter:	1.362	in
Height/Diameter Ratio:	2.2	
Torvane Shear:	N/A	tons / ft <sup>2</sup>
Pocket Penetrometer: Liquid Limit: Plastic Limit:	4.5	tons / ft <sup>2</sup>
Plasticity Index: Soil Classification (USC):	CL	

Specimen Condition: SPT Water Content Specimen: Obtained from Sample After Shear

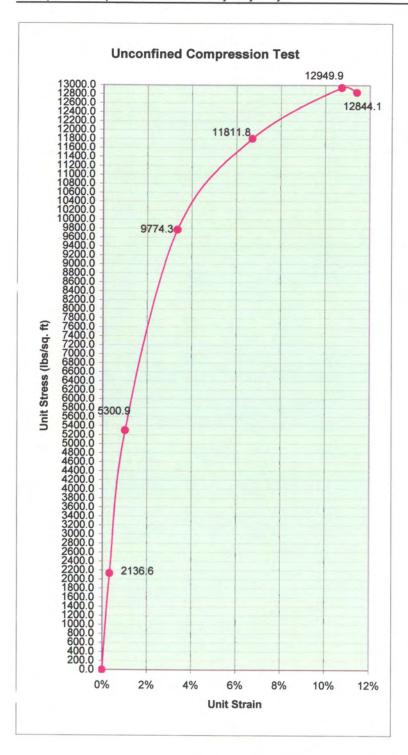
Remarks:





# Report of Unconfined Compressive Strength of Cohesive Soil

Job Name: MEM Terminal Apron Investigation		Job # E-9-429 Lab # P-10-015		
Client: Arun Wagh				
Boring # B-6	Sample # S-1	Tube Depth: 3.5' - 5'	Tested Sample Depth:	3.5' - 5'
Date Received: 03/18/10	Date Tested: 03/29/10		Lab Tech: J. Nuesch	
Sample Description: Brown	and Gray Silty Clay			



UC Strength (Q <sub>u</sub> ):	12949.9	lbs / ft <sup>2</sup>
Shear Strength:	6475.0	lbs / ft <sup>2</sup>
Strain at Failure:	10.73%	
Average Strain Rate:	2.5	% / minute
Water Content:	21.0	%
Wet Density:	129.5	lbs / ft <sup>3</sup>
Dry Density:	107.0	lbs / ft <sup>3</sup>
Average Height:	2.982	in
Average Diameter:	1.381	in
Height/Diameter Ratio:	2.2	
Torvane Shear:	N/A	tons / ft <sup>2</sup>
Pocket Penetrometer:	4.5	tons / ft <sup>2</sup>
Liquid Limit:		
Plastic Limit:		
Plasticity Index:		
Soil Classification (USC):	CL	
Specimen Condition:	SPT	

Specimen Condition: SPT Water Content Specimen: Obtained from Sample After Shear

Remarks:

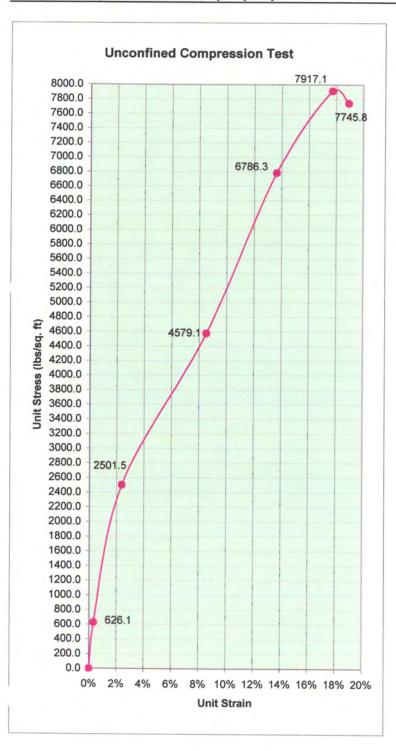




### Report of Unconfined Compressive Strength of Cohesive Soil

ASTM D 2166

Job Name: MEM Terminal	Apron Investigation		Job # E-9-429	
Client: Arun Wagh			Lab # P-10-015	
Boring # B-14	Sample # S-2	Tube Depth: 6' - 7.5'	Tested Sample Depth:	6' - 7.5'
Date Received: 03/18/10	Date Tested	: 03/29/10	Lab Tech: J. Nuesch	1
Sample Description: Brown	and Gray Silty Clay			



UC Strength (Q <sub>u</sub> ):	7917.1 lbs / ft <sup>2</sup>
Shear Strength:	3958.6 lbs / ft <sup>2</sup>
Strain at Failure:	17.72%
Average Strain Rate:	2.5 % / minute
Water Content:	20.2 %
Wet Density:	127.3 lbs / ft <sup>3</sup>
Dry Density:	106.0 lbs / ft3
Average Height:	2.934 in
Average Diameter:	1.356 in
Height/Diameter Ratio:	2.2
Torvane Shear:	N/A tons / ft <sup>2</sup>
Pocket Penetrometer:	3 tons / ft <sup>2</sup>
Liquid Limit:	36
Plastic Limit:	22
Plasticity Index:	14
Soil Classification (USC):	CL
Specimen Condition: \$	SPT

Water Content Specimen: Obtained from Sample After Shear

Remarks:

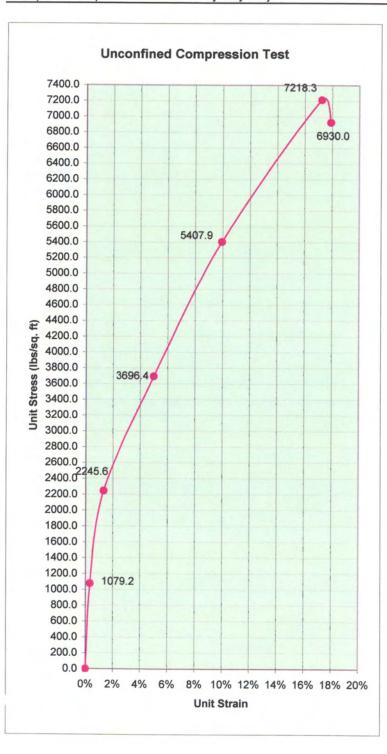




### Report of Unconfined Compressive Strength of Cohesive Soil

ASTM D 2166	AS	ТМ	D	21	66	
-------------	----	----	---	----	----	--

Job Name: MEM Terminal	Apron Investigation	1	Job # E-9-429	
Client: Arun Wagh			Lab # P-10-015	
Boring # B-14	Sample # S-4	Tube Depth: 13.5' - 15'	Tested Sample Depth:	13.5' - 15'
Date Received: 03/18/10	Date Te	sted: 03/29/10	Lab Tech: J. Nuesch	1
Sample Description: Brown	and Gray Silty Clay			



UC Strength (Q <sub>u</sub> ):	7218.3	lbs / ft <sup>2</sup>
Shear Strength:	3609.2	lbs / ft <sup>2</sup>
Strain at Failure:	17.24%	
Average Strain Rate:	2.5	% / minute
Water Content:	21.7	%
Wet Density:	125.2	lbs / ft <sup>3</sup>
Dry Density:	102.9	lbs / ft <sup>3</sup>
Average Height:	3.016	in
Average Diameter:	1.352	in
Height/Diameter Ratio:	2.2	
Torvane Shear:	N/A	tons / ft <sup>2</sup>
Pocket Penetrometer:	2	tons / ft <sup>2</sup>
Liquid Limit:		
Plastic Limit:		
Plasticity Index:		
Soil Classification (USC):	CL	
Specimen Condition	SPT	

Specimen Condition: SPT Water Content Specimen: Obtained from Sample After Shear

Remarks:





### MEMPHIS INTERNATIONAL AIRPORT MSCAA Project 08-1259-00 Terminal Apron Geotechnical Investigation

### **Geotechnical Concrete and Base Matrix**

	Y	
Hole #	Concrete Thickness	Soil Cement/CTB Thickness
B-1	14.5"	12"
B-2	13.5"	12"
B-3	14.5"	12"
B-4	11"	12"
B-5	14.5"	12"
B-6	11.5"	12"
B-7	11"	12"
B-8	11.5"	12"
B-9	18"	12"
B-10	12"	12"
B-11	14"	12"
B-12	11.5"	12"
B-13	14"	12"
B-14	13.5"	12"
B-15	10.5"	12"

### **DOCUMENT 2: SECTION D – SUBSURFACE ENVIRONMENTAL INVESTIGATION**

### SECTION D. SUBSURFACE ENVIRONMENTAL INVESTIGATION

### **D.1** Introduction

The purpose of this study is to determine the general subsurface conditions by drilling soil test borings and to evaluate these with respect to the possibility of the apron area subsurface soil being contaminated by jet fuel leaking from the existing hydrant fuel system.

Refer to **Appendix D** for the exhibits referred to in this section.

### **D.2** Site Investigation

A total of eighty-five (85) borings were drilled utilizing direct push technology from March 17 through 25, 2010. The locations of the direct push technology borings were picked at random along the existing underground refueling line. The existing jet fuel pipeline was physically located by electronic methods and then marked on the surface. The offset to the pipe was carefully considered, since the closer to the pipe the increased likelihood of finding jet fuel but also increased risk of damaging the pipe from the sampling effort. After some debate, a preferred offset of 6 feet was established and utilized in the field. However, this offset was adjusted in the field at a few locations when a subsurface feature, such as another utility, was conflicting. The direct push technology locations are shown on **Exhibits D.1** and **D.2** in **Appendix D.** 

The concrete pavement and underlying layers were cored and the thicknesses recorded. A 4 foot long macro core sampler loaded with a new polyvinyl chloride liner was advanced through the full depth of the sample interval. The sampler was retracted and



the liner was removed. The sample was cut open and scanned with a Photo Ionization Detection Instrument (minieRAE 3000) for Volatile Organic Compounds (VOC).

These results can be found on the direct push log for each sample. The sampler was decontaminated utilizing a wash with an anionic liquid detergent (liquinox) and a potable water rinse. The sampler was loaded with a new polyvinyl chloride liner and was advanced to the next sample interval. This procedure was repeated to the boring termination depth. One sample from each direct push technology boring was submitted to an analytical laboratory (GTW Analytical Laboratories) for testing. The sample submitted was the highest Photo Ionization Detection (PID) reading from that boring. If all the PID readings for a boring were below the instruments detection level, then a composite sample was submitted for that boring.

The results of these tests can be found in **Appendix D.1 and D.2** and noted on the direct push technology boring log. The concrete cores taken on each direct push technology hole were measured and a picture taken, as indicated in **Appendix D.3**. The cement treated base/soil cement was noted on the boring logs and on a table found in **Appendix D.3**. It is important to note that the referenced lengths are amounts recovered, not totally representative of what actually may exist at each location.

### D.3 Laboratory Testing

The direct push technology samples submitted to the analytical laboratory were analyzed for a jet fuel fingerprint in accordance with EPA Method 8015B, *Nonhalogenated Organics Using GC/F10*. These results and explanation of results can be found in **Appendix D.2**.

The analytical results show a "Yes" or "No" answer on whether jet fuel was found in the sample. The Diesel Range Organics (DRO) are shown in mg/Kg (or parts per million). Organics found in these ranges have less burn time and are lighter than Oil Range Organics (ORO) when compared on a gas chromatograph. Jet fuel would typically be



found in the DRO range. Waste oil, motor oil, and hydraulic oil would be typical of the ORO range.

### **D.4** Findings

A review of the analytical test results show various quantities of DRO/ORO in the samples submitted for this project. As indicated on **Table D.1**, twenty-three samples total showed a presence of DRO, ORO, or both in the sample. Twenty samples displayed levels less than 60 mg/Kg for either DRO or ORO, at levels not considered significant (less than the EPA's validation level). These results could be from other organic compounds found at the site, such as gasoline, motor oil, hydraulic oil, or glycol. There were seven samples showing the presence of jet fuel. They are from borings P-2, P-11, P-67 as well as borings P-72, P-83, P-84, and P-85. This shows that the largest concentration of jet fuel is on the west side of concourse A (samples P-11, P-83, P-84, and P-85). The remaining three samples were spread out across the apron area. **Only three samples out of eighty-five showed levels above the EPA's validation standard for analytical results, which was considered to be significant for this report - borings <b>P-2, P-11, and P-67.** Boring P-11 had the highest reading with a DRO of 2,160 mg/Kg. The other two samples were approximately eight times less in magnitude, boring P-2 with a DRO reading of 268 mg/Kg and boring P-67 with a DRO reading of 253 mg/Kg.

The Tennessee Department of Environment and Conservation (TDEC) has set guidelines for chemicals of concern and remediation levels for various oils and fuels. This report does not address these limits, and none of the tests were performed. **The Tennessee Department of Environment and Conservation was not contacted about the results of this investigation**. The chemicals of concern outlined by the Tennessee Department of Environment and Conservation are in **Appendix D.2** as Reference 1.



Sample	DRO	ORO	Jet	Above EPA
#	mg/Kg	mg/Kg	Fuel	Validation Level
P-2	268.0	406.0	Yes	Yes
P-7	11.9	15.5	No	No
P-10	18.6	20.1	No	No
P-11	2,160.0		Yes	Yes
P-14	14.2	11.3	No	No
P-15		11.2	No	No
P-17	17.7	20.6	No	No
P-21		12.5	No	No
P-28		10.8	No	No
P-29	15.7	14.5	No	No
P-30	14.8	20.0	No	No
P-38	30.9		No	No
P-53	12.5	16.3	No	No
P-67	253.0		Yes	Yes
P-71	13.6		No	No
P-72	24.4		Yes	No
P-74	31.4	27.9	No	No
P-75	34.0	40.0	No	No
P-78		11.8	No	No
P-82	11.5	25.3	No	No
P-83	56.0		Yes	No
P-84	37.7		Yes	No
P-85	39.2		Yes	No

Table D.1 – Summary of Analytical Testing

### NOTES:

1. All samples not listed in table above were below detection.

2. Source: Tri-State Testing Services, Inc.



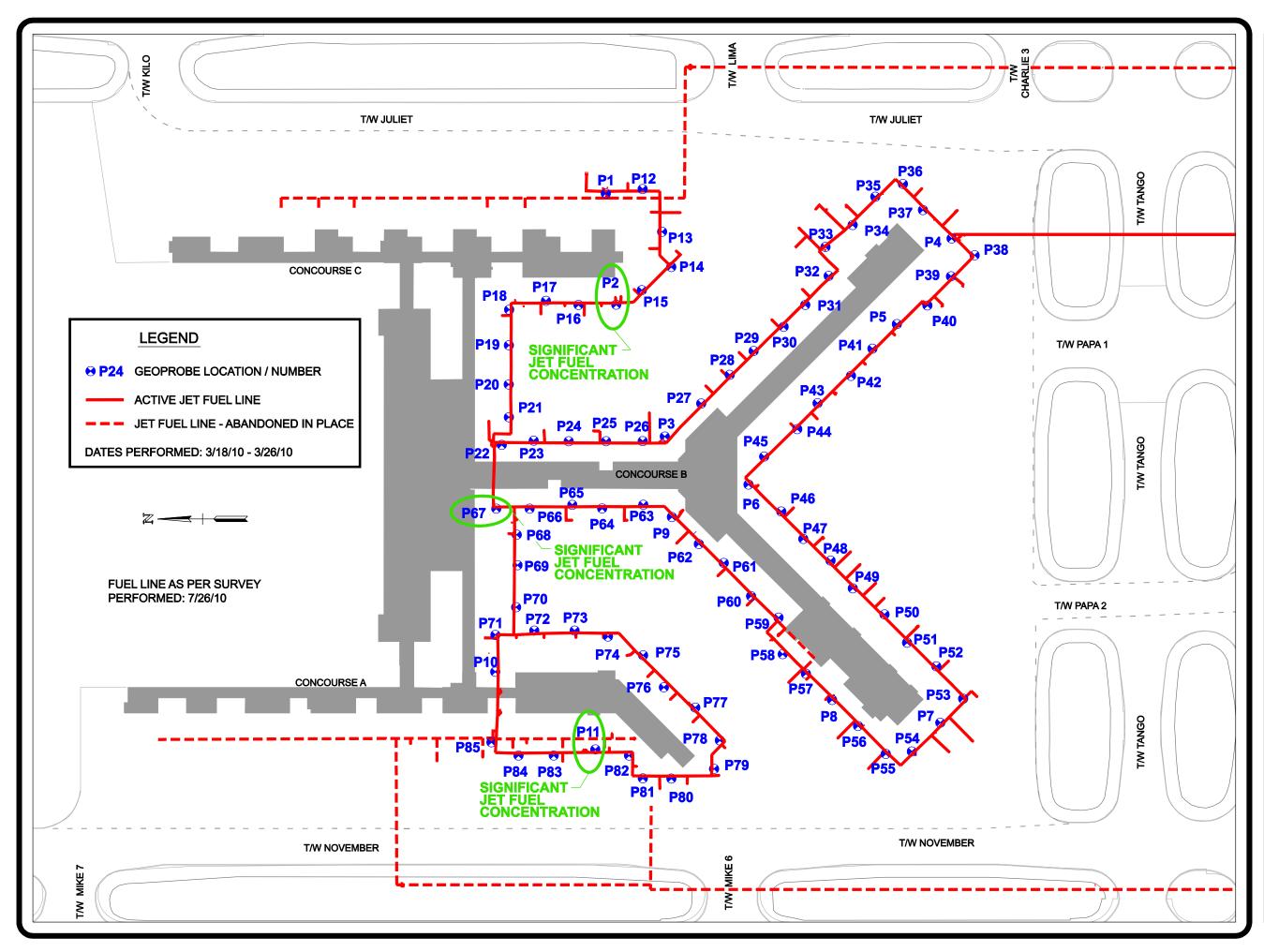
Memphis International Airport

### **D.5** Recommendations

- It is recommended, based on these results, that additional testing be performed on the west side of Concourse A in the vicinity of sample P-11. Samples south of this location showed low or non-detectable levels of jet fuel. Samples north of boring P-11 showed jet fuel at detectable levels. Therefore, it is recommended that additional subsurface investigation north, east, and west of boring P-11 be performed.
- During design and prior to contractor selection, prepare the appropriate construction specifications section(s) pertaining to potential hydrocarbon contamination and estimated quantities for bidding. The specifications should include a Remedial Action Plan consisting of:
  - Environmental professional on site during concrete pavement and subgrade exposure in areas overlying the existing hydrant fuel lines.
  - Sniff tests and/or field measurement of exposed soils. Consider usage of an on-site mobile laboratory to minimize downtime.
  - Preparation of a sampling protocol conforming to EPA Method 8260.
  - Strict reporting and chain of ownership procedures.
  - Remediation recommendations for contaminated soils.
  - Backfilling with clean soils and/or aggregates.
  - Continuous and complete coordination with Tennessee Department of Environment and Conservation (TDEC) officials.



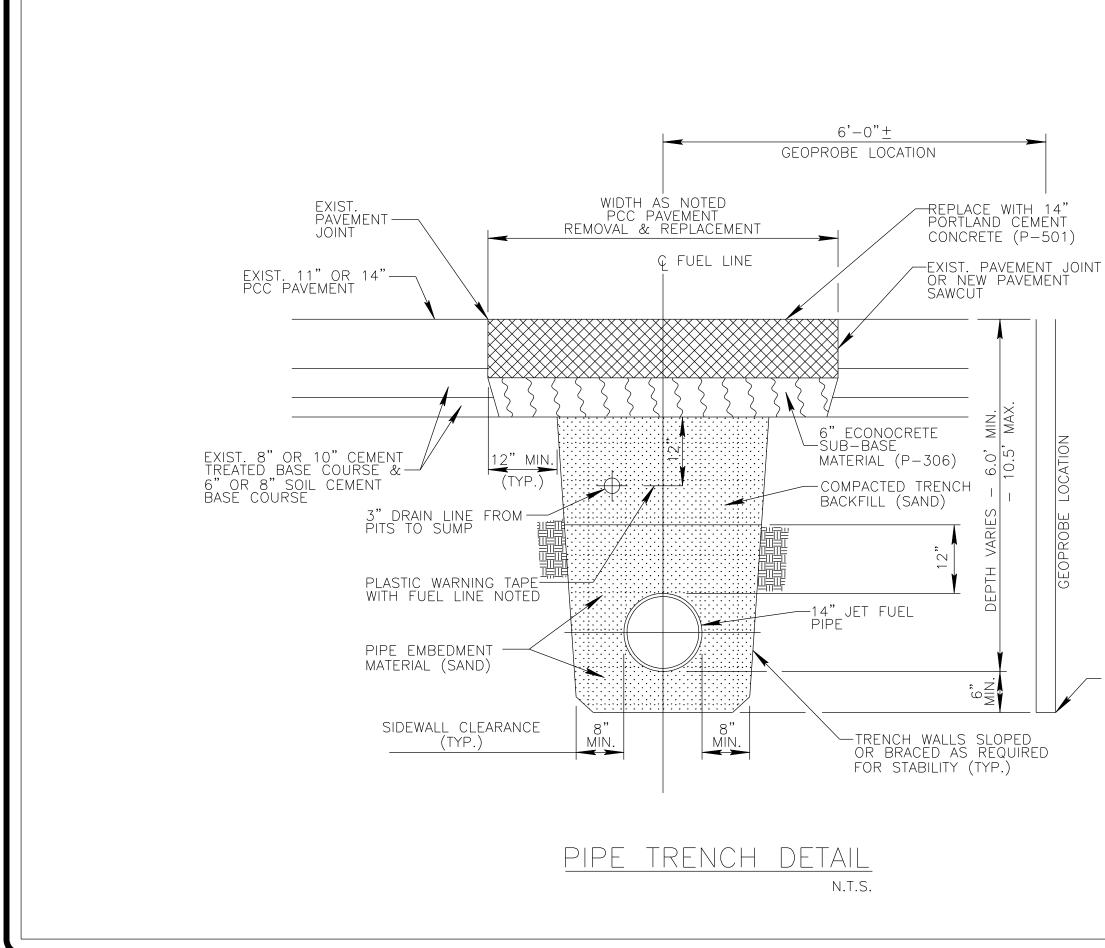
### APPENDIX D – SUBSURFACE ENVIRONMENTAL INVESTIGATION





### TERMINAL APRON RECONSTRUCTION STUDY MSCAA PROJ. 08-1259-00 MEMPHIS INTERNATIONAL AIRPORT

EXHIBIT D.2 DIRECT PUSH TECHNOLOGY BORINGS SCALE: 1" = 250'





# **MEMPHIS INTERNATIONAL AIRPORT**

MSCAA PROJ. 08-1259-00

## TERMINAL APRON RECONSTRUCTION STUDY

EXHIBIT D.1 DIRECT PUSH TECHNOLOGY BORING LOCATION SCALE: NTS

-END AT BOTTOM OF TRENCH <u>+</u>

### APPENDIX D.1 – DIRECT PUSH TECHNOLOGY BORING LOGS

TRI-ST		ESTIN		675 Men	6 Buc	Testing Services BORING NUMBER Kles Cove PAGE Tennessee 38133 85.1199; Fax: 901.386.6614	<b>R P1</b> 1 OF 1
CLIEN	T Picke	ering				PROJECT NAME MEM Terminal Apron Investigation	
PROJ	ECT NU	MBER	E-9-429			PROJECT LOCATION 2491 Winchester	
						GROUND ELEVATION         HOLE SIZE _ 2.5"	
DRILL	ING CO	NTRAC				nc. LATITUDE 35.04293171 LONGITUDE 89.97915426	
	ING ME					GROUND WATER LEVELS:	
				CKE	D BY	D.M. AT TIME OF DRILLING	
NOTE	S Weat	her - C	Cool & Clear	_		AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100				Concrete 1.3	
[ ]	_	100				1.9 Soil Cement/Cement Treated Base	
	DP 1	100		CL		Brown Silty Clay 4.0	0.1
	DP 2	100	DRO - < 10.0 mg/Kg / ORO - < 10.0 mg/Kg	CL		Brown Silty Clay	2.1
10	DP 3	100		CL		Brown Silty Clay	0.1
	DP 4	100		CL		Brown Silty Clay	0.1
						Bottom of hole at 12.0 feet.	

GENERAL BH / TF ... E-9-429\_PICKERING\_MEM AIRPORT.GPJ PROJECT TEMPLATE.GDT 4/26/10

TRI-S		ESTIN		6750 Mem	6 Buch	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 85.1199; Fax: 901.386.6614	
CLIEN	T Picke	ering				PROJECT NAME MEM Terminal Apron Investigation	
PROJ	ECT NU	MBER	E-9-429			PROJECT LOCATION 2491 Winchester	
						3/19/10 GROUND ELEVATION HOLE SIZE 2.5"	
DRILL	ING CO	NTRAC				nc. LATITUDE 35.04285204 LONGITUDE 89.98002324	
	ING MET					GROUND WATER LEVELS:	
				ECKE	D BY	D.M. AT TIME OF DRILLING	
NOTE	S Weat	her - C	Cool & Clear			AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100		-		Concrete	
	DP 1	100		CL		Gray Silty Clay	ND
5	DP 2	100	DRO - 268 mg/Kg / ORO - 406 mg/Kg (JP5/JP8 - Yes)	SM		Black Silty Sand with Clay Lense	5.9
	DP 3	100		CL		Brown Silty Clay	ND
	DP 4	100		CL		Brown Silty Clay	ND
- +						12.0 Bottom of hole at 12.0 feet.	-

ENERAL BH / TF ...L E-9-429\_PICKERING\_MEM AIRPORT.GPJ PROJECT TEMPLATE.GDT /

TRI-ST	ATE T	ESTIN		675 Men	6 Buc phis,	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 385.1199; Fax: 901.386.6614	
CLIENT	Picke	ering				PROJECT NAME _MEM Terminal Apron Investigation	
PROJE		MBER	E-9-429			PROJECT LOCATION 2491 Winchester	
DATE S	STARTE	D_3/2	20/10 CO	IPLE	TED _	3/20/10 GROUND ELEVATION HOLE SIZE 2.5"	
	NG CON					Inc. LATITUDE <u>35.04242451</u> LONGITUDE <u>89.98126315</u>	_
						D.M. AT TIME OF DRILLING	_
NOTES	Weat	her - C	Cool & Windy	_		AFTER DRILLING	
(ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (pom)
0	1	100	DRO - < 10.0 mg/Kg			Concrete	+
	DP 1	100	/ ORO - < 10.0 mg/Kg	CL		Brown and Gray Silty Clay	N
1						4.0	
5	DP 2	100		CL		Brown Silty Clay	N
+	-					7.0 Brown and Gray Silty Clay	+
0	DP 3	100		CL		10.0	N
-	DP 4	100		CL		Brown and Gray Silty Clay	N
+	_	-				Bottom of hole at 12.0 feet.	-

LI-STA		STIN		675 Men	6 Buc	esting Services BORING NUMBER les Cove PAGE 1 Tennessee 38133 35.1199; Fax: 901.386.6614	
IENT						PROJECT NAME _ MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION 2491 Winchester	
TE ST	ARTE	D_3/2	24/10 COM			24/10 GROUND ELEVATION HOLE SIZE 2.5"	
						c. LATITUDE <u>35.04032328</u> LONGITUDE <u>89.97940669</u>	
RILLING						GROUND WATER LEVELS:	
GGED	BY _	N.S.	CHE	CKE	DBY	.M. AT TIME OF DRILLING	
DTES	Weath	ner - C	Cold			AFTER DRILLING	
(ft)	NUMBER	<b>RECOVERY %</b>	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	(mun) (IId
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete	1
		100	mg/Kg		1.12.1	.4 .9 Soil Cement/Cement Treated Base	
	DP	100		CL		Brown Silty Clay	N
	1	100		OL.	<i>\\\\\</i>	0	
	DP					Brown Sandy Clay	
-	2	100		CL			N
$\square$				_	<i>\////</i>	0	
-	DP	5.1				Red Sandy Clay	
-	3	100		CL			N
	_				<i>\////</i>	0.0 Red Sandy Clay	-
-	DP 4	100		CL		Red Sandy Clay	N
+				-		2.0 Bottom of hole at 12.0 feet.	+
						Bottom of hole at 12.0 feet.	

TRI-ST	ATE TE	STIN	and a state of the	675 Men	6 Buc	kles C	essee 38	133 PAGE 1	
	T_Picke							PROJECT NAME MEM Terminal Apron Investigation	
1			E-9-429					PROJECT LOCATION 2491 Winchester	
DATES	STARTE	D 3/2	22/10 COI	IPLE	TED	3/22/10		GROUND ELEVATION HOLE SIZE _2.5"	
								LATITUDE _35.0407257 LONGITUDE _89.9801992	
								GROUND WATER LEVELS:	
LOGGE	ED BY	B.W.	CHE	CKE	DBY	D.M.		AT TIME OF DRILLING	
NOTES	Weat	her - C	Cold & Windy					AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG			MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			1.0	Concrete		
T			/ ORO - < 10.0 mg/Kg				Brown and	Gray Silty Clay	
1	DP 1	100		CL					ND
		1			<i>\\\\\</i>	4.0			
5							Brown Silt	/ Clay	
_	DP 2	100		CL					ND
-				_	<i>\\\\\</i>	7.0			
_	DP						Brown Silt	/ Clay	
_	3	100		CL					ND
10		_			<i>\////</i>	10.0			
-	DP 4	100		CL			Brown Silt	/ Clay	ND
+	4	_			<i>\////</i>	12.0			
								Bottom of hole at 12.0 feet.	

RI-ST/	TE TE	STIN		675 Men	6 Buc	Testing Services BORING NUMBE kles Cove PAGE , Tennessee 38133 385.1199; Fax: 901.386.6614	1 OF
	Picke			_	_	PROJECT NAME _ MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION 2491 Winchester	
						3/22/10 GROUND ELEVATION HOLE SIZE _2.5"	
	IG MET					Inc.         LATITUDE _35.0417655         LONGITUDE _89.9816802           GROUND WATER LEVELS:         GROUND WATER LEVELS:	
			CHE	CKE	DBY	D.M. AT TIME OF DRILLING	
OTES	Weat	her - C	Cold & Raining			AFTER DRILLING	
(ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	(mar) DID
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			0.9 Concrete	
1						Brown Silty Clay	
_	DP 1	100		CL			N
+		_				4.0	
-	DP	100		CL		Brown Silty Clay with Gravel	
-	2	100		CL			N
+	-				<i>\///</i>	7.0 Brown and Gray Silty Clay	
1	DP 3	100		CL			N
1						10.0	
_	DP	100		CL		Brown Silty Clay	N
+	4	100		UL.		12.0	
						Bottom of hole at 12.0 feet.	

TRI-ST		ESTIN		6750 Men	6 Buch	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 885.1199; Fax: 901.386.6614	
CLIEN	T Picke	ering				PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION 2491 Winchester	
						3/23/10 GROUND ELEVATION HOLE SIZE 2.5"	
						Inc. LATITUDE <u>35.04033852</u> LONGITUDE <u>89.98381371</u>	
1.	ING MET					GROUND WATER LEVELS:	
			CHI	ECKE	D BY _	D.M. AT TIME OF DRILLING AFTER DRILLING	
	o <u>_weat</u>			-	1		
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - 11.9 mg/Kg / ORO - 15.5 mg/Kg			Concrete	
[]			ORO - 15.5 liig/kg		ALL LOOP	Soil Coment/Coment Treated Base	- 1
	DP 1	100		CL		Brown and Gray Silty Clay 4.0	ND
5	DP 2	100		CL		Brown and Gray Silty Clay	ND
	DP 3	100		CL		7.0 Brown and Gray Silty Clay	ND
<u>    10</u> -        -	DP 4	100		CL		10.0 Brown and Gray Silty Clay	ND
F +			- D	-		12.0 Bottom of hole at 12.0 feet.	

GENERAL BH / TF \_\_L E-9-429\_PICKERING\_MEM AIRPORT.GPJ\_PROJECT TEMPLATE.GDT\_4/26/10

TRI-S		ESTIN		6750 Mem	6 Buc nphis	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 85.1199; Fax: 901.386.6614	
CLIEN	T Picke	ering				PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION 2491 Winchester	
						B/23/10         GROUND ELEVATION         HOLE SIZE 2.5"	
DRILL	ING CO	NTRAC	CTOR Tri-State Testin	g Ser	vices,	nc. LATITUDE <u>35.04115135</u> LONGITUDE <u>89.98364768</u>	
	ING ME					GROUND WATER LEVELS:	
	S Weat			CKE	D BY	D.M. AT TIME OF DRILLING AFTER DRILLING	
NOTE							-
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	(mqq) UIA
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0				
			mg/Kg			Brown Silty Clay	
	DP 1	100		CL			ND
						4.0	
5	DP					Brown Silty Clay	
	2	100		CL			ND
- +	-	-				7.0 Brown Silty Clay	
	DP	100		CL			ND
10	3	100		OL		10.0	
	DP					Brown Silty Clay	
[ ]	4	100		CL		12.0	ND
[ ]						Bottom of hole at 12.0 feet.	

GENERAL BH / TF ... L E-9-429\_PICKERING\_MEM AIRPORT.GPJ PROJECT TEMPLATE.GDT 4/26/10

	TATE T		IG SERVICES, INC.	675 Men Tel:	6 Buc nphis, 901.3	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 85.1199; Fax: 901.386.6614 PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION 2491 Winchester	
						3/23/10 GROUND ELEVATION HOLE SIZE 2.5"	
DRILL	ING COI	NTRAC				Inc. LATITUDE <u>35.04238891</u> LONGITUDE <u>89.98198955</u>	
						D.M. AT TIME OF DRILLING	
			Cold & Windy	LORL		D.M. AT TIME OF DRILLING AFTER DRILLING	
					1		
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			1.0 Concrete	
			mg/Kg			Brown Silty Clay	
	DP 1	100		CL			ND
	_				<i>\   </i>	4.0 Brown and Gray Silty Clay	
5	DP	100		CL		Brown and Gray Silty Clay	
	2	100		CL			ND
- +						7.0 Brown Silty Clay	
- 1	DP 3	100		CL			ND
10						10.0	
	DP 4	100		CL		Brown and Gray Silty Clay	ND
[ ]						Bottom of hole at 12.0 feet.	

GENERAL BH / TF \_\_L E-9-429\_PICKERING\_MEM AIRPORT.GPJ\_PROJECT TEMPLATE.GDT\_4/26/10

KI-ST/	TE TI	STIN	IG SERVICES, INC.	Men Tel:	901.3	Tennessee 38133 385.1199; Fax: 901.386.6614	
	Picke					PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION 2491 Winchester	
			25/10 COI				
			TOR Tri-State Testin				_
			CHE			GROUND WATER LEVELS:	
	Weat			CRE	001_	D.M.	
							T
	SAMPLE TYPE NUMBER	RY %		s.	₽		í.
(ft)	MBE	OVEI	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	(maa) (IId
	NUN	RECOVERY		Ū.	R		
0	Ś	R		_	1.000.0010		
-		100	DRO - 18.6 mg/Kg / ORO - 20.1 mg/Kg				
+	00				/////	Gray Silty Clay	+
-	DP 1	100		CL			N
+	-	-				4.0 ∑ Brown Silty Clay	-
5	DP 2	100		CL			N
1	2					7.0	
T	1000					T Brown Silty Clay	
	DP 3	100		CL		*	N
						10.0	
1	DP					Brown Silty Clay	
_	4	100		CL			N
+						13.0 Results City Class	-
-	DP	100		0		Brown Silty Clay	
-	5	100		CL			N
+						16.0 Bottom of hole at 16.0 feet.	+

TRI-S		ESTIN		6756 Mem	6 Buc	Testing Services BORING NUMBER ckles Cove PAGE , Tennessee 38133 385.1199; Fax: 901.386.6614	
CLIEN	T Picke	ering				PROJECT NAME MEM Terminal Apron Investigation	
PROJ	ECT NU	MBER	E-9-429			PROJECT LOCATION _2491 Winchester	
						3/25/10 GROUND ELEVATION HOLE SIZE 2.5"	
DRILL	ING CO	NTRAC	TOR Tri-State Testin	g Ser	vices,	Inc. LATITUDE <u>35.04296911</u> LONGITUDE <u>89.9841312</u>	_
DRILL	ING ME	THOD	DP			GROUND WATER LEVELS:	
LOGG	ED BY	W.S.	CHE	ECKE	D BY	D.M. AT TIME OF DRILLING	
NOTE	S Weat	ther - C	Cool			AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	(mqq) OIA
		100				Concrete	
[ ]	_	100	DRO - 2,160 mg/Kg				7-
	DP		/ ORO - < 1.000	CL		Brown Silty Clay	33.1
	1	100	mg/Kg (JP5/JP8 - Yes)			4.0	00.1
5						Brown Silty Clay	
	DP 2	100		CL			14.7
						7.0	
						Brown Silty Clay	
	DP 3	100		CL			13.6
10						10.0	
	DP 4	100		CL		Brown Silty Clay	ND
	4					12.0 Bottom of hole at 12.0 feat	_
						Bottom of hole at 12.0 feet.	

GENERAL BH / T. E-9-429\_PICKERING\_MEM AIRPORT.GPJ PROJECT TEMPLATE.GDT 4/26/10

TRI-STATE TESTING SERVICES, INC. Tri-State Test TRI-STATE TESTING SERVICES, INC.	PAGE PAGE
CLIENT Pickering	PROJECT NAME MEM Terminal Apron Investigation
PROJECT NUMBER E-9-429	PROJECT LOCATION 2491 Winchester
DATE STARTED 3/18/10 COMPLETED 3/18	GROUND ELEVATION HOLE SIZE _2.5"
DRILLING CONTRACTOR Tri-State Testing Services, Inc.	LATITUDE 35.04262818 LONGITUDE 89.97899749

### **BORING NUMBER P12**

PAGE	1	OF	1
------	---	----	---

DRILLING METHOD DP

LOGGED BY W.S. CHECKED BY D.M.

NOTES Weather - Cool & Cloudy

S Weat	ther - C	cool & Cloudy			AFTER DRILLING				
SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)			
	100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete 1.3				
	100	mg/Kg/			Soil Cement/Cement Treated Base 2.4				
DP 1	100		CL		Brown Silty Clay	ND			
DP 2	100		CL		Brown and Gray Silty Clay	ND			
DP 3	100		CL		Brown Silty Clay	ND			
DP	100		CL		Brown Silty Clay	ND			
4									
	SAMPLE TYPE SAMPLE TYPE Db 3 Db 3	SAMPLE TYPE SAMPLE TYPE NUMBER NUMBER 100 100 100 100 100 100 100 100 100 10	100         DRO - < 10.0 mg/Kg           100         100           DP         100	HAL BINON         % ABOODBY         TESTS         is is is is is is is in the second	Back         % AB         TESTS         S: S	MATERIAL DESCRIPTION       Material DESCRIPTION			

GROUND WATER LEVELS:

AT TIME OF DRILLING \_---

7					675 Men	6 Buc	Testing Services BORING NUMBER   PAGE 1	
RI-S							PROJECT NAME MEM Terminal Apron Investigation	
				E-9-429			PROJECT LOCATION _2491 Winchester	
							3/18/10         GROUND ELEVATION         HOLE SIZE         2.5"	
							nc. LATITUDE <u>35.04250539</u> LONGITUDE <u>89.97938859</u>	
							GROUND WATER LEVELS:	
OGG	ED	BY _	N.S.				D.M. AT TIME OF DRILLING	
OTE	s_\	Veat	ner - C	cool & Cloudy			AFTER DRILLING	
0 (ff)	SAMPLE TYPE	NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
_			100				Concrete 1.3	
-	-		100				1.8 Soil Cement/Cement Treated Base	-
-		DP 1	100		CL		Brown Silty Clay	ND
+	+	_			-		4.0 Brown and Gray Silty Clay	+
		DP						
1		2	100		CL			0.1
							8.0	
_		DP	100	DRO - < 10.0 mg/Kg / ORO - < 10.0	CL		Brown and Gray Silty Clay	0.4
+	-	3		mg/Kg			10.0 Brown and Gray Silty Clay	
+		DP 4	100		CL			ND
+			-				12.0 Bottom of hole at 12.0 feet.	-

			G SERVICES, INC.	675 Men Tel:	6 Buc nphis, 901.3	Testing Services BORING NUMBER kles Cove PAGE Tennessee 38133 885.1199; Fax: 901.386.6614	
LIENT						PROJECT NAME MEM Terminal Apron Investigation	
						PROJECT LOCATION _2491 Winchester           3/18/10         GROUND ELEVATION HOLE SIZE _2.5"	
RILLIN RILLIN OGGEI	IG CON IG MET D BY _	HOD W.S.	DP	g Ser	D BY _	Inc.         LATITUDE 35.04241961         LONGITUDE 89.97970062           GROUND WATER LEVELS:	
	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (nnm)
_		100				Concrete 1.2	
-		100				Soil Cement/Cement Treated Base 2.7	
-	DP 1	100		CL		Gray Silty Clay 4.0	0.
5	DP 2	100	DRO - 14.2 mg/Kg / ORO - 11.3 mg/Kg	CL		Brown Silty Clay	0.
0	DP 3	100		CL		Gray Silty Clay 10.0	N
-	DP 4	100		CL		Brown and Gray Silty Clay	N
						12.0 Bottom of hole at 12.0 feet.	

TRI-ST		ESTIN		675 Men	6 Buc	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 85.1199; Fax: 901.386.6614	
CLIEN	T Picke	ering	×			PROJECT NAME MEM Terminal Apron Investigation	
PROJ		BER	E-9-429			PROJECT LOCATION 2491 Winchester	
DATE	STARTE	D 3/	18/10 CO	MPLE	TED_	B/18/10         GROUND ELEVATION         HOLE SIZE _2.5"	
DRILL	ING CO	TRAC				nc. LATITUDE 35.04262472 LONGITUDE 89.97991437	
	ING MET					GROUND WATER LEVELS:	
				ECKE	DBY	D.M. AT TIME OF DRILLING	
NOTE	S Weat	her - (	Cool & Cloudy		-	AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - 11.2 mg/Kg			Concrete	
	-	100	7 OKO - 11.2 mg/kg			Soil Coment/Coment Treated Base	
	DP 1	100		CL		Brown Silty Clay 4.0	ND
5	DP 2	100		CL		Brown Silty Clay	ND
	DP 3	100		CL		Brown Silty Clay	ND
10	DP 4	100		CL		Brown Silty Clay	ND
	DP 5	100		CL		Brown Silty Clay	ND
+ +	_	-				12.0 Bottom of hole at 12.0 feet.	-

GENERAL BH / Ti \_\_LL E-9-429\_PICKERING\_MEM AIRPORT.GPJ PROJECT TEMPLATE.GDT 4/26/10

TRI-S		ESTIN		675 Men	6 Buc	Testing Services BORING NUMBER   kles Cove PAGE 1 Tennessee 38133 85.1199; Fax: 901.386.6614	
CLIEN	T Picke	ering				PROJECT NAME MEM Terminal Apron Investigation	
PROJ	ECT NUI	MBER				PROJECT LOCATION 2491 Winchester	
DATE	STARTE	D_3/	18/10 COM	IPLE	TED	B/18/10 GROUND ELEVATION HOLE SIZE 2.5"	
DRILL	ING CO	NTRAC	CTOR Tri-State Testing	g Ser	vices,	nc. LATITUDE <u>35.04311448</u> LONGITUDE <u>89.98006865</u>	
	ING ME					GROUND WATER LEVELS:	
				CKE	D BY	D.M. AT TIME OF DRILLING	
NOTE	S Weat	her - C	Cool & Clear		_	AFTER DRILLING	_
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete 1.3	
			mg/Kg			Brown and Gray Silty Clay	-
	DP 1	100		CL		4.0	ND
5	DP					Brown Silty Clay	
	2	100		CL			ND
+ +	-	-				7.0 Gray Silty Clay	-
	DP	100		CL			ND
10	3					10.0	
10	DP	100		0		Brown and Gray Silty Clay	
[ ]	4	100		CL		12.0	ND
						Bottom of hole at 12.0 feet.	

F-9-429 PI GENERAL BH / 7

TRI-ST	ATE TI	ESTIN		6750 Men	6 Buc	E Testing Services Ckles Cove 5, Tennessee 38133 385.1199; Fax: 901.386.6614 BORING NUMBER P PAGE 1 (	
CLIENT						PROJECT NAME MEM Terminal Apron Investigation	
						PROJECT LOCATION _2491 Winchester	
						3/19/10 GROUND ELEVATION HOLE SIZE 2.5"	
						Inc. LATITUDE <u>35.04335321</u> LONGITUDE <u>89.98003366</u>	
DRILLI						GROUND WATER LEVELS:	
LOGGE	D BY	W.S.	CHI	ECKE	DBY	D.M. AT TIME OF DRILLING	
NOTES	Weat	her - C	Cool & Clear				
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100				Concrete	
		100				2.1 Soil Cement/Cement Treated Base	
-	DP 1	100		CL		Brown Silty Clay	0.1
5	DP 2	100		CL		Brown Silty Clay 6.5	0.3
F	-					Brown Silty Clay	_
	DP 3	100		CL			0.5
10	DP 4	100	DRO - 17.7 mg/Kg / ORO - 20.6 mg/Kg	CL		10.0 Brown Silty Clay	1.9
• +	_					Bottom of hole at 12.0 feet.	

RI-STA	TE TE	STIN		6750 Men	6 Buc phis	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 885.1199; Fax: 901.386.6614	
LIENT	Picke	ering				PROJECT NAME MEM Terminal Apron Investigation	
		_	E-9-429			PROJECT LOCATION _2491 Winchester	
						3/19/10 GROUND ELEVATION HOLE SIZE 2.5"	
RILLIN	IG CON	ITRAC	TOR Tri-State Testing	g Ser	vices,	nc. LATITUDE <u>35.04363048</u> LONGITUDE <u>89.98010421</u>	
						GROUND WATER LEVELS:	
			CHE	CKE	DBY_	D.M. AT TIME OF DRILLING	
_				_	1	AFTER DRILLING	-
(tt)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete	+
1			mg/Kg			1.3 Brown Silty Clay	-
-	DP 1	100		CL		4.0	N
_	DP					Brown Silty Clay	
-	2	100		CL			
+						7.0 Brown and Gray Silty Clay	+
-	DP	100		CL			N
1	3					10.0	
+	DP	100		CL		Brown Silty Clay	
	4	100		CL		12.0	N
						Bottom of hole at 12.0 feet.	

TRI-ST		STIN		675 Men	6 Buc	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 885.1199; Fax: 901.386.6614	
CLIEN	T Picke	ering				PROJECT NAME MEM Terminal Apron Investigation	
PROJ		BER	E-9-429			PROJECT LOCATION 2491 Winchester	
DATE	STARTE	D_3/*	19/10 COM	IPLE	TED_	3/19/10 GROUND ELEVATION HOLE SIZE 2.5"	
DRILL	ING CO	TRAC	TOR Tri-State Testing	g Ser	vices,	nc. LATITUDE <u>35.04362597</u> LONGITUDE <u>89.98044433</u>	
	ING MET					GROUND WATER LEVELS:	
LOGG	ED BY	W.S.	CHE	CKE	DBY	D.M. AT TIME OF DRILLING	
NOTE	S Weat	her - C	Cool & Clear			AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete	
			mg/Kg			Brown Silty Clay	-
	DP 1	100		CL			ND
					<i>\\\\\</i>	4.0	
5	DP 2	100		CL		Brown Silty Clay	ND
- +				-		7.0 Brown Silty Clay	
	DP 3	100		CL			ND
10	3					10.0	
	DP					Brown Silty Clay	
- 1	4	100		CL		12.0	ND
						Bottom of hole at 12.0 feet.	

GENERAL BH / TF \_\_L E-9-429\_PICKERING\_MEM AIRPORT.GPJ PROJECT TEMPLATE.GDT 4/26/10

TRI-S		ESTIN		6750 Men	6 Buch	Testing Services BORING NUMBER kles Cove PAGE Tennessee 38133 885.1199; Fax: 901.386.6614	
CLIEN	T Pick	ering				PROJECT NAME MEM Terminal Apron Investigation	
PROJ	ECT NU	MBER	E-9-429			PROJECT LOCATION 2491 Winchester	
DATE	STARTE	ED_3/	19/10 CO	MPLE	TED_	3/19/10 GROUND ELEVATION HOLE SIZE 2.5"	
DRILL	ING CO	NTRA	CTOR Tri-State Testin	g Ser	vices,	Inc. LATITUDE <u>35.043621</u> LONGITUDE <u>89.9808065</u>	
	ING ME					GROUND WATER LEVELS:	
LOGG	ED BY	W.S.	CHE	ECKE	DBY	D.M. AT TIME OF DRILLING	
NOTE	S Weat	ther - (	Cool & Clear		_	AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100				Concrete	
			-		1111	Brown Silty Clay	-
	DP 1	100		CL		4.0	1.5
5	DP 2	100		CL		Brown Silty Clay	1.5
10	DP 3	100	DRO - < 10.0 mg/Kg / ORO - < 10.0 mg/Kg	CL		Brown Silty Clay	1.7
	DP 4	100		CL		Brown Silty Clay 12.0	ND
F 1						Bottom of hole at 12.0 feet.	

TEMPI ATE L E-9-429 PICKERING MEM AIRPORT.GPJ PRC GENERAL BH / Ti

			IG SERVICES, INC.	6750 Men Tel:	6 Buc nphis, 901.3	Testing Services BORING NUMBER ckles Cove PAGE 1 5, Tennessee 38133 385.1199; Fax: 901.386.6614				
	Picke					PROJECT NAME MEM Terminal Apron Investigation				
						PROJECT LOCATION 2491 Winchester				
						3/19/10         GROUND ELEVATION         HOLE SIZE         2.5"           Inc.         LATITUDE         35.04358394         LONGITUDE         89.98110055				
	NG MET					GROUND WATER LEVELS:				
						D.M. AT TIME OF DRILLING				
			Cool & Clear			AFTER DRILLING				
(ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	(man) OID			
+		100	DRO - < 10.0 mg/Kg			Concrete	+			
1	-	100	/ ORO - 12.5 mg/Kg			1.3 1.7 Soil Cement/Cement Treated Base				
	DP 1	100		CL		Brown Silty Clay 4.0	N			
-	DP 2	100		CL		Brown Silty Clay	N			
	DP 3	100		CL		7.0 Brown Silty Clay	N			
-	DP 4	100		CL		10.0 Brown Silty Clay with Sand Lense	N			
+	<u> </u>					Bottom of hole at 12.0 feet.	+			

TRI-S	TATE T	ESTIN		6750 Men	6 Buch	Testing Services BORING NUMBER   ckles Cove PAGE 1 , Tennessee 38133 385.1199; Fax: 901.386.6614	
CLIE	NT Picke	ering				PROJECT NAME _MEM Terminal Apron Investigation	
	1		E-9-429			PROJECT LOCATION 2491 Winchester	
DATE	STARTE	ED_3/*	19/10 COM	MPLE	TED	3/19/10 GROUND ELEVATION HOLE SIZE 2.5"	
DRILI	ING CO	NTRAC	CTOR Tri-State Testin	g Ser	vices,	Inc. LATITUDE <u>35.04368602</u> LONGITUDE <u>89.98136938</u>	
DRILI	ING ME	THOD	DP	_		GROUND WATER LEVELS:	
LOGO	ED BY	W.S.	CHE	CKE	DBY	D.M. AT TIME OF DRILLING	
			Cool & Clear	-	_	AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete	
		100	mg/Kg			1.3 1.9 Soil Cement/Cement Treated Base	
	DP 1	100		CL		Brown Silty Clay	ND
5	DP 2	100		CL		Brown Silty Clay	ND
	DP 3	100		CL		7.0 Brown Silty Clay	ND
10				_		10.0 Brown and Gray Silty Clay	-
	DP 4	100		CL		13.0	ND
15	DP 5	100		CL		Brown Silty Clay	ND
						16.0 Bottom of hole at 16.0 feet.	

