Ohio Department of Commerce

George V. Voinovich, Governor

Division of State Fire Marshal • Bureau of Underground Storage Tank Regulations
9221 Ravenna Road, Suite D7-D8 • Twinsburg, OH 44087 • (216) 425-9848

Nancy S. Chiles, Director

November 14, 1991

Susan McCauslin
Ravenna Arsenal, Inc.
8451 State Route 5
Ravenna, OH 44266

RE: Ravenna Arsenal, Inc.
8451 State Route 5
Ravenna, OH 44266
Portage County
679298-03 through 05

Dear Ms. McCauslin:

On October 22, 1991, the State Fire Marshal, Bureau of Underground Storage Tank Regulations (SFM, BUSTR) received information regarding the closure of the underground storage tank (UST) system(s) located at the aforementioned site. Upon review of the analytical results and associated information, BUSTR is not requiring further corrective actions at this time of any contamination resulting from petroleum UST systems activity at the site.

Due to information potentially not found or revealed, nothing in this letter should be interpreted as a guarantee or warrantee that no problems exist at the aforementioned site. In addition, this letter does not release the owners from future responsibility and liability under sections 3737.88 through 3737.89 of the Ohio Revised Code, other state laws and regulations or under the Federal Clean Water, Resource Conservation and Recovery; or Comprehensive Environmental Response, Compensation, and Liability Acts for remedying conditions resulting from any release of contaminants to the environment.

If you have questions about this determination, please contact me at (216) 425-9848. To assist our office in expediting a review of your correspondence, please reference the incident number (679298-03 through 05) and place it in the right hand corner of all your correspondence. Thank you for your cooperation.

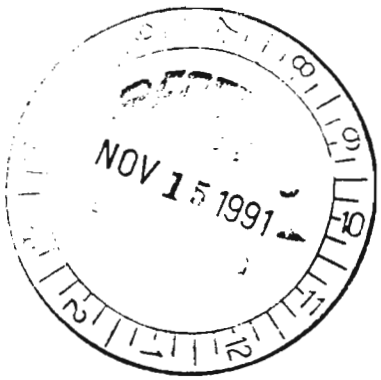
Sincerely,

Thomas J. Kilbane

Thomas J. Kilbane
Environmental Specialist

TJK/sk

cc: File #679298-03 through 05



Rec'd
COR
Sue
File
Wayne

Olin
ORDNANCE

RAVENNA ARSENAL, INC.
8451 STATE ROUTE 5, RAVENNA, OHIO 44266-9297
TELEPHONE: (216) 358-7111 • FAX: (216) 297-3216

October 17, 1991

THRU: Contracting Officer's Representative
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266-9297

TO: State Fire Marshal
Bureau of Underground Storage Tank Regulations
ATTN: Thomas Kilbane
9221 Ravenna Road
Suite D7 and D8
Twinsburg, Ohio 44087-2443

Subject: Ravenna Army Ammunition Plant Incident Numbers 679298-03 Through 05

Dear Mr. Kilbane:

The attached analytical results are provided to address the deficiency cited in your 2/1/91 letter regarding the closure of the referenced UST's. Cardamone Construction Company conducted re-sampling of the soils at the tank closure sites on August 28 and 29, 1991. The samples were analyzed by Wadsworth Alert Laboratories, Inc. to ppb detection limits.

If you have any questions please contact Susan McCauslin at (216) 297-3220. The Government point of contact is Robert J. Kasper, Commander's Representative, at (216) 297-3124.

Sincerely,

RAVENNA ARSENAL, INC.

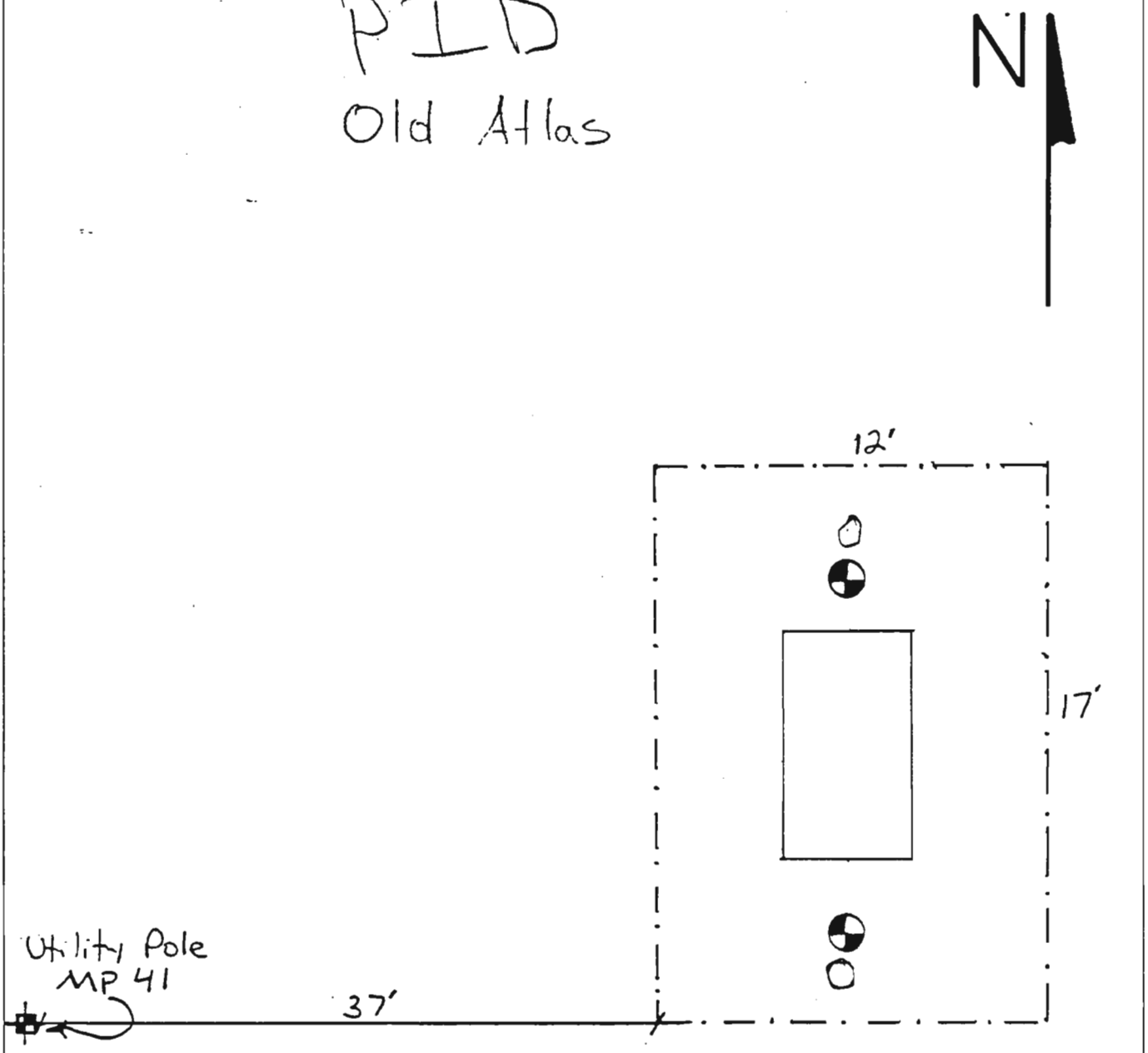
H.R. Cooper
Plant Engineer

SMC/ade/91025

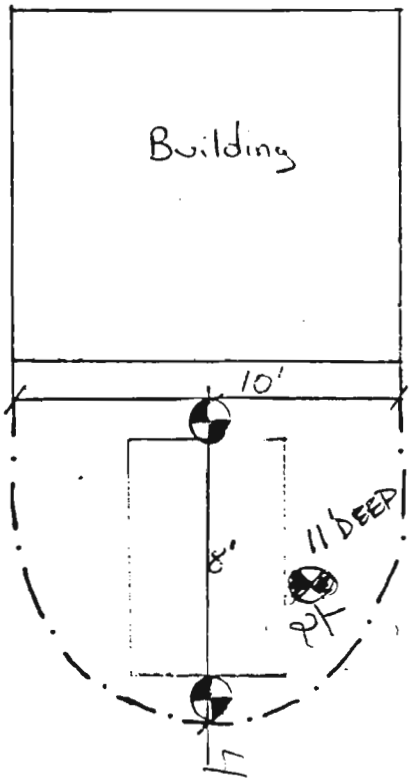
cc: N. Wulff
W. Carkido
B. Jenkins
S. McCauslin
File

PID

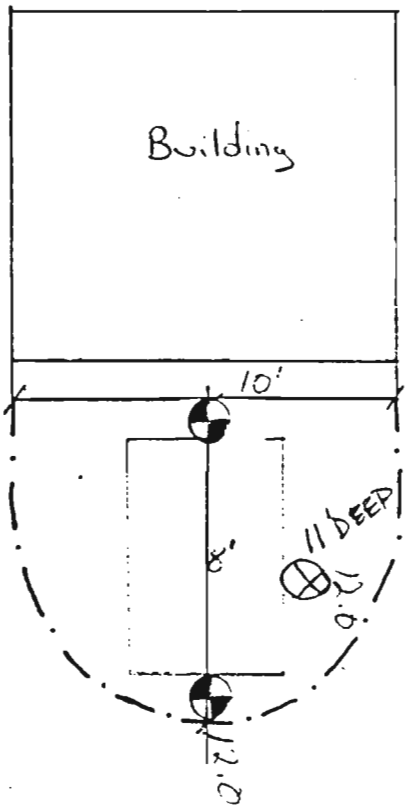
Old Atlas



Freedom Gate



Freedom Gate

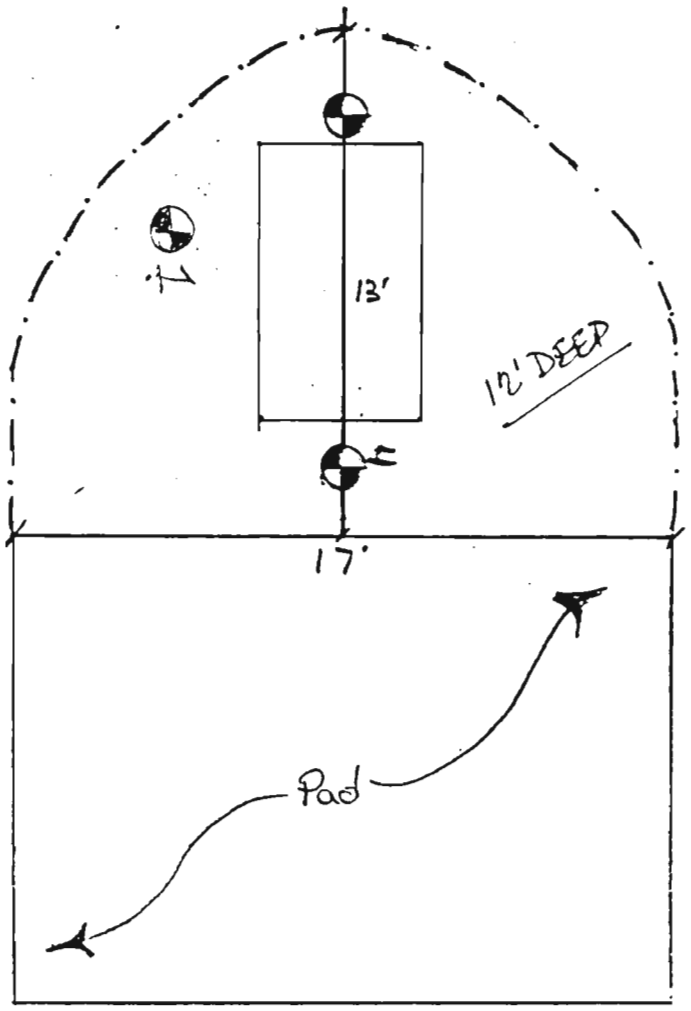


N

Detail

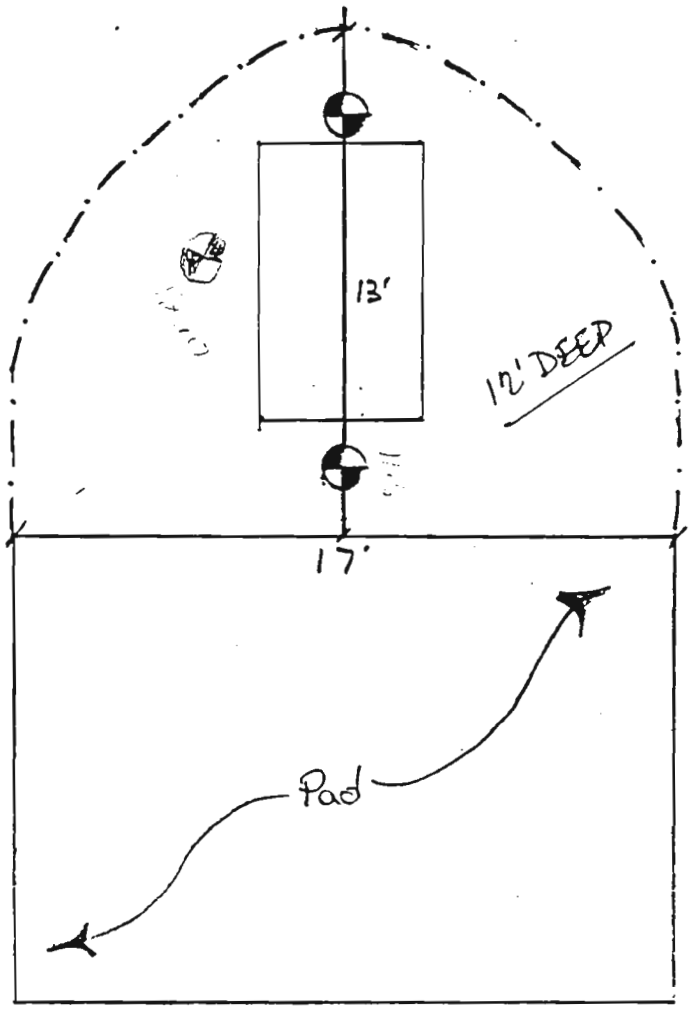
Post 24

N



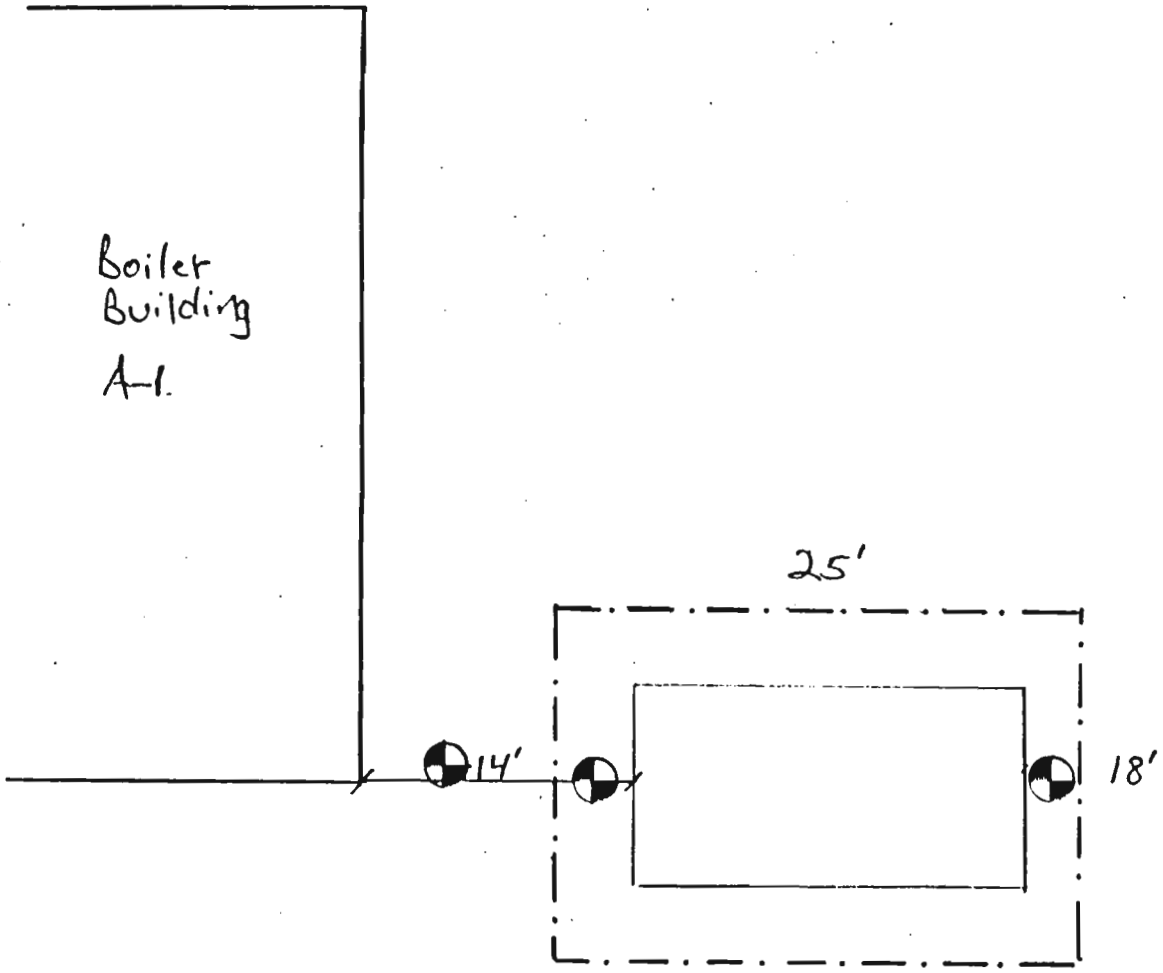
Post 24

N



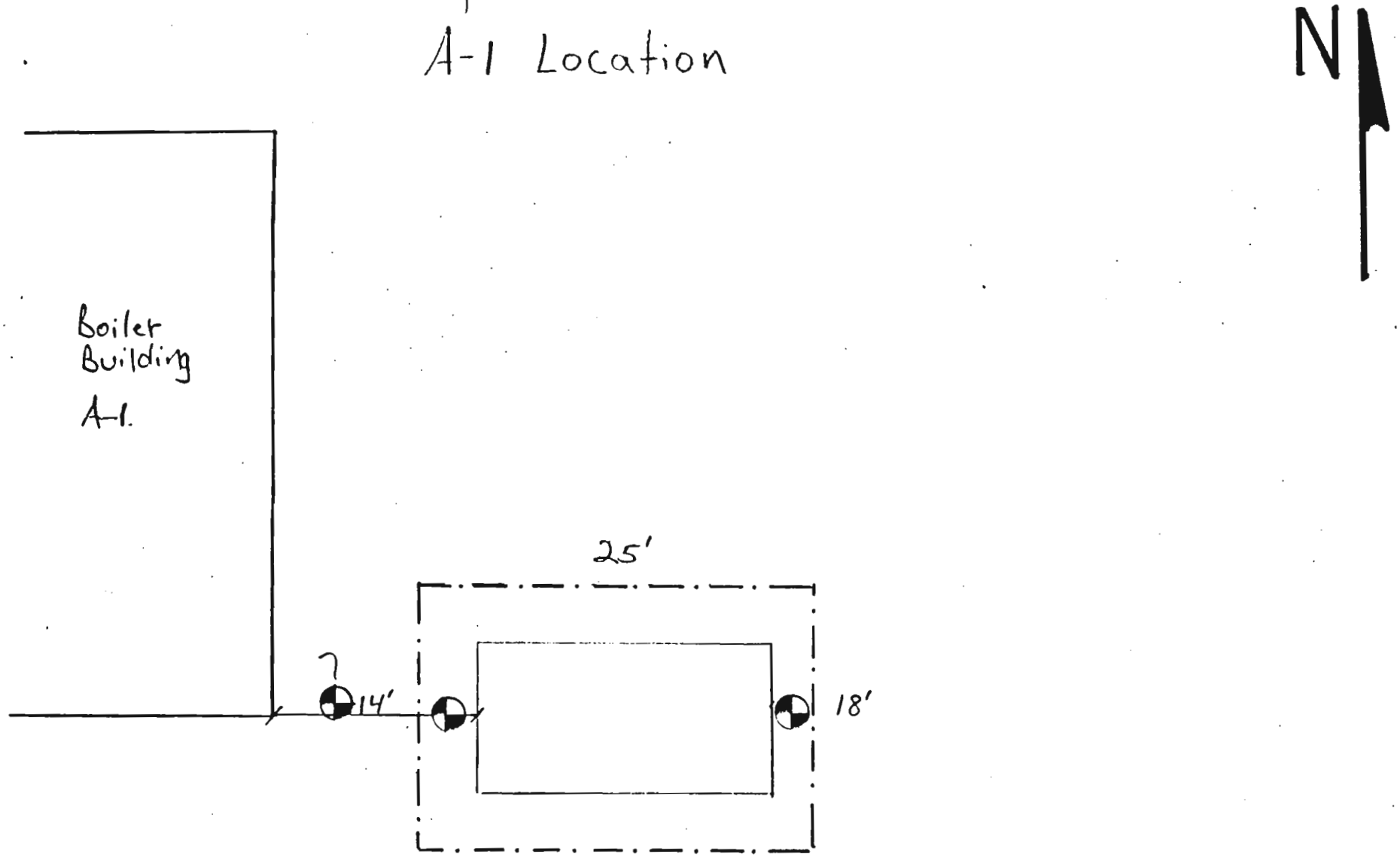
A-1 Location

N



Depth

A-1 Location

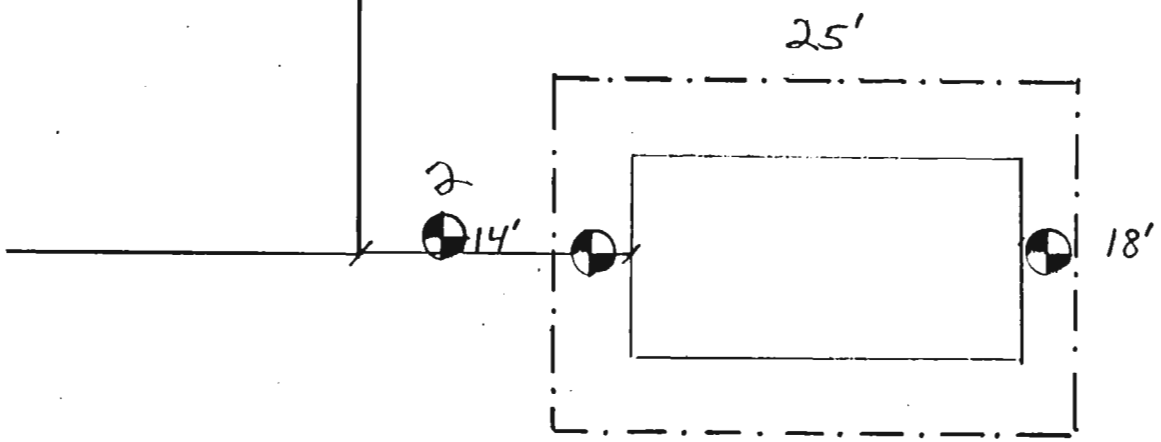


P. I. D.

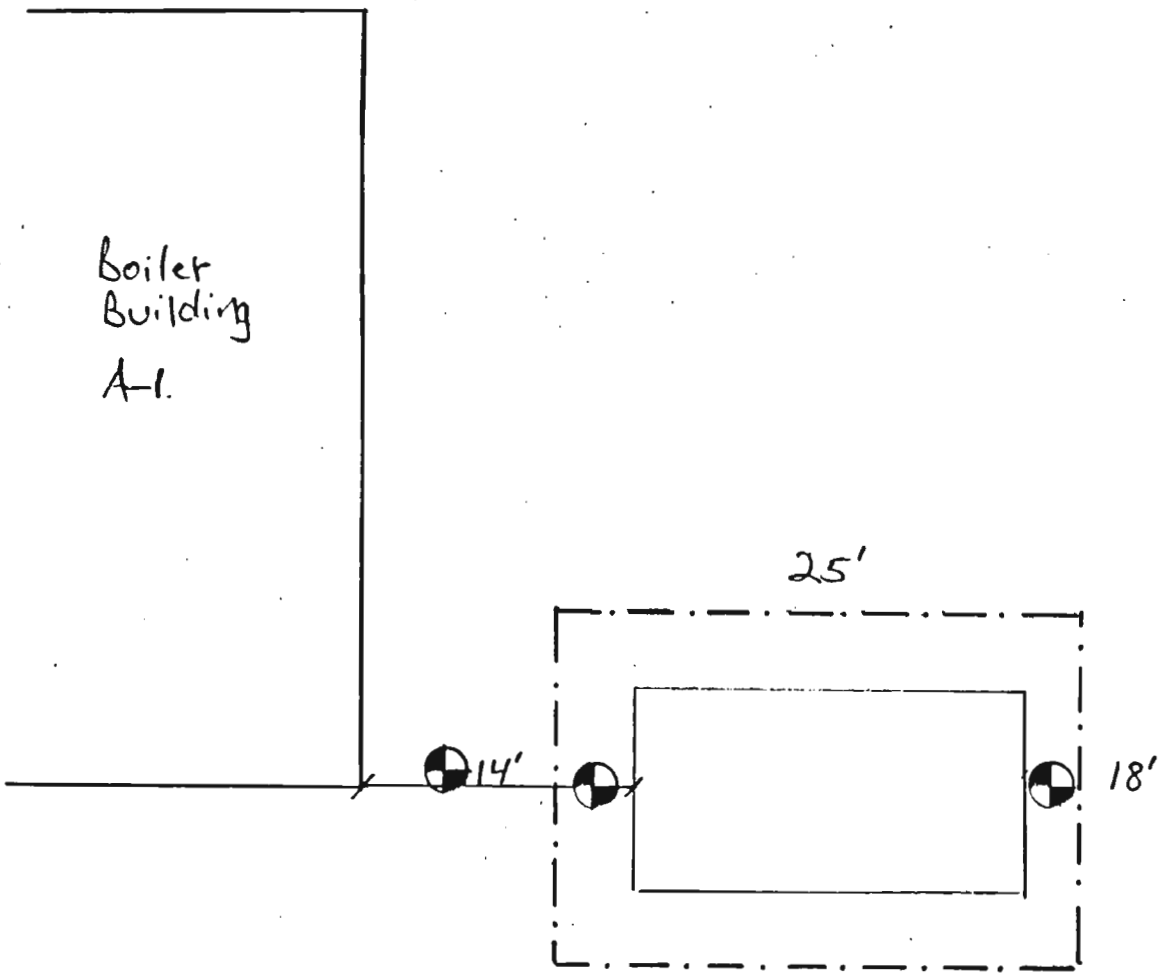
A-1 Location

N

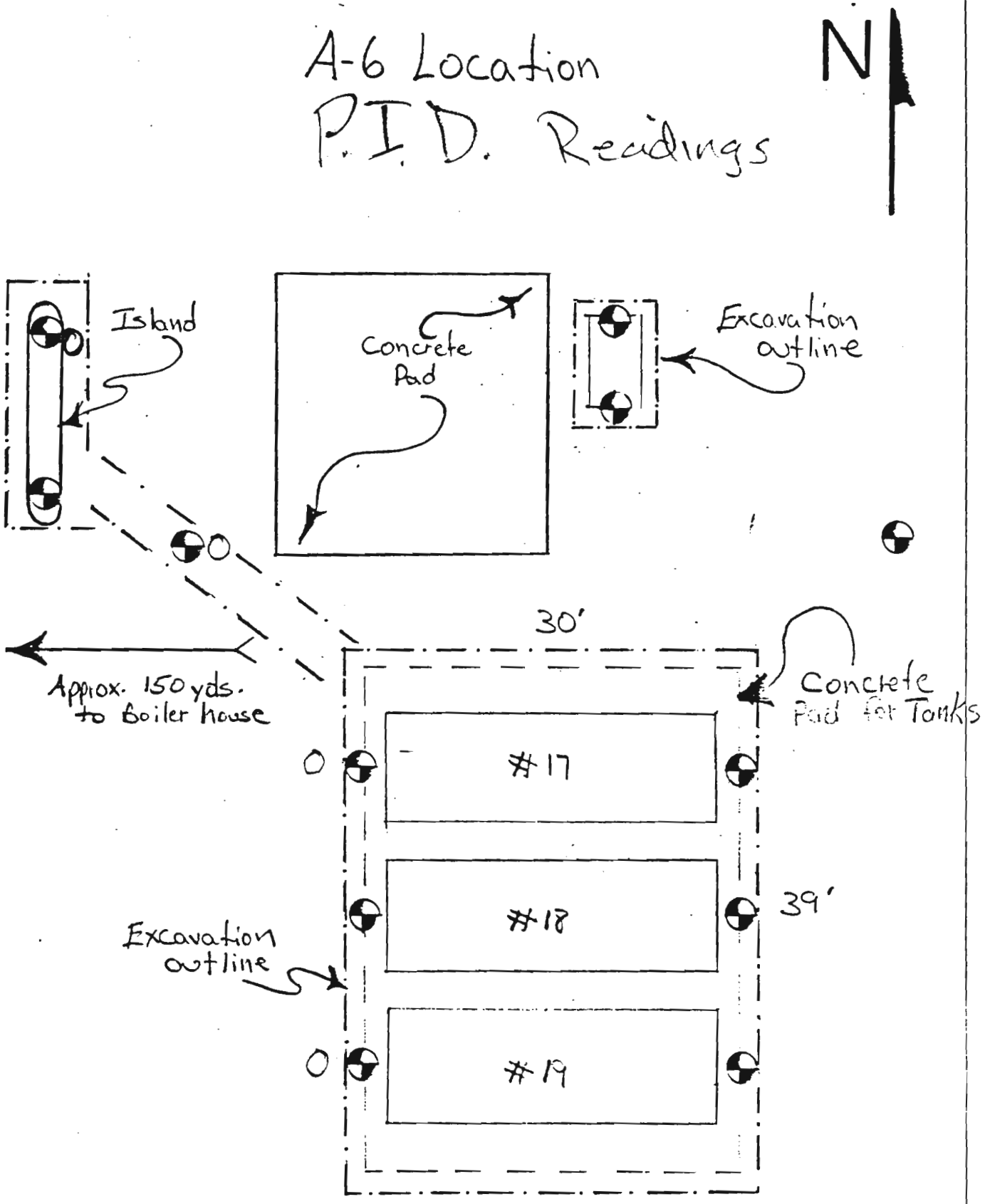
Boiler Building A-1.



