

**THE COMMONWEALTH OF MASSACHUSETTS  
GOVERNMENT LAND BANK  
Devens Commerce Center  
Devens, Massachusetts**

**UNDERGROUND STORAGE TANK  
CLOSURE REPORT**

**UST NO. 1693X**

**OCTOBER 1996**

**Prepared by:  
S E A CONSULTANTS INC.  
Science/Engineering/Architecture  
Cambridge, Massachusetts  
Rocky Hill, Connecticut  
Londonderry, New Hampshire  
Rochester, New York**

## TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
1.0	<u>INTRODUCTION</u> . . . . .	1
2.0	<u>BACKGROUND</u> . . . . .	1
3.0	<u>UST REMOVAL</u> . . . . .	3
4.0	<u>FIELD OBSERVATIONS AND ASSESSMENT</u> . . . . .	3

## LIST OF FIGURES

<u>Figure No.</u>	<u>Title</u>	<u>Page</u>
Figure 1	Location of UST and Sampling Locations . . . . .	2

## LIST OF TABLES

<u>Table No.</u>	<u>Title</u>	<u>Page</u>
Table 1	Summary of Laboratory Analytical Results . . . . .	5

## LIST OF APPENDICES

<b>APPENDIX A</b>	-	Uniform Hazardous Waste Manifests
<b>APPENDIX B</b>	-	Tank Manifests and Receipts
<b>APPENDIX C</b>	-	Laboratory Analytical Results
<b>APPENDIX D</b>	-	Compaction Tests

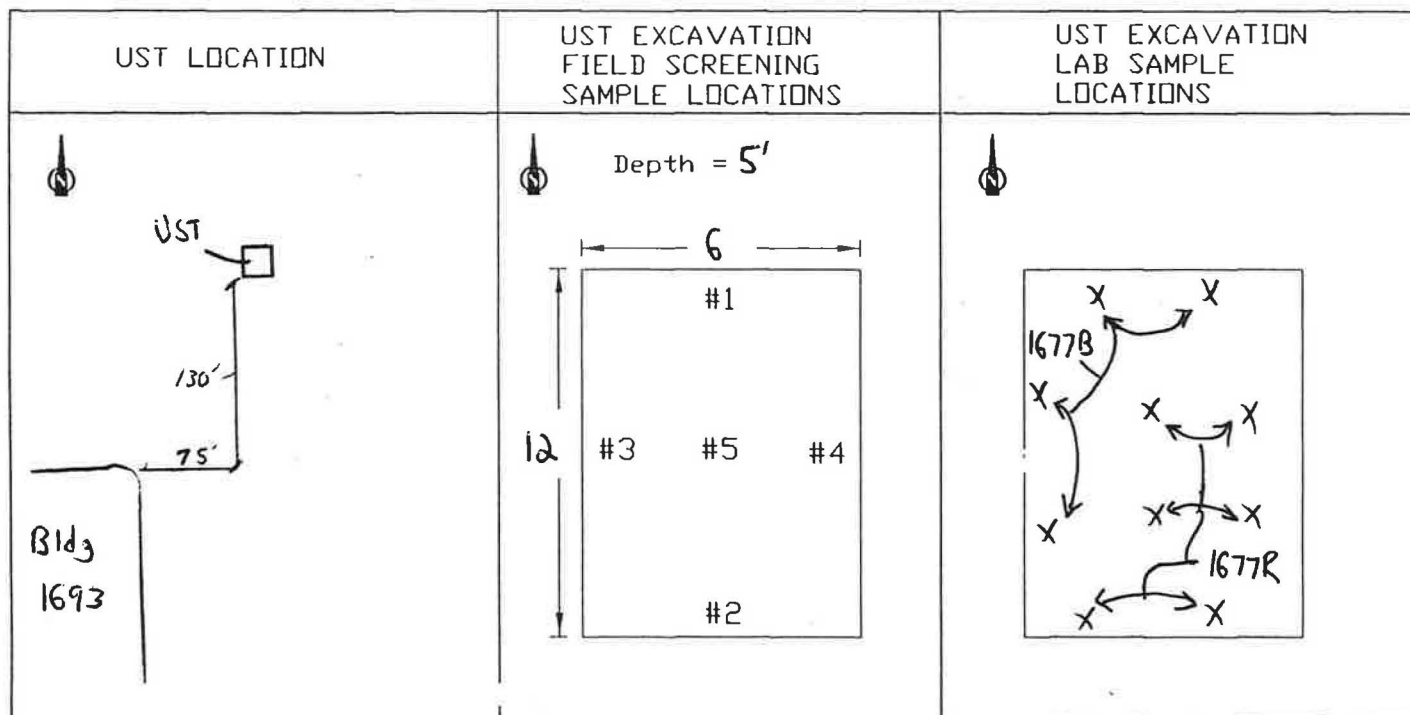
## 1.0 INTRODUCTION

This Underground Storage Tank (UST) Closure Report has been completed in accordance with the Commonwealth of Massachusetts Underground Storage Tank Closure Assessment Manual, dated April 9, 1996, and the Devens Commerce Center's (DCC) "*Underground Storage Tank Closure Protocol*" (Addendum to a DEP-approved Tier 1A permit), dated June 14, 1996. The 1,000-gallon UST was located near Building 1693, Cavite Street, Devens, Massachusetts (north/east [North American Datum, 1983] coordinates N3023513/630280). The former location of this UST is shown on Figure 1.