U-STAT	ETE	STIN		675 Men	6 Buc nphis,	esting Services BORING NUMBER les Cove PAGE 1 Fennessee 38133 55.1199; Fax: 901.386.6614	
	Picke	ring				PROJECT NAME MEM Terminal Apron Investigation	
ROJECT	NUM	BER	E-9-429			PROJECT LOCATION 2491 Winchester	
						20/10 GROUND ELEVATION HOLE SIZE 2.5"	
						c. LATITUDE <u>35.04343813</u> LONGITUDE <u>89.98132468</u>	
RILLING						GROUND WATER LEVELS:	
			CHE	CKE	D BY		
	- 1	ier - C	ool & Windy		-	AFTER DRILLING	_
(ft) SAMPLE TYPE	NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	DID (man)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete	
Н	ł	100	/ ORO - < 10.0 mg/Kg/	-		.3 .2 Soil Cement/Cement Treated Base	-
	DP	100				Brown Silty Clay	1.
11	1	100					N
						Brown Silty Clay	
-	DP 2	100		CL			N
-	-			CL			
++						.0 Brown Silty Clay	+
-							
	DP 3	100		CL			N
11						2.0	
1				-		Bottom of hole at 12.0 feet.	+



# TRI-STATE TESTING SERVICES, INC. Tri-State Testing Services 6756 Buckles Cove Memphis, Tennessee 38133 Tel: 901.385.1199; Fax: 901.386.6614

B	OF	RII		G	N	U	N	IB	E	R	P	2	4
---	----	-----	--	---	---	---	---	----	---	---	---	---	---

PAGE	1 (	OF 1

			E-9-429			PROJECT LOCATION 2491 Winchester	
						3/19/10 GROUND ELEVATION HOLE SIZE _2.5"	_
	NG ME	W.S.	DP			Inc.         LATITUDE _35.04317543         LONGITUDE _89.98132004           GROUND WATER LEVELS:	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
_		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete	+
-	DP 1	100	mg/Kg/	CL		Brown Silty Clay	N
5	DP 2	100		CL		Brown Silty Clay	1
-	DP 3	100		CL		Brown Silty Clay	1
-	DP 4	100		CL		10.0 Brown Silty Clay 12.0 Bottom of hole at 12.0 feet.	1

			IG SERVICES, INC.	6750 Men Tel:	5 Buc phis, 901.3	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 285.1199; Fax: 901.386.6614	
	T Picke					PROJECT NAME MEM Terminal Apron Investigation	
		_				PROJECT LOCATION _2491 Winchester           3/20/10         GROUND ELEVATION HOLE SIZE _2.5"	
						Inc. LATITUDE <u>35.04288442</u> LONGITUDE <u>89.981315</u>	
	ING MET					GROUND WATER LEVELS:	
						D.M. AT TIME OF DRILLING	
			Cool & Clear		_	AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			0.9 Concrete	
			mg/Kg			Brown Silty Clay with Sand Lense	
	DP 1	100		CL			ND
	-			-		4.0 Brown Silty Clay	
5	DP	100		CL			ND
	2					7.0	
						Brown Silty Clay	
	DP 3	100		CL			ND
10						10.0	
	DP 4	100		CL		Brown Silty Clay	ND
						12.0 Bottom of hole at 12.0 feet.	-

GENERAL BH / TP , \_\_L E-9-429\_PICKERING\_MEM AIRPORT.GPJ\_PROJECT TEMPLATE.GDT\_4/26/10

	TATE T		G SERVICES, INC.	675 Men Tel:	6 Buc nphis, 901.3	kles, Ten 385.1		PAGE 1	
								PROJECT LOCATION _2491 Winchester	
DATE	STARTE	D_3/2						GROUND ELEVATION HOLE SIZE 2.5"	
	ING CO							LATITUDE <u>35.04260936</u> LONGITUDE <u>89.98131008</u> GROUND WATER LEVELS:	_
LOGG	ED BY	W.S.	Cool & Clear						
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG			MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			0.9	Concrete		
	DP 1	100	mg/Kg	CL		4.0	Brown Sil	ty Clay	ND
5	DP 2	100		CL		7.0	Brown Sil	ty Clay	ND
  10	DP 3	100		CL		10.0	Brown Sil	ty Clay	ND
	DP 4	100		CL		12.0	Brown Sil	ty Clay	ND
								Bottom of hole at 12.0 feet.	

GENERAL BH / Th \_\_L E-9-429\_PICKERING\_MEM AIRPORT.GPJ PROJECT TEMPLATE.GDT 4/26/10

TRI-S		ESTIN		675 Men	6 Buc	e Testing Services In the services BORING NUMBER I PAGE 1 PAGE 1 PAGE 1	
CLIEN	IT Picke	ering				PROJECT NAME _ MEM Terminal Apron Investigation	_
PROJ	ECT NU	MBER	E-9-429			PROJECT LOCATION 2491 Winchester	
DATE	STARTE	ED 3/2	20/10 COM	MPLE	TED _	3/20/10 GROUND ELEVATION HOLE SIZE 2.5"	
DRILL	ING CO	NTRAC	CTOR Tri-State Testing	g Ser	vices,	s, Inc. LATITUDE <u>35.0421678</u> LONGITUDE <u>89.98093986</u>	
	ING MET					GROUND WATER LEVELS:	
LOGG	ED BY	W.S.	CHE	CKE	D BY	D.M. AT TIME OF DRILLING	
NOTE	S Weat	her - C	Cool & Clear			AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0				
[ ]		100	mg/Kg		V///	1.1 Soil Cement/Cement Treated Base /	1
	DP 1	100		CL		Brown Silty Clay	ND
5	DP 2	100		CL		Brown Silty Clay	ND
						Brown Silty Clay	
  10	DP 3	100		CL		10.0	ND
	DP 4	100		CL		Brown Silty Clay	ND
						12.0 Bottom of hole at 12.0 feet.	

TEMPI ATE GUT Cal Dan L E-9-429 PICKERING MEM AIRPI GENERAL BH / Th

TRI	-STA	TE TE	STIN		675 Men	6 Buc nphis	e Testing Services ckles Cove s, Tennessee 38133 385.1199; Fax: 901.386.6614 BORING NUMBER PAGE 1 PAGE 1	
CLI		Picke	ring			_	PROJECT NAME MEM Terminal Apron Investigation	
			_	E-9-429			PROJECT LOCATION 2491 Winchester	
							3/20/10 GROUND ELEVATION HOLE SIZE 2.5"	
							, Inc. LATITUDE _35.04195935 LONGITUDE _89.9806778	
							GROUND WATER LEVELS:	
					CKE	DBY	_D.M. AT TIME OF DRILLING	
NU	IES_	vveati	ier - C	Cool & Windy		-	AFTER DRILLING	
o DEPTH		NUMBER	<b>RECOVERY %</b>	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
			100	DRO - < 10.0 mg/Kg / ORO - 10.8 mg/Kg /		3.4		
-	-	DP 1	100	( <u>/ 010 - 10.0 mg/tg</u> )	CL		Brown Silty Clay	ND
- 5	-	DP 2	100		CL		Brown Silty Clay	ND
F	+				_		7.0 Brown and Gray Silty Clay	
Ē	11	DP 3	100		CL			ND
F10							10.0	
L		DP	100		CL		Brown Silty Clay	ND
-	$\square$	4					12.0 Bottom of hole at 12.0 feet.	

TRI-ST	TATE T	ESTIN		675 Men	6 Buc	Testing Services BORING NUMBER ckles Cove PAGE 1 , Tennessee 38133 385.1199; Fax: 901.386.6614	
CLIEN	T Pick	kering				PROJECT NAME MEM Terminal Apron Investigation	
PROJE	ECT NU	MBER	E-9-429			PROJECT LOCATION 2491 Winchester	
DATE	START	ED _3/2	20/10 COI	MPLE	TED_	3/20/10 GROUND ELEVATION HOLE SIZE 2.5"	
DRILLI	ING CC	ONTRA				Inc. LATITUDE <u>35.04179577</u> LONGITUDE <u>89.98047179</u>	
DRILLI						GROUND WATER LEVELS:	
				ECKE	DBY	D.M. AT TIME OF DRILLING	
NOTES	S Wea	ather - (	Cool & Clear		_	AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100				0.9 Concrete	
]						Brown Silty Clay	
	DP 1	100		CL			N
1						4.0	
5	DP		DRO - 15.7 mg/Kg /			Brown and Gray Silty Clay	
4	2	100	ORO - 14.5 mg/Kg	CL			0.5
+	_	-			¥////	7.0	_
-	DP					Brown Silty Clay	
-	3	100		CL			NE
0	-		-		-////	10.0 Brown Silty Clay	-
-	DP 4	100		CL		blown Silty Clay	ND
+		-				Bottom of hole at 12.0 feet.	+
						bottom of hole at 12.0 leet.	
					-		

TRI-ST/	ATE TE	STIN		6750 Men	6 Buc	Testing Services BORING NUMBER kles Cove PAGE 1 , Tennessee 38133 385.1199; Fax: 901.386.6614	
CLIENT	Picke	ring				PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION 2491 Winchester	
						3/20/10 GROUND ELEVATION HOLE SIZE 2.5"	
						Inc. LATITUDE <u>35.04156701</u> LONGITUDE <u>89.98024183</u>	
DRILLIN						GROUND WATER LEVELS:	
				CKE	D BY	D.M. AT TIME OF DRILLING	
NOTES	vveat	her - C	Cool & Windy		-	AFTER DRILLING	_
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (pom)
		100	DRO - 14.8 mg/Kg / ORO - 20.0 mg/Kg /				
-	DP 1	100		CL		Brown Silty Clay	NE
5	DP 2	100		CL		Brown Silty Clay	NE
-	DP 3	100		CL		Brown Silty Clay	NE
-	DP 4	100		CL		Brown Silty Clay	NE
+	-	-				Bottom of hole at 12.0 feet.	+

TRI-S		ESTIN		6750 Men	6 Buc	Testing Services BORING NUMBER kles Cove PAGE Tennessee 38133 85.1199; Fax: 901.386.6614	
CLIEN	T Picke	ering				PROJECT NAME MEM Terminal Apron Investigation	
PROJ	ECT NU	MBER	E-9-429			PROJECT LOCATION 2491 Winchester	
DATE	STARTE	D_3/2	20/10 COM	IPLE	TED _	B/20/10         GROUND ELEVATION         HOLE SIZE _2.5"	
DRILL	ING CO	NTRAC				nc. LATITUDE 35.04138575 LONGITUDE 89.98001354	
	ING MET					GROUND WATER LEVELS:	
				CKE	D BY	D.M. AT TIME OF DRILLING	
NOTE	S Weat	her - (	Cool & Clear		_	AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0				
			mg/Kg			Brown Silty Clay	
	DP 1	100		CL			ND
				-		4.0	
5	DP					Brown Silty Clay	
	2	100		CL			ND
	-	-				7.0 Brown Silty Clay	
	DP	100		CL		brown only olay	ND
	3	100		UL			
10	DP					10.0 Brown Silty Clay	
- 1	4	100		CL		12.0	ND
- 1						Bottom of hole at 12.0 feet.	

GENERAL BH / Tt ... E-9-429\_PICKERING\_MEM AIRPORT.GPJ PROJECT TEMPLATE.GDT 4/26/10

TRI-S		ESTIN		6750 Mem	6 Buc phis	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 885.1199; Fax: 901.386.6614	
CLIEN	T Picke	ering			_	PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION 2491 Winchester	
						B/22/10         GROUND ELEVATION         HOLE SIZE _2.5"	
			CTOR Tri-State Testin	g Ser	vices,	nc. LATITUDE <u>35.04122456</u> LONGITUDE <u>89.97975283</u>	
	ING ME					GROUND WATER LEVELS:	
				CKE	D BY	D.M. AT TIME OF DRILLING	
NOTE	s_vveat	ner - C	Cold & Raining		1	AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			0.9 Concrete	
						Brown Silty Clay	
[ ]	DP 1	100		CL			ND
					<i>[]]]</i> ]	4.0	
5	DP					Brown Silty Clay	
	2	100		CL			ND
	-			-	<i>\///</i>	7.0 Brown Silty Clay	-
	DP	100		CL		Brown Sinty Clay	
	3	100		UL			ND
10	DP					10.0 Brown Silty Clay	
- 1	4	100		CL		12.0	ND
1						Bottom of hole at 12.0 feet.	

GENERAL BH / Th ... L E-9-429\_PICKERING\_MEM AIRPORT.GPJ PROJECT TEMPLATE.GDT 4/26/10

RI-ST	ATE T	ESTIN	and the second se	675	6 Buc	Testing Services BORING NUMBER kles Cove PAGE 1 , Tennessee 38133 385.1199; Fax: 901.386.6614	
	Picke			-	-	PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429		TED	PROJECT LOCATION 2491 Winchester	_
						3/21/10         GROUND ELEVATION         HOLE SIZE         2.5"           Inc.         LATITUDE         35.04127054         LONGITUDE         89.97950436	
	NG ME					GROUND WATER LEVELS:	
OGGE	D BY	W.S.		CKE	DBY	D.M. AT TIME OF DRILLING AFTER DRILLING	
(ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			0.9 Concrete	+
-	DP 1	100	mg/Kg	CL		Brown Silty Clay	1
-	DP 2	100		CL		4.0 Brown Silty Clay	,
-	DP 3	100		CL		7.0 Brown Silty Clay	,
-	DP 4	100		CL		10.0 Brown Silty Clay	1
						Bottom of hole at 12.0 feet.	

TRI-ST/		STIN		675 Men	6 Buc	e Testing Services ckles Cove s, Tennessee 38133 .385.1199; Fax: 901.386.6614 BORING NUMBER PAGE 1 PAGE 1	
CLIENT						PROJECT NAME MEM Terminal Apron Investigation	
						PROJECT LOCATION 2491 Winchester	
						3/21/10         GROUND ELEVATION         HOLE SIZE _2.5"	
						bit         bit <td></td>	
						GROUND WATER LEVELS:	
						D.M. AT TIME OF DRILLING	
			Cold & Windy				
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
0		100	DRO - < 10.0 mg/Kg			0.9 Concrete	
T			/ ORO - < 10.0 mg/Kg			Brown and Gray Silty Clay	1
	DP 1	100		CL			ND
1						4.0	
;						Brown and Gray Silty Clay	
	DP 2	100		CL			N
						7.0	
						Brown and Gray Silty Clay	
	DP 3	100		CL			ND
						10.0	
-	DP	100		CL		Brown and Gray Silty Clay	ND
+	4				<i>\////</i>	12.0	
						Bottom of hole at 12.0 feet.	

	TATE TI		IG SERVICES, INC.	675 Men Tel:	6 Buc nphis, 901.3	Testing Services BORING NUMBER Exclass Cove PAGE 1 7 Tennessee 38133 385.1199; Fax: 901.386.6614 PROJECT NAME MEM Terminal Apron Investigation	
		12.00				PROJECT LOCATION 2491 Winchester	
						3/21/10 GROUND ELEVATION HOLE SIZE 2.5"	_
						Inc. LATITUDE 35.04091677 LONGITUDE 89.9790576	
						GROUND WATER LEVELS:	
			CHE Cold, Windy, & Raining			D.M. AT TIME OF DRILLING AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete	
	-		mg/Kg/			Brown Silty Clay	
	DP 1	100		CL			ND
	+					4.0 Brown Silty Clay	-
5	DP 2	100		CL			ND
	2					7.0	
	DP					Brown Silty Clay	
	3	100		CL			ND
10	-					10.0 Brown Silty Clay	-
	DP 4	100		CL		12.0	ND
- +						Bottom of hole at 12.0 feet.	

GENERAL BH / Th ... E-9-429\_PICKERING\_MEM AIRPORT.GPJ\_PROJECT TEMPLATE.GDT\_4/26/10

TRI-S		ESTIN		6750 Mem	6 Buc phis	Testing Services BORING NUMBER I ckles Cove PAGE 1 , Tennessee 38133 385.1199; Fax: 901.386.6614	
CLIEN	T Pick	ering				PROJECT NAME MEM Terminal Apron Investigation	
						PROJECT LOCATION _2491 Winchester	
						3/24/10 GROUND ELEVATION HOLE SIZE 2.5"	
						Inc. LATITUDE <u>35.04069015</u> LONGITUDE <u>89.97891968</u>	
	ING ME					GROUND WATER LEVELS:	
				CKE	D BY	D.M. AT TIME OF DRILLING	
NOTE	S Weat			_	-	AFTER DRILLING	_
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG		PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete	
		100	mg/Kg/			1.8 Soil Cement/Cement Treated Base	-
	DP 1	100		CL		4.0	ND
5	DP 2	100		CL		Brown Silty Clay	ND
10	DP 3	100		CL		Brown Silty Clay	ND
	DP 4	100		CL		Brown Silty Clay	ND
						Bottom of hole at 12.0 feet.	

	TATE T		IG SERVICES, INC.	675 Men Tel:	6 Buc phis 901.3	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 85.1199; Fax: 901.386.6614 PROJECT NAME MEM Terminal Apron Investigation	
						PROJECT LOCATION _2491 Winchester	
						3/21/10         GROUND ELEVATION         HOLE SIZE         2.5"	
						Inc. LATITUDE <u>35.0405368</u> LONGITUDE <u>89.97915581</u>	
	ING MET					GROUND WATER LEVELS:	
LOGG	ED BY	W.S.	CHE	ECKE	DBY	D.M. AT TIME OF DRILLING	-
NOTE	S Weat	her - C	Cold			AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete 1.3	
		100	mg/Kg			2.0 Soil Cement/Cement Treated Base	
	DP 1	100		CL		Brown Silty Clay 4.0	ND
5	DP 2	100		CL		Brown Silty Clay	ND
	DP 3	100		CL		Brown and Gray Silty Clay with Wood	ND
	DP 4	100		CL		Gray Silty Clay 12.0	ND
						Bottom of hole at 12.0 feet.	

GENERAL BH / TP . L E-9-429 PICKERING MEM AIRPORT.GPJ PROJECT TEMPLATE.GDT 4/26/10

			IG SERVICES, INC.	675 Men Tel:	6 Buc 1phis, 901.3	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 85.1199; Fax: 901.386.6614	
	Picke					PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429		TED	PROJECT LOCATION 2491 Winchester	
						B/22/10         GROUND ELEVATION         HOLE SIZE         2.5"	
	IG MET					nc.         LATITUDE35.04016294         LONGITUDE89.9795395           GROUND WATER LEVELS:	
			CHE	CKE	DBY	D.M. AT TIME OF DRILLING	
OTES	Weat	her - C	Cold			AFTER DRILLING	_
							1
(#)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	(maa) Old
		100				Concrete	1
1					1111	1.3 Brown and Gray Silty Clay	-
-	DP 1	100	DRO - 30.9 mg/Kg / ORO - < 10.0 mg/Kg	CL		4.0	31.0
; †						Brown Silty Clay	-
	DP 2	100		CL			N
1	_					7.0	
						Brown Silty Clay	
_	DP 3	100		CL			N
+						10.0	
-	DP 4	100		CL		Brown Silty Clay	N
+	1			-		12.0 Bottom of hole at 12.0 feet.	-

RI-ST/		STIN		675) Men	6 Buc	Testing Services BORING NUMBER ckles Cove PAGE 1 prennessee 38133 385.1199; Fax: 901.386.6614	
LIENT	Picke	ering				PROJECT NAME MEM Terminal Apron Investigation	
ROJE		BER	E-9-429			PROJECT LOCATION 2491 Winchester	
DATE S	TARTE	D 3/2	2/10 COM	IPLE	TED _	3/22/10 GROUND ELEVATION HOLE SIZE 2.5"	
RILLIN	NG CO	TRAC	TOR Tri-State Testing	g Ser	vices,	Inc. LATITUDE <u>35.04032271</u> LONGITUDE <u>89.97975267</u>	
	NG MET		DP			GROUND WATER LEVELS:	
OGGE	DBY_	B.W.	CHE	CKE	DBY	D.M. AT TIME OF DRILLING	
OTES	Weat	her - C	old, Windy, & Raining			AFTER DRILLING	
	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (pom)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete	+
E	-	100	/ ORO - < 10.0 mg/Kg		216-2671	1.2 1.9 Soil Cement/Cement Treated Base	
-	DP 1	100		CL		Brown and Gray Silty Clay	NE
T						Brown and Gray Silty Clay	+
	DP 2	100		CL			N
	_					7.0	
T						Brown Silty Clay	
	DP 3	100		CL			N
						10.0	
_	DP	100		CL		Brown Silty Clay	NE
+	4	100		OL		12.0	
						Bottom of hole at 12.0 feet.	

	5		Tri-Sta 6756 I Memp
TRUSTATE T	FESTING SER	VICES INC	Tel: 90

#### Tri-State Testing Services 5756 Buckles Cove Memphis, Tennessee 38133 Fel: 901.385.1199; Fax: 901.386.663

В	0	R	1		G	N	11	JI	<b>MI</b>	B	E	R	F	24	0	
---	---	---	---	--	---	---	----	----	-----------	---	---	---	---	----	---	--

PAGE	: 1	0	F

	T Picke					PROJECT NAME _ MEM Terminal Apron Investigation	
						PROJECT LOCATION 2491 Winchester	
ATE	STARTE	D 3/2	2/10	COMPLE	TED _	3/22/10 GROUND ELEVATION HOLE SIZE 2.5"	
RILL	NG CO	TRAC	TOR Tri-State To	esting Ser	vices,	Inc. LATITUDE <u>35.04052807</u> LONGITUDE <u>89.98000822</u>	
RILL	NG MET		DP			GROUND WATER LEVELS:	
OGG	ED BY	B.W.		CHECKE	D BY	D.M. AT TIME OF DRILLING	
OTES	Weat	her - C	old & Windy			AFTER DRILLING	
0 (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
		100					
						Gray Silty Clay	
	DP 1	100		CL			1
						4.0	
5						Brown and Gray Silty Clay	
	DP 2	100		CL			1
1						7.0	
						Brown and Gray Silty Clay	
	DP 3	100		CL			1
0						10.0	
	DP	100	DRO - < 10.0 mg / ORO - < 10.0	/Kg CL		Brown and Gray Silty Clay	1
1	4		mg/Kg				
						Bottom of hole at 12.0 feet.	

	Picke		IG SERVICES, INC.	675 Men Tel:	6 Buc nphis 901.3	Testing Services BORING NUI kles Cove Tennessee 38133 85.1199; Fax: 901.386.6614 PROJECT NAME MEM Terminal Apron Investigation	MBER P4
ROJE		BER	E-9-429			PROJECT LOCATION 2491 Winchester	
						3/22/10 GROUND ELEVATION HOLE SIZE 2.5	
RILLIN	IG CON	ITRAC	TOR Tri-State Testing	g Ser	vices,	nc. LATITUDE <u>35.04090406</u> LONGITUDE <u>89.9</u>	8042332
	IG MET					GROUND WATER LEVELS:	
				CKE	DBY	D.M. AT TIME OF DRILLING	
OTES	Weat	her - C	Cold	_		AFTER DRILLING	
(ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			0.9 Concrete	
			/ ORO - < 10.0 mg/Kg		V////	Brown Silty Clay	
]	DP 1	100		CL			N
1						4.0	
	-					Brown Silty Clay	
	DP 2	100		CL			N
						7.0	
-						Brown Silty Clay	
_	DP 3	100		CL			N
-						10.0	
-	DP 4	100		CL		Brown Silty Clay	N
+	4				<i>\////</i>	12.0 Bottom of hole at 12.0 feet.	

TRI-S		ESTIN		675 Men	6 Buc	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 885.1199; Fax: 901.386.6614	
CLIEN	T Picke	ering				PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION _2491 Winchester	
						B/22/10         GROUND ELEVATION         HOLE SIZE _2.5"	
						nc. LATITUDE <u>35.04107792</u> LONGITUDE <u>89.98070005</u>	
	ING ME					GROUND WATER LEVELS:	
			Che	CKE	DBI_	D.M. AT TIME OF DRILLING AFTER DRILLING	
	_						
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete 1.3	
	-		mg/Kg/			Brown Silty Clay	
	DP 1	100		CL			ND
					\////	4.0 Brown Silty Clay	
5	DP	100		CL			ND
	2					7.0	
						Brown Silty Clay	
	DP 3	100		CL			ND
10						10.0	
	DP 4	100		CL		Brown Silty Clay	ND
- +	_					12.0 Bottom of hole at 12.0 feet.	

GENERAL BH / TF ... E-9-429\_PICKERING\_MEM AIRPORT.GPJ\_PROJECT TEMPLATE.GDT\_4/26/10

	TATE T		and the second se	675 Men Tel:	6 Buc nphis, 901.3	kles ( Teni 385.1	nessee 38: 199; Fax: 9	PAGE 1	
	_		E-9-429					PROJECT LOCATION 2491 Winchester	
								GROUND ELEVATION HOLE SIZE _2.5"	
								LATITUDE <u>35.04143654</u> LONGITUDE <u>89.98092775</u>	
			CHE					GROUND WATER LEVELS:	
			Cool & Windy	LORE		D.IVI.		AT TIME OF DRILLING AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG			MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			0.9	Concrete		
	DP		mg/Kg				Brown and	Gray Silty Clay	
	1	100		CL					ND
		-			<i>\////</i>	4.0	Brown and	Gray Silty Clay	_
5	DP	100		CL			brown and		ND
	2					7.0			, ND
							Brown and	Gray Silty Clay	
	DP 3	100		CL					ND
10	_				<i>\///</i>	10.0	Prown and	Gray Silty Clay	
	DP 4	100		CL			Brown and	Gray Sitty Gray	ND
- +						12.0		Bottom of hole at 12.0 feet.	

GENERAL BH / TF ... E-9-429\_PICKERING\_MEM AIRPORT.GPJ\_PROJECT TEMPLATE.GDT\_4/26/10

	5	
TRI-STATE	TESTING SEE	VICES INC

### Tri-State Testing Services **6756 Buckles Cove** Memphis, Tennessee 38133 Tel: 901.385.1199; Fax: 901.386.6614

B	0	R	I		G	N	11	J	Λ	B	E	F	S	P	4	4
---	---	---	---	--	---	---	----	---	---	---	---	---	---	---	---	---

P	AGE	1	OF	

CLIENT Pickering		
PROJECT NUMBER E-9-429		
DATE STARTED 3/22/10	COMPLETED	3/22/10
DRILLING CONTRACTOR Tri-State	Testing Services,	Inc.
DRILLING METHOD _DP		
LOGGED BY _B.W.	CHECKED BY	D.M.

PROJECT NAME	MEM Terminal Apron Investigation

LATITUDE 35.04145021 LONGITUDE 89.98116846

PROJECT LOCATION 2491 Winchester

GROUND ELEVATION HOLE SIZE 2.5"

LOGGED BY B.W.

NOTES Weather - Cloudy & Raining

GROUND WATER LEVELS: AT TIME OF DRILLING ----

AFTER DRILLING \_---

	o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
ľ	-		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			0.9 Concrete	
t	1			/ ORO - < 10.0 mg/Kg		/////	Brown and Gray Silty Clay	
		DP 1	100		CL		4.0	ND
	5	DP 2	100		CL		Brown and Gray Silty Clay	ND
	10	DP 3	100		CL		Brown and Gray Silty Clay	ND
F		DP 4	100		CL		Brown and Gray Silty Clay 12.0	ND
BH / TiE-9-429_PICKERING_MEM_AIRPORT.GPJ_PROJECT_TEMPLATE.GDT_4/26/10								
GENERAL BH / Ti								

IENT Pick	erina				PROJECT NAME MEM Terminal Apron Investigation	
		E-9-429				
					GROUND ELEVATION HOLE SIZE _2.5"	
					LATITUDE _35.04169665 LONGITUDE _89.9814207	
ILLING ME					GROUND WATER LEVELS:	
		CHE				
TES Weat					AFTER DRILLING	
(ft) SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	(maa) Old
	100	DRO - < 10.0 mg/Kg			Concrete	-
- DP - 1	100	/ ORO - < 10.0 mg/Kg	CL		Brown and Gray Silty Clay	N
DP 2	100		CL		Brown and Gray Silty Clay	N
- DP - 3	100		CL		Brown Silty Clay	N
_ DP _ 4	100		CL		Brown Silty Clay	N
+					Bottom of hole at 12.0 feet.	+



#### Tri-State Testing Services 6756 Buckles Cove Memphis, Tennessee 38133 Tel: 901.385.1199; Fax: 901.386.6614

BORING NUMBER P4
------------------

PAGE 1 OF 1
-------------

	T Picke					PROJECT NAME _ MEM Terminal Apron Investigation	
			E-9-429				
						3/22/10 GROUND ELEVATION HOLE SIZE _2.5"	
						Inc. LATITUDE <u>35.04156374</u> LONGITUDE <u>89.9819166</u>	
	NG ME					GROUND WATER LEVELS:	
OGG	ED BY	B.W.	CHE	CKE	D BY	D.M. AT TIME OF DRILLING	
OTES	Weat	ther - F	Raining & Windy			AFTER DRILLING	
o UEPIH (ft)	SAMPLE TYPE NUMBER	<b>RECOVERY %</b>	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0		3.4		
-	DP 1	100	mg/Kg	CL		Brown and Gray Silty Clay	N
5 †	-					4.0 Brown and Gray Silty Clay	+
-	DP 2	100		CL		7.0	N
Ţ						Brown and Gray Silty Clay	
	DP 3	100		CL			N
10						10.0	
_	DP	100		CL		Brown and Gray Silty Clay	N
1	4	100		OL		12.0 Bottom of hole at 12.0 feet.	

TRI-S		STIN		6750 Mem	6 Buc	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 85.1199; Fax: 901.386.6614	
CLIEN	T Picke	ering				PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION 2491 Winchester	
						B/22/10         GROUND ELEVATION         HOLE SIZE _2.5"	
						nc. LATITUDE <u>35.04139754</u> LONGITUDE <u>89.98216681</u>	
	ING MET					GROUND WATER LEVELS:	
			CHE	CKE	D BY	D.M. AT TIME OF DRILLING AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			0.9 Concrete	
			/ ORO - < 10.0 mg/Kg			Brown and Gray Silty Clay	
	DP 1	100		CL		4.0	ND
5						Brown and Gray Silty Clay	
	DP 2	100		CL			ND
						7.0	
	DP	-				Brown and Gray Silty Clay	
	3	100		CL			ND
10		_		-		10.0 Difference of the Oliver	
	DP 4	100		CL		Brown and Gray Silty Clay	ND
- +	_					12.0 Bottom of hole at 12.0 feet.	

GENERAL BH / TP . ... L E-9-429\_PICKERING\_MEM AIRPORT.GPJ\_PROJECT TEMPLATE.GDT\_4/26/10

	ATE TI		IG SERVICES, INC.	675 Men Tel:	6 Buc nphis 901.3	Testing Services       BORING NUMBER         ckles Cove       PAGE         5, Tennessee 38133       385.1199; Fax: 901.386.6614         PROJECT NAME       MEM Terminal Apron Investigation	
ROJE		MBER	E-9-429			PROJECT LOCATION 2491 Winchester	
						3/22/10 GROUND ELEVATION HOLE SIZE 2.5"	
RILLI	NG COI	NTRAC				Inc. LATITUDE _35.04118312 LONGITUDE _89.98236247	
	NG MET					GROUND WATER LEVELS:	
						D.M. AT TIME OF DRILLING	
			Cold, Windy, & Raining		1	AFTER DRILLING	
(#)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0	_		0.9 Concrete	
			mg/Kg			Brown and Gray Silty Clay	
-	DP 1	100		CL			1
+						4.0 Brown and Gray Silty Clay	_
-	DP	100		CL		Lioun and only only only	
-	2			UL		7.0	
t						Brown and Gray Silty Clay	+
	DP 3	100		CL			1
						10.0	
-	DP 4	100		CL		Brown and Gray Silty Clay	1
+	4					12.0 Bottom of hole at 12.0 feet.	
						Bottom of hole at 12.0 leet.	

			6756	5 Buc	kles (	PAGE 1	
TATE T	ESTIN	IG SERVICES, INC.	Tel:	901.3	85.1	199; Fax: 901.386.6614	
			g Sen	vices,	Inc.	LATITUDE 35.04102778 LONGITUDE 89.98260017	
				D BY	D.M.	AT TIME OF DRILLING AFTER DRILLING	
SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	PID (ppm)
	100	DRO - < 10.0 mg/Kg			1.0	Concrete	
DP 1	100	mg/Kg	CL		4.0	Brown and Gray Silty Clay	ND
DP 2	100		CL		7.0		ND
DP 3	100		CL		10.0		ND
DP 4	100		CL		12.0	Brown Silty Clay	ND
					12.0	Bottom of hole at 12.0 feet.	
	IT Pick ECT NUI STARTE ING COU ING ME ED BY S Weat S Weat S Weat DP 1 DP 2 DP 3 DP 3 DP	ING Pickering ECT NUMBER STARTED 3/2 ING CONTRAC ING METHOD ED BY B.W. S Weather - C Weather - C Weather - C DP 100 DP 100 DP 100 DP 100	TATE TESTING SERVICES, INC.         NT Pickering         ECT NUMBER E-9-429         STARTED 3/22/10       CON         ING CONTRACTOR Tri-State Testing         ING METHOD DP         SED BY B.W.       CHE         S Weather - Cold & Windy         Wather - Cold & Windy         TESTS         Wather - Cold & Windy         DP 100         DP 100         DP 100         DP 100	6750         Mem         TATE TESTING SERVICES, INC.         NT Pickering         ECT NUMBER E-9-429         STARTED 3/22/10       COMPLE         ING CONTRACTOR Tri-State Testing Ser         ING METHOD DP         SED BY B.W.       CHECKER         S Weather - Cold & Windy         Weather - Cold & Windy         Weather - Cold & Windy         DP         100       DRO - < 10.0 mg/Kg	6756 Buc Memphis, Tate Testing Services, INC.         6756 Buc Memphis, Tel: 901.3           NT_Pickering         ECT NUMBER E-9-429           STARTED 3/22/10         COMPLETED 3           STARTED 3/22/10         COMPLETED 3           ING CONTRACTOR Tri-State Testing Services, ING METHOD DP         CHECKED BY           S         Weather - Cold & Windy           Way         X           Y         Y           Y         Y           Y         BW,           CHECKED BY         CHECKED BY           S         Weather - Cold & Windy           Way         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y           Y         Y	6756 Buckles C Memphis, Tenn TATE TESTING SERVICES, INC.           TI_Pickering           ECT NUMBER         E-9-429           STARTED         3/22/10         COMPLETED         3/22/10           ING CONTRACTOR         Tri-State Testing Services, Inc.         Inc.         Inc.           ING METHOD         DP         CHECKED BY         D.M.         S           S         Weather - Cold & Windy         TESTS         0; 0; 0; 0; 0;         0 0; 0; 0;         0 0; 0;         0 0; 0;         0 0;         0 0;<	PAGE 1         PAGE 1           TATE TESTING SERVICES, INC.         Tel: 901.385.1199; Fax: 901.386.6614           MT_Pickering         PROJECT NAME MEM Terminal Apron Investigation           ECT NUMBER_E-9-429         PROJECT LOCATION 2491 Winchester           STARTED_3/22/10         COMPLETED_3/22/10         GROUND ELEVATION

GENERAL BH / TF ... E-9-429\_PICKERING\_MEM AIRPORT.GPJ\_PROJECT TEMPLATE.GDT\_4/26/10

		Statements of the local division in which the
	In the second se	10
TRUSTATE	TESTING SE	MCES INC

# Tri-State Testing Services 6756 Buckles Cove Memphis, Tennessee 38133 c. Tel: 901.385.1199; Fax: 901.386.661

B	0	R	IN	10	3	Ν	U	N	1E	BE	R	F	25	0
---	---	---	----	----	---	---	---	---	----	----	---	---	----	---

PAGE 1 OF
-----------

	T_Picke					85.1199; Fax: 901.386.6614 PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION _2491 Winchester	
		_		MPLE	TED	Algorithm         Algorithm <t< th=""><th></th></t<>	
						nc. LATITUDE <u>35.0407693</u> LONGITUDE <u>89.98284713</u>	
	ING ME					GROUND WATER LEVELS:	
						D.M. AT TIME OF DRILLING	
	Weat					AFTER DRILLING	
					1		
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	(mon) DID
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			0.9 Concrete	
	DP 1	100	mg/Kg	CL		Brown Silty Clay with Sand Lense	NE
5	DP 2	100		CL		Brown Silty Clay	N
-	DP 3	100		CL		Brown Silty Clay	N
10	DP 4	100		CL		10.0 Brown Silty Clay 12.0	N
Ť						Bottom of hole at 12.0 feet.	



#### Tri-State Testing Services 6756 Buckles Cove Memphis, Tennessee 38133 Tel: 901.385.1199; Fax: 901.386.6614

B	0	R	IN		G	N		U	Ν	Λ	B	Ε	R	F	25	•
---	---	---	----	--	---	---	--	---	---	---	---	---	---	---	----	---

PA	GE	1	0	F

			E-9-429			PROJECT LOCATION 2491 Winchester	
			22/10 COM				
DRILLI	NG CO	NTRAC	CTOR Tri-State Testing	g Ser	vices,	Inc. LATITUDE <u>35.04060252</u> LONGITUDE <u>89.98309831</u>	
	NG ME					GROUND WATER LEVELS:	
				CKE	D BY	D.M. AT TIME OF DRILLING	
NOTES	S Weat	ther - C	Cool			AFTER DRILLING	
(ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0		100	DRO - < 10.0 mg/Kg			Concrete	-
1	-		/ ORO - < 10.0 mg/Kg		1111	Brown Silty Clay	-
	DP 1	100		CL		4.0	N
5	DP					Brown Silty Clay	
-	2	100		CL			N
+		-		-		7.0 Brown Silty Clay	
-	DP	100		CL			
0	3					10.0	
-	DP	100		CI		Brown Silty Clay	
]	4	100		CL		12.0	N
						Bottom of hole at 12.0 feet.	

RI-ST/	TE TE	STIN		675 Men	6 Buc nphis	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 185.1199; Fax: 901.386.6614	
LIENT	Picke	ering			_	PROJECT NAME MEM Terminal Apron Investigation	
ROJE		BER	E-9-429		-	PROJECT LOCATION 2491 Winchester	
DATE S	TARTE	D 3/2	23/10 COM	IPLE	TED_	3/23/10 GROUND ELEVATION HOLE SIZE 2.5"	
RILLIN	IG CON	TRAC	TOR Tri-State Testing	g Ser	vices,	nc. LATITUDE <u>35.04037871</u> LONGITUDE <u>89.98330319</u>	
RILLIN	IG MET	HOD	DP			GROUND WATER LEVELS:	
OGGE	D BY	B.W.	CHE	CKE	DBY	D.M. AT TIME OF DRILLING	
IOTES	Weat	her - C	Cool & Windy			AFTER DRILLING	
	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete	1
F	1	100	mg/Kg			1.9 Soil Cement/Cement Treated Base	
1	DP 1	100		CL		4.0	NE
5	DP 2	100		CL		Brown Silty Clay	N
+						7.0 Brown Silty Clay	-
	DP 3	100		CL			N
0	DP 4	100		CL		10.0 Brown Silty Clay 12.0	NE
+	-		-			Bottom of hole at 12.0 feet.	-

ENT Picke	ering				PROJECT NAME MEM Terminal Apron Investigation	
JECT NUM	BER	E-9-429			PROJECT LOCATION 2491 Winchester	
E STARTE	D 3/2	3/10 CO	MPLE	TED _	3/10         GROUND ELEVATION         HOLE SIZE         2.5"	
LLING CON	ITRAC	TOR Tri-State Testin	g Ser	vices,	LATITUDE <u>35.0401947</u> LONGITUDE <u>89.98357624</u>	
LLING MET					GROUND WATER LEVELS:	
GED BY	B.W.	CHI	ECKE	D BY	M. AT TIME OF DRILLING	
ES Weat	her - C	lool			AFTER DRILLING	
SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
	100	DRO - 12.5 mg/Kg / ORO - 16.3 mg/Kg			Concrete	+
- DP - 1	100		CL		Gray Silty Clay	
DP 2	100		CL		Brown and Gray Silty Clay	
DP 3	100		CL		Brown and Gray Silty Clay	
_ DP _ 4	100		CL		.0 Brown and Gray Silty Clay	-
					.0 Bottom of hole at 12.0 feet.	-

			IG SERVICES, INC.	675 Men Tel:	6 Buc nphis, 901.3	Testing Services BORING NUMBER I kles Cove PAGE 1 Tennessee 38133 185.1199; Fax: 901.386.6614	
						PROJECT NAME MEM Terminal Apron Investigation	
		-				PROJECT LOCATION _2491 Winchester           3/24/10         GROUND ELEVATION HOLE SIZE _2.5"	
						Inc. LATITUDE <u>35.04055187</u> LONGITUDE <u>89.98408504</u>	
	ING MET					GROUND WATER LEVELS:	
			Cool & Windy	LORL		D.M. AT TIME OF DRILLING AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete 1.2	
	-	100	mg/Kg		alle dott	2.0 Soil Cement/Cement Treated Base	1
	DP 1	100		CL		Brown Silty Clay 4.0	ND
5	DP 2	100		CL		Brown and Gray Silty Clay	ND
10	DP 3	100		CL		Brown Silty Clay	ND
	DP 4	100		CL		Brown Silty Clay 12.0	ND
						Bottom of hole at 12.0 feet.	

GENERAL BH / TF \_\_L E-9-429\_PICKERING\_MEM AIRPORT.GPJ\_PROJECT TEMPLATE.GDT\_4/26/10

٦				675 Men	6 Buc	Testing Services BORING NUMBER	
						885.1199; Fax: 901.386.6614	
		1.1.1.1	E-9-429			PROJECT NAMEMEM Terminal Apron Investigation PROJECT LOCATION _2491 Winchester	
						PROJECT LOCATION _2491 Winchester           3/24/10         GROUND ELEVATION HOLE SIZE _2.5"	
						Inc. LATITUDE <u>35.04074033</u> LONGITUDE <u>89.98413081</u>	
						GROUND WATER LEVELS:	
			CHE				
			Cool & Windy				
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete	1
1		100	mg/Kg/			2.0 Soil Cement/Cement Treated Base	1
1	DP 1	100		CL		Brown Silty Clay 4.0	N
5	DP 2	100		CL		Brown Silty Clay	N
-	DP 3	100		CL		Brown Silty Clay	N
10	DP 4	100		CL		10.0 Brown Silty Clay	N
+	_	1		-		12.0 Bottom of hole at 12.0 feet.	+

LIENT	Picke	ring					PROJECT NAME MEM Terminal Apron Investigation	
ROJEC		BER	E-9-429				PROJECT LOCATION 2491 Winchester	
ATE S	TARTE	D 3/2	3/10 C	OMPLE	TED _	3/23/1	GROUND ELEVATION HOLE SIZE 2.5"	
RILLIN	G CON	ITRAC	TOR Tri-State Tes	ing Ser	vices,	Inc.	LATITUDE _35.04093927 LONGITUDE _89.98389661	
	G MET						GROUND WATER LEVELS:	
OGGEI	BY_	B.W.	c	HECKE	D BY	D.M.	AT TIME OF DRILLING	
OTES	Weat	her - C	ool & Windy				AFTER DRILLING	
(tt)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	(mon) OIG
_		100	DRO - < 10.0 mg/K / ORO - < 10.0	g		0.9	Concrete	
			/ ORO - < 10.0 mg/Kg		////		Brown Silty Clay	
	DP 1	100		CL				N
						4.0		
_	DP	100					Brown Silty Clay	
-	2	100		CL				N
+						7.0	Brown Silty Clay	
-	DP	100		CL				N
	3					10.0		
<u> </u>	DP	100				10.0	Brown Silty Clay	
	4	100		CL		12.0		N
							Bottom of hole at 12.0 feet.	

TATE T	ESTIN		675 Men	6 Buc	kles Cove Tennessee 38	133	BORING NUMBER PAGE 1	
IT Pick	ering					PROJECT NAME MEM Termina	Apron Investigation	
ING ME	THOD	DP		1				
ED BY	B.W.	CHE						
S Weat	ther - C	Cold & Windy		_		AFTER DRILLING		
SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG		MATERIAL DESC	RIPTION	PID (ppm)
	100	DRO - < 10.0 mg/Kg			0.9 Concrete			
DP 1	100	mg/Kg	CL			Gray Silty Clay		ND
DP 2	100		CL		Brown and	Gray Silty Clay		ND
DP 3	100		CL			Gray Silty Clay		ND
DP 4	100		CL			Gray Silty Clay		ND
_					12.0	Bottom of hole at	12.0 feet.	
	IT Picka ECT NUI STARTE ING COI ING ME ED BY S Weat Bd L BY Bd L BY Bd L BY Bd L BY DP 1 DP 1 DP 2 DP 3 DP 3 DP	IT <u>Pickering</u> ECT NUMBER STARTED <u>3/2</u> ING CONTRAC ING METHOD ED BY <u>B.W.</u> S <u>Weather - C</u> Weather - C Weather - C DP 100 DP 100 DP 100 DP 100	TATE TESTING SERVICES, INC.         IT       Pickering         ECT NUMBER       E-9-429         STARTED       3/23/10       COL         ING CONTRACTOR       Tri-State Testin         ING METHOD       DP         SED BY       B.W.       CHE         S       Weather - Cold & Windy       CHE         S       Weather - Cold & Windy       TESTS         WWPZ       %       TESTS         DP       100       DRO - < 10.0 mg/Kg	675         Men         TATE TESTING SERVICES, INC.         IT         Pickering         ECT NUMBER         ECT NUMBER         E-9-429         STARTED         STARTED         3/23/10         COMPLE         ING CONTRACTOR         Tri-State Testing Ser         ING METHOD         DP         SWeather - Cold & Windy         CHECKE         S         Weather - Cold & Windy         TESTS         S         Weather - Cold & Windy         TESTS         S         Weather - Cold & Windy         TESTS         S         DP         100         DRO - < 10.0 mg/Kg	6756 Buck Memphis, Tate TESTING SERVICES, INC.       6756 Buck Memphis, Tel: 901.3         IT       Pickering         ECT NUMBER       E-9-429         STARTED $3/23/10$ COMPLETED          ING CONTRACTOR       Tri-State Testing Services, ING         ING METHOD       DP         EED BY       B.W.         CHECKED BY       S         Weather - Cold & Windy       CHECKED BY         S       Weather - Cold & Windy         Indication       DP         Indication       DRO - < 10.0 mg/Kg	6756 Buckles Cove Memphis, Tennessee 38 TATE TESTING SERVICES, INC.           IT_Pickering           ECT NUMBER E-9-429           STARTED 3/23/10           STARTED 3/23/10           ING CONTRACTOR Tri-State Testing Services, Inc.           ING METHOD DP           EED BY B.W.           S Weather - Cold & Windy           W           W           W           W           IDP           IDP	Memphis, Tennessee 38133         TATE TESTING SERVICES, INC.       Tel: 901.385.1199; Fax: 901.386.6614         IT       PROJECT NAME MEM Termina         ECT NUMBER E-9-429       PROJECT LOCATION 2491 Wir         STARTED 3/23/10       COMPLETED 3/23/10       GROUND ELEVATION         ING CONTRACTOR Tri-State Testing Services, Inc.       LATITUDE 35.04136144         JING METHOD DP       GROUND WATER LEVELS:         Sted BY       B.W.       CHECKED BY         S       Weather - Cold & Windy       AT TIME OF DRILLING         S       Weather - Cold & Windy       AFTER DRILLING         Way       TESTS       Si       OP         I       100       DRO - < 10.0 mg/Kg	PAGE 1           G756 Buckles Cove memphis, Tennessee 38133           TATE TESTING SERVICES, INC.         Tel: 901.385.1199; Fax: 901.386.6614           NT_Pickering         PROJECT NAME MEM Terminal Apron Investigation           ECT NUMBER         E-9-429         PROJECT LOCATION _2491 Winchester           STARTED         3/23/10         COMPLETED         3/23/10         GROUND ELEVATION         HOLE SIZE _2.5"           ING CONTRACTOR         Tri-State Testing Services, Inc.         LATITUDE _35.04136144         LONGITUDE _89.98340066           ING METHOD         DP         GROUND WATER LEVELS:           ED BY B.W.         CHECKED BY D.M.         AT TIME OF DRILLING           S _Weather - Cold & Windy         TESTS         Of OF AU         OF AU           MATERIAL DESCRIPTION         MATERIAL DESCRIPTION         Brown and Gray Silty Clay           DP         100         DRO - < 10.0 mg/Kg         Brown and Gray Silty Clay           CL         Brown and Gray Silty Clay         Brown and Gray Silty Clay           DP         100         CL         Brown and Gray Silty Clay           DP         100         CL         Brown and Gray Silty Clay

GENERAL BH / TP \_\_\_\_E-9-429\_PICKERING\_MEM AIRPORT.GPJ\_PROJECT TEMPLATE.GDT\_4/26/10

RI-STATE T		IG SERVICES, INC.	675 Men Tel:	6 Buc nphis, 901.3	Services       BORING NUMBER         Ales Cove       PAGE 1         Tennessee 38133       PAGE 1         85.1199; Fax: 901.386.6614       PROJECT NAME MEM Terminal Apron Investigation	
ROJECT NU					PROJECT LOCATION _2491 Winchester	
			MPLE	TED_	/23/10 GROUND ELEVATION HOLE SIZE 2.5"	
RILLING CO RILLING ME OGGED BY	THOD W.S.	CTOR <u>Tri-State Testin</u> _DP CHI	g Ser	vices,	Inc.         LATITUDE _35.04152459         LONGITUDE _89.98320882           GROUND WATER LEVELS:         AT TIME OF DRILLING	
OTES Wea	ther - (	Cold			AFTER DRILLING	
o (ft) SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
	100	DRO - < 10.0 mg/Kg / ORO - < 10.0			1.0 Concrete	-
- DP - 1	100	mg/Kg	CL		Brown Silty Clay	1
5 _ DP _ 2	100		CL		Brown Silty Clay	1
- DP - 3	100		CL		Brown Silty Clay	-
_ DP	100		CL		Brown and Gray Silty Clay	1
++	-				12.0 Bottom of hole at 12.0 feet.	-

	cering		_		PROJECT NAME MEM Terminal Apron Investigation	
					PROJECT LOCATION _2491 Winchester	
					GROUND ELEVATION HOLE SIZE _2.5"	
RILLING CO	NTRAC	TOR Tri-State Testin	g Ser	vices,	LATITUDE <u>35.04158248</u> LONGITUDE <u>89.98288438</u>	
RILLING ME					GROUND WATER LEVELS:	
GGED BY	B.W.	CHI	ECKE	D BY	AT TIME OF DRILLING	
DTES Wea	ather - C	ool & Windy			AFTER DRILLING	_
(ft) SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
,	100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete	+
	100	/ ORO - < 10.0 mg/Kg			oil Cement/Cement Treated Base	7
- DP	100		CL		rown and Gray Silty Clay	
_ DP _ 2	100		CL		rown and Gray Silty Clay	
++					rown and Gray Silty Clay	+
- DP 3	100		CL		Town and Gray Sitty Gray	
DP 4	100		CL		rown and Gray Silty Clay	+
4					Bottom of hole at 12.0 feet.	+



# TRI-STATE TESTING SERVICES, INC. TRI-STATE TESTING SERVICES, INC.

	В	0	R	IN	IG	N	UN	<b>IB</b>	ER	P	60
--	---	---	---	----	----	---	----	-----------	----	---	----

PAGE 1 OF 1

			E-9-429				PROJECT LOCATION 2491 Winchester		
							GROUND ELEVATION HOLE SIZE _2.5"		
							LATITUDE <u>35.04178979</u> LONGITUDE <u>89.98269573</u>		
	ING MET								
	S Weat		CHE	CRE	ивт_	D.M.	AT TIME OF DRILLING AFTER DRILLING		
				_				T	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	PID (nnm)	
-		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			0.9 Concrete			
]						Brown Sil	ty Clay		
_	DP 1	100		CL				N	
-	-			_		4.0 Brown Sil	h Clov		
5	DP	100		CL		Brown Sil	ty Glay		
-	2	100		UL		7.0		N	
+	-					7.0 Brown an	d Gray Silty Clay	-	
-	DP 3	100		CL				N	
10						10.0			
-	DP	100		CL		Brown Sil	ty Clay	N	
+	4					12.0	Detter of hele of 40.0 feet	-	
							Bottom of hole at 12.0 feet.		
							e		

TRI-S	TATE T	ESTIN		6756 Mem	5 Buc	kles C	Services BORING NUMBER PAGE See 38133 ; Fax: 901.386.6614	<b>R P61</b>
CLIEN	T Pick	ering					PROJECT NAME MEM Terminal Apron Investigation	
							PROJECT LOCATION 2491 Winchester	
							GROUND ELEVATION HOLE SIZE _2.5"	
	ING CO						LATITUDE <u>35.0419884</u> LONGITUDE <u>89.98240534</u>	<u>.                                    </u>
			CHE				GROUND WATER LEVELS:	
	S Weat			CRE	001_	D.IVI.	AT TIME OF DRILLING AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			0.9	oncrete	
	DP 1	100	mg/Kg	CL			own Silty Clay	ND
 5 	DP 2	100		CL		4.0	own Silty Clay	ND
  10	DP 3	100		CL		10.0	own and Gray Silty Clay with Sand Lense	ND
	DP 4	100		CL			own Silty Clay	ND
						12.0	Bottom of hole at 12.0 feet.	