A-1 Location

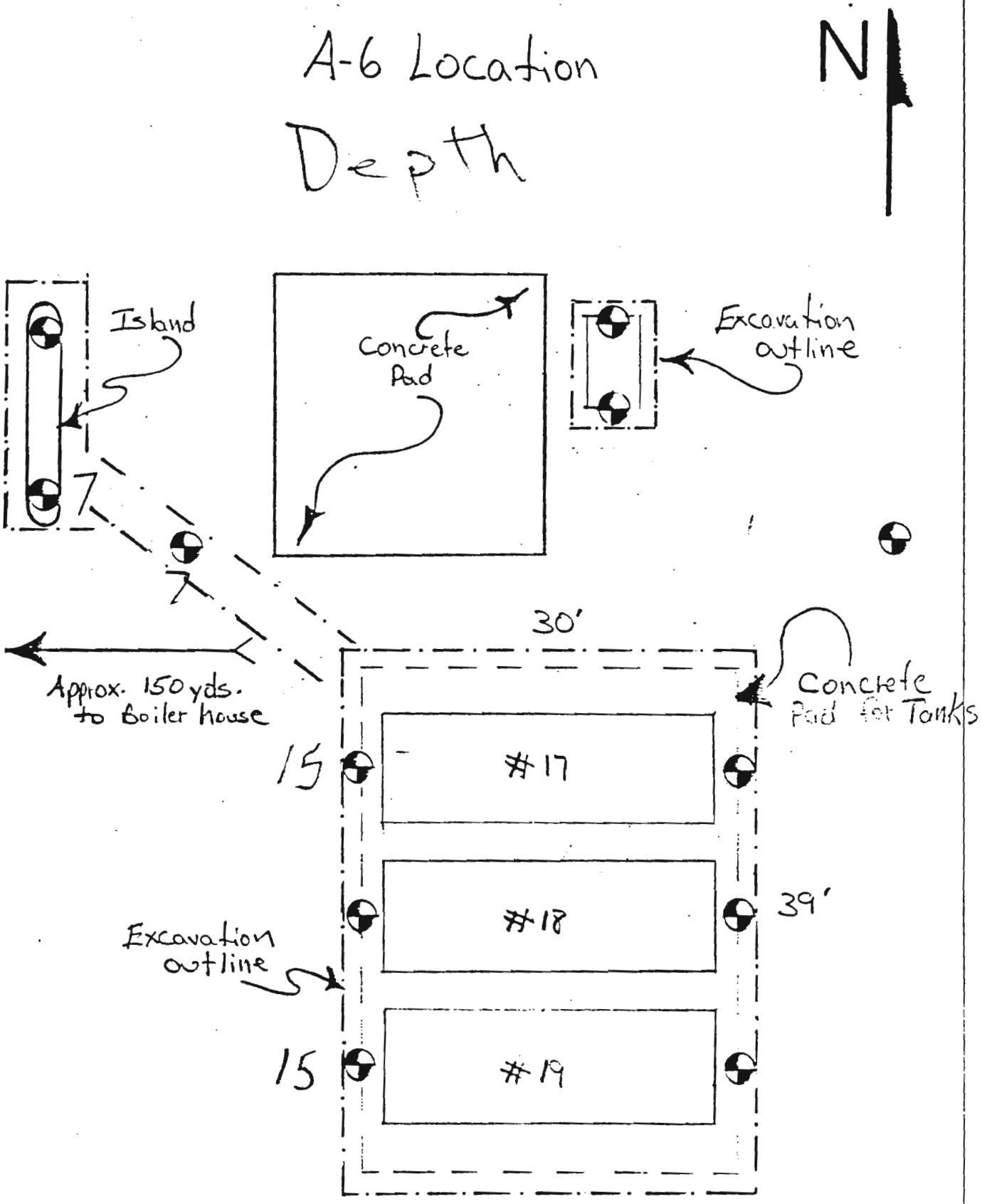


A-6 Location
P.I.D. Readings

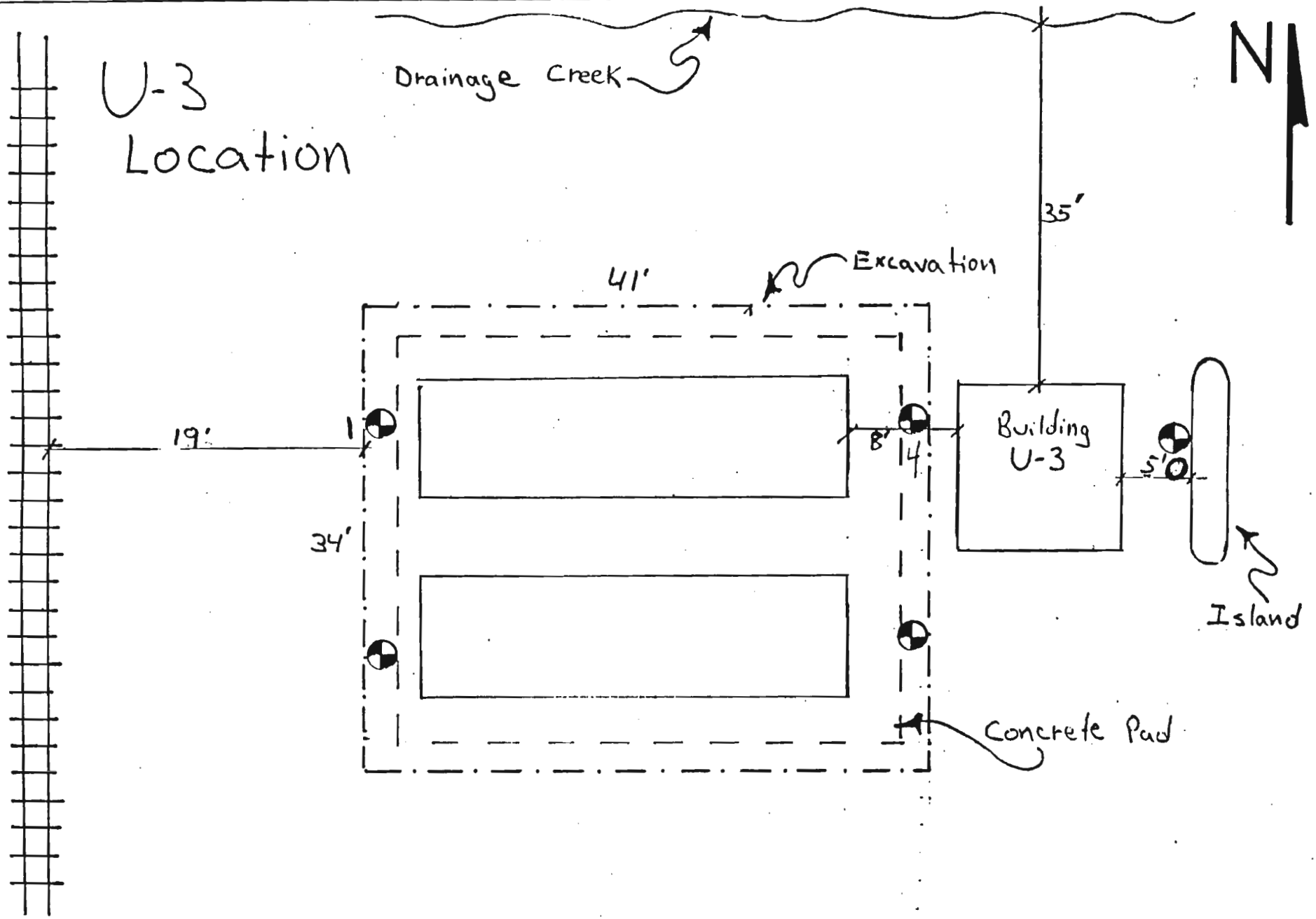


A-6 Location

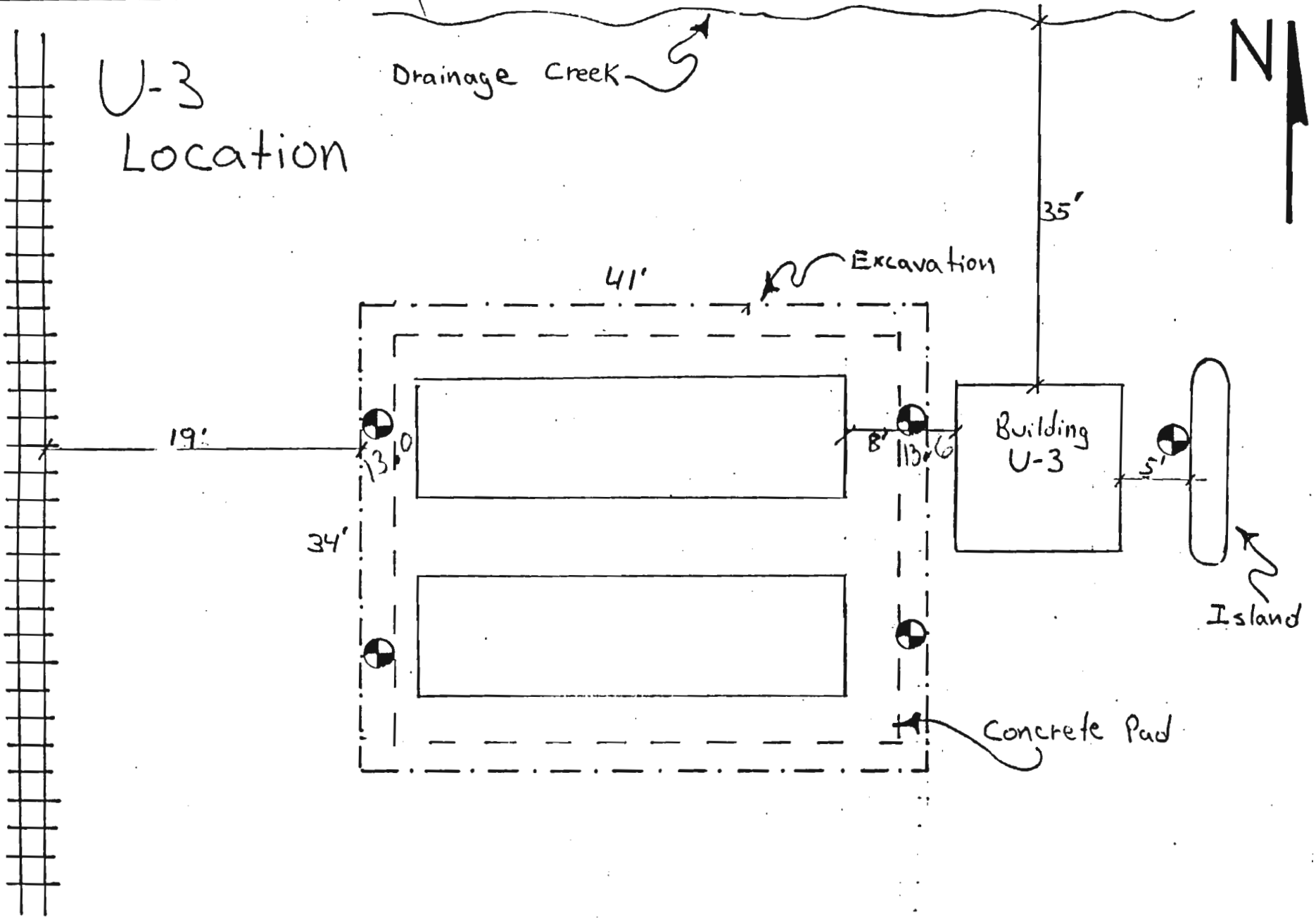
Depth



P.I.D.

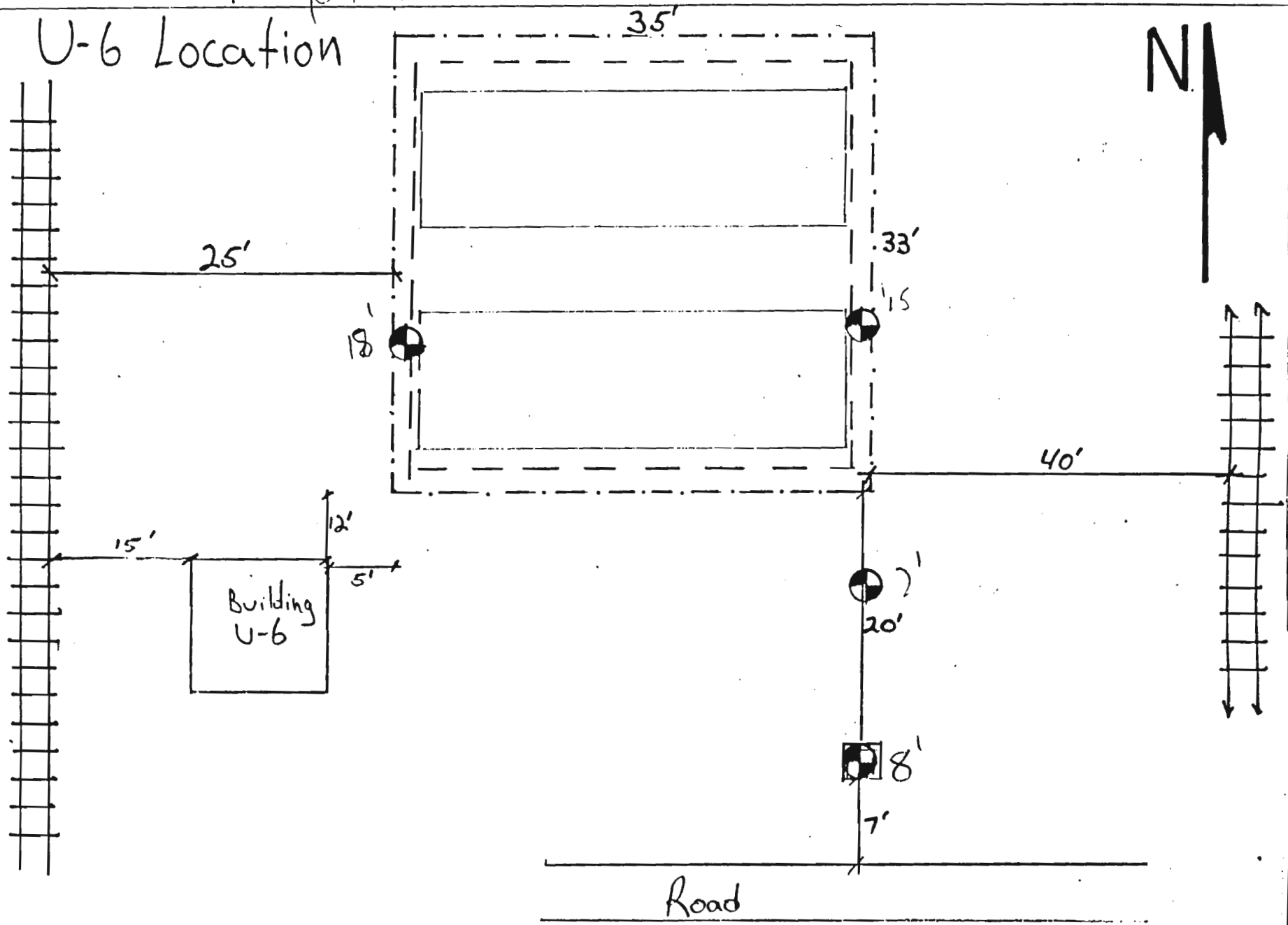

U-3
Location
Drainage Creek
N
35'
Excavation
41'
19'
1
8'
4
Building
U-3
5'
34'
Island
Concrete Pad

Depth



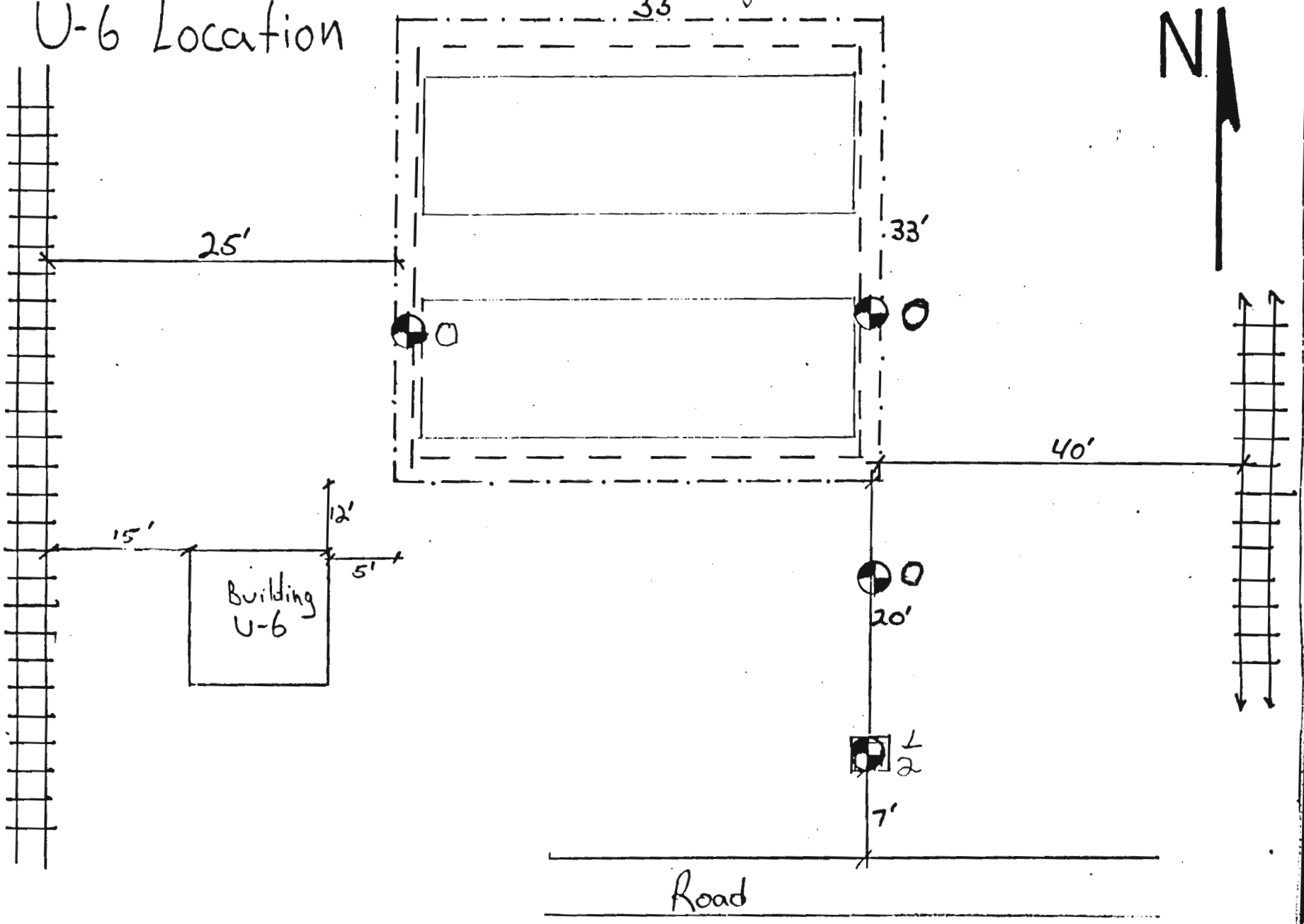
Depth

U-6 Location



P.T.D. Findings

U-6 Location



COLUMN →	A	B	C	D	E	F	G
LOCATION ↓	DEPTH TO TANK	TANK DIAMETER	TANK PAD THICKNESS CONTRACTORS RESPONSIBILITY	TOTAL DEPTH INCLUDING 5 FT BELOW TANK/PAD.	EXCAVATION DEPTH FIELD DETERMINED BY DRILLER	EXCAVATION RESPONSIBILITY (COL. D - COL E)	REMARK PTD
BLDG. U-6 BOTTOM: EAST & WEST SOUTH PUMP ISLAND LINE FROM SOUTH PUMP	2 FT.	8 FT.	3 FT.	18 FT.	West 8.0 East 15.0 Island 8.0 Line 7.0 33 x 35		0 0 ½ 0
BLDG. U-3 BOTTOM EAST & WEST SUPPLY LINES	2 FT.	8 FT	3 FT.	18 FT.	East 13.6 west 13 Supply Line 7.6 34 x 41		4 1 0
BLDG. A-6 BOTTOM/SIDE: NO. 17 & 19 WEST ISLAND & PRODUCT LINE	3'-3"	6 FT	2 FT.	16'-3"	west 19 15.0 west 17 15.0 Island 7.0 Lines 7.0 30 x 39		0 0 0 0
BLDG. A-1 PRODUCT LINE	2FT.	8 FT	2 FT.	17 FT.			
CHARLESTOWN GATE (POST 24) BOTTOM: SOUTH-WEST	2 FT	3'-8"	⊖	10'-8"	west 12.0 South 11.6 17 x 13		4 1
FREEDOM GATE BOTTOM: NORTH & SOUTH	2 FT.	3'-8"	⊖	10'-8"	North 12.0 South 12.0 10 x 8		½ 4
ATLAS BOTTOM EAST WEST WALL	2 FT.	3'-8"	⊖	10'-8"	East Bottom 11.9 westwall 9.0		0 0

COLUMN →	A	B	C	D	E	F	G
LOCATION ↓	DEPTH TO TANK	TANK DIAMETER	TANK PAD THICKNESS CONTRACTORS RESPONSIBILITY	TOTAL DEPTH INCLUDING 5 FT BELOW TANK/PAD.	EXCAVATION DEPTH FIELD DETERMINED BY DRILLER	EXCAVATION RESPONSIBILITY (COL B - COL E)	REMARKS PTD
BLDG. U-6 BOTTOM: EAST & WEST SOUTH PUMP ISLAND LINE FROM SOUTH PUMP	2 FT.	8 FT.	3 FT.	18 FT.	West 15.0 East 15.0 Island 8.0 Line 8.0 33 x 35		0 0 1/2 0
BLDG. U-3 BOTTOM EAST & WEST SUPPLY LINES	2 FT.	8 FT	3 FT.	18 FT.	East 13.6 West 13 Suction Line 7.6 34 x 41		4 1 0
BLDG. A-6 BOTTOM/SIDE: NO. 17 & 19 WEST ISLAND & PRODUCT LINE	3'-3"	6 FT	2 FT.	16'-3"	West 19 15.0 West 17 15.0 Island 7.0 Lines 7.0 30 x 39		0 0 0 0
BLDG. A-1 PRODUCT LINE	2FT.	8 FT	2 FT.	17 FT.	Product Line 7' 18 x 25		2
CHARLESTOWN GATE (POST 24) BOTTOM: SOUTH-WEST	2 FT	3'-8"	O	10'-8"	West 2.0 [illegible]		4 1
FREEDOM GATE BOTTOM: NORTH & SOUTH	2 FT.	3'-8"	O	10'-8"	North 12.0 South 12.0 10 x 8		1/2 4
ATLAS BOTTOM EAST WEST WALL	2 FT.	3'-8"	O	10'-8"	East Bottom 11.0 West wall 9.0		0 0

COLUMN →	A	B	C	D	E	F	G
LOCATION ↓	TANK DIAMETER (TD.)	TANK LENGTH (TL.)	EXCAVATION RESPONSIBILITY TD.+2FT. OR TL+2FT. (LEFT/RT. SIDE)	TOTAL RESPONSIBILITY (COL C + 10 FT. (2 SIDES) (FOR TD OR TL.)	EXCAVATION WIDTH FIELD DETERMINED (ENGR./CONTRACTOR)	EXCAVATION RESPONSIBILITY (COL B - COL E)	REMAR
BLDG. A-6 SIDE NO. 17 & 19 WEST	3 @ 6'-0" + SPACING TD_{TOT} = 23 FT.	18'-11"	TD - 25 FT TL - 20'-11"	TD_{TOT} - 35 FT TL_{TOT} - 30'-11"			
ATLAS WEST WALL	3'-8"	6 FT.	TD - 5'-8" TL - 8 FT.	TD_{TOT} 15'-8" TL_{TOT} 18 FT			

SAMPLES REQUIRING REANALYSIS FOR BETX

2, 8, 3, Bottom 12'-0 Bottom Tank-

✓ Building U-6:
- Bottom West
- Bottom East
- South Pump Island
- Line from South Pump

2 + 8-0 + 3

✓ Building U-3
- Bottom West
- Bottom East
- Supply Lines

3-3 6-0 2-0

✓ Building A-6
- Bottom/Side #17 West
- Bottom/Side #19 West
- Island
- Product Line

2-8-32

Building A-1
- Product Line

Post #24* 2+3-8-0
- Bottom South West

Freedom Gate* 2+3-8-0
- Bottom South
- Bottom North

Atlas 2 3-8-0
- East Bottom
- West Wall

*Not registered tanks

Charlestown

SAMPLES REQUIRING REANALYSIS FOR BETX

Building U-6:
- Bottom West
- Bottom East
- South Pump Island
- Line from South Pump

Building U-3
- Bottom West
- Bottom East
- Supply Lines

Building A-6
- Bottom/Side #17 West
- Bottom/Side #19 West
- Island
- Product Line

Building A-1
- Product Line

Post #24*
- Bottom South West

Freedom Gate*
- Bottom South
- Bottom North

Atlas
- East Bottom
- West Wall

*Not registered tanks

SUBCONTRACT WEEKLY STATUS REPORT

WEEK ENDING 30 Aug 91

P.O. NUMBER 19506

P.O. DESCRIPTION 12 USTs Removal (Resampling)
"Cardamone"

WEATHER CONDITIONS

PERSONNEL ON JOB 2

DAYS WORKED 2

WORK PERFORMED THIS WEEK

They came in & resampled all 17 spots as required now we ~~just~~ must await the results. I also received copy of all work & ~~result~~ info. derived

PERCENT COMPLETE

~~REMARKS~~ from the past 2 Days

PROJECT ENGINEER Wayne A Carlisle 29 Aug 91

June 12, 1991

TO: Bill Jenkins - Purchasing Department

FROM: Wayne Carkido - Engineering Department

Attached is the resampling information as requested per Cardamone Construction.

The tank depth chart is self explanatory. Contractor was responsible for tank and concrete pad and then 5 feet below. The excavation depth determined by driller must be verified by RAI representative. The depth of drilling is to be actual excavated depth and not estimated total depth.

For tank walls the subcontractor was responsible for tank excavation plus one foot in order to remove said tank and then addition 5x5x5x5 feet perimeter is required. Again excavation width or length must be verified by RAI representative and width or length shall be actual width or length excavated and not total responsible width or length.

There is some confusion to location building A-6.

This location is listed as bottom/side No. 17 and 19 west. It is not known if this is a bottom or side sample that is required, so it is listed on both tables until contractor can clear up the discrepancy. This issue must be resolved prior to start of resampling.

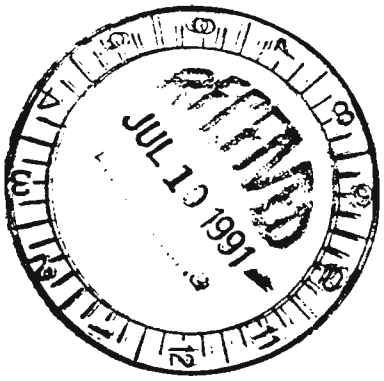
Wayne Carkido

COLUMN →	A	B	C	D	E	F	G
LOCATION ↓	DEPTH TO TANK	TANK DIAMETER	TANK PAD THICKNESS CONTRACTORS RESPONSIBILITY	TOTAL DEPTH INCLUDING 5FT BELOW TANK/PAD.	EXCAVATION DEPTH FIELD DETERMINED BY DRILLER	EXCAVATION RESPONSIBILITY (COL D - COL E)	REMARKS
BLDG. U-6 BOTTOM: EAST & WEST SOUTH PUMP ISLAND LINE FROM SOUTH PUMP	2 FT.	8 FT.	3 FT.	18 FT.			
BLDG. U-3 BOTTOM EAST & WEST SUPPLY LINES	2 FT.	8 FT	3 FT.	18 FT.			
BLDG. A-6 BOTTOM/SIDE: NO. 17 & 19 WEST ISLAND & PRODUCT LINE	3'-3"	6 FT	2 FT.	16'-3"			
BLDG. A-1 PRODUCT LINE	2FT.	8 FT	2 FT.	17 FT.			
CHARLESTOWN GATE (POST 24) BOTTOM: SOUTH-WEST	2FT	3'-8"	⊖	10'-8"			
FREEDOM GATE BOTTOM: NORTH & SOUTH	2 FT.	3'-8"	⊖	10'-8"			
ATLAS BOTTOM EAST WEST WALL	2 FT.	3'-8"	⊖	10'-8"			

COLUMN →	A	B	C	D	E	F	G
LOCATION ↓	TANK DIAMETER (TD.)	TANK LENGTH (TL.)	EXCAVATION RESPONSIBILITY TD.+2FT. OR TL+2FT. (1FT/EA SIDE)	TOTAL RESPONSIBILITY (COL C +10FT.(2SIDES) (FOR TD. OR TL.)	EXCAVATION WIDTH FIELD DETERMINED (BAI REP./CONTRACTOR)	EXCAVATION RESPONSIBILITY (COL.B - COL. E)	REMARKS
BLDG. A-6 SIDE NO. 17 & 19 WEST	3 @ 6'-0" + SPACING TD_{TOT} = 23 FT.	18'-11"	TD - 25 FT TL - 20'-11"	TD_{TOT} - 35 FT TL_{TOT} - 30'-11"			
ATLAS WEST WALL	3'-8"	6 FT.	TD - 5'-8" TL - 8 FT.	TD_{TOT} 15'-8" TL_{TOT} 18 FT			

Cardamone
CONSTRUCTION INC.

4865
Chaincraft Road
Garfield Heights
Ohio 44125
216•581•1133
1•800•686•2476



July 9, 1991

Ravenna Arsenal
8451 State Route 5
Ravenna, Ohio 44266-9297

Attention: Mr. Wayne Carkido

Dear Mr. Carkido:

Enclosed is the letter for Mr. William Jenkins. Please review this letter and if there are any questions please contact my office.

Sincerely,

John S. Cardamone,
President

JSC/mb

Enclosure

JC
HRC
SMC
BLJ

Cardamone
CONSTRUCTION INC.

4865
Chaincraft Road
Garfield Heights
Ohio 44125
216•581•1133
1•800•686•2476

June 3, 1991

Ravenna Army Ammunition Plant
c/o Ravenna Arsenal Incorporated
8451 State Route 5
Ravenna, Ohio 44266

Attention: William Jenkins

Regarding: Ravenna Arsenal
8451 State Route 5
Ravenna, Ohio 44266

Gentlemen:

In the spirit of the original agreement between Cardamone Construction, Inc. and the Ravenna Arsenal further soil sampling and analysis will be performed at the above referenced subject site. The reason for this further testing was that the lowest possible quantative limit on samples previously taken was not achieved as requested by the Ohio State Fire Marshal's Office. Cardamone Construction, Inc. does not feel that it is entirely responsible, but in the interest of achieving customer satisfaction will perform the following scope of work:

1. Benzene Toluene Ethylbenzene Xylene (BTEX), analysis only.
2. Sample quantity and site location as per the following table will be done in the locations similar to as noted in the closure report.

TABLE 1

LOCATION	NUMBER OF SAMPLES
U-6	4
U-3	3
A-6	4
Post 24	2
Gate House Freedom	2
Old Atlas	2

The depth of each sample to be taken will be represented by the depth of the final excavation before back filling occurred. The following table represents the depth of each final excavation floor, and consequently the depth of samples to be taken.

Cardamone
CONSTRUCTION INC.

4865
Chaincraft Road
Garfield Heights
Ohio 44125
216•581•1133
1•800•686•2476

TABLE 2

LOCATION	VERTICAL DEPTH (FEET)	SAMPLE DEPTH (FEET)
U-6	12	12.0-13.0
U-3	11	11.0-12.0
A-6	11	11.0-12.0
Post 24	12	12.0-13.0
Freedom	11	11.0-12.0
Old Atlas	10	10.0-11.0

Results of these tests will be reported to Ravenna Arsenal on a time table set by Wadsworth Alert Labs (approximately two weeks after samples are taken by Cardamone Construction, Inc.). Copy's marked preliminary will be faxed to Ravenna Arsenal for review.

Ravenna Arsenal agrees that the criteria for acceptance will be limited to the following interpretations of the specifications:

"During Excavation, headspace screening data may define areas of contamination contamination within the excavation. Excavation shall continue laterally away from the excavation to remove those soils displaying headspace readings above ten (10) parts per million (ppm).

According to the specifications the criteria used for clearance was based only on PID readings of <10 ppm. Therefore, analytical results were not intended to be used for clearance accordance with the project specifications.

To further substantiate this interpretation the specifications further acknowledges that "analytical soil samples are to be collected from the finished excavation, whether there is evidence of contamination or not".

Our interpretation of these quotations from the specifications is that the responsibility of the remediation contractor is to excavate each tank site until the Photoionization Detector indicates a reading of <10 ppm or until the excavation reached a maximum dimension over the original excavation of 5' bottom & sides. This criteria was met as reported in the closure report by Cardamone.