The 1,000-gallon steel UST, storing No. 2 heating oil, was removed on August 21, 1996. Headspace and Petroflag field screening on soil adjacent to the UST indicated minimal impact to the soils from the UST. Laboratory tests within the UST excavation confirmed contaminant levels below applicable regulatory levels (RCS-1) outlined in the Massachusetts Contingency Plan (MCP) [310 CMR 40.0000]. Following review of the laboratory data, the excavated hole was backfilled.

## 2.0 BACKGROUND

The UST near Building 1693 was originally installed in 1966 by the U.S. Army to store No. 2 fuel oil. Upon the closure of Fort Devens, the UST's ownership was transferred from the U.S. Army to the DCC. As part of the DCC's goal to develop Fort Devens, a number of USTs, including this UST near Building 1693, were removed. This steel UST had a diameter of four (4) feet and a length of eleven (11) feet. The associated piping was copper tubing.



FIELD SCREENING				
SAMPLE #	DEPTH	TPH SCREEN	HEAD SPACE	LAB ANAL METHOD
#1	2-4'	458/ND	0.0	
#2		1010/ND		
#3		ND		
#4		ND		
#5	5'	ND		
1677B				ND
1677R				ND

Figure 1  
UST and Sample Locations

Massachusetts Land Bank  
Devens, Massachusetts



### **3.0 UST REMOVAL**

On August 21, 1996, D&C Construction Co., Inc. of Rockland, Massachusetts, as part of its UST removal contract with the DCC, removed product from the UST with a vacuum truck. Later, soil above the UST was removed with an excavator. The UST was then tilted by the excavator to allow the remaining product to pool at the UST's bottom corner. A two-foot by two-foot access hole was then cut in the UST after it had been tested for combustible gases and oxygen. A laborer then made entry into the tank, and, using squeegee wipers, rags and a vacuum hose, cleaned out the remaining product from the tank. All product was transported off-site as hazardous waste. The manifests are in Appendix A. On August 21, 1996, the UST was removed and transported off-site. Transfer documentation (Forms FP290R and 291) is in Appendix B. A total of five (5) cubic yards of soil were excavated as part of the UST removal. Contaminant levels within the stockpile were later found to be below applicable regulatory thresholds.

### **4.0 FIELD OBSERVATIONS AND ASSESSMENT**

Upon removal of the UST, it was observed to be intact with very little rust. There was no visual or olfactory evidence of impacted soil within the excavation and groundwater was not observed.

Soil was then collected for Jar Headspace measurements using a Photoionization Detector (PID), and Total Petroleum Hydrocarbons (TPH) readings were measured using a Petroflag Hydrocarbon Analyzer. PID readings ranged from 0.0 to 0.1 ppmv. A composite sample collected from the sidewalls and base of the excavation measured between 8 and 1000 ppm of TPH using the Petroflag Hydrocarbon Analyzer. Based on these readings, an additional three (3) cubic yards of soil were excavated. A subsequent sample collected from the base and sidewalls of the excavation measured below the Petroflag Analyzer's detection limits.

Results and sampling locations are shown in Figure 1. Due to the low levels of these field readings, no further excavation was conducted and samples were collected from the excavation and associated soil stockpile for laboratory analysis. The sidewalls and base of the excavation and the associated stockpile were analyzed for TPH [Method 418.1], Polynuclear Aromatic Hydrocarbons (PAHs) [Method 8270] and Volatile Organic Compounds (VOCs) [Method 8260]. All samples were below the applicable MCP "RCS-1 Reportable Concentrations". Results and sampling locations are shown in Table 1 and Figure 1, respectively. The laboratory analytical data package is contained in Appendix C.

After receipt of the laboratory data, the stockpiled soil was backfilled into the excavation. Off-site fill was then added and compacted to bring the excavation back to grade. Compaction documentation is contained in Appendix D.