GENERAL BH / TF L E-9-429 PICKERING MEM AIRPORT.GPJ PROJECT TEMPLATE.GDT 4/26/10



### Tri-State Testing Services 6756 Buckles Cove Memphis, Tennessee 38133 Tel: 901.385.1199; Fax: 901.386.6614

B	OF	RIN	IG	N	JN	<b>IB</b>	ER	P	62
---	----	-----	----	---	----	-----------	----	---	----

PAGE 1 OF 1

			E-9-429		TED	PROJECT LOCATION _2491 Winchester           3/23/10         GROUND ELEVATION HOLE SIZE _2.5"	
						Inc. LATITUDE <u>35.04218196</u> LONGITUDE <u>89.98223339</u>	
						GROUND WATER LEVELS:	
OGGE	D BY	W.S.	CHE	CKE	D BY	D.M. AT TIME OF DRILLING	
OTES	Weat	her - C	Cold			AFTER DRILLING	
(ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	(maa) OId
0		100	DRO - < 10.0 mg/Kg		100 State	Concrete	-
+	-	100	/ ORO - < 10.0 mg/Kg			Brown Silty Clay	-
-	DP 1	100		CL		4.0	N
5	-					Brown and Gray Silty Clay	
-	DP 2	100		CL			N
+	-					7.0 Brown Silty Clay	-
-	DP 3	100		CL			N
0						10.0	
-	DP 4	100		CL		Brown Silty Clay	N
+	4					12.0 Bottom of hole at 12.0 feet.	-

	TATE T		IG SERVICES, INC.	675 Men Tel:	6 Buc nphis, 901.3	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 385.1199; Fax: 901.386.6614 PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429				
						3/23/10 GROUND ELEVATION HOLE SIZE 2.5"	
						Inc. LATITUDE <u>35.04261528</u> LONGITUDE <u>89.98188039</u>	
	ING ME		CHI			GROUND WATER LEVELS:	
	S Weat			LORL		D.M. AT TIME OF DRILLING AFTER DRILLING	
	ш	%					
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0				
	DP		mg/Kg			Brown Silty Clay	
	1	100		CL			ND
	_					4.0 Brown Silty Clay	
5	DP	100		CL			ND
	2					7.0	
						Brown Silty Clay	
	DP 3	100		CL			ND
10				_		10.0 Brown Silty Clay	
	DP 4	100		CL			ND
	_			-		12.0 Bottom of hole at 12.0 feet.	-

GENERAL BH / TP , ... E-9-429\_PICKERING\_MEM AIRPORT.GPJ\_PROJECT TEMPLATE.GDT\_4/26/10

LIENT	Picke	ering	IG SERVICES, INC.	675 Men Tel:	6 Buc nphis, 901.3	ing Services BORING NUMBER Cove PAGE Inessee 38133 I199; Fax: 901.386.6614 PROJECT NAME MEM Terminal Apron Investigation	
OATE ST	IG CON	THOD W.S.	CTOR Tri-State Testin	g Ser	vices,	PROJECT LOCATION _2491 Winchester           I0         GROUND ELEVATION HOLE SIZE _2.5"           LATITUDE _35.04290626         LONGITUDE _89.98192756           GROUND WATER LEVELS:	
	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
-	DP 1	100 100	DRO - < 10.0 mg/Kg / ORO - < 10.0 mg/Kg	CL		Concrete Brown Silty Clay	1
5	DP 2	100		CL		Brown Silty Clay	1
-	DP 3 DP	100		CL		Brown and Gray Silty Clay Brown Silty Clay	-
	4	100		CL		Bottom of hole at 12.0 feet.	

LIENT	Picke	ering	IG SERVICES, INC.	Men Tel:	ophis, 901.3	s Cove       PAGE 1         nnessee 38133       .1199; Fax: 901.386.6614         PROJECT NAME MEM Terminal Apron Investigation         PROJECT LOCATION 2491 Winchester	UF
ATE S RILLIN RILLIN DGGE	TARTE	D <u>3/2</u> NTRAC HOD B.W.	23/10 COI CTOR Tri-State Testin DP CHE	g Ser	TED	/10         GROUND ELEVATION         HOLE SIZE 2.5"           LATITUDE 35.04314002         LONGITUDE 89.98189333           GROUND WATER LEVELS:	3
( <del>t</del> )	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
-	DP 1	100 100	DRO - < 10.0 mg/Kg / ORO - < 10.0 mg/Kg	CL		Concrete Brown Silty Clay	
5	DP 2	100		CL		Brown Silty Clay	•
	DP 3	100		CL		Brown and Gray Silty Clay	•
	DP 4	100		CL		Brown Silty Clay	N

IENT	Picke	ering				PROJECT NAME MEM Terminal Apron Investigation	
						PROJECT LOCATION _2491 Winchester	
						24/10 GROUND ELEVATION HOLE SIZE _2.5"	
						C. LATITUDE _35.0434461 LONGITUDE _89.98194091	
		HOD	DP			GROUND WATER LEVELS:	
GGE	DBY_	W.S.	CHE	CKE	DBY	.M. AT TIME OF DRILLING	
TES	Weat	her - C	Cool			AFTER DRILLING	
(μ)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
+		100	DRO - < 10.0 mg/Kg			Concrete	+
1		100	/ ORO - < 10.0 mg/Kg			4 Soil Cement/Cement Treated Base	_
1	DP	100		CL		Brown Silty Clay	Τ.
1	1	100		OL		0	N
_						Brown Silty Clay	
_	DP 2	100		CL			N
+						0	
-	DP	-				Brown Silty Clay with Sand Lense	
-	3	100		CL			N
						0.0 Brown Silty Clay	-
-	DP 4	100		CL		Brown Silly Clay	N
+	1					Bottom of hole at 12.0 feet.	-
					· ·		
							1

TRISTATE	TESTING SE	

## Tri-State Testing Services 6756 Buckles Cove Memphis, Tennessee 38133 Tel: 901.385.1199; Fax: 901.386.6614

BORING NUMBER P67	В	0	R	IN	10		N	U	M	B	Ε	R	P	6	7
-------------------	---	---	---	----	----	--	---	---	---	---	---	---	---	---	---

PAGE 1 OF 1

	1.00	kering	E-9-429		-	PROJECT NAME _ MEM Terminal Apron Investigation PROJECT LOCATION _ 2491 Winchester	
DATE DRILL DRILL LOGG	STAR ING C ING M ED BY	TED <u>3/</u>	24/10 COI CTOR Tri-State Testin DP CHI	g Ser	vices,		
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100				Concrete	+
	DF 1	1 100	DRO - 253 mg/Kg / ORO - < 100 mg/Kg (JP5/JP8 - Yes)	CL		Gray Silty Clay	2.6
5	DF 2			CL		Brown Silty Clay	NE
10	DF 3			CL		Brown and Gray Silty Clay	N
	DF 4			CL		Brown Silty Clay 12.0 Bottom of hole at 12.0 feet.	NE

TRI-ST	ATE T	ESTIN		675 Men	6 Buch 1 phis	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 385.1199; Fax: 901.386.6614	
CLIENT						PROJECT NAME _MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION _2491 Winchester	
		_		IPLE	TED	3/24/10 GROUND ELEVATION HOLE SIZE 2.5"	
						Inc. LATITUDE 35.04358243 LONGITUDE 89.98217233	
	NG MET					GROUND WATER LEVELS:	
LOGGE	D BY	B.W.				D.M. AT TIME OF DRILLING	
NOTES	Weat	her - C	Cold & Windy			AFTER DRILLING	
DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (nom)
0	1	100	DRO - < 10.0 mg/Kg			Concrete	+
1	-		/ ORO - < 10.0 mg/Kg			Brown and Gray Silty Clay	-
	DP 1	100		CL		4.0	N
5	DP 2	100		CL		Brown and Gray Silty Clay	N
+	-					7.0	_
-	DP 3	100		CL		Brown and Gray Silty Clay	N
0	DP 4	100		CL		Brown and Gray Silty Clay	N
+						12.0 Bottom of hole at 12.0 feet.	-

				6750 Mem	6 Buc phis,	Testing Services BORING NUMBER F kles Cove PAGE 1 Tennessee 38133 885.1199; Fax: 901.386.6614	
	T Picke					PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION 2491 Winchester	
						3/24/10 GROUND ELEVATION HOLE SIZE 2.5"	
						Inc. LATITUDE <u>35.04354557</u> LONGITUDE <u>89.98245201</u>	
	NG MET					D.M. AT TIME OF DRILLING	
			Cold & Windy	CRE	DBT_	D.M. AT TIME OF DRILLING AFTER DRILLING	
	_weat				1		-
(ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete	
F	-	100	mg/Kg			1.6 Soil Cement/Cement Treated Base	1
-	DP 1	100		CL		Brown and Gray Silty Clay 4.0	N
-	DP 2	100		CL		Brown and Gray Silty Clay	N
+	-				¥////	7.0 Brown and Gray Silty Clay	
-	DP 3	100		CL			•
0	DP 4	100		CL		10.0 Brown and Gray Silty Clay	N
+	_					12.0 Bottom of hole at 12.0 feet.	$\vdash$

ENI	Picker	ing				PROJECT NAME MEM Terminal Apron Investigation	
		BFR	F-9-429			PROJECT LOCATION 2491 Winchester	
TE S	TARTE	3/2	4/10 COI	IPLET	TED 3	24/10 GROUND ELEVATION HOLE SIZE 2.5"	
ILLI	NG CON	TRAC	TOR Tri-State Testin	g Serv	vices, I	c.         LATITUDE _35.04357364         LONGITUDE _89.98284523           GROUND WATER LEVELS:         GROUND WATER LEVELS:	
GGE	D BY _\ Weath	N.S.	CHI	ECKEI	BY_	.M. AT TIME OF DRILLING AFTER DRILLING	
(ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
-		100	DRO - < 10.0 mg/Kg / ORO - < 10.0 mg/Kg			Concrete	
-	DP 1	100		CL		Brown and Gray Silty Clay	M
-	DP 2	100		CL		Brown Silty Clay	1
	DP 3	100		сн		7.0 Brown and Gray Clay	
0	DP	100		СН		10.0 Gray Clay	
-	4		-	-		12.0 Bottom of hole at 12.0 feet.	

TRI-ST		ESTIN		675 Men	6 Buch	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 85.1199; Fax: 901.386.6614	
CLIEN	T Picke	ering				PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429		-	PROJECT LOCATION 2491 Winchester	
DATE	STARTE	ED_3/2	24/10 COI	MPLE	TED	GROUND ELEVATION HOLE SIZE 2.5"	
DRILL	ING CO	NTRAC	TOR Tri-State Testin	g Ser	vices,	nc. LATITUDE <u>35.04368672</u> LONGITUDE <u>89.98307315</u>	
	ING ME					GROUND WATER LEVELS:	
LOGG	ED BY	W.S.	CHE	CKE	DBY	D.M AT TIME OF DRILLING 4.0 ft	
NOTE	S Weat	ther - C	Cool			AFTER DRILLING 12.7 ft	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
0		100	DRO - 13.6 mg/Kg /			Concrete	+
-	-	100	ORO - < 10.0 mg/Kg			1.3 2.0 Soil Cement/Cement Treated Base	-
-	DP 1	100		CL		Gray Silty Clay	ND
5	DP 2	100		CL		Brown Silty Clay	ND
-	DP 3	100		CL		Brown Silty Clay	ND
- 10 -	DP 4	100		CL		Brown Silty Clay	NE
						Bottom of hole at 12.0 feet.	

			G SERVICES, INC.	rel:	901.3	385.1199; Fax: 901.386.6614	
	Picke					PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION 2491 Winchester	
						3/24/10 GROUND ELEVATION HOLE SIZE 2.5"	
				g Ser	vices,	Inc. LATITUDE <u>35.04339246</u> LONGITUDE <u>89.98305023</u>	
	NG MET					GROUND WATER LEVELS:	
	Weat		CHE	CKE	D BY	D.M. V AT TIME OF DRILLING 4.0 ft V AFTER DRILLING 12.7 ft	
(ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG		
	S		DRO - 24.4 mg/Kg /				
-		100	ORO - < 10.0 mg/Kg (JP5/JP8 - Yes)				
-	DP 1	100	(JF5/JF8 - Tes)	CL		Brown Silty Clay 4.0 ▽	
-	DP 2	100		CL		Brown Silty Clay	N
-	DP 3	100		CL		Brown Silty Clay	1
-	DP 4	100		CL		10.0 Brown Silty Clay	N
						Y Bottom of hole at 12.0 feet.	

TRI-S		ESTIN		6750 Mem	6 Buc phis,	Testing Services BORING NUMBER ckles Cove PAGE 1 provide the services S8133 385.1199; Fax: 901.386.6614	
CLIEN	T Picke	ering				PROJECT NAME MEM Terminal Apron Investigation	
PROJ	ECT NUI	MBER	E-9-429			PROJECT LOCATION _2491 Winchester	
						3/24/10 GROUND ELEVATION HOLE SIZE 2.5"	
DRILL	ING CO	NTRAC	CTOR Tri-State Testin	g Ser	vices,	Inc. LATITUDE 35.04310397 LONGITUDE 89.98304363	_
	ING MET					GROUND WATER LEVELS:	
			CHE	ECKE	D BY		
NOTE	S Weat	her - (	Cool & Windy			AFTER DRILLING 4.0 ft	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100				Concrete	
					1111	Gray Sand with Brown Silty Clay	
	DP 1	100	DRO - < 10.0 mg/Kg / ORO - < 10.0 mg/Kg	CL		4.0 V	11.6
5	DP 2	100		CL		Brown and Gray Silty Clay	0.3
	DP 3	100		CL		Brown and Gray Silty Clay 8.0	2.9
	DP 4	100		CL		Brown and Gray Silty Clay	ND
10	DP 5	100		CL		Brown and Gray Silty Clay	ND
						Bottom of hole at 12.0 feet.	

			G SERVICES, INC.	675 Men Tel:	6 Buc 1phis, 901.3	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 385.1199; Fax: 901.386.6614	
	T Picke		E-9-429			PROJECT NAME MEM Terminal Apron Investigation	
					TED	PROJECT LOCATION _ 2491 Winchester           3/25/10         GROUND ELEVATION _ HOLE SIZE _ 2.5"	
						Inc. LATITUDE <u>35.0428419</u> LONGITUDE <u>89.9830778</u>	
	NG MET					GROUND WATER LEVELS:	
			CHE				
	Weat					D.M. AT TIME OF DRILLING 4.0 ft AFTER DRILLING 8.0 ft	
					1		1
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (nnm)
_		100	DRO - 31.4 mg/Kg / ORO - 27.9 mg/Kg			Concrete	
F		100	Site Lite nighty		1///	14 Soil Cement/Cement Treated Base	1
-	DP 1	100		CL		Brown Silty Clay 4.0 ∑	N
5	DP 2	100		CL		Brown Silty Clay	N
Ī	DP 3	100		CL		Brown Silty Clay with Sand Lense	N
+						9.0	
0	DP 4	100		CL		Brown Silty Clay	N
+						12.0 Bottom of hole at 12.0 feet.	-

			G SERVICES, INC.	6750 Men Tel:	6 Buch 19his 901.3	esting Services es Cove Tennessee 38133 5.1199; Fax: 901.386.6614 BORING NUMBER PAGE 1 PAGE 1	
	Picke				-	PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION 2491 Winchester	
						25/10 GROUND ELEVATION HOLE SIZE 2.5"	
						LATITUDE <u>35.04258426</u> LONGITUDE <u>89.98326664</u>	
			CHE			GROUND WATER LEVELS:	
	Weat			CRE		M. ✓ AT TIME OF DRILLING <u>4.0 ft</u> ✓ AFTER DRILLING <u>9.0 ft</u>	
					1		
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	(man) OID
		100	DRO - 34.0 mg/Kg / ORO - 40.0 mg/Kg			Concrete	1
]	1		0R0 - 40.0 mg/Kg			3 Soil Cement/Cement Treated Base	-
-	DP	100		C		4 Brown Silty Clay with Sand Lense	
+	1	100		CL			N
5	DP					Brown Silty Clay	
-	2	100		CL			N
+						0 Brown Silty Clay	-
-	DP	100		CL			
_	3	100		GL		Ā	N
0	DP					Brown and Gray Silty Clay	-
1	4	100		CL		2.0	N
t	_					Bottom of hole at 12.0 feet.	+

		IG SERVICES, INC.	6750 Mem Tel:	6 Buc 1phis, 901.3	essee 38133 99; Fax: 901.386.6614	
LIENT Pick					PROJECT NAME MEM Terminal Apron Investigation	
ROJECT NU				TED	PROJECT LOCATION 2491 Winchester	
					GROUND ELEVATION         HOLE SIZE 2.5"           LATITUDE 35.04240866         LONGITUDE 89.9835264	
RILLING ME						
		CHE				
		Cool & Windy			Ter Drilling 4.0 ft	
SAMPLE TYPE	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
o ts	-					
-	100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete	
-	100	mg/Kg/			Soil Cement/Cement Treated Base	
- DP	100		CL		Brown Silty Clay	N
5					Brown Silty Clay	+
DP 2	100		CL			N
DP					Brown Silty Clay	
- 3	100		CL			N
0	-		-		Brown Silty Clay	-
- DP 4	100		CL		Blown Sitty Clay	N
+					Bottom of hole at 12.0 feet.	-

TRI-S	TATE	TESTIN		675 Men	6 Buc	Testing Services BORING NUMBER   Ekles Cove PAGE 1 7 Tennessee 38133 385.1199; Fax: 901.386.6614	
	NT Pic					PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION 2491 Winchester	
						3/25/10 GROUND ELEVATION HOLE SIZE 2.5"	
		ETHOD				Inc. LATITUDE <u>35.04219344</u> LONGITUDE <u>89.98372135</u> GROUND WATER LEVELS:	
			CHE				
			Cool & Windy			AFTER DRILLING 4.0 ft	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete	
	H	100	mg/Kg			Soil Cement/Cement Treated Base	1
	DF	1 100		CL		2.6 Brown and Gray Silty Clay with Sand	ND
	1	100		UL	-////	4.0 ▼ Brown and Gray Silty Clay	ND
	DF 2			CL		7.0	ND
	DF 3			CL		Brown and Gray Silty Clay	ND
10	DF			~		Brown and Gray Silty Clay	
	4	1 1(1()		CL		12.0	ND
						Bottom of hole at 12.0 feet.	

TRI-ST/	ATE T	ESTIN		675 Men	6 Buc	Testing ServicesBORING NUMBERkles CovePAGE 1Tennessee 38133PAGE 185.1199; Fax: 901.386.6614PAGE 1	
LIENT	Picke	ering				PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION 2491 Winchester	
						3/25/10 GROUND ELEVATION HOLE SIZE 2.5"	
RILLIN	IG COI	NTRAC	CTOR Tri-State Testing			nc. LATITUDE <u>35.04201155</u> LONGITUDE <u>89.9839885</u>	
RILLIN						GROUND WATER LEVELS:	
OGGE	DBY_	W.S.	CHE	CKE	D BY	D.M. AT TIME OF DRILLING	
IOTES					1	AFTER DRILLING	_
(ff)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
_		100	DRO - < 10.0 mg/Kg / ORO - 11.8 mg/Kg			Concrete	
_		100				2.2 Soil Cement/Cement Treated Base	1
-	DP	100		CL		Brown Silty Clay	N
-	1					4.0 Brown Silty Clay	
-	DP	100		CL			
-	2	100		UL		70	
+			_			7.0 Brown and Gray Silty Clay	+
1	DP 3	100		CL			
1						10.0	
-	DP 4	100		CL		Brown Silty Clay	
+	4			_	<i>[]]]]</i>	12.0 Bottom of hole at 12.0 feet.	1

	F Picke					85.1199; Fax: 901.386.6614 PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429				
		_				PROJECT LOCATION _2491 Winchester           9/25/10         GROUND ELEVATION HOLE SIZE _2.5"	
						nc. LATITUDE 35.04203842 LONGITUDE 89.98426965	1
RILLI	NG MET	THOD	DP			GROUND WATER LEVELS:	
			CHE				
	Weat					AFTER DRILLING	
	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
-		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete 1.3	
+		100	mg/Kg/			1.7 Soil Cement/Cement Treated Base Brown Silty Clay	7
1	DP 1	100		CL		4.0	N
5	DP 2	100		CL		Brown Silty Clay	N
1	-					7.0	
T						Brown Silty Clay	
0	DP 3	100		CL		10.0	N
-	DP 4	100		CL		Brown Silty Clay	
+						12.0 Bottom of hole at 12.0 feet.	+

CLIEN	IT Picke	ering	IG SERVICES, INC.	675 Men Tel:	6 Buch 19his, 901.3		PAGE 1	
							PROJECT LOCATION 2491 Winchester	
							GROUND ELEVATION HOLE SIZE 2.5"	
							LATITUDE <u>35.04226713</u> LONGITUDE <u>89.98436155</u>	
	ING MET		CHE				GROUND WATER LEVELS:	
	S Weat					D.M.	AT TIME OF DRILLING AFTER DRILLING	
o DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION	PID (ppm)
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			L2 Concrete		
	_	100	mg/Kg	_		1.8 Soil Cem	ent/Cement Treated Base	
	DP	100		CL		Brown Sil	ty Clay	ND
	-				\////	4.0 Brown Sil	ty Clay	
5	DP 2	100		CL				ND
	2					7.0		
						Brown Sil	ty Clay	
	DP 3	100		CL				ND
10	-					10.0 Brown Sil	h. Olau	
	DP 4	100		CL			uy ciay	ND
- +	_					12.0	Bottom of hole at 12.0 feet.	

GENERAL BH / TP / \_ \_ E-9-429\_PICKERING\_MEM AIRPORT.GPJ\_PROJECT TEMPLATE.GDT\_4/26/10

TRI-ST		STIN		675 Men	6 Buch	Testing ServicesBORING NUMBERcles CovePAGE 1Tennessee 3813385.1199; Fax: 901.386.6614	
	T Picke			_	_	PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION 2491 Winchester	-
						/25/10 GROUND ELEVATION HOLE SIZE 2.5"	_
						nc LATITUDE _35.04255532 LONGITUDE _89.98436881	
	NG MET					GROUND WATER LEVELS:	
			CHE	CKE	D BY		
OTES	Weat	ner - C	2001		-	AFTER DRILLING	_
	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
		100	DRO - < 10.0 mg/Kg / ORO - < 10.0			Concrete	
]		100				2.2 Soil Cement/Cement Treated Base	-
-	DP 1	100		CL		Brown Silty Clay 4.0	N
5	DP 2	100		CL		Brown Silty Clay	~
-	DP 3	100		CL		Brown Silty Clay	1
0	DP 4	100		CL		10.0 Brown Silty Clay	
						Bottom of hole at 12.0 feet.	



#### Tri-State Testing Services 6756 Buckles Cove Memphis, Tennessee 38133 Tel: 901.385.1199; Fax: 901.386.661

B	0	R	IN	10	1	V	U	N	/IE	BE	R	RF	28	2
---	---	---	----	----	---	---	---	---	-----	----	---	----	----	---

PAGE	1	OF	1

	T Picke					PROJECT NAME MEM Terminal Apron Investigation	
			E-9-429			PROJECT LOCATION 2491 Winchester	
						/25/10 GROUND ELEVATION HOLE SIZE 2.5"	
				g Ser	vices, l	Inc.         LATITUDE         35.04268968         LONGITUDE         89.98416618	
	NG MET				D DV	GROUND WATER LEVELS:	
			CHE	CKE	D BY		
	Weat	ner - C	001	_	1	AFTER DRILLING	-
(ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
		100	DRO - 11.5 mg/Kg / ORO - 25.3 mg/Kg			Concrete	
1		100	0R0 - 25.5 mg/kg			2.0 Soil Cement/Cement Treated Base	
T	DP	100		0		Brown Silty Clay	1.
1	1	100		CL		4.0	1
						Brown Silty Clay	
_	DP 2	100		CL			
+						7.0	
-	DP					Brown Silty Clay	
-	3	100		CL			
+	_					10.0 Brown Silty Clay	-
-	DP 4	100		CL		Brown Silty Clay	
+	4					12.0 Bottom of hole at 12.0 feet.	-

TRI-S	STAT		STIN		675 Men	6 Buc	Testing Services BORING NUMBER kles Cove PAGE 1 Tennessee 38133 385.1199; Fax: 901.386.6614	
CLIE							PROJECT NAME _MEM Terminal Apron Investigation	
	_			E-9-429			PROJECT LOCATION _2491 Winchester	
					MPLE	TED	3/25/10 GROUND ELEVATION HOLE SIZE 2.5"	
							Inc. LATITUDE 35.04324695 LONGITUDE 89.98417639	
							GROUND WATER LEVELS:	
LOG	GED	BY_	W.S.	CHE	CKE	DBY	D.M. AT TIME OF DRILLING	
NOT	ES _	Weat	her - (	Cool & Raining			AFTER DRILLING	
o DEPTH (ft)	SAMPI E TVPE	NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
			100				Concrete	1
	Н		100				Soil Coment/Coment Treated Base	
[ ]	$\mathbb{H}$	DP		DRO - 56.0 mg/Kg /	0		2.3 Brown Silty Clay	
L .	$\square$	1	100	ORO - < 10.0 mg/Kg (JP5/JP8 - Yes)	CL	<i>\\\\\</i>	4.0	2.8
5	-	DP					Brown and Gray Silty Clay	
	-	2	100		CL			ND
	++					-////	7.0 Brown Silty Clay	-
- ·	+	DP	100		CL		blown birty blay	ND
+ .	+	3	100		UL			ND
10	++	DP				¥////	10.0 Brown Silty Clay	-
	11	4	100		CL		12.0	ND
	<u> </u>	-					Bottom of hole at 12.0 feet.	

						85.1199; Fax: 901.386.6614	
	Picke				_	PROJECT NAME MEM Terminal Apron Investigation	
_			E-9-429			PROJECT LOCATION _2491 Winchester	
						/25/10         GROUND ELEVATION         HOLE SIZE 2.5"	
RILLI	NG COI	NTRAC	TOR Tri-State Testing	g Ser	vices,	nc LATITUDE _35.04349068 LONGITUDE _89.98418	111
	NG MET				-	GROUND WATER LEVELS:	
			CHE	CKE	D BY_		
IOTES	Weat	her - C	lool		_	AFTER DRILLING	
(ft)	SAMPLE TYPE NUMBER	RECOVERY %	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0		100				Concrete	
+	-	100				1.2 1.9 Soil Cement/Cement Treated Base	
t	DP		DRO - 37.7 mg/Kg /		<i>ÌÌ]]]</i>	Brown Silty Clay	
1	1	100	ORO - < 10.0 mg/Kg (JP5/JP8 - Yes)	CL		4.0	1
5						Brown Silty Clay	
	DP 2	100	-	CL			1
1						7.0	
						Brown Silty Clay	
	DP 3	100		CL			N
10						10.0	
	DP	100		CL		Brown Silty Clay	N
	4			UL		12.0	
						Bottom of hole at 12.0 feet.	
					ı		

U-STAT	E TEST	NG SERVICES, INC.	675	6 Buc	Testing ServicesBORING NUMBERkles CovePAGE, Tennessee 38133385.1199; Fax: 901.386.6614	1 OF
	Pickering				PROJECT NAME MEM Terminal Apron Investigation	
		R_E-9-429		_	PROJECT LOCATION 2491 Winchester	
					3/25/10 GROUND ELEVATION HOLE SIZE 2.5"	
					Inc. LATITUDE <u>35.04368136</u> LONGITUDE <u>89.98410329</u>	
	METHO	СН			GROUND WATER LEVELS:	
	Veather -		LONE		D.M.	
(ft) SAMPLE TYPE	NUMBER RECOVERY %		U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
	100				Concrete	
Н	100			ale con	Soil Cement/Cement Treated Base	-
	DP 100		CL		2.4 ∑ Gray Silty Clay	
++	1 10	,		<i>\///</i>	4.0 Brown Silty Clay	1
5	DP 100	DRO - 39.2 mg/Kg / ORO - < 10.0 mg/Kg (JP5/JP8 - Yes)	CL		7.0	13
					Brown Silty Clay	
-	DP 3 100		CL		10.0	N
-	DP 100		CL		Brown Silty Clay	N
					Bottom of hole at 12.0 feet.	

## APPENDIX D.2 – DIRECT PUSH TECHNOLOGY BORING ANALYTICAL RESULTS

## **REFERENCE 1**

## Chemicals of Concern Tennessee Division of Underground Storage Tanks

## Effective December 1, 2005

Product Released	Chemicals To Sample Drinking Water	Chemicals To Sample Non-Drinking Water	Chemicals To Sample Surface Drinking Water***	Chemicals To Sample Surface Non-Drinking Water***
Gasoline	Benzene Ethylbenzene Toluene Total Xylenes MtBE Naphthalene	Benzene Ethylbenzene Toluene Total Xylenes MtBE Naphthalene	Benzene Ethylbenzene Toluene Total Xylenes	Benzene Ethylbenzene Toluene
Diesel* Jet Fuel Kerosene	Benzene Ethylbenzene Toluene Total Xylenes MtBE PAHs	Benzene Ethylbenzene Toluene Total Xylenes MtBE Naphthalene	Benzene Ethylbenzene Toluene Total Xylenes Benzo(a)pyrene	Benzene Ethylbenzene Toluene Modified PAHs****
Waste Oil* Used Oil	PAHs Cadmium Chromium, Total Lead, Total Silver Zinc	Naphthalene	Benzo(a)pyrene Cadmium Chromium, Total Lead, Total	Modified PAHs****
Aviation Fuel*	Benzene Ethylbenzene Toluene Total Xylenes MtBE EDB***** EDC PAHs Lead, Total	Benzene Ethylbenzene Toluene Total Xylenes MtBE Naphthalene EDB EDC Lead, Total	Benzene Ethylbenzene Toluene Total Xylenes EDB***** EDC Benzo(a)pyrene Lead, Total	Benzene Ethylbenzene Toluene EDC Modified PAHs***
Unknown**	Aviation + Waste Oil	Aviation + Waste Oil	Aviation + Waste Oil	Aviation + Waste Oil

\*EPH to be sampled only during closure and analyzed by TN Extractable Petroleum Hydrocarbons (EPH) Method

\*\*Tanks with unknown contents will be required to analyze all COCs

\*\*\*Chemicals to be sampled <u>only</u> at the surface water receptor

\*\*\*\*Modified PAHs - Reference 2 list minus Acenaphthylene, Benzo(g,h,i)perylene, Naphthalene, and Phenanthrene

\*\*\*\*\*EDB drinking water samples shall be analyzed by EPA method 8011

BTEX, MtBE, Naphthalene, EDB and EDC shall be analyzed by EPA method 8260b

" Is shall be analyzed by either EPA method 8270c SIM or EPA method 8310

Metals shall be analyzed by EPA method 200.7 for water and EPA method 6010/3050 for soil



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

4/2/2010

Tri-State Testing Mr. David McCray 6756 Buckles Cove Memphis, TN, 38133

Ref: Analytical Testing Report Number: 10-078-0231 Project Description: Memphis International Airport Project #E-9-429

Dear Mr. David McCray:

GTW Analytical Services received 7 sample(s) on 3/19/2010 for the analyses presented in the following report.

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Quality Assurance, instrumentation maintenance and calibration were performed in accordance with guidelines established by the USEPA and NELAP.

The results are shown on the attached analysis sheet(s).

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,

Randell H. Thomas

Randy Thomas Project Manager

៣រទ	ECI	25	75	安匡 2010	M
	APR	0	5	2010	U
В	Y:				



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

CLIENT:	Tri-State Testing	CASE NARRATIVE
Project:	Memphis International Airport	Date: 04/02/10
Lab Order Number:	10-078-0231	GTW01

Fingerprint Analysis by Method 8015B Jet Fuels

Samples were extracted and analyzed by Method 8015B. Comparisons were made to the chromatographic library, with special attention given to Jet fuels. Results are reported for both Diesel Range Organics (C10-C28) and Oil Range Organics (>C28-C40), with quantitation achieved using Diesel Fuel and Motor Oil.

The method blank associated with these samples indicated low level contamination in the Oil Range Organics. This contamination did not impact the comparisons with the Jet fuels. All Jet fuels reported and reviewed for comparisons elute within the Diesel Range Organics (C10-C28) area of the chromatogram.

The following sample indicated contamination in Diesel Range Organics (C10-C28) which may be degraded JP5/8. This sample extract also indicated higher levels of what appeared to be waste oil. The sample extract was unable to be concentrated to the default final volume of 1.0 mL due to the viscous nature of the final extract. Reporting limits have been adjusted for the final volume increase. 1003368-002A (P2/6')

The contamination reported as Diesel Range Organics (C10-C28) and Oil Range Organics (>C28-C40) did not match the Jet fuels used for comparison purposes for the following sample: 1003368-004A (P17/11')



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-078-0231
Lab ID	1003368-001A
Field ID	P1/6'

## ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

## **Report of Analysis**

 Received
 03/19/10

 Matrix
 Soil

 Sampled
 03/18/10 23:35

Prep Method 3550B	Prep Batch	28782			Date/Time Prep	ped	03/24/10 10:06	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.3	g	Date/Time		Analytical	
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	03/26/10 14:42	MJ	44079	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	03/26/10 14:42	MJ	44079	
Gasoline/Aviation Jet	No			1	03/26/10 14:42	MJ	44079	
JP4	No			1	03/26/10 14:42	MJ	44079	
JP5 / JP8	No			1	03/26/10 14:42	MJ	44079	
JP7	No			1	03/26/10 14:42	MJ	44079	
JP10	No			1	03/26/10 14:42	MJ	44079	
JP18 / Turbine Jet Fuel	No			1	03/26/10 14:42	MJ	44079	
Surrogate: o-Terphenyl		70 %	Limits: 50-150	1	03/26/10 14:42	MJ	44079	

Qualifiers/		*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	-	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
		E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
		J	Estimated Value Analyte below reported detection limit	М	Minimum value
	1	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	1	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
		Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/02/10	5160	TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-078-0231
Lab ID	1003368-002A
Field ID	P2/6'

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

Report of AnalysisReceived03/19/10MatrixSoilSampled03/19/10 0:07

Prep Method 3550B	Prep Batch	28782				Date/Time P	repped	03/24/10 10:06
	Default Vol/Wt	30 g	Sample Vol/Wt	30.1	g	Date/Time		Analytical
Compound	Result	Units	M	MQL DF		Analyzed		Batch
Diesel Range Organics (C10-C28)	268	mg/Kg		100	1	03/26/10 16:3	3 MJ	44079
Oil Range Organics (>C28-C40)	406	mg/Kg		100	1	03/26/10 16:3	3 MJ	44079
Gasoline/Aviation Jet	No				1	03/26/10 16:3	3 MJ	44079
JP4	No				1	03/26/10 16:3	3 MJ	44079
JP5 / JP8	Yes				1	03/26/10 16:3	3 MJ	44079
JP7	No				1	03/26/10 16:3	3 MJ	44079
JP10	No				1	03/26/10 16:3	3 MJ	44079
JP18 / Turbine Jet Fuel	No				1	03/26/10 16:3	3 MJ	44079
Surrogate: o-Terphenyl		99 %	Limits: 50-150	D	1	03/26/10 16:3	3 MJ	44079

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/02/10 516	50 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

 Memphis, TN 38133

 Lab Order Number
 10-078-0231

 Lab ID
 1003368-003A

Field ID P16/1 1/3" to 12'

Report of AnalysisReceived03/19/10MatrixSoilSampled03/18/10 22:47

Prep Method 3550B	Prep Batch	28782			Date/Time Prep	ped	03/24/10 10:06
	Default Vol/Wt	30 g	Sample Vol/Wt 30.2	g	Date/Time Analyzed		Analytical
Compound	Result	Units	MQL	DF			Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	03/26/10 14:55	MJ	44079
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	03/26/10 14:55	MJ	44079
Gasoline/Aviation Jet	No			1	03/26/10 14:55	MJ	44079
JP4	No			1	03/26/10 14:55	MJ	44079
JP5 / JP8	No			1	03/26/10 14:55	MJ	44079
JP7	No			1	03/26/10 14:55	MJ	44079
JP10	No			1	03/26/10 14:55	MJ	44079
JP18 / Turbine Jet Fuel	No			1	03/26/10 14:55	MJ	44079
Surrogate: o-Terphenyl		98 %	Limits: 50-150	1	03/26/10 14:55	MJ	44079

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions B	Analyte detected in the associated Method Blank	DF	Dilution Factor	
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/02/10 51	160 TRIST	CATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-078-0231
Lab ID	1003368-004A
Field ID	P17/11'

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

Report of AnalysisReceived03/19/10MatrixSoilSampled03/15/10 0:50

Prep Method 3550B	Prep Batch	28782				Date/Time Pr	epped	03/24/10 10:06	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.6 g		g	Date/Time		Analytical	
Compound	Result	Units	мс	2L	DF	Analyzed	Ву		
Diesel Range Organics (C10-C28)	17.7	mg/Kg		10.0	1	03/26/10 15:0	3 MJ	44079	
Oil Range Organics (>C28-C40)	20.6	mg/Kg		10.0	1	03/26/10 15:0	MJ	44079	
Gasoline/Aviation Jet	No				1	03/26/10 15:00	8 MJ	44079	
JP4	No				1	03/26/10 15:00	3 MJ	44079	
JP5 / JP8	No				1	03/26/10 15:08	MJ	44079	
JP7	No				1	03/26/10 15:00	1960	44079	
JP10	No				1	03/26/10 15:00		44079	
JP18 / Turbine Jet Fuel	No				1	03/26/10 15:00		44079	
Surrogate: o-Terphenyl		114 %	Limits: 50-150	)	1	03/26/10 15:08		44079	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high backgroun
-		Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/02/10 516	0 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-078-0231
Lab ID	1003368-005A
Field ID	P18/1 1/2" to 12'

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/19/10

 Matrix
 Soil

 Sampled
 03/19/10 1:37

Prep Method 3550B	Prep Batch	28782			Date/Time Prep	ped	03/24/10 10:06	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.2	g	Date/Time		Analytical	
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	03/26/10 15:21	MJ	44079	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	03/26/10 15:21	MJ	44079	
Gasoline/Aviation Jet	No			1	03/26/10 15:21	MJ	44079	
JP4	No			1	03/26/10 15:21	MJ	44079	
JP5 / JP8	No			1	03/26/10 15:21	MJ	44079	
JP7	No			1	03/26/10 15:21	MJ	44079	
JP10	No			1	03/26/10 15:21	MJ	44079	
JP18 / Turbine Jet Fuel	No			1	03/26/10 15:21	MJ	44079	
Surrogate: o-Terphenyl		87 %	Limits: 50-150	1	03/26/10 15:21	MJ	44079	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/02/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### Memphis, TN 38133

Lab Order Number	10-078-0231					
Lab ID	1003368-006A					
Field ID	P19/1 1/3" to 12'					

## **Report of Analysis**

 Received
 03/19/10

 Matrix
 Soil

 Sampled
 03/19/10 2:14

Prep Method 3550B	Prep Batch	28782			Date/Time Prepped Date/Time Analyzed B		03/24/10 10:06	
	Default Vol/Wt Result	30 g	Sample Vol/Wt 31 g				Analytical By Batch	
Compound		Units	MQL	DF				
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	03/26/10 15:37	MJ	44079	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	03/26/10 15:37	MJ	44079	
Gasoline/Aviation Jet	No			1	03/26/10 15:37	MJ	44079	
JP4	No			1	03/26/10 15:37	MJ	44079	
JP5 / JP8	No			1	03/26/10 15:37	MJ	44079	
JP7	No			1	03/26/10 15:37	MJ	44079	
JP10	No			1	03/26/10 15:37	MJ	44079	
JP18 / Turbine Jet Fuel	No			1	03/26/10 15:37	MJ	44079	
Surrogate: o-Terphenyl		93 %	Limits: 50-150	1	03/26/10 15:37	MJ	44079	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/02/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road

Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-078-0231
Lab ID	1003368-007A
Field ID	P20/8'

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

## **Report of Analysis**

 Received
 03/19/10

 Matrix
 Soil

 Sampled
 03/19/10 3:15

Prep Method 3550B	Prep Batch	28782			Date/Time Prep	ped	03/24/10 10:06	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.4	g	Date/Time		Analytical	
Compound	Result	Units	MQL	DF	Analyzed	By	Batch	
Diesel Range Órganics (C10-C28)	< 10.0	mg/Kg	10.0	1	03/26/10 15:50	MJ	44079	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	03/26/10 15:50	MJ	44079	
Gasoline/Aviation Jet	No			1	03/26/10 15:50	MJ	44079	
JP4	No			1	03/26/10 15:50	MJ	44079	
JP5 / JP8	No			1	03/26/10 15:50	MJ	44079	
JP7	No			1	03/26/10 15:50	MJ	44079	
JP10	No			1	03/26/10 15:50	MJ	44079	
JP18 / Turbine Jet Fuel	No			1	03/26/10 15:50	MJ	44079	
Surrogate: o-Terphenyl		66 %	Limits: 50-150	1	03/26/10 15:50	MJ	44079	

Oualifiers/		*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions		В	Analyte detected in the associated Method Blank	DF	Dilution Factor
		E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
		J	Estimated Value Analyte below reported detection limit	М	Minimum value
		MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
		MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
		Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/02/10 5	5160	TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## **Cooler Receipt Form**

## Customer Number: 05160 Customer Name: Tri-State Testing Report Number: 10-078-0231

## **Shipping Method**

⊖ FedEx		US Postal Clier	nt (	) LMP	$\bigcirc$	Courier	⊖ Ot	her:	
Shipping co	ntainer/coole	r uncompromised?	•	Yes	0	No	С	Not Present	
Custody sea	als intact on s	hipping container/cooler	? ()	Yes	0	No	•	Not Require	d
Custody sea	als intact on s	ample bottles?	0	Yes	0	No	•	Not Require	d
Chain of Cu	stody presen	t?	•	Yes	0	No			-
COC agrees	with sample	labels?	•	Yes	0	No			-
Samples in	proper contai	ners?	•	Yes	0	No			
Sample cont	tainers intact	?	•	Yes	0	No			
Sufficient sa	mple volume	for indicated tests?	•	Yes	0	No			
All samples	received with	in holding time?	•	Yes	0	No			
Container te	mperature in	compliance?	•	Yes	0	No			-
Water - VOA	vials free of	headspace?	0	Yes	0	No		N/A	-
Water - Pres	servation acc	eptable upon receipt?	0	Yes	0	No	•	N/A	-
Samples scr	eened for rac	dioactivity (COE only)?	0	Yes	0	No	•	N/A	-
Special prec	autions or ins	structions included?	0	Yes	•	No			

Comments:

-	

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Rebekah Ross

Date & Time: 03/19/2010 10:52:40

1000	8		Airpor		LARNH	-		1.5	- Charter	2	1. 4. 4. 4.				N IN IN		1-2-6			~	
DEDAmmin	SUBMIT REPORT TO: David D. McCray COMPANY: Tri-State Testing Services Inc.	PROJECT: David McCray • 901-385-1199	Memphis International Airport		REMARKS (ANALVCEC ETC)	Method 8015. let Fiel Final Financial	Mathod 8015 1.4 5.4 5.	Method 2015 Jet Fuel FingerPrint	Method 8015 lot Fuel FingerPrint	Method 2015 1-1 T	Martina outs Jet Fuel FingerPrint	method 8015 Jet Fuel FingerPrint	Y: DATE/TIME:		DATE/TIME;	3.19.10 0833 DATE/TIME:					
	IT REP	ACT: D		88	ALTRIX 0. OF ONTAINE	N	5	-			-	+	-	C 1	-	S 1	<b>RELINQUISHED BY:</b>				SE ONLY
THE RECORD		01-71-7440		the Shalland	TIME SAMPLE LOCATION	11:36m PI 61	12:074 22/61	10:47pm P16/13" 40 17'	1	112" +0	2: 1 at 1, 2, 1 / 510 muchi:2	101				7	DATE/TIME:	3-19-10 08	BY RECEIVED FOR LAB	COOLER OPENED BY:	SHADED AREAS FOR LABORATORY USE ONLY
	ALYTYC hitten Rd. 13-2400	E-9-429	17	N	DATE	01842	2-19-10	3-18-10	3-19-10	3-19-10	01-61-8	3-19-10						SHIPPED RV.			
	GTW ANALYTY 2790 Whitten R PHONE 901-213-2400	PERMIT/PROJECT NO .:	SAMPLER'S SIGNATURE:		NO. NO.	1d,	1	PILO	LID	P18	61d	P20				SHED RV.	()	DF SHIPMENT:		CONDITION OF COOLER/SEAL:	
		PERMIT	SAMPLE	4.4	LAB S NO.		The second		N. I.		84 1	1.4	1.14.14		a verte	RELINOUTSHED RV	1	METHOD OF		ONDITION	

Daga 10 of 12



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

4/2/2010

Tri-State Testing Mr. David McCray 6756 Buckles Cove Memphis, TN, 38133

Ref: Analytical Testing Report Number: 10-077-0201 Project Description: Memphis International Airport Project # E-9-429

Dear Mr. David McCray:

GTW Analytical Services received 4 sample(s) on 3/18/2010 for the analyses presented in the following report.

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Quality Assurance, instrumentation maintenance and calibration were performed in accordance with guidelines established by the USEPA and NELAP.

The results are shown on the attached analysis sheet(s).

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,

Rendell H. Homas

Randy Thomas Project Manager

៣រា	ZCI	25	1	VE	
	APR	0	5	2010	U
В	Y:				



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

CLIENT:	Tri-State Testing	CASE NARRATIVE
Project:	Memphis International Airport ber: 10-077-0201	Date: 04/02/10
ab Order Num	ber: 10-077-0201	GTW01

Fingerprint Analysis by Method 8015B Jet Fuels

Samples were extracted and analyzed by Method 8015B. Comparisons were made to the chromatographic library, with special attention given to Jet fuels. Results are reported for both Diesel Range Organics (C10-C28) and Oil Range Organics (>C28-C40), with quantitation achieved using Diesel Fuel and Motor Oil.

The method blank associated with these samples indicated low level contamination in the Oil Range Organics. This contamination did not impact the comparisons with the Jet fuels. All Jet fuels reported and reviewed for comparisons elute within the Diesel Range Organics (C10-C28) area of the chromatogram.

The contamination reported as Diesel Range Organics (C10-C28) and Oil Range Organics (>C28-C40) did not match the Jet fuels used for comparison purposes.