The specifications do not address further excavations of each site based on laboratory results but on Photoionization readings only. This procedure is customary in the industry because (1) clearance criteria is not published by the Ohio State Fire Marshal's Office and (2) response time from this authority is impracticable.

Cardamone
CONSTRUCTION INC.

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1•800•686•2476

Under the terms of this specifications any additional excavation beyond the specified criteria, (<10 ppm based on Photoionization and if 10 ppm is not achieved to the maximum extent on 5' sides and bottom from the original excavation) is not part of the agreement.

In consideration of Cardamone Construction, Inc. offering this proposal, Ravenna Arsenal agrees that upon receiving final copies of the laboratory reports, a letter of release will be issued to the Bond Company indicating in terms that a full and unequivocal satisfaction of the original agreement is complete therefore releasing Cardamone Construction, Inc. from any further obligations for additional work relating to the subject project.

In the original agreement no provisions were made for duplicating samples. As such no duplicate samples will be taken.

Sincerely,

CARDAMONE CONSTRUCTION, INC.

John Cardamone

Title

Release only if
① sample is beyond 5x5x5x5
② within 5x5x5x5 & acceptable to EPA/OEPA.

UST SAMPLES

SAMPLE	DATE LAB RECEIVED	DET. LIMITS
POST #24 NORTH	2/13/90	.2 PPM
POST #24 SOUTH	2/13/90	.2 PPM
A-1 LF	2/13/90	1 PPB
POST #24 LF	2/13/90	.2 PPM
TANK #47 LF	2/13/90	.2 PPM
A-6 550 LF	2/13/90	1 PPB
A-6 550 SOUTH	2/13/90	1 PPB
A-1 WEST	2/13/90	1 PPB
A-6 550 NORTH	2/13/90	1 PPB
A-1 EAST	2/13/90	1 PPB
✓ FREEDOM SOUTH	2/13/90	.2 PPM
✓ FREEDOM NORTH	2/13/90	.2 PPM
✓ ATLAS EAST	2/14/90	.2 PPM
✓ ATLAS WEST	2/14/90	.2 PPM
LF PILE	2/14/90	.2 PPM
U-6 BOT WEST	2/19/90	.2 PPM
U-3 LF	2/19/90	.2 PPM
U-6 PUMP ISLAND	2/19/90	.2 PPM
U-6 LF	2/19/90	.2 PPM
U-6 BOT EAST	2/19/90	.2 PPM
U-6 LINE	2/19/90	.2 PPM
U-3 BOT WEST	2/19/90	.2 PPM
U-3 BOT EAST	2/19/90	.2 PPM
A-6 #17 WEST	2/21/90	.2 PPM
A-6 LINE	2/21/90	.2 PPM
A-6 LF	2/21/90	.2 PPM
A-6 #19 WEST	2/21/90	.2 PPM
✓ A-1 LINE	2/21/90	.2 PPM
A-6 ISLAND	2/21/90	.2 PPM
U-3 SUPPLY LINES	2/22/90	.2 PPM
POST #24 #1	3/23/90	2 PPB
POST #24 #2	3/23/90	.1 PPM
✓ POST #24 SW	4/5/90	.2 PPM
POST #24 SE	4/5/90	4 PPB
PILE	4/5/90	5 PPB

✓ Non Cert → Recanned ~?

MINUTES OF CARDAMONE/JILBERT MEETING

DATE/TIME: May 30, 1991, 1:15 P.M.

ATTENDEES:

John Cardamone	Wayne Carkido
David Jilbert	Susan McCauslin
Bill Jenkins	Harold Cooper

ITEM 01: PURPOSE

The purpose of the meeting was defined by BJJ as: 1) define the argument to be presented before the State Fire Marshal at the June 5, 1991 meeting; and 2) define action required by Cardomone Construction to fulfill contract obligation.

ITEM 02: ISSUES

RAI tank removal specifications required BETX analysis be performed according to SW-846 Method 8020. Method detection limits can vary from PPB to PPM due to type of sample matrix. State Fire Marshal Closure Requirements, also included in RAI specifications, require that the lowest achievable detection limits be used for samples showing non-detectable BETX. RAI has asked for, and has not received, a letter from Wadsworth Laboratory explaining why the PPB limit was not achieved on certain closure samples.

Re-sampling of 11 sample sites at 3 registered tank locations are required to correct deficiency. In addition, 6 sample sites at 4 non-registered tank sites also need to be re-sampled in case EPA requirements mirror those of the Fire Marshal.

The contents and requirements of the RAI specifications were not disputed by Cardamone/Jilbert. What actually happened, according to Jilbert, was that Wadsworth Laboratory was routinely running BETX samples to PPM detection limites until January, 1990. This was common practice in the industry at the time, and was acceptable at the time to the State Fire Marshal Office.

Cardamone/Jilbert made an offer to resolve issues: Wadsworth Laboratory will analyze re-samples to PPB levels at no cost; Cardamone will send in North Coast Drilling to core sample for re-testing at no cost to RAI. Cardamone stated that he would not excavate the area if contamination is found, and that he wants his performance bond to be released upon completion of the re-sampling.

RAI countered that excavation to the 5' by 5' limits of the tank areas was originally required as part of the contract in the specifications and therefore Cardamone was still obligated to excavate to those limits if necessary. Cardamone/Jilbert did not agree or disagree with that contention.

ITEM 03: CONCLUSION

RAI personnel agreed to discuss the Cardamone offer and to provide him with an answer before the COB May 30, 1991. RAI personnel agreed during the discussion that the offer was acceptable if: 1) Cardamone agreed to excavate, at his expense, to the 5' by 5' boundary of any tank site if the sample results within that 5' by 5' area show detectable BETX; and 2) Cardamone agreed to re-sample both registered and non-registered tank sites.

cc: Jenkins
Cooper
Carkido
File

RAVENNA ARSENAL, INC.

INTEROFFICE MEMO

TO: Bill Jenkins

FROM: H. R. Cooper

DATE: May 30, 1991

SUBJECT: Underground Storage Tank Removal Project - Cardamone Construction

---

I have reviewed with Susan McCauslin and Wayne Carkido the significant facts relative to detection limits used in the soil analysis for this project with the following conclusions.

Did The Fire Marshal's Office accept test results in parts per million (ppm) (i.e. milligrams/kilogram) prior to the spring of 1990?

John Cardomone said that Raymond D. Roe, State Fire Marshal's Corrective Actions Supervisor, Twinsburg would confirm that they did. We have not been able to confirm this yet.

We do not believe this question has any bearing on the matter since, as described later, our specification requires lowest possible quantification limit.

Did the RAI specification requirements for Underground Storage Tank Removal, July 1989 require a detection level of parts per billion (ppb) (i.e. micrograms per kilogram)?

Page 1 of the specification reads "All work is to be performed in accordance with applicable provisions of.....Ohio Department of Commerce, Division of State Fire Marshal, Petroleum Underground Storage Tank Closure Assessment Requirements (Ohio Closure Assessment Requirements) ....." This document dated June, 1989 was included in the specification in Appendix A.

Section 3.9, Excavation Sampling, of the specification requires that "All analytical soil samples collected are to be analyzed for.....benzene, ethylbenzene, toluene, xylenes (BETX; U.S. EPA Method 8020). The analytical methodologies are detailed in USEPA Publication SW-846."

The Ohio Storage Tank Closure Assessment, Section VI Sampling Quality Assurance, Parameters, and Documentation, Paragraph E, Laboratory Detection/Quantitation Limits states "The owner/operator shall have samples analyzed by a laboratory capable of analyzing

samples in accordance with method protocols described in the SW846 and 600/4-79-020 manuals. The laboratory quantitation limits achieved shall be those listed in these manuals. A sample with "non-detectable" results shall have been analyzed using the lowest possible quantitation limit listed for the sample matrix (i.e., soil, water, etc.)."

SW-846 method 8020 provides the protocol for BETX analysis. Table 1 identifies a method detection limit of 0.2 micrograms/L (UG/L) Table 2 provides a factor to multiply times the method detection limit to obtain the Practical Quantitation Limit. Two matrices are identified for soil. Low-Level Soil and High Level Soil. The level refers to interferences with the reading of the results of the test as a result of other materials in the soil.

The factor and the resulting Practical Quantitation Limit for both matrices are as follows:

MATRIX	FACTOR	PRACTICAL QUANTITTATION LIMIT (PQL)
Low Level Soil	10	2.0 ug/kg (ppb)
High Level Soil	1,250	250 ug/kg (ppb) or 0.25 mg/kg (ppm)

Note: PQL is determined by multiplying the method detection limit (0.2 ug/l) by the respective factor. Solids are reported on a wet weight basis, therefore, Liter becomes kg.

The determination of High or Low Level interference can only be made by the laboratory doing the analysis. Since they are required to use the lowest possible quantitation limit the lab must try for the lower limit (for Low Level soil). If interferences are high then the results would be reported to the limit for High Level soil. If the lab did that they should have so noted on the report. None of the analytical reports have any reference to trying for Low-Level soil. If they did and they have records to confirm it, then revised laboratory reports should be submitted.

If the analysis was not attempted at the lower limit then our specification requirements were not met.

We have summarized the analytical results obtained during the course of the project. Attachment 1 shows, in chronological order, the date the sample was received at the lab, the description of the sample and the detection limits reported for each sample.

What is the Fire Marshal Requiring?

The State Fire Marshal's Office is requiring that a total of 11 samples at 3 tank sites (Bldgs.. U-6, U-3, A-6) be resampled and analyzed to a detection level of 2.0 ppb.

Related Issue

In addition to the tank sites which the Fire Marshal is addressing another 6 samples at 4 tank sites (Bldg. A-1, Post 24, Freedom Gate, Atlas) are not regulated by the Fire Marshal and have been submitted to the Ohio EPA Division of Emergency and Remedial Response. The potential exists that these may have to be resampled. These tanks were required by our specification to be analyzed to the same requirements as those regulated by the Fire Marshal. Whatever agreement is reached with Cardamone should make he or his bonding company liable for resampling those additional 6 samples if necessary.

Other Issues

In our last telephone conversation with Mr. Cardamone he alleged that Sue McCauslin was "calling the shots" on the sampling program and subsequent reporting. I have confirmed that no instructions were given changing the requirements of the specification in regard to detection limits. The situation he was referring to was in regard to how water, which had filled some of the holes, was handled and reported. In all cases but one the water was surface water runoff. He wanted to treat all holes with water as groundwater even though the sites, with the exception of the one, were above the water table. This classification has an impact on how much testing is required. RAI had the test performed on the one site and on the other sites followed the method given by the state inspector for another project being conducted at the same time.

H. Cooper

cc: N. Wulff
S. McCauslin
W. Carkido
File

hc530.mem

UST SAMPLES

SAMPLE	DATE LAB RECEIVED	DET. LIMITS
POST #24 NORTH	2/13/90	.2 PPM
POST #24 SOUTH	2/13/90	.2 PPM
A-1 LF	2/13/90	1 PPB
POST #24 LF	2/13/90	.2 PPM
TANK #47 LF	2/13/90	.2 PPM
A-6 550 LF	2/13/90	1 PPB
A-6 550 SOUTH	2/13/90	1 PPB
A-1 WEST	2/13/90	1 PPB
A-6 550 NORTH	2/13/90	1 PPB
A-1 EAST	2/13/90	1 PPB
FREEDOM SOUTH	2/13/90	.2 PPM
FREEDOM NORTH	2/13/90	.2 PPM
ATLAS EAST	2/14/90	.2 PPM
ATLAS WEST	2/14/90	.2 PPM
LF PILE	2/14/90	.2 PPM
U-6 BOT WEST	2/19/90	.2 PPM
U-3 LF	2/19/90	.2 PPM
U-6 PUMP ISLAND	2/19/90	.2 PPM
U-6 LF	2/19/90	.2 PPM
U-6 BOT EAST	2/19/90	.2 PPM
U-6 LINE	2/19/90	.2 PPM
U-3 BOT WEST	2/19/90	.2 PPM
U-3 BOT EAST	2/19/90	.2 PPM
A-6 #17 WEST	2/21/90	.2 PPM
A-6 LINE	2/21/90	.2 PPM
A-6 LF	2/21/90	.2 PPM
A-6 #19 WEST	2/21/90	.2 PPM
A-1 LINE	2/21/90	.2 PPM
A-6 ISLAND	2/21/90	.2 PPM
U-3 SUPPLY LINES	2/22/90	.2 PPM
POST #24 #1	3/23/90	2 PPB
POST #24 #2	3/23/90	.1 PPM
POST #24 SW	4/5/90	.2 PPM
POST #24 SE	4/5/90	4 PPB
PILE	4/5/90	5 PPB

Ohio Department of Commerce

George Voinovich, Governor

Division of State Fire Marshal • Bureau of Underground Storage Tank Regulations
9221 Ravenna Rd•Suite D7• Twinsburg, OH 44087-2443

Nancy S. Chiles, Director

February 1, 1991

Susan McCauslin
Ravenna Arsenal, Inc.
8451 State Route 5
Ravenna, OH 44266

RE: Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, OH 44266
Portage County
679298-03 through 05

Dear Ms. McCauslin:

On August 20, 1990, the State Fire Marshal, Bureau of Underground Storage Tank Regulations (SFM,BUSTR) received your closure report for the underground storage tank (UST) systems at the aforementioned site. Based on our review of the closure report, the SFM, BUSTR has determined the closure of the UST systems at the site does not meet the state closure criteria. Enclosed is a copy of the Petroleum Underground Storage Tank Closure Assessment Requirements for your reference in meeting the closure criteria.

The closure is deficient for the following reason:

> The quantitation limits used by the laboratory for its analyses of benzene, toluene, ethylbenzene, and xylene(s), were too high according to U.S. EPA document SW-846.

This deficiency is to be corrected and addressed in writing to the following address:

State Fire Marshal
Bureau of Underground Storage Tank Regulations
Attention Thomas Kilbane
9221 Ravenna Road
Suite D7 and D8
Twinsburg, OH 44087-2443

Please reference the incident number (679298-03 through 05) when you communicate with the SFM.

Thank you for your cooperation. If you have any questions regarding this matter, please contact me at (216) 425-9848.

Sincerely,

Thomas J. Kilbane

Thomas J. Kilbane, Environmental Specialist
Environmental Review Unit
Release Prevention Section
Bureau of Underground Storage Tank Regulations

TJK/sk

Enclosure

cc: File #679298-03 through 05

TANK REMOVAL REQUIREMENTS
RAVENNA ARSENAL
Ravenna, Ohio

1. INTRODUCTION

The following Plan sets forth the requirements for the removal of twelve underground storage tanks at the Ravenna Arsenal located in Ravenna, Ohio. This work is to be performed for the Ravenna Arsenal, Inc. (RAI), operator of the facility. The Plan provides for the removal of the tanks and their associated contents and for the restoration of tank locations following removal. Should field evidence indicate that a release has occurred, the Plan also details initial abatement measures, as required under Article 36, Section (C) of the Ohio Fire Code.

All work is to be conducted in accordance with applicable provisions of 40 CFR Part 280, "EPA Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks;" Articles 28, 35 and 36 of the Ohio Fire Code (1301:7-7-28, 1301:7-7-35 and 1301:7-7-36 of the Ohio Administrative Code); Ohio Department of Commerce, Division of State Fire Marshal, Petroleum Underground Storage Tank Closure Assessment Rerquirements (Ohio Closure Assessment Requirements) and American Petroleum Institute (API) Bulletin No. 1604, "Recommended Practice for Abandonment or Removal of Used Underground Service Station Tanks." In addition, the Contractor(s) must comply with the safety and security regulations as stipulated in the RAI pamphlet "Safety and Security Rules," dated 1986. Copies of these regulations and guidelines are provided in Appendix A. The Ohio Closure Assessment Requirements are to be updated in the fall of 1989. The Contractor shall comply with all applicable provisions of the most current version of the above regulations and guidelines.

The twelve tanks are located in seven separate locations and formerly contained No. 2 fuel oil or gasoline. The tanks are believed to be of steel construction. The tanks were associated with former fueling areas, facility gate houses and boiler houses. The tanks were taken out of service approximately 15 years ago. Most product was removed and the tanks were filled with a water-based corrosion inhibitor. A summary of the tank sizes and locations is provided in Table 1; RAI plans illustrating the features for the various tank areas are also included. A characterization of the tanks is also provided in Section 3.2.1 to 3.2.6, inclusive.

2. GENERAL REQUIREMENTS

In performing the tasks associated with the tank removal project, the Contractor must accept the following requirements:

tional excavation in localized areas beyond the five-foot zone would result in removal of contaminated soils. Beyond five feet from the original excavation, contamination problems will likely be addressed through measures other than soil excavation. These measures are beyond this scope of work.

In the event that a release is detected and contamination is believed to remain beyond the five-foot-zone, the excavation shall remain open pending the receipt of analytical data from the excavation. Excavations that remain open shall be surrounded by an earthen berm to reduce potential surface water inflow and, if feasible, shall be covered to reduce direct precipitation into the excavation. Excavation samples shall be analyzed by quick turnaround to expedite excavation closure should additional excavation in localized areas be required.

Piles of contaminated soil shall be covered with plastic sheeting to minimize the influx of surface water and precipitation. This sheeting shall be appropriately weighted down to assure that it remains in place.

3.9 Excavation Sampling Procedures

Analytical soil samples are to be collected from the tank excavations. These analytical soil samples are to be collected from each finished excavation, whether there is evidence of contamination or not. All analytical soil samples collected are to be analyzed for total petroleum hydrocarbons (U.S. EPA Extraction Procedure 9071 and Analytical Method 418.1); benzene, ethylbenzene, toluene, xylenes (BETX; U.S. EPA Method 8020) and total lead (U.S. EPA Method 7420) and total chromium (U.S. EPA Method 7190). The analytical methodologies are detailed in the U.S. EPA Publication SW-846, "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods".

Due to the potential for excavation collapse, samples shall be collected from the backhoe bucket, not directly from the excavation. Soil that is collected for analysis shall not be in contact with the backhoe bucket. Contractor shall take appropriate cleaning measures to reduce the potential for cross-contamination of samples via contaminated sampling equipment.

Sampling location and methodology are specified in the Ohio Closure Assessment Requirements. Samples shall be collected from discrete locations and shall not be composited. Samples shall be collected in the native soil material, or if the entire site is fill material, samples may be collected from the original fill (as opposed to the tank cavity fill material). Of all the samples collected from a tank area during closure, only three (3) from each tank area must be sent to a laboratory for analysis.

methods such as 8240 (GC/MS for semivolatile organics).

Soil and water sampling and analysis should be performed by the procedures described in the U.S. EPA documents entitled "Test Methods for Evaluating Solid Wastes-Physical/Chemical Methods" SW-846, and "Manual for Chemical Analysis of Water and Wastes", 600/4-79-020. The laboratory Quality Assurance/Quality Control documentation should conform to USEPA protocols and be immediately available upon request by the State Fire Marshal. The owner/operator is not required to use a USEPA Contract Laboratory Program (CLP) laboratory unless otherwise directed by the State Fire Marshal.

E. *Laboratory Detection/Quantitation Limits*

The owner/operator shall have samples analyzed by a laboratory capable of analyzing samples in accordance with method protocols described in the SW846 and 600/4-79-020 manuals. The laboratory quantitation limits achieved shall be those listed in these manuals. A sample with "non-detectable" results shall have been analyzed using the lowest possible quantitation limit listed for the sample matrix (i.e., soil, water, etc.).

VII. RELEASE REPORTING

If a release is confirmed during the tank closure, closure assessment, or by subsequent sample analysis, the owner/operator must contact BUSTR and the local fire official within 24 hours to report the release. The necessary actions after reporting will vary with several factors including the degree of contamination, the depth to groundwater, and the nature of surrounding land use. BUSTR staff will work with the owner/operator and their consultants to develop an investigation and corrective action plan appropriate to conditions at the site.

VIII. REPORTING OF TANK CLOSURES

Unless otherwise instructed, all closure activities exclusive of laboratory analysis must be completed within 30 days of receiving a permit to close. Copies of all closure records (described in Section IV, C of this guidance) must be submitted to the State Fire Marshal, BUSTR, within three days of the owner/operator receiving sample results. The report must include all laboratory results and the documentation described in section V. The reports shall be sent to:

Release Prevention Supervisor
Division of State Fire Marshal
Bureau of Underground Storage Tank Regulations
7510 East Main Street
P.O. Box 525
Reynoldsburg, Ohio 43068-3395

The State Fire Marshal will review the reports and determine what additional actions, if any, are required.

*** THESE REQUIREMENTS MAY CHANGE IN RESPONSE TO NEW INFORMATION AND CHANGES IN REGULATIONS. ***

TABLE 1. CHROMATOGRAPHIC CONDITIONS AND METHOD DETECTION LIMITS FOR AROMATIC VOLATILE ORGANICS

Compound	Retention time (min) Col. 1	Retention time (min) Col. 2	Method detection limit[a] (ug/L)
Benzene	3.33	2.75	0.2
Chlorobenzene	9.17	8.02	0.2
1,4-Dichlorobenzene	16.8	16.2	0.3
1,3-Dichlorobenzene	18.2	15.0	0.4
1,2-Dichlorobenzene	25.9	19.4	0.4
Ethyl Benzene	8.25	6.25	0.2
Toluene	5.75	4.25	0.2
Xylenes			

[a] Using purge-and-trap method (Method 5030).

TABLE 2. DETERMINATION OF PRACTICAL QUANTITATION LIMITS (PQL) FOR VARIOUS MATRICES[a]

Matrix	Factor[b]
Ground water	10
Low-level soil	10
Water miscible liquid waste	500
High-level soil and sludge	1250
Non-water miscible waste	1250

[a]Sample PQLs are highly matrix-dependent. The PQLs listed herein are provided for guidance and may not always be achievable.

[b]PQL = [Method detection limit (Table 1)] X [Factor (Table 2)]. For non-aqueous samples, the factor is on a wet-weight basis.

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: Cardamone Construction, Inc.
LAB #: 4306-53656
MATRIX: SOLID

DATE RECEIVED: 2/14/90
DATE EXTRACTED: 2/16/90
DATE ANALYZED: 2/16/90

SAMPLE ID: EAST BOTTOM

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (mg/kg)	DETECTION LIMIT
Xylenes	ND	0.2
Benzene	ND	0.2
Toluene	ND	0.2
Ethylbenzene	ND	0.2

NOTE: ND (None Detected)
J (Detected, but below quantitation limit; quantitation suspect)

Cardamone
CONSTRUCTION INC.

4805
Chaincraft Road
Garfield Heights
Ohio 44125
216-581-1133
1-800-686-2476

B J JENKINS
AUG 14 1991

cc: Wayne Cardamone
Susan McCandlish

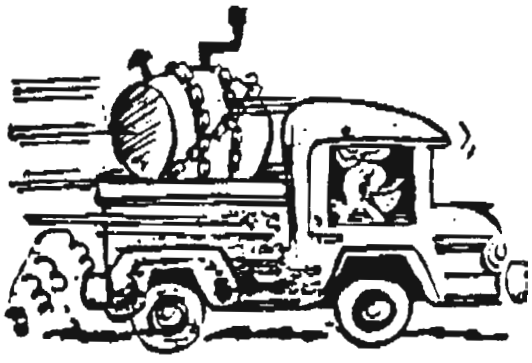
SEND TO FAX NUMBER: 1-297-3216 DATE: 8/13/91

MESSAGE TO: MR BILL JENKINS

MESSAGE FROM: JOHN SCARDAMONE

NUMBER OF PAGES: 1

AS PER PHONE CONVERSATION DRILL WILL BE DONE
ON AUGUST 27 & 28 1991



Cardamone
CONSTRUCTION INC

4365
Chaincraft Road
Garfield Heights
Ohio 44125
216 •581•1135

June 3, 1991

S. J. JENKINS
JUL 18 1991

cc: Sue McCauley
Wayne Carbido

Ravenna Army Ammunition Plant
c/o Ravenna Arsenal Incorporated
8451 State Route 5
Ravenna, Ohio 44266

Attention: William Jenkins

Regarding: Ravenna Arsenal
8451 State Route 5
Ravenna, Ohio 44266

Gentlemen:

In the spirit of the original agreement between Cardamone Construction, Inc. and the Ravenna Arsenal further soil sampling and analysis will be performed at the above referenced subject site. The reason for this further testing was that the lowest possible quantitative limit on samples previously taken was not achieved as requested by the Ohio State Fire Marshal's Office. Cardamone Construction, Inc. does not feel that it is entirely responsible, but in the interest of achieving customer satisfaction will perform the following scope of work:

1. Benzene, Toluene, Ethylbenzene, Xylene (BTEX), analysis only. Quantitative limit to be <2 PPB.

2. Sample quantity and site location as per the following table will be done in the locations similar to as noted in the closure report.

TABLE 1

LOCATION	NUMBER OF SAMPLES
U-6	4
U-3	3
A-6	4
Port 24	2
Gate House Freedom	2
Old Atlas	2

The depth of each sample to be taken will be represented by the depth of the final excavation before back filling occurred. The following table represents the depth of each final excavation floor, and consequently the approximate depth of sample to be taken. Final determination will be done in the field during drilling operations.

TABLE 2

LOCATION	VERTICAL DEPTH (FEET)	SAMPLE DEPTH (FEET)
U-6	12	12.0-13.0
U-3	11	11.0-12.0
A-6	11	11.0-12.0
Post 24	12	12.0-13.0
Freedom	11	11.0-12.0
Old Atlas	10	10.0-11.0

Results of these tests will be reported to Ravenna Arsenal on a time table set by Wadsworth Alert Labs (approximately two weeks after samples are taken by Cardamone Construction, Inc.). Copy's marked preliminary will be faxed to Ravenna Arsenal for review.

Ravenna Arsenal agrees that the criteria for acceptance will be limited to the following interpretations of the specifications.

"During Excavation, headspace screening data may define areas of contamination within the excavation. Excavation shall continue laterally away from the excavation to remove those soils displaying headspace readings above ten (10) parts per million (ppm).

According to the specifications the criteria used for clearance was based only on PID readings of <10 ppm. Therefore, analytical results were not intended to be used for clearance accordance with the project specifications.

To further substantiate this interpretation the specifications further acknowledges that "analytical soil samples are to be collected from the finished excavation, whether there is evidence of contamination or not".

Our interpretation of these quotations from the specifications is that the responsibility of the remediation contractor is to excavate each tank site until the Photoionization Detector indicates a reading of <10 ppm or until the excavation reached a maximum dimension over the original excavation of 5' bottom & sides. This criteria was met as reported in the closure report by Cardemone.

The specifications do not address further excavations of each site based on laboratory results but on Photoionization readings only. This procedure is customary in the industry because (1) clearance criteria is not published by the Ohio State Fire Marshal's office and (2) response time from this authority is impracticable.

Under the terms of this specifications any additional excavation beyond the specified criteria, (<10 ppm based on Photoionization and if 10 ppm is not achieved to the maximum extent on 5' sides and better from the original excavation) is not part of the agreement.

In consideration of Cardamone Construction, Inc. offering this proposal, Ravenna Arsenal agrees that after reviewing preliminary copies and upon receiving final copies of the laboratory reports, a letter of release will be issued to the Bond Company indicating in terms that a full and unequivocal satisfaction of the original agreement is complete therefore releasing Cardamone Construction, Inc. from any further obligations for additional work relating to the subject project.

In the original agreement no provisions were made for duplicating samples. As such no duplicate samples will be taken.

Sincerely,

CARDAMONE CONSTRUCTION, INC.

_____
John Cardamone

_____ _____
Bill Jenkins Title

I strongly recommend we procur... and analyze the samples in questi... ramifications from the SFM offic... incurred for resampling and analy... by whatever fashion Purchasing de...

Wayne A. (

WAC/ade

cc: N. Wulff
B. Jenkins
S. McCauslin
File

Bill Jenkins
What is the "new information" that changes this memo.

P.S. Please return this copy

7 MAY 91

Spoke with John Cardamone to notify him that Purchasing has another insurance form to prepare regarding bond for 12 UST. I will be notifying them that samples will be retaken and charges taken against the bond.

John Cardamone stated that the he, Wadsworth Lab and State Fire Marshal are in disagreement to test limit in parts per billion.

State Fire Marshal guideline is not a written law or bill. It is just a guideline (something they desire). Wadsworth Lab tested to 846 method. No specific limit, therefore, lab/contractor uses the least costly method (parts per million).

Several companies are presently fighting this issue in Chicago (EPA).

I requested a letter from Cardamone explaining above. I will set up meeting with EPA, Cardamone and RAI immediately.

B. J. JENKINS
MAY 8 1991

Sandy, Copy Harold & Wayne on Bill's note last page.

Cardamone
CONSTRUCTION INC.

4865
Chaincraft Road
Garfield Heights
Ohio 44125
216•581•1133
1•216•686•2476

May 21, 1991

B. J. JENKINS
MAY 21 1991

cc: Harold Cooper
Wayne Carbiche
Susan McCauslin

RAVENNA ARSENAL
8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297

ATTENTION: MR. WILLIAM JENKINS

RE: UNDERGROUND STORAGE TANK - CLOSURE REPORT
RAVENNA ARSENAL
8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297

Gentlemen:

We are pleased to provide the following information regarding your request for explanation, on the above referenced Closure Report.

When the Underground Storage Tank Program was initiated by BUSTR, laboratories were informed that the State Fire Marshal would review Closure Reports and determine if further action was necessary.

Before lower detection limits were set by BUSTR, limits of detection were routinely reported at 0.1 to 0.5 mg/Kg, as per SW846 methodology. The low-level method is currently done for all soils when samples are for Underground Storage Tank Closures under BUSTR jurisdiction.

Sincerely,

John S. Cardamone

President

JSC/rd

RAVENNA ARSENAL, INC.
INTEROFFICE MEMORANDUM
April 26, 1991

TO: H.R. Cooper - Plant Engineer

FROM: W.A. Carkido - Engineering

SUBJECT: Non-Compliance With Test Methods For Soil Analysis By Cardamone Construction Company

---

As you are aware RAI Engineering and Purchasing Departments have been pursuing Cardamone Construction to resample and analyze the samples which the State Fire Marshal has noted DO NOT MEET THE CRITERIA OF SW846 METHOD 8020 and RAI Specification PS-666.

Below is a chronological summary of the past 6 months pertaining to this situation.

24 OCT 90: RAI received notification by phone from Kelly Gill, State Fire Marshals Office that some of the sample analysis were not run per EPA requirement SW846 Method 8020.

26 OCT 90: RAI notified Wadsworth Lab's (Cardamone's Subcontractor) of the above mentioned situation basically that they had run the detection limits to high (parts/million instead of required parts/billion). Mr. Olson (Wadsworth) stated he was directed by Cardamone Construction. He said he informed Cardamone the limits were to high and Cardamone replied it was what RAI specifications required. (This claim is totally false. A Review of RAI specification clearly specifies SW846 Method 8020 which is parts/billion.)

9 NOV 90: RAI received phone verification from Kelly Gill that RAI could resample via a core sampling device instead of reexcavation.

19 NOV 90: An overview of the above situation to Purchasing and recommendation for resampling and analysis from Cardamone ASAP.

17 DEC 90: Official notification of a variety of clerical deficiencies from State Fire Marshalls Office.

22 JAN 91: Cardamone replies to clerical deficiencies.

4 FEB 91: Official notification from Thomas Kilbane of the Ohio State Fire Marshalls Office on the non-compliance of soil sample parameters.

12 MARCH 91: Phone conversation with Cardamone which he claimed SW846 Method 8020 required parts/million, not parts/billion. Therefore, his sampling was correct. I totally disagreed with him.