**TABLE 1**  
**SUMMARY OF LABORATORY ANALYTICAL RESULTS**

SAMPLE I.D. NUMBER <sup>1</sup>	ANALYTE	LABORATORY RESULT (PPM)	RCS-1* (PPM)
T-1677B T-1677R T-1677S	TPH	ND ND 143	500
T-1677B T-1677R T-1677S	Ethybenzene	ND ND 0.0198	500
T-1677B T-1677R T-1677S	Isopropylbenzene	0.00564	500
T-1677B T-1677R T-1677S	Napthalene	ND ND 0.498	400
T-1677B T-1677R T-1677S	n-propylbenzene	ND ND 0.0114	100
T-1677B T-1677R T-1677S	Toluene	ND ND 0.0267	1,000
T-1677B T-1677R T-1677S	1,2,4-Trimethylbenzene	ND ND 0.176	600
T-1677B T-1677R T-1677S	Xylenes	ND ND 0.101	500
T-1677B T-1677R T-1677S	2-Methylnapthalene	ND ND 0.557	0.7

<sup>1</sup> Tank originally thought to be associated with Building 1677, hence the sample i.d.

\*Applicable Reportable Concentration (310 CMR 40.1600).

ND = Not Detected above laboratory detection limits.

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**APPENDIX A**

**UNIFORM HAZARDOUS WASTE MANIFESTS**



COMMONWEALTH OF MASSACHUSETTS  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
DIVISION OF HAZARDOUS MATERIALS  
One Winter Street  
Boston, Massachusetts 02108

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator US EPA ID No. M P 5 0 8 7 7 2 6 3 4 0 4 8 2 1 6		Manifest Document No. 4 8 2 1 6		2. Page 1 of 1		Information in the shaded areas is not required by Federal law.					
3. Generator's Name and Mailing Address DEVENS COMMERCE CENTER 43 BUENA VISTA ST. P-12 FORT DEVENS, MA 01433						A. State Manifest Document Number MA J148216							
4. Generator's Phone ( 508 ) 772-6340						B. State Gen. ID SAME							
5. Transporter 1 Company Name ENVIRONMENTAL PRODUCTS & SERVICES, INC						6. US EPA ID Number N Y D 9 8 0 7 6 1 1 9 1							
7. Transporter 2 Company Name						8. US EPA ID Number							
9. Designated Facility Name and Site Address OLSON'S GREENHOUSES 590 SOUTH ST. E. RAYNHAM, MA 02767						10. US EPA ID Number M A D 0 5 9 7 3 3 5 8							
11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)						12. Containers		13. Total Quantity		14. Unit Wt/Vol		15. Waste No.	
a. FUEL OIL MIXTURE, COMBUSTIBLE LIQUID, NA1993, PGIII						0 0 1 T T		1 1 0 0 0		G		HA98	
b.													
c.													
d.													
J. Additional Descriptions for Materials Listed Above (include physical state and hazard code.)						K. Handling Codes for Wastes Listed Above							
a. #2 OIL, WATER						a. D 8 4							
b.						b.							
15. Special Handling Instructions and Additional Information Job #: E0748 PO #: Emergency #: (315471-0503) <b>ERG A. 27</b>						BURNED FOR ENERGY RECOVERY							
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.													
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.													
17. Transporter 1 Acknowledgement of Receipt of Materials													
Printed/Typed Name Jim Balaguer (Rep for Gen.)						Signature Jim Balaguer (Rep for Gen.)						Date 08/21/96	
18. Transporter 2 Acknowledgement of Receipt of Materials													
Printed/Typed Name Steve Oakley						Signature Steve Oakley						Date 08/21/96	
19. Discrepancy Indication Space													
20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.													
Printed/Typed Name Anthony Caron						Signature Anthony Caron						Date 08/21/96	

---

**APPENDIX B**

**TANK MANIFESTS AND RECEIPTS**

0/21



# The Commonwealth of Massachusetts

## Department of Public Safety—Division of Fire Prevention

### APPLICATION FOR PERMIT FOR REMOVAL AND TRANSPORTATION TO APPROVED TANK YARD

Aug 21 1996

D & C CONSTRUCTION CO. INC.

To: HEAD OF FIRE DEPARTMENT

AUG 26 1995

C.02 \$40 M.G.L.

DIG SAFE NUMBER

Start Date

In accordance with the provisions of Chapter 148, B.L. as provided in Section 38A Application is hereby made by D & C Construction Tim GATAGAD  
(Name of Person, Firm or Corporation)

1400 area  
1 1000gk

415 VFW DR. Portland ME  
Address

For permission to remove and transport underground steel storage tank(s) from

Deven Commerce Center  
Street address (city or town)

FDID# 17919 to approved Tank Yard# 008

State clearly type of  
inert gas used in  
steel storage tank

Type of inert gas used

Name of Person, Firm, Corporation disposing tank J.G. Grant

Date issued - rejected 8/21/96 19 19  
Date of expiration 8/21/96 19 19 paid/due  
Fee 25.00 (MGL C-148, S-10A)

By: Tim GATAGAD  
Signature of Applicant

## The Commonwealth of Massachusetts

### DEPARTMENT OF PUBLIC SAFETY—DIVISION OF FIRE PREVENTION

# PERMIT

### FOR REMOVAL AND TRANSPORTATION TO APPROVED TANK YARD

In accordance with the provisions of Chapter 148, B.L. as provided in Section 38A this permit is granted to

Name:

Full name of person, firm or Corporation

To transport underground steel storage tank(s)  
to Approved tank yard#

State clearly type of  
inert gas used in  
steel storage tank

steel tank:

method

FDID# 17919

Fee paid \$

Name and address of contractor  
disposing tank

Location to which tank will  
be transported

This permit will expire 8-27 19 96

Approved Tank yard# 008  
Signature of official granting permit (TITLE)  
(Head of Fire Dept.)