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

## Memphis, TN 38133

Lab Order Number	10-077-0201
Lab ID	1003342-001A
Field ID	P-12

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/18/10

 Matrix
 Soil

 Sampled
 03/18/10 0:30

Prep Method 3550B	Prep Batch	28782			Date/Time Prep	ped	03/24/10 10:06	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.8	g	Date/Time		Analytical	
Compound	Result	Units	MQL	DF	Analyzed		Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	03/26/10 12:45	MJ	44079	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	03/26/10 12:45	MJ	44079	
Gasoline/Aviation Jet	No			1	03/26/10 12:45	MJ	44079	
JP4	No			1	03/26/10 12:45	MJ	44079	
JP5 / JP8	No			1	03/26/10 12:45	MJ	44079	
JP7	No			1	03/26/10 12:45	MJ	44079	
JP10	No			1	03/26/10 12:45	MJ	44079	
JP18 / Turbine Jet Fuel	No			1	03/26/10 12:45	MJ	44079	
Surrogate: o-Terphenyl		95 %	Limits: 50-150	1	03/26/10 12:45	MJ	44079	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/02/10 51	160 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-077-0201
Lab ID	1003342-002A
Field ID	P-13

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

Report of AnalysisReceived 03/18/10MatrixSoilSampled 03/18/10 1:20

Prep Method 3550B	Prep Batch	28782			Date/Time Prep	ped	03/24/10 10:06
	Default Vol/Wt	30 g	Sample Vol/Wt 31.4	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	03/26/10 12:58	MJ	44079
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	03/26/10 12:58	MJ	44079
Gasoline/Aviation Jet	No			1	03/26/10 12:58	MJ	44079
JP4	No			1	03/26/10 12:58	MJ	44079
JP5 / JP8	No			1	03/26/10 12:58	MJ	44079
JP7	No			1	03/26/10 12:58	MJ	44079
JP10	No			1	03/26/10 12:58	MJ	44079
JP18 / Turbine Jet Fuel	No			1	03/26/10 12:58	MJ	44079
Surrogate: o-Terphenyl		93 %	Limits: 50-150	1	03/26/10 12:58	MJ	44079

	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
В	Analyte detected in the associated Method Blank	DF	Dilution Factor
E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
J	Estimated Value Analyte below reported detection limit	М	Minimum value
MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
	E J MDL MRL	<ul> <li>E Value exceeds method calibration range</li> <li>J Estimated Value Analyte below reported detection limit</li> <li>MDL Method Dection Limit (unadjusted)</li> <li>MRL Method Reporting Limit</li> </ul>	E     Value exceeds method calibration range     H       J     Estimated Value Analyte below reported detection limit     M       MDL     Method Dection Limit (unadjusted)     MQL       MRL     Method Reporting Limit     N



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-077-0201
Lab ID	1003342-003A
Field ID	P-14

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

## **Report of Analysis**

 Received
 03/18/10

 Matrix
 Soil

 Sampled
 03/18/10 2:22

Prep Method 3550B	Prep Batch	28782			Date/Time Prep	bed	03/24/10 10:06
	Default Vol/Wt	30 g	Sample Vol/Wt 31.6	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28)	14.2	mg/Kg	10.0	1	03/26/10 13:11	MJ	44079
Oil Range Organics (>C28-C40)	11.3	mg/Kg	10.0	1	03/26/10 13:11	MJ	44079
Gasoline/Aviation Jet	No			1	03/26/10 13:11	MJ	44079
JP4	No			1	03/26/10 13:11	MJ	44079
JP5 / JP8	No			1	03/26/10 13:11	MJ	44079
JP7	No			1	03/26/10 13:11	MJ	44079
JP10	No			1	03/26/10 13:11	MJ	44079
JP18 / Turbine Jet Fuel	No			1	03/26/10 13:11	MJ	44079
Surrogate: o-Terphenyl		109 %	Limits: 50-150	1	03/26/10 13:11	MJ	44079

Oualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/02/10 516	50 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

## Memphis, TN 38133

Lab Order Number	10-077-0201
Lab ID	1003342-004A
Field ID	P-15

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

## **Report of Analysis**

 Received
 03/18/10

 Matrix
 Soil

 Sampled
 03/18/10 3:30

Prep Method 3550B	Prep Batch	28782			Date/Time Prep	ped	03/24/10 10:06
	Default Vol/Wt	30 g	Sample Vol/Wt 31.1	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	03/26/10 13:24	MJ	44079
Oil Range Organics (>C28-C40)	11.2	mg/Kg	10.0	1	03/26/10 13:24	MJ	44079
Gasoline/Aviation Jet	No			1	03/26/10 13:24	MJ	44079
JP4	No			1	03/26/10 13:24	MJ	44079
JP5 / JP8	No			1	03/26/10 13:24	MJ	44079
JP7	No			1	03/26/10 13:24	MJ	44079
JP10	No			1	03/26/10 13:24	MJ	44079
JP18 / Turbine Jet Fuel	No			1	03/26/10 13:24	MJ	44079
Surrogate: o-Terphenyl		103 %	Limits: 50-150	1	03/26/10 13:24	MJ	44079

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high backgroun
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## **Cooler Receipt Form**

## Customer Number: 05160 Customer Name: Tri-State Testing Report Number: 10-077-0201

## **Shipping Method**

○ FedEx ○ UPS ○ US Postal Client	t 🔿 LMP	⊖ Courier	Other:
Shipping container/cooler uncompromised?	• Yes	O No	O Not Present
Custody seals intact on shipping container/cooler?	O Yes	O No	Not Required
Custody seals intact on sample bottles?	⊖ Yes	O No	Not Required
Chain of Custody present?	Yes	O No	
COC agrees with sample labels?	Yes	O No	
Samples in proper containers?	Yes	O No	
Sample containers intact?	Yes	O No	
Sufficient sample volume for indicated tests?	Yes	O No	
All samples received within holding time?	Yes	O No	
Container temperature in compliance?	Yes	O No	
Water - VOA vials free of headspace?	O Yes	O No	N/A
Water - Preservation acceptable upon receipt?	Yes	O No	() N/A
Samples screened for radioactivity (COE only)?	⊖ Yes	O No	N/A
Special precautions or instructions included?	⊖ Yes	No No	

Comments:

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Brooke Shoup

Date & Time: 03/18/2010 09:03:02

CH		Airport	201	HC HC						-	t and the	A State	t	t Karal			2		
REPORT NO.   COSSU	SUBMIT REPORT TO: David D. McCray COMPANY: Tri-State Testing Services, Inc. CONTACT: David McCray • 901-385-1199	PROJECT NAME: Memphis International Airport	10-077-0201	15150 1-State Testing (GTW) 8:54:56 inport Protect	Method 8015 Jet Fuel FingerPrint	DATE/TME:		2. 18. 10 0830	DATE/TIME:										
REPOI	SUBMIT REPORT TO: David D. McCray COMPANY: Tri-State Testing Services CONTACT: David McCray • 901-385-1	r NAME: Mem		Tri-State Testing (GTW) Airport Protect	Method 801	BY:													
	REPO	KOJEC	SAB	CONTAIN NO. OF	-	-	-	-	-	-	-	+	-	-	RELINQUISHED BY:		₩ ¥	1 14	
	UBMIT OMPA	PI		MATRIX	S	S	S	S	S	S	S	S	S	S	ELINQI		NAJ AC		the second se
CHAIN OF CUSTODY RECORD	LLC. 33 -213-2440		3 halley	SAMPLE LOCATION	P-12 / 2.5 To 12'	P-13/ 10'	· 14/ 6'	P.15 / 2.5 To 12'							DATE/TIME: R	18-10 0820		COOLER OPENED BY:	
OF C	L SER Aemphis	29	Nin	TIME	12:304	1:20 000	Z:22 AM	3,30 4m							DA	at		DOLER (	
HAIN	V ANALYTICAL SERVICES, 2790 Whitten Rd. Memphis, TN 3813 5 901-213-2400 FAX 901.	E-9-429	all	DATE	3-18-10 12:30 AM	3-18-10		3-18-10									SHIPPED BY:		
	GTW ANALYTICAL SERVICES, 2790 Whitten Rd. Memphis, TN 381; PHONE 901-213-2400 FAX 901	PERMIT/PROJECT NO .:	SAMPLER'S SIGNATURE:	SAMPLE NO.	P-12	P-13	P-14	P-15							RELINQUISHED BY:	R C	METHOD OF SHIPMENT:	CONDITION OF COOLER/SEAL:	)
	h	IT/PR(	LER'S	SEQ NO.			100 L 10	-	g . 4	ALL TO		NR.	1000	-14 St.	ISINON	1.	IOD OF	NOITION	
		PERM	SAMP	LAB NO.			- States			R	A.S.				RELIN	J	METH	CONL	



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

4/6/2010

Tri-State Testing Mr. David McCray 6756 Buckles Cove Memphis, TN, 38133

Ref: Analytical Testing Report Number: 10-081-0239 Project Description: Memphis International Airport Project #E-9-429

Dear Mr. David McCray:

GTW Analytical Services received 12 sample(s) on 3/22/2010 for the analyses presented in the following report.

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Quality Assurance, instrumentation maintenance and calibration were performed in accordance with guidelines established by the USEPA and NELAP.

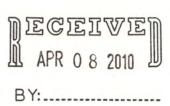
The results are shown on the attached analysis sheet(s).

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,

Rendell H. Thomas

Randy Thomas Project Manager





2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

CLIENT:	Tri-State Testing	<b>CASE NARRATIVE</b>
Project:	Memphis International Airport	Date: 04/06/10
Lab Order Nun	<b>ber:</b> 10-081-0239	GTW01

Fingerprint Analysis by Method 8015B Jet Fuels

Samples were extracted and analyzed by Method 8015B. Comparisons were made to the chromatographic library, with special attention given to Jet fuels. Results are reported for both Diesel Range Organics (C10-C28) and Oil Range Organics (>C28-C40), with quantitation achieved using Diesel Fuel and Motor Oil.



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-081-0239
Lab ID	1003393-001A
Field ID	P-21

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

## **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/19/10 22:40

Prep Method 3550B	Prep Batch	28782			Date/Time Prep	ped	03/24/10 10:06
	Default Vol/Wt	30 g	Sample Vol/Wt 30.6	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	03/26/10 16:46	MJ	44079
Oil Range Organics (>C28-C40)	12.5	mg/Kg	10.0	1	03/26/10 16:46	MJ	44079
Gasoline/Aviation Jet	No			1	03/26/10 16:46	MJ	44079
JP4	No			1	03/26/10 16:46	MJ	44079
JP5 / JP8	No			1	03/26/10 16:46	MJ	44079
JP7	No			1	03/26/10 16:46	MJ	44079
JP10	No			1	03/26/10 16:46	MJ	44079
JP18 / Turbine Jet Fuel	No			1	03/26/10 16:46	MJ	44079
Surrogate: o-Terphenyl		84 %	Limits: 50-150	1	03/26/10 16:46	MJ	44079

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-081-0239
Lab ID	1003393-002A
Field ID	P-22

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

## **Report of Analysis**

Received03/22/10MatrixSoilSampled03/19/10 23:28

Prep Method 3550B	Prep Batch	28782			Date/Time Prep	ped	03/24/10 10:06
	Default Vol/Wt	30 g	Sample Vol/Wt 30.5	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed E		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	03/26/10 16:59	MJ	44079
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	03/26/10 16:59	MJ	44079
Gasoline/Aviation Jet	No			1	03/26/10 16:59	MJ	44079
JP4	No			1	03/26/10 16:59	MJ	44079
JP5 / JP8	No			1	03/26/10 16:59	MJ	44079
JP7	No			1	03/26/10 16:59	MJ	44079
JP10	No			1	03/26/10 16:59	MJ	44079
JP18 / Turbine Jet Fuel	No			1	03/26/10 16:59	MJ	44079
Surrogate: o-Terphenyl		83 %	Limits: 50-150	1	03/26/10 16:59	MJ	44079

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high backgroun
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fex (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-081-0239
Lab ID	1003393-003A
Field ID	P-24

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/19/10 23:57

Prep Method 3550B	Prep Batch	28782			Date/Time Prep	ped	03/24/10 10:06
	Default Vol/Wt	30 g	Sample Vol/Wt 30.4	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	03/26/10 17:12	MJ	44079
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	03/26/10 17:12	MJ	44079
Gasoline/Aviation Jet	No			1	03/26/10 17:12	MJ	44079
JP4	No			1	03/26/10 17:12	MJ	44079
JP5 / JP8	No			1	03/26/10 17:12	MJ	44079
JP7	No			1	03/26/10 17:12	MJ	44079
JP10	No			1.	03/26/10 17:12	MJ	44079
JP18 / Turbine Jet Fuel	No			1	03/26/10 17:12	MJ	44079
Surrogate: o-Terphenyl		86 %	Limits: 50-150	1	03/26/10 17:12	MJ	44079

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/06/10 51	60 TRIST	TATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

## Memphis, TN 38133

Lab Order Number	10-081-0239
Lab ID	1003393-004A
Field ID	P-25

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/20/10 0:27

Prep Method 3550B	Prep Batch	28782			Date/Time Prep	ped	03/24/10 10:06
	Default Vol/Wt	30 g	Sample Vol/Wt 30.5	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed E		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	03/26/10 17:25	MJ	44079
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	03/26/10 17:25	MJ	44079
Gasoline/Aviation Jet	No			1	03/26/10 17:25	MJ	44079
JP4	No			1	03/26/10 17:25	MJ	44079
JP5 / JP8	No			1	03/26/10 17:25	MJ	44079
JP7	No			1	03/26/10 17:25	MJ	44079
JP10	No			1	03/26/10 17:25	MJ	44079
JP18 / Turbine Jet Fuel	No			1	03/26/10 17:25	MJ	44079
Surrogate: o-Terphenyl		85 %	Limits: 50-150	1	03/26/10 17:25	MJ	44079

*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
В	Analyte detected in the associated Method Blank	DF	Dilution Factor
Е	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
J	Estimated Value Analyte below reported detection limit	М	Minimum value
MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
	E J MDL MRL	<ul> <li>B Analyte detected in the associated Method Blank</li> <li>E Value exceeds method calibration range</li> <li>J Estimated Value Analyte below reported detection limit</li> <li>MDL Method Dection Limit (unadjusted)</li> <li>MRL Method Reporting Limit</li> </ul>	BAnalyte detected in the associated Method BlankDFEValue exceeds method calibration rangeHJEstimated Value Analyte below reported detection limitMMDLMethod Dection Limit (unadjusted)MQLMRLMethod Reporting LimitN



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-081-0239
Lab ID	1003393-005A
Field ID	P-26

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

Report of AnalysisReceived03/22/10MatrixSoil

Sampled 03/20/10 1:53

Prep Method 3550B	Prep Batch	28782			Date/Time Prep	ped 0	3/24/10 10:06
	Default Vol/Wt	30 g	Sample Vol/Wt 31	.7 g	Date/Time		Analytical Batch
Compound	Result	Units	MQL	DF	Analyzed	Ву	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	) 1	03/26/10 17:38	MJ	44079
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	) 1	03/26/10 17:38	MJ	44079
Gasoline/Aviation Jet	No			1	03/26/10 17:38	MJ	44079
JP4	No			1	03/26/10 17:38	MJ	44079
JP5 / JP8	No			1	03/26/10 17:38	MJ	44079
JP7	No			1	03/26/10 17:38	MJ	44079
JP10	No			1	03/26/10 17:38	MJ	44079
JP18 / Turbine Jet Fuel	No			1	03/26/10 17:38	MJ	44079
Surrogate: o-Terphenyl		94 %	Limits: 50-150	1	03/26/10 17:38	MJ	44079

Qualifiers	1	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high backgroun
Definition	S	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
		E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
		J	Estimated Value Analyte below reported detection limit	М	Minimum value
		MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
		MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
		Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/06/10	5160		CATE_GTW	SQL	Sample Quantitation Limit (adjusted MD



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-081-0239
Lab ID	1003393-006A
Field ID	P-27

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

## **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/20/10 2:38

Prep Method 3550B	Prep Batch	28782			Date/Time Prep	ped	03/24/10 10:06	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.3	g	Date/Time		Analytical	
Compound	Result	Units	MQL	DF	Analyzed		Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	03/26/10 17:51	MJ	44079	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	03/26/10 17:51	MJ	44079	
Gasoline/Aviation Jet	No			1	03/26/10 17:51	MJ	44079	
JP4	No			1	03/26/10 17:51	MJ	44079	
JP5 / JP8	No			1	03/26/10 17:51	MJ	44079	
JP7	No			1	03/26/10 17:51	MJ	44079	
JP10	No			1	03/26/10 17:51	MJ	44079	
JP18 / Turbine Jet Fuel	No			1	03/26/10 17:51	MJ	44079	
Surrogate: o-Terphenyl		103 %	Limits: 50-150	1	03/26/10 17:51	MJ	44079	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	Ν	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/06/10 510	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fex (901) 213-2440

### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-081-0239
Lab ID	1003393-007A
Field ID	P-29

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

## **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/20/10 3:11

Prep Method 3550B	Prep Batch	28782			Date/Time Prep	ped	03/24/10 10:06
	Default Vol/Wt	30 g	Sample Vol/Wt 30.	2 g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed		Batch
Diesel Range Organics (C10-C28)	15.7	mg/Kg	10.0	1	03/26/10 18:04	MJ	44079
Oil Range Organics (>C28-C40)	14.5	mg/Kg	10.0	1	03/26/10 18:04	MJ	44079
Gasoline/Aviation Jet	No			1	03/26/10 18:04	MJ	44079
JP4	No			1	03/26/10 18:04	MJ	44079
JP5 / JP8	No			1	03/26/10 18:04	MJ	44079
JP7	No			1	03/26/10 18:04	MJ	44079
JP10	No			1	03/26/10 18:04	MJ	44079
JP18 / Turbine Jet Fuel	No			1	03/26/10 18:04	MJ	44079
Surrogate: o-Terphenyl		95 %	Limits: 50-150	1	03/26/10 18:04	MJ	44079

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/06/10 51	60 TRIST	ATE_GTW		



Lab Order Number 10-081-0239

P-31

# **GTW** Analytical Services

s 2790 Whitten Road

ten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/20/10 3:54

## Lab ID 1003393-008A

Field ID

Prep Method 3550B	Prep Batch	28782			Date/Time Prep	ped	03/24/10 10:06	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.7	g	Date/Time		Analytical	
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	03/26/10 18:17	MJ	44079	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	03/26/10 18:17	MJ	44079	
Gasoline/Aviation Jet	No			1	03/26/10 18:17	MJ	44079	
JP4	No			1	03/26/10 18:17	MJ	44079	
JP5 / JP8	No			1	03/26/10 18:17	MJ	44079	
JP7	No			1	03/26/10 18:17	MJ	44079	
JP10	No			1	03/26/10 18:17	MJ	44079	
JP18 / Turbine Jet Fuel	No			1	03/26/10 18:17	MJ	44079	
Surrogate: o-Terphenyl		95 %	Limits: 50-150	1	03/26/10 18:17	MJ	44079	

Qualifiers/	*	Surrogate Recovery outside accepted limits	*1	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/06/10 516	50 TRIST	TATE_GTW		



2790 Whitten Road

Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-081-0239
Lab ID	1003393-009A
Field ID	P-3

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/20/10 2:06

Prep Method 3550B	Prep Batch	28791			Date/Time Prep	ped	03/24/10 14:44	
	Default Vol/Wt	30 g	Sample Vol/Wt 30 g		Date/Time		Analytical	
Compound	Result	Units	MQL	DF	Analyzed		Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/01/10 15:50	MJ	44120	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/01/10 15:50	MJ	44120	
Gasoline/Aviation Jet	No			1	04/01/10 15:50	MJ	44120	
JP4	No			1	04/01/10 15:50	MJ	44120	
JP5 / JP8	No			1	04/01/10 15:50	MJ	44120	
JP7	No			1	04/01/10 15:50	MJ	44120	
JP10	No			1	04/01/10 15:50	MJ	44120	
JP18 / Turbine Jet Fuel	No			1	04/01/10 15:50	MJ	44120	
Surrogate: o-Terphenyl		61 %	Limits: 50-150	1	04/01/10 15:50	MJ	44120	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions B		Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/06/10 51	160 TRIST	TATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-081-0239
Lab ID	1003393-010A
Field ID	P-23

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

## **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/20/10 0:22

Prep Method 3550B	Prep Batch	28791			Date/Time Prep	bed	03/24/10 14:44
	Default Vol/Wt	30 g	Sample Vol/Wt 30.3	g	Date/Time Analyzed		Analytical
Compound	Result	Units	MQL	DF			Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/01/10 16:03	MJ	44120
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/01/10 16:03	MJ	44120
Gasoline/Aviation Jet	No			1	04/01/10 16:03	MJ	44120
JP4	No			1	04/01/10 16:03	MJ	44120
JP5 / JP8	No			1	04/01/10 16:03	MJ	44120
JP7	No			1	04/01/10 16:03	MJ	44120
JP10	No			1	04/01/10 16:03	MJ	44120
JP18 / Turbine Jet Fuel	No			1	04/01/10 16:03	MJ	44120
Surrogate: o-Terphenyl		74 %	Limits: 50-150	1	04/01/10 16:03	MJ	44120

Oualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/06/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-081-0239
Lab ID	1003393-011A
Field ID	P-28

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

Report of AnalysisReceived03/22/10MatrixSoilSampled03/20/10 3:00

Prep Method 3550B	Prep Batch	28791			Date/Time Prep	ped	03/24/10 14:44	
	Default Vol/Wt	30 g	Sample Vol/Wt 30	0.3 g	Date/Time Analyzed		Analytica	
Compound	Result	Units	MQL	DF			Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.	0 1	04/01/10 16:16	MJ	44120	
Oil Range Organics (>C28-C40)	10.8	mg/Kg	10.	0 1	04/01/10 16:16	MJ	44120	
Gasoline/Aviation Jet	No			1	04/01/10 16:16	MJ	44120	
JP4	No			1	04/01/10 16:16	MJ	44120	
JP5 / JP8	No			1	04/01/10 16:16	MJ	44120	
JP7	No			1	04/01/10 16:16	MJ	44120	
JP10	No			1	04/01/10 16:16	MJ	44120	
JP18 / Turbine Jet Fuel	No			1	04/01/10 16:16	MJ	44120	
Surrogate: o-Terphenyl		88 %	Limits: 50-150	1	04/01/10 16:16	MJ	44120	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/06/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-081-0239
Lab ID	1003393-012A
Field ID	P-30

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

## **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/20/10 3:52

Prep Method 3550B	Prep Batch	28791			Date/Time Prep	ped	03/24/10 14:44
	Default Vol/Wt	30 g	Sample Vol/Wt 30.4	g	Date/Time		Analytical Batch
Compound	Result	Units	MQL	DF	Analyzed	By	
Diesel Range Organics (C10-C28)	14.8	mg/Kg	10.0	1	04/01/10 16:29	MJ	44120
Oil Range Organics (>C28-C40)	20.0	mg/Kg	10.0	1	04/01/10 16:29	MJ	44120
Gasoline/Aviation Jet	No			1	04/01/10 16:29	MJ	44120
JP4	No			1	04/01/10 16:29	MJ	44120
JP5 / JP8	No			1	04/01/10 16:29	MJ	44120
JP7	No			1	04/01/10 16:29	MJ	44120
JP10	No			1	04/01/10 16:29	MJ	44120
JP18 / Turbine Jet Fuel	No			1	04/01/10 16:29	MJ	44120
Surrogate: o-Terphenyl		81 %	Limits: 50-150	1	04/01/10 16:29	MJ	44120

Oualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions B		Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/06/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## **Cooler Receipt Form**

## Customer Number: 05160 Customer Name: Tri-State Testing Report Number: 10-081-0239

## **Shipping Method**

⊖ FedEx		O US Postal Clien	t 🔿 LMP	⊖ Courier	Other:
Shipping co	ntainer/coole	r uncompromised?	• Yes	O No	O Not Present
Custody sea	als intact on s	hipping container/cooler?	Yes	O No	Not Required
Custody sea	als intact on s	ample bottles?	O Yes	O No	Not Required
Chain of Cu	stody presen	t?	Yes	O No	
COC agrees	s with sample	labels?	Yes	O No	
Samples in	proper contai	ners?	Yes	O No	
Sample cont	tainers intact	?	Yes	O No	
Sufficient sa	mple volume	for indicated tests?	Yes	O No	
All samples	received with	in holding time?	Yes	O No	
Container te	mperature in	compliance?	Yes	O No	
Water - VOA	A vials free of	headspace?	⊖ Yes	O No	N/A
Water - Pres	servation acc	eptable upon receipt?	⊖ Yes	O No	N/A
Samples scr	reened for rac	dioactivity (COE only)?	⊖ Yes	O No	N/A
Special prec	autions or ins	structions included?	O Yes	No No	

Comments:

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Rebekah Ross

Date & Time: 03/22/2010 11:39:21

					al Airnort		LAB pH	int		44.5													
03393 REPORT NO	THE OWN INC.	T REPORT TO: David D. McCrav	NY: Tri-State Testing Services, Inc.	101. Uavid Incuray • 901-385-1199	PROJECT NAME: Membhis International Airnort		REMARKS (ANALYSES, ETC.)	Method 8015 Jet Fuel FingerPrint	IY: DATE/TIME:	3/20/10	DATE/TIME	DATE/TIME:		14									
2		<b>F REPO</b>	L'AN	11.0	ROJEC	Sa	CONTAINE NO. OF	-	-	-	-	-	-	1	1	1	1	KELINQUISHED BY:	1	0			SE ONL
,	,			-	H	-	WATRLY	S	S	S	S	S	S	S	S	S	S	INDN		ANB		1	ORYU
10-081-0239			EAV 001 117 TANK			X	SAMPLE LOCATION	0 P3 /11-12'	P13 23"-13.	P28 / 11" -12'	P30 / 11- 120							DATE/TIME: / R. 7444 REI	1 0.0	RECEIVED FOR BY:	PENED BY:	747	SHADED AREAS FOR LABORA TORY USE ONLY!
	Tri-State	Memohis			29	- Wan	TIME	2. dat	1. J. M.	3, WAM	3.54							DAT	2	DBY:	COOLER OPENED		
CHAIT		TYTIC	2790 Whitten Rd	0047-0	E-9-429	Z	DATE	3)00/10	3/24 10 13. 22 AM	2/20/10	2/20/10									SHIPPED BY:	-		
		<b>GTW ANALYTIC</b>	2790 Whitten R		FEKMI1/PROJECT NO.:	SAMPLER'S SIGNATURE:	SAMPLE NO.	P3	Pa3	pag	P30							ED BY:	the second secon	SHIPMENT:	CONDITION OF COOLER/SEAL:		
			Id	THE AND	11/PK	LER'S	SEQ NO.											HSIN	7	5)	LION C		
				1 LULU	rekm	SAMP	LAB NO.		-				-	14				RELINQUISHED BY:	ATT TOTAL	METHON	CONDIT		

- -- - ---

	Airport		LAB PH												-J.7		
IT REPORT NO. REPORT NO. ANY: Tri-State Testing Services, Inc.	CONTACT: David McCray • 901-385-1199 PROJECT NAME: Membhis International Airnort		REMARKS (ANALYSES, ETC.)	Method 8015 Jet Fuel FingerPrint	(: DATE/TIME:	J 3/ 3/ 10 Y	DATE/TIME:										
REPO NY: Tri	CT: Da	58	CONTAINE NO. OF	1	1	-	-	-	1	1	1	-	1	RELINQUISHED BY	A		EONT
I II W	PR		XIATAM	5	S	S	S	S	S	S	0	S	S	NOUIS	TAB		DV LIC
1.35.28 dioreal Arroot	FAX 901-213-2440	- Sharkeday		221/ 1.5" 4. 12	P22/1114 to XX	15	2		P27/1.12 1:12	P2916.	1 31/ 11" + 12			1.201	CUPWEIO 0. CAR C	COOLER OPENED BY:	SHADED AREAS FOR LABORATORY LICE ONLY
Tri-Sta	429	l'il-	TIME		11.25	1.5.11	12.27	" 6 . 1	7:35	3.11 0	124.45		ł	0 0	DBY:	OLER	
CHAI V ANALYTIC 2790 Whiten Rc	E-9-429	ice	DATE	7 110		1.11	×1. 11.	3 16 16	5 11 a	ZK IC	3 th W				SHUPEDBY	-	
CHAI GTW ANALYTIC 2790 Whitten RC	PERMIT/PROJECT NO.:	SAMPLER'S SIGNATURE:	SAM			117		1. 26.		111	12 11		DEI INVI IGHED DV.		SHIPMENT	CONDITION OF COOLER/SEAL:	
	HIT/PF	PLER	SEQ NO.				_						ITOI N.	V V	10 00	TION C	
	PERN	SAM	LAB NO.										INI LAR		METLIC	ICINO	

HON



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

4/7/2010

Tri-State Testing Mr. David McCray 6756 Buckles Cove Memphis, TN, 38133

Ref: Analytical Testing Report Number: 10-081-0242 Project Description: Memphis International Airport Project #E-9-429

Dear Mr. David McCray:

GTW Analytical Services received 15 sample(s) on 3/22/2010 for the analyses presented in the following report.

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Quality Assurance, instrumentation maintenance and calibration were performed in accordance with guidelines established by the USEPA and NELAP.

The results are shown on the attached analysis sheet(s).

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,

Rendell H. Homas

Randy Thomas Project Manager

DI	EC:	E	I	VI	M	. 18
	APR	0	9	2010		
B	Y:					



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

CLIENT:	Tri-State Testing	CASE NARRATIVE
Project: Lab Order Numb	Memphis International Airport	Date: 04/07/10
Lab Order Nullib	er: 10-081-0242	GTW01

Fingerprint Analysis by Method 8015B Jet Fuels

Samples were extracted and analyzed by Method 8015B. Comparisons were made to the chromatographic library, with special attention given to Jet fuels. Results are reported for both Diesel Range Organics (C10-C28) and Oil Range Organics (>C28-C40), with quantitation achieved using Diesel Fuel and Motor Oil.

The following sample indicated contamination in Diesel Range Organics (C10-C28) which may be degraded JP5/8.

1003390-012A (P38)

Surrogate Recovery Failure

Surrogates were flagged for recoveries outside QC limits in several of the associated project samples. These samples were re-analyzed for verification, with similar recoveries. Batch QC samples (method blank and laboratory control samples) all showed surrogates within QC limits indicating that failing recoveries were due to the sample matrix. 1003390-010A (P33) 1003390-013A (P41)



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-081-0242
Lab ID	1003390-001A
Field ID	P34

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/21/10 23:00

Prep Method 3550B	Prep Batch	28791			Date/Time Prep	ped	03/24/10 14:44
	Default Vol/Wt	30 g	Sample Vol/Wt 30.9	9 g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 9:29	MJ	44120
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 9:29	MJ	44120
Gasoline/Aviation Jet	No			1	04/05/10 9:29	MJ	44120
JP4	No			1	04/05/10 9:29	MJ	44120
JP5 / JP8	No			1	04/05/10 9:29	MJ	44120
JP7	No			1	04/05/10 9:29	MJ	44120
JP10	No			1	04/05/10 9:29	MJ	44120
JP18 / Turbine Jet Fuel	No			1	04/05/10 9:29	MJ	44120
Surrogate: o-Terphenyl		88 %	Limits: 50-150	1	04/05/10 9:29	MJ	44120

Analyte detected in the associated Method Blank Value exceeds method calibration range Estimated Value Analyte below reported detection limit	DF H M	Dilution Factor Prepped / Analyzed out of holding time.
Estimated Value Analyte below reported detection limit	М	Minimum and
	1.1	Minimum value
Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
Method Reporting Limit	N	Refer to attached Non-Compliance Report
RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
L	L Method Dection Limit (unadjusted) L Method Reporting Limit RPD >40% between primary and confirmation columns STATE_GTW	L Method Reporting Limit N RPD >40% between primary and confirmation columns SQL



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

 Lab Order Number
 10-081-0242

 Lab ID
 1003390-002A

 Field ID
 P35

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/21/10 23:40

Prep Method 3550B	Prep Batch	28791			Date/Time Prep	ped	03/24/10 14:44
	Default Vol/Wt	30 g	Sample Vol/Wt 30.2	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed	By	Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 9:42	MJ	44120
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 9:42	MJ	44120
Gasoline/Aviation Jet	No			1	04/05/10 9:42	MJ	44120
JP4	No			1	04/05/10 9:42	MJ	44120
JP5 / JP8	No			1	04/05/10 9:42	MJ	44120
JP7	No			1	04/05/10 9:42	MJ	44120
JP10	No			1	04/05/10 9:42	MJ	44120
JP18 / Turbine Jet Fuel	No			1	04/05/10 9:42	MJ	44120
Surrogate: o-Terphenyl		71 %	Limits: 50-150	1	04/05/10 9:42	MJ	44120

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high backgroun
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/07/10 516	50 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-081-0242
Lab ID	1003390-003A
Field ID	P39

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/22/10 0:00

Prep Method 3550B	Prep Batch	28791				Date/Time Prep	ped	03/24/10 14:44
	Default Vol/Wt	30 g	Sample Vol/Wt	31.5 g		Date/Time		Analytical
Compound	Result	Units	MQI	L	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	1(	0.0	1	04/05/10 9:55	MJ	44120
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10	0.0	1	04/05/10 9:55	MJ	44120
Gasoline/Aviation Jet	No				1	04/05/10 9:55	MJ	44120
JP4	No				1	04/05/10 9:55	MJ	44120
JP5 / JP8	No				1	04/05/10 9:55	MJ	44120
JP7	No				1	04/05/10 9:55	MJ	44120
JP10	No				1	04/05/10 9:55	MJ	44120
JP18 / Turbine Jet Fuel	No				1	04/05/10 9:55	MJ	44120
Surrogate: o-Terphenyl		72 %	Limits: 50-150		1	04/05/10 9:55	MJ	44120

Analyte detected in the associated Method Blank Value exceeds method calibration range Estimated Value Analyte below reported detection limit	DF H M	Dilution Factor Prepped / Analyzed out of holding time. Minimum value
Ũ		
Estimated Value Analyte below reported detection limit	М	Minimum value
		- Andrewith Parate
Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
Method Reporting Limit	N	Refer to attached Non-Compliance Report
RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
	Method Reporting Limit RPD >40% between primary and confirmation columns TATE_GTW	Method Reporting Limit     N       RPD >40% between primary and confirmation columns     SQL



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-081-0242
Lab ID	1003390-004A
Field ID	P40

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/22/10 0:20

Prep Method 3550B	Prep Batch	28791			Date/Time Prep	bed	03/24/10 14:44	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.6	g	Date/Time		Analytical	
Compound	Result	Units	MQL	DF	Analyzed B		by Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 10:08	MJ	44120	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 10:08	MJ	44120	
Gasoline/Aviation Jet	No			1	04/05/10 10:08	MJ	44120	
JP4	No			1	04/05/10 10:08	MJ	44120	
JP5 / JP8	No			1	04/05/10 10:08	MJ	44120	
JP7	No			1	04/05/10 10:08	MJ	44120	
JP10	No			1	04/05/10 10:08	MJ	44120	
JP18 / Turbine Jet Fuel	No			1	04/05/10 10:08	MJ	44120	
Surrogate: o-Terphenyl		61 %	Limits: 50-150	1	04/05/10 10:08	MJ	44120	

*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high backgroun
В	Analyte detected in the associated Method Blank	DF	Dilution Factor
E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
J	Estimated Value Analyte below reported detection limit	М	Minimum value
MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
	B E J MDL MRL	<ul> <li>B Analyte detected in the associated Method Blank</li> <li>E Value exceeds method calibration range</li> <li>J Estimated Value Analyte below reported detection limit</li> <li>MDL Method Dection Limit (unadjusted)</li> <li>MRL Method Reporting Limit</li> </ul>	BAnalyte detected in the associated Method BlankDFEValue exceeds method calibration rangeHJEstimated Value Analyte below reported detection limitMMDLMethod Dection Limit (unadjusted)MQLMRLMethod Reporting LimitN



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

## Memphis, TN 38133

Lab Order Number	10-081-0242
Lab ID	1003390-005A
Field ID	P5

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/22/10 1:00

Prep Method 3550B	Prep Batch	28791			Date/Time Prep	ped	03/24/10 14:44
	Default Vol/Wt	30 g	Sample Vol/Wt 30.8	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 10:21	MJ	44120
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 10:21	MJ	44120
Gasoline/Aviation Jet	No			1	04/05/10 10:21	MJ	44120
JP4	No			1	04/05/10 10:21	MJ	44120
JP5 / JP8	No			1	04/05/10 10:21	MJ	44120
JP7	No			1	04/05/10 10:21	MJ	44120
JP10	No			1	04/05/10 10:21	MJ	44120
JP18 / Turbine Jet Fuel	No			1	04/05/10 10:21	MJ	44120
Surrogate: o-Terphenyl		76 %	Limits: 50-150	1	04/05/10 10:21	MJ	44120

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	l	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

## Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-081-0242
Lab ID	1003390-006A
Field ID	P44

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

## **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/22/10 2:00

Compound	Default Vol/Wt Result	30 g Units	Sample Vol/Wt 30.1	g	Date/Time		Amplution
Compound	Result	Units					Analytical
			MQL	DF	Analyzed E		Batch
Diesel Range Organics (C10-	-C28) < 10.0	mg/Kg	10.0	1	04/05/10 10:34	MJ	44120
Oil Range Organics (>C28-C	40) < 10.0	mg/Kg	10.0	1	04/05/10 10:34	MJ	44120
Gasoline/Aviation Jet	No			1	04/05/10 10:34	MJ	44120
JP4	No			1	04/05/10 10:34	MJ	44120
JP5 / JP8	No			1	04/05/10 10:34	MJ	44120
JP7	No			1	04/05/10 10:34	MJ	44120
JP10	No			1	04/05/10 10:34	MJ	44120
JP18 / Turbine Jet Fuel	No			1	04/05/10 10:34	MJ	44120
Surrogate: o-Terphen	yl	75 %	Limits: 50-150	1	04/05/10 10:34	MJ	44120

	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
В	Analyte detected in the associated Method Blank	DF	Dilution Factor
E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
J	Estimated Value Analyte below reported detection limit	М	Minimum value
MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
	E J MDL MRL Q	<ul> <li>E Value exceeds method calibration range</li> <li>J Estimated Value Analyte below reported detection limit</li> <li>MDL Method Dection Limit (unadjusted)</li> <li>MRL Method Reporting Limit</li> </ul>	EValue exceeds method calibration rangeHJEstimated Value Analyte below reported detection limitMMDLMethod Dection Limit (unadjusted)MQLMRLMethod Reporting LimitNQRPD >40% between primary and confirmation columnsSQL



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-081-0242
Lab ID	1003390-007A
Field ID	P46

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/22/10 2:30

Prep Method 3550B	Prep Batch	28791			Date/Time Prep	ped	03/24/10 14:44
	Default Vol/Wt	30 g	Sample Vol/Wt 30.2	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 10:47	MJ	44120
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 10:47	MJ	44120
Gasoline/Aviation Jet	No			1	04/05/10 10:47	MJ	44120
JP4	No			1	04/05/10 10:47	MJ	44120
JP5 / JP8	No			1	04/05/10 10:47	MJ	44120
JP7	No			1	04/05/10 10:47	MJ	44120
JP10	No			1	04/05/10 10:47	MJ	44120
JP18 / Turbine Jet Fuel	No			1	04/05/10 10:47	MJ	44120
Surrogate: o-Terphenyl		68 %	Limits: 50-150	1	04/05/10 10:47	MJ	44120

*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
В	Analyte detected in the associated Method Blank	DF	Dilution Factor
E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
J	Estimated Value Analyte below reported detection limit	М	Minimum value
MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
	B E J MDL MRL	<ul> <li>B Analyte detected in the associated Method Blank</li> <li>E Value exceeds method calibration range</li> <li>J Estimated Value Analyte below reported detection limit</li> <li>MDL Method Dection Limit (unadjusted)</li> <li>MRL Method Reporting Limit</li> </ul>	B     Analyte detected in the associated Method Blank     DF       E     Value exceeds method calibration range     H       J     Estimated Value Analyte below reported detection limit     M       MDL     Method Dection Limit (unadjusted)     MQL       MRL     Method Reporting Limit     N



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-081-0242
Lab ID	1003390-008A
Field ID	P47

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/22/10 2:50

Prep Method 3550B	Prep Batch	28791			Date/Time Prep	ped	03/24/10 14:44
	Default Vol/Wt	30 g	Sample Vol/Wt 30.4	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 11:00	MJ	44120
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 11:00	MJ	44120
Gasoline/Aviation Jet	No			1	04/05/10 11:00	MJ	44120
JP4	No			1	04/05/10 11:00	MJ	44120
JP5 / JP8	No			1	04/05/10 11:00	MJ	44120
JP7	No			1	04/05/10 11:00	MJ	44120
JP10	No			1	04/05/10 11:00	MJ	44120
JP18 / Turbine Jet Fuel	No			1	04/05/10 11:00	MJ	44120
Surrogate: o-Terphenyl		87 %	Limits: 50-150	1	04/05/10 11:00	MJ	44120

Oualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/07/10 51	160 TRIST	TATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-081-0242
Lab ID	1003390-009A
Field ID	P48

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/22/10 3:00

Prep Method 3550B	Prep Batch	28791			Date/Time Prep	ped	03/24/10 14:44
	Default Vol/Wt	30 g	Sample Vol/Wt 30.7	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed E		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 11:13	MJ	44120
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 11:13	MJ	44120
Gasoline/Aviation Jet	No			1	04/05/10 11:13	MJ	44120
JP4	No			1	04/05/10 11:13	MJ	44120
JP5 / JP8	No			1	04/05/10 11:13	MJ	44120
JP7	No			1	04/05/10 11:13	MJ	44120
JP10	No			1	04/05/10 11:13	MJ	44120
JP18 / Turbine Jet Fuel	No			1	04/05/10 11:13	MJ	44120
Surrogate: o-Terphenyl		51 %	Limits: 50-150	1	04/05/10 11:13	MJ	44120

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-081-0242
Lab ID	1003390-010A
Field ID	P33

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/21/10 22:54

Prep Method 3550B	Prep Batch	28791			Date/Time Prep	ped	03/24/10 14:44
	Default Vol/Wt	30 g	Sample Vol/Wt 30.8	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 11:26	MJ	44120
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 11:26	MJ	44120
Gasoline/Aviation Jet	No			1	04/05/10 11:26	MJ	44120
JP4	No			1	04/05/10 11:26	MJ	44120
JP5 / JP8	No			1	04/05/10 11:26	MJ	44120
JP7	No			1	04/05/10 11:26	MJ	44120
JP10	No			1	04/05/10 11:26	MJ	44120
JP18 / Turbine Jet Fuel	No			1	04/05/10 11:26	MJ	44120
Surrogate: o-Terphenyl		42 %	* Limits: 50-150	1	04/05/10 11:26	MJ	44120

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/07/10 51	60 TRIST	TATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-081-0242
Lab ID	1003390-011A
Field ID	P37

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/21/10 23:53

Prep Method 3550B	Prep Batch	28791			Date/Time Prep	ped	03/24/10 14:44
	Default Vol/Wt	30 g	Sample Vol/Wt 30.3	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed E		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 11:39	MJ	44120
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 11:39	MJ	44120
Gasoline/Aviation Jet	No			1	04/05/10 11:39	MJ	44120
JP4	No			1	04/05/10 11:39	MJ	44120
JP5 / JP8	No			1	04/05/10 11:39	MJ	44120
JP7	No			1	04/05/10 11:39	MJ	44120
JP10	No			1	04/05/10 11:39	MJ	44120
JP18 / Turbine Jet Fuel	No			1	04/05/10 11:39	MJ	44120
Surrogate: o-Terphenyl		74 %	Limits: 50-150	1	04/05/10 11:39	MJ	44120

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/07/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-081-0242
Lab ID	1003390-012A
Field ID	P38

## ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/22/10 0:45

Prep Method 3550B	Prep Batch	28791			Date/Time Prep	ped	03/24/10 14:44
	Default Vol/Wt	30 g	Sample Vol/Wt 30.2	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed B		Batch
Diesel Range Organics (C10-C28)	30.9	mg/Kg	10.0	1	04/05/10 11:52	MJ	44120
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 11:52	MJ	44120
Gasoline/Aviation Jet	No			1	04/05/10 11:52	MJ	44120
JP4	No			1	04/05/10 11:52	MJ	44120
JP5 / JP8	No			1	04/05/10 11:52	MJ	44120
JP7	No			1	04/05/10 11:52	MJ	44120
JP10	No			1	04/05/10 11:52	MJ	44120
JP18 / Turbine Jet Fuel	No			1	04/05/10 11:52	MJ	44120
Surrogate: o-Terphenyl		78 %	Limits: 50-150	1	04/05/10 11:52	MJ	44120

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-081-0242
Lab ID	1003390-013A
Field ID	P41

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/22/10 1:49

Prep Method 3550B	Prep Batch	28791			Date/Time Prep	ped	03/24/10 14:44
	Default Vol/Wt	30 g	Sample Vol/Wt 31.6	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 12:05	MJ	44120
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 12:05	MJ	44120
Gasoline/Aviation Jet	No			1	04/05/10 12:05	MJ	44120
JP4	No			1	04/05/10 12:05	MJ	44120
JP5 / JP8	No			1	04/05/10 12:05	MJ	44120
JP7	No			1	04/05/10 12:05	MJ	44120
JP10	No			1	04/05/10 12:05	MJ	44120
JP18 / Turbine Jet Fuel	No			1	04/05/10 12:05	MJ	44120
Surrogate: o-Terphenyl		47 %	* Limits: 50-150	1	04/05/10 12:05	MJ	44120

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/07/10 516	0 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-081-0242
Lab ID	1003390-014A
Field ID	P45

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/22/10 2:31

Prep Method 3550B	Prep Batch	28791			Date/Time Prep	ped (	03/24/10 14:44
	Default Vol/Wt	30 g	Sample Vol/Wt 30.4	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed B		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 12:18	MJ	44120
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 12:18	MJ	44120
Gasoline/Aviation Jet	No			1	04/05/10 12:18	MJ	44120
JP4	No			1	04/05/10 12:18	MJ	44120
JP5 / JP8	No			1	04/05/10 12:18	MJ	44120
JP7	No			1	04/05/10 12:18	MJ	44120
JP10	No			1	04/05/10 12:18	MJ	44120
JP18 / Turbine Jet Fuel	No			1	04/05/10 12:18	MJ	44120
Surrogate: o-Terphenyl		68 %	Limits: 50-150	1	04/05/10 12:18	MJ	44120

*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
В	Analyte detected in the associated Method Blank	DF	Dilution Factor
Е	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
J	Estimated Value Analyte below reported detection limit	М	Minimum value
MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
	E J MDL MRL	<ul> <li>B Analyte detected in the associated Method Blank</li> <li>E Value exceeds method calibration range</li> <li>J Estimated Value Analyte below reported detection limit</li> <li>MDL Method Dection Limit (unadjusted)</li> <li>MRL Method Reporting Limit</li> </ul>	BAnalyte detected in the associated Method BlankDFEValue exceeds method calibration rangeHJEstimated Value Analyte below reported detection limitMMDLMethod Dection Limit (unadjusted)MQLMRLMethod Reporting LimitN



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-081-0242
Lab ID	1003390-015A
Field ID	P6

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/22/10

 Matrix
 Soil

 Sampled
 03/22/10 6:10

Prep Method 3550B	Prep Batch	28791			Date/Time Prep	ped	03/24/10 14:44
	Default Vol/Wt	30 g	Sample Vol/Wt 30.1	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed	By	Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 12:31	MJ	44120
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 12:31	MJ	44120
Gasoline/Aviation Jet	No			1	04/05/10 12:31	MJ	44120
JP4	No			1	04/05/10 12:31	MJ	44120
JP5 / JP8	No			1	04/05/10 12:31	MJ	44120
JP7	No			1	04/05/10 12:31	MJ	44120
JP10	No			1	04/05/10 12:31	MJ	44120
JP18 / Turbine Jet Fuel	No			1	04/05/10 12:31	MJ	44120
Surrogate: o-Terphenyl		73 %	Limits: 50-150	1	04/05/10 12:31	MJ	44120

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### **Cooler Receipt Form**

Customer Number: 05160			
Customer Name: Tri-State Testing Report Number: 10-081-0242			
Shippin	ng Method		
○ FedEx ○ UPS ○ US Postal Clien	t 🔿 LMP		Other:
Shipping container/cooler uncompromised?	• Yes	⊖ No	O Not Present
Custody seals intact on shipping container/cooler?	⊖ Yes	O No	Not Required
Custody seals intact on sample bottles?	O Yes	O No	Not Required
Chain of Custody present?	• Yes	O No	
COC agrees with sample labels?	Yes	O No	
Samples in proper containers?	Yes	O No	
Sample containers intact?	Yes	O No	
Sufficient sample volume for indicated tests?	Yes	O No	
All samples received within holding time?	Yes	O No	
Container temperature in compliance?	Yes	O No	
Water - VOA vials free of headspace?	⊖ Yes	O No	N/A
Water - Preservation acceptable upon receipt?	• Yes	O No	○ N/A
Samples screened for radioactivity (COE only)?	O Yes	O No	N/A
Special precautions or instructions included?	O Yes	No No	

Comr

its:			

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Brooke Shoup

Date & Time: 03/22/2010 10:44:19

0022901	luc.	ational Airnout		05160 2510-03-22 2510-03-22 0 42 19 <i>pH</i>	gerPrint	gerPrint	gerPrint		gerPrint	gerPrint	gerPrint	gerPrint	gerPrint	gerPrint				8280	nuan a	
REPORT NO. 1 C	U'5 %	PROJECT NAME: Memohis International Airport		Th-State Testing (GTW) Memohis International Airport	Method 8015 Jet Fuel FingerPrint	Method 8015 Jet Fuel FingerPrint	Method 8015 Jet Fuel FingerPrint	Method 8015 Jet Fuel FingerPrint	Method 8015 Jet Fuel FingerPrint	Method 8015 Jet Fuel FingerPrint	Method 8015 Jet Fuel FingerPrint	Method 8015 Jet Fuel FingerPrint	Method 8015 Jet Fuel FingerPrint	Method 8015 Jet Fuel FingerPrint	3Y: DATE/TIME:		DATE/TIME:	a.23.10	DATE/TIME:	14
	REPO	COLECT	SB	CONTAINE NO. OF	-	-	1	1	-	-	-	-	-	-	SHED B					E ONL
	UBMIT OMPA	PR	-	XIATAM	S	S	S	S	S	S	S	S	S	S	RELINQUISHED BY:		K LAB	ath		TORY US
DY RECORD	LLC. 33 -213-2440		Cont	SAMPLE LOCATION	P34 /1112.	P35 /11-12'	P.39 /22.5" - 12.	P40 10-12'	PS /11.5" - 12'	P44 / 11 - 12.	Pyle /11-12.	· e1 11/ tha	P48 /11 - 121		DATE/TIME: RE	122-10 0925	RECEIVED FOR LAB		ENED BY:	SHADED AREAS FOR LABORATORY USE ONLY!
OF CI	Memphis, FA	129	f Wo	TIME	11:00Pm	Ing of :11	MH 00.6	MH oc: S	mpro:1	2. Po Am	2:30 AM	2: 50 AM	S.ou AM		DATE	2-2	DBY:		COOLER OPENED BY	
CHAIN	LYTICA nitten Rd. 3-2400	E-9-429	A.	DATE	3/21/10	Wd of: 11 01/1 c/2	3/24/10 12:00 AM	3/22/10/22:20 AM	MANO:1 offerts	Allo 2:00 Am	MH VE: C ol rels	MA 02:50 allels	3122 1/0 Sion AM				SHIPPED BY:			
	GTW ANALYTICAL SERVICES, 2790 Whitten Rd. Memphis, TN 381, PHONE 901-213-2400 FAX 901	PERMIT/PROJECT NO.:	SAMPLER'S SIGNATURE:	SAMPLE NO.	P34	D35	P39	9 4	52	pyd		thd	She		SD BY:	3 of Can	METHOD OF SHIPMENT:		CONDITION OF COOLER/SEAL	2
	h	111/PR	LER'S	SEQ NO.											<b>RELINQUISHED BY:</b>		DD OF		NOIT	
		PERM	SAMP	LAB NO.		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1									KELIN	1	METHC		IGNO	

REPORT NO. 1 COL'290	Cray vices, Inc.	emphasized and a	Membrilly International Airnord	10-081-0242 05160 05160 05150 05150 05150 05150	Tri-State Testima (GTW) 0.42.15 H	Method 8015 Jet Fuel FinderPrint	Method 8015 Jet Fuel FingerPrint	Method 8015 Jet Firel FingerDrint	Method 8015 Jet Fuel FingerPrint	DATE/TIME:	-	DATE/TIME:	72.20 dl. 22.2	DATE/TIME:							
RE	RT TO: Da	PROJECT NAME: M			Tri-Stat Memph	Memod 8	Method 8	Method 8	Method 8	Method 8	Method 8	Method 8	Method 8	Method 8	Method 8	Y:					-
	T REPO	ROJECT	-		'ON	1	-	-	-	-	-	-	-	-	-	<b>RELINQUISHED BY:</b>					A LIVE ZO
	SUBMI' COMPA	bl	+	TRIX	VM	S	S	S	S	S	S	5	S	S	S	INDNIT		R LAB	4		II ARUL
CHAIN OF CUSTODY RECORD	V ANALYTICAL SERVICES, LLC. 2790 Whitten Rd. Memphis, TN 38133 901-213-2400 FAX 901-213-2440	29	Olin She M.			10:54 P-33/11" to 12	11:53PT P-37/ 5'32" to 12	- P-381	1:49 at PHI 10 1/2 to 12'	2:31 at P46/ 11" to 12'	6:1000 P-6 / 11" to 12'					DATE/TIME:	3-2-0-23	BY: RECEIVED FOR LAB		COOLEK OPENED BY:	SHADED AREAS FOR LARDRATORY LICE ONLY
NIN	YTICA en Rd. N 2400	E-9-429	1.7.00	DATE 1			321-10 1	3-22-10 12:45 4	3-22-10 1	3-22-10	3-22-10				_			SHIPPED BY:	-		
3	GTW ANALYTICAL SERVICES 2790 Whitten Rd. Memphis, TN 381 PHONE 901-213-2400 FAX 90		SAMPLER'S SIGNATURE:	SAMPLE		P-33 3	2-373	P-38 3	P-41 3-	22	P. 6 3.				200	0.61:	X- Boe		CONDITION OF COOLED/SEAL.	UNC CUC	
	Hd	WILLI'LIN	IPLER'S	seq NO.	-											- CUBRE	Bende	NUD OF S	TTION OF		
	DED	LEN	SAN	LAB											DCIT	VERI	X	METE	COND	THOO	



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

4/7/2010

Tri-State Testing Mr. David McCray 6756 Buckles Cove Memphis, TN, 38133

Ref: Analytical Testing Report Number: 10-082-0215 Project Description: Memphis International Airport Project #E-9-429

Dear Mr. David McCray:

GTW Analytical Services received 16 sample(s) on 3/23/2010 for the analyses presented in the following report.