15 MARCH 91: Phone conversation with RAI and State Fire Marshall (SFM) about Cardamones insistence that parts/million were acceptable to the SFM Office at the time of sampling. Mr. Kilbane (SFM) stated Cardamones claim was incorrect and he would speak with Cardamone.

20 MARCH 91: Cardamones reply to SFM that Wadsworth ran analysis per SW846 Method 8020 in parts/million (again this is incorrect SW846 Method 8020 clearly defines parts/billion.)

2 APRIL 91: Phone conversation between Thomas Kilbane (SFM) and RAI that he informed Cardamone that the analysis run at parts/million was not acceptable and resampling and analysis at parts/billion was necessary.

3 APRIL 91: Phone conversation between B. Jenkins and Cardamone: Cardamone stated that Thomas Kilbane (SFM) conceded that SW846 does not specify parts/billion.

4 APRIL 91: Phone conversation between RAI and Thomas Kilbane (SFM) to verify Cardamones claim on 3 April 91. Mr. Kilbane stated Cardamones claim was totally untrue, he never told Cardamone that parts/million was acceptable but just the opposite that parts/million was not acceptable at any time by the SFM and resampling and analysis was required in parts/billion.

5 APRIL 91: Letter to Cardamone enclosing copy of SW846 Method 8020 dated September 86 (most current at time of sampling) clearly stating soil sampling requires parts/billion and requesting immediate action.

WEEK OF APRIL 12: Phone conversation between B. Jenkins and Cardamone: Cardamone stated his reply is in the mail. (To date no reply has been received by RAI)

Review of the above events, I believe Cardamone is no closer to resolving the problem then when first informed of the situation back in October 1990 based on:

1. The above summary of events including:
   a) False statements made from 2 April 91 - 4 April 91.

2. All the problems encountered with Cardamone Construction during this situation and a variety of situations which arose during the physical removal of the 12 underground storage tanks.

I feel Cardamones credibility is very questionable and could be detrimental to RAI. It is my recommendation that it would be in RAI best interest to subcontract to Nozzle New Inc. (currently removing 22 USTs at RAI) to resample and analyze the samples in question because:

A) They are currently on site working (therefore their costs should be minimal) and RAI has not had any past or present problems with this company.

B) Cardamones integrity is definitely questionable.

C) The State Fire Marshalls Office has approved core sampling procedures for the time being but continual delays in providing resampled analysis can lead to:

1. A definite mandates period to perform sampling, analysis and penalties for failure to comply within allotted time frame. I believe that allotted time when mandated may not be achievable and penalties incurred do to

    a. Time needed to arrange subcontractor or Cardamone to perform sampling.
    b. Turn around time the lab requires for the analysis.

2. SFM may also change their attitude toward allowing core sampling and require reexcavation of the sites causing:

    a. More expenses
        1. Excavation, backfilling, grading, seeding

    b. More time involved
        1. If coupled with any dead line dates it could present even more problems.

D) Mr. Jenkins has been more than fair and given Cardamone every opportunity to resolve this problem and every other problem encountered during this project.

I strongly recommend we procure some company to resample and analyze the samples in question to prevent any possible ramifications from the SFM office and try to recover any costs incurred for resampling and analysis from Cardamone Construction by whatever fashion Purchasing determines feasible.

Wayne A. Carkido

WAC/ade

cc: N. Wulff
B. Jenkins
S. McCauslin
File

April 9, 1991

Ravenna Arsenal, Inc.
8451 State Route 5
Ravenna, Ohio 44266

B. J. JENKINS
MAY 1 1991

Attention: Bill Jenkins

cc: Wayne Carbide
Dan McCauslin
Review and discuss with me.

Regarding: Underground Storage Tank
Closure Specifications
Ravenna Arsenal, Inc.
8451 State Route 5
Ravenna, Ohio

Dear Mr. Jenkins:

Please review SW846 Method 8020 "Aromatic Volatile Organics." It is agreed that this method is specifically referenced by the Ravenna Arsenal specification and is further referenced on page 9, paragraph 3.9, "Excavation Sampling Procedures," first paragraph.

However, contrary to your statement, the method detection limits are not clear. Unless specifically referenced, SW846 clearly offers a choice between low level soil and high level soil. See subject Method Table 2. Practical quantitation limits can be calculated as follows:

(Table 2) X (Table 1)
Factor X Method Detection Limit = Practical Quantitation Limit

Low Level Soil	10 X .2 =	2 ug/Kg
High Level Soil	1250 X .2 =	.2 mg/Kg

In any event, limits of detection as per SW846 Method 8020 are correct if reported at 2 ug/Kg or .2 mg/Kg.

It can be concluded that the sampling analysis performed at the Ravenna Arsenal was in fact done in accordance with the specified Method (SW846 8020).

Sincerely,

CARDAMONE CONSTRUCTION, INC.

John Cardamone
President

JC/av

RAVENNA ARSENAL, INC.

TELEPHONE CONVERSATION RECORD

October 26, 1990

PERSON CALLING: Susan McCauslin, RAI Environmental Specialist
PHONE: 297-3220

PERSON CALLED: Cary E. Olson - Project Manager, Wadsworth Alert Laboratories
PHONE: 642-9151

SUBJECT: Laboratory Detection Limits on Tank Closure Samples

I questioned Mr. Olson regarding the high analytical detection limits used on some of the samples for tank closure submitted by Cardamone Construction to Wadsworth Labs for analysis. Mr. Olson indicated that he remembered this project specifically because he knew the detection limits were too high to be acceptable, but was instructed by Cardamone Construction to run samples at that level. When he informed Cardamone that the levels were too high, Cardamone responded that our (RAI) specifications called for those detection limits on the closure samples.

S. McCauslin

Susan McCauslin

SMC/ade

cc: B. Jenkins
H. Cooper

RAVENNA ARSENAL, INC.

TELEPHONE CONVERSATION RECORD

DATE: November 9, 1990

PERSON CALLING:	Susan McCauslin RAI Environmental Specialist
PHONE:	297-3220
PERSON CALLED:	Kelly Gill State Fire Marshal's Office
PHONE:	1-800-686-2878
SUBJECT:	Tank Closure Report, USTs

After a cursory review of our closure report on the UST's removal by Cardamone Construction, Mr. Gill discovered that the laboratory detection limits on some of the analytical reports submitted in the closure document were too high to be acceptable for tank closure. Those samples run with the high detection limit will need to be resampled and reanalyzed. Mr. Gill indicated that we can resample using a soil core sampler at the same location as the unacceptable samples, as best we can estimate.

I informed Mr. Gill that we would resample and forward the new results to his attention.

cc: B. Jenkins
H. Cooper

sm119.pr

SAMPLES REQUIRING REANALYSIS FOR BETX

Building U-6:
- Bottom West
- Bottom East
- South Pump Island
- Line from South Pump

Building U-3
- Bottom West
- Bottom East
- Supply Lines

Building A-6
- Bottom/Side #17 West
- Bottom/Side #19 West
- Island
- Product Line

Building A-1
- Product Line

Post #24*
- Bottom South West

Freedom Gate*
- Bottom South
- Bottom North

Atlas
- East Bottom
- West Wall

*Not registered tanks

RAVENNA ARSENAL, INC.

INTEROFFICE MEMO

TO: Bill Jenkins
Purchasing

FROM: Susan McCauslin
Environmental Engineering SMc

DATE: November 19, 1990

SUBJECT: UST Removal Project

The Fire Marshal's Office has conducted a preliminary review of our report submitted to them regarding the removal of 12 underground storage tanks. During that review, it was discovered that the detection limits on certain samples submitted for analysis were set too high to be acceptable to the State. As a result, the samples run under the high detection limits are unacceptable and we will have to resample in those locations.

After checking with the laboratory on the reason for the high limits, I learned that the laboratory was instructed by Cardamone Construction to set limits at that level. The lab was told that our (RAI's) specifications only required detection to that level. A review of the Haven's and Emerson specifications clearly indicate that the laboratory analysis was to follow SW-846 methodology, including the detection limits set forth in that method. The specs also require that analysis be done in accordance with the tank closure guidelines provided by the State Fire Marshal's Office.

It is my recommendation that we recover the cost of our required resampling and reanalysis from Cardamone Construction in some fashion. We should try to resample as soon as we can so that we can end this project.

Attached are copies of telephone conversation memos regarding this subject.

cc: H. R. Cooper
W. Carkido
File

sm1119.mem

Ohio Department of Commerce

Richard F. Celeste, Governor

Division of State Fire Marshal • Bureau of Underground Storage Tank Regulations
7510 E. Main St., P.O. Box 525 • Reynoldsburg, OH 43068-3395 • (614) 752-8200

Nappy Hetzler, Director

December 17, 1990

Wayne Carkido
Ravenna Arsenal, Incorporated
8451 State Route 5
Ravenna, OH 44266

RE: Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, OH 44266
Portage County
Incident # 679298-03 through 05
and 679298-07 through 10

Dear Mr. Carkido:

On August 20, 1990, the State Fire Marshal, Bureau of Underground Storage Tank Regulations (SFM,BUSTR) received your closure report for the underground storage tank (UST) systems at the aforementioned site. Based on our review of the closure report, the SFM, BUSTR has determined the closure of the UST systems at the site does not meet the state closure criteria. Enclosed is a copy of the Petroleum Underground Storage Tank Closure Assessment Requirements for your reference in meeting the closure criteria.

The closure is deficient for the following reasons:

1. A copy of the laboratory chain-of-custody form was not included for U-3 and U-6.
2. The location of the UST piping and dispensers, and whether these UST components were removed, is not included.
3. The location and PID readings for the screening samples were not included.
4. Copies of the records demonstrating final acceptance of the contaminated soil at the solid waste management facility were not included.
5. The name of the person(s) that collected the samples for both gatehouse locations were not included.
6. Additional information is requested on the water supply for the area and the location of any wells located within 2,000 feet of the facility.
7. Additional information is requested on the exact content and usage for the products contained in all UST(s)

These deficiencies are to be corrected and addressed in writing to the following address:

State Fire Marshal
Bureau of Underground Storage Tank Regulations
Attention Thomas Kilbane
9221 Ravenna Road
Suite D7 and D8
Twinsburg, OH 44087-2443

Please reference the incident number (679298-03 through 05 and 07 through 10) when you communicate with the SFM.

Thank you for your cooperation. If you have any questions regarding this matter, please contact Thomas Kilbane at (216) 425-9848.

Sincerely,

Kelly J. Gill, Supervisor
Environmental Review Unit
Release Prevention Section
Bureau of Underground
Storage Tank Regulations

KJG/sk

Enclosure

cc: File #679298-03 through 05 and 07 through 10

OHIO DEPARTMENT OF COMMERCE
DIVISION OF STATE FIRE MARSHAL
PETROLEUM UNDERGROUND STORAGE TANK CLOSURE
ASSESSMENT REQUIREMENTS
TABLE OF CONTENTS

7/90

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The purpose of this guidance is to describe what must be done to comply with the federal (USEPA) closure regulations (40 CFR 280). These regulations are in effect today. In the summer of 1990 the State Fire Marshal will revise Ohio's underground storage tank regulations to better reflect the new federal requirements as well as issues specific to Ohio. As a result some requirements and procedures described in this document may be changed. In addition, this document may be changed as a result of new information received. Therefore, the owner/operator must make sure he/she has the latest copy of the guidance.

OHIO DEPARTMENT OF COMMERCE
DIVISION OF STATE FIRE MARSHAL
PETROLEUM UNDERGROUND STORAGE TANK CLOSURE
ASSESSMENT REQUIREMENTS 7/90

I. WHEN CLOSURE ASSESSMENTS MUST BE DONE

The purpose of the closure assessment is to check for the presence of spilled or leaked petroleum products where it is most likely to be found at the site. Under the new federal tank rules, a closure assessment must be completed when the UST system is permanently closed by removal or abandonment in place or before a change in service is completed. A closure assessment must also be conducted before a request is made to extend, beyond twelve months, the temporary closure of a tank which does not meet the performance standards for new USTs or the upgrade requirements (except for spill and overfill protection).

Because a closure assessment requires taking soil samples for laboratory analysis, the best (and least expensive) approach is to conduct the assessment during the tank closure when the soil is exposed. If the tank is being abandoned in place, it will be necessary to take samples by using a soil drilling rig prior to the completion of the abandonment-in-place.

A site assessment is not required if vapor or groundwater monitoring release detection methods (see 40 CFR 280.43(e) and (f)) are operating at the time of closure and indicate no release has occurred. (Methods used must have been installed and operated in compliance with the new Federal EPA rules).

II. RESPONSIBILITY FOR THE SITE ASSESSMENT

It is the responsibility of the UST system owner and/or operator to complete the closure assessment according to the procedures outlined below. A closure assessment is currently required for only federally regulated USTs. If your tank is not covered by the EPA regulations, a closure assessment is not required but some kind of investigation could be required by the state or local fire official or the Ohio Environmental Protection Agency.

III. PRE-ASSESSMENT STEPS

A. *Notify The State Fire Marshal*

The owner/operator must notify the State Fire Marshal at least 30 days before beginning permanent closure or a change-in-service, of intent to permanently close or make a change-in-service of an underground storage tank. The notification must be in writing. Send the notification to the following address:

RELEASE PREVENTION MANAGER
Division of State Fire Marshal
Bureau of Underground Storage Tank Regulations
7510 East Main Street
P.O. Box 525
Reynoldsburg, Ohio 43068-3395

B. *Obtain A Written Permit*

The owner/operator must obtain a written permit from the local fire official and arrange for an inspector to be on site during tank and piping removal. If a written permit and inspector cannot be supplied by the local officials the owner will need to contact the State Fire Marshal, Bureau of Underground Storage Tank Regulation (BUSTR), at (800) 686-2878 to obtain the permit and schedule an inspector. BUSTR will need a minimum of 30 days notice to schedule an inspection.

C. *Plan The Closure Activities*

A plan for each closure assessment and other removal/abandonment activities should be developed which addresses each item in this guidance. Planning the UST system closure and closure assessment will save time and money. For example, if proper sample equipment is not available when the tank is being removed, you may have to keep the excavation open longer than planned or even re-excavate to the base of the tank when such equipment is obtained. Pre-closure soil sampling, such as soil borings, may be advisable if soil contamination is suspected so that soil disposal arrangements are completed when excavation begins.

IV. PROCEDURES FOR TANK REMOVAL AND ABANDONMENT IN PLACE

A. *Removal and Abandonment Requirements*

Since January 8, 1990 a state certified tank installer is required to oversee the removal or abandonment in place of a regulated UST system. The tank(s) shall be removed from the property in accordance with American Petroleum Institute (API) 1604 and the site restored to an approved condition. When the fire official determines that the removal of the tank(s) is not necessary, he may permit the tank(s) to be abandoned in place in accordance with API 1604. To obtain a copy of API 1604, please call or write to:

API -- American Petroleum Institute
1220 L Street N.W.
Washington, DC 20005
(202) 682-8000

When tanks are to be abandoned in place, soil sampling must still be performed (see section V, B, 6).

B. *Liquid and Solid Waste Disposal*

Water, product or other liquids, sludges and tank bottoms removed from the tank and the excavation zones must be tested and disposed of in accordance with state and local requirements. No discharge of liquid to a storm sewer, ditch or other surface water or groundwater is permitted without the expressed approval of the Ohio Environmental Protection Agency. Discharge of liquids to the sanitary sewer is not allowed without the

permission of the local sanitary sewer district. Soil and other contaminated solid waste materials must be tested and treated and/or disposed of in accordance with state and local requirements. To obtain more information on disposal of liquids, sludges, soils, etc., the owner/operator should contact the appropriate Ohio Environmental Protection Agency, District Office for your county. The map, telephone numbers and addresses for the District Offices can be found on page 10.

C. *Closure Records*

Owners and operators must maintain records that are capable of demonstrating compliance with closure requirements. These records must be maintained for at least three years after completion in one of the following ways:

1. By the owners and operators who took the UST system out of service;

2. By the current owners and operators of the UST system site; or

3. By mailing these records to the implementing agency if they cannot be maintained at the closed facility.

These records should include copies of the following:

1. The 30-day letter to the State Fire Marshal's office;

2. Permit from local or state officials;

3. Closure Assessment Report (see section VI, C)

4. Records indicating the methods of disposal and locations of disposal for tanks, soil, liquids, sludges and other contaminated waste materials generated during closure.

When tanks are to be abandoned in place, the owner and/or operator must also maintain the Registration Permit Application for Underground Storage Tanks. Copies of the closure records shall be submitted to the State Fire Marshal as noted in section VIII of this guidance.

V. PROCEDURES FOR SITE ASSESSMENTS

A. *Visual Site Evaluation*

As an initial step to any closure, the owner/operator should perform a visual walk-over of the site looking for obvious signs of past or present operational problems (i.e., concrete patchwork, surface staining, and areas where piping and pump islands used to be). The observations shall be recorded and documented in the Closure Assessment Report. Soil and water samples should be collected from these areas and screened with field instruments for contamination. These samples shall be included with those being evaluated for laboratory analysis.

B. *Soil Sampling Locations:*

Samples should be collected in the native soil material, or if the entire site is fill material, samples may be collected from the original fill (as opposed to the tank cavity fill material). Of all the samples collected during closure, only three (3) must be sent to a laboratory for analysis (see section V, D).

Soil samples should be taken at the following locations:

1. At points where strong odors or soil discolorations indicate the presence of contamination;

2. If tanks are being removed, from the floor of the excavation at both ends of each tank;

3. Underneath each pump island on the supply line side;

4. Every 20 feet, or segment thereof, along piping runs, or, if piping will be exposed, under swing joints, pipe elbows, and flex connectors;

5. Beneath piping section where leaks are known or suspected to have occurred; (a minimum of two samples along the piping are required--one at the island and one along the piping run).

6. When tanks are to be abandoned in place, soil sampling must still be performed. This may be accomplished in two ways:

   a. If the tanks(s) can be safely entered, and holes can be cut in the bottom, the soil beneath the tank(s) may be sampled through the holes using a hand soil sampling tool (see section VI, A). The holes shall be located near each end of each tank.

   b. If the tank cannot be entered, then soil borings should be installed using a drill rig and split tube or thin walled tube samplers. The borings shall be located as close as possible (less than 3 feet) from each end of each tank. Soil borings along piping runs and pump islands shall be located immediately adjacent to these structures.

Samples from each soil boring shall be collected at three (3) foot intervals starting at approximately two (2) feet below the ground surface and ending at approximately twenty (20) feet in depth or auger refusal. If ground water is encountered above the twenty foot depth, then the last sample collected in the boring(s) shall be from the last several inches above the saturated zone.

All core samples must be field screened in accordance with Sections (V)(D) and (VI)(C). These samples will then be included with those being evaluated for laboratory analysis. All soil borings must be

logged in accordance with the Ohio Department of Natural Resources requirements.

If site conditions interfere with collection of samples the owner/operator must contact the State Fire Marshal, Bureau of Underground Storage Tank Regulations to determine alternate sampling protocols. The owner/operator must take precautions to avoid cross-contamination of aquifer zones.

C. *Variances to Sampling Requirements:*

1. Redundant samples need not be taken. For example, if the dispenser is directly above the tank, a single sample from beneath the dispenser on the supply side will meet requirements (B) 3 and 4 above.

2. If free product, heavily saturated soils or other conditions make it obvious that a release has occurred, a closure assessment with soil sampling need not be completed provided that the State Fire Marshal's office Bureau of Underground Storage Tank Regulations (BUSTR) and local fire officials are immediately notified and apprised of site conditions. At that time the owner/operator shall immediately begin corrective actions pursuant to OAC 1301:7-7-36.

   (Note: site investigations under OAC 1301:7-7-36 always include soil sampling so it may still be advisable to collect samples when the tank excavation is open and soils are accessible).

3. If the groundwater table is found within the tank or piping excavations, a sample of groundwater must be collected and analyzed in addition to soil sampling. Where the groundwater table exists in the excavation area(s) soil samples shall be collected just above the water table surface at the locations described in B above.

D. *Use of Field Instruments in Selecting Laboratory Samples:*

Field instruments including photoionization detectors (PIDs), flame ionization detectors (FIDs) and portable gas chromatographs (GCs) may be used for field screening of soil samples and to choose samples to be tested at a laboratory. The three soil samples with the "highest" readings on the field instrument must be sent to a laboratory for analysis.

If the field instrument shows non-detectable readings, three samples must still be sent for analysis. In the cases where there are non-detectable readings, the three samples should include one from the tank area, one from the piping run and the third sample at the dispenser/island if one is present. If there is no dispenser/island, the third sample should be taken along the piping run.

Samples must be sealed in appropriate containers (see section VI, B) and cooled to 4° Celsius (put them on ice) as soon as possible after sampling. Samples should not be allowed to warm up, and should not be left open to the air while awaiting screening.

E. *Who May Collect Soil Samples for Analysis:*

Samples may be collected by any individual trained and experienced in the sampling and record keeping techniques described under Sections V and VI. This individual may include the contractor hired to remove the UST or install soil borings, or an environmental consultant. It is preferred that samples be collected in the presence of a "neutral third party" if available. A "neutral third party" includes a local fire official, a field employee of the State Fire Marshal's Inspection Bureau, Hazardous Materials Bureau, and Bureau of Underground Storage Tank Regulations.

VI. SAMPLING QUALITY ASSURANCE, PARAMETERS, AND DOCUMENTATION

A. *Sample Collection Methods:*

Due to the volatile nature of petroleum products, sampling should be performed in a manner which disturbs the sample as little as possible. Split tube (split spoon) and thin walled tube (Shelby tube) samplers are devices which allow sampling at established depths with minimum physical disturbance to the samples. Composite sampling is not acceptable since samples are mixed together which allows volatilization of contaminants. If samples are collected by hand a device such as a soil (tube) sampler which collects the sample as a soil "core" may be used. Just prior to collecting a soil sample by hand the first several inches (3 to 4 inches) of soil must be scraped away so that the sample is collected from a previously unexposed soil area.

Liquid and water samples shall also be collected in a manner which does not aerate the sample. If wells are to be sampled, precautions must be taken to purge the well prior to sampling. At least three (3) well volumes of water must be removed from the well prior to sampling.

B. *Sample Containers:*

Samples should be placed in containers which will not distort, rupture or leak due to chemical reactions with the sample. Since volatile compounds are being sampled, the containers should have air tight seals and the container walls should be of adequate thickness to withstand handling during sample collection and transport to the laboratory. Glass jars with teflon lids are recommended. The owner/operator should check with the laboratory of their choice, many of which supply sampling containers. Immediately following sample collection, samples should be cooled to 4 degrees Celsius (put them on ice) until the laboratory receives them for analysis. Be sure that laboratory holding times are not exceeded.

C. *Record Keeping/Documentation:*

Documentation of sample collection and analysis is required in order for the State Fire Marshal to consider the analytical results valid. Closure Assessment Reports submitted to the State Fire Marshal shall be signed by the owner/operator or the representative overseeing the closure activities, and shall include:

- results of the visual site evaluation
- details of sample collection procedures
- description of sampling equipment and containers
- sample locations (also identified on a site map)
- sample dates
- sample preservation techniques
- chain-of-custody
- name and affiliation of person(s) collecting the samples
- name and affiliation of neutral third party
- name, address, and telephone number of the laboratory analyzing the samples
- name, address, and telephone number of the Fire Inspector
- date(s) of tank system removal

If field instruments are used, the instrument calibration procedures must be described, including calibration frequency. Instrument settings (such as span and potential for a photoionization meter) must be documented. The field instrument readings and sample locations must be identified as well as the sample procedure, i.e., holding the probe over the sample or head space sampling.

D. *Sample Parameters*

All soil and water samples must be analyzed for the parameters listed in the table below:

Parameters Tested For	Test Method	USEPA Document
BTEX (benzene, toluene, ethylbenzene, xylene)	8020	SW846
TPH (total petroleum hydrocarbons)	418.1[a]	600/4-79-020
TPH (total petroleum hydrocarbons)	9071[b]	SW846

a-For liquid samples use 418.1 protocols for extraction, clean-up and analysis.
b-For soil samples use 9071 protocols for extraction, then use 418.1 for clean-up and analysis.

When there are indications of existing or potential contamination by constituents other than those listed above, additional testing will be required. The additional testing may include using other USEPA test methods such as 8240 (GC/MS for semivolatile organics).

Soil and water sampling and analysis should be performed by the procedures described in the U.S. EPA documents entitled "Test Methods for Evaluating Solid Wastes-Physical/Chemical Methods" SW-846, and "Manual for Chemical Analysis of Water and Wastes", 600/4-79-020. The laboratory Quality Assurance/Quality Control documentation should conform to USEPA protocols and be immediately available upon request by the State Fire Marshal. The owner/operator is not required to use a USEPA Contract Laboratory Program (CLP) laboratory unless otherwise directed by the State Fire Marshal.

E. *Laboratory Detection/Quantitation Limits*

The owner/operator shall have samples analyzed by a laboratory capable of analyzing samples in accordance with method protocols described in the SW846 and 600/4-79-020 manuals. The laboratory quantitation limits achieved shall be those listed in these manuals. A sample with "non-detectable" results shall have been analyzed using the lowest possible quantitation limit listed for the sample matrix (i.e., soil, water, etc.).

VII. RELEASE REPORTING

If a release is confirmed during the tank closure, closure assessment, or by subsequent sample analysis, the owner/operator must contact BUSTR and the local fire official within 24 hours to report the release. The necessary actions after reporting will vary with several factors including the degree of contamination, the depth to groundwater, and the nature of surrounding land use. BUSTR staff will work with the owner/operator and their consultants to develop an investigation and corrective action plan appropriate to conditions at the site.

VIII. REPORTING OF TANK CLOSURES

Unless otherwise instructed, all closure activities exclusive of laboratory analysis must be completed within 30 days of receiving a permit to close. Copies of all closure records (described in Section IV, C of this guidance) must be submitted to the State Fire Marshal, BUSTR, within three days of the owner/operator receiving sample results. The report must include all laboratory results and the documentation described in section V. The reports shall be sent to:

Release Prevention Manager
Division of State Fire Marshal
Bureau of Underground Storage Tank Regulations
7510 East Main Street
P.O. Box 525
Reynoldsburg, Ohio 43068-3395

The State Fire Marshal will review the reports and determine what additional actions, if any, are required.

*** **THESE REQUIREMENTS MAY CHANGE IN RESPONSE TO NEW INFORMATION AND CHANGES IN REGULATIONS.** ***

OhioEPA

DISTRICT OFFICES

Central District Office
P.O. Box 1049
1800 WaterMark Dr.
Columbus, Ohio 43266-0149
1-800-686-2330

Northeast District Office
2110 E. Aurora Road
Twinsburg, Ohio 44087
1-800-686-6330

Northwest District Office
1035 Devlac Grove Drive
Bowling Green, Ohio 43402
1-800-686-6930

Southeast District Office
2195 Front St.
Logan, Ohio 43138
1-800-686-7330

Southwest District Office
40 South Main St.
Dayton, Ohio 45402
1-800-686-8930

Olin
ORDNANCE

RAVENNA ARSENAL, INC.
8451 STATE ROUTE 5, RAVENNA, OHIO 44266-9297
TELEPHONE: (216) 358-7111 • FAX: (216) 297-3216

January 2, 1991

Cardamone Construction
4865 Chaincraft Road
Garfield Hts., OH 44125
Attention: John Cardamone

John:

Attached is a copy of the State Fire Marshall's findings concerning the underground storage tanks removed at Ravenna Army Ammunition Plant.

As noted the State Fire Marshall determined the closure does not meet the state closure criteria. The deficiencies are identified in the attached letter. Cardamone Construction must correct these deficiences.

Please advise your action plan and final results by January 11, 1991.

Sincerely,

B.J. Jenkins

BJJ/jh

cc: N. Wulff
T. Chanda
H. Cooper
S. McCauslin
W. Carkido

Cardamone
CONSTRUCTION INC.

4865
Chaincraft Road
Garfield Heights
Ohio 44125
216 •581•1133

January 15, 1991

Ravenna Arsenal Incorporated
8451 State Route 5
Ravenna, Ohio 44266

Attention: Wayne Carrido

Regarding: Report of Underground Storage Tank Closure
Ravenna Arsenal Incorporated
8451 State Route 5
Ravenna, Ohio

Gentlemen:

We are pleased to provide the following clarifications as requested by the Ohio State Fire Marshal as referenced in the BUSTR letter dated December 17, 1990 by Kelly J. Gill of the Environmental Review Unit. A total of seven (7) items need to be addressed.

Item 1

Find enclosed a copy of the missing U-3 and U-6 chain-of-custody record. Exclusion from the report was an error related to report reproduction.

Item 2

All associated UST piping was dismantled and removed from each UST site and disposed of at the following facility with each removed tank:

A. Shaw Company, Inc.
940 East 67th Street
Cleveland, Ohio

No dispensers were noted or in place from the onset of removal proceedings. These units were likely removed many years ago prior to abatement procedures.

Item 3

During excavation, headspace screening data defined areas of contamination within each excavation, including pipeline runs and dispensing islands as per the project specifications with Ravenna Arsenal. Excavation continued until remaining soils displayed headspace readings less than ten parts per million (10 ppm). PID samples were taken at the following locations:

1. At points where strong odors or soil discoloration by contamination existed (side walls, etc.).

2. From the floor of the excavation at both ends of each tank.

3. Underneath each pump island.

4. Every twenty feet (20'), or fraction thereof, along piping runs.

Because of the project specifications of acceptable PID clearance values of <10 ppm, all samples taken to the laboratory for analysis had a PID headspace reading of <10 ppm. Because the project specifications and the petroleum underground storage tank closure assessment requirements do not require the recording of these values, none were recorded. Only the highest value from a set of samples (of less than 10 ppm) were sent to the laboratory for analysis.

Item 4

Please find attached all landfill acceptance receipts demonstrating final acceptance of the contaminated soil at the solid waste management facility.

Item 5

Because of the way in which the chain-of-custody was filled out, the name of the person that collected the sample was rather generic. Our records indicate that Don Johnson, employee of Cardamone Construction, took the samples for analysis.

Item 6

Upon review of the project specifications and workscope in which Cardamone Construction was hired, the request for information regarding well locations on and/or off-site within 2,000 feet of the facility can be better delineated by Ravenna Arsenal perhaps by reviewing their records and/or contacting the Ohio Department of Natural Resources (ODNR) for well log information.

Item 7

The twelve (12) tanks are located in seven (7) separate locations and formerly contained No. 2 fuel oil or gasoline. The tanks were associated with former fueling areas, facility gate houses and boiler houses. The tanks were taken out of service approximately 15 years ago. The petroleum product was removed and the tanks were filled with a water-based corrosion inhibitor at this time.

Additional information, other than above or as outlined in the Closure Report, Section G, Underground Storage Tanks, can perhaps be supplied from the records of Ravenna Arsenal. We are not privy to any additional information as to the exact content and usage for the products contained in all the USTs.

We would be pleased to provide any additional assistance as may be appropriate.

Sincerely,

CARDAMONE CONSTRUCTION COMPANY, INC.