TOTAL P.08

P.08

98%



RECEIPT OF DISPOSAL OF UNDERGROUND STEEL STORAGE TANK  
NAME AND ADDRESS

JAMES G. GRANT CO., INC.

OF

R. 28 WOLCOTT ST.

APPROVED TANK YARD

READVILLE MA 02137

APPROVED TANK YARD NO.

#006

Tank Yard Ledger 502 CMR 3.03(4) Number: 9627031

I certify under penalty of law I have personally examined the underground steel storage tank delivered to this "approved tank yard" by firm, corporation or partnership DTC CRAST and accepted same in conformance with Massachusetts Fire Prevention

Regulation 502 CMR 3.00 Provisions for Approving Underground Steel Storage Tank dismantling yards.

A valid permit was issued by LOCAL Head of Fire Department FDID# 17919 to transport this tank to this yard.

Name and official title of approved tank yard owner or owners authorized representative:

SIGNATURE

TITLE

DATE SIGNED

This signed receipt of disposal must be returned to the local head of the fire department FDID# 17919 pursuant to 502 CMR 3:00. (EACH TANK MUST HAVE A RECEIPT OF DISPOSAL)

FORM F.P. 291 (rev. 11/95)

(OVER)

MASSACHUSETTS STATE FIRE MARSHAL'S OFFICE





**Tank Data**Gallons 1,000Previous Contents #2FO

Diameter \_\_\_\_\_ Length \_\_\_\_\_

Date Received 8-21-96

Serial # (if available) \_\_\_\_\_

Tank I.D. # (Form FP-290) 1693**Tank Removed From:**DEVENS Chemical Ctn  
( No. and Street )FT DEVENS  
( City or Town )Fire Dept. Permit # N/A

Owner/Operator to mail revised copy of Notification Form(FP-290, or Fp-290R) to: UST Compliance, Office of the State Fire Marshal, 1010 Commonwealth Avenue, Boston, Ma. 02215.

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**APPENDIX C**

**LABORATORY ANALYTICAL RESULTS**

**GeoLabs, Inc.***Environmental Laboratories*

Phone: (617) 878-1346 Fax: (617) 871-7069

**FINAL REPORT**

**PREPARED FOR:** Hydro-Science Associates  
415 VFW Drive  
P.O. Box 552  
Rockland, MA 02370

**Att:** Whitey Morris

**PROJECT ID:** Fort Devens

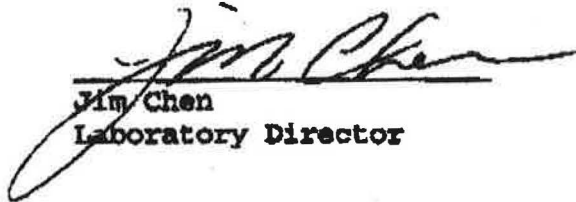
**GEOLABS CLIENT #:** 1317-95

**SAMPLE NUMBER:** 45630-45632

**DATE PREPARED:** August 23, 1996

**PREPARED BY:** Suzanne Pidgeon

**APPROVED BY:**

  
Jim Chen  
Laboratory Director

Project File Note	7871	Date	8/23/96
Whitey Morris	From	GeoLabs	
Co. Rep. HYDRO-SCIENCE	Re	ASSOC.	
Phone 8	Phone 8		
Fax 8	Fax 8		

**Location:** 400 Hingham Street  
Rockland, MA 02370

**Mailing Address:** PO Box 254  
Accord, MA 02018

GEOLABS, INC.  
P.O. BOX 234  
ACCORD, MA 02018  
(617) 878-1346

CLIENT NAME:	HYDRO-SCIENCE	PROJECT ID:	FORT DEVENS
SAMPLE TYPE:	SOIL	REPORT DATE:	08/23/96
COLLECTION DATE:	08/21/96	ANALYZED BY:	EYE 08/21/96
REC'D BY LAB:	08/21/96	EXTRACTION DATE:	N/A
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

VOLATILE ORGANICS ANALYSIS  
EPA METHOD 8260

SAMPLE NUMBER:	45630	45631	45632	DETECTION
SAMPLE LOCATION:	T-1677B	T-1677R	T-1677S	LIMIT
	BOTTOM	NIGHT SIDE	STOCK FILE	(µg/kg)

RESULTS  
(µg/kg)