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Quality Assurance, instrumentation maintenance and calibration were performed in accordance with guidelines established by the USEPA and NELAP.

The results are shown on the attached analysis sheet(s).

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,

Rendell H. Thomas

Randy Thomas Project Manager

APR 0 9 2010



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

CLIENT:	Tri-State Testing	<b>CASE NARRATIVE</b>
Project:	Memphis International Airport	Date: 04/07/10
Lab Order Number:	10-082-0215	GTW01

Fingerprint Analysis by Method 8015B Jet Fuels

Samples were extracted and analyzed by Method 8015B. Comparisons were made to the chromatographic library, with special attention given to Jet fuels. Results are reported for both Diesel Range Organics (C10-C28) and Oil Range Organics (>C28-C40), with quantitation achieved using Diesel Fuel and Motor Oil.

· t.,



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-082-0215
Lab ID	1003410-001A
Field ID	P-32

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/23/10

 Matrix
 Soil

 Sampled
 03/22/10 22:29

Prep Method 3550B	Prep Batch	28797			Date/Time Prep	ped (	3/25/10 9:26	
	Default Vol/Wt	30 g	Sample Vol/Wt 31 g		Date/Time		Analytical	
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 15:17	MJ	44131	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 15:17	MJ	44131	
Gasoline/Aviation Jet	No			1	04/05/10 15:17	MJ	44131	
JP4	No			1	04/05/10 15:17	MJ	44131	
JP5 / JP8	No			1	04/05/10 15:17	MJ	44131	
JP7	No			1	04/05/10 15:17	MJ	44131	
JP10	No			1	04/05/10 15:17	MJ	44131	
JP18 / Turbine Jet Fuel	No			1	04/05/10 15:17	MJ	44131	
Surrogate: o-Terphenyl		67 %	Limits: 50-150	1	04/05/10 15:17	MJ	44131	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/07/10 510	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-082-0215
Lab ID	1003410-002A
Field ID	P-50

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/23/10

 Matrix
 Soil

 Sampled
 03/22/10 23:40

Prep Method 3550B	Prep Batch	28797			Date/Time Prep	ped	03/25/10 9:26
	Default Vol/Wt	30 g	Sample Vol/Wt 30.4	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 15:30	MJ	44131
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 15:30	MJ	44131
Gasoline/Aviation Jet	No			1	04/05/10 15:30	MJ	44131
JP4	No			1	04/05/10 15:30	MJ	44131
JP5 / JP8	No			1	04/05/10 15:30	MJ	44131
JP7	No			1	04/05/10 15:30	MJ	44131
JP10	No			1	04/05/10 15:30	MJ	44131
JP18 / Turbine Jet Fuel	No			1	04/05/10 15:30	MJ	44131
Surrogate: o-Terphenyl		66 %	Limits: 50-150	1	04/05/10 15:30	MJ	44131

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/07/10 51	160 TRIST	LATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-082-0215	
Lab ID	1003410-003A	
Field ID	P-51	

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/23/10

 Matrix
 Soil

 Sampled
 03/22/10 0:09

Prep Method 3550B	Prep Batch	28797			Date/Time Prep	ped 0	3/25/10 9:26
	Default Vol/Wt	30 g	Sample Vol/Wt 30.3	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 15:43	MJ	44131
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 15:43	MJ	44131
Gasoline/Aviation Jet	No			1	04/05/10 15:43	MJ	44131
JP4	No			1	04/05/10 15:43	MJ	44131
JP5 / JP8	No			1	04/05/10 15:43	MJ	44131
JP7	No			1	04/05/10 15:43	MJ	44131
JP10	No			1	04/05/10 15:43	MJ	44131
JP18 / Turbine Jet Fuel	No			1	04/05/10 15:43	MJ	44131
Surrogate: o-Terphenyl		66 %	Limits: 50-150	1	04/05/10 15:43	MJ	44131

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/07/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-082-0215
Lab ID	1003410-004A
Field ID	P-8

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/23/10

 Matrix
 Soil

 Sampled
 03/23/10 0:59

Prep Method 3550B	Prep Batch	28797			Date/Time Prep	ped 0	3/25/10 9:26
	Default Vol/Wt	30 g	Sample Vol/Wt 30.1	g Date/Time DF Analyzed		Analyti	
Compound	Result	Units	MQL			Ву	Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 15:56	MJ	44131
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 15:56	MJ	44131
Gasoline/Aviation Jet	No			1	04/05/10 15:56	MJ	44131
JP4	No			1	04/05/10 15:56	MJ	44131
JP5 / JP8	No			1	04/05/10 15:56	MJ	44131
JP7	No			1	04/05/10 15:56	MJ	44131
JP10	No			1	04/05/10 15:56	MJ	44131
JP18 / Turbine Jet Fuel	No			1	04/05/10 15:56	MJ	44131
Surrogate: o-Terphenyl		51 %	Limits: 50-150	1	04/05/10 15:56	MJ	44131

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high backgroun
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/07/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-082-0215
Lab ID	1003410-005A
Field ID	P-58

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/23/10

 Matrix
 Soil

 Sampled
 03/23/10 1:50

Prep Method 3550B	Prep Batch	28797			Date/Time Prep	oed 0	3/25/10 9:26
	Default Vol/Wt	30 g	Sample Vol/Wt 30.1 g		Date/Time		Analytical
Compound	Result	Units	MQL	DF	DF Analyzed		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 16:09	MJ	44131
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 16:09	MJ	44131
Gasoline/Aviation Jet	No			1	04/05/10 16:09	MJ	44131
JP4	No			1	04/05/10 16:09	MJ	44131
JP5 / JP8	No			1	04/05/10 16:09	MJ	44131
JP7	No			1	04/05/10 16:09	MJ	44131
JP10	No			1	04/05/10 16:09	MJ	44131
JP18 / Turbine Jet Fuel	No			1	04/05/10 16:09	MJ	44131
Surrogate: o-Terphenyl		65 %	Limits: 50-150	1	04/05/10 16:09	MJ	44131

*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
В	Analyte detected in the associated Method Blank	DF	Dilution Factor
E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
J	Estimated Value Analyte below reported detection limit	М	Minimum value
MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
	B E J MDL MRL	<ul> <li>B Analyte detected in the associated Method Blank</li> <li>E Value exceeds method calibration range</li> <li>J Estimated Value Analyte below reported detection limit</li> <li>MDL Method Dection Limit (unadjusted)</li> <li>MRL Method Reporting Limit</li> </ul>	B       Analyte detected in the associated Method Blank       DF         E       Value exceeds method calibration range       H         J       Estimated Value Analyte below reported detection limit       M         MDL       Method Dection Limit (unadjusted)       MQL         MRL       Method Reporting Limit       N



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-082-0215
Lab ID	1003410-006A
Field ID	P-60

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/23/10

 Matrix
 Soil

 Sampled
 03/23/10 3:14

Default Vol/Wt         30 g         Sample Vol/Wt         30.9 g         Date/Time           Compound         Result         Units         MQL         DF         Analyzed         By           Diesel Range Organics (C10-C28)         <10.0         mg/Kg         10.0         1         04/05/10         17:14         MJ           Oil Range Organics (>C28-C40)         <10.0         mg/Kg         10.0         1         04/05/10         17:14         MJ           Gasoline/Aviation Jet         No         1         04/05/10         17:14         MJ           JP4         No         1         04/05/10         17:14         MJ           JP5 / JP8         No         1         04/05/10         17:14         MJ           JP7         No         1         04/05/10         17:14         MJ           JP10         No         1         04/05/10         17:14         MJ           JP18 / Turbine Jet Fuel         No         1         04/05/10         17:14         MJ	/25/10 9:26	<b>d</b> 0	ne Prepped	Date/Tim				28797	Prep Batch	3550B	Prep Method
Diesel Range Organics (C10-C28)         < 10.0	Analytical		ime	Date/T	g	ol/Wt 30.9	Sample V	30 g	Default Vol/Wt		
Oil Range Organics (>C28-C40)       < 10.0       mg/Kg       10.0       1       04/05/10       17:14       MJ         Gasoline/Aviation Jet       No       1       04/05/10       17:14       MJ         JP4       No       1       04/05/10       17:14       MJ         JP5 / JP8       No       1       04/05/10       17:14       MJ         JP7       No       1       04/05/10       17:14       MJ         JP10       No       1       04/05/10       17:14       MJ         JP18 / Turbine Jet Fuel       No       1       04/05/10       17:14       MJ	Batch	By Batch		Analyzed		MQL D		Units	Result	Compound	
Gasoline/Aviation Jet         No         1         04/05/10         17:14         MJ           JP4         No         1         04/05/10         17:14         MJ           JP5 / JP8         No         1         04/05/10         17:14         MJ           JP7         No         1         04/05/10         17:14         MJ           JP10         No         1         04/05/10         17:14         MJ           JP18 / Turbine Jet Fuel         No         1         04/05/10         17:14         MJ	44131	MJ	17:14	04/05/10	1	10.0		mg/Kg	< 10.0	Organics (C10-C28)	Diesel Range O
JP4     No     1     04/05/10     17:14     MJ       JP5 / JP8     No     1     04/05/10     17:14     MJ       JP7     No     1     04/05/10     17:14     MJ       JP10     No     1     04/05/10     17:14     MJ       JP18 / Turbine Jet Fuel     No     1     04/05/10     17:14     MJ	44131	MJ	17:14 M	04/05/10	1	10.0		mg/Kg	< 10.0	anics (>C28-C40)	Oil Range Organ
JP5 / JP8     No     1     04/05/10     17:14     MJ       JP7     No     1     04/05/10     17:14     MJ       JP10     No     1     04/05/10     17:14     MJ       JP18 / Turbine Jet Fuel     No     1     04/05/10     17:14     MJ	44131	MJ	17:14	04/05/10	1				No	tion Jet	Gasoline/Aviat
JP7         No         1         04/05/10         17:14         MJ           JP10         No         1         04/05/10         17:14         MJ           JP18 / Turbine Jet Fuel         No         1         04/05/10         17:14         MJ	44131	MJ	17:14	04/05/10	1				No		JP4
JP10         No         1         04/05/10         17:14         MJ           JP18 / Turbine Jet Fuel         No         1         04/05/10         17:14         MJ	44131	MJ	17:14	04/05/10	1				No		JP5 / JP8
JP18 / Turbine Jet Fuel No 1 04/05/10 17:14 MJ	44131	MJ	17:14	04/05/10	1				No		JP7
JP18 / Turbine Jet Fuel No 1 04/05/10 17:14 MJ	44131	MJ	17:14	04/05/10	1				No		JP10
	44131				1				No	Jet Fuel	JP18 / Turbine
Surrogate: o-Terphenyl 67 % Limits: 50-150 1 04/05/10 17:14 MJ	44131			04/05/10	1	50-150	Limits:	67 %		e: o-Terphenyl	Surrogate

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/07/10 516	50 TRIST	ATE_GTW		



Project

Description Airport

Project No. E-9-429

2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

**Memphis International** 

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-082-0215
Lab ID	1003410-007A
Field ID	P-61

**Report of Analysis** 

 Received
 03/23/10

 Matrix
 Soil

 Sampled
 03/23/10 2:54

Prep Method 3550B	Prep Batch	28797			Date/Time Prep	ped	03/25/10 9:26	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.2	g	Date/Time		Analytical	
Compound	Result	Units	MQL DF		F Analyzed		By Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 17:27	MJ	44131	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 17:27	MJ	44131	
Gasoline/Aviation Jet	No			1	04/05/10 17:27	MJ	44131	
JP4	No			1	04/05/10 17:27	MJ	44131	
JP5 / JP8	No			1	04/05/10 17:27	MJ	44131	
JP7	No			1	04/05/10 17:27	MJ	44131	
JP10	No			1	04/05/10 17:27	MJ	44131	
JP18 / Turbine Jet Fuel	No			1	04/05/10 17:27	MJ	44131	
Surrogate: o-Terphenyl		69 %	Limits: 50-150	1	04/05/10 17:27	MJ	44131	

*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
В	Analyte detected in the associated Method Blank	DF	Dilution Factor
E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
J	Estimated Value Analyte below reported detection limit	М	Minimum value
MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
	E J MDL MRL	<ul> <li>B Analyte detected in the associated Method Blank</li> <li>E Value exceeds method calibration range</li> <li>J Estimated Value Analyte below reported detection limit</li> <li>MDL Method Dection Limit (unadjusted)</li> <li>MRL Method Reporting Limit</li> </ul>	BAnalyte detected in the associated Method BlankDFEValue exceeds method calibration rangeHJEstimated Value Analyte below reported detection limitMMDLMethod Dection Limit (unadjusted)MQLMRLMethod Reporting LimitN



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-082-0215
Lab ID	1003410-008A
Field ID	P-62

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/23/10

 Matrix
 Soil

 Sampled
 03/23/10 3:52

Prep Method 3550B	Prep Batch	28797			Date/Time Prep	ped 0	3/25/10 9:26	
	Default Vol/Wt	30 g	Sample Vol/Wt 30 g		Date/Time		Analytical	
Compound	Result	Units	MQL	DF	Analyzed By		Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 17:40	MJ	44131	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 17:40	MJ	44131	
Gasoline/Aviation Jet	No			1	04/05/10 17:40	MJ	44131	
JP4	No			1	04/05/10 17:40	MJ	44131	
JP5 / JP8	No			1	04/05/10 17:40	MJ	44131	
JP7	No			1	04/05/10 17:40	MJ	44131	
JP10	No			1	04/05/10 17:40	MJ	44131	
JP18 / Turbine Jet Fuel	No			1	04/05/10 17:40	MJ	44131	
Surrogate: o-Terphenyl		53 %	Limits: 50-150	1	04/05/10 17:40	MJ	44131	

*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
В	Analyte detected in the associated Method Blank	DF	Dilution Factor
Е	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
J	Estimated Value Analyte below reported detection limit	М	Minimum value
MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
MRL	Method Reporting Limit	Ν	Refer to attached Non-Compliance Report
Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
	B E J MDL MRL	<ul> <li>B Analyte detected in the associated Method Blank</li> <li>E Value exceeds method calibration range</li> <li>J Estimated Value Analyte below reported detection limit</li> <li>MDL Method Dection Limit (unadjusted)</li> <li>MRL Method Reporting Limit</li> </ul>	BAnalyte detected in the associated Method BlankDFEValue exceeds method calibration rangeHJEstimated Value Analyte below reported detection limitMMDLMethod Dection Limit (unadjusted)MQLMRLMethod Reporting LimitN



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-082-0215
Lab ID	1003410-009A
Field ID	P-42

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/23/10

 Matrix
 Soil

 Sampled
 03/22/10 22:36

Prep Method 3550B	Prep Batch	28797			Date/Time Prep	ped	03/25/10 9:26	
	Default Vol/Wt	30 g	Sample Vol/Wt 30 g		Date/Time		Analytical	
Compound	Result	Units	MQL	DF	Analyzed B		y Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 17:53	MJ	44131	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 17:53	MJ	44131	
Gasoline/Aviation Jet	No			1	04/05/10 17:53	MJ	44131	
JP4	No			1	04/05/10 17:53	MJ	44131	
JP5 / JP8	No			1	04/05/10 17:53	MJ	44131	
JP7	No			1	04/05/10 17:53	MJ	44131	
JP10	No			1	04/05/10 17:53	MJ	44131	
JP18 / Turbine Jet Fuel	No			1	04/05/10 17:53	MJ	44131	
Surrogate: o-Terphenyl		61 %	Limits: 50-150	1	04/05/10 17:53	MJ	44131	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/07/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-082-0215
Lab ID	1003410-010A
Field ID	P-49

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

Report of AnalysisReceived03/23/10MatrixSoilSampled03/22/10 22:56

Prep Method 3550B	Prep Batch	28797			Date/Time Prep	ped (	3/25/10 9:26	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.5	g	Date/Time		Analytical	
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 18:06	MJ	44131	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 18:06	MJ	44131	
Gasoline/Aviation Jet	No			1	04/05/10 18:06	MJ	44131	
JP4	No			1	04/05/10 18:06	MJ	44131	
JP5 / JP8	No			1	04/05/10 18:06	MJ	44131	
JP7	No			1	04/05/10 18:06	MJ	44131	
JP10	No			1	04/05/10 18:06	MJ	44131	
JP18 / Turbine Jet Fuel	No			1	04/05/10 18:06	MJ	44131	
Surrogate: o-Terphenyl		63 %	Limits: 50-150	1	04/05/10 18:06	MJ	44131	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/07/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-082-0215
Lab ID	1003410-011A
Field ID	P-52

## ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/23/10

 Matrix
 Soil

 Sampled
 03/23/10 0:10

Prep Method 3550B	Prep Batch	28797			Date/Time Prep	ped (	3/25/10 9:26	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.1	g	Date/Time		Analytical	
Compound	Result	Units	MQL DF		Analyzed B		by Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 18:19	MJ	44131	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 18:19	MJ	44131	
Gasoline/Aviation Jet	No			1	04/05/10 18:19	MJ	44131	
JP4	No			1	04/05/10 18:19	MJ	44131	
JP5 / JP8	No			1	04/05/10 18:19	MJ	44131	
JP7	No			1	04/05/10 18:19	MJ	44131	
JP10	No			1	04/05/10 18:19	MJ	44131	
JP18 / Turbine Jet Fuel	No			1	04/05/10 18:19	MJ	44131	
Surrogate: o-Terphenyl		62 %	Limits: 50-150	1	04/05/10 18:19	MJ	44131	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	Μ	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/07/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 218-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-082-0215
Lab ID	1003410-012A
Field ID	P-56

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/23/10

 Matrix
 Soil

 Sampled
 03/23/10 0:35

Prep Method 3550B	Prep Batch	28797			Date/Time Prep	ped (	03/25/10 9:26	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.2 g		Date/Time		Analytical	
Compound	Result	Units	MQL	DF	Analyzed	Ву	y Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 18:32	MJ	44131	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 18:32	MJ	44131	
Gasoline/Aviation Jet	No			1	04/05/10 18:32	MJ	44131	
JP4	No			1	04/05/10 18:32	MJ	44131	
JP5 / JP8	No			1	04/05/10 18:32	MJ	44131	
JP7	No			1	04/05/10 18:32	MJ	44131	
JP10	No			1	04/05/10 18:32	MJ	44131	
JP18 / Turbine Jet Fuel	No			1	04/05/10 18:32	MJ	44131	
Surrogate: o-Terphenyl		76 %	Limits: 50-150	1	04/05/10 18:32	MJ	44131	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/07/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-082-0215
Lab ID	1003410-013A
Field ID	P-57

## ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/23/10

 Matrix
 Soil

 Sampled
 03/23/10 2:00

Compound         Result         Units         MQL         DF         Analyzed         By           Diesel Range Organics (C10-C28)         < 10.0         mg/Kg         10.0         1         04/05/10         18:46         MJ           Oil Range Organics (>C28-C40)         < 10.0         mg/Kg         10.0         1         04/05/10         18:46         MJ           Gasoline/Aviation Jet         No         1         04/05/10         18:46         MJ           JP4         No         1         04/05/10         18:46         MJ           JP5 / JP8         No         1         04/05/10         18:46         MJ           JP7         No         1         04/05/10         18:46         MJ           JP10         No         1         04/05/10         18:46         MJ           JP18 / Turbine Jet Fuel         No         1         04/05/10         18:46         MJ	Method 3550B	Prep Batch	28797			Date/Time Prep	ped (	03/25/10 9:26
Diesel Range Organics (C10-C28)         < 10.0		Default Vol/Wt	30 g	Sample Vol/Wt 30.2	g			Analytical
Oil Range Organics (>C28-C40)       < 10.0	pound	Result	Units	MQL	DF			Batch
Gasoline/Aviation Jet       No       1       04/05/10       18:46       MJ         JP4       No       1       04/05/10       18:46       MJ         JP5 / JP8       No       1       04/05/10       18:46       MJ         JP7       No       1       04/05/10       18:46       MJ         JP10       No       1       04/05/10       18:46       MJ         JP18 / Turbine Jet Fuel       No       1       04/05/10       18:46       MJ	Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 18:46	MJ	44131
JP4     No     1     04/05/10     18:46     MJ       JP5 / JP8     No     1     04/05/10     18:46     MJ       JP7     No     1     04/05/10     18:46     MJ       JP10     No     1     04/05/10     18:46     MJ       JP18 / Turbine Jet Fuel     No     1     04/05/10     18:46     MJ	ange Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 18:46	MJ	44131
JP5 / JP8     No     1     04/05/10     18:46     MJ       JP7     No     1     04/05/10     18:46     MJ       JP10     No     1     04/05/10     18:46     MJ       JP18 / Turbine Jet Fuel     No     1     04/05/10     18:46     MJ	line/Aviation Jet	No			1	04/05/10 18:46	MJ	44131
JP7         No         1         04/05/10         18:46         MJ           JP10         No         1         04/05/10         18:46         MJ           JP18 / Turbine Jet Fuel         No         1         04/05/10         18:46         MJ		No			1	04/05/10 18:46	MJ	44131
No         1         04/05/10         18:46         MJ           JP10         No         1         04/05/10         18:46         MJ           JP18 / Turbine Jet Fuel         No         1         04/05/10         18:46         MJ	JP8	No			1	04/05/10 18:46	MJ	44131
JP18 / Turbine Jet Fuel No 1 04/05/10 18:46 MJ		No			1	04/05/10 18:46	MJ	44131
1 04/03/10 18.46 WJ		No			1	04/05/10 18:46	MJ	44131
	/ Turbine Jet Fuel	No			1	04/05/10 18:46		44131
Surrogate. 0-reprietyr 66 % Limits: 50-150 1 04/05/10 18:46 MJ	Surrogate: o-Terphenyl		66 %	Limits: 50-150	1	04/05/10 18:46	MJ	44131

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/07/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-082-0215
Lab ID	1003410-014A
Field ID	P-59

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/23/10

 Matrix
 Soil

 Sampled
 03/23/10 2:30

Prep Method 3550B	Prep Batch	28797			Date/Time Prep	ped (	3/25/10 9:26
	Default Vol/Wt	30 g	Sample Vol/Wt 30.3	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 18:59	MJ	44131
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 18:59	MJ	44131
Gasoline/Aviation Jet	No			1	04/05/10 18:59	MJ	44131
JP4	No			1	04/05/10 18:59	MJ	44131
JP5 / JP8	No			1	04/05/10 18:59	MJ	44131
JP7	No			1	04/05/10 18:59	MJ	44131
JP10	No			1	04/05/10 18:59	MJ	44131
JP18 / Turbine Jet Fuel	No			1	04/05/10 18:59	MJ	44131
Surrogate: o-Terphenyl		59 %	Limits: 50-150	1	04/05/10 18:59	MJ	44131

Analyte detected in the associated Method Blank Value exceeds method calibration range	DF H	Dilution Factor Prepped / Analyzed out of holding time.
5	Н	Prepped / Analyzed out of holding time.
Estimated Value Analyte below reported detection limit	М	Minimum value
Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
Method Reporting Limit	N	Refer to attached Non-Compliance Report
RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-082-0215
Lab ID	1003410-015A
Field ID	P-43

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/23/10

 Matrix
 Soil

 Sampled
 03/23/10 3:05

Prep Method 3550B	Prep Batch	28797			Date/Time Prep	ped (	3/25/10 9:26
	Default Vol/Wt	30 g	Sample Vol/Wt 30.8	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 19:12	MJ	44131
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 19:12	MJ	44131
Gasoline/Aviation Jet	No			1	04/05/10 19:12	MJ	44131
JP4	No			1	04/05/10 19:12	MJ	44131
JP5 / JP8	No			1	04/05/10 19:12	MJ	44131
JP7	No			1	04/05/10 19:12	MJ	44131
JP10	No			1	04/05/10 19:12	MJ	44131
JP18 / Turbine Jet Fuel	No			1	04/05/10 19:12	MJ	44131
Surrogate: o-Terphenyl		54 %	Limits: 50-150	1	04/05/10 19:12	MJ	44131

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/07/10 5	160 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-082-0215
Lab ID	1003410-016A
Field ID	P-9

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/23/10

 Matrix
 Soil

 Sampled
 03/23/10 3:45

Prep Method 3550B	Prep Batch	28797			Date/Time Prep	ped 0	3/25/10 9:26
	Default Vol/Wt	30 g	Sample Vol/Wt 30.1	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/05/10 19:25	MJ	44131
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/05/10 19:25	MJ	44131
Gasoline/Aviation Jet	No			1	04/05/10 19:25	MJ	44131
JP4	No			1	04/05/10 19:25	MJ	44131
JP5 / JP8	No			1	04/05/10 19:25	MJ	44131
JP7	No			1	04/05/10 19:25	MJ	44131
JP10	No			1	04/05/10 19:25	MJ	44131
JP18 / Turbine Jet Fuel	No			1	04/05/10 19:25	MJ	44131
Surrogate: o-Terphenyl		58 %	Limits: 50-150	1	04/05/10 19:25	MJ	44131

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	H	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/07/10 510	60 TRIST	TATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### **Cooler Receipt Form**

Customer Number: 05160			
Customer Name: Tri-State Testing			
Report Number: 10-082-0215			
Shippin	g Method		
○ FedEx ○ UPS ○ US Postal Client			Other:
Shipping container/cooler uncompromised?	• Yes	⊖ No	O Not Present
Custody seals intact on shipping container/cooler?	⊖ Yes	O No	Not Required
Custody seals intact on sample bottles?	⊖ Yes	O No	Not Required
Chain of Custody present?	Yes	O No	
COC agrees with sample labels?	• Yes	O No	
Samples in proper containers?	Yes	O No	
Sample containers intact?	Yes	O No	
Sufficient sample volume for indicated tests?	Yes	O No	
All samples received within holding time?	Yes	O No	
Container temperature in compliance?	Yes	O No	
Water - VOA vials free of headspace?	⊖ Yes	O No	N/A
Water - Preservation acceptable upon receipt?	⊖ Yes	O No	N/A
Samples screened for radioactivity (COE only)?	◯ Yes	O No	• N/A
Special precautions or instructions included?	⊖ Yes	No No	

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Rebekah Ross

Date & Time: 03/23/2010 10:25:08

		V	Airpo	I AB WEL		1.3	1.5		111	1.5		1.17		The .					
REPORT NO.	OMPANY: Tri-State Testing Services, Inc.	PROJECT NAME: Memohis International Aires		REMARKS	(.) E1C.)	Method 8015 Jet Fuel FingerPrint	: DATE/TIME;	DATE/TIME:	3.23.10 0935										
11	NY: J	COJEC	S	90.0P	N			-	-	-	-	-	-	-	-	<b>RELINQUISHED BY:</b>			ONEN
	AMPA	PR	-	XIATRIX	V	0 0	0 0	0	0	0	n	S	S	0	S	ISINON	AB	2	14 C
10-082-0215 05160 W) 2010-02-23 W) 0:24:54	FAX 901-213-2440	000	Staddy	SAMPLE LOCATION	D-27 / 111 1 101	P-50/	P-E1 / 1'1"	1 "" 10	111	1 40 12	11		r-62/1, to 12'		-	0) 0935	RECEIVED FOR LAB		SHADED AREAS FOR LABORATORY USE ONLY
Tri-State Testing (GTW) Memohis International Alroon	FI	E-9-429	cellin	TIME	a 10:29 PM	3-2240 11 40 PM	12.09 mm P-EI	5-23-10 12:59 P-8	1:38	3:14	12.0	E SIE O	70.0		DATP/TIME.	3/2	DBY:	COOLER OPENED BY	
	hit 3-2400	6- 1	3	DATE	3-22-10	3-22-10	3-22-10	5-23-10	3-23-10	3-23-10	3-2340	3-23-10				h	SHIPPED BY:	-	_
C GTW ANAL	PERMIT/PROJECT NO	14		SAMPLE NO.	P- 32	P-50	P-51	6-0	00	1			T		ABY:	D. Wel	SHIPMENT	CONDITION OF COOLER/SEAL:	
	PI PR	LER'S		SEQ NO.											<b>eanstrong</b>		HOD OF SI	ON OF	
	DERM	AMP		LAB NO.	Ser.						1.3	Trie I	12.in	Ales. L	-ONIG	>	INHI	ITION	

2	0		Airnort		LAB PH				and the second	A ANDER			E.e.	1. 1.		A Star of the				
	SUBMIT REPORT TO: David D. McCray COMPANY: Tri-State Testing Services Inc.	CONTACT: David McCray • 901-385-1199	PROJECT NAME: Memphis International Airnort		REMARKS (ANALYSES, ETC.)	Mothod 0045 1-4 7	meriou ou io Jet Fuel FingerPrint	method 8015 Jet Fuel FingerPrint	Method 8015 Jet Fuel FingerPrint	Method 8015 Jet Fuel FingerPrint	Method 8015 Jet Fuel FingerPrint	Method 8015 Jet Fuel FingerPrint	Method 8015 Jet Fuel FingerPrint	Method 8015 Jet Fuel FingerPrint	Method 8015 Jet Fuel FingerPrint	Method 8015 Jet Fuel FingerPrint	DATE/TME:	DATE/TIMF.	\$.23.10 0935 DATETIME	
	REPC	CL D	COLECT	52	TO OF	-			-	-	-	-	-	-	1	-	RELINQUISHED BY.			ONLY
	TIMBU DMPA	ATNO	r.		XLATAN	0	0	0	0	S	S	S	S	S	0	0	SINON	LAB		RY USE
CHAIN OF CUSTODY RECORD	TC.	FAX 901-213-2440	-	K	SAMPLE LOCATION	117.31 KHO	and with	~	19- 40 000	156 /11 -12	P57 /1" - 12.	P59 12/21-12.		P9 /11/2"-12.			10 00935		VED BY:	SHADED AREAS FOR LABORATORY USE ONLY
IN OF C	W ANALYTICAL SERVICES, I 2790 Whitten Rd. Memphis, TN 38133 901-213-2400	UCY	-423	5766	TIME	10:360	3/20/10 12:4 PM	7135/10 12. 10 And	1			WHOS . P allerts		3/25/10 2.45/104			3/23	SHIPPED BY:	COOLER OPENED BY:	
CHA	LYTY hitten R		P.		DATE	ellects	3/20/2	3112112	112/12	allerte	alsets	ollerts	orterts	alste			5	SHIPP		_
	GTW ANALYTI 2790 Whitten R PHONE 901-213-2400	PERMIT/PROJECT NO .:	SAMPLER'S SIGNATTIRF.		SAMPLE NO.	PAS	P49	P53	1		124	110	~			) BY:	May	SHIPMENT: C	CONDITION OF COOLER/SEAL:	
	E	IT/PRO	LER'S		SEQ NO.				2	,	0	7	7	1	1	RELINQUISHED BY	R	HOUD OF SI	ON OF	
		PERM	SAMP		L4B NO.			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		12	1. 1 M 1		大学			IUNI	X	CHOH	LLICING	



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

4/8/2010

Tri-State Testing Mr. David McCray 6756 Buckles Cove Memphis, TN, 38133

Ref: Analytical Testing Report Number: 10-083-0206 Project Description: Memphis International Airport Project #E-9-429

Dear Mr. David McCray:

GTW Analytical Services received 1 sample(s) on 3/24/2010 for the analyses presented in the following report.

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Quality Assurance, instrumentation maintenance and calibration were performed in accordance with guidelines established by the USEPA and NELAP.

The results are shown on the attached analysis sheet(s).

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,

Randell H. Thomas

Randy Thomas Project Manager

APR 1 2 2010 BY:-----



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

CLIENT:	Tri-State Testing	CASE NARRATIVE		
Project:	Memphis International Airport	Date: 04/08/10		
Lab Order Num	ber: 10-083-0206	Date: 04/08/10		
		GTW01		

Fingerprint Analysis by Method 8015B Jet Fuels

Samples were extracted and analyzed by Method 8015B. Comparisons were made to the chromatographic library, with special attention given to Jet fuels. Results are reported for both Diesel Range Organics (C10-C28) and Oil Range Organics (>C28-C40), with quantitation achieved using Diesel Fuel and Motor Oil.

The following sample indicated contamination in Diesel Range Organics (C10-C28) which may be degraded JP5/8.

1003427-011A (P67)

The following sample(s) indicated contamination in Diesel Range Organics (C10-C28) and Oil Range Organics (>C28-C40), which consisted of non-specific contamination. 1003427-002A (P53) 1003427-003A (P7)



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-083-0206
Lab ID	1003427-001A
Field ID	P65

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

Received03/24/10MatrixSoilSampled03/23/10 22:45

Prep Batch	28823			Date/Time Prepped Date/Time		03/27/10 5:30 Analytical
Default Vol/Wt	30 g	Sample Vol/Wt 31	7 g			
Result	Units	MQL	DF	Analyzed By	Batch	
< 10.0	mg/Kg	10.0	1	04/06/10 9:51	MJ	44150
< 10.0	mg/Kg	10.0	1	04/06/10 9:51	MJ	44150
No			1	04/06/10 9:51	MJ	44150
No			1	04/06/10 9:51		44150
No			1			44150
No			1	04/06/10 9:51		44150
No			1			44150
No			1			44150
	67 %	Limits: 50-150	1	04/06/10 9:51	MJ	44150
	Result < 10.0 < 10.0 No No No No	Result         Units           < 10.0	Result         Units         MQL           < 10.0	Result         Units         MQL         DF           < 10.0	Result         Units         MQL         DF         Analyzed           < 10.0	Result         Units         MQL         DF         Analyzed         By           < 10.0

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/08/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-083-0206
Lab ID	1003427-002A
Field ID	P53

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/24/10

 Matrix
 Soil

 Sampled
 03/23/10 23:08

Prep Method 3550B	Prep Batch	28823			Date/Time Prep	ped (	3/27/10 5:30
	Default Vol/Wt	30 g	Sample Vol/Wt 30.3	Bg	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed I		Batch
Diesel Range Organics (C10-C28)	12.5	mg/Kg	10.0	1	04/06/10 10:04	MJ	44150
Oil Range Organics (>C28-C40)	16.3	mg/Kg	10.0	1	04/06/10 10:04	MJ	44150
Gasoline/Aviation Jet	No			1	04/06/10 10:04	MJ	44150
JP4	No			1	04/06/10 10:04	MJ	44150
JP5 / JP8	No			1	04/06/10 10:04	MJ	44150
JP7	No			1	04/06/10 10:04	MJ	44150
JP10	No			1	04/06/10 10:04	MJ	44150
JP18 / Turbine Jet Fuel	No			1	04/06/10 10:04	MJ	44150
Surrogate: o-Terphenyl		70 %	Limits: 50-150	1	04/06/10 10:04	MJ	44150

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	1	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/08/10 51	60 TRIST	TATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-083-0206
Lab ID	1003427-003A
Field ID	P7

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/24/10

 Matrix
 Soil

 Sampled
 03/23/10 23:30

Prep Method 3550B	Prep Batch	28823			Date/Time Prep	ped (	03/27/10 5:30
	Default Vol/Wt	30 g	Sample Vol/Wt 30.4	g	Date/Time		Analytical
Compound	Result	Units	MQL DF		F Analyzed		Batch
Diesel Range Organics (C10-C28)	11.9	mg/Kg	10.0	1	04/06/10 10:17	MJ	44150
Oil Range Organics (>C28-C40)	15.5	mg/Kg	10.0	1	04/06/10 10:17	MJ	44150
Gasoline/Aviation Jet	No			1	04/06/10 10:17	MJ	44150
JP4	No			1	04/06/10 10:17	MJ	44150
JP5 / JP8	No			1	04/06/10 10:17	MJ	44150
JP7	No			1	04/06/10 10:17	MJ	44150
JP10	No			1	04/06/10 10:17	MJ	44150
JP18 / Turbine Jet Fuel	No			1	04/06/10 10:17	MJ	44150
Surrogate: o-Terphenyl		67 %	Limits: 50-150	1	04/06/10 10:17	MJ	44150

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/08/10 516	50 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-083-0206
Lab ID	1003427-004A
Field ID	P54

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/24/10

 Matrix
 Soil

 Sampled
 03/24/10 0:30

Prep Method 3550B	Prep Batch	28823			Date/Time Prep	ped	03/27/10 5:30
	Default Vol/Wt	30 g	Sample Vol/Wt 30.3	3 g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed I		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/06/10 10:30	MJ	44150
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/06/10 10:30	MJ	44150
Gasoline/Aviation Jet	No			1	04/06/10 10:30	MJ	44150
JP4	No			1	04/06/10 10:30	MJ	44150
JP5 / JP8	No			1	04/06/10 10:30	MJ	44150
JP7	No			1	04/06/10 10:30	MJ	44150
JP10	No			1	04/06/10 10:30	MJ	44150
JP18 / Turbine Jet Fuel	No			1	04/06/10 10:30	MJ	44150
Surrogate: o-Terphenyl		69 %	Limits: 50-150	1	04/06/10 10:30	MJ	44150

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/08/10 51	160 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-083-0206
Lab ID	1003427-005A
Field ID	P55

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/24/10

 Matrix
 Soil

 Sampled
 03/24/10 1:00

Prep Method 3550B	Prep Batch	28823			Date/Time Prep	ped	03/27/10 5:30	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.4	g	Date/Time		Analytical	
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/06/10 10:43	MJ	44150	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/06/10 10:43	MJ	44150	
Gasoline/Aviation Jet	No			1	04/06/10 10:43	MJ	44150	
JP4	No			1	04/06/10 10:43	MJ	44150	
JP5 / JP8	No			1	04/06/10 10:43	MJ	44150	
JP7	No			1	04/06/10 10:43	MJ	44150	
JP10	No			1	04/06/10 10:43	MJ	44150	
JP18 / Turbine Jet Fuel	No			1	04/06/10 10:43	MJ	44150	
Surrogate: o-Terphenyl		72 %	Limits: 50-150	1	04/06/10 10:43	MJ	44150	

Qualifiers/		*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions		В	Analyte detected in the associated Method Blank	DF	Dilution Factor
		Е	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
		J	Estimated Value Analyte below reported detection limit	М	Minimum value
		MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
		MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
		Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/08/10	5160	TRIST	CATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-083-0206	
Lab ID	1003427-006A	
Field ID	P68	

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/24/10

 Matrix
 Soil

 Sampled
 03/24/10 2:30

Prep Method 3550B	Prep Batch	28823			Date/Time Prep	ped (	03/27/10 5:30
	Default Vol/Wt	30 g	Sample Vol/Wt 30.3	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/06/10 10:56	MJ	44150
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/06/10 10:56	MJ	44150
Gasoline/Aviation Jet	No			1	04/06/10 10:56	MJ	44150
JP4	No			1	04/06/10 10:56	MJ	44150
JP5 / JP8	No			1	04/06/10 10:56	MJ	44150
JP7	No			1	04/06/10 10:56	MJ	44150
JP10	No			1	04/06/10 10:56	MJ	44150
JP18 / Turbine Jet Fuel	No			1	04/06/10 10:56	MJ	44150
Surrogate: o-Terphenyl		74 %	Limits: 50-150	1	04/06/10 10:56	MJ	44150

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/08/10 5	160 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-083-0206
Lab ID	1003427-007A
Field ID	P69

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/24/10

 Matrix
 Soil

 Sampled
 03/24/10 3:00

Prep Method 3550B	Prep Batch	28823			Date/Time Prep	ped (	03/27/10 5:30	
	Default Vol/Wt	30 g	Sample Vol/Wt 31.6	g	Date/Time		Analytical	
Compound	Result	Units	Units MQL DF		Analyzed E		By Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/06/10 11:09	MJ	44150	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/06/10 11:09	MJ	44150	
Gasoline/Aviation Jet	No			1	04/06/10 11:09	MJ	44150	
JP4	No			1	04/06/10 11:09	MJ	44150	
JP5 / JP8	No			1	04/06/10 11:09	MJ	44150	
JP7	No			1	04/06/10 11:09	MJ	44150	
JP10	No			1	04/06/10 11:09	MJ	44150	
JP18 / Turbine Jet Fuel	No			1	04/06/10 11:09	MJ	44150	
Surrogate: o-Terphenyl		66 %	Limits: 50-150	1	04/06/10 11:09	MJ	44150	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/08/10 51	160 TRIST	TATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-083-0206
Lab ID	1003427-008A
Field ID	P63

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/24/10

 Matrix
 Soil

 Sampled
 03/23/10 23:26

Prep Method 3550B	Prep Batch	28823			Date/Time Prep	ped	03/27/10 5:30
	Default Vol/Wt	30 g	Sample Vol/Wt 30.2	g	Date/Time DF Analyzed		Analytical
Compound	Result	Units	MQL	DF			Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/06/10 11:22	MJ	44150
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/06/10 11:22	MJ	44150
Gasoline/Aviation Jet	No			1	04/06/10 11:22	MJ	44150
JP4	No			1	04/06/10 11:22	MJ	44150
JP5 / JP8	No			1	04/06/10 11:22	MJ	44150
JP7	No			1	04/06/10 11:22	MJ	44150
JP10	No			1	04/06/10 11:22	MJ	44150
JP18 / Turbine Jet Fuel	No			1	04/06/10 11:22	MJ	44150
Surrogate: o-Terphenyl		79 %	Limits: 50-150	1	04/06/10 11:22	MJ	44150

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	H	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	Ν	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/08/10 516	0 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-083-0206
Lab ID	1003427-009A
Field ID	P64

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/24/10

 Matrix
 Soil

 Sampled
 03/23/10 22:41

Prep Method 3550B	Prep Batch	28823			Date/Time Prep	ped (	3/27/10 5:30	
	Default Vol/Wt	30 g	Sample Vol/Wt 31 g		Date/Time Analyzed By		Analytical y Batch	
Compound	Result	Units	MQL	DF				
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/06/10 11:35	MJ	44150	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/06/10 11:35	MJ	44150	
Gasoline/Aviation Jet	No			1	04/06/10 11:35	MJ	44150	
JP4	No			1	04/06/10 11:35	MJ	44150	
JP5 / JP8	No			1	04/06/10 11:35	MJ	44150	
JP7	No			1	04/06/10 11:35	MJ	44150	
JP10	No			1	04/06/10 11:35	MJ	44150	
JP18 / Turbine Jet Fuel	No			1	04/06/10 11:35	MJ	44150	
Surrogate: o-Terphenyl		64 %	Limits: 50-150	1	04/06/10 11:35	MJ	44150	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high backgroun
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/08/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-083-0206	
Lab ID	1003427-010A	
Field ID	P66 3/23-24/10	

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/24/10

 Matrix
 Soil

 Sampled
 03/24/10 0:54

Prep Method 3550B	Prep Batch	28823			Date/Time Prep	ped	03/27/10 5:30	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.4	g	Date/Time		Analytical	
Compound	Result	Units	MQL DF		Analyzed E		By Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/06/10 11:48	MJ	44150	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/06/10 11:48	MJ	44150	
Gasoline/Aviation Jet	No			1	04/06/10 11:48	MJ	44150	
JP4	No			1	04/06/10 11:48	MJ	44150	
JP5 / JP8	No			1	04/06/10 11:48	MJ	44150	
JP7	No			1	04/06/10 11:48	MJ	44150	
JP10	No			1	04/06/10 11:48	MJ	44150	
JP18 / Turbine Jet Fuel	No			1	04/06/10 11:48	MJ	44150	
Surrogate: o-Terphenyl		70 %	Limits: 50-150	1	04/06/10 11:48	MJ	44150	

В	Analyte detected in the associated Method Blank		
	,	DF	Dilution Factor
E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
J	Estimated Value Analyte below reported detection limit	М	Minimum value
MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
MRL	Method Reporting Limit		Refer to attached Non-Compliance Report
Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
)	J MDL MRL Q	J Estimated Value Analyte below reported detection limit MDL Method Dection Limit (unadjusted) MRL Method Reporting Limit	J       Estimated Value Analyte below reported detection limit       M         MDL       Method Dection Limit (unadjusted)       MQL         MRL       Method Reporting Limit       N         Q       RPD >40% between primary and confirmation columns       SQL



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-083-0206
Lab ID	1003427-011A
Field ID	P67

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/24/10

 Matrix
 Soil

 Sampled
 03/24/10 0:39

Prep Method 3550B	Prep Batch	28823			Date/Time Prep	ped	03/27/10 5:30
	Default Vol/Wt	30 g	Sample Vol/Wt 3	1.3 g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed		Batch
Diesel Range Organics (C10-C28)	253	mg/Kg	10	0 10	04/06/10 14:03	MJ	44150
Oil Range Organics (>C28-C40)	< 100	mg/Kg	10	0 10	04/06/10 14:03	MJ	44150
Gasoline/Aviation Jet	No			10	04/06/10 14:03	MJ	44150
JP4	No			10	04/06/10 14:03	MJ	44150
JP5 / JP8	Yes			10	04/06/10 14:03	MJ	44150
JP7	No			10	04/06/10 14:03	MJ	44150
JP10	No			10	04/06/10 14:03	MJ	44150
JP18 / Turbine Jet Fuel	No			10	04/06/10 14:03	MJ	44150
Surrogate: o-Terphenyl		81 %	Limits: 50-150	10	04/06/10 14:03	MJ	44150

D		* I	Recoveries affected by interferences or high background
В	Analyte detected in the associated Method Blank	DF	Dilution Factor
E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
J	Estimated Value Analyte below reported detection limit	М	Minimum value
MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
	J MDL MRL Q	J       Estimated Value       Analyte below reported detection limit         MDL       Method Dection Limit (unadjusted)         MRL       Method Reporting Limit	J       Estimated Value Analyte below reported detection limit       M         MDL       Method Dection Limit (unadjusted)       MQL         MRL       Method Reporting Limit       N         Q       RPD >40% between primary and confirmation columns       SQL



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-083-0206
Lab ID	1003427-012A
Field ID	P4

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/24/10

 Matrix
 Soil

 Sampled
 03/24/10 2:50

Prep Method 3550B	Prep Batch	28823			Date/Time Prep	ped	03/27/10 5:30
	Default Vol/Wt	30 g	Sample Vol/Wt 30.2	g	Date/Time		Analytical
Compound	Result	Units	MQL D		DF Analyzed		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/06/10 12:14	MJ	44150
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/06/10 12:14	MJ	44150
Gasoline/Aviation Jet	No			1	04/06/10 12:14	MJ	44150
JP4	No			1	04/06/10 12:14	MJ	44150
JP5 / JP8	No			1	04/06/10 12:14	MJ	44150
JP7	No			1	04/06/10 12:14	MJ	44150
JP10	No			1	04/06/10 12:14	MJ	44150
JP18 / Turbine Jet Fuel	No			1	04/06/10 12:14	MJ	44150
Surrogate: o-Terphenyl		71 %	Limits: 50-150	1	04/06/10 12:14	MJ	44150

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	l	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/08/10 516	50 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-083-0206
Lab ID	1003427-013A
Field ID	P36

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/24/10

 Matrix
 Soil

 Sampled
 03/24/10 3:06

Prep Method 3550B	Prep Batch	28823			Date/Time Prep	ped	03/27/10 5:30
	Default Vol/Wt	30 g	Sample Vol/Wt 30 g		Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed E		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/06/10 12:27	MJ	44150
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/06/10 12:27	MJ	44150
Gasoline/Aviation Jet	No			1	04/06/10 12:27	MJ	44150
JP4	No			1	04/06/10 12:27	MJ	44150
JP5 / JP8	No			1	04/06/10 12:27	MJ	44150
JP7	No			1	04/06/10 12:27	MJ	44150
JP10	No			1	04/06/10 12:27	MJ	44150
JP18 / Turbine Jet Fuel	No			1	04/06/10 12:27	MJ	44150
Surrogate: o-Terphenyl		64 %	Limits: 50-150	1	04/06/10 12:27	MJ	44150

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	в	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	Ν	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/08/10 516	0 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-083-0206
Lab ID	1003427-014A
Field ID	P70

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/24/10

 Matrix
 Soil

 Sampled
 03/24/10 3:57

Prep Method 3550B	Prep Batch	28823			Date/Time Prep	ped	03/27/10 5:30
	Default Vol/Wt	30 g	Sample Vol/Wt 30.1	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed B		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/06/10 13:24	MJ	44150
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/06/10 13:24	MJ	44150
Gasoline/Aviation Jet	No			1	04/06/10 13:24	MJ	44150
JP4	No			1	04/06/10 13:24	MJ	44150
JP5 / JP8	No			1	04/06/10 13:24	MJ	44150
JP7	No			1	04/06/10 13:24	MJ	44150
JP10	No			1	04/06/10 13:24	MJ	44150
JP18 / Turbine Jet Fuel	No			1	04/06/10 13:24	MJ	44150
Surrogate: o-Terphenyl		68 %	Limits: 50-150	1	04/06/10 13:24	MJ	44150

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	1	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/08/10 510	50 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### **Cooler Receipt Form**

### Customer Number: 05160

Customer Name: Tri-State Testing Report Number: 10-083-0206

#### **Shipping Method**

○ FedEx ○ UPS ○ US Postal Client			Other:
Shipping container/cooler uncompromised?	• Yes	O No	O Not Present
Custody seals intact on shipping container/cooler?	O Yes	O No	Not Required
Custody seals intact on sample bottles?	O Yes	O No	Not Required
Chain of Custody present?	Yes	O No	
COC agrees with sample labels?	Yes	O No	
Samples in proper containers?	Yes	O No	
Sample containers intact?	• Yes	O No	
Sufficient sample volume for indicated tests?	• Yes	O No	
All samples received within holding time?	• Yes	O No	
Container temperature in compliance?	• Yes	O No	
Water - VOA vials free of headspace?	⊖ Yes	O No	N/A
Water - Preservation acceptable upon receipt?	O Yes	O No	• N/A
Samples screened for radioactivity (COE only)?	O Yes	O No	• N/A
Special precautions or instructions included?	⊖ Yes	No No	

Comments:

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Rebekah Ross

Date & Time: 03/24/2010 11:40:27

			Airport		LAB pH	•••		11.2		The second second	2	1.1.1							
+	TNO.	REPORT TO: David D. McCray NY: Tri-State Testing Services, Inc. ACT: David McCray • 901-385-1199	PROJECT NAME: Memphis International Airport		REMARKS (ANALYSES, ETC.)	Method 8015 Jet Fuel FingerPrint	DATE/TIME:	DATE/TIME:	EVTIME:										
12F-00	REPORT NO	REPORT TO: David D. NY: Tri-State Testing CT: David McCray • 9	r NAME: Mem		F (ANA	Method 8015	BY:			TAI									
		REPO	OJEC	SAE	NO. OF	-	+	-	-	-	-	-	-	1	-	RELINQUISHED BY:			RY USE ON
	l		PR		XIATAM	S	S	S	S	S	S	S	S	S	S	CINQU	LAB 7174		TORY
	05160 05100 05160 050000000000			Nact	SAMPLE LOCATION	Pus /11-121	P53/14"-12	p7 /35% -12.	P54 / 34'2 ' 12'	P55 /3316-12.	P68 (1413 - 141	Plo9 / 19" - 12'				ETIME: 6:15 AM	BY CHARTER LAB	COOLER OPENED BY:	SHADED AREAS FOR LABORATORY USE ONLY
		Tr-Slate Testing (GTW) Momphus International Al	429	to	TIME	10:451277	11. 08 Pm	11.30.20	12. John	1.WAM	2. 30 Am	S.w.Am				DAT 3,	SHIPPED BY:	OOLER O	
	CHA	LYTI hitten R 3-2400	E-9-429	21	DATE	SIBJIN	3/33/10	3/33/10	3/24/10	3/24/10	3/24/10	324/10	-			14	A SHIPP	-	_
		GTW ANALYTI 2790 Whitten R PHONE 901-213-2400	PERMIT/PROJECT NO.:	SAMPLER'S SIGNATURE:	SAMPLE NO.	P65	P 53	Ed	P54	P 55	P 68	P 69				RELINOUTSHEDBY:	F SHIPMENT	CONDITION OF COOLER/SEAL:	
		d	MIT/PR	PLER	SEQ NO.			1								NOLUB	MERHODOF	NOILION	
			PERI	SAM	LAB NO.	-						1	-11	1 1 1 1	-100	RELI	MER	CON	

			Airport		LAB pH	• •					2		· · · ·	1. 30						
XT TNO.	David D. McCray Testing Services, Inc.	ACT: David McCray • 901-385-1199	PROJECT NAME: Memphis International Airport		REMARKS (ANALYSES, ETC.)	Method 8015 Jet Fuel FingerPrint	DATE/TIME:	DATE/TIME:	214.10 0915	DATE/TIME:										
REPORT NO.	IT REPORT TO: David D. McCray ANY: Tri-State Testing Services	avid McCray -	T NAME: Mem			Method 8015	BY:			T.T.	IL DI									
	T REPO		ROJEC	SAB	CONTAINI	-	-	-	-	-	-	T	-	1	-	JISHED	~		1	AL TANG
8		4	4		MATRIX	S	S	S	S	S	S	S	S	S	S	RELINQUISHED BY:	OR LAI	11th		THOM I
0-581-01	Memohis International Airbort 1 40 18	FAX 901-213-2440		- Studly	SAMPLE LOCATION		P64/1'-12	12:64 mp bbb 1.9" - 12	, t / L 9 d,	P4/ 1:11"-12	P36/1.94-12	P70/ 1:10"-1				ETIME: 94/10 9:15 Am	RECEIVED FOR LAB	The second	COOLER OPENED BY:	In hit was have aver to be a the man the
Th-Slate T	Memohis In	F.	429	) Clim	TIME	11:26 2	10:41	12:54 4	12:39 MM 96:21	2:50 AF	3:06 40	3.57Am				DAT	ED BY:		OOLER OI	
CHA.	V ANALYTI 2790 Whitten R	3-2400	E-9-429	3	DATE	3-2340		3-24-10	arttz.e	3-24-10	3-24-10	3-24-10				A	SHIPPED BY			
	GTW ANALYTI 2790 Whitten R	PHONE 901-213-2400	PERMIT/PROJECT NO.:	SAMPLER'S SIGNATURE:	SAMPLE NO.	P-63	P-64	P.66	P-67	b-4	P-36	P. 70			5	C S	OD OF SHIPMENT:		CONDITION OF COOLER/SEAL:	
		A	MIT/PR	APLER'S	B SEQ NO.							民间				RELINQUISTIED BY:	Heb OF		DITION	
			PER	SAA	LAB NO.			54 g			112					REL	MEAH		CON	

Page 19 of 19



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

4/12/2010

Tri-State Testing Mr. David McCray 6756 Buckles Cove Memphis, TN, 38133

Ref: Analytical Testing Report Number: 10-084-0221 Project Description: Memphis International Airport Project #E-9-429

Dear Mr. David McCray:

GTW Analytical Services received 15 sample(s) on 3/25/2010 for the analyses presented in the following report.