John Cardamone

JC/av

WADSWORTH/ALERT LABORATORIES

5405 EAST SCHAAF RD./CLEVELAND, OH 44131
(216) 642-9151

Chain-of Custody Record

No. 1510

PROJ. NO.	PROJECT NAME/LOCATION
10704	RAVENNA

SAMPLERS: (Signature) DON JOHNSON

CHARDHONE CONSTRUCTION

STA. NO.	DATE	TIME	COMP.	GRAB.	STATION LOCATION	NO. OF CONTAINERS	PARAMETER: TRPH	BTXE	EP TOX LEAD	EP TOX CHROMIUM	PURGE TRAP	DH	REMARKS
#1	2/14	[illegible]		X	U-6 12000 BOT WEST	1	X	X	X	X			TAKEN AT 1:05 PM ASS. WEST
#2	2/14	PM		X	U-6 12000 BOT EAST	1	X	X	X	X			TAKEN AT 1:00 PM ASS. EAST
#3	2/14	PM	X		U-6 12000 LANDFILL	1	X	X	X	X	X	X	
#1	2/14	PM		X	U-3 12,000 BOT. EAST	1	X	X	X	X			
#2	2/14	PM		X	U-3 12,000 BOT. WEST	1	X	X	X	X			
#3	2/14	PM	X		U-3 12,000 LANDFILL	1	X	X	X	X	X	X	
#1	2/13	PM		X	U-6 SOUTH PUMP ESCHAID	1	X	X	X	X			
#2	2/13	PM		X	U-6 LINE FROM S. PUMP	1	X	X	X	X			
#BLK	2/13	PM											

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	2/16/90 PM	Donald Link			
Relinquished by: (Signature) Donald Link	Date / Time 2/19/90	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time 2/19 1135	Remarks	

Distribution Original Accompanies Shipment. Copy returned with Report.

Olin
ORDNANCE

RAVENNA ARSENAL, INC.
8451 STATE ROUTE 5, RAVENNA, OHIO 44266-9297
TELEPHONE: (216) 358-7111 • FAX: (216) 297-3216

January 22, 1991

THRU: Contracting Officer's Representative
Ravenna Army Ammunition Plant
Ravenna, Ohio 44266-9297

TO: Ohio Department of Commerce
Division of State Fire Marshal
Bureau of Underground Storage Tank Regulations
ATTN: Thomas Kilbane
9221 Ravenna Road
Suite D7 and D8
Twinsburg, Ohio 44087-2443

Subject: Underground Storage Tank Closures; Incident #679298-03 Through 05 and 679298-07 Through 10 (Reference Your 12/17/90 Letter).

Dear Mr. Kilbane:

The following information is provided to address the deficiencies cited in your December 17, 1990 letter:

1. **A copy of the laboratory chain-of-custody form was not included for U-3 and U-6.**

   Attached is a copy of the U-3 and U-6 chain-of-custody record. The forms was mistakenly left out of the report.

2. **The location of the UST piping and dispensers, and whether these UST components were removed, is not included.**

   All associated UST piping was dismantled and removed from each UST site and was disposed of at the following facility with each removed tank:

   A. Shaw Company, Inc.
   940 East 67th Street
   Cleveland, Ohio

   No dispensers were in place and were likely removed many years ago.

3. **The location and PID readings for the screening samples were not included.**

   During excavation, headspace screening data defined areas of contamination within each excavation, including pipeline runs and dispensing islands as per the project specifications with Ravenna Arsenal, Inc. Excavation continued until remaining

soils displayed headspace readings less than ten parts per million (10 ppm). PID samples were taken at the following locations:

1. At points where strong odors or soil discoloration by contamination existed (side walls, etc).

2. From the floor of the excavation at both ends of each tank.

3. Underneath each pump island.

4. Every twenty feet (20'), or fraction thereof, along piping runs.

Because of the project specifications of acceptable PID clearance values of <10 ppm, all samples taken to the laboratory for analysis had a PID headspace reading of <10 ppm. Because the project specifications and the petroleum underground storage tank closure assessment requirements do not require the recording of these values, none were recorded. Only the highest value from a set of samples (of less than 10 ppm) were sent to the laboratory for analysis.

4. **Copies of the records demonstrating final acceptance of the contaminated soil at the solid waste management facility were not included.**

Attached are all landfill acceptance receipts demonstrating final acceptance of the contaminated soil at the solid waste management facility.

5. **The name of the person(s) that collected the samples for both gatehouse locations were not included.**

Because of the way in which the chain-of-custody was filled out, the name of the person that collected the sample was rather generic. Cardamone Construction Company records indicate that Don Johnson, employee of Cardamone Construction, took the samples for analysis.

6. **Additional information is requested on the water supply for the area and the location of any wells located within 2,000 feet of the facility.**

Groundwater is currently the exclusive source of water supply for the Ravenna Army Ammunition Plant. There are three groundwater drinking water treatment plants on the installation, two of which are currently in operation. These plants are supplied by five active and seven standby groundwater wells. The location of the removed underground storage tanks and the locations of the 12 wells are shown on the attached map of the facility.

The only tanks located within 2,000 feet of the facility border were RV47 and RV10, both of which were 500 gallon tanks used to store fuel oil for heating purposes.

7. **Additional information is requested on the exact content and usage for the products contained in all UST(s).**

   Attached are copies of pages taken from an Army Corps of Engineers report on underground storage tanks at Ravenna Army Ammunition Plant. These pages provide all available information on the tanks removed under this project.

If you have any questions or require further information, the Ravenna Arsenal Inc. point of contact for this matter is Susan McCauslin, (216) 297-3220; the Government point of contact is Robert J. Kasper, (216) 297-3124.

Sincerely,

RAVENNA ARSENAL, INC.

H.R. Cooper
Plant Engineer

SMC/91003

cc: N. Wulff
S. McCauslin
W. Carkido
B. Jenkins
File

Sue Mc
W: Corkado
Dale

Ohio Department of Commerce

George Voinovich, Governor

Division of State Fire Marshal • Bureau of Underground Storage Tank Regulations — Nancy S. Chiles, Director

9221 Ravenna Rd•Suite D7• Twinsburg, OH 44087-2443

RECEIVED
FEB 04 1991
N. WULFF

General Manager
Ravenna Arsenal, Inc.
FWD FOR
☐ Information
☐ Compliance as applicable
☐ Reply NLT

TO	2/4/91	
	CR-COR	
	CONT ADM	
	PROP ADM	
	QASAS	
	SECURITY	
✓	RAI	
✓	RETURN FOR FILE	

February 1, 1991

Susan McCauslin
Ravenna Arsenal Incorporated
8451 State Route 5
Ravenna, OH 44266

RE: Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, OH 44266
Portage County
Incident #679298-07 through 10

Dear Ms. McCauslin:

On August 20, 1990, the State Fire Marshal, Bureau of Underground Storage Tank Regulations (SFM, BUSTR) received your closure report for the underground storage tank (UST) system(s) located at the aforementioned site. Based on our review of the closure report, the SFM, BUSTR has determined that the UST systems at this site are not regulated by the SFM,BUSTR. Information regarding these UST systems must be sent to the Ohio Environmental Protection Agency (OEPA) at the following address:

OEPA
Central Office
Division of Emergency Remedial Response
P.O. Box 1049
1800 Watermark Drive
Columbus, OH 43266-1049

Thank you for your cooperation. If you have any questions regarding this matter, you can contact me at (216) 425-9848.

Sincerely,

Thomas J. Kilbane

Thomas J. Kilbane, Environmental Specialist
Environmental Review Unit
Release Prevention Section
Bureau of Underground Storage Tank Regulations

TJK/sk

cc: File #679298-07 through 10

RECEIVED
FEB 04 1991
L... ...G

TO	OFFICE	ACTION
✓	GM	
	CO-COR	
	ACCTG	
	SEC	
✓	ENGR	
	IR	
	S&T&O	
	P&CA	
	SAF	
	DPM	
	RETURN	

Ohio Department of Commerce

George Voinovich, Governor

Division of State Fire Marshal • Bureau of Underground Storage Tank Regulations
9221 Ravenna Rd•Suite D7• Twinsburg, OH 44087-2443

Nancy S. Chiles, Director

February 1, 1991

Susan McCauslin
Ravenna Arsenal, Inc.
8451 State Route 5
Ravenna, OH 44266

RE: Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, OH 44266
Portage County
679298-03 through 05

Dear Ms. McCauslin:

On August 20, 1990, the State Fire Marshal, Bureau of Underground Storage Tank Regulations (SFM,BUSTR) received your closure report for the underground storage tank (UST) systems at the aforementioned site. Based on our review of the closure report, the SFM, BUSTR has determined the closure of the UST systems at the site does not meet the state closure criteria. Enclosed is a copy of the Petroleum Underground Storage Tank Closure Assessment Requirements for your reference in meeting the closure criteria.

The closure is deficient for the following reason:

> The quantitation limits used by the laboratory for its analyses of benzene, toluene, ethylbenzene, and xylene(s), were too high according to U.S. EPA document SW-846.

This deficiency is to be corrected and addressed in writing to the following address:

State Fire Marshal
Bureau of Underground Storage Tank Regulations
Attention Thomas Kilbane
9221 Ravenna Road
Suite D7 and D8
Twinsburg, OH 44087-2443

Please reference the incident number (679298-03 through 05) when you communicate with the SFM.

Thank you for your cooperation. If you have any questions regarding this matter, please contact me at (216) 425-9848.

Sincerely,

Thomas J. Kilbane

Thomas J. Kilbane, Environmental Specialist
Environmental Review Unit
Release Prevention Section
Bureau of Underground Storage Tank Regulations

TJK/sk

Enclosure

cc: File #679298-03 through 05

Olin ORDNANCE

RAVENNA ARSENAL, INC.
8451 STATE ROUTE 5, RAVENNA, OHIO 44266-9297
TELEPHONE: (216) 358-7111 • FAX: (216) 297-3216

February 8, 1991

THRU: Contracting Officer's Representative
Ravenna Army Ammunition Plant
Ravenna, Ohio 44266-9297

TO: Ohio Environmental Protection Agency
Division of Emergency and Remedial Response
P.O. Box 1049
1800 Watermark Avenue
Columbus, Ohio 43266-1049

Subject: Closure and Removal of Five Underground Storage Tanks

Dear Sir:

Attached is information regarding the removal of five underground storage tanks at Ravenna Army Ammunition Plant (RVAAP), Ravenna, Ohio. This information was taken from formal closure reports generated by contractors performing under two underground storage tank removal contracts in which a total of 16 underground tanks were removed. The State Fire Marshal, Bureau of Underground Storage Tank Regulations has determined that five of the removed tanks are not regulated by their agency and has therefore directed RVAAP to forward information on those closures to your division. The five removed tanks were identified as RV10, RV33, RV37, RV47 and RV52.

If you have any questions or require further information, the Ravenna Arsenal, Inc. point of contact for this subject is Susan McCauslin, (216) 297-3220; the Government point of contact is Robert J. Kasper, Commander's Representative, (216) 297-3124.

Sincerely,

RAVENNA ARSENAL, INC.

H.R. Cooper
Plant Engineer

HRC/smc/91004

cc: N. Wulff
S. McCauslin
W. Carkido
B. Jenkins
File

RAVENNA ARSENAL, INC.
INTEROFFICE MEMORANDUM

March 11, 1991

TO: Bill Jenkins - Purchasing Department

FROM: Susan McCauslin - Environmental Engineering

SUBJECT: Cardamone Construction Company - UST Job

As required by the State Fire Marshal, I turned over the tank removal report/results on the non-registered tanks to Ohio EPA. Harley Bowers of EPA called to question the level of TPH in our background sample at Freedom Gate. Since that sample was taken before I was involved with this project, I need to know from Cardamone or Gem exactly where and how the sample was taken.

We also need to know what is happening with regard to the detection limits issue for the other samples taken by Gem.

If you need any further information or if you want me to contact Cardamone, let me know.

S McCauslin

Susan McCauslin

SMC/ade

cc: W. Carkido
H. Cooper
File

RAVENNA ARSENAL, INC.
TELEPHONE CONVERSATION RECORD

March 12, 1991

PERSON CALLING: John Cardamone - Cardamone Construction

PERSON CALLED: Wayne Carkido - Engineering Department

SUBJECT: Noncompliance With Test Methods and for Soil Analysis

---

I received a phone call from Mr. Cardamone about a fax sent to him on 12 March 1991. He did not elaborate about the contents of said fax, but instead stated that he had addressed a letter to myself or Sue McCauslin's attention on Friday 8 March 1991 or Monday 11 March 1991 concerning the above subject matter.

He started to say that SW846 does not require parts per billion testing and that the lab changed from parts per million to parts per billion when a new mandate was enacted by the Fire Marshalls office. I informed him I felt he was wrong that SW846 does require parts per billion testing but I would have to check with RAI environmental personnel. I also informed him that though we feel he did not instruct the lab to run the tests in parts per million they were his subcontractors and his responsibility. Since they did not comply with the requirements in testing Cardamone Construction is responsible. Mr. Cardamone stated that they were trying to handle the situation low key and would like to set up a meeting with all parties involved (Fire Marshall included). I told him that any and all decisions on behalf of RAI would wait until receipt of his supposed letter and review by all RAI personnel involved. He agreed then proceeded to ask why he was not included in the recent bid of the removal of the 22 USTs. I injected that the selection of bidders was made by the Procurement Officer for the Ravenna Arsenal, Inc.

I concluded by requesting that any future environmental information on the above subject be sent or copied to Sue McCauslin.

Wayne A Carkido

Wayne Carkido

WAC/ade

cc: N. Wulff
H. Cooper
S. McCauslin
B. Jenkins

Carnation

cc
W Corkett
Bill Jenkins
S. McCaughlin
File (HRC)

Cardamone

[illegible]

[illegible]

[illegible]

Re: [illegible] Background [illegible] Closure [illegible]
Ra[illegible] Arsenal, Inc.
8[illegible] State Route [illegible]
Ra[illegible], Ohio

[illegible]

We are pleased to provide the following clarification and further information [illegible] with respect for sampling information on background sample [illegible] "Freedom."

The location in which the sample was taken can be found in the sketch in Appendix B, Laboratory Report Freedom. Although not labelled this location in relation to the sketch can be described as the lower left sample location.

The [illegible] procedures [illegible] the integrity of the sample were as follows:

1. [illegible] Grab Sampling, 1.0' - 2.0'.

2. [illegible] each sample taken.

3. [illegible] sample.

4. [illegible] glass [illegible] seal.

5. [illegible] for sample preservation.

6. Chain of custody procedures.

7. [illegible] the laboratory.

[illegible] of Building 3' off [illegible].

The selection of this location was based on the assumption that the area [illegible] had not been disturbed by [illegible] activities.

Cardamome

Cardamone
CONSTRUCTION INC

4805
Chainbridge Road
Garfield Heights
Ohio 44125
216-581-1113

J. JENKIN.
MAR 15 1991

cc: Wayne Carkido

March 13, 1991

Ravenna Arsenal, Inc.
8451 State Route 5
Ravenna, Ohio 44266

Attention: Wayne Carkido

Regarding: Underground Storage Tank Closure Report
Ravenna Arsenal, Inc.
8451 State Route 5
Ravenna, Ohio

Gentlemen:

We are pleased to provide the following clarification and further information regarding your request for sampling information on background sample location "Freedom."

The location in which this sample was taken can be found in the sketch in Appendix M, Laboratory Report Freedom. Although not labelled this location relative to the sketch can be described as the lower left sample location.

Sampling precautions to preserve the integrity of the sample was as follows:

1. Excavation with a backhoe to one foot (1') below grade.
2. Oakfield Grab Sampling, 1.0'-2.0'.
3. Oakfield Sampler cleaned after each sample taken.
4. Discarding upper soil zone of sample.
5. Use of glass jars with a teflon seal.
6. Immediate icing for sample preservation.
7. Chain-of-custody procedures.
8. Prompt delivery to the laboratory.

The selection of this location was based on the assumption that the area selected had not been disturbed by human activities. Subsequent to our sampling and analysis, it was indicated through casual conversations that a release of a fuel product may have occurred a number of years ago in the vicinity of the Freedom Gate when a vehicle accident occurred demolishing an adjacent structure.

Sincerely,

CARDAMONE CONSTRUCTION, INC.

John Cardamone, President

JC/av

RAVENNA ARSENAL, INC.
TELEPHONE CONVERSATION RECORD

March 15, 1991

PERSON CALLING: Thomas Kilbane - State Fire Marshal's Office
PHONE: 425-9848

PERSON CALLED: Susan McCauslin - RAI Environmental Engineering
PHONE: 297-3220

SUBJECT: Underground Storage Tank Removal by Cardamone Construction Detection Limits Issue

---

I informed Mr. Kilbane that Cardamone Construction insists that at the time the samples in question were analyzed a PPM detection limit was acceptable to the SFM. Mr. Kilbane said that this was a common misconception among contractors and labs, and that to his knowledge a PPM detection limit has never been acceptable for tank removals. He said many companies are in the same situation as ours in that they must resample in order to comply with tank removal standards. Mr. Kilbane indicated that he would call John Cardamone and discuss this issue; and then call me next week to discuss our course of action.

Sue McCauslin

SMC/ade

cc: H. Cooper
W. Carkido
B. Jenkins

Olin
ORDNANCE

RAVENNA ARSENAL, INC.
8451 STATE ROUTE 5, RAVENNA, OHIO 44266-9297
TELEPHONE: (216) 358-7111 • FAX: (216) 297-3216

March 20, 1991

THRU: Contracting Officer's Representative
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266-9297

TO: Ohio Department of Commerce
Division of State Fire Marshal
Bureau of Underground Storage Tank Regulations
ATTN: Thomas Kilbane
9221 Ravenna Road
Suite D7 and D8
Twinsburg, Ohio 44087-2443

Subject: Underground Storage Tank Closures; Incident #679298-03 through 05 (reference your February 1, 1991 letter)

Dear Mr. Kilbane:

The contractor who performed the referenced tank closures has provided the attached information in response to the issue raised in your February 1, 1991 letter. We are providing this information for your consideration.

If you have any questions, the Ravenna Arsenal, Inc. point of contact is Susan McCauslin (216) 297-3220; the Government point of contact is Robert J. Kasper, Commander's Representative (216) 297-3124.

Sincerely,

RAVENNA ARSENAL, INC.

H.R. Cooper
Plant Engineer

SMC/ade/91010

cc: N. Wulff
W. Carkido
B. Jenkins
S. McCauslin
File

Cardamone
CONSTRUCTION INC.

4865
Chaincraft Road
Garfield Heights
Ohio 44125
216 •581•1133

March 5, 1991

J. JENKIN

MAR 1 3 1991

cc: Wayne Carkido
Harold Cooper
Dave McCandless

Ravenna Arsenal, Inc.
8451 State Route 5
Ravenna, Ohio 44266

Attention: Wayne Carkido

Regarding: Report of Underground Storage Tank Closure
Ravenna Arsenal
8451 State Route 5
Ravenna, Ohio 44266

Gentlemen:

We are pleased to provide the following clarifications regarding your request for further information regarding laboratory quantitative limits used during closure proceeding at the above referenced project.

According to our review of the Tank Removal Requirements (specifications) 3.9 Excavation Sampling Procedures, the analytical methodologies were to be in accordance with USEPA Publication SW846, "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods." According to each laboratory report received by us from Wadsworth/Alert Laboratories, Inc., all analysis was in fact done in accordance with this methodology (see attached).

Sincerely,

CARDAMONE CONSTRUCTION, INC.

John Cardamone, President

JC/av

WADSWORTH/ALERT
LABORATORIES, INC.

March 6, 1990

Cardamone Construction, Inc.
4865 Chaincraft Road
Garfield Hts, OH 44125

Re: Laboratory Project # 4369
Site: Ravenna 2/14
Attn: John Cardamone

At the request of Cardamone Construction, Inc., Wadsworth/ALERT Laboratories analyzed 8 solid samples. The samples received were identified as U-6 12,000 BOT WEST, U-6 12,000 BOT EAST, U-6 12,000 LANDFILL, U-3 12,000 BOT EAST, U-3 12,000 BOT WEST, U-3 12,000 LANDFILL, U-6 SOUTH PUMP ISLAND AND U-6 LINE FROM SOUTH PUMP.

All samples received in the laboratory are included in the QA/QC plan which consists of laboratory blanks, check samples and spike/spike duplicate analysis on 20% of all samples by parameter.

The analysis was conducted by SW846 EPA Methods as follows.

Parameter	Method
Total Recoverable Petroleum Hydrocarbons	SW846 9071/EPA 418.1
BTEX (benzene, toluene, ethylbenzene, xylenes)	SW846 8020
EP Toxicity Extraction	SW846 1310
Metals: (Pb, Cr)	SW846 7000 Series
Flash Point	SW846 1010
pH	SW846 9045

References:

SW846 "Test Methods for Evaluating Solid Waste Physical/Chemical Methods," Third Edition, September 1986.

EPA 600/4-79-02, "Methods for Chemical Analysis of Water and Wastes," March 1983.

This report is not a complete closure report but is supplementary information required for a closure report.

If you have any questions feel free to contact Dale Mori or myself.

Very truly yours,

Wadsworth/ALERT Laboratories, Inc.

Cary E. Olson
Project Manager

216 - 497 -
642 - 9151

Dale Mori - mgr.
Cary left Wadsworth/Alert
January 17, 1991.

WADSWORTH/ALERT
LABORATORIES, INC.

March 12, 1990

Cardamone Construction, Inc.
4865 Chaincraft Road
Garfield Heights, OH 44125

Re: Laboratory Project # 4425
Site: Ravenna

Attn: John Cardamone

At the request of Cardamone Construction, Inc., Wadsworth/ALERT Laboratories analyzed 2 solid samples. The samples received February 22, 1990 were identified as Atlas Background and U-3 Supply Lines.

All samples received in the laboratory are included in the QA/QC plan which consists of laboratory blanks, check samples and spike/spike duplicate analysis on 20% of all samples by parameter.

The analysis was conducted by SW846 and EPA Methods as follows.

Parameter	Method
Benzene, Toluene, Xylenes, Ethylbenzene	SW846 8020
Total Recoverable Petroleum Hydrocarbons	SW846 9071/EPA 418.1
Total Metals: Cr, Pb	SW846 7000 Series
EP Toxicity Extraction	SW846 1310

References:

SW846 "Test Methods for Evaluating Solid Waste Physical/Chemical Methods," Third Edition, September 1986.

EPA 600/4-79-02, "Methods for Chemical Analysis of Water and Wastes," March 1983.

This report is not a complete closure report but is supplementary information required for a closure report.

If you have any questions feel free to contact Dale Mori or myself.

Very truly yours,

Wadsworth/ALERT Laboratories, Inc.

Cary E. Oleen
Project Manager

WADSWORTH/ALERT
LABORATORIES, INC.

March 8, 1990

Cardamone Construction, Inc.
4865 Chaincraft Road
Garfield Heights, OH 44125

Re: Laboratory Project # 4413
Site: Ravenna
Attn: John Cardamone

At the request of Cardamone Construction, Inc., Wadsworth/ALERT Laboratories analyzed 9 solid samples. The samples received February 21, 1990 were identified as Background Post 27 1-2', Background Freedom 1-2', Background A6 1-2', A-6 3900 Bot/side #17 West, A-6 3900 Bot/side #19 West, A-6 3900 Landfill, A-6 3900 Island, A-6 3900 Product line and A1 5000 Product line.

All samples received in the laboratory are included in the QA/QC plan which consists of laboratory blanks, check samples and spike/spike duplicate analysis on 20% of all samples by parameter.

The analysis was conducted by SW846 and EPA Methods as follows.

Parameter	Method
Total Recoverable Petroleum Hydrocarbons	SW846 9071/EPA 418.1
Metals: (Cr, Pb)	SW846 7000 Series
EP Toxicity Extraction	SW846 1310
BTEX (benzene, toluene, ethylbenzene, xylenes)	SW846 9020
Flash Point	SW846 1010
pH	SW846 9045

References:

SW846 "Test Methods for Evaluating Solid Waste Physical/Chemical Methods," Third Edition, September 1986.

EPA 600/4-79-02, "Methods for Chemical Analysis of Water and Wastes," March 1983.

ASTM 1987 Annual Book of ASTM Standards.

This report is not a complete closure report but is supplementary information required for a closure report.

If you have any questions feel free to contact Dale Mori or myself.

Very truly yours,

Wadsworth/ALERT Laboratories, Inc.

Cary E. Olson

Cary E. Olson
Project Manager

RAVENNA ARSENAL, INC.
TELEPHONE CONVERSATION RECORD

April 2, 1991

PERSON CALLING: Thomas kilbane - State Fire Marshal
PHONE: 425-9848

PERSON CALLED: Susan McCauslin - RAI Environmental Department
PHONE: 297-3220

SUBJECT: UST Removal - Detection Limits

Mr. Kilbane spoke with John Cardamone on 3/25/91 regarding the soil analysis lab reports for the UST removal project at RVAAP. He informed Mr. Cardamone in that conversation that samples analyzed using a ppm detection limit would have to be re-tested and run using a ppb limit. Cardamone told Mr. Kilbane that he, his attorney and Wadsworth Labs would be meeting to discuss a plan of action. He asked Mr. Kilbane to call me to relay that information. Cardamone gave no time table for taking action.

S. McCauslin

Susan McCauslin

SMC/ade

cc: B. Jenkins
W. Carkido
H. Cooper

RAVENNA ARSENAL, INC.
TELEPHONE CONVERSATION RECORD

April 4, 1991

PERSON CALLING: S. McCauslin - Environmental Engineering
PHONE: 297-3220

PERSON CALLED: Thomas Kilbane - State Fire Marshal
PHONE: 425-9848

SUBJECT: UST Closure Method Detection Limits

I called Mr. Kilbane to verify John Cardamone's statement that Mr. Kilbane conceded that SW-846 does not specify ppb detection limits. Mr. Kilbane indicated that Cardamone's statement is false, he did not say that, and that the ppb limits must be met for this closure to be acceptable.

Susan McCauslin

Susan McCauslin

SMC/ade

cc: H. Cooper
B. Jenkins
W. Carkido

Olin
ORDNANCE

RAVENNA ARSENAL, INC.
8451 STATE ROUTE 5, RAVENNA, OHIO 44266-9297
TELEPHONE: (216) 358-7111 • FAX: (216) 297-3216

April 5, 1991

Cardamone Construction Inc.
4865 Chaincraft Road
Garfield Heights, Ohio 44125
Attention: John Cardamone

Dear John:

Confirming our conversation today I am enclosing a copy of Method 8020 "Aromatic Volatile Organics".

This method is specifically referenced by Ravenna Arsenal Specification PS-666 via referenced Underground Storage Tank (UST) Removal Specification written by Havens and Emerson and approved by the State Fire Marshall. This method is specifically referenced on page 9 paragraph 3.9 "Excavation Sampling Procedures" first paragraph.

It is very clear as to Method detection limits (ug/L) Table 1 and 2.

Advise immediately, actions to be taken as to when you will reanalyze samples for submitting to the State Fire Marshall.

Best Regards,

B.J. Jenkins

cc: N. Wulff
S. McCauslin
H. Cooper
W. Carkido

METHOD 8020

AROMATIC VOLATILE ORGANICS

1.0 SCOPE AND APPLICATION

1.1 Method 8020 is used to determine the concentration of various aromatic volatile organic compounds. Table 1 indicates compounds which may be determined by this method and lists the method detection limit for each compound in reagent water. Table 2 lists the practical quantitation limit (PQL) for other matrices.

2.0 SUMMARY OF METHOD

2.1 Method 8020 provides chromatographic conditions for the detection of aromatic volatile compounds. Samples can be analyzed using direct injection or purge-and-trap (Method 5030). Ground water samples must be determined using Method 5030. A temperature program is used in the gas chromatograph to separate the organic compounds. Detection is achieved by a photo-ionization detector (PID).

2.2 If interferences are encountered, the method provides an optional gas chromatographic column that may be helpful in resolving the analytes from the interferences and for analyte confirmation.

3.0 INTERFERENCES

3.1 Refer to Method 5030 and 8000.

3.2 Samples can be contaminated by diffusion of volatile organics (particularly chlorofluorocarbons and methylene chloride) through the sample container septum during shipment and storage. A field sample blank prepared from reagent water and carried through sampling and subsequent storage and handling can serve as a check on such contamination.

4.0 APPARATUS AND MATERIALS

4.1 Gas chromatograph:

4.1.1 **Gas Chromatograph:** Analytical system complete with gas chromatograph suitable for on-column injections or purge-and-trap sample introduction and all required accessories, including detectors, column supplies, recorder, gases, and syringes. A data system for measuring peak heights and/or peak areas is recommended.

TABLE 1. CHROMATOGRAPHIC CONDITIONS AND METHOD DETECTION LIMITS FOR AROMATIC VOLATILE ORGANICS

Compound	Retention time (min)		Method detection limit[a] (ug/L)
	Col. 1	Col. 2	
Benzene	3.33	2.75	0.2
Chlorobenzene	9.17	8.02	0.2
1,4-Dichlorobenzene	16.8	16.2	0.3
1,3-Dichlorobenzene	18.2	15.0	0.4
1,2-Dichlorobenzene	25.9	19.4	0.4
Ethyl Benzene	8.25	6.25	0.2
Toluene	5.75	4.25	0.2
Xylenes			

[a] Using purge-and-trap method (Method 5030).

TABLE 2. DETERMINATION OF PRACTICAL QUANTITATION LIMITS (PQL) FOR VARIOUS MATRICES[a]

Matrix	Factor[b]
Ground water	10
~~Low-level soil~~	~~10~~
Water miscible liquid waste	500
High-level soil and sludge	1250
Non-water miscible waste	1250

[a]Sample PQLs are highly matrix-dependent. The PQLs listed herein are provided for guidance and may not always be achievable.

[b]PQL = [Method detection limit (Table 1)] X [Factor (Table 2)]. For non-aqueous samples, the factor is on a wet-weight basis.

RAVENNA ARSENAL, INC.

TELEPHONE CONVERSATION RECORD

October 24, 1990

PERSON CALLING: Kelly Gill - State Fire Marshal's Office
PHONE: 1-800-686-2878

PERSON CALLED: Susan McCauslin - RAI Environmental Specialist
PHONE: 297-3220

SUBJECT: Tank Closure Report, USTs

After a cursory review of our closure report on the USTs removal by Cardamone Construction, Mr. Gill discovered that the laboratory detection limits on some of the analytical reports submitted in the closure document were too high to be acceptable. I informed Mr. Gill that I would check with the laboratory to make sure that the limits run were actually as reported, and if so, why the lab did not follow the specified method and its appropriate detection limits.

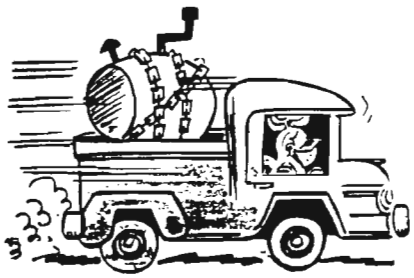
Susan McCauslin

SMC/ade

cc: B. Jenkins
H. Cooper

Cardamone
CONSTRUCTION INC.

4865
Chaincraft Road
Garfield Heights
Ohio 44125
216•581•1133
1•800•686•2476



May 23, 1990

Mr. Wayne Carkido
Ravenna Arsenal
8451 State Route 5
Ravenna, Ohio 44266-9297

Dear Mr. Carkido:

Enclosed is a draft copy of the closure report for your project. As of 5/23/90, we have not received a copy of the state notification letter or permit as I requested last week.

If you have any questions, please feel free to contact our office.

Sincerely,

John S. Cardamone,
President

JSC/mb

REVIEW OF
UNDERGROUND STORAGE TANK CLOSURE

PROJECT
Ravenna Arsenal
8451 State Route 5
Ravenna, Ohio 44266

CLIENT
Ravenna Army Ammunition Plant
c/o Ravenna Arsenal Incorporated
8451 State Route 5
Ravenna, Ohio 44266

Revised: June 5, 1990

May 25, 1990

Ravenna Arsenal Incorporated
8451 State Route 5
Ravenna, Ohio 44266

Regarding: Report of Underground
Storage Tank Closure
Ravenna Arsenal
8451 State Route 5
Ravenna, Ohio

Gentlemen:

Enclosed you will find the report of our closure review for the above referenced property. We trust you will find our work in accordance with your requirements.