Benzene	ND	ND	ND	5.0
Bromobenzene	ND	ND	ND	5.0
Bromochloromethane	ND	ND	ND	5.0
Bromoform	ND	ND	ND	5.0
Bromomethane	ND	ND	ND	5.0
n-butylbenzene	ND	ND	ND	5.0
Carbon tetrachloride	ND	ND	ND	5.0
Chlorobenzene	ND	ND	ND	5.0
Chloroethane	ND	ND	ND	5.0
Chloroform	ND	ND	ND	5.0
Chloromethane	ND	ND	ND	5.0
2-Chlorotoluene	ND	ND	ND	5.0
4-Chlorotoluene	ND	ND	ND	5.0
Dibromochloromethane	ND	ND	ND	5.0
Dichlorobromomethane	ND	ND	ND	5.0
Dichlorodifluoromethane	ND	ND	ND	5.0
1,1-Dichloroethane	ND	ND	ND	5.0
1,1-Dichloroethane	ND	ND	ND	5.0
1,1-Dichloropropene	ND	ND	ND	5.0
1,2-Dibromo-3-chloropropane	ND	ND	ND	5.0
1,2-Dichlorobenzene	ND	ND	ND	5.0
1,2-Dichloroethane	ND	ND	ND	5.0
1,2-Dichloropropane	ND	ND	ND	5.0
1,3-Dichlorobenzene	ND	ND	ND	5.0
1,3-Dichloropropane	ND	ND	ND	5.0
1,4-Dichlorobenzene	ND	ND	ND	5.0
2,2-Dichloropropane	ND	ND	ND	5.0
c-1,2-Dichloroethene	ND	ND	ND	5.0
c-1,3-Dichloropropene	ND	ND	ND	5.0
t-1,2-Dichloroethene	ND	ND	ND	5.0

GEOLABS, INC.  
P.O. BOX 254  
ACCORD, MA 02018  
(617) 878-1346

CLIENT NAME: HYDRO-SCIENCE  
SAMPLE TYPE: SOIL  
COLLECTION DATE: 08/21/96  
REC'D BY LAB: 08/21/96  
COLLECTED BY: CLIENT

PROJECT ID: PORT DEVENS  
REPORT DATE: 08/23/96  
ANALYZED BY: EYE 08/21/96  
EXTRACTION DATE: N/A  
DIGESTION DATE: N/A

VOLATILE ORGANICS ANALYSIS  
EPA METHOD 8260

SAMPLE NUMBER:	45630	45631	45632	DETECTION
SAMPLE LOCATION:	T-1677B	T-1677R	T-1677S	LIMIT
	BOTTOM	RIGHT SIDE	STOCK PILE	(µg/kg)

RESULTS  
(µg/kg)

c-1,3-Dichloropropene	ND	ND	ND	5.0
Ethylbenzene	ND	ND	19.8	5.0
Hexachlorobutadiene	ND	ND	ND	5.0
Isopropylbenzene	ND	ND	5.64	5.0
p-Isopropyltoluene	ND	ND	ND	5.0
Methylene Chloride	ND	ND	ND	5.0
Naphthalene	ND	ND	498	100.0
n-propylbenzene	ND	ND	11.4	5.0
Sec-butylbenzene	ND	ND	ND	5.0
Styrene	ND	ND	ND	5.0
tert-butylbenzene	ND	ND	ND	5.0
Tetrachloroethene	ND	ND	ND	5.0
Toluene	ND	ND	26.7	5.0
Trichloroethene	ND	ND	ND	5.0
Trichlorofluoromethane	ND	ND	ND	5.0
1,1,1-Trichloroethane	ND	ND	ND	5.0
1,1,2-Trichloroethane	ND	ND	ND	5.0
1,1,2,2-Tetrachloroethane	ND	ND	ND	5.0
1,2,3-Trichloropropane	ND	ND	ND	5.0
1,2,3-Trichlorobenzene	ND	ND	ND	5.0
1,2,4-Trichlorobenzene	ND	ND	ND	5.0
1,2,4-Trimethylbenzene	ND	ND	176	5.0
1,3,5-Trimethylbenzene	ND	ND	ND	5.0
Vinyl Chloride	ND	ND	ND	5.0
Xylenes	ND	ND	101	5.0

ND - NOT DETECTED

Method Reference:  
EPA Method 8260 (1)

1) US EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.

GEOLABS, INC.  
P.O. BOX 254  
ACCORD, MA 02018  
(617) 878-1346

CLIENT NAME: HYDRO-SCIENCE  
SAMPLE TYPE: SOIL  
COLLECTION DATE: 08/21/96  
REC'D BY LAB: 08/21/96  
COLLECTED BY: CLIENT

PROJECT ID: FORT DEVENS  
REPORT DATE: 08/23/96  
ANALYZED BY: EC 08/22/96  
EXTRACTION DATE: N/A  
DIGESTION DATE: N/A

TOTAL PETROLEUM HYDROCARBONS

SAMPLE NUMBER	SAMPLE LOCATION	TPH (mg/kg)	DETECTION LIMIT (mg/kg)
45630	T-1677R BOTTOM	ND	30.0
45631	T-1677R RIGHT SIDE	ND	30.0
45632	T-1677E STOCK PILE	143	30.0

ND - NOT DETECTED

Method Reference:

Total Petroleum Hydrocarbons 418.1 (1)

1) U.S. EPA 1983. "Methods for Chemical Analysis of Water and Wastes." EPA-600/4-79-020, EPA, EMSL, Cincinnati, OH.