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Quality Assurance, instrumentation maintenance and calibration were performed in accordance with guidelines established by the USEPA and NELAP.

The results are shown on the attached analysis sheet(s).

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,

Randell H. Thomas

Randy Thomas Project Manager

MI	ECI APR	21	ζ	VE	M
Ĩ	APR	16	6	2010	U
B	Y:				



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

CLIENT:	Tri-State Testing	CASE NARRATIVE
Project:	Memphis International Airport	
Lab Order Number:	10-084-0221	Date: 04/12/10
		GTW01

Fingerprint Analysis by Method 8015B Jet Fuels

Samples were extracted and analyzed by Method 8015B. Comparisons were made to the chromatographic library, with special attention given to Jet fuels. Results are reported for both Diesel Range Organics (C10-C28) and Oil Range Organics (>C28-C40), with quantitation achieved using Diesel Fuel and Motor Oil.

The following sample indicated contamination in Diesel Range Organics (C10-C28) which may be degraded JP5/8. 1003474-001A (P84) 1003474-002A (P85)

The contamination reported as Diesel Range Organics (C10-C28) and Oil Range Organics (>C28-C40) did not match the Jet fuels used for comparison purposes for the following sample: 1003368-004A (P17/11')



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-084-0221
Lab ID	1003449-001A
Field ID	P-10

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/25/10

 Matrix
 Soil

 Sampled
 03/25/10 0:26

Default Vol/Wt         30 g         Sample Vol/Wt         30.2 g           Compound         Result         Units         MQL           Diesel Range Organics (C10-C28)         18.6         mg/Kg         10.0	DF 1	Date/Time Analyzed	Ву	Analytical Batch
	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28) 18.6 mg/Kg 10.0	1			
		04/07/10 9:19	MJ	44151
Oil Range Organics (>C28-C40) 20.1 mg/Kg 10.0	1	04/07/10 9:19	MJ	44151
Gasoline/Aviation Jet No	1	04/07/10 9:19	MJ	44151
JP4 No	1	04/07/10 9:19	MJ	44151
JP5 / JP8 No	1	04/07/10 9:19	MJ	44151
JP7 No	1	04/07/10 9:19	MJ	44151
JP10 No	1	04/07/10 9:19	MJ	44151
JP18 / Turbine Jet Fuel No	1	04/07/10 9:19	MJ	
Surrogate: o-Terphenyl 88 % Limits: 50-150	1	04/07/10 9:19	MJ	<b>44151</b> 44151

	le accepted limits * I Recoveries affe	ected by interferences or high background
Analyte detected in the a		
Value exceeds method ca	bration range H Prepped / Analy	lyzed out of holding time.
Estimated Value Analyt	below reported detection limit M Minimum value	ie
Method Dection Limit (u	adjusted) MQL Method Quanti	itation Limit (adjusted)
Method Reporting Limit	N Refer to attache	ed Non-Compliance Report
RPD >40% between prin		itation Limit (adjusted MDL)
RPD >40% between prin TATE GTW	ary and confirmation	ation columns SQL Sample Quanti



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-084-0221
Lab ID	1003449-002A
Field ID	P-11

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

Received 03/25/10 Matrix Soil Sampled 03/25/10 5:12

Prep Method 3550B	Prep Batch	28833			Date/Time Prep	ped (	03/28/10 7:26
	Default Vol/Wt	30 g	Sample Vol/Wt 30.8	g	Date/Time		Analytical
Compound	Result	Units	MQL DF		Analyzed		Batch
Diesel Range Organics (C10-C28)	2,160	mg/Kg	1,000	100	04/07/10 15:55	MJ	44151
Oil Range Organics (>C28-C40)	< 1,000	mg/Kg	1,000	100	04/07/10 15:55	MJ	44151
Gasoline/Aviation Jet	No			100	04/07/10 15:55	MJ	44151
JP4	No			100	04/07/10 15:55	MJ	44151
JP5 / JP8	Yes			100	04/07/10 15:55	MJ	44151
JP7	No			100	04/07/10 15:55	MJ	44151
JP10	No			100	04/07/10 15:55	MJ	44151
JP18 / Turbine Jet Fuel	No			100	04/07/10 15:55	MJ	44151
Surrogate: o-Terphenyl		76 %	Limits: 50-150	100	04/07/10 15:55	MJ	44151

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns		Sample Quantitation Limit (adjusted MDL)
04/12/10 5	160 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-084-0221
Lab ID	1003449-003A
Field ID	P-71

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/25/10

 Matrix
 Soil

 Sampled
 03/24/10 22:34

Prep Method 3550B	Prep Batch	28833			Date/Time Prep	ped	03/28/10 7:26
	Default Vol/Wt	30 g	Sample Vol/Wt 30.	3 g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28)	13.6	mg/Kg	10.0	1	04/07/10 9:45	MJ	44151
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/07/10 9:45	MJ	44151
Gasoline/Aviation Jet	No			1	04/07/10 9:45	MJ	44151
JP4	No			1	04/07/10 9:45	MJ	44151
JP5 / JP8	No			1	04/07/10 9:45	MJ	44151
JP7	No			1	04/07/10 9:45	MJ	44151
JP10	No			1	04/07/10 9:45	MJ	44151
JP18 / Turbine Jet Fuel	No			1	04/07/10 9:45	MJ	44151
Surrogate: o-Terphenyl		74 %	Limits: 50-150	1	04/07/10 9:45	MJ	44151

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/12/10 51	160 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

4

Memphis, TN 38133

Lab Order Number	10-084-0221
Lab ID	1003449-004A
Field ID	P-72

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/25/10

 Matrix
 Soil

 Sampled
 03/24/10 23:45

Prep Method 3550B	Prep Batch	28833			Date/Time Prep	ped	03/28/10 7:26	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.5	g	Date/Time		Analytical	
Compound	Result	Units	MQL	DF Analyzed		Ву		
Diesel Range Organics (C10-C28)	24.4	mg/Kg	10.0	1	04/07/10 9:58	MJ	44151	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/07/10 9:58	MJ	44151	
Gasoline/Aviation Jet	No			1	04/07/10 9:58	MJ	44151	
JP4	No			1	04/07/10 9:58	MJ	44151	
JP5 / JP8	Yes			1	04/07/10 9:58	MJ	44151	
JP7	No			1	04/07/10 9:58	MJ	44151	
JP10	No			1	04/07/10 9:58	MJ	44151	
JP18 / Turbine Jet Fuel	No			1	04/07/10 9:58	MJ	44151	
Surrogate: o-Terphenyl		66 %	Limits: 50-150	1	04/07/10 9:58	MJ	44151	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	Е	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit		Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns		Sample Quantitation Limit (adjusted MDL)
04/12/10 516	50 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-084-0221
Lab ID	1003449-005A
Field ID	P-74

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/25/10

 Matrix
 Soil

 Sampled
 03/25/10 1:06

Prep Method 3550B	Prep Batch	28833			Date/Time Prep	ped	03/28/10 7:26
	Default Vol/Wt	30 g	Sample Vol/Wt 30.9	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF Analyzed		Ву	Batch
Diesel Range Organics (C10-C28)	31.4	mg/Kg	10.0	1	04/07/10 10:11	MJ	44151
Oil Range Organics (>C28-C40)	27.9	mg/Kg	10.0	1	04/07/10 10:11	MJ	44151
Gasoline/Aviation Jet	No			1	04/07/10 10:11	MJ	44151
JP4	No			1	04/07/10 10:11	MJ	44151
JP5 / JP8	No			1	04/07/10 10:11	MJ	44151
JP7	No			1	04/07/10 10:11	MJ	44151
JP10	No			1	04/07/10 10:11	MJ	44151
JP18 / Turbine Jet Fuel	No			1	04/07/10 10:11	MJ	44151
Surrogate: o-Terphenyl		61 %	Limits: 50-150	1	04/07/10 10:11	MJ	44151

	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
В	Analyte detected in the associated Method Blank	DF	Dilution Factor
E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
J	Estimated Value Analyte below reported detection limit	М	Minimum value
MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
	E J MDL MRL Q	<ul> <li>E Value exceeds method calibration range</li> <li>J Estimated Value Analyte below reported detection limit</li> <li>MDL Method Dection Limit (unadjusted)</li> <li>MRL Method Reporting Limit</li> </ul>	EValue exceeds method calibration rangeHJEstimated Value Analyte below reported detection limitMMDLMethod Dection Limit (unadjusted)MQLMRLMethod Reporting LimitNQRPD >40% between primary and confirmation columnsSQL



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-084-0221
Lab ID	1003449-006A
Field ID	P-75

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/25/10

 Matrix
 Soil

 Sampled
 03/25/10 1:41

Prep Method 3550B	Prep Batch	28833			Date/Time Prep	ped (	3/28/10 7:26	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.7	g	Date/Time		Analytical	
Compound	Result	Units	MQL	DF	DF Analyzed		Batch	
Diesel Range Organics (C10-C28)	34.0	mg/Kg	10.0	1	04/07/10 16:08	MJ	44151	
Oil Range Organics (>C28-C40)	40.0	mg/Kg	10.0	1	04/07/10 16:08	MJ	44151	
Gasoline/Aviation Jet	No			1	04/07/10 16:08	MJ	44151	
JP4	No			1	04/07/10 16:08	MJ	44151	
JP5 / JP8	No			1	04/07/10 16:08	MJ	44151	
JP7	No			1	04/07/10 16:08	MJ	44151	
JP10	No			1	04/07/10 16:08	MJ	44151	
JP18 / Turbine Jet Fuel	No			1	04/07/10 16:08	MJ	44151	
Surrogate: o-Terphenyl		50 %	Limits: 50-150	1	04/07/10 16:08	MJ	44151	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/12/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-084-0221
Lab ID	1003449-007A
Field ID	P-78

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/25/10

 Matrix
 Soil

 Sampled
 03/25/10 2:20

Prep Method 3550B	Prep Batch	28833			Date/Time Prep	ped (	03/28/10 7:26
	Default Vol/Wt	30 g	Sample Vol/Wt 30.2	2 g Date/Time			Analytical
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/07/10 10:37	MJ	44151
Oil Range Organics (>C28-C40)	11.8	mg/Kg	10.0	1	04/07/10 10:37	MJ	44151
Gasoline/Aviation Jet	No			1	04/07/10 10:37	MJ	44151
JP4	No			1	04/07/10 10:37	MJ	44151
JP5 / JP8	No			1	04/07/10 10:37	MJ	44151
JP7	No			1	04/07/10 10:37	MJ	44151
JP10	No			1	04/07/10 10:37	MJ	44151
JP18 / Turbine Jet Fuel	No			1	04/07/10 10:37	MJ	44151
Surrogate: o-Terphenyl		69 %	Limits: 50-150	1	04/07/10 10:37	MJ	44151

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/12/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-084-0221
Lab ID	1003449-008A
Field ID	P-80

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/25/10

 Matrix
 Soil

 Sampled
 03/25/10 7:06

Prep Method 3550B	Prep Batch	28833			Date/Time Prep	ped	03/28/10 7:26
	Default Vol/Wt	30 g	Sample Vol/Wt 30.7	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/07/10 10:50	MJ	44151
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/07/10 10:50	MJ	44151
Gasoline/Aviation Jet	No			1	04/07/10 10:50	MJ	44151
JP4	No			1	04/07/10 10:50	MJ	44151
JP5 / JP8	No			1	04/07/10 10:50	MJ	44151
JP7	No			1	04/07/10 10:50	MJ	44151
JP10	No			1	04/07/10 10:50	MJ	44151
JP18 / Turbine Jet Fuel	No			1	04/07/10 10:50	MJ	44151
Surrogate: o-Terphenyl		61 %	Limits: 50-150	1	04/07/10 10:50	MJ	44151

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/12/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-084-0221	
Lab ID	1003449-009A	
Field ID	P-81	

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/25/10

 Matrix
 Soil

 Sampled
 03/25/10 5:38

Prep Method 3550B	Prep Batch	28833			Date/Time Prep	ped	03/28/10 7:26	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.5	g	Date/Time		Analytical	
Compound	Result	Units	MQL	DF Analyzed		Ву		
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/07/10 11:03	MJ	44151	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/07/10 11:03	MJ	44151	
Gasoline/Aviation Jet	No			1	04/07/10 11:03	MJ	44151	
JP4	No			1	04/07/10 11:03	MJ	44151	
JP5 / JP8	No			1	04/07/10 11:03	MJ	44151	
JP7	No			1	04/07/10 11:03	MJ	44151	
JP10	No			1	04/07/10 11:03	MJ	44151	
JP18 / Turbine Jet Fuel	No			1	04/07/10 11:03	MJ	44151	
Surrogate: o-Terphenyl		61 %	Limits: 50-150	1	04/07/10 11:03	MJ	44151	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
4/12/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-084-0221
Lab ID	1003449-010A
Field ID	P-82

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/25/10

 Matrix
 Soil

 Sampled
 03/25/10 5:27

Prep Method 3550B	Prep Batch	28833			Date/Time Prep	ped	03/28/10 7:26
	Default Vol/Wt	30 g	Sample Vol/Wt 30.3	g	Date/Time Analyzed B		Analytical
Compound	Result	Units	MQL	DF			Batch
Diesel Range Organics (C10-C28)	11.5	mg/Kg	10.0	1	04/07/10 11:16	MJ	44151
Oil Range Organics (>C28-C40)	25.3	mg/Kg	10.0	1	04/07/10 11:16	MJ	44151
Gasoline/Aviation Jet	No			1	04/07/10 11:16	MJ	44151
JP4	No			1	04/07/10 11:16	MJ	44151
JP5 / JP8	No			1	04/07/10 11:16	MJ	44151
JP7	No			1	04/07/10 11:16	MJ	44151
JP10	No			1	04/07/10 11:16	MJ	44151
JP18 / Turbine Jet Fuel	No			1	04/07/10 11:16	MJ	44151
Surrogate: o-Terphenyl		59 %	Limits: 50-150	1	04/07/10 11:16	MJ	44151

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions		Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	1	Estimated Value Analyte below reported detection limit	М	Minimum value
	MD	L Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MR	L Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/12/10 5	160 TRI	STATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-084-0221	
Lab ID	1003449-011A	
Field ID	P-73	

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/25/10

 Matrix
 Soil

 Sampled
 03/24/10 23:07

Prep Method 3550B	Prep Batch	28833			Date/Time Prep	ped (	3/28/10 7:26	
	Default Vol/Wt	30 g	Sample Vol/Wt 30.8	g	Date/Time		Analytical	
Compound	Result	Units	MQL	DF	Analyzed	By	Batch	
	100							
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/07/10 11:29	MJ	44151	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/07/10 11:29	MJ	44151	
Gasoline/Aviation Jet	No			1	04/07/10 11:29	MJ	44151	
JP4	No			1	04/07/10 11:29	MJ	44151	
JP5 / JP8	No			1	04/07/10 11:29	MJ	44151	
JP7	No			1	04/07/10 11:29	MJ	44151	
JP10	No			1	04/07/10 11:29	MJ	44151	
JP18 / Turbine Jet Fuel	No			1	04/07/10 11:29	MJ	44151	
Surrogate: o-Terphenyl		31 %	* Limits: 50-150	1	04/07/10 11:29	MJ	44151	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background				
Definitions B		Analyte detected in the associated Method Blank	DF	Dilution Factor				
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.				
	J	Estimated Value Analyte below reported detection limit	М	Minimum value				
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)				
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report				
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)				
04/12/10 51	60 TRIST	TATE_GTW						



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

#### Memphis, TN 38133

Lab Order Number	10-084-0221
Lab ID	1003449-012A
Field ID	P-76

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/25/10

 Matrix
 Soil

 Sampled
 03/25/10 2:00

Prep Method 3550B	Prep Batch	28833			Date/Time Prep	ped	03/28/10 7:26	
	Default Vol/Wt	30 g	30 g Sample Vol/Wt 30.6 g Units MQL DF		Date/Time		Analytical	
Compound	Result	Units			Analyzed		By Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/07/10 11:42	MJ	44151	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/07/10 11:42	MJ	44151	
Gasoline/Aviation Jet	No			1	04/07/10 11:42	MJ	44151	
JP4	No			1	04/07/10 11:42	MJ	44151	
JP5 / JP8	No			1	04/07/10 11:42	MJ	44151	
JP7	No			1	04/07/10 11:42	MJ	44151	
JP10	No			1	04/07/10 11:42	MJ	44151	
JP18 / Turbine Jet Fuel	No			1	04/07/10 11:42	MJ	44151	
Surrogate: o-Terphenyl		58 %	Limits: 50-150	1	04/07/10 11:42	MJ	44151	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/12/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab ID

Field ID

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/25/10

 Matrix
 Soil

 Sampled
 03/25/10 2:30

Lab Order Number 10-084-0221

1003449-013A

P-77

Prep Method 3550B	Prep Batch	28833				Date/Time Pre	pped	03/28/10 7:26	
	Default Vol/Wt	30 g	Sample Vol/W	t 31 g		Date/Time		Analytical	
Compound	Result	Units	MQL		DF	Analyzed		Batch	
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg		10.0	1	04/07/10 11:55	MJ	44151	
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg		10.0	1	04/07/10 11:55	MJ	44151	
Gasoline/Aviation Jet	No				1	04/07/10 11:55	MJ	44151	
JP4	No				1	04/07/10 11:55	MJ	44151	
JP5 / JP8	No				1	04/07/10 11:55	MJ	44151	
JP7	No				1	04/07/10 11:55	MJ	44151	
JP10	No				1	04/07/10 11:55	MJ	44151	
JP18 / Turbine Jet Fuel	No				1	04/07/10 11:55	MJ	44151	
Surrogate: o-Terphenyl		77 %	Limits: 50-1	150	1	04/07/10 11:55	MJ	44151	

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/12/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-084-0221
Lab ID	1003449-014A
Field ID	P-79

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/25/10

 Matrix
 Soil

 Sampled
 03/25/10 3:00

Prep Method 3550B	Prep Batch	28833			Date/Time Prep	ped	03/28/10 7:26
	Default Vol/Wt	30 g	Sample Vol/Wt 30.1	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed		Batch
Diesel Range Organics (C10-C28)	< 10.0	mg/Kg	10.0	1	04/07/10 12:08	MJ	44151
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/07/10 12:08	MJ	44151
Gasoline/Aviation Jet	No			1	04/07/10 12:08	MJ	44151
JP4	No			1	04/07/10 12:08	MJ	44151
JP5 / JP8	No			1	04/07/10 12:08	MJ	44151
JP7	No			1	04/07/10 12:08	MJ	44151
JP10	No			1	04/07/10 12:08	MJ	44151
JP18 / Turbine Jet Fuel	No			1	04/07/10 12:08	MJ	44151
Surrogate: o-Terphenyl		60 %	Limits: 50-150	1	04/07/10 12:08	MJ	44151

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high backgroun
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/12/10 51	60 TRIST	ATE GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-084-0221
Lab ID	1003449-015A
Field ID	P-83

# ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

#### **Report of Analysis**

 Received
 03/25/10

 Matrix
 Soil

 Sampled
 03/25/10 4:55

Prep Method 3550B	Prep Batch	28833			Date/Time Prep	ped 0	3/28/10 7:26
	Default Vol/Wt	30 g	Sample Vol/Wt 30.4	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28)	56.0	mg/Kg	10.0	1	04/07/10 12:21	MJ	44151
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/07/10 12:21	MJ	44151
Gasoline/Aviation Jet	No			1	04/07/10 12:21	MJ	44151
JP4	No			1	04/07/10 12:21	MJ	44151
JP5 / JP8	Yes			1	04/07/10 12:21	MJ	44151
JP7	No			1	04/07/10 12:21	MJ	44151
JP10	No			1	04/07/10 12:21	MJ	44151
JP18 / Turbine Jet Fuel	No			1	04/07/10 12:21	MJ	44151
Surrogate: o-Terphenyl		51 %	Limits: 50-150	1	04/07/10 12:21	MJ	44151

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	Н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/12/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### **Cooler Receipt Form**

### Customer Number: 05160

Customer Name:	<b>Tri-State Testing</b>
Report Number:	10-084-0221

#### **Shipping Method**

○ FedEx ○ UPS ○ US Postal Clier	nt 🔿 LMP		Other:
Shipping container/cooler uncompromised?	• Yes	◯ No	O Not Present
Custody seals intact on shipping container/cooler	? O Yes	O No	Not Required
Custody seals intact on sample bottles?	O Yes	O No	Not Required
Chain of Custody present?	Yes	O No	
COC agrees with sample labels?	Yes	O No	
Samples in proper containers?	Yes	O No	
Sample containers intact?	• Yes	O No	
Sufficient sample volume for indicated tests?	• Yes	O No	
All samples received within holding time?	Yes	O No	
Container temperature in compliance?	Yes	O No	
Water - VOA vials free of headspace?	O Yes	O No	N/A
Water - Preservation acceptable upon receipt?	O Yes	O No	N/A
Samples screened for radioactivity (COE only)?	O Yes	O No	• N/A
Special precautions or instructions included?	⊖ Yes	No No	

Comn

ents:		

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Rebekah Ross

Date & Time: 03/25/2010 09:02:22

		I Airport		LAB pH	nt ···	nt	nt	ıt	nt	ıt	nt	nt	nt	h			5		
REPORT NO.	r REPORT TO: David D. McCray NY: Tri-State Testing Services, Inc. CT: David McCray • 901-385-1199	PROJECT NAME: Memphis International Airport		REMARKS (ANALYSES, ETC.)	Method 8015 Jet Fuel FingerPrint	DATE/TIME:	DATE/TIME:	3 35.10 083	DATE/IIME:										
3	ORT TO	CT NAN	513	CONTAINI	Met	DBY:				NI VI									
	r REP NY: 1	ROJE		NO. OF	S 1	S 1	S 1	S 1	S 1	S 1	S 1	S 1	S 1	S 1	RELINQUISHED BY:	8		)	LISE O
10-084-0221	Memohis International Airport		- Shalley	SAMPLE LOCATION	Pro/ 189" to 16'	11-0	PHP.71 / 11" to 12'	5 P-72 / 1:3" to 12'	1: 06 0 74 / 1'S" to 12'	m P-75 / 2442" to 12'	P-78 / 2.24" to 12'	mp-80/1:9" to 12'	# P-81 2:2" to 12'	P-82/2' to 12'	DATETIME: 0 0 835 REI 3/25/10 0 0 835	BY 0	1. Am	COOLER OPENED BY: U 24(	CHAREN APPACEND I ARORATORY LICE ONI VI
AIF	U-	E-9-429	Wille	DATE TIME	3-25-10 12:26	3-25-10 5:12 am	3.24-10 10:34 PH	3 24.10 11:45	3-25-10 1:06	3-25-10 1:41 4	3-25-10 2,20 04	3-25-10 7000	5-25-10 5:38"	3.25-10 5:27 44		SHIPPED BY:	ŀ		
CHAIL	GTW ANALVTIC 2790 Whitten Rd. PHONE 901-213-2400	PERMIT/PROJECT NO.: E-	SAMPLER'S SIGNATURE:	SAMPLE DA NO.	P-10 3-	P-11 3-	P-71 3.2	P-72 32	P-74 32	P.75 3-1	P-78 3-2	P. 80 3.	p. 81 3.	P-82 3.	ED BY:	METHOD OF SHIPMENT S		CONDITION OF COOLER/SEAL:	
	Hd	MIT/PRC	IPLER'S	8 SEQ NO.											KELINOUTSHED B	HOD OF		NOLLION	
		PER	SAN	LAB NO.											E-	MET		CON	

	NO.	). McCray J Services, Inc. 901-385-1199	PROJECT NAME: Memphis International Airport		REMARKS (ANALYSES, ETC.)	Method 8015 Jet Fuel FingerPrint	DATE/TIME:	DATE/TIME:	15.10 0835 DATE/TIME: 0835									
5715001	REPORT NO.	SUBMIT REPORT TO: David D. McCray COMPANY: Tri-State Testing Services, Inc. CONTACT: David McCray • 901-385-1199	CT NAME: Memp	S83	CONTRIN (ANAI								Method 8015	1 Method 8015	1 Method 8015	ED BY:		0.60
5	1	MIT REI IPANY: TACT:	PROJE	;	M.ATRIX 70.0F	S 1	S 1	S 1	S	S 1	S 1	S	S	S	S	RELINQUISHED BY:	LAB	uth
	10-084-0221 05160	95106		Det	SAMPLE LOCATION	P-73/1-4'	p-76/26"-12'	p-77/31"-12"	101-14-1 bl-d	20"						25/10 90835		COOLER OPENED RY.
		TrState Testing (GTW) Membhis International Arrort	129	RHC	TIME	md:0:11	Diodane	2:30000	3:000							DAT	1	OOLER OI
			E-9-429		DATE	3-2410	3-25-10	3:25-60 2:30am	3-25-10							150	SHIPPED BY	-
		GTW ANAI 2790 Whi PHONE 901-213	PERMIT/PROJECT NO.:	SAMPLER'S SIGNATURE:	SAMPLE NO.	P.73	p.76	rr.q	p.y							THE AN	SHIPMENT:	
		à	MIT/PR(	APLER'S	B SEQ NO.											BELINOUISILED BY	LIOD OF	IDITION
	1		H	17	NO.	1	1	1	1	1	1	10	1		1	1. The	E1	12

••				Airmont	HIDOLIN	LAB pH															
PU03449	REPORT NO.	SUBMIT REPORT TO: David D. McCray COMPANY: Tri-State Testing Society	CONTACT: David McCray • 901-385-1199	PROJECT NAME: Memohic International Airaa		REMARKS (ANALYSES, ETC.)	Method 8015 Jet Fuel FingerPrint	DATE/TIME:	DATE/TIME:		DATE/TIME:	3/25.10 0835									
00		REPOR.	T: Dav	DIECT	S	CONTAINER NO. OF		1 N	1 N	1 M	1 M	1 M	1 M	1 M	1 M	1 M	RELINQUISHED BY:				NULY!
		MIT	TAC	PRC		XIATAM	S	S	S	S	S	S	S	S	S	S	ISINÒ	AB	5		IY USE
	10-084-0221 05160	2010.03.25	TAA JUTTALITATIU		- Struggt	SAMPLE LOCATION	P-83/2,44 012										3/25/10 0) 0835 RU	RECEIVED FOR LAB		PENED BY:	SHADED AREAS FOR LABORATORY USE ONLY
THE REAL PRIME AND ADDRESS ADDRESS		Memotics International Arroon		429	illen	TIME	4.55 8									4	3/2	DBY:		COOLER OPENED	
		Memotive Inte	3-24UU	E-9-429	3	DATE	5.2510										X	SHIPPED BY	F		_
		GTW AP 2790	PHONE 901-213-2400	ONECT NO.:	SAMPLER'S SIGNATURE:	SAMPLE NO.	P-83									.vd uansu	Men	SHIPMENT		CONDITION OF COOLER/SEAL:	
			P.	NJ/IT	LER'S	SEQ NO.												OF	C INOL	NOI O	
			DEDW	I CINN	SAMP	LAB NO.										BELINOI	A	METHOD	LUCK CL	IGNO	



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

4/8/2010

Tri-State Testing Mr. David McCray 6756 Buckles Cove Memphis, TN, 38133

Ref: Analytical Testing Report Number: 10-085-0222 Project Description: Memphis International Airport Project #E-9-429

Dear Mr. David McCray:

GTW Analytical Services received 2 sample(s) on 3/26/2010 for the analyses presented in the following report.

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods, The Solid Waste Manual SW-846, EPA Methods for Chemical Analysis of Water and Wastes and /or 40 CFR part 136.

The analytical data has been validated using standard quality control measures performed as required by the analytical method. Quality Assurance, instrumentation maintenance and calibration were performed in accordance with guidelines established by the USEPA and NELAP.

The results are shown on the attached analysis sheet(s).

Please do not hesitate to contact me or client services if you have any questions or need additional information.

Sincerely,

Rendell H. Thomas

Randy Thomas Project Manager

APR 1 2 2010 BY:-----



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

CLIENT:	Tri-State Testing	CASE NARRATIVE
Project:	Memphis International Airport	
Lab Order Number:	10-085-0222	Date: 04/08/10
		GTW01

Fingerprint Analysis by Method 8015B Jet Fuels

Samples were extracted and analyzed by Method 8015B. Comparisons were made to the chromatographic library, with special attention given to Jet fuels. Results are reported for both Diesel Range Organics (C10-C28) and Oil Range Organics (>C28-C40), with quantitation achieved using Diesel Fuel and Motor Oil.

The following sample indicated contamination in Diesel Range Organics (C10-C28) which may be degraded JP5/8. 1003474-001A (P84)

1003474-002A (P85)



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

 Lab Order Number
 10-085-0222

 Lab ID
 1003474-001A

 Field ID
 P84

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/26/10

 Matrix
 Soil

 Sampled
 03/25/10 22:59

#### Analytical Method 8015B\_FIN

Prep Method 3550B	Prep Batch	28833			Date/Time Prep	ped	03/28/10 7:26
	Default Vol/Wt	30 g	Sample Vol/Wt 30.4	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28)	37.7	mg/Kg	10.0	1	04/06/10 15:08	MJ	44151
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/06/10 15:08	MJ	44151
Gasoline/Aviation Jet	No			1	04/06/10 15:08	MJ	44151
JP4	No			1	04/06/10 15:08	MJ	44151
JP5 / JP8	Yes			1	04/06/10 15:08	MJ	44151
JP7	No			1	04/06/10 15:08	MJ	44151
JP10	No			1	04/06/10 15:08	MJ	44151
JP18 / Turbine Jet Fuel	No			1	04/06/10 15:08	MJ	44151
Surrogate: o-Terphenyl		57 %	Limits: 50-150	1	04/06/10 15:08	MJ	44151

	Analyte detected in the associated Method Blank Value exceeds method calibration range	DF H	Dilution Factor Prepped / Analyzed out of holding time.
	C.	н	Prepped / Analyzed out of holding time.
T			
2	Estimated Value Analyte below reported detection limit	M	Minimum value
MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
	MRL Q	MDL       Method Dection Limit (unadjusted)         MRL       Method Reporting Limit         Q       RPD >40% between primary and confirmation columns         TRISTATE_GTW	MRL         Method Reporting Limit         N           Q         RPD >40% between primary and confirmation columns         SQL



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

Tri-State Testing 6756 Buckles Cove

Memphis, TN 38133

Lab Order Number	10-085-0222
Lab ID	1003474-002A
Field ID	P85

ProjectMemphis InternationalDescriptionAirportProject No.E-9-429

**Report of Analysis** 

 Received
 03/26/10

 Matrix
 Soil

 Sampled
 03/25/10 23:21

#### Analytical Method 8015B\_FIN

Prep Method 3550B	Prep Batch	28833			Date/Time Prep	ped	03/28/10 7:26
	Default Vol/Wt	30 g	Sample Vol/Wt 30.4	g	Date/Time		Analytical
Compound	Result	Units	MQL	DF	Analyzed	Ву	Batch
Diesel Range Organics (C10-C28)	39.2	mg/Kg	10.0	1	04/06/10 15:21	MJ	44151
Oil Range Organics (>C28-C40)	< 10.0	mg/Kg	10.0	1	04/06/10 15:21	MJ	44151
Gasoline/Aviation Jet	No			1	04/06/10 15:21	MJ	44151
JP4	No			1	04/06/10 15:21	MJ	44151
JP5 / JP8	Yes			1	04/06/10 15:21	MJ	44151
JP7	No			1	04/06/10 15:21	MJ	44151
JP10	No			1	04/06/10 15:21	MJ	44151
JP18 / Turbine Jet Fuel	No			1	04/06/10 15:21	MJ	44151
Surrogate: o-Terphenyl		68 %	Limits: 50-150	1	04/06/10 15:21	MJ	44151

Qualifiers/	*	Surrogate Recovery outside accepted limits	* I	Recoveries affected by interferences or high background
Definitions	В	Analyte detected in the associated Method Blank	DF	Dilution Factor
	E	Value exceeds method calibration range	н	Prepped / Analyzed out of holding time.
	J	Estimated Value Analyte below reported detection limit	М	Minimum value
	MDL	Method Dection Limit (unadjusted)	MQL	Method Quantitation Limit (adjusted)
	MRL	Method Reporting Limit	N	Refer to attached Non-Compliance Report
	Q	RPD >40% between primary and confirmation columns	SQL	Sample Quantitation Limit (adjusted MDL)
04/08/10 51	60 TRIST	ATE_GTW		



2790 Whitten Road Memphis, TN 38133 (901) 213-2400 Fax (901) 213-2440

#### **Cooler Receipt Form**

#### Customer Number: 05160

Customer Name: Tri-State Testing Report Number: 10-085-0222

## **Shipping Method**

○ FedEx ○ UPS ○ US Postal Client	t 🔿 LMP		Other:
Shipping container/cooler uncompromised?	• Yes	◯ No	O Not Present
Custody seals intact on shipping container/cooler?	⊖ Yes	O No	Not Required
Custody seals intact on sample bottles?	⊖ Yes	O No	Not Required
Chain of Custody present?	Yes	O No	
COC agrees with sample labels?	• Yes	O No	
Samples in proper containers?	Yes	O No	
Sample containers intact?	• Yes	O No	
Sufficient sample volume for indicated tests?	• Yes	O No	
All samples received within holding time?	• Yes	O No	
Container temperature in compliance?	• Yes	() No	
Water - VOA vials free of headspace?	O Yes	O No	N/A
Water - Preservation acceptable upon receipt?	() Yes	() No	• N/A
Samples screened for radioactivity (COE only)?	O Yes	O No	• N/A
Special precautions or instructions included?	⊖ Yes	No No	

Comments:

ts:		

Any regulatory non-compliance issues will be recorded on non-compliance report.

Signature: Rebekah Ross

Date & Time: 03/26/2010 08:50:01

6 -			Airport		LAB pH	1.2	100 miles	1		ALC: NOT OF		1 1.7	-	No. March								
1003474	r REPORT TO: David D. McCray	CT: David McCray • 901-385-1199	PROJECT NAME: Memphis International Airport		REMARKS (ANALYSES, ETC.)	Method 8015 Jet Fuel FingerPrint	Y: DATE/TIME:		DATE/TIME:	3.26.10 0834												
9	REPO	T: Da	OJECT	SA:	NO. OF	-	-	-	-	1	1	-	1	1	-	RELINQUISHED BY:			last		E ONLY	
		y	PR		XIATAM	S	S	S	S	S	S	S	S	S	S	Indu		LAB	da		RY US	1
10-085-022	Th-Shate Testing (GTVV) Th-Shate Testing (GTVV) Merrohis International Airport 8-49-48	FAX 901-213-2440	000	- Thaddey	SAMPLE LOCATION	P84 3'	P85 / 6'									DATE/TIME: REL	6.6 0334	BY/	A Phaddey	B1: V	SHADED AREAS FOR LABORATORY USE ONLY!	1.1
	Tri-State Merrohis		129	Alen	TIME	m462.01	maie:1									DAT	36	UBY:	COOL DB CORVER	ALLAN UP		
CHAIN	V ANALYTIC 2790 Whitten Rd.	3-2400	E-9-429	3	DATE	3/35/10 10:59.PM	3/15/10 11: JIPM	-										SHIFTED BY:	F			
	GTW ANALYTIC 2790 Whitten Rd.	PERMIT/PROJECT NO		Advirter S Signal UKE:	SAMPLE NO.	P84	P85									ED BY:	X - Balen	INEWEN	CONDITION OF COOL FR /SEAT -			
		PI IT/PR		LEK	SEQ NO.											UTSH		IO OL	ONOL			
		PERM	C A A CD	INTYC	LAB NO.											RELINQUISHED BY	METUD	METHO	LIQNOL			

# APPENDIX D.3 – DIRECT PUSH TECHNOLOGY EXISTING PAVEMENT DATA



## Cement-Treated Base Compressive Strength Test Report Drilled Cores

Project: Memphis International Airport Apron Investigation Client: Pickering Environmental

Date of Report: 04/12/10 Date Cored: 04/09/10 Job No.: E-9-429

### **CTB TEST RESULTS**

CORE NUMBER	<u>LENGTH</u>	DIAMETER	<u> /D</u>	LOADS Lbs.	CORRECTED COMPRESSIVE STRENGTH
P69	4.7"	3.75"	1.25	7993	670 psi
P4	6.4"	3.75"	1.70	27123	2405 psi
P54	7.3"	3.75"	1.95	20379	1845 psi
P76	7.0"	3.75"	1.87	14840	1330 psi
P82	6.5"	3.75"	1.73	31727	2815 psi
P23	4.7"	3.75"	1.25	15279	1285 psi
P83	7.1"	3.75"	1.89	3897	650 psi
P15	5.1"	3.75"	1.36	14840	1330 psi
P52	7.1"	3.75"	1.89	37983	3405 psi
P17	5.2"	3.75"	1.39	34641	2980 psi
P85	6.3"	3.75"	1.68	23685	2080 psi
P7	7.3"	3.75"	1.95	45559	4125 psi
P55	4.7"	3.75"	1.25	45971	3870 psi
P80	5.8"	3.75"	1.55	21628	1880 psi
P14	5.7"	3.75"	1.52	21745	1890 psi
P13	4.5"	3.75"	1.20	11394	950 psi

Test Method: ASTM C-42, Obtaining and Testing Drilled Cores of Concrete.



## MEMPHIS INTERNATIONAL AIRPORT MSCAA Project 08-1259-00 Terminal Apron Geotechnical Investigation

## **Direct Push Technology Concrete and Base Matrix**

Hole #	Concrete Thickness	Soil Cement/CTB Thickness Recovered
P-1	15"	8"
P-2	18.5"	
P-3	13"	
P-4	17"	6"
P-5	11.5"	
P-6	11"	
P-7	14.5"	11"
P-8	11"	
P-9	11.5"	
P-10	21"	
P-11	14"	6"
P-12	15"	14"
P-13	15"	7"
P-14	14"	18"

P-15	15"	13"
P-16	15"	
P-17	14"	11"
P-18	15"	
P-19	15"	
P-20	15"	
P-21	15"	5"
P-22	16"	7"
P-23	15.5"	10.5"
P-24	16"	
P-25	11"	
P-26	11"	
P-27	11.5"	2"
P-28	11"	
P-29	11"	
P-30	11"	
P-31	11"	
P-32	11"	
P-33	11"	
P-34	11"	· · · · ·
P-35	15.5"	
P-36	14.5"	6.5"

P-37	15.5"	8.5"
P-38	16"	
P-39	14.5"	8"
P-40	11.5"	
P-41	10.5"	
P-42	15"	
P-43	11"	
P-44	11"	
P-45	11"	
P-46	11"	
P-47	11"	1 1 A
P-48	11"	
P-49	11.5"	
P-50	11"	
P-51	13"	
P-52	15"	13"
P-53	14"	
P-54	14.5"	10"
P-55	14.5"	9"
P-56	11"	
P-57	11"	
P-58	12"	

P-59	11.5"	1"
P-60	11"	
P-61	11"	
P-62	12"	
P-63	11.5"	
P-64	12"	
P-65	11"	1
P-66	17"	4"
P-67	15"	
P-68	14.5"	
P-69	14"	5"
P-70	20"	
P-71	15.5"	7.5"
P-72	15"	
P-73	14"	
P-74	13.5"	3.5"
P-75	15.5"	13"
P-76	14"	17"
P-77	15"	16"
P-78	14"	12.5"
P-79	15"	5"
P-80	14"	7

P-81	14.5"	11.5"
P-82	14"	10"
P-83	14.5"	13.5"
P-84	14"	9"
P-85	14"	15"

LKI - STATE TESTING SERVICES, INC. 6756 Buckles Cove Memph

# MEMPHIS INTL. AIRPORT E-9-429 Hole: B-2 Depth: 15'

 TRI - STATE TESTING SERVICES, INC.
 6756 Buckles Cove Memphis, 12

## MEMPHIS INTL. AIRPORT E-9-429 Hole: B-1 Depth: 15'

# MEMPHIS INTL. AIRPORT E-9-429 Hole: B-3 Depth: 15'

6756 Buckles Cove Me TRI - STATE TESTING SERVICES, ONI 

MEMPHIS INTL. AIRPORT E-9-429 Hole: B-4 Depth: 15'

#### 6756 Buckles Cove TRI - STATE TESTING SERVICES, INC.

TRI - STATE TESTING SERVICES, INC. 6756 Buckles Cove Mem

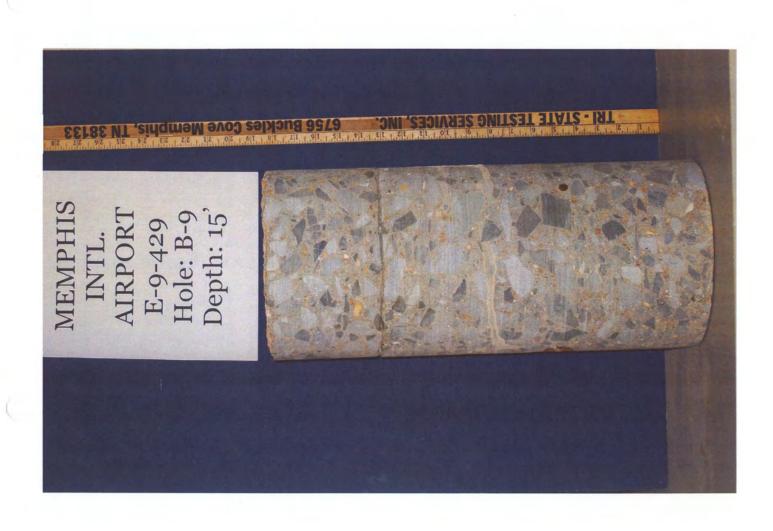
# MEMPHIS INTL. AIRPORT E-9-429 Hole: B-6 Depth: 15'

MEMPHIS INTL. AIRPORT E-9-429 Hole: B-5 Depth: 15' 

## MEMPHIS INTL. AIRPORT E-9-429 Hole: B-8 Depth: 15'

## MEMPHIS INTL. AIRPORT E-9-429 Hole: B-7 Depth: 15'





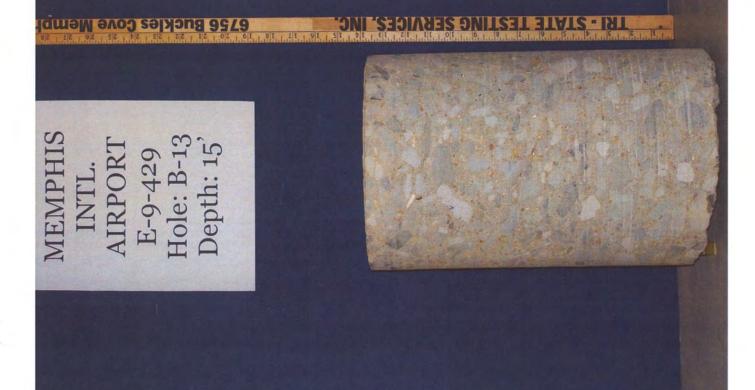
MEMPHIS INTL. AIRPORT E-9-429 Hole: B-10 Depth: 15'

 MEMPHIS INTL. AIRPORT E-9-429 Hole: B-12 Depth: 15'

TRI - STATE TESTING SERVICES, INC. 6756 Buckles Cove Memp

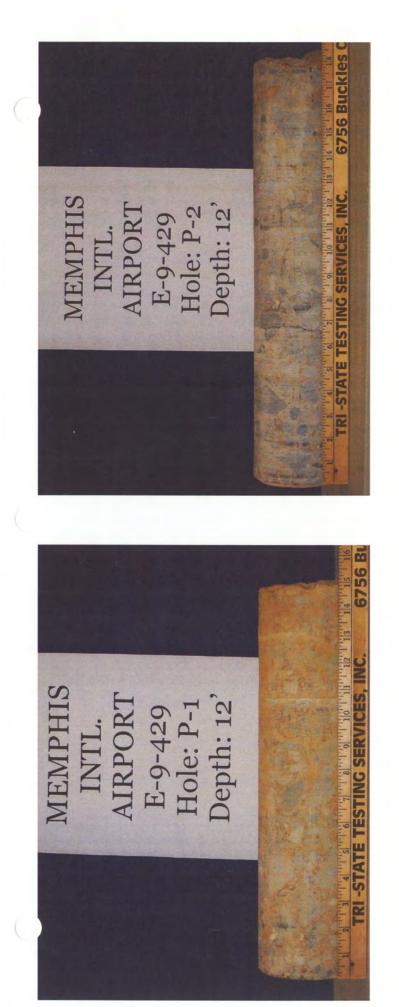
MEMPHIS INTL. AIRPORT E-9-429 Hole: B-11 Depth: 15' 
 Image: 1
 Image: 1