We would be pleased to provide any additional assistance as may be appropriate. Please do not hesitate to call us with any questions or for further information.

Sincerely,

CARDAMONE CONSTRUCTION COMPANY, INC.

_____

John Cardamone

TABLE OF CONTENTS

I. INTRODUCTION

A. SCOPE OF WORK:

The objective of this report is to present the data regarding the tank closure activities managed by representatives of the owner at the site. Approval of tank closure activities and/or specifications for remediation are determined by the office of the State Fire Marshall and/or other public or private entities with the appropriate authority or workscope.

Visual Site Evaluation

A visual site evaluation, walk-over, was performed at each tank site location looking for obvious signs of past or present operational problems. No such problems were apparent at any of the tank locations.

II. PRE-CLOSURE

B. NAME OF OWNER:

Ravenna Army Ammunition Plant
C/O Ravenna Arsenal Incorporated
8451 State Route 5
Ravenna, Ohio 44266
Phone # (216) 297-3237
Contact Person: Wayne Carkido and/or Sue McCauslin

C. NOTIFICATION LETTER TO STATE FIRE MARSHALL:

See Appendix "A"

D. LOCAL JURISDICTION:

A Local Permit is not required.

E. STATE FIRE MARSHALL INSPECTOR:

Required:
Tank Removal Witnessed by State Fire Officials

Virginia Canankamp
Inspection Bureau (BUSTR)
8895 E. Main Street
Reynoldsburg, Ohio 43068
Office Phone No: (614) 752-8200
Home Phone No: (216) 654-2595

and

Homer Myers
Inspection Bureau (BUSTR)
8895 E. Main Street
Reynoldsburg, Ohio 43068
Office Phone No: (614) 864-5510
Home Phone No: (216) 325-1375

F. UST ABATEMENT & REMEDIATION CONTRACTOR:

Cardamone Construction Inc.
4865 Chaincraft Road
Garfield Heights, Ohio 44125
Phone No.: (216) 581-1133
Contact: John Cardamone

G. UNDERGROUND STORAGE TANKS (USTs):

Location: See Map Appendix "B"

Table 1. Tanks to be Permanently Closed

#	Location	Size (Gal.)	Known Prior Contents	Construction Material	Removal Date (1990)
13	Bldg U-6	12,000	Fuel Oil	Steel	Feb. 12
14	Bldg U-6	12,000	Fuel Oil	Steel	Feb. 12
15	Bldg U-3	12,000	Fuel Oil	Steel	Feb. 12
16	Bldg U-3	12,000	Fuel Oil	Steel	Feb. 12
17	Bldg A-6	3,900	Gas/Fuel Oil	Steel	Feb. 8
18	Bldg A-6	3,900	Gas/Fuel Oil	Steel	Feb. 8
19	Bldg A-6	3,900	Gas/Fuel Oil	Steel	Feb. 8
No#	Bldg A-6	550	Heating Oil	Steel	Feb. 7
37	Bldg A-1	5,000	Fuel Oil	Steel	Feb. 8
10	Gatehouse Post #24 Charleston	500	Fuel Oil	Steel	Feb. 7
47	Gatehouse Freedom	500	Fuel Oil	Steel	Feb. 6
No#	Old Atlas Boiler House	1,000	Fuel Oil	Steel	Feb. 6

III. CLOSURE

H. TANK ABATEMENT ACTIVITIES:

The tank's contents were tested, pumped and disposed of by:

Research Oil Company
2655 Transport Road2
Cleveland, Ohio
Phone # (216) 621-8656

According to the tank removal specifications liquid samples were taken on June 20, 1989 from each tank and analyzed by Research Oil, Inc. Samples were collected using a 5 foot long stainless steel bailer. Samples were then analyzed for oil and grease, total suspended solids, total and volatile chlorine, RCRA metals, flashpoint, ph, chemical oxygen demand (COD), viscosity and odor. Research Oil Data is summarized in Appendix C.

Sampling results indicate that the contents of all the tanks, with the exception of the Charleston Gate tank, exceed the characteristics of E.P. Tox chromium CFR 40 261.24 and was considered, for the purposes of this project, hazardous in nature. All manifesting and documentation was the responsibility of the Ravenna Army Ammunition Plant.

I. TANK VENTING

Tank venting/perging prior to removal of USTs from the ground was accomplished by the use of solid carbon dioxide (dry ice) at a quantity of 15 lbs per 1000 gallons of tank capacity. In addition, ventilation of USTs was done by employing an educator-type air mover driven by compressed air.

J. TANK CLEANING

Tanks were cleaned as appropriate for acceptance for off-site disposal as scrap. Tank cleaning was done by placing an appropriate hole in tank for human access. Sludge was manually removed with the help of an oil absorbent product (oil dry) then placed in 55 gallon drums. After this was accomplished a high pressure steam washer was used to abate any remaining residue.

K. TANK DISPOSAL

After cleaning, the tanks were rendered unusable by cutting a large hole in the top of each tank. They were then promptly removed from site and disposed of at the following facility:

A Shaw Company, Inc.
940 E. 67th Street
Cleveland, Ohio

See Appendix D for Release/Chain of Custody

L. SLUDGE SAMPLING AND DISPOSAL

Two (2) sludge samples were collected, one (1) sample from tanks known to have contained fuel oil and one (1) sample from tanks that contained gasoline. All sludge/still bottoms were disposed of at the following facility:

Erieway Industrial Waste Handling
4200 Rockside Road
Cleveland, Ohio 44131

See Cardamone Construction for characterization and chain of custody

IV. CONTAMINATION ASSESSMENT

M. SOIL SCREENING AND STOCKPILING:

All soils removed from the tank excavatings were stockpiled on 4 mil plastic sheeting to prevent any contamination from impacting adjacent soils and groundwater. In addition, piles of contaminated soil were covered with plastic to minimize surface water impacts and volatilization of contamination into the atmosphere.

During excavation headspace screening data defined areas of contamination within the excavation. Excavation of soil continued away from the tank excavation removing soils displaying headspace readings greater than ten parts per million (10 ppm) as per project specifications.

Soil samples were selected for screening. Each sample was subjected to a field screening test with a photoinozation detector for the presence of volatile organic compounds (VOC). These samples were placed in a clean, airtight jar. The mouth of the jar was covered with aluminum foil, then secured with a screw-on teflon-lined lid. After ten minutes holding time the headspace above each sample was scanned for VOCs with the detector by piercing the aluminum foil seal with the instrument probe, then recording the VOC reading observed. See Appendix "E" Photoionization Detector Manual Excerpts.

N. REMEDIATION TECHNIQUES:

The technique used is the most direct method; contaminated soil removal by excavating and transporting to an approved disposal facility with conventional construction equipment.

O. SOIL CLEARANCE SAMPLING:

Efforts were made to preserve the integrity of the clearance samples taken. Such precautions include:

1. Oakfield grab sampling
2. Disregarding upper soil zones of sample
3. Use of glass jars with Teflon seals
4. Immediate icing for VOC preservation
5. Chain-of Custody procedures
6. Prompt delivery to laboratory

Due to the potential for excavation collapse some samples were collected from the backhoe bucket. No sample was collected for analysis that was in contact with the backhoe bucket.

Each sample was subjected to a field screening test with a photoinozation detector for the presence of volatile organic compounds (VOC). These samples were placed in a clean, airtight jar. The mouth of the jar was covered with aluminum foil, then secured with a screw-on teflon-lined lid. After ten minutes holding time the headspace above each sample was scanned for VOCs with the detector by piercing the aluminum foil seal with the instrument probe, then observing the VOC reading. See Appendix "E" Photoinozation Detector Manual Excerpts.

Two to three samples from each excavation area with the "highest" reading on the field instrument was sent to the laboratory for analysis. The laboratory used throughout this project was:

Wadsworth/Alert Laboratories, Inc.
5405 E. Schaaf Road
Cleveland, Ohio 44131
Phone (216) 642-9151
Contact person: Dale L. Mori, Laboratory Manager

Each clearance sample was analyzed for a battery of chemical constituents to include:

1. TRPH Total Recoverable Petroleum Hydrocarbons (U.S. EPA Extraction procedure 9071 and analytical Method 418.1)
2. BTEX Benzene, Toluene, Ethylbenzene, Xylene (U.S. EPA Method 8020)
3. Total Lead (U.S. EPA Method 7420)
4. Total Chromium (U.S. EPA Method 7190)
5. Lead Leachate (Method 1310)
6. Chromium Leachate (Method 1310)

Laboratory quality control and chain of custody forms for all samples taken can be found in Appendix F. Each quality control section is related to the previous chain-of-custody prior to the particular section.

Sampling personell[1] included:

Affiliation	Personel
Cardamone Construction	Jon Parker, Don Johnson
G.E.M. Testing	~~Don Lenk~~
Olin Ordnance	Wayne A. Carkido

NO!

[1] ~~For~~ specific locations see Appendix F for Chain-of-Custody Sampler Section.

The following is a summary of clearance sampling results:

EXCAVATION LOCATION BLDG. U-6

Table 2. Clearance Sample Analysis & Results (mg/kg Soil Matrix)

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
Bottom West	ND	ND	18	14	ND	ND
Bottom East	ND	ND	--	--	ND	ND
South Pump Island	110	ND	--	--	ND	ND
Line From S. Pump	55	ND	--	--	ND	ND

See Appendix G for site map, laboratory reports, detection limits

EXCAVATION LOCATION BLDG. U-3

Table 3. Clearance Sample Analysis & Results (mg/kg Soil Matrix)

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
Bottom West	ND	ND	--	--	ND	ND
Bottom East	ND	ND	11	17	ND	ND
Supply Lines	37	ND	--	--	ND	ND

See Appendix H

EXCAVATION LOCATION BLDG. A-6

Table 4. Clearance Sample Analysis & Results (mg/kg Soil Matrix)

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
Bot/Side #17 West	22	ND	ND	5.4	ND	ND
Bot/Side #19 West	ND	ND	ND	6.8	ND	ND
Island	16	ND	--	--	ND	ND
Product Line	ND	ND	--	--	ND	ND

See Appendix I

EXCAVATION LOCATION BLDG. A-6 500 gal

Table 5. Clearance Sample Analysis & Results
(mg/kg Soil Matrix)

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
Bottom South	ND	ND*	--	--	ND	ND
Bottom North	ND	ND*	--	--	ND	ND

*ug/kg
See Appendix J

EXEAVATION LOCATION BLDG. A-1

Table 6. Clearance Sample Analysis & Results
(mg/kg Soil Matrix)

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
Bottom West	16	ND*	--	--	ND	ND
Bottom East	ND	ND*	--	--		
Product Line	ND	ND	--	--	ND	ND

*ug/kg
See Appendix K

EXCAVATION LOCATION GATEHOUSE CHARLESTON POST 24

Table 7. Clearance Sample Analysis & Results
(mg/kg Soil Matrix)

SAMPLING ROUND I

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
Bottom South	1,200	ND	--	--	ND	ND
Bottom North	300	ND	--	--	ND	ND

SAMPLING ROUND #II

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
North Bottom	ND	3.2*	--	--	ND	ND
South Bottom	500	ND	--	--	ND	ND

SAMPLING ROUND #III

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
South East Bottom	ND	ND*	ND	5.4	ND	ND
South West Bottom	27	.2	ND	ND	ND	ND

*ug/kg
See Appendix L

EXCAVATION LOCATION GATEHOUSE FREEDOM

Table 8. Clearance Sample Analysis & Results (mg/kg Soil Matrix)

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
Bottom South	ND	ND	--	--	ND	ND
Bottom North	ND	ND	23	11	ND	ND

See Appendix M

EXCAVATION LOCATION OLD ATLAS BOILER HOUSE

Table 9. Clearance Sample Analysis & Results (mg/kg Soil Matrix)

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
East Bottom	16	ND	ND	13	ND	ND
West Wall	ND	ND	--	--	ND	ND

See Appendix N

P. BACKGROUND SAMPLING

In order to establish background levels of total lead, total petroleum hydrocarbons, and total chromium in the site soils, four (4) background soil samples were taken randomly throughout the Ravenna Facility adjacent to UST abatement activities. Samples were taken in what appeared to be pristine soils not disturbed by human activities. Each background sample was analyzed using the following EPA Methodology:

1. TRPH Total Recoverable Petroleum Hydrocarbons Analytical Method 418.1
2. Total Lead U.S. EPA Method 7420
3. Total Chromium U.S. EPA Method 7190

Table 10. A Summary of Background Results From Areas Selected Randomly Throughout Facility (mg/kg Soil Matrix)

Sample Location	Depth (Feet)	TRPH	Lead	Total Chromium
Freedom	1.0 - 2.0	1,600	18	7.7
A-6	1.0 - 2.0	ND	19	8.9
Atlas	1.0 - 2.0	120	20	9.6
Post #27	1.0 - 2.0	ND	14	11

See Appendix O Laboratory Reports, Detection Limits

Q. CONTAMINATED SOIL DESTINATION:

Approximately 500 cubic yards as calculated by the Ravenna Arsenal of contaminated soil was removed from The Ravenna Facility. Prior to removal from the site the soil was tested for hazardous concentrations of contaminants. The soil was analyzed for the following parameters:

1. TRPH Total Recoverable Petroleum Hydrocarbons Analytical Method 418.1
2. BTEX Benzene, Toluene, Ethylbenzene, Xylene (U.S. EPA Method 8020)
3. Lead Leachate (Method 1310)
4. Chromium Leachate (Method 1310)

See Appendix P for landfill sample laboratory results and detection limits.

The contaminated soil was disposed of at the following landfill:

Norton Construction Co.
6200 Rockside Woods Blvd.
Independence, Ohio 44131
(216) 447-0070
Landfill: 3401 E. Royalton Road
Broadview Hts., Ohio

See Cardamone Construction for Chain-of-Custody

The remaining uncontaminated soil was then placed back into the excavation. Decisions in regards to what remained and was to be removed was at the sole discretion of representatives of The Ravenna Arsenal Incorporated.

The schedule of soil fate can be found in Appendix Q.

At the request of representatives of the Ravenna Arsenal the following language is incorporated in this report to clarify action taken relating to water in the excavations by representatives of the arsenal.

A groundwater table was present in only one (1) excavation (A6). This groundwater was sampled and determined by representatives of the arsenal to be non-contaminated based on samples and testing parameters determined by the same personnel (See Appendix R). Water was present in the other excavations. The water in each hole was a result of:

1. Seasonal Perched Groundwater
2. Run-Off

Upon receipt of soil results verifying the excavations to be clean, then and only then was non-contaminated run-off and related seasonal groundwater permitted to be pumped out of the hole onto adjacent ground.

RELEASE

KNOWN TO ALL MEN BY THESE PRESENTS that CARDAMONE CONSTRUCTION & GENERAL CONTRACTING INC. for a valuable consideration paid to it, the receipt of which is hereby acknowledged, hereby sells and conveys to A. SHAW COMPANY, hereinafter called PURCHASER, the following equipment located at RAVENNA ARSENAL INC 8451 STATE RT 5 RAVENNA OHIO.

(4) 550 GALLON CUT UP STEEL TANKS
(3) 4,000 GALLON CUT UP STEEL TANKS
(1) 5,000 GALLON CUT UP STEEL TANK
(4) 12,000 GALLON CUT UP STEEL TANKS

It is understood that the sale of this property is made without warranty of any kind, express or implied, as to the title and condition of the above described equipment.

It is further understood that the above described equipment was formerly used for the storage and/or handling of gasoline or other petroleum products and PURCHASER agrees that said equipment can not be reused because it was disassembled for scrap metal.

PURCHASER as part of the consideration for this sale, hereby fully releases and forever discharges CARDAMONE CONSTRUCTION & GENERAL CONTRACTING INC., its successors and assigns, from any and all actions, causes of action, liability, claims and demands whatsoever arising out of the ownership possession, use of installation of the above described property.

PURCHASER further agrees to indemnify and hold CARDAMONE CONSTRUCTION & GENERAL CONTRACTING INC. its successors and assigns, harmless from any and all liability for damages and losses of any kind, to person (s) or property, caused in any manner by the ownership, possession, use or installation of the above described property.

EXECUTED THIS 21 DAY OF FEB, 19 90.

WITNESS

CARDAMONE CONSTRUCTION & GENERAL CONTRACTING INC.

WITNESS

PURCHASER A. SHAW COMPANY

Cardamone
CONSTRUCTION INC.

4865
Chaincraft Road
Garfield Heights
Ohio 44125
216•581•1133
1•216•686•2476

April 6, 1990

Ravenna Arsenal
8451 State Route 5
Ravenna, Ohio 44266

Attention: Ms. Sue McCauslin

Regarding: Ravenna Arsenal
UST Closures
Ravenna, Ohio

Gentlemen:

As per verbal discussions with Mr. Jenkins and Mr. Carkido, the initial contaminated soil from the Charleston Gate was hauled to the landfill March 29 and March 30, 1990.

On April 4 and April 5, 1990 additional excavations were completed at the Charleston Gate. Materials were stockpiled and samples taken. Stockpiled material was handled as directed by Ravenna Arsenal.

Sincerely,

John S. Cardamone,
President

JSC/mb

PART V: CONCLUSION

R. SIGNATURE

This closure report represents all the pertinent available data for this project, and was completed in accordance with Ravenna Arsenal Inc., Tank Closure 3.15 Documentation Requirements.

I certify that I have personally examined and am familiar with the "Requirements for Underground Storage Tank Removal" as prepared for the Ravenna Arsenal, Inc. at the direction of and on the behalf of the U.S. Army. All removal, abatement, restoration and reporting activities were conducted in accordance with the "Requirements for Underground Storage Tank Removal" and applicable provisions of 40 CFR Part 280, "EPA Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks"; Articles 28, 35, and 36 of the Ohio Administrative Code; and American Petroleum Institute (APE) Bulletin No. 1604 "Recommended Practice for Abandonment or Removal of Used Underground Service Station Tanks"

Sincerely,

Cardamone Construction, Inc.

_____

John Cardamone

D - Evidence of Scrap
H -
Q - Ravenna - misspelled
R - Cert. Statement
Visual Site eval for each
Dates of Rem
Name + affl Samp personnel
Cert Statement
Appendix Q - G.W onto ground

Underground Storage Tanks Removal

C. no notification letter

D. Release Chain of Custody offers no proof of tanks being scraped

E. When was PD last calibrated? Was it calibrated?

H. Manifesting/documentation responsibility RAI? RVAAP?

O Sample from backhoe bucket. Is this acceptible practice?

Q miss spelled Ravenna.

Contaminated soil disposed at Norton Construction? See Cardamone cc for c of c.

R. RAI vs RVAAP?

S. J. JENKINS
MAY 31 1990

Missing from Tank Closure Report

1. Discussion of the visual site evaluation for each tank.
2. Dates of tank removals
3. Name and affiliation of sampling personnel. *
4. Signed Certification Statement *

* these items specifically required in specifications for this job

NEED TO INCLUDE OUR WATER SAMPLES & CHAIN OF CUSTODY

APPENDIX Q REWRITE

NOT ACCURATE

June 13, 1990

Ravenna Arsenal
8451 State Route 5
Ravenna, Ohio 44266

Attention: Mr. William Jenkins

Regarding: Ravenna Arsenal
UST Closures
Ravenna, Ohio

Gentleman:

As per your conversation of 6/5/90 with Karen Fortuna, the following are our interpretations of the revisions of the letters dated March 21, 1990 and April 12, 1990 to reflect the changes you requested. We will change all words in Appendix Q referred to as groundwater to run-off water. Also, the changes you requested in Section Q will appear in Appendix Q.

Sincerely,

John S. Cardamone,
President

cc: Mr. Wayne Carkido

W. J. JENKINS
JUN 13 1990

6-13-90

April 12, 1990
REVISED JUNE 6, 1990

Ravenna Arsenal
8451 State Route 5
Ravenna, Ohio 44226

Attention: Ms. Sue McCauslin

Regarding: Ravenna Arsenal
UST Closures
Ravenna, Ohio

Gentlemen:

As per verbal discussions with Mr. Jenkins and Mr. Carkido, decisions with regards to the destination of the excavated soil pile were concluded by phone on Wednesday April 11, 1990. The following specification were authorized and directed by representatives of the Ravenna Arsenal (Mr. Jenkins, and Mr. Carkido).

Location	Soil (Contaminated) Removal	Soil To Stay
Charleston	1. N/A	1. All remainder of soil to stay 2. All run-off water to be pumped onto adjacent ground

This work scope is to commence on April 12 and April 16, 1990.

Sincerely,

John S. Cardamone,
President

JSC:mb

March 21, 1990
REVISED JUNE 6, 1990

Ravenna Arsenal
8451 State Route 5
Ravenna, Ohio 44266

Attention: Ms. Sue McCauslin

Regarding: Ravenna Arsenal
UST Closures
Ravenna, Ohio

Gentlemen:

As per discussions with Mr. Jenkins, Mr. Carkido and Ms. McCauslin, decisions with regards to the destination of each adjacent excavated soil material pile were concluded at the site on Wednesday March 21, 1990. The following specifications were authorized and directed by representatives of the Ravenna Arsenal (Mr. Jenkins, Mr. Carkido and Ms. McCauslin).

Location	Soil (Contaminated) Removal	Soil To Stay
Old Atlas	1. All south of excavation	1. All north of excavation
	2. Norton Landfill	2. All run-off water to be pumped onto adjacent ground
U-3	N/A	1. All soil to stay
		2. All run-off water to be pumped onto adjacent ground
U-6	1. Soil from bottom section S.E. of excavation	1. All remaining soil to stay
	2. Norton Landfill	2. All run-off water to be pumped onto adjacent ground

A-1	1. Soil east of excavation to be removed 2. Norton Landfill	1. All remaining soil to stay 2. All run-off water to be pumped onto adjacent ground
A-6 (small tank)	N/A	1. Total excavation soil to stay 2. All run-off water to be pumped onto adjacent ground
A-6 (3 larger tanks)	1. Soil east and south of excavation to be removed 2. Norton Landfill	1. All remaining soil to stay 2. All groundwater to be pumped onto adjacent ground
Freedom Gate	1. All soil furthest south of excavation	1. All remainder of soil to stay 2. All run off water to be pumped onto adjacent ground
Charleston	1. All soil to be removed from this location 2. Norton Landfill	N/A

This work scope is to commence on March 22, 1990.

Sincerely,

CARDAMONE CONSTRUCTION COMPANY

John S. Cardamone

JSC:jmh

REVIEW OF
UNDERGROUND STORAGE TANK CLOSURE

PROJECT
Ravenna Arsenal
8451 State Route 5
Ravenna, Ohio 44266

CLIENT
Ravenna Army Ammunition Plant
c/o Ravenna Arsenal Incorporated
8451 State Route 5
Ravenna, Ohio 44266

Revised: June 5, 1990

May 25, 1990

Ravenna Arsenal Incorporated
8451 State Route 5
Ravenna, Ohio 44266

Regarding: Report of Underground
Storage Tank Closure
Ravenna Arsenal
8451 State Route 5
Ravenna, Ohio

Gentlemen:

Enclosed you will find the report of our closure review for the above referenced property. We trust you will find our work in accordance with your requirements.

We would be pleased to provide any additional assistance as may be appropriate. Please do not hesitate to call us with any questions or for further information.

Sincerely,

CARDAMONE CONSTRUCTION COMPANY, INC.

_____

John Cardamone

TABLE OF CONTENTS

I. INTRODUCTION

A. SCOPE OF WORK:

The objective of this report is to present the data regarding the tank closure activities managed by representatives of the owner at the site. Approval of tank closure activities and/or specifications for remediation are determined by the office of the State Fire Marshall and/or other public or private entities with the appropriate authority or workscope.

Visual Site Evaluation

A visual site evaluation, walk-over, was performed at each tank site location looking for obvious signs of past or present operational problems. No such problems were apparent at any of the tank locations.

II. PRE-CLOSURE

B. NAME OF OWNER:

Ravenna Army Ammunition Plant
C/O Ravenna Arsenal Incorporated
8451 State Route 5
Ravenna, Ohio 44266
Phone # (216) 297-3237
Contact Person: Wayne Carkido and/or Sue McCauslin

C. NOTIFICATION LETTER TO STATE FIRE MARSHALL:

See Appendix "A"

D. LOCAL JURISDICTION:

A Local Permit is not required.

E. STATE FIRE MARSHALL INSPECTOR:

Required:
Tank Removal Witnessed by State Fire Officials

Virginia Canankamp
Inspection Bureau (BUSTR)
8895 E. Main Street
Reynoldsburg, Ohio 43068
Office Phone No: (614) 752-8200
Home Phone No: (216) 654-2595

and

Homer Myers
Inspection Bureau (BUSTR)
8895 E. Main Street
Reynoldsburg, Ohio 43068
Office Phone No: (614) 864-5510
Home Phone No: (216) 325-1375

F. UST ABATEMENT & REMEDIATION CONTRACTOR:

Cardamone Construction Inc.
4865 Chaincraft Road
Garfield Heights, Ohio 44125
Phone No.: (216) 581-1133
Contact: John Cardamone

G. UNDERGROUND STORAGE TANKS (USTs):

Location: See Map Appendix "B"

Table 1. Tanks to be Permanently Closed

#	Location	Size (Gal.)	Known Prior Contents	Construction Material	Removal Date (1990)
13	Bldg U-6	12,000	Fuel Oil	Steel	Feb. 12
14	Bldg U-6	12,000	Fuel Oil	Steel	Feb. 12
15	Bldg U-3	12,000	Fuel Oil	Steel	Feb. 12
16	Bldg U-3	12,000	Fuel Oil	Steel	Feb. 12
17	Bldg A-6	3,900	Gas/Fuel Oil	Steel	Feb. 8
18	Bldg A-6	3,900	Gas/Fuel Oil	Steel	Feb. 8
19	Bldg A-6	3,900	Gas/Fuel Oil	Steel	Feb. 8
No#	Bldg A-6	550	Heating Oil	Steel	Feb. 7
37	Bldg A-1	5,000	Fuel Oil	Steel	Feb. 8
10	Gatehouse Post #24 Charleston	500	Fuel Oil	Steel	Feb. 7
47	Gatehouse Freedom	500	Fuel Oil	Steel	Feb. 6
No#	Old Atlas Boiler House	1,000	Fuel Oil	Steel	Feb. 6

III. CLOSURE

H. TANK ABATEMENT ACTIVITIES:

The tank's contents were tested, pumped and disposed of by:

Research Oil Company
2655 Transport Road2
Cleveland, Ohio
Phone # (216) 621-8656

According to the tank removal specifications liquid samples were taken on June 20, 1989 from each tank and analyzed by Research Oil, Inc. Samples were collected using a 5 foot long stainless steel bailer. Samples were then analyzed for oil 2and grease, total suspended solids, total and volatile chlorine, RCRA metals, flashpoint, ph, chemical oxygen demand (COD), viscosity and odor. Research Oil Data is summarized in Appendix C.

Sampling results indicate that the contents of all the tanks, with the exception of the Charleston Gate tank, exceed the characteristics of E.P. Tox chromium CFR 40 261.24 and was considered, for the purposes of this project, hazardous in nature. All manifesting and documentation was the responsibility of the Ravenna Army Ammunition Plant.

I. TANK VENTING

Tank venting/perging prior to removal of USTs from the ground was accomplished by the use of solid carbon dioxide (dry ice) at a quantity of 15 lbs per 1000 gallons of tank capacity. In addition, ventilation of USTs was done by employing an educator-type air mover driven by compressed air.

J. TANK CLEANING

Tanks were cleaned as appropriate for acceptance for off-site disposal as scrap. Tank cleaning was done by placing an appropriate hole in tank for human access. Sludge was manually removed with the help of an oil absorbent product (oil dry) then placed in 55 gallon drums. After this was accomplished a high pressure steam washer was used to abate any remaining residue.

K. TANK DISPOSAL

After cleaning, the tanks were rendered unusable by cutting a large hole in the top of each tank. They were then promptly removed from site and disposed of at the following facility:

A Shaw Company, Inc.
940 E. 67th Street
Cleveland, Ohio

See Appendix D for Release/Chain of Custody

L. SLUDGE SAMPLING AND DISPOSAL

Two (2) sludge samples were collected, one (1) sample from tanks known to have contained fuel oil and one (1) sample from tanks that contained gasoline. All sludge/still bottoms were disposed of at the following facility:

Erieway Industrial Waste Handling
4200 Rockside Road
Cleveland, Ohio 44131

See Cardamone Construction for characterization and chain of custody

IV. CONTAMINATION ASSESSMENT

M. SOIL SCREENING AND STOCKPILING:

All soils removed from the tank excavatings were stockpiled on 4 mil plastic sheeting to prevent any contamination from impacting adjacent soils and groundwater. In addition, piles of contaminated soil were covered with plastic to minimize surface water impacts and volatilization of contamination into the atmosphere.

During excavation headspace screening data defined areas of contamination within the excavation. Excavation of soil continued away from the tank excavation removing soils displaying headspace readings greater than ten parts per million (10 ppm) as per project specifications.

Soil samples were selected for screening. Each sample was subjected to a field screening test with a photoinozation detector for the presence of volatile organic compounds (VOC). These samples were placed in a clean, airtight jar. The mouth of the jar was covered with aluminum foil, then secured with a screw-on teflon-lined lid. After ten minutes holding time the headspace above each sample was scanned for VOCs with the detector by piercing the aluminum foil seal with the instrument probe, then recording the VOC reading observed. See Appendix "E" Photoionization Detector Manual Excerpts.

N. REMEDIATION TECHNIQUES:

The technique used is the most direct method; contaminated soil removal by excavating and transporting to an approved disposal facility with conventional construction equipment.

O. SOIL CLEARANCE SAMPLING:

Efforts were made to preserve the integrity of the clearance samples taken. Such precautions include:

1. Oakfield grab sampling
2. Disregarding upper soil zones of sample
3. Use of glass jars with Teflon seals
4. Immediate icing for VOC preservation
5. Chain-of Custody procedures
6. Prompt delivery to laboratory

Due to the potential for excavation collapse some samples were collected from the backhoe bucket. No sample was collected for analysis that was in contact with the backhoe bucket.

Each sample was subjected to a field screening test with a photoinozation detector for the presence of volatile organic compounds (VOC). These samples were placed in a clean, airtight jar. The mouth of the jar was covered with aluminum foil, then secured with a screw-on teflon-lined lid. After ten minutes holding time the headspace above each sample was scanned for VOCs with the detector by piercing the aluminum foil seal with the instrument probe, then observing the VOC reading. See Appendix "E" Photoinozation Detector Manual Excerpts.

Two to three samples from each excavation area with the "highest" reading on the field instrument was sent to the laboratory for analysis. The laboratory used throughout this project was:

Wadsworth/Alert Laboratories, Inc.
5405 E. Schaaf Road
Cleveland, Ohio 44131
Phone (216) 642-9151
Contact person: Dale L. Mori, Laboratory Manager

Each clearance sample was analyzed for a battery of chemical constituents to include:

1. TRPH Total Recoverable Petroleum Hydrocarbons (U.S. EPA Extraction procedure 9071 and analytical Method 418.1)
2. BTEX Benzene, Toluene, Ethylbenzene, Xylene (U.S. EPA Method 8020)
3. Total Lead (U.S. EPA Method 7420)
4. Total Chromium (U.S. EPA Method 7190)
5. Lead Leachate (Method 1310)
6. Chromium Leachate (Method 1310)

Laboratory quality control and chain of custody forms for all samples taken can be found in Appendix F. Each quality control section is related to the previous chain-of-custody prior to the particular section.

Sampling personel included:

Affiliation	Personel
Cardamone Construction	Jon Parker, Don Johnson
G.E.M. Testing	Don Lenk
Olin Ordnance	Wayne A. Carkido, Observer/Director

For specific locations see Appendix F for Chain-of-Custody Sampler Section.