GEOLABS, INC.  
P.O. BOX 254  
ACCORD, MA 02018  
(617) 878-1346

CLIENT NAME: HYDRO-SCIENCE  
SAMPLE TYPE: SOIL  
COLLECTION DATE: 08/21/96  
REC'D BY LAB: 08/21/96  
COLLECTED BY: CLIENT

PROJECT ID: FORT DEVENS  
REPORT DATE: 08/23/96  
ANALYSED BY: NER 08/22/96  
EXTRACTION DATE: 08/22/96  
DIGESTION DATE: N/A

POLYNUCLEAR AROMATIC HYDROCARBONS  
EPA METHOD 8270

SAMPLE NUMBER:	45630	45631	45632	DETECTION
SAMPLE LOCATION:	T-1677B	T-1677R	T-1677S	LIMIT
	BOTTOM	RIGHT SIDE	STOCK PILE	(µg/kg)

PARAMETER

RESULT  
(µg/kg)

Acenaphthene	ND	ND	ND	270
Acenaphthylene	ND	ND	ND	230
Anthracene	ND	ND	ND	270
Benzo (a) Anthracene	ND	ND	ND	300
Benzo (b) Fluoranthene	ND	ND	ND	230
Benzo (k) Fluoranthene	ND	ND	ND	300
Benzo (g, h, i) Perylene	ND	ND	ND	130
Benzo (a) Pyrene	ND	ND	ND	200
Chrysene	ND	ND	ND	270
Dibenzo (a, h) Anthracene	ND	ND	ND	130
Fluoranthene	ND	ND	ND	170
Fluorene	ND	ND	ND	200
Indeno (1, 2, 3-CD) Pyrene	ND	ND	ND	170
2-Methylnaphthalene	ND	ND	557	170
Naphthalene	ND	ND	ND	230
Phenanthrene	ND	ND	ND	230
Pyrene	ND	ND	ND	230

ND = NOT DETECTED

Method Reference:

Polynuclear Aromatic Hydrocarbons 8270 (1)

1) US EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.

## CHAIN OF CUSTODY

**ENVIRONMENTAL LABORATORIES**  
**Location:**  
 400 Hingham Street, Rockland, MA 02370  
**Mailing Address:**

**P.O. Box 254, Accord, MA 02018**

**(617) 878-1346 OFFICE (617) 871-7089 FAX •**

## TURNAROUND SCHEDULE:

☒ **MEETING** ☐ **STANDARD**

**CLIENT DUE DATE:**

**LABORATORY**

GeoLab Client: Hydro Science  
Address: 415 WFW Dr.  
Rockland, MA.  
Phone: 871 0232  
Fax: 871 1029  
Contact Name: Whitney Morris

**CLIENT PROJECT INFORMATION:**

**Project Name:** XXXXXXXXXX

Fort Owens - Gilbert

---

**Purchase Order #:**

Sample Collector: D.B.W.

**COMMENT 8:**

24 Hour

Page 2

## ANALYSES REQUESTED

FIELD SAMPLE ID#	COLLECTION		SOURCE/ LOCATION/ STATION	CONTAINER		MATRIX	COMPR.	GRADE	PRES.	GEO LABS SAMPLE ID NUMBER	8260	418.1 (m)	PAH
	D A T E	T I M E		T Y P E	#								
1-1677B	8/21	1:00	Bottom	G	1	S	✓			45620	✓	✓	✓
1-1677R	8/21	1:10	Right Side	G	1	S	✓			45631	✓	✓	✓
1-1677S	8/21	1:20	Stock Pile	G	1	S	✓			45632	✓	✓	✓

CONTAINER TYPE CODES: A=Amber S=Bag  
G=Glass P=Plastic V=VOA S=Stainless O=Other

SEAT/BACK CODES: WFW - Westwood FW - Greenwood  
OW - Drinking Water S - Soft Q - Oil SL - Sludge OT - Other  
SEE BACK COVER RV. DATE/TIME

PERMANENT CODES 1 - H<sub>2</sub> 2 - HNO<sub>3</sub> 3 - H<sub>2</sub>SO<sub>4</sub>  
4 - H<sub>2</sub>S<sub>2</sub>O<sub>8</sub> 5 - NaOH 6 - HCl 7 - Acetic Acid  
SEE MEMORANDUM BY DATE/TIME