# MEMPHIS INTL. AIRPORT E-9-429 Hole: B-14 Depth: 15'

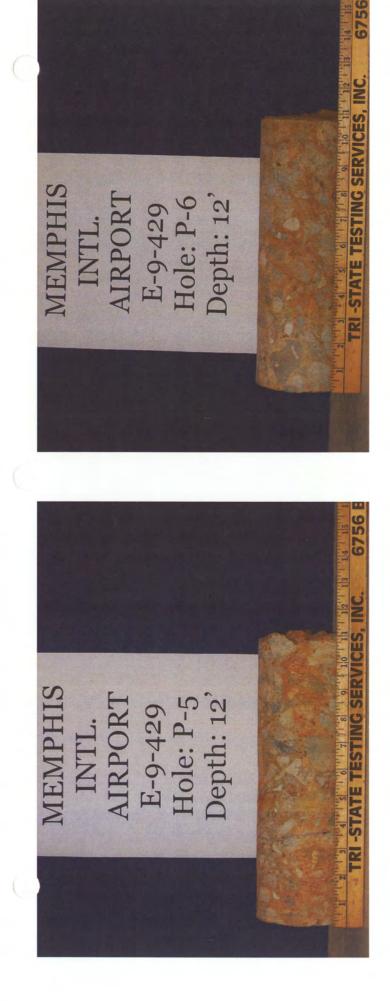


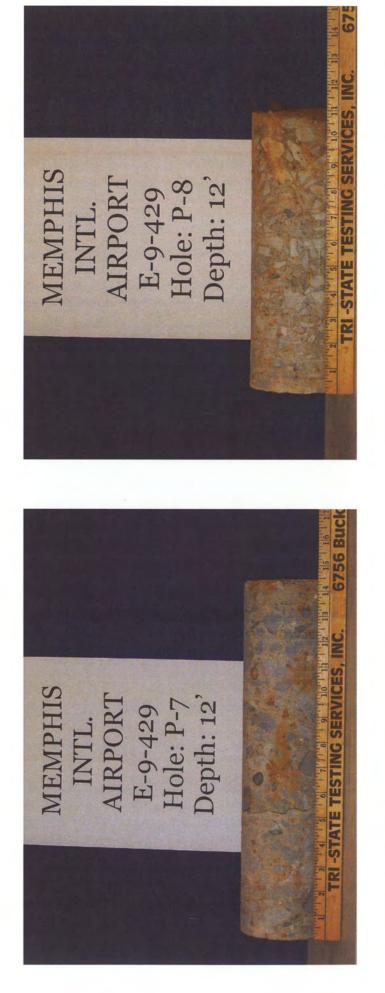
# MEMPHIS INTL. AIRPORT E-9-429 Hole: B-15 Depth: 15'

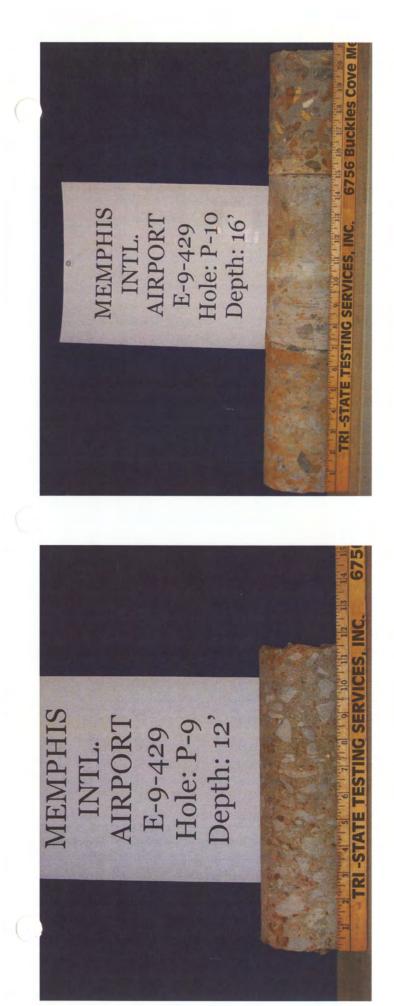
 III
 SINC
 EXAMPLE
 EXAMP







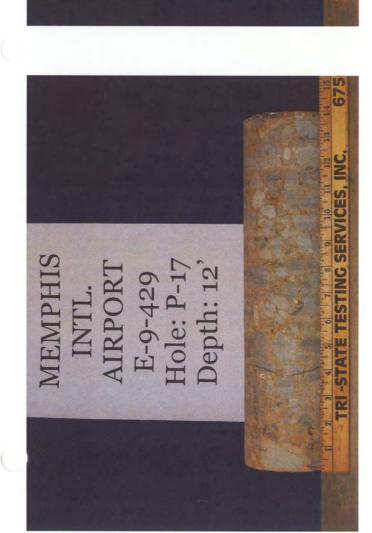








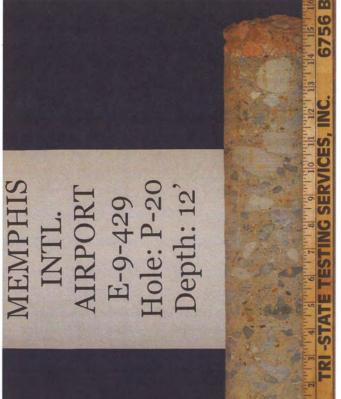




6756 B **FRI -STATE TESTING SERVICES, INC.** INTL. AIRPORT E-9-429 Hole: P-18 Depth: 12' MEMPHIS



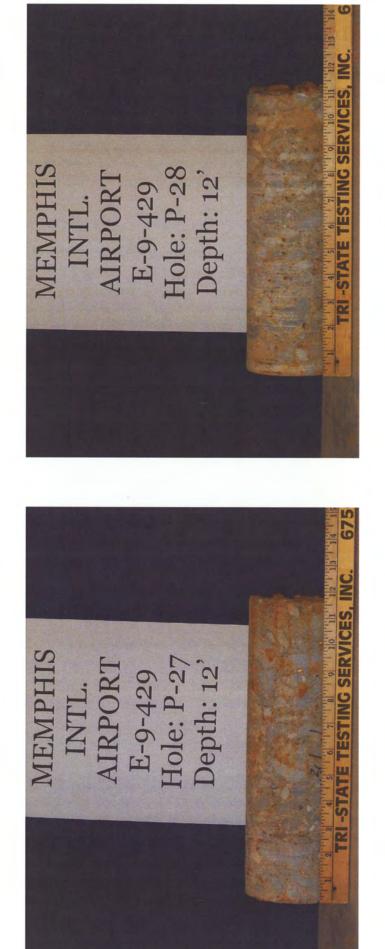
INTL. AIRPORT E-9-429 Hole: P-20 Depth: 12' MEMPHIS

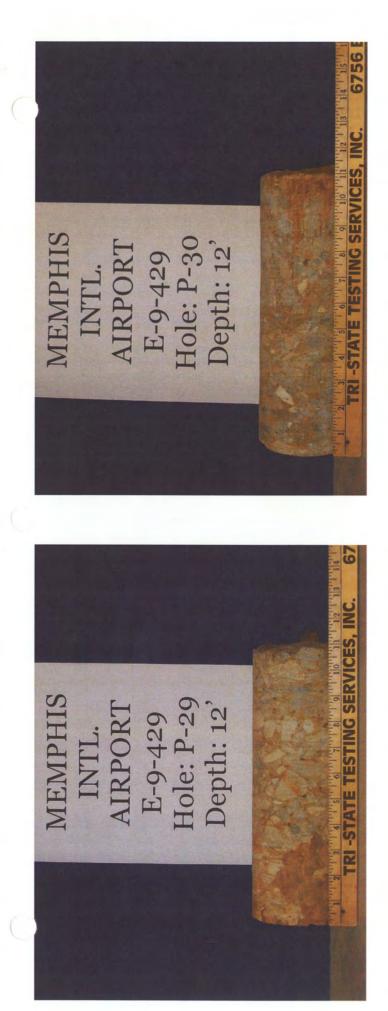


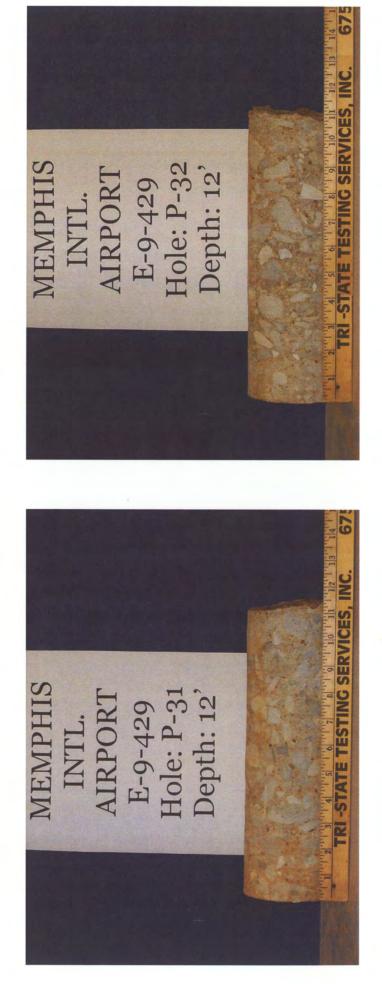


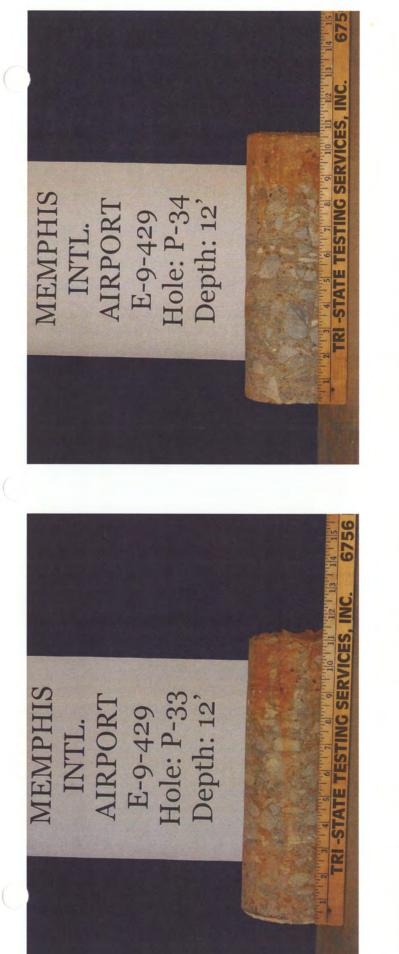








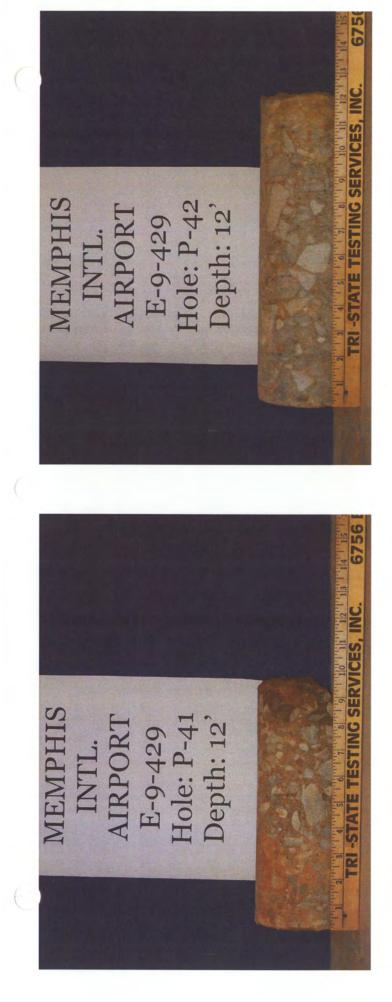








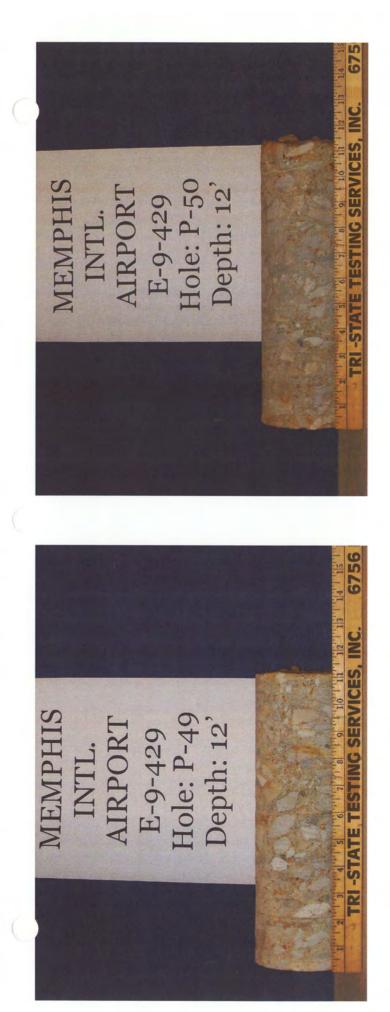
















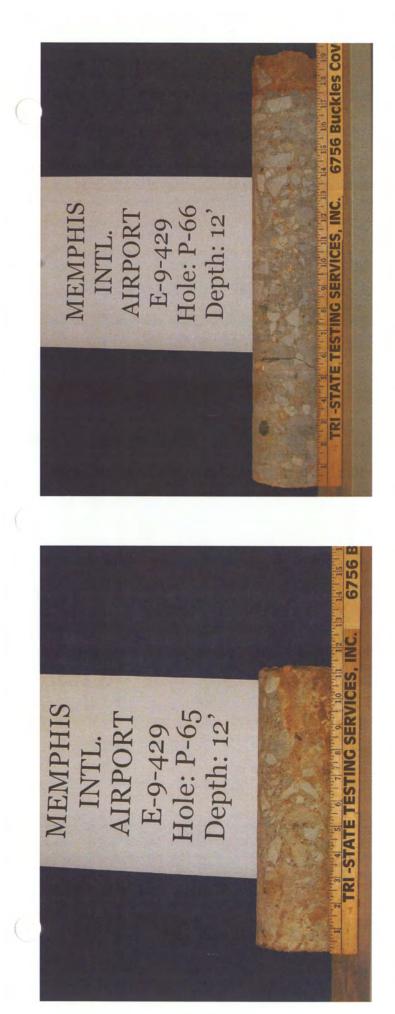










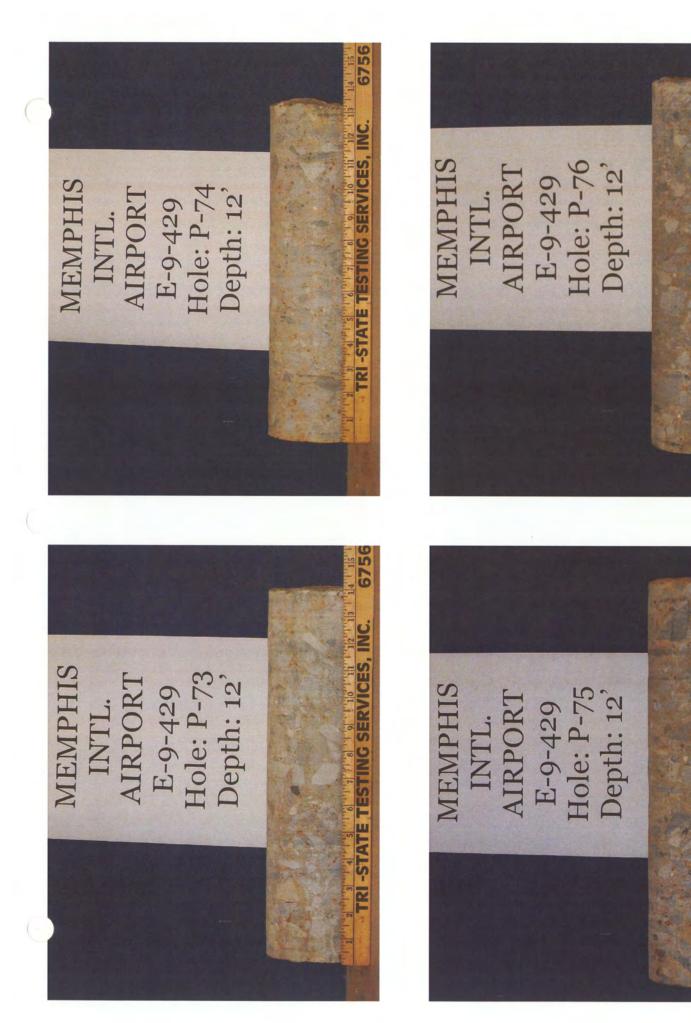








6756 B



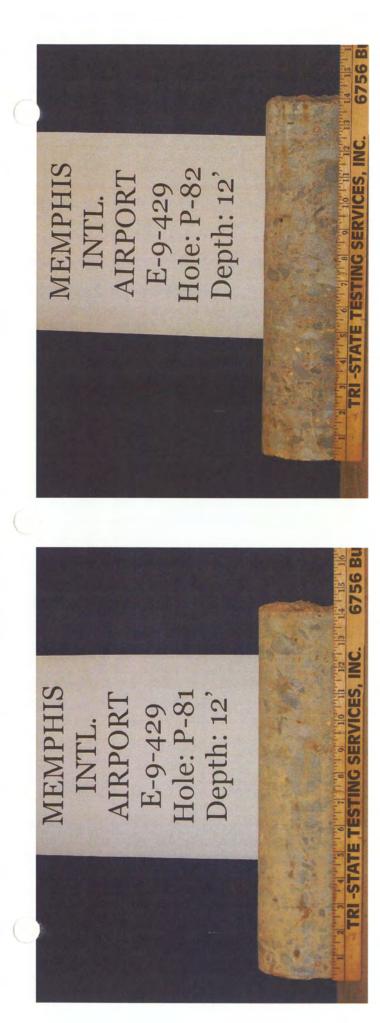
TRI -STATE TESTING SERVICES. INC. 6756 Bi

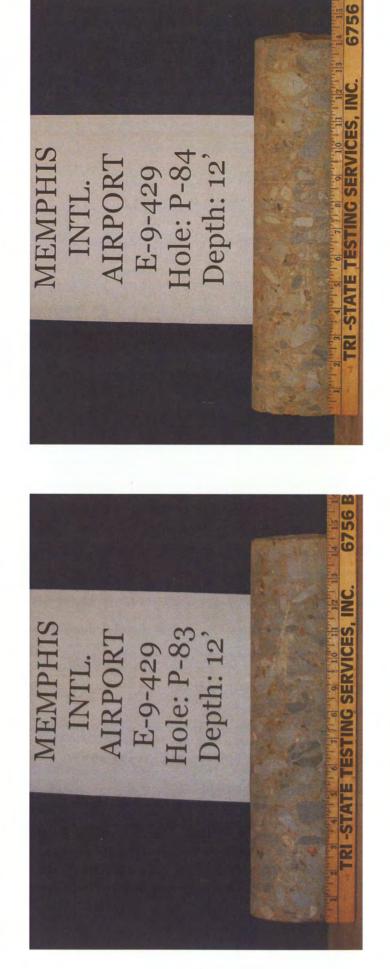
675

TRI -STATE TESTING SERVICES, INC.











# **DOCUMENT 3: ASR INVESTIGATION**



### **REPORT OF CONCRETE TESTING**

**PROJECT:** 

MEMPHIS TERMINAL APRON RECONSTRUCTION

### **REPORTED TO:**

THY, INC. 1760 MORIAH WOODS BLVD., STE. 1 MEMPHIS, TN 38117

**ATTN:** TECK TANG

**APS JOB NO:** 10-06903

DATE: FEBRUARY 28, 2011

### **INTRODUCTION**

This report presents the results of laboratory work performed by our firm on twelve concrete core samples submitted to us by Mr. Teck Tang of Thy, Inc. on February 15, 2011. We understand the concrete cores were obtained from an exterior concrete airfield terminal apron that is currently under evaluation. The concrete was reportedly placed in 1972 and 1964. The scope of our work was limited to performing petrographic analysis testing to document the overall quality of the concrete.

### **CONCLUSIONS**

Based on our observations, test results, and past experience, our conclusions are as follows:

- 1. The overall quality of the concrete ranged from fair to good to poor. The cement paste was moderately dense and hard with carbonation up to 5/8" from the top surface and up to 1" from the bottom surface. The crushed carbonate aggregate was relatively hard, but somewhat reactive. The concrete was placed with a moderate slump.
- 2. The concrete in cores #B4, B7, B8, B14, P14, P20, P35, P54, P69 and P77 has poor durability. The concrete contained an air void system that is not consistent with current technology for resistance to freeze-thaw deterioration. We expect deterioration to occur if exposed to freezing conditions when saturated.
- 3. The concrete exhibited evidence of active alkali silica reactivity (ASR) in all but two cores (B12 and P35). In general, we consider the level of reactivity to be minor.
- 4. The concrete also exhibited evidence of ettringite distress. We observed extensive secondary ettringite filling of air voids and some filling of microcracks. We consider the level of distress to be minor to moderate and expect it to continue if the concrete is exposed to moisture.

Sample Number	Level of ASR Reactivity	Level of Ettringite Distress
B1	Minor	Minor
B4	Minor	Minor
B7	Minor	Minor to moderate
<b>B</b> 8	Minor	Minor to moderate
B12	None Observed	Minor
B14	Minor	Minor to moderate
D14	Minor	Madarata
P14	Minor	Moderate
P20	Minor	Moderate
P35	None Observed	Moderate
P54	Minor	Moderate
P69	Minor	Minor
P77	Minor	Minor

The table below lists the level of ASR reactivity and ettringite distress we observed:

### **SAMPLE IDENTIFICATION**

Sample Number	Original Sample Dimensions, in.
B1	197 mm (7-3/4") diameter x 369 mm (14-1/2") long
B4	197 mm (7-3/4") diameter x 305 mm (12") long
B7	197 mm (7-3/4") diameter x 280 mm (11") long
B8	197 mm (7-3/4") diameter x 318 mm (12-1/2") long
B12	223 mm (8-3/4") diameter x 299 mm (11-3/4") long
B14	197 mm (7-3/4") diameter x 363 mm (14-1/4") long
P14	96 mm (3-3/4") diameter x 356 mm (14") long
P20	96 mm (3-3/4") diameter x 375 mm (14-3/4") long
P35	96 mm (3-3/4") diameter x 394 mm (15-1/2") long
P54	96 mm (3-3/4") diameter x 243 mm (9-9/16") long
P69	96 mm (3-3/4") diameter x 349 mm (13-3/4") long
P77	96 mm (3-3/4") diameter x 286 mm (11-1/4") long

### TEST RESULTS

Our complete petrographic analysis test results appear on the attached sheets entitled 00 LAB 001 "Petrographic Examination of Hardened Concrete, ASTM:C856." A brief summary of the general concrete properties is as follows:

- 1. The coarse aggregate in the cores was comprised of 1" to 1-1/2" maximum sized crushed carbonate that was fairly well graded with fair to good overall distribution.
- 2. Pozzolanic admixtures were not observed in any of the concrete samples.
- 3. The paste color of the cores was tannish gray with the slump estimated to be medium (2 to 5").
- 4. The paste hardness of the cores was judged to be medium to hard with the paste/aggregate bond considered good.
- 5. The depth of carbonation was up to 5/8" from the top surface.
- 6. The water/cement ratio of the cores was estimated at between 0.42 to 0.49 with approximately 2-6% unhydrated cement particles.

Air Content Testing – See attached data sheets.

### TEST PROCEDURES

Laboratory testing was performed on February 15, 2011 and subsequent dates. Our procedures were as follows:

### **Petrographic Analysis**

A petrographic analysis was performed in accordance with APS Standard Operating Procedure 00 LAB 001, "Petrographic Examination of Hardened Concrete," ASTM:C856-latest revision. The petrographic analysis consisted of reviewing cement paste and aggregate qualities on a whole basis as well as on a cut/polished section. The depth of carbonation was documented using a phenolphthalein indicator solution applied on a freshly cut and polished surface of the concrete sample. The water/cement ratio of the concrete was estimated by viewing a thin section of the concrete under an Olympus BH-2 polarizing microscope at magnification up to 1000x. Thin section analysis was performed in accordance with APS Standard Operating Procedure 00 LAB 013, "Determining the Water/Cement of Portland Cement Concrete, APS Method." The samples are first highly polished, then epoxied to a glass slide. The excess sample is cut from the glass and the slide is polished until the concrete reaches 25 microns or less in thickness.

### **Air Content Testing**

Air content testing was performed using APS Standard Operating Procedure 00 LAB 003, "Microscopical Determination of Air Void Content and Parameters of the Air Void System in Hardened Concrete, ASTM:C457-latest revision." The linear traverse method was used. The concrete cores were cut perpendicular with respect to the horizontal plane of the concrete as placed and then polished prior to testing.

### **REMARKS**

The test samples will be retained for a period of at least thirty days from the date of this report. Unless further instructions are received by that time, the samples may be discarded. Test results relate only to the items tested. No warranty, express or implied, is made.

Report Prepared By: American Petrographic Services, Inc.

Walter

Scott F. Wolter, P.G. President MN License No. 30024

Job No.	10-06903	Date:	2-22-2011 / 3-3-2011
Sample Identification:	B1	Performed by:	M. Koch / D. Hunt

#### I. General Observations

- 1. Sample Dimensions: Our analysis was performed on a 358 mm (14-1/8") x 162 mm (6-3/8") x 44 mm (1-3/4") thick polished section that was cut from the original 197 mm (7-3/4") diameter x 369 mm (14-1/2") long core.
- Surface Conditions: Top: Rough, mortar eroded surface with marker paint Bottom: Rough, irregular, formed surface; placed on grade with approximately 50% fractured
- 3. Reinforcement: None observed
- 4. General Physical Conditions: The entire top surface has undergone mortar erosion, exposing numerous fine aggregate particles. Approximately 40% of the top surface was covered with white marker paint. An approximately 17 mm (11/16") diameter hole was observed on the present top surface. A few microcracks were present. Carbonation proceeds up to 3 mm (1/8") depth. The concrete was air entrained with a fairly well distributed air void system. White ettringite was observed. Evidence of active alkali silica reaction was observed. Fair to good overall condition.

#### II. Aggregate

- 1. Coarse: 38 mm (1-1/2") maximum sized crushed carbonate consisting of fossiliferous, micritic, oolitic and sandy limestone. The coarse aggregate was mostly sub-angular with several angular particles. Fairly well graded with good overall uniform distribution.
- 2. Fine: Quartz and lithic sand with many carbonate and chert particles that was fairly well graded. The grains were mostly sub-angular with many sub-rounded particles. Good overall uniform distribution.

#### III. Paste

1.	Air Content:	4.3% total
2.	Paste proportions:	20% to 22%
3.	Depth of carbonation:	Ranged from negligible up to approximately 3 mm $(1/8")$ depth from the present top surface and ranged from negligible up to approximately 3 mm $(1/8")$ depth from the bottom surface. Carbonation was observed intermittently around the perimeters of a few coarse carbonate aggregate particles scattered throughout the sample.
4.	Paste/aggregate bond:	Good
5.	Paste color:	Medium gray becoming dark tan within the bottom approximately 3 mm $(1/8")$ of the sample and dark gray between negligible and 9 mm $(3/8")$ depth from the bottom surface
6.	Paste hardness:	Medium
7.	Microcracking:	A few sub-vertical drying shrinkage microcracks proceed from the present top surface up to approximately $30 \text{ mm} (1-3/16")$ depth. A few microcracks were observed scattered throughout the sample at various depths and orientations.
8.	Secondary deposits:	White ettringite was observed partially lining many to filling a few air voids scattered throughout the sample. White alkali silica gel was observed partially lining to filling a few air voids scattered throughout the sample.
9.	Slump:	Estimated, medium (2 to 4").
10.	Pozzolan/Slag presence:	None observed
11.	Water/cement ratio:	Estimated at between 0.42 to 0.47 with approximately 3-5% unhydrated or residual portland cement clinker particles.
12.	Cement hydration:	Alites-mostly fully; Belites-moderate to mostly well

#### IV. Conclusions

Job No.	10-06903	Date:	2-16-2011 / 3-4-2011
Sample Identification:	B4	Performed by:	M. Koch / D. Hunt

#### I. General Observations

- 1. Sample Dimensions: Our analysis was performed on a 295 mm (11-5/8") x 180 mm (7-1/6") x 62 mm (2-7/16") thick polished section that was cut from the original 197 mm (7-3/4") diameter x 305 mm (12") long core.
- 2. Surface Conditions:

Top:Rough, mortar eroded and traffic worn surface with marker paintBottom:Rough, irregular, formed surface; placed on grade

- 3. Reinforcement: None observed
- 4. General Physical Conditions: The entire top surface has undergone mortar erosion, exposing a few coarse and numerous fine aggregate particles. The top surface has undergone moderate traffic wear with the topographic highs worn smooth. Approximately 30% of the top surface was covered with white marker paint. An approximately 16 mm (5/8") concrete anchor was observed protruding from the top surface of the core. A few microcracks were present. Carbonation proceeds up to 26 mm (1") depth. The concrete was not air entrained. White ettringite was observed. Evidence of active alkali silica reaction was observed. Fair overall condition.

#### II. Aggregate

- 1. Coarse: 38 mm (1-1/2") maximum sized crushed carbonate consisting of fossiliferous, micritic, oolitic and sandy limestone. The coarse aggregate was mostly sub-angular with many angular particles. Fairly well graded with good overall uniform distribution.
- 2. Fine: Quartz and lithic sand with many carbonate and chert particles that was fairly well graded. The grains were mostly sub-angular with many sub-rounded particles. Good overall uniform distribution.

#### III. Paste

газ	raste			
1.	Air Content:	1.8% total		
2.	Paste proportions:	24% to 26%		
3.	Depth of carbonation:	Ranged from approximately 1 mm $(1/32")$ up to 9 mm $(3/8")$ depth from the present top surface and negligible up to approximately 26 mm $(1")$ depth from the bottom surface		
4.	Paste/aggregate bond:	Good		
5.	Paste color:	Mottled light to medium gray becoming medium tan within the carbonated areas		
6.	Paste hardness:	Medium		
7.	Microcracking:	A few subvertical drying shrinkage microcracks proceed from the present top surface up to approximately 9 mm $(3/8")$ depth.		
8.	Secondary deposits:	White ettringite was observed partially lining many to filling a few air voids below approximately 2 mm (1/16") depth from the present top surface. White alkali silica gel was observed lining a few air voids proximate to a reactive coarse aggregate particle approximately 73 mm (2-7/8") depth from the present top surface.		
9.	Slump:	Estimated, medium (3 to 5").		
10.	Pozzolan/Slag presence:	None observed		
11.	Water/cement ratio:	Estimated at between 0.43 to 0.48 with approximately 4-6% unhydrated or residual portland cement clinker particles.		
12.	Cement hydration:	Alites-mostly fully; Belites-moderate to mostly well		

#### IV. Conclusions

Job No.	10-06903	Date:	2-16-2011 / 3-4-2011
Sample Identification:	B7	Performed by:	S. Malecha / D. Hunt

#### I. General Observations

- 1. Sample Dimensions: Our analysis was performed on a 276 mm (10-7/8") x 178 mm (7") x 60 mm (2-3/8") thick polished section that was cut from the original 197 mm (7-3/4") diameter x 280 mm (11") long core.
- Surface Conditions: Top: Rough, mortar eroded surface Bottom: Rough, irregular, formed surface; placed on grade
- 3. Reinforcement: None observed
- 4. General Physical Conditions: The entire top surface of the core has undergone mortar erosion, exposing many coarse and numerous fine aggregate particles. Remnants of white marker paint were observed on the present top surface of the core. An approximately 18 mm (11/16") diameter concrete anchor was observed protruding from the top surface of the core. Few microcracks were present. Carbonation proceeds up to 11 mm (7/16") depth from the present top surface. The concrete contains air entrainment with a fairly well distributed air void system, but compromised by ettringite. Minor evidence of active alkali silica reaction observed. Fair overall condition.

#### II. Aggregate

- Coarse: 38 mm (1-1/2") maximum sized crushed carbonate consisting of fossiliferous, micritic, oolitic, and sandy limestone with a few chert and partially silicified limestone particles. The coarse aggregate was mostly angular with many sub-angular particles. Fairly well graded with good overall uniform distribution. Reactive particles consist of chert and partially silicified limestone.
- 2. Fine: Quartz and lithic sand with many carbonate and chert particles that was fairly well graded. The grains were mostly sub-angular with many sub-rounded particles. Good overall uniform distribution.

#### III. Paste

1		
1.	Air Content:	4.0% total
2.	Paste proportions:	25% to 27%
3.	Depth of carbonation:	Ranged from approximately 7 mm $(1/4")$ up to 11 mm $(7/16")$ depth from the present top surface and ranged from approximately 14 mm $(9/16")$ up to 24 mm $(15/16")$ depth from the bottom surface
4.	Paste/aggregate bond:	Good
5.	Paste color:	Mottled light to medium gray becoming tan in the carbonated top up to 11 mm $(7/16")$ and light tannish gray in the carbonated bottom approximately 24 mm $(15/16")$ of the sample.
6.	Paste hardness:	Moderate
7.	Microcracking:	Few subvertical microcracks proceed up to approximately 7 mm $(1/4")$ depth from the present top surface.
8.	Secondary deposits:	White ettringite was observed lining to filling numerous entrained air voids scattered throughout the sample below the carbonated top approximately 24 mm ( $15/16$ ") of the sample. White alkali silica gel was observed lining a void space proximate to a reactive coarse aggregate particle approximately 152 mm (6") depth from the present top surface.
9.	Slump:	Estimated, medium (2 to 4")
10.	Pozzolan/Slag presence:	None observed
	Water/cement ratio:	Estimated at between 0.42 to 0.47 with approximately 3-5% unhydrated or residual portland cement clinker particles.
12.	Cement hydration:	Alites-mostly fully; Belites-moderate to mostly well

#### IV. Conclusions

Job No.	10-06903	Date:	2-17-2011 / 3-4-2011
Sample Identification:	B8	Performed by:	S. Malecha / D. Hunt

#### I. General Observations

- 1. Sample Dimensions: Our analysis was performed on a 286 mm (11-1/4") x 176 mm (6-15/16") x 57 mm (2-1/4") thick polished section that was cut from the original 197 mm (7-3/4") diameter x 318 mm (12-1/2") long core.
- Surface Conditions: Top: Rough, mortar eroded and traffic worn surface Bottom: Rough, irregular, formed surface; placed on grade
- 3. Reinforcement: None observed
- 4. General Physical Conditions: The entire top surface of the core has undergone mortar erosion, exposing several coarse and many fine aggregate particles. The top surface appears to have been traffic worn with topographic highs worn smooth. Remnants of white marker paint were observed on the present top surface of the core. An approximately 18 mm (11/16") diameter concrete anchor was observed protruding from the top surface of the core. Few microcracks were present. Carbonation proceeds up to 8 mm (5/16") depth from the present top surface. The concrete contains air entrainment with a fairly well distributed air void system, but compromised by ettringite. Minor evidence of active alkali silica reaction observed. Fair to good overall condition.

#### II. <u>Aggregate</u>

- 1. Coarse: 38 mm (1-1/2") maximum sized crushed carbonate consisting of fossiliferous, micritic, and oolitic limestone with a few chert and partially silicified limestone particles. The coarse aggregate was mostly sub-angular with several sub-angular particles. Fairly well graded with good overall uniform distribution.
- 2. Fine: Quartz and lithic sand with many carbonate and chert particles that was fairly well graded. The grains were mostly sub-angular with many sub-rounded particles. Good overall uniform distribution.

#### III. Paste

laste			
1.	Air Content:	4.3% total	
2.	Paste proportions:	23% to 25%	
3.	Depth of carbonation:	Ranged from negligible up to approximately 8 mm $(5/16")$ depth from the present top surface and ranged from approximately 1 mm $(1/32")$ up to 8 mm $(5/16")$ depth from the bottom surface	
4.	Paste/aggregate bond:	Good	
5.	Paste color:	Tannish gray becoming light tan in the carbonated top up to 8 mm $(5/16")$ and medium tan in the carbonated bottom up to 8 mm $(5/16")$ of the sample.	
6.	Paste hardness:	Medium	
7.	Microcracking:	Few sub-vertical microcracks proceed up to approximately 13 mm $(1/2")$ depth from the present top surface.	
8.	Secondary deposits:	White ettringite was observed lining to filling many entrained air voids scattered throughout the sample below the carbonated top approximately 8 mm ( $5/16$ ") of the sample. White alkali silica gel was observed lining a void space proximate to a reactive coarse aggregate particle at approximately 183 mm ( $7-3/16$ ") depth from the present top surface.	
9.	Slump:	Estimated, medium (2 to 4")	
10.	Pozzolan/Slag presence:	None observed	
	Water/cement ratio:	Estimated at between 0.42 to 0.47 with approximately 3-5% unhydrated or residual portland cement clinker particles.	
12.	Cement hydration:	Alites-mostly fully; Belites-moderate to mostly well	

#### IV. Conclusions

Job No.	10-06903	Date:	2-17-11 / 3-4-2011
Sample Identification:	B12	Performed by:	M. Koch / D. Hunt

#### I. General Observations

- 1. Sample Dimensions: Our analysis was performed on a 286 mm (11-1/4") x 188 mm (7-3/8") x 52 mm (2-1/16") thick polished section that was cut from the original 223 mm (8-3/4") diameter x 299 mm (11-3/4") long core.
- Surface Conditions: Top: Rough, mortar eroded surface Bottom: Rough, irregular, formed surface; placed on grade
- 3. Reinforcement: None observed
- 4. General Physical Conditions: The entire top surface has undergone mortar erosion, exposing several coarse and numerous fine aggregate particles. An approximately 16 mm (5/8") concrete anchor was observed protruding from the top surface of the core. A few microcracks were present. Carbonation proceeds up to 16 mm (5/8") depth. The concrete was air entrained with a fairly well distributed air void system. White ettringite was observed. No evidence of active alkali silica reaction was observed. Fair overall condition.

#### II. Aggregate

- 1. Coarse: 38 mm (1-1/2") maximum sized crushed carbonate consisting of fossiliferous, micritic, oolitic and sandy limestone with a few chert and partially silicified limestone particles. The coarse aggregate was mostly sub-angular with many angular particles. Fairly well graded with good overall uniform distribution.
- 2. Fine: Quartz and lithic sand with many carbonate and chert particles that was fairly well graded. The grains were mostly sub-angular with many sub-rounded particles. Good overall uniform distribution.

#### III. Paste

-	Paste			
	1.	Air Content:	5.0% total	
2	2.	Paste proportions:	22% to 24%	
	3.	Depth of carbonation:	Ranged from approximately 5 mm $(3/16")$ up to 16 mm $(5/8")$ depth from the present top surface and ranged from negligible up to approximately 10 mm $(3/8")$ depth from the bottom surface	
4	4.	Paste/aggregate bond:	Good	
	5.	Paste color:	Mottled light to medium gray becoming medium tan within the bottom approximately 1 mm $(1/32")$ of the sample	
(	5.	Paste hardness:	Moderately hard	
	7.	Microcracking:	A few sub-vertical drying shrinkage microcracks proceed from the present top surface up to approximately 19 mm ( $3/4$ ") depth. A few sub-horizontal microcracks were observed within the present top approximately 1 mm ( $1/32$ ") of the sample.	
8	8.	Secondary deposits:	White ettringite was observed partially lining many to filling several air voids below approximately 123 mm (4-13/16") depth from the present top surface.	
9	Э.	Slump:	Estimated, medium (2 to 4")	
	10.	Pozzolan/Slag presence:	None observed	
	11.	Water/cement ratio:	Estimated at between 0.42 to 0.47 with approximately 3-5% unhydrated or residual portland cement clinker particles.	
	12.	Cement hydration:	Alites-mostly fully; Belites-moderate to mostly well	

#### IV. Conclusions

Job No.	10-06903	Date:	2-22-2011 / 3-4-2011
Sample Identification:	B14	Performed by:	S. Malecha / D. Hunt

#### I. General Observations

- 1. Sample Dimensions: Our analysis was performed on a 354 mm (13-15/16") x 164 mm (6-7/16") x 48 mm (1-7/8") thick polished section that was cut from the original 197 mm (7-3/4") diameter x 363 mm (14-1/4") long core.
- 2. Surface Conditions:

Top: Rough, mortar eroded surface

- Bottom: Approximately 20% rough, formed surface; placed on grade and approximately 80% rough, irregular, fractured surface
- 3. Reinforcement: None observed
- 4. General Physical Conditions: The entire top surface of the sample has undergone light to medium scaling exposing many coarse and fine aggregate particles. An approximately 17 mm (11/16") diameter concrete anchor was observed protruding from the top surface of the core. Few microcracks were present. Intermittent carbonation proceeds up to 15 mm (9/16") depth from the present top surface. The concrete contains air entrainment with a fairly well distributed air void system, but compromised by ettringite. Minor evidence of active alkali silica reaction observed. Good overall condition.

#### II. <u>Aggregate</u>

- 1. Coarse: 38 mm (1-1/2") maximum sized crushed carbonate consisting of fossiliferous, micritic, and oolitic limestone with a few chert and partially silicified limestone. The coarse aggregate was mostly angular with many sub-angular particles. Fairly well graded with good overall uniform distribution.
- 2. Fine: Quartz and lithic sand with many carbonate and chert particles that was fairly well graded. The grains were mostly sub-angular with many sub-rounded and few rounded particles. Good overall uniform distribution.

#### III. Paste

- 1. Air Content: 3.5% total
- 2. Paste proportions: 23% to 25%
- Depth of carbonation: Ranged from negligible up to approximately 3 mm (1/8") depth and occurred intermittently up to 15 mm (9/16") depth from the present top surface along subvertical microcracks. Carbonation was negligible from the bottom surface. Intermittent carbonation was observed along the perimeter of few coarse aggregate particles scattered throughout the sample.
   Paste/aggregate bond: Good
- 5. Paste color: Tannish gray becoming tan in the carbonated zones
- 6. Paste hardness: Medium
- 7. Microcracking: Few subvertical microcracks proceed up to approximately 48 mm (1-7/8") depth from the present top surface.
- 8. Secondary deposits: White ettringite was observed lining to filling numerous entrained air voids scattered throughout the sample. White alkali silica gel was observed lining few voids proximate to few coarse aggregate particles.

9. Slump: Estimated, medium (3 to 5")

- 10. Pozzolan/Slag presence: None observed
- 11. Water/cement ratio: Estimated at between 0.43 to 0.48 with approximately 3-5% unhydrated or residual portland cement clinker particles.
- 12. Cement hydration: Alites-mostly fully; Belites-moderate to mostly well

#### IV. Conclusions

Job No.	10-06903	Date:	2-17-2011 / 3-3-2011
Sample Identification:	P14	Performed by:	S. Malecha / D. Hunt

#### I. General Observations

- 1. Sample Dimensions: Our analysis was performed on a 352 mm (13-7/8") x 96 mm (3-3/4") x 48 mm (1-7/8") thick polished section that was cut from the original 96 mm (3-3/4") diameter x 356 mm (14") long core.
- Surface Conditions: Top: Rough, mortar eroded surface Bottom: Rough, irregular, formed surface; placed on grade
- 3. Reinforcement: None observed
- 4. General Physical Conditions: The entire top surface of the core has undergone mortar erosion, exposing many fine and a few coarse aggregate particles. Few microcracks were present. Carbonation proceeds up to 6 mm (1/4") depth from the top surface. The sample was fractured, in an orientation sub-parallel to the top surface, was observed between approximately 54 mm (2-1/8") and 76 mm (3") depth and between approximately 251 mm (9-7/8") and 273 mm (10-3/4") depth from the present top surface. The concrete contains air entrainment with a fairly well distributed air void system, but compromised by ettringite. Minor evidence of active alkali silica reaction observed. Fair to poor overall condition.

#### II. <u>Aggregate</u>

- 1. Coarse: 38 mm (1-1/2") maximum sized crushed carbonate consisting of fossiliferous, micritic, and oolitic limestone. The coarse aggregate was mostly angular with many sub-angular particles. Fairly well graded with good overall uniform distribution.
- 2. Fine: Quartz and lithic sand with many carbonate and chert particles that was fairly well graded. The grains were mostly sub-angular with many sub-rounded particles. Good overall uniform distribution.

#### III. Paste

1.	Air Content:	4.6% total
2.	Paste proportions:	24% to 26%
3.	Depth of carbonation:	Ranged from negligible up to approximately 6 mm $(1/4")$ depth from the present top surface along sub-vertical microcrack. Ranged from approximately 6 mm $(1/4")$ up to 20 mm $(13/16")$ depth from the bottom surface. Proceeds up to approximately 6 mm $(1/4")$ depth from the cored edge of the sample.
4.	Paste/aggregate bond:	Good
5.	Paste color:	Light gray becoming light tannish gray in the carbonated bottom up to 20 mm (13/16") of the sample.
6.	Paste hardness:	Moderately hard
7.	Microcracking:	Few sub-vertical microcracks proceed up to approximately 25 mm (1") depth from the present top surface. Few microcracks, mostly sub-horizontal, were observed between approximately 70 mm $(2-3/4")$ and 229 mm $(9")$ depth from the present top surface.
8.	Secondary deposits:	White to clear ettringite was observed lining to filling numerous entrained air voids throughout the sample. White silica gel was observed partially lining two void spaces along microcracks and proximate to coarse aggregate particles.
9.	Slump:	Estimated, medium (2 to 4")
10.	Pozzolan/Slag presence:	None observed
11.	Water/cement ratio:	Estimated at between 0.42 to 0.47 with approximately 4-6% unhydrated or residual portland cement clinker particles.
12.	Cement hydration:	Alites-mostly fully; Belites-low to moderate

#### IV. Conclusions

Job No.	10-06903	Date:	2-23-2011/3-3-2011
Sample Identification:	P20	Performed by:	M. Koch / D. Hunt

#### I. General Observations

- 1. Sample Dimensions: Our analysis was performed on a 369 mm (14-1/2") x 94 mm (3-11/16") x 43 mm (1-11/16") thick polished section that was cut from the original 96 mm (3-3/4") diameter x 375 mm (14-3/4") long core.
- Surface Conditions: Top: Rough, mortar eroded surface with marker paint Bottom: Rough, irregular, formed surface; placed on grade
- 3. Reinforcement: None observed
- 4. General Physical Conditions: The entire top surface has undergone mortar erosion, exposing a few coarse and many fine aggregate particles. Approximately 70% of the top surface was covered with white marker paint. A few sub-horizontal fractures were observed between approximately 109 mm (4-5/16") and 207 mm (8-1/8") depth from the present top surface proceeding around coarse aggregate particles. Several microcracks were present. Carbonation proceeds up to 24 mm (15/16") depth. The concrete was air entrained with a fairly well distributed air void system, but compromised by ettringite. Evidence of active alkali silica reaction was observed. Poor overall condition.

#### II. Aggregate

- 1. Coarse: 38 mm (1-1/2") maximum sized crushed carbonate consisting of fossiliferous, micritic, oolitic, partially silicified and sandy limestone. The coarse aggregate was mostly sub-angular with several angular particles. Fairly well graded with good overall uniform distribution.
- 2. Fine: Quartz and lithic sand with many carbonate and chert particles that was fairly well graded. The grains were mostly sub-angular with many sub-rounded particles. Good overall uniform distribution.

#### III. Paste

Pas	le	
1.	Air Content:	2.9% total
2.	Paste proportions:	19% to 21%
3.	Depth of carbonation:	Ranged from negligible up to approximately 6 mm $(1/4")$ from the present top surface, along sub-vertical microcracking and ranged from negligible up to approximately 6 mm $(1/4")$ depth from the bottom surface
4.	Paste/aggregate bond:	Good
5.	Paste color:	Light gray becoming medium tan within the carbonated area
6.	Paste hardness:	Medium hard
7.	Microcracking:	Several sub-vertical drying shrinkage microcracks proceed from the present top surface up to approximately 17 mm $(11/16")$ depth. Several, predominately sub-horizontal, microcracks were observed scattered throughout the sample.
8.	Secondary deposits:	White ettringite was observed partially lining to filling numerous air voids scattered throughout the sample. White alkali silica gel was observed lining a few air voids proximate to a reactive coarse aggregate particles scattered throughout the sample.
9.	Slump:	Estimated, medium (2 to 4")
10.	Pozzolan/Slag presence:	None observed
11.	Water/cement ratio:	Estimated at between 0.42 to 0.47 with approximately 3-5% unhydrated or residual portland cement clinker particles.
12.	Cement hydration:	Alites-mostly fully; Belites-low to moderate

#### IV. Conclusions

Job No.	10-06903	Date:	2-28-2011 / 3-3-2011
Sample Identification:	P35	Performed by:	S. Malecha / D. Hunt

#### I. General Observations

- 1. Sample Dimensions: Our analysis was performed on a 394 mm (15-1/2") x 94 mm (3-11/16") x 48 mm (1-7/8") thick polished section that was cut from the original 96 mm (3-3/4") diameter x 394 mm (15-1/2") long core.
- Surface Conditions: Top: Rough, mortar eroded, and traffic worn surface Bottom: Rough, irregular, formed surface; placed on grade
- 3. Reinforcement: None observed
- 4. General Physical Conditions: The entire top surface has undergone mortar erosion, exposing many coarse and fine aggregate particles. The top surface appears to have been traffic worn with topographic highs worn smooth. Few microcracks were present. Carbonation proceeds up to 11 mm (7/16") depth from the present top surface. The sample was fractured, oriented sub-parallel to the top surface, between approximately 114 mm (4-1/2") and 133 mm (5-1/4") depth from the present top surface. The concrete contains air entrainment with a fairly well distributed air void system, but compromised by ettringite. No evidence of active alkali silica reaction observed. Fair overall condition.

#### II. Aggregate

- 1. Coarse: 38 mm (1-1/2") maximum sized crushed carbonate consisting of fossiliferous, micritic, and oolitic limestone. The coarse aggregate was mostly angular with many sub-angular particles. Fairly well graded with good overall uniform distribution.
- 2. Fine: Quartz and lithic sand with many carbonate and chert particles that was fairly well graded. The grains were mostly sub-angular with many sub-rounded particles. Good overall uniform distribution.

#### III. Paste

ras	le	
1.	Air Content:	3.8% total
2.	Paste proportions:	19% to 21%
3.	Depth of carbonation:	Ranged from negligible up to approximately 14 mm (9/16") depth from the present top surface. Ranged from negligible up to approximately 3 mm (1/8") depth from the bottom surface. Carbonation occurs intermittently between approximately 3 mm (1/8") and 23 mm (7/8") depth from the present top surface along a sub-vertical microcrack.
4.	Paste/aggregate bond:	Good
5.	Paste color:	Grayish tan becoming medium tan in the carbonated bottom up to 3 mm (1/8") of the sample
6.	Paste hardness:	Moderately hard
7.	Microcracking:	Few sub-vertical microcracks proceed up to approximately 60 mm (2-3/8") depth from the present top surface. Few other microcracks, mostly sub-horizontal, proceed across most of the core's diameter at various depths throughout the length of the core. Microcracking proceeds through a few coarse aggregate particles.
8.	Secondary deposits:	White ettringite was observed lining to filling many entrained voids scattered throughout the sample.
9.	Slump:	Estimated, medium (3 to 5")
10.	Pozzolan/Slag presence:	None observed
11.	Water/cement ratio:	Estimated at between 0.44 to 0.49 with approximately 2-4% unhydrated or residual portland cement clinker particles.
12.	Cement hydration:	Alites-mostly fully; Belites-low to moderate

#### IV. Conclusions

Job No.	10-06903	Date:	2-24-2011 / 3-3-2011
Sample Identification:	P54	Performed by:	M. Koch / D. Hunt

#### I. General Observations

- 1. Sample Dimensions: Our analysis was performed on a 243 mm (9-9/16") x 93 mm (3-11/16") x 48 mm (1-7/8") thick polished section that was cut from the original 96 mm (3-3/4") diameter x 243 mm (9-9/16") long core.
- Surface Conditions: Top: Rough, irregular, fractured surface Bottom: Fairly smooth, irregular, formed surface; placed on grade with worn surface
- 3. Reinforcement: None observed
- 4. General Physical Conditions: A sub-horizontal fracture was observed between approximately 83 mm (3-1/4") and 103 mm (4-1/16") depth from the present top surface proceeding through coarse aggregate particles. A few microcracks were present. Carbonation proceeds up to 5 mm (3/16") depth from the bottom surface. The concrete was air entrained with a fairly well distributed air void system, but compromised by ettringite. Evidence of active alkali silica reaction was observed. The entire bottom surface was worn away during coring of the sample. Poor overall condition.