The following is a summary of clearance sampling results:

EXCAVATION LOCATION BLDG. U-6

Table 2. Clearance Sample Analysis & Results (mg/kg Soil Matrix)

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
Bottom West	ND	ND	18	14	ND	ND
Bottom East	ND	ND	--	--	ND	ND
South Pump Island	110	ND	--	--	ND	ND
Line From S. Pump	55	ND	--	--	ND	ND

See Appendix G for site map, laboratory reports, detection limits

EXCAVATION LOCATION BLDG. U-3

Table 3. Clearance Sample Analysis & Results (mg/kg Soil Matrix)

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
Bottom West	ND	ND	--	--	ND	ND
Bottom East	ND	ND	11	17	ND	ND
Supply Lines	37	ND	--	--	ND	ND

See Appendix H

EXCAVATION LOCATION BLDG. A-6

Table 4. Clearance Sample Analysis & Results (mg/kg Soil Matrix)

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
Bot/Side #17 West	22	ND	ND	5.4	ND	ND
Bot/Side #19 West	ND	ND	ND	6.8	ND	ND
Island	16	ND	--	--	ND	ND
Product Line	ND	ND	--	--	ND	ND

See Appendix I

EXCAVATION LOCATION BLDG. A-6 500 gal

Table 5. Clearance Sample Analysis & Results
(mg/kg Soil Matrix)

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
Bottom South	ND	ND*	--	--	ND	ND
Bottom North	ND	ND*	--	--	ND	ND

*ug/kg
See Appendix J

EXCAVATION LOCATION BLDG. A-1

Table 6. Clearance Sample Analysis & Results
(mg/kg Soil Matrix)

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
Bottom West	16	ND*	--	--	ND	ND
Bottom East	ND	ND*	--	--		
Product Line	ND	ND	--	--	ND	ND

*ug/kg
See Appendix K

EXCAVATION LOCATION GATEHOUSE CHARLESTON POST 24

Table 7. Clearance Sample Analysis & Results
(mg/kg Soil Matrix)

SAMPLING ROUND I

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
Bottom South	1,200	ND	--	--	ND	ND
Bottom North	300	ND	--	--	ND	ND

SAMPLING ROUND #II

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
North Bottom	ND	3.2*	--	--	ND	ND
South Bottom	500	ND	--	--	ND	ND

SAMPLING ROUND #III

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
South East Bottom	ND	ND*	ND	5.4	ND	ND
South West Bottom	27	.2	ND	ND	ND	ND

*ug/kg
See Appendix L

EXCAVATION LOCATION GATEHOUSE FREEDOM

Table 8. Clearance Sample Analysis & Results (mg/kg Soil Matrix)

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
Bottom South	ND	ND	--	--	ND	ND
Bottom North	ND	ND	23	11	ND	ND

See Appendix M

EXCAVATION LOCATION OLD ATLAS BOILER HOUSE

Table 9. Clearance Sample Analysis & Results (mg/kg Soil Matrix)

Sample Loc. Description	TRPH	BTEX	Total LEAD	Total CHROMIUM	Leachable LEAD	Leachable CHROMIUM
East Bottom	16	ND	ND	13	ND	ND
West Wall	ND	ND	--	--	ND	ND

See Appendix N

P. BACKGROUND SAMPLING

In order to establish background levels of total lead, total petroleum hydrocarbons, and total chromium in the site soils, four (4) background soil samples were taken randomly throughout the Ravenna Facility adjacent to UST abatement activities. Samples were taken in what appeared to be pristine soils not disturbed by human activities. Each background sample was analyzed using the following EPA Methodology:

1. TRPH Total Recoverable Petroleum Hydrocarbons Analytical Method 418.1
2. Total Lead U.S. EPA Method 7420
3. Total Chromium U.S. EPA Method 7190

Table 10. A Summary of Background Results From Areas Selected Randomly Throughout Facility (mg/kg Soil Matrix)

Sample Location	Depth (Feet)	TRPH	Lead	Total Chromium
Freedom	1.0 - 2.0	1,600	18	7.7
A-6	1.0 - 2.0	ND	19	8.9
Atlas	1.0 - 2.0	120	20	9.6
Post #27	1.0 - 2.0	ND	14	11

See Appendix O Laboratory Reports, Detection Limits

Q. CONTAMINATED SOIL DESTINATION:

Approximately 500 cubic yards as calculated by the Ravenna Arsenal of contaminated soil was removed from The Ravenna Facility. Prior to removal from the site the soil was tested for hazardous concentrations of contaminants. The soil was analyzed for the following parameters:

1. TRPH Total Recoverable Petroleum Hydrocarbons Analytical Method 418.1
2. BTEX Benzene, Toluene, Ethylbenzene, Xylene (U.S. EPA Method 8020)
3. Lead Leachate (Method 1310)
4. Chromium Leachate (Method 1310)

See Appendix P for landfill sample laboratory results and detection limits.

The contaminated soil was disposed of at the following landfill:

Norton Construction Co.
6200 Rockside Woods Blvd.
Independence, Ohio 44131
(216) 447-0070
Landfill: 3401 E. Royalton Road
Broadview Hts., Ohio

See Cardamone Construction for Chain-of-Custody

The remaining uncontaminated soil was then placed back into the excavation. Decisions in regards to what remained and was to be removed was at the sole discretion of representatives of The Ravenna Arsenal Incorporated.

The schedule of soil fate can be found in Appendix Q.

PART V: CONCLUSION

R. SIGNATURE

This closure report represents all the pertinent available data for this project, and was completed in accordance with Ravenna Arsenal Inc., Tank Closure 3.15 Documentation Requirements.

I certify that I have personally examined and am familiar with the "Requirements for Underground Storage Tank Removal" as prepared for the Ravenna Arsenal, Inc. at the direction of and on the behalf of the U.S. Army. All removal, abatement, restoration and reporting activities were conducted in accordance with the "Requirements for Underground Storage Tank Removal" and applicable provisions of 40 CFR Part 280, "EPA Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks"; Articles 28, 35, and 36 of the Ohio Administrative Code; and American Petroleum Institute (APE) Bulletin No. 1604 "Recommended Practice for Abandonment or Removal of Used Underground Service Station Tanks"

Sincerely,

Cardamone Construction, Inc.

_____

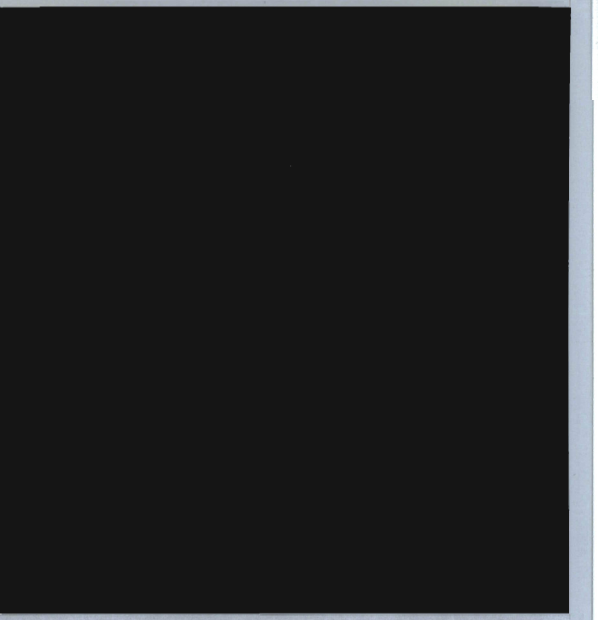
John Cardamone

At the request of representatives of the Ravenna Arsenal the following language is incorporated in this report to clarify action taken relating to water in the excavations by representatives of the arsenal.

A groundwater table was present in only one (1) excavation (A6). This groundwater was sampled and determined by representatives of the arsenal to be non-contaminated based on samples and testing parameters determined by the same personnel (See Appendix R). Water was present in the other excavations. The water in each hole was a result of:

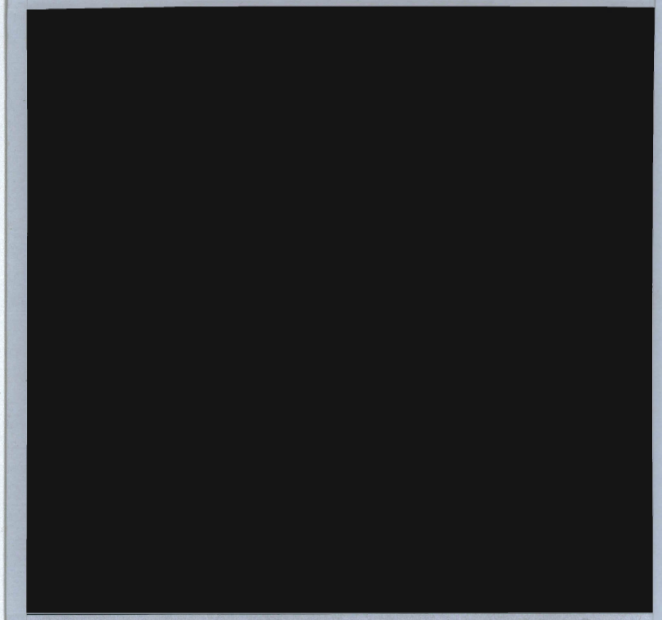
1. Time of Season Work Commenced (spring)
2. Run-Off

Upon receipt of soil results verifying the excavations to be clean, then and only then was non-contaminated run-off permitted to be pumped out of the hole onto adjacent ground.



0893405102S POLAROID © 4

UNCOVERED SITE LEFT OPEN
2WKS (A-L)



0893405102S POLAROID © 4

COLLAPSE OF COVER Charlestown gate
2/90

0893405102S POLAROID © 4

UNCOVERED SITE LEFT OPEN
2WKS 2/90 (A-L)

PART V: CONCLUSION

R. SIGNATURE

This closure report represents all the pertinent available data for this project, and was completed in accordance with Ravenna Arsenal Inc., Tank Closure 3.15 Documentation Requirements.

I certify that I have personally examined and am familiar with the "Requirements for Underground Storage Tank Removal" as prepared for the Ravenna Arsenal, Inc. at the direction of and on the behalf of the U.S. Army. All removal, abatement, restoration and reporting activities were conducted in accordance with the "Requirements for Underground Storage Tank Removal" and applicable provisions of 40 CFR Part 280, "EPA Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks"; Articles 28, 35, and 36 of the Ohio Administrative Code; and American Petroleum Institute (APE) Bulletin No. 1604 "Recommended Practice for Abandonment or Removal of Used Underground Service Station Tanks"

Sincerely,

Cardamone Construction, Inc.

John S Cardamone

John Cardamone

cc: N. Wulff
D. Kanavy
T. Chanda
S. McCauslin
W. Carkido
File

RAVENNA ARSENAL INC.
8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297

Telephone (216) 358-7111

Autovon 346-3210

December 6, 1989

THRU: Contracting Officer's Representative
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266-9297

TO: Commander
U. S. Army Armament, Munitions and Chemical Command
ATTN: AMSMC-PCG-B
Rock Island, IL 61299-6000

Subject: Funding Requirements for Environmental Compliance
(Ref. Ltr. Dated June 7, 1989 Subject UST Testing)
(Ref. Ltr. Dated June 23, 1989 Subject UST Removal)

Dear Sir:

On June 7, and 23, 1989 Ravenna Arsenal, Inc. identified to AMSMC-IRE the requirement to fund the subject projects to meet USEPA and Ohio EPA regulations. All required project documentation was submitted to support the projects.

The two Underground Storage Tank (UST) projects still remain unfunded and are facing a December 22, 1989 compliance date. One project is for removal of UST's. These tanks are no longer used and contain a corrosion inhibitor which contains chromium. They require abandonment in accordance with UST regulations. The abandonment process will take 120 days after receipt of funds on the contract. The second project is for testing of the remaining regulated UST's. Testing will take 8 weeks after receipt of funds on the contract.

AMSMC-ISE, in a letter dated 27 Nov. 1989, requested that a request to use overhead funds for the project be submitted to your office since they have, to date, been unable to obtain separate funding. It also required that the state regulators be notified and an extension requested. Extraordinary overhead requests for the two UST projects are attached for your consideration and action.

We also understand from Ms. Ronnie DePorter of AMSMC-ISE that due to cancellation of a project at another plant, her office may be able to fund the projects. We believe that special project funding is more appropriate than overhead since the tanks to be removed have been inactive and do not support current operations.

We recommend that immediate attention be given to this matter so that special funding or approval to use overhead funding may be provided as soon as possible. Failure to react quickly could subject the Army and its responsible officials to daily fines and imprisonment. As soon as you can tell us when funds can be expected, we will prepare the extension request for submittal to the state regulators.

Sincerely,

RAVENNA ARSENAL, INC.

H. R. Cooper D.J.

H. R. Cooper
Plant Engineer

Attachment

cf: AMSMC-IRE

HRC/wt/hc89028

RAVENNA ARMY AMMUNITION PLANT

RAVENNA ARSENAL, INC.

REQUEST FOR APPROVAL OF EXTRAORDINARY PLANT OVERHEAD EXPENDITURE AT RAVENNA AAP

FOR

UNDERGROUND STORAGE TANK REMOVAL

STATEMENT OF EFFORT: Provide subcontractor to remove and dispose of 12 regulated underground storage tanks and their contents IAW applicable Federal and State UST regulations. Refer to AMCCOM Form 319-R attached.

COST ESTIMATE: $186,100 (Refer to previously submitted DD1411 for Underground Storage Tank Removal dated August 4 1989).

JUSTIFICATION: See Attached Form 319-R.

IDENTIFICATION OF CONTROVERSIAL ASPECTS:

There are no controversial aspects. The project is required by regulations cited in the attached 319-R.

IMPACT IF NOT FUNDED:

As of December 22, 1989 the plant will be in non-compliance with the cited regulation. The Army and its responsible officials may be liable for civil fines and penalties of $10,000 to $25,000 per day while in violation along with a 2 to 4 year term of imprisonment.

Completion of this project will take 120 days from the receipt of funding on the operating contract.

ustrem.fm

CURRENT OR BACKLOG OF DEFICIENCY IDENTIFICATION AND INDUSTRIAL PREPAREDNESS MEASURE (IPM)
(AMCCOM Suppl 1 to AR 700-90)

1. INSTALLATION NAME/PIN: RAVENNA ARMY AMMUNTION PLANT/PIN 995282

2. DATE OF SUBMISSION: ORIGINAL 5/89; REVISED

3.

4. LINE/AREA	5. LINE/AREA STATUS CODE	6. IPM NUMBER	7. REASON CODE	8. PROG FUNDING CODE	12. TIME TO COMP DESIGN	13. TIME TO COMP WORK
GENERAL	A		C1	T 5892910	2	2

9. IMPACT CODE	10. IMPLEMENTATION CODE	11. TIME IPM REQ AFTER M-DAY
E	G	--

15. ITEM/COMPONENT MANUFACTURED	16. ISN	17. PROD CAP (MAX) WITHOUT IPM	17. PROD CAP (MAX) WITH IPM	18. PROD LEVEL OFF TIME WITHOUT IPM	18. PROD LEVEL OFF TIME WITH IPM
a.					
b. N/A	N/A	N/A	N/A	N/A	N/A
c.					
d.					
e.					
f.					
g.					
h.					
i.					
j.					
k.					
l.					
m.					
n.					
o.					
p.					

19. RELATED IPMS

20. OPERATIONA
[XX] MISSION SUP
[ ] PROD SUPPOR

21. LOCAL CON

22. PROGRAM C

2

a. REAL PROPE
(1) LABOR COS
(2) MATERIAL C
(3) SUBCONTRA 176.8
(4) G&A COST 2.1
(5) FEE 7.2
(6) TOTAL EST 186.1

26. DD FORM 1

27. AMCCOM NUMBER

23. DEFICIENCY PROJECT TITLE

DESCRIPTION: (Bldg no, equipment, sq ft, length, quantity, etc.)

[XX] a. REAL PROPERTY FAC CAT CODE NUMBER 12450

[ ] b. EQUIPMENT

TO REMOVE 12 UNDERGROUND STORAGE TANKS (UST's) IN ACCORDANCE WITH STATE AND FEDERAL REGULATIONS. TANKS TO BE REMOVED:

1. POST 24 - 500 GALS. - INHIBITOR/WATER
2. BLDG.U-6(S) - 12,000 GALS. - INHIBITOR/WATER
3. BLDG.U-6(N) - 12,000 GALS. - INHIBITOR/WATER
4. BLDG.U-3(S) - 12,000 GALS. - INHIBITOR/WATER
5. BLDG.U-3(N) - 12,000 GALS. - INHIBITOR/WATER
6. BLDG.A-6(N) - 3,900 GALS. - INHIBITOR/WATER
7. BLDG.A-6(C) - 3,900 GALS. - INHIBITOR/WATER
8. BLDG.A-6(S) - 3,900 GALS. - INHIBITOR/WATER

(9-12 CONTINUED ON BACK)

TECH/ADMIN APPROVAL IS GRANTED AT INSTALLATION LEVEL BY:

ROBERT J. KASPER
COMMANDER'S REPRESENTATIVE

24. JUSTIFICATION (Includes impact on mobilization planning, effort, economics, etc.)

BY OHIO AND FEDERAL EPA MANDATES OAC 1301:7-7-28 (A), (E), (I), (J), (K); OAC 1301:7-7-35 AND 1301:7-7-36; 40 CFR 280 AND 281 ALL UNDERGROUND STORAGE TANKS (UST's) THAT ARE REGISTERED AND DECLARED ABANDONED SHALL BE REMOVED IN COMPLIANCE WITH OHIO AND FEDERAL EPA REGULATIONS AND NFPA 329 AND BE COMPLETED BY NO LATER THAN 12/89.

28. VERIFIED [ ] YES [ ] NO

OFFICE

SIGNATURE

29. VALIDATED [ ] YES [ ] NO

OFFICE

SIGNATURE

RAVENNA ARMY AMMUNITION PLANT

RAVENNA ARSENAL, INC.

REQUEST FOR APPROVAL OF EXTRAORDINARY PLANT OVERHEAD EXPENDITURE AT RAVENNA AAP

FOR

UNDERGROUND STORAGE TANK TESTING

STATEMENT OF EFFORT: Provide a subcontractor to perform leak detection testing on eight (8) regulated Underground Storage Tanks at Ravenna AAP. Refer to attached AMCCOM form 319-R.

COST ESTIMATE: $19,100 (Refer to attached cost estimate)

JUSTIFICATION: See attached form 319-R

IDENTIFICATION OF CONTROVERSIAL ASPECTS: There are no controversial aspects. The project is required by regulations cited in the attached 319-R.

IMPACT IF NOT FUNDED: As of Dec. 22, 1989, the plant will be in non-compliance with the cited regulations. The Army and its responsible officials may be liable for fines and penalties of $10,000 to $25,000 per day while in violation along with a two to four year term of imprisonment.

Completion of the project will take eight (8) weeks from the receipt of funds on the operating contract.

COST ESTIMATE REVISION AND BREAKDOWN FOR
UNDERGROUND STORAGE TANK TESTING
AT THE RAVENNA ARMY AMMUNITION PLANT

1.	Contracted Vendor Services	
	a. Site prep charges on tanks 12,000 gals. or less (6 tanks ea.)	$1,200
	b. Site prep charges on tanks 12,001 gals. or greater (2 tanks ea.)	2,000
	c. Petro-Tite Testing for tanks 2,000 gals. or less (4 tanks ea.)	1,600
	d. Petro-Tite Testing for tanks of 12,000 gal. capacity	1,600
	e. Petro-Tite testing for tanks of 15,000 gal. capacity	2,200
	f. Tank Contingency for any regulated initial corrective action in event of release	8,125
2.	In-house labor charges	
	a. Personnel and equipment to perform designated fuel transfer/relocation tasks during tank exchange	650
	b. Plant Engineering - Est. 13.5 hours (Includes fee)	1,725
	TOTAL	$19,100

CURRENT OR BACKLOG OF DEFICIENCY IDENTIFICATION AND INDUSTRIAL PREPAREDNESS MEASURE (IPM)
(AMCCOM Suppl 1 to AR 700-90)

1. INSTALLATION NAME/PIN: RAVENNA ARMY AMMUNITION PLANT: PIN 995282

2. DATE OF SUBMISSION: ORIGINAL 5/89; REVISED

REQUIRED FEEDER

3. ACTION

4. LINE/AREA	5. LINE/AREA STATUS CODE	6. IPM NUMBER	7. REASON CODE	8. PROG FUNDING CODE	12. TIME TO COMP DESIGN	13. TIME TO COMP PHY WORK	14. WITH
GENERAL	A		C1	T 5892910	1	1	
	9. IMPACT CODE: E	10. IMPLEMENTATION CODE: G	11. TIME IPM REQ AFTER M-DAY: N/A				

15. ITEM/COMPONENT MANUFACTURED	16. ISN	17. PROD CAP (MAX) WITHOUT IPM	17. PROD CAP (MAX) WITH IPM	18. PROD LEVEL OFF TIME WITHOUT IPM	18. PROD LEVEL OFF TIME WITH IPM	19. RELATED IPMS
a.						
b. N/A	N/A	N/A	N/A	N/A	N/A	
c.						
d.						
e.						
f.						
g.						
h.						
i.						
j.						
k.						
l.						
m.						
n.						
o.						
p.						

20. OPERATIONAL IMPACT
[X] MISSION SUPPORT
[ ] PROD SUPPORT

21. LOCAL CONTROL NUMB

22. PROGRAM CONTROL NU

25. COST D

a. REAL PROPERTY	
(1) LABOR COST	1.5
(2) MATERIAL COST	-0-
(3) SUBCONTRACT	16.7
(4) G&A COST	N/A
(5) FEE	0.9
(6) TOTAL EST COST	19.1

26. DD FORM 1391 PROCE

27. AMCCOM PROJECT ID NUMBER

23. DEFICIENCY PROJECT TITLE: LEAK TESTING OF UNDERGROUND STORAGE TANKS

DESCRIPTION: (Bldg no, equipment, sq ft, length, quantity, etc.)

[X] a. REAL PROPERTY FAC CAT CODE NUMBER 12450

[ ] b. EQUIPMENT TO PERFORM TANK TIGHTNESS AND SUCTION TESTS ON SEVENTEEN USTs IN ACCORDANCE WITH STATE AND FEDERAL REGULATIONS. TANKS TO BE TESTED:

1. GEORGE RD. GAS STATION - 12,000 GAL. (GAS)
2. GEORGE RD. GAS STATION - 12,000 GAL. (GAS)
3. POST 1 GENERATOR - 285 GAL. (#2 FUEL OIL)
4. RAILROAD YARD - 15,000 GAL. (#2 FUEL OIL)
5. POWERHOUSE 6 - 1,000 GAL. (#2 FUEL OIL)
6. BUILDING 1045 - 15,000 GAL. (#2 FUEL OIL)
7. DEAC FURNACE (BURNING GROUNDS) - 2,000 GAL. (#2 FUEL OIL)
8. WATERWORKS 4 (GENERATOR) - 550 GAL. (#2 FUEL OIL)

TECH/ADMIN APPROVAL IS GRANTED AT INSTALLATION LEVEL BY:

ROBERT J. KASPER
COMMANDER'S REPRESENTATIVE

24. JUSTIFICATION (Includes impact on mobilization planning, effort, economics, etc.) BY OHIO AND FEDERAL EPA MANDATES: OAC 1301:7-7-28 (A), (E), (I), (J), (K); OAC 1301:7-7-35 AND 1301:7-7-36; 40 CFR 280 AND 281 ALL REGISTERED UNDERGROUND STORAGE TANKS (UST) CONTAINING ANY SUBSTANCE OTHER THAN FUEL FOR HEATING PURPOSES MUST RECEIVE TANK TIGHTNESS AND SUCTION LINE TESTING TO DETECT ANY LEAKAGE THAT MAY OCCUR. SAID TEST SHALL COMPLY WITH NFPA 329 AND BE COMPLETED BY NO LATER THAN 12/89.

28. VERIFIED [ ] YES [ ] NO
OFFICE _____ DATE _____
SIGNATURE

29. VALIDATED [ ] YES [ ] NO
OFFICE _____ DATE _____
SIGNATURE

RAVENNA ARSENAL INC.
8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297
Telephone (216) 358-7111

cc: N. Wulff
B. Jenkins
D. Kanavy
T. Chanda
W. Carkido
File

June 23, 1989

THRU Contracting Officer's Representative
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, OH 44266-9297

TO Commander
U.S. Army Armament, Munitions and Chemical Command
Attn: AMSMC-BPA-P
Rock Island, IL 61299-6000

Subject: Underground Storage Tank Removal

Dear Sir:

A new AMCCOM Form 319-R concerning Underground Storage Tank Removal is submitted for further action.

Sincerely,

RAVENNA ARSENAL, INC.

H. R. Cooper
Plant Engineer

HRC:WAC:ju:89004

Attachment

CURRENT OR BACKLOG OF DEFICIENCY IDENTIFICATION AND INDUSTRIAL PREPAREDNESS MEASURE (IPM)
(AMCCOM Suppl 1 to AR 700-90)

1. INSTALLATION NAME/PIN: RAVENNA ARMY AMMUNTION PLANT/PIN 995282

2. DATE OF SUBMISSION: ORIGINAL 5/89; REVISED

REQUIREME FEEDER F

3. ACTION O

4. LINE/AREA	5. LINE/AREA STATUS CODE	6. IPM NUMBER	7. REASON CODE	8. PROG FUNDING CODE	12. TIME TO COMP DESIGN	13. TIME TO COMP PHY WORK	14. ST WITHO
GENERAL	A		C1	T 5892910	2	2	N/
	9. IMPACT CODE: E	10. IMPLEMENTATION CODE: G	11. TIME IPM REQ AFTER M-DAY				

15. ITEM/COMPONENT MANUFACTURED	16. ISN	17. PROD CAP (MAX) WITHOUT IPM	17. PROD CAP (MAX) WITH IPM	18. PROD LEVEL OFF TIME WITHOUT IPM	18. PROD LEVEL OFF TIME WITH IPM
a.					
b. N/A	N/A	N/A	N/A	N/A	N/A
c.					
d.					
e.					
f.					
g.					
h.					
i.					
j.					
k.					
l.					
m.					
n.					
o.					
p.					

19. RELATED IPMS

20. OPERATIONAL IMPACT
- [XX] MISSION SUPPORT
- [ ] PROD SUPPORT

21. LOCAL CONTROL NUMBER

22. PROGRAM CONTROL NUM

25. COST DA

a. REAL PROPERTY	b.
(1) LABOR COST	(1)
(2) MATERIAL COST	(2)
(3) SUBCONTRACT 176.8	(3)
(4) G&A COST 2.1	(4)
(5) FEE 7.2	(5)
(6) TOTAL EST COST 186.1	(6

26. DD FORM 1391 PROCESS

27. AMCCOM PROJECT IDEN NUMBER

23. DEFICIENCY PROJECT TITLE

DESCRIPTION: (Bldg no, equipment, sq ft, length, quantity, etc.)

[XX] a. REAL PROPERTY FAC CAT CODE NUMBER 12450

[ ] b. EQUIPMENT

TO REMOVE 12 UNDERGROUND STORAGE TANKS (UST's) IN ACCORDANCE WITH STATE AND FEDERAL REGULATIONS. TANKS TO BE REMOVED:

1. POST 24 - 500 GALS. - INHIBITOR/WATER
2. BLDG.U-6(S) - 12,000 GALS. - INHIBITOR/WATER
3. BLDG.U-6(N) - 12,000 GALS. - INHIBITOR/WATER
4. BLDG.U-3(S) - 12,000 GALS. - INHIBITOR/WATER
5. BLDG.U-3(N) - 12,000 GALS. - INHIBITOR/WATER
6. BLDG.A-6(N) - 3,900 GALS. - INHIBITOR/WATER
7. BLDG.A-6(C) - 3,900 GALS. - INHIBITOR/WATER
8. BLDG.A-6(S) - 3,900 GALS. - INHIBITOR/WATER

(9-12 CONTINUED ON BACK)

TECH/ADMIN APPROVAL IS GRANTED AT INSTALLATION LEVEL BY:

ROBERT J. KASPER
COMMANDER'S REPRESENTATIVE

24. JUSTIFICATION (Includes impact on mobilization planning, effort, economics, etc.)

BY OHIO AND FEDERAL EPA MANDATES OAC 1301:7-7-28 (A), (E), (I), (J), (K); OAC 1301:7-7-35 AND 1301:7-7-36; 40 CFR 280 AND 281 ALL UNDERGROUND STORAGE TANKS (UST's) THAT ARE REGISTERED AND DECLARED ABANDONED SHALL BE REMOVED IN COMPLIANCE WITH OHIO AND FEDERAL EPA REGULATIONS AND NFPA 329 AND BE COMPLETED BY NO LATER THAN 12/89.

28. VERIFIED [ ] YES [ ] NO C

OFFICE _____ DATE _____

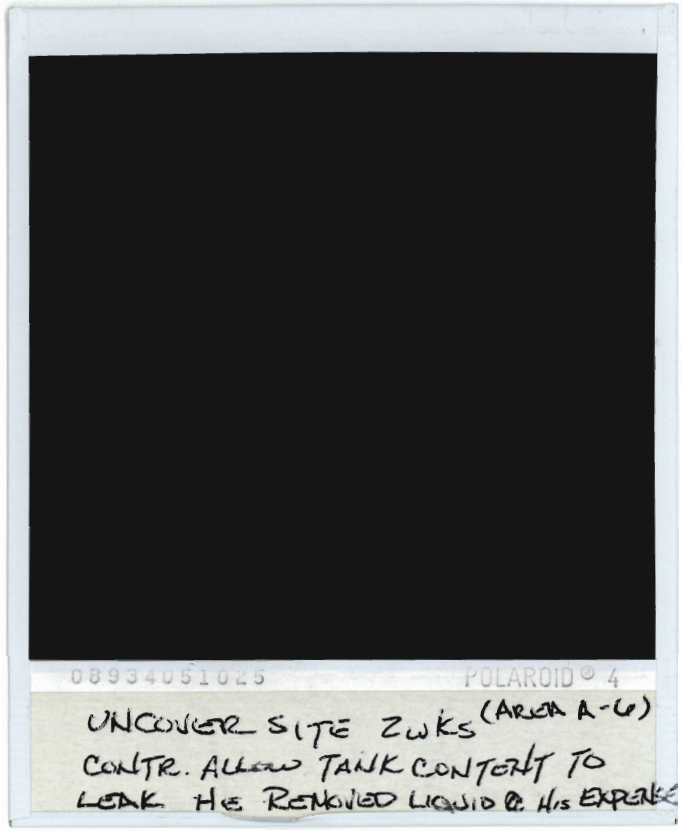
SIGNATURE

29. VALIDATED [ ] YES [ ] NO C

OFFICE _____ DATE _____

SIGNATURE

S BOILER HOUSE - 1,000 GALS. - #2 FUEL OIL
- 500 GALS. - INHIBITOR/WATER
1 DEPOT - 5,000 GALS. - INHIBITOR/WATER
EA - 500 GALS. - #2 FUEL OIL


0893405102S
POLAROID © 4
UNCOVER SITE 2WKS (AREA A-G)
CONTR. ALLOW TANK CONTENT TO
LEAK. HE REMOVED LIQUID @ HIS EXPENSE

cc: N. Wulff
T. Chanda
B. Jenkins
D. Kanavy
W. Carkido
File

RAVENNA ARSENAL INC.