THE UNIVERSITY OF CHICAGO

RECEIVED BY: CATERING  
06/12/08 16:55

RECORDED BY: DATATIME

1000 JOURNAL OF CLIMATE

RECEIVED BY AND DATE: DATE/TIME *8/2/84*



---

## APPENDIX D

### COMPACTION TESTS



Briggs Associates  
400 Hingham Street  
Rockland, MA 02370  
A Tundra Corporation Company

## SOILS INSPECTION

PROJECT: Fort Devens

PROJECT #: 60904

DATE: 8-21-96

INSPECTOR: J. Vogel

EMP#: 236	REPORT #:	CODE:	# of PAGES: 2
ARR. TIME: 700	JOB HOURS: 5	T.T.:	MILEAGE:
TEMP.: <u>H</u> L	WIND: H <u>B</u>	HUMID.: <u>H</u> L	<u>SUNNY</u> CLOUDY

Briggs Associates field engineer took in place density tests. In place density was determined in accordance with ASTM D-2922 and D-3017 for comparison to the laboratory determined maximum density at optimum moisture in accordance with ASTM D-1557, Method C.

LOCATION: Fort Devens, Rock Filling at bldg 1400, 1693 & and 1403

REMARKS: all tests exceeded the 95% minimum

FREQUENCY OF COMPACTION TESTS: 1 every 2 lifts

TECHNICIAN:   
APPROVED: 



## Tundra Corporation

D & C Construction / Ft. Devens  
Briggs # 60904  
Tested: 6-5-96

1. Sample No. *Keating Sand + Gravel Fitchburg* Description Gravelly Sand with silt Source Site  
M-956

2. Sieve Analysis { ASTM C 136, and ASTM C 117 }

<u>Sieve Size</u>	<u>Results</u> { % Passing by Wt. }	<u>Specs.</u>
4"	100	
3"	100	
2-1/2"	100	
2"	100	
1-1/2"	86	
1"	86	
3/4"	75	
1/2"	71	
3/8"	67	
#4	55	
#10	45	
#20	36	
#40	30	
#80	23	
#100	20	
#200	17.8	

3. No specifications provided.

4. Proctor Density { four point procedure - ASTM D 1557 Method C, and ASTM D 4718 }.

	<u>Results</u>
Maximum Dry Unit Weight (pcf)	130.8
Optimum Moisture Content (%)	8.3

400 Hingham Street, Rockland, Massachusetts 02370

Tel (617) 871-6040 • Fax (617) 871-7932

Offices located throughout the United States and Canada



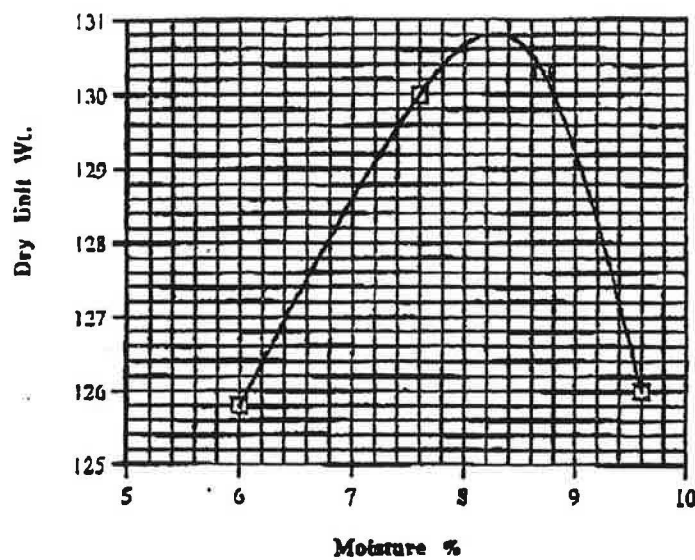
Briggs Associates  
A Tundra Corporation Company