#### II. Aggregate

- 1. Coarse: 38 mm (1-1/2") maximum sized crushed carbonate consisting of fossiliferous, micritic, oolitic and sandy limestone. The coarse aggregate was mostly sub-angular with many angular particles. Fairly well graded with fair overall distribution.
- 2. Fine: Quartz and lithic sand with many carbonate and chert particles that was fairly well graded. The grains were mostly sub-angular with many sub-rounded particles. Good overall uniform distribution.

#### III. <u>Paste</u>

ras	le	
1.	Air Content:	2.5% total
2.	Paste proportions:	17% to 19%
3.	Depth of carbonation:	Negligible from the present top surface and ranged from approximately 2 mm $(1/16")$ up to 5 mm $(3/16")$ depth from the bottom surface
4.	Paste/aggregate bond:	Good
5.	Paste color:	Tannish gray becoming medium tan within the carbonated area
6.	Paste hardness:	Moderately hard
7.	Microcracking:	A sub-vertical drying shrinkage microcrack was observed proceeding from the present top surface up to approximately 8 mm ( $5/16$ ") depth. A few sub-horizontal microcracks were observed within the present top approximately 2 mm ( $1/16$ ") of the sample. A few microcracks were observed scattered throughout the sample at various depths and orientations.
8.	Secondary deposits:	White ettringite was observed partially lining to filling many air voids scattered throughout the sample. White alkali silica gel was observed lining a few air voids proximate to a reactive coarse aggregate particles scattered throughout the sample.
9.	Slump:	Estimated, medium (3 to 5")
10.	Pozzolan/Slag presence:	None observed
11.	Water/cement ratio:	Estimated at between 0.43 to 0.48 with approximately 3-5% unhydrated or residual portland cement clinker particles.
12.	Cement hydration:	Alites-mostly fully; Belites-low to moderate

#### IV. Conclusions

Job No.	10-06903	Date:	2-23-2011 / 3-3-2011
Sample Identification:	P69	Performed by:	S. Malecha / D. Hunt

#### I. General Observations

- 1. Sample Dimensions: Our analysis was performed on a 349 mm (13-3/4") x 94 mm (3-11/16") x 44 mm (1-3/4") thick polished section that was cut from the original 96 mm (3-3/4") diameter x 349 mm (13-3/4") long core.
- Surface Conditions: Top: Rough, mortar eroded surface Bottom: Rough, irregular formed surface; placed on grade
- 3. Reinforcement: None observed

4. General Physical Conditions: The entire top surface has undergone mortar erosion, exposing many coarse and fine aggregate particles. Remnants of white marker paint were observed on the present top surface. The sample was fractured, oriented sub-parallel to the top surface, between approximately 152 mm (6") and 165 mm (6-1/2") depths from the present top surface. Few microcracks were present. Carbonation proceeds up to 7 mm (1/4") depth. The concrete appears to contain a small amount of air entrainment. Ettringite was observed. Minor evidence of active alkali silica reaction observed. Fair to poor overall condition.

#### II. Aggregate

- 1. Coarse: 25 mm (1") maximum sized crushed carbonate consisting of fossiliferous, micritic, and oolitic limestone. The coarse aggregate was mostly angular with many sub-angular particles. Fairly well graded with good overall uniform distribution.
- 2. Fine: Quartz and lithic sand with many chert and carbonate particles that was fairly well graded. The grains were mostly sub-angular with many sub-rounded and few rounded particles. Good overall uniform distribution.

#### III. Paste

1 as		
1.	Air Content:	1.3% total
2.	Paste proportions:	22% to 24%
3.	Depth of carbonation:	Ranged from negligible up to approximately 7 mm $(1/4")$ depth from the present top surface. Ranged from negligible up to approximately 3 mm $(1/8")$ depth from the bottom surface. Carbonation occurred intermittently along the perimeter of few coarse aggregate particles
		scattered throughout the sample.
4.	Paste/aggregate bond:	Good
5.	Paste color:	Gray becoming medium tan in the carbonated zones
6.	Paste hardness:	Moderately hard
7.	Microcracking:	Few sub-vertical microcracks proceed up to approximately 20 mm (13/16") depth from the present top surface. Few microcracks were observed proximate and sub-parallel to the fracture.
8.	Secondary deposits:	White to clear ettringite was observed lining to filling most entrained air voids throughout the sample. White alkali silica gel was observed lining a void space proximate to coarse aggregate particles at approximately 46 mm $(1-13/16")$ depth and white alkali silica gel appears to be filling an entrained air void at approximately 289 mm $(11-3/8")$ depth from the top surface.
9.	Slump:	Estimated, medium (3 to 5")
10.	Pozzolan/Slag presence:	None observed
	Water/cement ratio:	Estimated at between 0.43 to 0.48 with approximately 3-5% unhydrated or residual portland cement clinker particles.
12.	Cement hydration:	Alites-mostly fully; Belites-low to moderate

#### IV. Conclusions

Job No.	10-06903	Date:	2-24-2011 / 3-3-2011
Sample Identification:	P77	Performed by:	S. Malecha / D. Hunt

#### I. General Observations

- 1. Sample Dimensions: Our analysis was performed on a 276 mm (10-7/8") x 96 mm (3-3/4") x 44 mm (1-3/4") thick polished section that was cut from the original 96 mm (3-3/4") diameter x 286 mm (11-1/4") long core.
- Surface Conditions: Top: Rough, irregular, fractured surface Bottom: Rough, irregular, formed surface; placed on grade
- 3. Reinforcement: None observed
- 4. General Physical Conditions: Few microcracks were present. Carbonation proceeds up to 14 mm (9/16") depth from the fractured surface. The concrete contains air entrainment with a fairly well distributed air void system, but compromised by ettringite. Minor evidence of active alkali silica reaction observed. Poor overall condition.

#### II. Aggregate

- 1. Coarse: 25mm (1") maximum sized crushed carbonate consisting of fossiliferous, micritic, and oolitic limestone. The coarse aggregate was mostly angular with many sub-angular particles. Fairly well graded with good overall uniform distribution.
- 2. Fine: Quartz and lithic sand with many carbonate and chert particles that was fairly well graded. The grains were mostly sub-angular with many sub-rounded particles. Good overall uniform distribution.

#### III. Paste

- 1. Air Content: 3.4% total
- 2. Paste proportions: 26% to 28%

2.	Paste proportions:	26% to 28%
3.	Depth of carbonation:	Ranged from negligible up to approximately 14 mm $(9/16")$ depth from the fractured surface. Ranged from approximately 3 mm $(1/8")$ up to 5 mm $(3/16")$ depth from the bottom surface.
		Ranged from negligible up to approximately 9 mm $(3/8^{\circ})$ depth from the cored sides of the
		sample.
4.	Paste/aggregate bond:	Good
5.	Paste color:	Light gray becoming medium tan in the bottom approximately 1 mm (1/32") of the sample
6.	Paste hardness:	Moderately hard
7.	Microcracking:	Few microcracks were observed at various depths and orientations scattered throughout the
		sample. One sub-horizontal microcrack proceeds across the core's diameter approximately 102
		mm (4") depth from the bottom surface. Microcracking proceeds through a few coarse
		aggregate particles.
8.	Secondary deposits:	White to clear ettringite was observed lining to filling numerous entrained air voids scattered
		throughout the sample. White alkali silica gel appears to be filling few entrained air voids
		proximate to a coarse aggregate particle approximately 171 mm (6-3/4") depth from the
	<b>a</b> 1	fractured surface.
9.	Slump:	Estimated, medium (3 to 5")
10.	Pozzolan/Slag presence:	
11.	Water/cement ratio:	Estimated at between 0.43 to 0.48 with approximately 3-5% unhydrated or residual portland cement clinker particles.
12	Coment hydration:	Alites-mostly fully; Belites-low to moderate
12.	Cement hydration:	Antes-mostry runy, bentes-low to moderate

#### IV. Conclusions



**PROJECT:** MEMPHIS TERMINAL APRON RECONSTRUCTION

10-06903

Traverse Length, inches

Test Date

**APS JOB NO:** 

#### **REPORTED TO:**

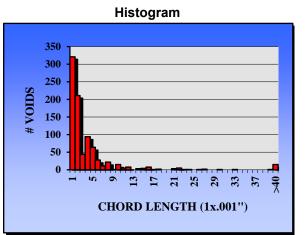
THY INC. 1760 MORIAH WOODS BLVD, STE 1 MEMPHIS, TN 38117

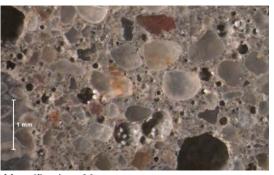
ATTN: TECK TANG DATE: FEBRUARY 22, 2011

Sample ID: Conformance:	The sample cont system which is current technolog resistance.	
Sample Data:		
Description:	Hardened Concr	
Dimensions:	197 mm (7-3/4")	
	mm (14-1/2") long	
Test Data:	ASTM: C457 Linear Traverse	
	Method, APS SC	OP 00LAB003 and
	ACI 116R	
Ain Maid Oantan	± 0/	4.0
Air Void Conten	t %	4.3
Entrained %		3.0
Entrapped %		1.3
Air Voids/inch		8.73
Specific Surface	e, in2/in3	820
Spacing Factor, inches		0.006
Paste Content,	% estimated	22
Magnification		50x

100

2/22/2011





Magnification: 30x Description: Overall hardened air content



**PROJECT:** MEMPHIS TERMINAL APRON RECONSTRUCTION

10-06903

**APS JOB NO:** 

Test Date

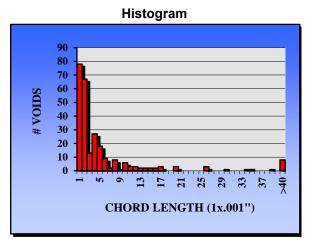
#### **REPORTED TO:**

THY INC. 1760 MORIAH WOODS BLVD, STE 1 MEMPHIS, TN 38117

ATTN: TECK TANG DATE: FEBRUARY 17, 2011

Sample ID: Conformance:	•	B4 ains an air void not consistent with gy for freeze-thaw
Sample Data:		
Description:	Hardened Concr	ete Core
Dimensions:	197 mm (7-3/4")	diameter x 305
	mm (12") long	
Test Data:	ASTM: C457 Linear Traverse	
	Method, APS SC	OP 00LAB003 and
	ACI 116R	
Air Void Content %		1.8
Entrained %	. ,0	1.2
Entrapped %		0.6
Air Voids/inch		2.64
Specific Surface, in2/in3		620
Spacing Factor, inches		0.012
Paste Content, % estimated Magnification		26
		50x
Traverse Length	n, inches	100

2/16/2011





Magnification: 30x Description: Overall hardened air content



**PROJECT:** MEMPHIS TERMINAL APRON RECONSTRUCTION

10-06903

**APS JOB NO:** 

Test Date

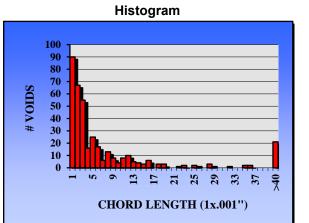
#### **REPORTED TO:**

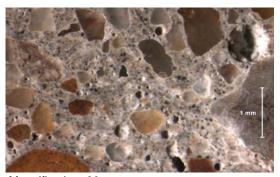
THY INC. 1760 MORIAH WOODS BLVD, STE 1 MEMPHIS, TN 38117

ATTN: TECK TANG DATE: FEBRUARY 17, 2011

Sample ID: Conformance:	B7 The sample contains an air void system which is not consistent with current technology for freeze-thaw resistance.	
Sample Data:		
Description:	Hardened Conc	
Dimensions:	197 mm (7-3/4")	diameter x 280
	mm (11") long	
Test Data:	ASTM: C457 Linear Traverse	
	,	OP 00LAB003 and
	ACI 116R	
Air Void Conten	t %	4.0
Entrained %		2.0
Entrapped %		2.0
Air Voids/inch		3.79
Specific Surface, in2/in3		380
Spacing Factor, inches		0.014
Paste Content, 9	% estimated	26
Magnification		50x
Traverse Length	n, inches	100

2/16/2011





Magnification: 30x Description: Overall hardened air content



**PROJECT:** MEMPHIS TERMINAL APRON RECONSTRUCTION

10-06903

**APS JOB NO:** 

Test Date

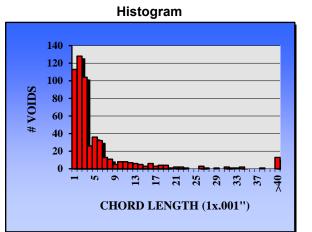
#### **REPORTED TO:**

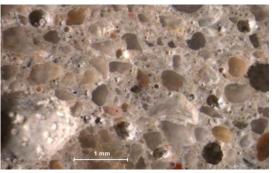
THY INC. 1760 MORIAH WOODS BLVD, STE 1 MEMPHIS, TN 38117

ATTN: TECK TANG DATE: FEBRUAURY 17, 2011

Sample ID: Conformance:	DIFORMANCE: The sample contains system which is not current technology for resistance.	
Sample Data:		
Description:	Hardened Concr	ete Core
Dimensions:	197 mm (7-3/4")	
	mm (12-1/2") long	
Test Data:	ASTM: C457 Linear Traverse	
	Method, APS SC	OP 00LAB003 and
	ACI 116R	
		4.3
Air Void Conten	1 %	
Entrained %		2.6
Entrapped % Air Voids/inch		1.7
		5.53
Specific Surface, in2/in3		510
Spacing Factor, inches Paste Content, % estimated		0.010
		25
Magnification		50x
Traverse Length	n, inches	100

2/17/2011





Magnification: 30x Description: Overall hardened air content



**PROJECT:** MEMPHIS TERMINAL APRON RECONSTRUCTION

10-06903

Traverse Length, inches

Test Date

**APS JOB NO:** 

#### **REPORTED TO:**

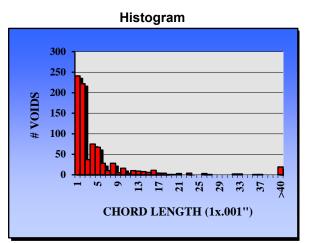
THY INC. 1760 MORIAH WOODS BLVD, STE1 MEMPHIS, TN 38117

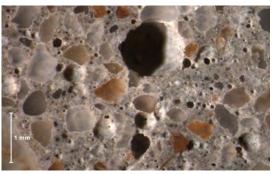
ATTN: TECK TANG DATE: FEBRUARY 17, 2011

Sample ID: Conformance:	The sample consistent which is	
Sample Data:		into Coro
Description:	Hardened Concr	
Dimensions:	223 mm (8-3/4")	
Test Data:	mm (11-3/4") lor ASTM: C457 Lin Method, APS SC ACI 116R	•
Air Void Conten	t %	5.0
Entrained %		3.4
Entrapped %		1.6
Air Voids/inch		8.23
Specific Surface, in2/in3 Spacing Factor, inches		660
		0.007
Paste Content,	% estimated	24
Magnification		50x

100

2/17/2011





Magnification: 30x Description: Overall hardened air content



**PROJECT:** MEMPHIS TERMINAL APRON RECONSTRUCTION

10-06903

**APS JOB NO:** 

Test Date

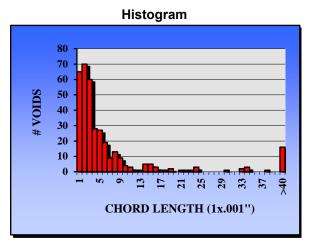
#### **REPORTED TO:**

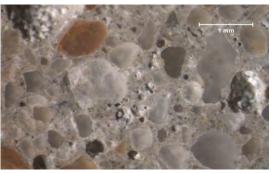
THY INC. 1760 MORIAH WOODS BLVD, STE 1 MEMPHIS, TN 38117

ATTN: TECK TANG DATE: FEBRUARY 23, 2011

Sample ID: Conformance:	The sample cont system which is	B14 tains an air void not consistent with gy for freeze-thaw
Sample Data:		
Description:	Hardened Concr	
Dimensions:	197 mm (7-3/4")	
	mm (14-1/4") long	
Test Data:	ASTM: C457 Linear Traverse	
		OP 00LAB003 and
	ACI 116R	
Air Void Conten	+ 0 <u>/</u>	3.5
Entrained %	1 /0	1 7
Entrapped %		1.8
Air Voids/inch		3.55
Specific Surface, in2/in3		400
Spacing Factor, inches		0.013
Paste Content, % estimated		25
Magnification		50x
Traverse Length	n, inches	100

2/23/2011





Magnification: 30x Description: Overall hardened air content



**PROJECT:** MEMPHIS TERMINAL APRON RECONSTRUCTION

10-06903

**APS JOB NO:** 

Test Date

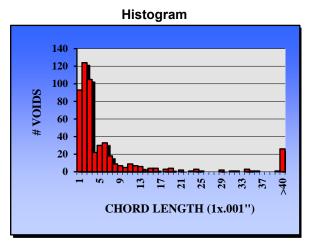
#### **REPORTED TO:**

THY INC. 1760 MORIAH WOODS BLVD, STE 1 MEMPHIS, TN 38117

ATTN: TECK TANG DATE: FEBRUARY 17, 2011

Sample ID: Conformance:	The sample con system which is	P14 tains an air void not consistent with gy for freeze-thaw
Sample Data:		
Description:	Hardened Conc	
Dimensions:		diameter x 356 mm
	(14") long	
Test Data:	ASTM: C457 Linear Traverse	
		OP 00LAB003 and
	ACI 116R	
Air Void Conten	t %	4.6
Entrained %		2.4
Entrapped %		2.2
Air Voids/inch		5.28
Specific Surface	e, in2/in3	460
Spacing Factor, inches		0.011
Paste Content,	% estimated	26
Magnification		50x
Traverse Length	n, inches	100

2/17/2011





Magnification: 30x Description: Overall hardened air content



**PROJECT:** MEMPHIS TERMINAL APRON RECONSTRUCTION

10-06903

**APS JOB NO:** 

Test Date

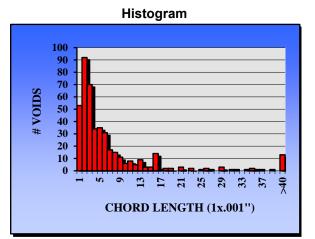
#### **REPORTED TO:**

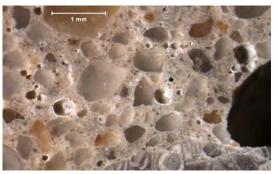
THY INC. 1760 MORIAH WOODS BLVD, STE 1 MEMPHIS, TN 38117

ATTN: TECK TANG DATE: FEBRUARY 28, 2011

Sample ID: Conformance:	The sample con system which is	P35 tains an air void not consistent with gy for freeze-thaw
Sample Data:		
Description:	Hardened Conci	
Dimensions:	( )	diameter x 394 mm
	(15-1/2") long	
Test Data:	ASTM: C457 Lin	
		OP 00LAB003 and
	ACI 116R	
Air Void Conten	t %	3.8
Entrained %		2.6
Entrapped %		1.2
Air Voids/inch		4.44
Specific Surface	e, in2/in3	470
Spacing Factor,	inches	0.010
Paste Content, % estimated		21
Magnification		50x
Traverse Length	n, inches	100

2/28/2011





Magnification: 30x Description: Overall hardened air content



**PROJECT:** MEMPHIS TERMINAL APRON RECONSTRUCTION

10-06903

**APS JOB NO:** 

Test Date

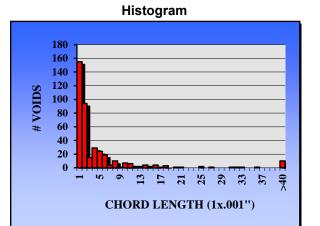
#### **REPORTED TO:**

THY INC. 1760 MORIAH WOODS BLVD, STE 1 MEMPHIS, TN 38117

ATTN: TECK TANG DATE: FEBRUARY 24, 2011

Sample ID:	-	P54
Conformance:	•	tains an air void not consistent with gy for freeze-thaw
Sample Data:		
Description:	Hardened Concr	ete Core
Dimensions:	96 mm (3-3/4") o (9-9/16") long	diameter x 243 mm
Test Data:	ASTM: C457 Linear Traverse Method, APS SOP 00LAB003 and ACI 116R	
Air Void Conten	t %	2.5
Entrained %		1.5
Entrapped %		1.0
Air Voids/inch		4.01
Specific Surface, in2/in3		650
Spacing Factor, inches		0.009
Paste Content, % estimated		19
Magnification		50x
Traverse Length	n, inches	100

2/24/2011





Magnification: 30x Description: Overall hardened air content



**PROJECT:** MEMPHIS TERMINAL APRON RECONSTRUCTION

10-06903

**APS JOB NO:** 

Test Date

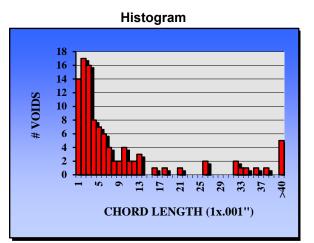
#### **REPORTED TO:**

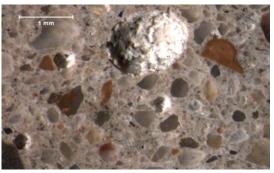
THY INC. 1760 MORIAH WOODS BLVD, STE 1 MEMPHIS, TN 38117

ATTN: TECK TANG DATE: FEBRUARY 23, 2011

Sample ID: Conformance:	The sample con system which is	P69 tains an air void not consistent with gy for freeze-thaw
Sample Data:		0
Description:	Hardened Conci	
Dimensions:		diameter x 349 mm
Test Data:	(13-3/4") long ASTM: C457 Linear Traverse Method, APS SOP 00LAB003 and ACI 116R	
Air Void Conten	t %	1.3
Entrained %		0.7
Entrapped %		0.6
Air Voids/inch		1.03
Specific Surface	e, in2/in3	330
Spacing Factor,	inches	0.025
Paste Content, 9	% estimated	24
Magnification		50x
Traverse Length	n, inches	100

2/23/2011





Magnification: 30x Description: Overall hardened air content



**PROJECT:** MEMPHIS TERMINAL APRON RECONSTRUCTION

10-06903

**APS JOB NO:** 

Test Date

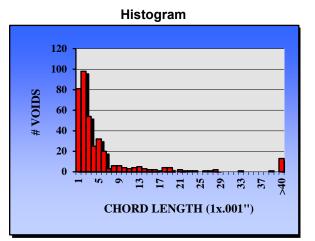
#### **REPORTED TO:**

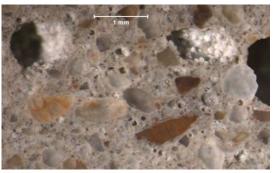
THY INC. 1760 MORIAH WOODS BLVD, STE 1 MEMPHIS, TN 38117

ATTN: TECK TANG DATE: FEBRUARY 24, 2011

Sample ID: Conformance: Sample Data:	system which is	P77 Itains an air void not consistent with ogy for freeze-thaw
-	Hardened Conc	rata Cara
Description:		
Dimensions:	· · /	diameter x 286 mm
Test Data:	(11-1/4") long ASTM: C457 Linear Traverse Method, APS SOP 00LAB003 and ACI 116R	
Air Void Conten	t %	3.4
Entrained %		1.7
Entrapped %		1.7
Air Voids/inch		3.81
Specific Surface, in2/in3		440
Spacing Factor, inches Paste Content, % estimated		0.013
		26
Magnification		50x
Traverse Length	n, inches	100

2/24/2011





Magnification: 30x Description: Overall hardened air content



**DESCRIPTION:** Overall view of the samples as received.



**DESCRIPTION:** Overall view of the samples as received.



**DESCRIPTION:** Overall view of the samples as received.



**SAMPLE ID:** B14 **DESCRIPTION:** Top surface of the sample as received. Note the mortar eroded surface.



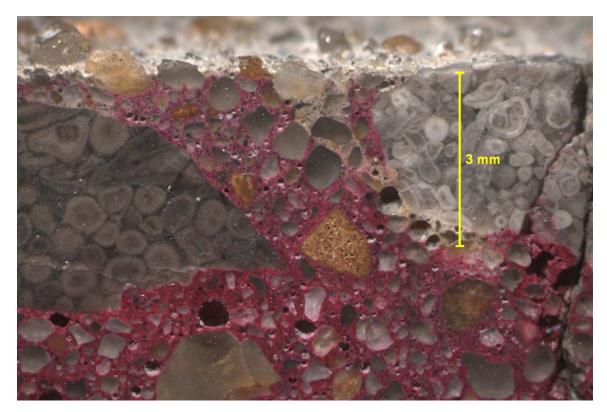
**SAMPLE ID:** B7 **DESCRIPTION:** Top surface of the sample as received. Note the mortar eroded surface.



**SAMPLE ID:** P14 **DESCRIPTION:** Top surface of the sample as received. Note the mortar eroded surface.



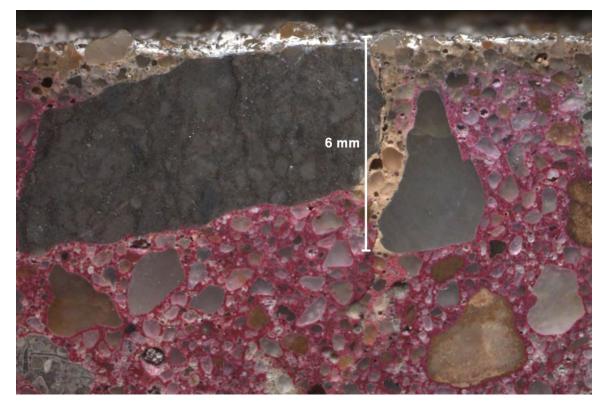
**SAMPLE ID:** P35 **DESCRIPTION:** Top surface of the sample as received. Note the mortar eroded surface.



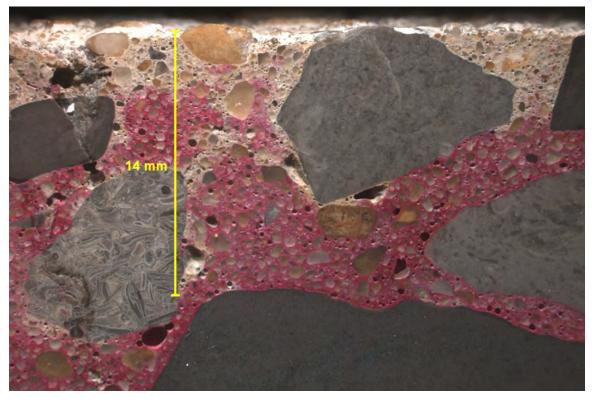
SAMPLE ID:B1DESCRIPTION:Carbonation proceeds to approximately 3 mm (1/8") from the top surfaceMAG:15xof the core.



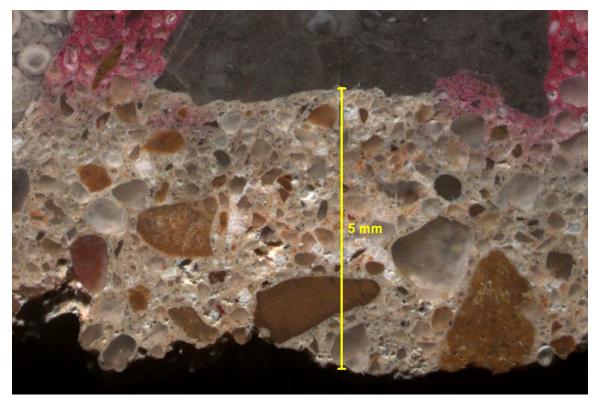
SAMPLE ID:B7DESCRIPTION:Carbonation proceeds to approximately 11 mm (7/16") depth from the topMAG:5xsurface of the core.



SAMPLE ID:P14DESCRIPTION:Carbonation proceeds to approximately 6 mm (1/4") depth from the topMAG:10xsurface of the core.



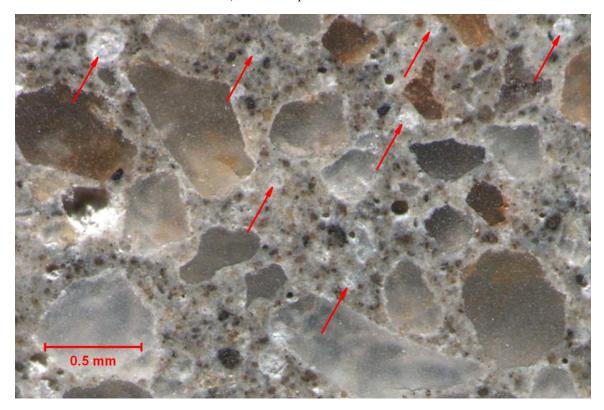
SAMPLE ID:P35DESCRIPTION:Carbonation proceeds to approximately 6 mm (1/4") depth from the topMAG:15xsurface of the core.



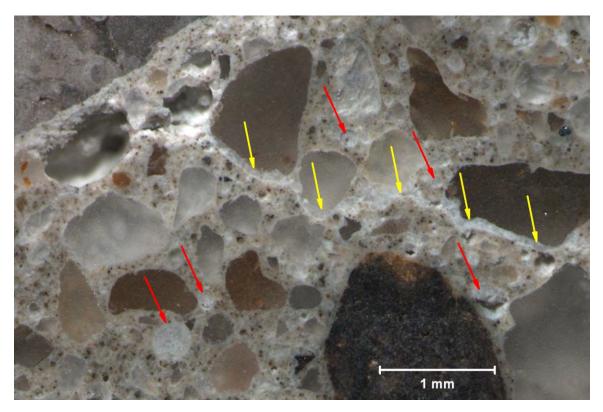
SAMPLE ID:P54DESCRIPTION:Carbonation proceeds to approximately 5 mm (3/16") depth from theMAG:30xbottom surface of the core.



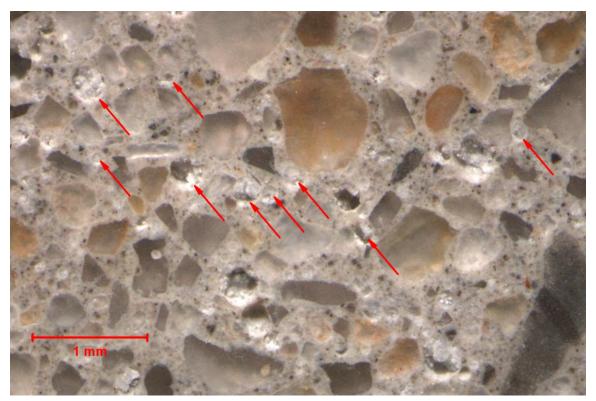
**SAMPLE ID:** P20 **DESCRIPTION:** Predominately sub-horizontal microcracks (mapped with red ink on the left side of the core) in a cut and polished cross section of the core.



SAMPLE ID:B7DESCRIPTION:Ettringite partially filling to filling many entrained sized air voids in a cutMAG:50xand polished cross section of the corel.



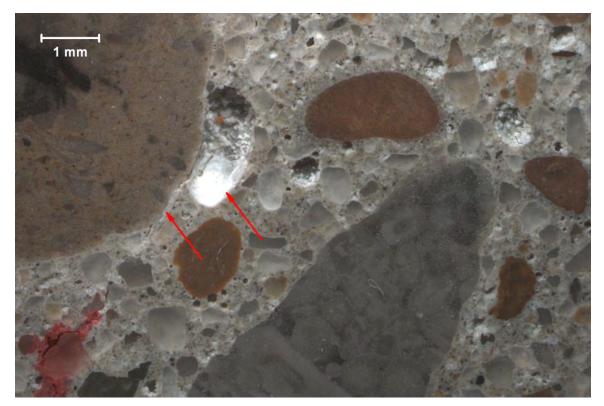
SAMPLE ID:P14DESCRIPTION:Ettringite filling entrained sized air voids (red arrows) and a microcrackMAG:30x(yellow arrows) in a cut and polished cross section of the core.



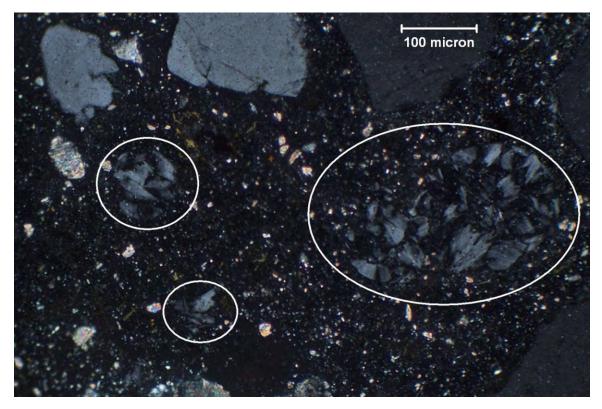
SAMPLE ID:P20DESCRIPTION:Ettringite partially filling to filling entrained sized air voids in a cut andMAG:30xpolished cross section of the core.



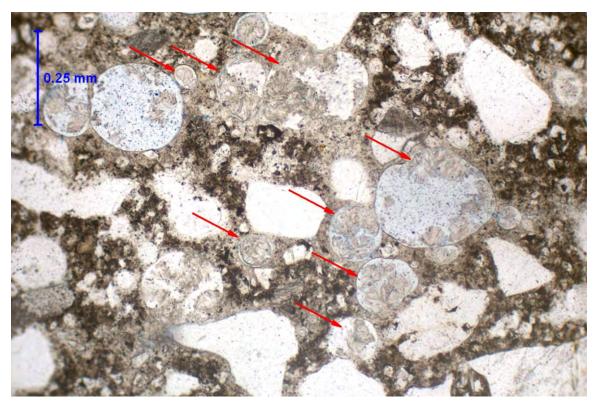
SAMPLE ID:B7DESCRIPTION:ASR gel partially filling and filling voids proximate to a reactive chertMAG:30xparticle (right side of photo) in a cut and polished cross section of the core.



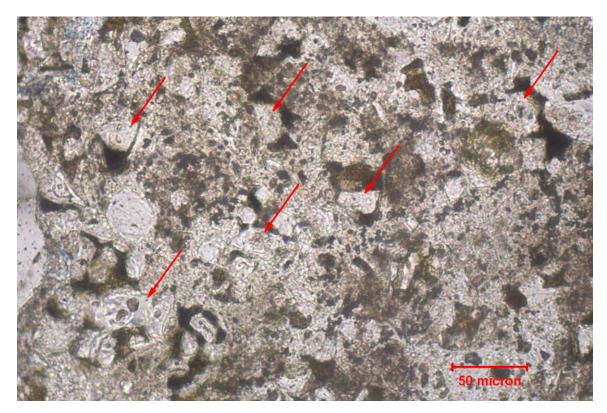
SAMPLE ID:P14DESCRIPTION:ASR gel partially filling a void and microcrack proximate to a reactiveMAG:15xchert particle (left side of photo) in a cut and polished cross section of the core.



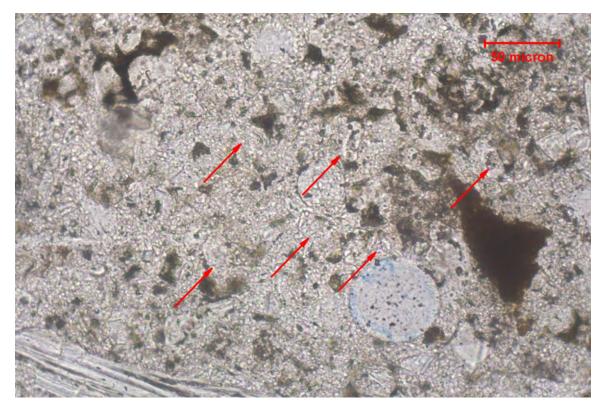
SAMPLE ID:B7DESCRIPTION:Ettringite filling air voids in a thin section of the sample under crossMAG:200xpolarized light.



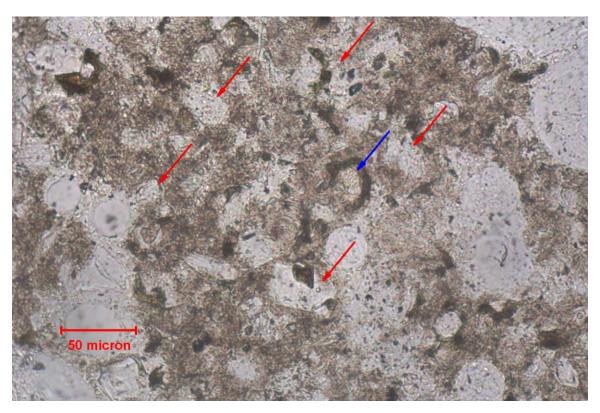
SAMPLE ID:P20DESCRIPTION:Ettringite partially filling to filling air voids in a thin section of the sampleMAG:100xunder plane polarized light.



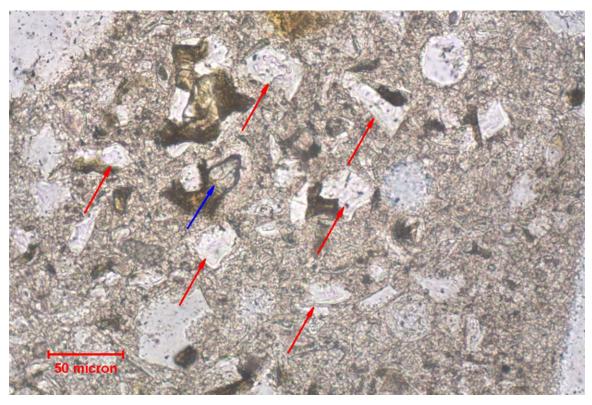
SAMPLE ID:B4DESCRIPTION:Mostly fully hydrated alite portland cement clinker particles in a thinMAG:400xsection of the hardened cement paste under plane polarized light.



SAMPLE ID:B7DESCRIPTION:Mostly fully hydrated alite portland cement clinker particles in a thinMAG:400xsection of the hardened cement paste under plane polarized light.



SAMPLE ID:P20DESCRIPTION:Mostly fully hydrated alite portland cement clinker particles (red arrows)MAG:400xand a moderately hydrated belite particle in a thin section of the hardened cement paste under<br/>plane polarized light.



SAMPLE ID:P35DESCRIPTION:Mostly fully hydrated alite portland cement clinker particles (red arrows)MAG:400xand a moderately hydrated belite particle in a thin section of the hardened cement paste under<br/>plane polarized light.

**DOCUMENT 4: LETTER ONE – ARUN WAGH INC.** 

### **ARUN WAGH, INC.** GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS

August 13, 2011

Mr. Gary Scruggs, P.E. Pickering Firm, Inc. 6775 Lenox Center Ct., Suite 300 Memphis, TN 38115

> SUBJECT: Terminal Apron, MSCAA Project # 08-1259-00 Memphis International Airport Memphis, Tennessee AWI Project No.: GEC-5339

Dear Mr. Scruggs:

I had prepared the geotechnical report for the referenced project as a consulting engineer for Tri-State Testing Services (TSTS). In that report I had given recommendations for the CBR and coefficient of subgrade reaction values. Recently you asked me during a telephone conversation to also give recommendations for bearing capacities for the design of foundations. You also said that recommendations are needed for all types of structural supports, such as isolated square (pad) footings, continuous (wall) footings, and mat/slab foundation. While no specific structure type or loading information is available, I have presented a discussion regarding the soil conditions (somewhat repetitive from the original report but, nonetheless, relevant to this report) and then some general recommendations for bearing capacities in the following paragraphs, which I would like to review once the structure and loading- related information is finalized. For a more detailed soil description I refer to the original report.

The soils investigated consisted of natural soils as well as fill soils. Table 1 below, reproduced from the original report, indicates the depth extent of fill in different borings and related notes. This table is strictly based on my inferences drawn from sample inspection. All soils, natural as well as fill, were found to be silty clays or clayey silts. With the exception of boring B-9, the soils were indicated (by the SPT blow counts and unconfined compression strength tests) to be of stiff to very stiff consistencies. Boring B-9 indicated very moist and weaker soils at critical depths. Two favorable factors about the fill are: 1) the fill is dormant for awhile and, therefore, has had a chance to settle under its own weight, and 2) all the borings in apparent fill consistently indicated stiff to very stiff consistencies. I still caution that even with these favorable results obtained from the investigation we should be mindful that in general investigation results in an uncontrolled fill mass cannot be considered as entirely fool proof.

Boring Number	Inferred Depth of Fill Soils	Boring Number	Inferred Depth of Fill Soils
1	None	9	None
2	None	10	15'
3	15'	11	8'
4	None	12	8'
5	5'	13	5'
6	None	14	15'
7	15'	15	None
8	5'		

### **TABLE-1**

### **NOTES:**

- 1. All borings were terminated at a depth of 15'. Thus, when the inferred depth of fill is given as 15', it implies to the depth extent of the boring.
- 2. The depths given in the above table are with reference to the existing surface. Thus, the pavement is included in the depths given.
- 3. Although no fill is mentioned in B-2, small amount of sand and gravel was noted at the top of the first sample at  $3.5^{\circ} 5.0^{\circ}$ .

I have given detailed recommendations in the original report regarding checking of the fill by proof rolling and digging test pits. I note here that test pits should be dug away from the footing/foundation areas so as to not disturb the subgrade in those areas. I have made special mention in the original report regarding boring B-9, which showed questionable soils. Depending on the field observations decisions should be taken regarding need of any undercut in this area. If any structure is to be built in this area, please contact me for additional comments.

Subject to observing above precautions, I have recommended below (next page) allowable bearing capacities for different type of foundations. I consider these bearing capacities as conservative vis-à-vis the soil investigation data in the original report. I also consider this conservatism to be justified given the uncertainties associated with any uncontrolled fill mass. Also, wherever presence of natural soils is inferred, it is strictly based on sample inspection and without a high degree of certainty.

Footings should be set below the frost depth. Typically, the footings/foundations are set at a minimum depth of 18" in this area. If the footings are relatively large (that is, if loads are relatively large, say greater than 150 kips for columns and 6 kips per foot for walls), please contact me for an evaluation with respect to the area and boring in that area. Mat foundation tends to bridge over small irregularities and heterogeneity of the soil mass beneath. Still a very conservative soil bearing pressure has been recommended below for two reasons -1) to account for the fill-related uncertainty factor, which would be exaggerated for the larger mat foundation, and 2) the recommended bearing pressure generally has been found to suffice in most cases.

Following are the Recommended Allowable Bearing Capacities:

Pad Footings: 3,000 psf

Continuous Footings: 2,500 psf

Mat Foundation: 1,500 psf

If higher bearing pressures are needed for the design, I would be pleased to review the data with respect to the specific structure, loads, and the area it is to be built in.

For proof rolling, test pits, site preparation, fill placement, and inspection I refer to the original report. However, I emphasize here that footing/foundation subgrade should be inspected by a geotechnical engineer or an engineering technician working under the direction of the engineer.

If you have any questions regarding this report, please feel free to call this office at (901) 755-3230.

Very truly yours,

Arun Wagh, P.E. AWI **DOCUMENT 5: LETTER TWO – ARUN WAGH INC.** 

### **ARUN WAGH, INC.** GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS

August 18, 2011

Mr. Gary Scruggs, P.E. Pickering Firm, Inc. 6775 Lenox Center Ct., Suite 300 Memphis, TN 38115

> SUBJECT: Terminal Apron, MSCAA Project # 08-1259-00 Memphis International Airport Memphis, Tennessee AWI Project No.: GEC-5339-A

Dear Mr. Scruggs:

I had submitted a letter report dated August 13, 2011, in which I had given bearing capacity values for various foundation types. Subsequently, Mr. Joe Smith, the structural engineer, requested through Mr. Ken Bilson to provide a value for angle of internal friction ( $\Phi$ ) for the soil that can be used to calculate that lateral pressures on the vault walls. I present my discussion and recommendations in the following paragraphs.

I assume that this request is related to the soils investigated in TSTS's report of recommendations (prepared by me) for the referenced project. In that investigation all the soils investigated were predominantly cohesive materials, classified as silty clays (CL) or clayey silts (ML). Such soils are generally not considered as desirable for use behind retaining walls. Granular materials are generally considered as suitable behind retaining walls. For predominantly cohesive materials,  $\Phi$  angle would be obtained from drained shear strength or S-test, and used as a long-term soil parameter. Strictly based on the soil type, and based on correlation with plasticity index, I conservatively recommend a value of  $26^{\circ}$ .

I recommend use of predominantly granular material to be used behind retaining walls. If the material inherent to the site is predominantly cohesive, typically a  $45^{\circ}$  wedge behind the wall is filled with compacted granular material.

We recommend that if backfill is placed behind the wall/s, it should be compacted to at least 95% of the dry density obtained from the standard moisture-density (standard Proctor) density test, ASTM D-698. Soil within about 5 feet of the wall should be compacted with hand compactors to avoid excessive stresses on the wall/s. For compacted clean sand I conservatively recommend

a value of  $35^0$  for the  $\Phi$  angle.

Crushed concrete may be considered for backfill since it acts as predominantly granular material, and generally proves to be cost-effective. For this type of material I conservatively recommend a value of  $32^0$  for the  $\Phi$  angle. A separation type of geofabric should be used at the interface of the predominantly cohesive soils and crushed concrete backfill.

Provision of good drainage behind the walls is critical.

Backfill placement, inspection of retaining wall footings, and other related work should be completed under the oversight of a geotechnical engineer or an engineering technician working under the direction of the engineer.

If you have any questions regarding this report, please feel free to call this office at (901) 755-3230.

Very truly yours,

Arun Wagh, P.E. AWI **DOCUMENT 6: LETTER THREE – ARUN WAGH INC.** 

### **ARUN WAGH, INC.** GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS

August 19, 2011

Mr. Gary Scruggs, P.E. Pickering Firm, Inc. 6775 Lenox Center Ct., Suite 300 Memphis, TN 38115

> SUBJECT: Terminal Apron, MSCAA Project # 08-1259-00 Memphis International Airport Memphis, Tennessee AWI Project No.: GEC-5339-B

Dear Mr. Scruggs:

I add to my August 19, 2011 letter that if clean sand (in general granular soils with less than four percent by weight passing the No. 200 sieve, or less than eight percent for a uniform gradation) were to be used as backfill behind the retaining walls, then relative density criterion would be more appropriate for compaction. I recommend that the sand backfill should be compacted to to at least 70% relative density as defined by ASTM Designations D-4253 and D-4254 instead of 95% of standard Proctor density.

If you have any questions regarding this report, please feel free to call this office at (901) 755-3230.

Very truly yours,

Arun Wagh, P.E. AWI

# **DOCUMENT 7: LETTER FOUR – B & W ENGINEERING LABORATORIES INC.**

P.O. Box 341091

Memphis, Tennessee 38184-1091

(901) 373-7957

12 September 2011 Job No. 7835 Serial No. D-1489

Mr. Tyler Johnson Pickering Firm, Inc. 6775 Lenox Center Court Suite 300 Memphis, TN 38115 (901) 726-0810 tjohnson@pickeringfirm.com

> Ref: Concrete Core Strength Tests Memphis International Airport Memphis, Tennessee

Dear Tim:

Compressive strength test results of tests performed on concrete cores received from Tri-State Testing Services, Inc., are attached. As indicated on the applicable test report, the nominal eight and nine inch diameter cores were re-cored to a nominal four inch diameter prior to testing. All cores were saw cut on both ends to achieve an acceptable length to diameter ratio and to avoid inclusion of reinforcing steel noted in some of the un-cut cores within the cores to be tested. In some instances, two testable cores were obtained from the same core; in such instances, both cores were tested. All testing was performed in accordance with ASTM C39, *Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens*. If there are any questions, or if additional information is required, please advise.

Respectfully submitted,

B & W Engineering Laboratories, Inc.

John L. Walton, Sr., P.E. President

JLW/jw0911

Attachements (2)

## **B & W Engineering Laboratories, Inc.**

P.O. Box 341091

Memphis, Tennessee 38184-1091

(901) 373-7957

12 September 2011 Job No. 7835 Serial No. D-1487 Memphis International Airport Nominal 4" diameter Concrete Cores Provided by Tri-State Testing Services

Core	Diameter	Area	Length	L/D	Cor.	Load	Compressive
No.	(in)	(sq in)	(in)	Ratio	Factor	(pounds)	Strength (psi)
P1a	3.90	11.94	6.625	1.70	.98	71796	5890
P1b	3.90	11.94	5.375	1.38	.95	62442	4970
P2a	3.87	11.76	5.96	1.54	.96	64144	5240
P2b	3.87	11.76	7.625	1.97	1	70745	6020
P4a	3.87	11.76	7.67	1.98	1	46364	3940
P4b	3.87	11.76	7.23	1.87	.99	49324	4150
P7	3.85	11.64	7.54	1.96	1	69833	6000
P9	3.84	11.58	7.68	2	1	67950	5870
P27	3.83	11.52	7.65	2	1	68461	5940
P34	3.83	11.52	7.65	2	1	70741	6140
P40	3.83	11.52	7.125	1.86	.99	72827	6260
P51	3.86	11.70	7.67	1.99	1	82751	7070
P61	3.84	11.58	7.125	1.86	.99	63369	5420
P72	3.88	11.82	5.15	1.33	.94	64674	5140
P79	3.91	12.00	7.33	1.88	.99	59111	4880
P85a	3.86	11.70	7.65	1.98	1	68451	5850
P85b	3.86	11.70	5.74	1.49	.96	61164	5020

Respectfully submitted,

B & W Engineering Laboratories, Inc.

In Walt

John L. Walton, Sr., P.E. President

JLW/jw0911

## **B & W Engineering Laboratories, Inc.**

P.O. Box 341091

Memphis, Tennessee 38184-1091

(901) 373-7957

12 September 2011 Job No. 7835 Serial No. D-1488 Memphis International Airport Nominal 8"/9" diameter Concrete Cores Provided by Tri-State Testing Services

Core No.	Re-cored Diameter (in)	Area (sq in)	Length (in)	L/D Ratio	Cor. Factor	Load (pounds)	Compressive Strength (psi)
B-2	3.81	11.40	7.00	1.84	.99	63257	5490
B-3	3.81	11.40	4.67	1.23	.93	60582	4940
B-5	3.81	11.40	6.79	1.78	.98	58632	5040
B-6	3.82	11.46	6.125	1.60	.97	79616	6740
B-9	3.82	11.46	7.625	2	1	72630	6340
B-10	3.81	11.40	6.83	1.79	.98	53837	4630
B-11	3.81	11.40	7.625	2	1	59273	5200
B-13	3.80	11.34	7.625	2.01	1	55472	4890
B-15	3.81	11.40	6.125	1.61	.97	57216	4870

Respectfully submitted,

B & W Engineering Laboratories, Inc.

Walt

John L. Walton, Sr., P.E. President

JLW/jw0911