Project: D & C Construction / Ft. Devens

Sample no. M-956

Date: 6/5/96

### Proctor



Max. Dry Density  
130.8 pcf

Optimum  
Moisture  
8.3 %



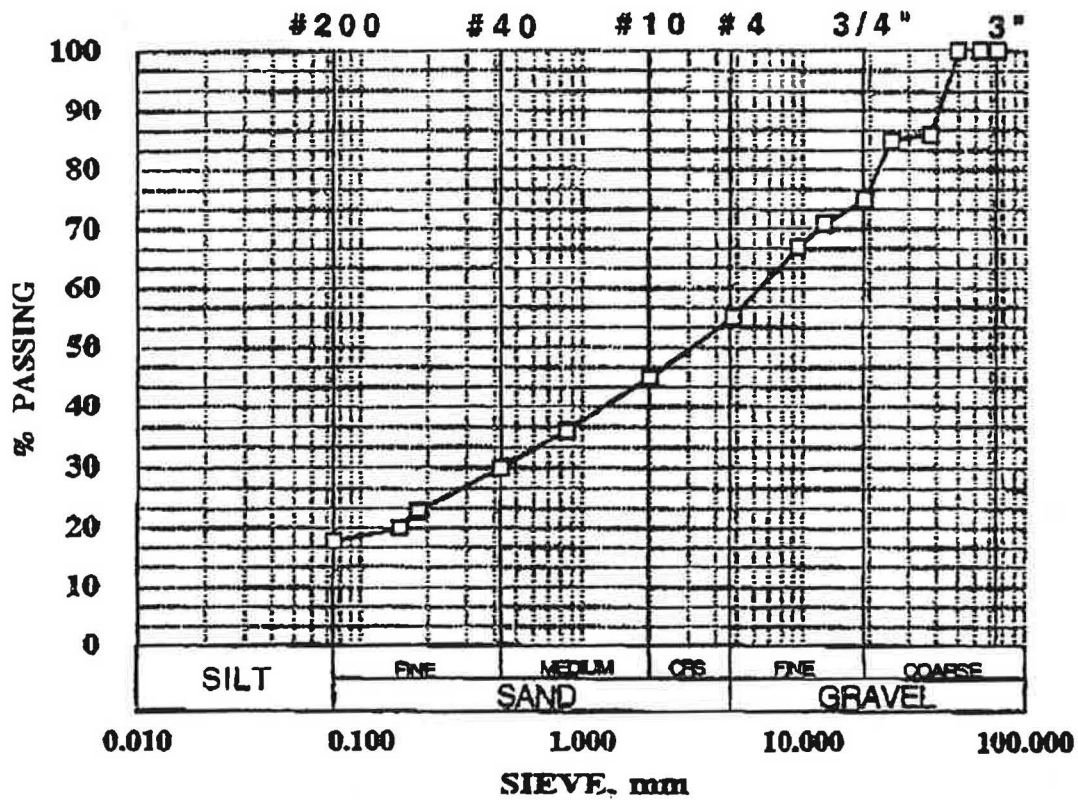
Briggs Associates  
A Tundra Corporation Company

Project: D & C Construction / Ft. Devens

Sample No. M-956

Date: 6/3/96

## SIEVE





# Tundra Corporation

D & C Construction / Ft. Devens

Briggs # 60904

Tested: 6-5-96

1.	<u>Sample No.</u>	<u>Description</u>	<u>Source</u>
	M-957	Gravelly Sand	Site

2. Sieve Analysis {ASTM C 136, and ASTM C 117}

<u>Sieve Size</u>	<u>Results</u> { % Passing by Wt. }	<u>Specs.</u>
4"	100	
3"	100	
2-1/2"	100	
2"	100	
1-1/2"	100	
1"	100	
3/4"	98	
1/2"	96	
3/8"	95	
#4	90	
#10	85	
#20	70	
#40	38	
#80	11	
#100	9	
#200	5.4	

3. No specifications provided.

4. Proctor Density {four point procedure - ASTM D 1557 Method C, and ASTM D 4718}.

	<u>Results</u>
Maximum Dry Unit Weight (pcf)	118.3
Optimum Moisture Content (%)	9.5

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Briggs Associates

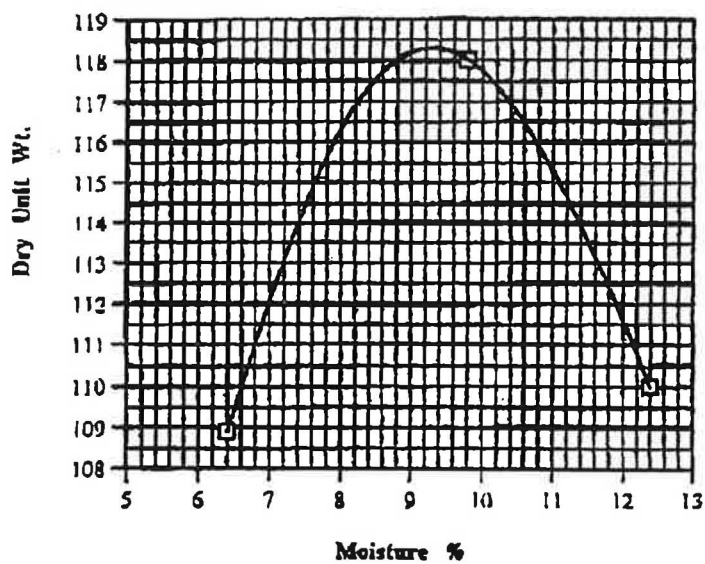
A Tundra Corporation Company

**Project:** D & C Construction / Ft. Devens

**Sample no.** M-957

**Date:** 6/5/96

### Proctor



**Max. Dry Density**  
118.3 pcf

**Optimum  
Moisture**  
9.5 %



Briggs Associates  
A Tundra Corporation Company

Project: D & C Construction / Ft. Devens

Sample No. M-957

Date: 6/3/96

## SIEVE