8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297

Telephone (216) 358-7111

Autovon 346-3210

October 12, 1989

THRU: Contracting Officer's Representative
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266-9297

TO: Commander
U. S. Army Armament, Munitions and Chemical Command
ATTN: AMSMC-ISE (Ronnie DePorter)
Rock Island, IL 61299-6000

Subject: Underground Storage Tank Removal - 23 DERA Eligible Tanks

Dear Sir:

Project documentation for Underground storage Tank Removal is included for further action as DERA funding. For 319-R is being sent to AMCCOM, Attn: AMSMC-BPA-P.

Sincerely,

RAVENNA ARSENAL, INC.

H. R. Cooper
Plant Engineer

HRC/TMC/wt/tc89030

Attachments

United States Environmental Protection Agency
Washington, DC 20460

EPA Federal Agency Pollution Abatement Plan — Project Report

I. Facility Information

1. State Alpha	2. Agency/Bureau	3. GSA Installation	4. EPA Region	5. Country	6. New Installation
OH	2138	20736	05	USA	☐ Yes ☒ No

7. Name of the Installation: RAVENNA ARMY AMMUNITION PLANT

8. Street Address: 8451 STATE ROUTE 5

9. City Name	10. ZIP Code, if known	11. Ownership Type
RAVENNA OHIO	44266-9297	C

II. Basic Project Information

1. Agency Project Number	2. Various Locations	3. Media	4. Pollutant Category	5. Funding Account	6. Year Funding Required
	☐ Yes ☒ No	SW	LUST	04	90

7. Project Name *(Brief description)*: UNDERGROUND STORAGE TANK REMOVAL

8. Project Contact Name	9. Contact Telephone	10. Total Cost Estimate *(in $1,000's)*
TOM CHANDA	216-297-3221	[redacted]

11. Project Assessment

- ☒ High (H) — Project critical to Agency program and/or cleanup of local environment
- ☐ Med (M) — Project important to Agency program and/or cleanup of local environment
- ☐ Low (L) — Project desirable to Agency program and/or cleanup of local environment

12. Compliance Status

- ☐ ESOP Does not meet established standard and compliance deadline has passed
- ☐ ESDF Does not meet established standard and compliance deadline is in the future
- ☐ PSDF Does not meet pending standard and compliance deadline is in the future
- ☐ ESRO Meets established standard but needs replacement due to obsolescence
- ☐ ESRE Meets established standard but needs replacement due to need for expansion
- ☐ ESDL Meets established standards but needs to demonstrate leadership
- ☒ OTHR Other

13. Project Cost

Fiscal Year	Budgeted *($1,000)*	Funded *($1,000)*
90	434.0	

14. Project Milestones/Progress *(All dates are month/year)*

Design/Plan Completion	Construction/Work Start	Construction/Work Completion
1289	0290	0590

First Compliance Required	Progress Code	Fiscal Year Completed
1289	[redacted]	1289

For DOE Use Only

Program ID	Field Office

Project Narrative *(including description of legal requirement and pollutants to be controlled)*

SEE ATTACHED PAGES

EPA Form 3500-7 (Rev. 8-85) Previous edition is obsolete.

1383 REPORT EXHIBIT 1

SUPPLEMENTAL INFORMATION SHEET

DATE PREPARED: 10/11/89
GSA INVENTORY CONTROL NO: 20736

1. PROJECT NARRATIVE DESCRIPTION:

In order to comply with 40CFR 280 & 281, Ravenna AAP (RVAAP) requires 23 tanks for removal/closure. This removal/closure project addresses all tanks that were last used prior to January 1984 and, therefore, eligible for DERA Funding. DERA eligibility is supported by the U.S. Army Corps of Engineers' September 1989 Program document titles: RAVENNA AAP, RAVENNA, OHIO INVESTIGATION & EVALUATION OF UNDERGROUND STORAGE TANKS.* The costs within this 1383 report reflect the development of closure plans and specifications, engineering, and additional surveys and analytical field work required to accomplish final closure standards.

FUNDING TYPE: DERA INSTALLATION STATUS: Inactive
REQUIRED FOR MOBILIZATION: No; however, the removal of these tanks must be fully coordinated with revisions to the mobilization plan.

2. SPECIFIC TYPE OF POLLUTION/CONTAMINATION:

The subject tanks at one time contained either leaded gasoline, No. 2 or No. 5 fuel oils. Fifteen of these tanks have visual confirmation that they contain a previous stored petroleum product. These sludge volumes range in 10-15% of tank capacity.

3. AMOUNT OF POLLUTION/CONTAMINATION:

The twenty three (23) tanks to be removed have a combined capacity of 283,500 gals.

4. POLLUTION ~~SOURCE AND~~ DISCHARGE, EMISSION OR DEPOSIT POINT:

None. No known discharge taking place.

5. EXISTING TREATMENT & OTHER CONTROL MEASURES: None

6. EFFECTIVENESS OF EXISTING TREATMENT CONTROL: Not applicable

7. REMEDIAL MEASURES PROPOSED & ESTIMATED EFFECT IN CORRECTING PROBLEMS: None

8. APPLICABLE STANDARD: OAC 1301:7-7-28 (A), (E), (I), (J), and (K)
OAC 1301:7-7-35 and 1301:7-7-36
40 CFR 280 and 281
NEPA 329
API Bulletin 1604

*9. OTHER RELEVANT INFORMATION:

The entire quantity of USTs sited by the USACOE, RVAAP investigative and evaluation survey includes 33 DERA Eligible Tanks; 10 DERA tanks were previously submitted under an earlier (unfunded) RVAAP 1383 submittal. This earlier 1383 submittal included an additional abandoned UST which did not meet USCOE criteria for funding.

Exhibit 1
1383 REPORT EXHIBIT 1
AMCCOM SUPPLEMENTAL INFORMATION SHEET

Installation Name: Ravenna Army Ammunition Plant
Project Name: Underground Storage Tank Removal - 23 DERA Eligible Tanks

1. FUNDED: NO
2. PRON:
3. AMS CODE/PROGRAM ELEMENT (PE):
4. EXECUTING AGENCY: RVAAP OPERATING CONTRACTOR
5. PRIORITY: HIGH
6. 319R #:
7. HAZMIN: YES
8. SOURCE STATUS: INACTIVE
9. TECH/ADMIN APPROVAL: YES (REF. 319-R)
10. PERCENT CMPL: -0-
11. a. SUPPORTS PRODUCTION: NO

    b. IF YES, SPECIFY:

12. TYPE EFFORT: CLOSURE
13. CORRECT NOV: NO
14. ON COMPLIANCE SCHEDULE/AGREEMENT: YES
15. NEPA DOCUMENTATION:

    A. Prepared; Record of Environmental Consideration

    B. Approved: YES, Installation Level Only

16. IMPACT IF NOT FUNDED: Ravenna Army Ammunition Plant will not be in compliance with 40 CFR 280 and 281; and AMCCOM Underground Tank Compliance Policy and pertinent to Abandoned (prior to January 1984) USTs.

2WC89007.RPT

DERA

DERA ELIGIBLE UNDERGROUND STORAGE TANKS

Reference: Ravenna AAP Investigation and Evaluation of Underground Storage Tanks Prepared by OMAHA District Corps of Engineers

ITEM	RVAAP TANK NO.	REMOVAL COSTS	LOCATION	MAT'L LAST STORED	CAPACITY
1	20)	$37,195.00	Bldg. DB-27 (LL-2)	#2 Fuel Oil	15,000
2	21)		Bldg. DB-27 (LL-2)	#2 Fuel Oil	15,000
3	22	$18,664.00	Railroad Yard	#2 Fuel Oil	15,000
4	46	$5,793.00	EE-102 (Bolton House)	#2 Fuel Oil	1,500
5	50	$4,203.00	WaterWorks #4 (Heating)	#2 Fuel Oil	1,000
6	55)	$42,277.00	Powerhouse 1 (LL 1)	#5 Fuel Oil	20,000
7	56)		Powerhouse 1 (LL 1)	#5 Fuel Oil	20,000
8	57)	$36,846.00	Powerhouse 2 (LL 2)	#5 Fuel Oil	15,000
9	58)		Powerhouse 2 (LL 2)	#5 Fuel Oil	15,000
10	59)	$42,277.00	Powerhouse 4 (Near LL 5)	#5 Fuel Oil	20,000
11	60)		Powerhouse 4 (Near LL 5)	#5 Fuel Oil	20,000
12	61)	$42,277.00	Powerhouse 5 (Near LL10)	#5 Fuel Oil	20,000
13	62)		Powerhouse 5 (Near LL10)	#5 Fuel Oil	20,000
14	63)	$42,277.00	Powerhouse 7 (LL 4)	#5 Fuel Oil	20,000
15	64)		Powerhouse 7 (LL 4)	#5 Fuel Oil	20,000
16	80	$18,744.00	Geo Rd Gas Sta (Abandoned)	Leaded Gasoline	12,000
17	81)		Building 1047	Gasoline	10,000
18	82)	$48,499.00	Building 1047	Gasoline	10,000
19	83)		Building 1047	Gasoline	10,000
20	86)	$8,406.00	Telephone Bldg. (North)	Unknown	Unknown(est 1,000 Gal
21	87)		Telephone Bldg. (NE)	Unknown	Unknown(est 1,000 Gal
22	88	$4,203.00	Fire Station #2 (McClintocksburg)	#2 Fuel Oil	Unknown(est 1,000 Gal
23	89	$4,203.00	Geo. Rd. STP (Near SS Rd.)	Unknown	Unknown(est 1,000 Gal
		$355,864.00	Construction Costs Only		283,500 Including Estimates
		$20,000.00	RAI estimate of costs to dispose of current tank contents		
		$375,864.00			

This list excludes 10 DERA eligible tanks previously submitted on 1383 Report

RAVENNA ARMY AMMUNITION PLANT

RAVENNA ARSENAL, INC. UNDERGROUND STORAGE TANK REMOVAL

Consultant Engineering Services to prepare removal plan and perform analytical sampling of the tank contents	$ 20,000
Subcontract (See attached summary of removal costs estimated by the OMAHA District Corps of Engineers) To complete tank removal per approved Removal Plan	375,900
Allocated Fee	16,700
On site inspection during tank removal operations (Contract)	17,200
RAI Engineering 80 hours Subcontract Administration	4,200
TOTAL	$434,000

wctank

RAVENNA ARMY AMMUNITION PLANT

RECORD OF ENVIRONMENTAL CONSIDERATION (REC)

Ravenna Arsenal, Inc. October 11, 1989

I. PROJECT TITLE/PROPOSED PROJECT

State and Federal EPA regulations require removal of Underground Storage Tanks (UST) that have been declared abandoned.

II. PROJECT DESCRIPTION

Under 40 CFR Part 280 RVAAP has 23 USTs which meet abandoned criteria. In compliance with State and Federal EPA regulations said USTs and their appurtenances must be removed. The proposed action requires the services of a qualified contractor.

III. ANTICIPATED DATE AND/OR DURATION OF PROPOSED ACTION

Approximated to commence Dec. 1989 pending administrative process to funding request and procuring of a qualified contractor. The proposed project is expected to last two (2) to three (3) months.

IV. REASON FOR USING RECORD OF ENVIRONMENTAL CONSIDERATION

The proposed action is categorically excluded under the provisions of Categorical Exclusion (CX) A-5 and A-12, AR200-2, Appendix A (and no extraordinary circumstances exist as defined in paragraph 4-3) because subject action is in compliance with State and Federal EPA regulations pertaining to the removal of declared abandoned USTs.

T. M. CHANDA
Environmental Engineer

Oct. 11 1989
DATE

H. R. Cooper
HAROLD R. COOPER
Plant Engineer

Oct. 11, 1989
DATE

ROBERT J. KASPER
Commander's Representative/Installation
Environmental Coordinator

11 OCT 89
DATE

2WC89007.RPT

WADSWORTH/ALERT
LABORATORIES, INC.

March 8, 1990

Cardamone Construction, Inc.
4865 Chaincraft Road
Garfield Heights, OH 44125

Re: Laboratory Project # 4413
Site: Ravenna
Attn: John Cardamone

At the request of Cardamone Construction, Inc., Wadsworth/ALERT Laboratories analyzed 9 solid samples. The samples received February 21, 1990 were identified as Background Post 27 1-2', Background Freedom 1-2', Background A6 1-2', A-6 3900 Bot/side #17 West, A-6 3900 Bot/side #19 West, A-6 3900 Landfill, A-6 3900 Island, A-6 3900 Product line and A1 5000 Product line.

All samples received in the laboratory are included in the QA/QC plan which consists of laboratory blanks, check samples and spike/spike duplicate analysis on 20% of all samples by parameter.

The analysis was conducted by SW846 and EPA Methods as follows.

Parameter	Method
Total Recoverable Petroleum Hydrocarbons	SW846 9071/EPA 418.1
Metals: (Cr, Pb)	SW846 7000 Series
EP Toxicity Extraction	SW846 1310
BTEX (benzene, toluene, ethylbenzene, xylenes)	SW846 8020
Flash Point	SW846 1010
pH	SW846 9045

References:

SW846 "Test Methods for Evaluating Solid Waste Physical/Chemical Methods," Third Edition, September 1986.

EPA 600/4-79-02, "Methods for Chemical Analysis of Water and Wastes," March 1983.

ASTM 1987 Annual Book of ASTM Standards.

This report is not a complete closure report but is supplementary information required for a closure report.

If you have any questions feel free to contact Dale Mori or myself.

Very truly yours,

Wadsworth/ALERT Laboratories, Inc.

Cary E. Olson
Project Manager

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: Cardamone Construction, Inc.
LAB #: 4413-54036
MATRIX: SOLID

DATE RECEIVED: 2/21/90
DATE EXTRACTED: 3/ 6/90
DATE ANALYZED: 3/ 6/90

SAMPLE ID: BACKGROUND POST 27 1'-2

ANALYTICAL REPORT - INFRARED SPECTROSCOPY

PARAMETER	RESULT (mg/kg)	DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	15

NOTE: ND (None Detected)
J (Detected, but below quantitation limit; quantitation suspect)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : Cardamone Construction, Inc. **DATE RECEIVED:** 2/21/90
LAB #: 4413-54036
MATRIX : SOLID

SAMPLE ID : BACKGROUND POST 27 [illegible]

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Chromium	2/27- 2/28/90	11	5	mg/kg
Lead	2/27- 2/28/90	14	10	mg/kg

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: Cardamone Construction, Inc.
LAB #: 4413-54037
MATRIX: SOLID

DATE RECEIVED: 2/21/90
DATE EXTRACTED: 3/ 6/90
DATE ANALYZED: 3/ 6/90

SAMPLE ID: BACKGROUND FREEDOM 1'-2'

ANALYTICAL REPORT - INFRARED SPECTROSCOPY

PARAMETER	RESULT (mg/kg)	DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	1,600	15

NOTE: ND (None Detected)
J (Detected, but below quantitation limit; quantitation suspect)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : Cardamone Construction, Inc. **DATE RECEIVED:** 2/21/90
LAB #: 4413-54037
MATRIX : SOLID

SAMPLE ID : BACKGROUND FREEDOM 1'-2'

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Chromium	2/27- 2/28/90	7.7	5	mg/kg
Lead	2/27- 2/28/90	18	10	mg/kg

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: Cardamone Construction, Inc.
LAB #: 4413-54038
MATRIX: SOLID

DATE RECEIVED: 2/21/90
DATE EXTRACTED: 3/ 6/90
DATE ANALYZED: 3/ 6/90

SAMPLE ID: BACKGROUND A6 1'-2'

ANALYTICAL REPORT - INFRARED SPECTROSCOPY

PARAMETER	RESULT (mg/kg)	DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	15

NOTE: ND (None Detected)
J (Detected, but below quantitation limit; quantitation suspect)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : Cardamone Construction, Inc. **DATE RECEIVED:** 2/21/90
LAB #: 4413-54038
MATRIX : SOLID

SAMPLE ID : BACKGROUND A6 1'-2'

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Chromium	2/27- 2/28/90	8.9	5	mg/kg
Lead	2/27- 2/28/90	19	10	mg/kg

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: Cardamone Construction, Inc.
LAB #: 4413-54039
MATRIX: SOLID

DATE RECEIVED: 2/21/90
DATE EXTRACTED: 3/ 6/90
DATE ANALYZED: 3/ 6/90

SAMPLE ID: A-6 3900 BOT/SIDE #17 WEST

ANALYTICAL REPORT - INFRARED SPECTROSCOPY

PARAMETER	RESULT (mg/kg)	DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	22	15

NOTE: ND (None Detected)
J (Detected, but below quantitation limit; quantitation suspect)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : Cardamone Construction, Inc. **DATE RECEIVED:** 2/21/90
LAB #: 4413-54039
MATRIX : SOLID

SAMPLE ID : A-6 3900 BOT/SIDE #17 WEST

METALS ANALYTICAL REPORT
SELECTED LIST

Leachate testing in accordance with USEPA Manual SW846 Method 1310

EP EXTRACTION DATE: 2/23/90

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Chromium	2/26- 2/28/90	ND	0.05	mg/l
Lead	2/26/90	ND	0.1	mg/l

NOTE: ND (None Detected)

Initial pH	8.6	su
Final pH	5.0	su
Amount of acetic acid used per method	100	ml

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: Cardamone Construction, Inc.
LAB #: 4413-54039
MATRIX: SOLID

DATE RECEIVED: 2/21/90
DATE EXTRACTED: 2/28/90
DATE ANALYZED: 2/28/90

SAMPLE ID: A-6 3900 BOT/SIDE #17 WEST

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (mg/kg)	DETECTION LIMIT
Xylenes	ND	0.2
Benzene	ND	0.2
Toluene	ND	0.2
Ethylbenzene	ND	0.2

NOTE: ND (None Detected)
J (Detected, but below quantitation limit; quantitation suspect)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: Cardamone Construction, Inc.
LAB #: 4413-54040
MATRIX: SOLID

DATE RECEIVED: 2/21/90
DATE EXTRACTED: 3/ 6/90
DATE ANALYZED: 3/ 6/90

SAMPLE ID: A-6 3900 BOT/SIDE #19 WEST

ANALYTICAL REPORT - INFRARED SPECTROSCOPY

PARAMETER	RESULT (mg/kg)	DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	15

NOTE: ND (None Detected)
J (Detected, but below quantitation limit; quantitation suspect)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : Cardamone Construction, Inc. **DATE RECEIVED:** 2/21/90
LAB #: 4413-54040
MATRIX : SOLID

SAMPLE ID : A-6 3900 BOT/SIDE #19 WEST

METALS ANALYTICAL REPORT
SELECTED LIST

Leachate testing in accordance with USEPA Manual SW846 Method 1310

EP EXTRACTION DATE: 2/23/90

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Chromium	2/26- 2/28/90	ND	0.05	mg/l
Lead	2/26/90	ND	0.1	mg/l

NOTE: ND (None Detected)

Initial pH	8.4	su
Final pH	5.1	su
Amount of acetic acid used per method	37	ml

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: Cardamone Construction, Inc.
LAB #: 4413-54040
MATRIX: SOLID

DATE RECEIVED: 2/21/90
DATE EXTRACTED: 2/28/90
DATE ANALYZED: 2/28/90

SAMPLE ID: A-6 3900 BOT/SIDE #19 WEST

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (mg/kg)	DETECTION LIMIT
Xylenes	ND	0.2
Benzene	ND	0.2
Toluene	ND	0.2
Ethylbenzene	ND	0.2

NOTE: ND (None Detected)
J (Detected, but below quantitation limit; quantitation suspect)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : Cardamone Construction, Inc. **DATE RECEIVED:** 2/21/90
LAB #: 4413-54041
MATRIX : SOLID

SAMPLE ID : A-6 3900 LANDFILL

ANALYTICAL REPORT

PARAMETER	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Flash Point (PMCC)	3/ 5/90	>210		Deg.F
pH	2/21/90	8.5		su

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: Cardamone Construction, Inc.
LAB #: 4413-54041
MATRIX: SOLID

DATE RECEIVED: 2/21/90
DATE EXTRACTED: 3/ 6/90
DATE ANALYZED: 3/ 6/90

SAMPLE ID: A-6 3900 LANDFILL

ANALYTICAL REPORT - INFRARED SPECTROSCOPY

PARAMETER	RESULT (mg/kg)	DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	76	15

NOTE: ND (None Detected)
J (Detected, but below quantitation limit; quantitation suspect)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : Cardamone Construction, Inc. **DATE RECEIVED:** 2/21/90
LAB #: 4413-54041
MATRIX : SOLID

SAMPLE ID : A-6 3900 LANDFILL

METALS ANALYTICAL REPORT
SELECTED LIST

Leachate testing in accordance with USEPA Manual SW846 Method 1310

EP EXTRACTION DATE: 2/23/90

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Chromium	2/26- 2/28/90	ND	0.05	mg/l
Lead	2/26/90	ND	0.1	mg/l

NOTE: ND (None Detected)

Initial pH	8.7	su
Final pH	5.0	su
Amount of acetic acid used per method	80	ml

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: Cardamone Construction, Inc.
LAB #: 4413-54041
MATRIX: SOLID

DATE RECEIVED: 2/21/90
DATE EXTRACTED: 2/28/90
DATE ANALYZED: 2/28/90

SAMPLE ID: A-6 3900 LANDFILL

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (mg/kg)	DETECTION LIMIT
Xylenes	ND	0.2
Benzene	ND	0.2
Toluene	ND	0.2
Ethylbenzene	ND	0.2

NOTE: ND (None Detected)
J (Detected, but below quantitation limit; quantitation suspect)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: Cardamone Construction, Inc.
LAB #: 4413-54042
MATRIX: SOLID

DATE RECEIVED: 2/21/90
DATE EXTRACTED: 3/ 6/90
DATE ANALYZED: 3/ 6/90

SAMPLE ID: A-6 3900 ISLAND

ANALYTICAL REPORT - INFRARED SPECTROSCOPY

PARAMETER	RESULT (mg/kg)	DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	16	15

NOTE: ND (None Detected)
J (Detected, but below quantitation limit; quantitation suspect)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : Cardamone Construction, Inc. **DATE RECEIVED:** 2/21/90
LAB #: 4413-54042
MATRIX : SOLID

SAMPLE ID : A-6 3900 ISLAND

METALS ANALYTICAL REPORT
SELECTED LIST

Leachate testing in accordance with USEPA Manual SW846 Method 1310

EP EXTRACTION DATE: 2/23/90

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Chromium	2/26- 2/28/90	ND	0.05	mg/l
Lead	2/26/90	ND	0.1	mg/l

NOTE: ND (None Detected)

Initial pH	7.6	su
Final pH	5.1	su
Amount of acetic acid used per method	16	ml

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: Cardamone Construction, Inc.
LAB #: 4413-54042
MATRIX: SOLID

DATE RECEIVED: 2/21/90
DATE EXTRACTED: 2/28/90
DATE ANALYZED: 2/28/90

SAMPLE ID: A-6 3900 ISLAND

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (mg/kg)	DETECTION LIMIT
Xylenes	ND	0.2
Benzene	ND	0.2
Toluene	ND	0.2
Ethylbenzene	ND	0.2

NOTE: ND (None Detected)
J (Detected, but below quantitation limit; quantitation suspect)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: Cardamone Construction, Inc.
LAB #: 4413-54043
MATRIX: SOLID

DATE RECEIVED: 2/21/90
DATE EXTRACTED: 3/ 6/90
DATE ANALYZED: 3/ 6/90

SAMPLE ID: A-6 3900 PRODUCT LINE

ANALYTICAL REPORT - INFRARED SPECTROSCOPY

PARAMETER	RESULT (mg/kg)	DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	15

NOTE: ND (None Detected)
J (Detected, but below quantitation limit; quantitation suspect)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : Cardamone Construction, Inc. **DATE RECEIVED:** 2/21/90
LAB #: 4413-54043
MATRIX : SOLID

SAMPLE ID : A-6 3900 PRODUCT LINE

METALS ANALYTICAL REPORT
SELECTED LIST

Leachate testing in accordance with USEPA Manual SW846 Method 1310

EP EXTRACTION DATE: 2/23/90

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Chromium	2/26- 2/28/90	ND	0.05	mg/l
Lead	2/26/90	ND	0.1	mg/l

NOTE: ND (None Detected)

Initial pH	8.3	su
Final pH	5.0	su
Amount of acetic acid used per method	45	ml

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: Cardamone Construction, Inc.
LAB #: 4413-54043
MATRIX: SOLID

DATE RECEIVED: 2/21/90
DATE EXTRACTED: 2/28/90
DATE ANALYZED: 2/28/90

SAMPLE ID: A-6 3900 PRODUCT LINE

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (mg/kg)	DETECTION LIMIT
Xylenes	ND	0.2
Benzene	ND	0.2
Toluene	ND	0.2
Ethylbenzene	ND	0.2

NOTE: ND (None Detected)
J (Detected, but below quantitation limit; quantitation suspect)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: Cardamone Construction, Inc.
LAB #: 4413-54044
MATRIX: SOLID

DATE RECEIVED: 2/21/90
DATE EXTRACTED: 3/ 6/90
DATE ANALYZED: 3/ 6/90

SAMPLE ID: A1 5000 PRODUCT LINE 1

ANALYTICAL REPORT - INFRARED SPECTROSCOPY

PARAMETER	RESULT (mg/kg)	DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	15

NOTE: ND (None Detected)
J (Detected, but below quantitation limit; quantitation suspect)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : Cardamone Construction, Inc. **DATE RECEIVED:** 2/21/90
LAB #: 4413-54044
MATRIX : SOLID

SAMPLE ID : A1 5000 PRODUCT LINE

METALS ANALYTICAL REPORT
SELECTED LIST

Leachate testing in accordance with USEPA Manual SW846 Method 1310

EP EXTRACTION DATE: 2/23/90

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Chromium	2/26- 2/28/90	ND	0.05	mg/l
Lead	2/26/90	ND	0.1	mg/l

NOTE: ND (None Detected)

Initial pH	8.5	su
Final pH	4.9	su
Amount of acetic acid used per method	25	ml

Removal and Disposal of Used Underground Petroleum Storage Tanks

API RECOMMENDED PRACTICE 1604
SECOND EDITION, DECEMBER 1987

American Petroleum Institute
1220 L Street, Northwest
Washington, D.C. 20005

March 6, 1989

SUPPLEMENT TO RECOMMENDED PRACTICE 1604 ON REMOVAL AND DISPOSAL OF USED UNDERGROUND PETROLEUM STORAGE TANKS (Second Edition, December 1987)

On September 23, 1988, the United States Environmental Protection Agency issued its Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST). These standards, which will be Part 280 of Volume 40 of the Code of Federal Regulations, were published in Volume 53 of the Federal Register at pages 37194-212.

The EPA Technical Standards deal with removal and disposal of used USTs, among other topics. Consequently, some changes in Recommended Practice 1604 are called for. This Supplement contains revisions that will be included in the next edition.

SPECIFIC REVISIONS TO RECOMMENDED PRACTICE 1604

Unnumbered Page -- Foreword

Delete the third paragraph in the Foreword and substitute the following material:

> On September 23, 1988, the United States Environmental Protection Agency issued its Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST). These standards, which will be Part 280 of Volume 40 of the Code of Federal Regulations, were published in Volume 53 of the Federal Register at pages 37194-212. Furthermore, legislation and regulations on all aspects of UST management are under active development at state and local levels. These levels may have requirements other than those specified in the EPA Technical Standards, and the appropriate government agencies should be consulted about regulations that apply in the geographic area of interest before any action suggested by this Recommended Practice is taken. When used in this document, the term "implementing agency" means EPA or the designated state or local agency responsible for carrying out an approved UST program.
>
> This Recommended Practice is based upon the experience of knowledgeable members of the petroleum industry. In some respects it may be more stringent than the requirements imposed by the Technical Standards. However, the Recommended Practice does not attempt to cover all of the subjects covered by the EPA Technical Standards. Furthermore, while substantial effort has been made to ensure that none of the recommendations contravene the requirements of the Technical Standards, API is not undertaking to interpret the Standards and cannot guarantee that its recommendations are completely in accord. Nor is any representation made that these recommendations conform with any requirements imposed by state and local agencies.
>
> This edition of API Recommended Practice 1604 supersedes API Recommended Practice 1604, Second Edition, December 1987. The EPA Technical Standards provide that Recommended Practice 1604 can be used as a guide to compliance with EPA's requirements governing closure of USTs. According to EPA, an owner or operator conforms with this provision of the Standards if it uses the 1987 edition, which was in force when the Standards became final. However, an owner or operator who uses this

amended version will also be meeting the requirements of the 1987 edition, and EPA encourages the use of the most recent version.

Table of Contents

Change SECTIONS 3 and 4 to read as follows:

SECTION 3 - PERMANENT CLOSURE AND CHANGE OF SERVICE
3.1 General Requirements
3.2 Disposal in Place
3.3 Removal of Underground Tanks
3.4 Change of Service

Renumber SECTIONS 5, 6, and 7 to SECTIONS 4, 5, and 6.

Page 2

In subsection 1.3.1.1 Benzene, delete all material starting with the fourth sentence in the paragraph ("The American Conference . . . ") to the end of the paragraph and substitute the following:

The Occupational Safety and Health Administration (OSHA) imposes limits on occupational exposure. See 29 C.F.R. 1910.1000, Table Z-2, and 1910.1028.

Page 3

Delete the material under Section 2.1 Applicability and substitute the following:

An UST is considered temporarily out of service if it is:
a. Idle but will be returned to service;
b. Awaiting abandonment in place; or
c. Awaiting removal.
An UST that meets EPA's standards for new tanks or that has been upgraded in accord with EPA requirements can remain in the status of "temporarily out of service" indefinitely. An UST that does not meet EPA standards must be permanently removed from service after 12 months unless the implementing agency grants an extension. A site assessment must be completed before an extension can be applied for.

Add the following sentence to Section 2.2 Securing Tank Systems, subsection b.2.:

(If more than 2.5 centimeters (1 inch) of residue or more than 0.3 percent of the capacity of the system remain in

the tank, then release detection measures must be continued.)

Add a new major title SECTION 3 -- PERMANENT CLOSURE AND CHANGE OF SERVICE, and insert the following sections:

3.1 General Requirements

3.1.1 Applicability

Permanent closure of an UST can take place through abandonment in place or removal from the ground. A change of service (that is, conversion of the UST to storage of a non-regulated substance) should also be subject to many of the safeguards that apply to permanent closure.

3.1.2 Notification

The implementing agency must be notified at least 30 days before permanent closure or change of service is begun.

3.1.3 Site Assessment

Following notification, but before closure or change of service is completed, a site assessment must measure for the presence of a release at those places where contamination is most likely to be found. If the UST has been subject to release detection in the form of vapor monitoring, ground water monitoring, interstitial monitoring (in the form of monitoring between the walls of double wall tanks or observation wells), and if no release is indicated, then further site assessment is not necessary.

3.1.4 Corrective Action

If the site assessment indicates that a release(s) has occurred, then appropriate further evaluation and corrective action must be undertaken. See API Publication 1628.

3.1.5 Recordkeeping

Records demonstrating compliance with closure requirements must be maintained. The results of any site assessment of the excavation must be maintained for at least three years. These records can be kept by the owners and operators who took the tank out of service, by the current owners of the site, or by mailing the records to the implementing agency.

Change "SECTION 3 -- DISPOSAL IN PLACE" to "Section 3.2 Disposal in Place," and renumber the subsections accordingly.

Page 4

Insert the following material after the first sentence of present subsection 3.2.4 [renumbered to be 3.2.2.4]:

> During removal of liquids or residues from a tank it is likely that air will enter the tank, and may bring the tank atmosphere into the flammable range. Extra care should be taken during removal operations. For a complete description of safety precautions, refer to API Publication 2015.

Page 5

Change "SECTION 4 -- REMOVAL OF UNDERGROUND TANKS" to "Section 3.3 Removal of Underground Tanks," and renumber the subsections accordingly.

Page 7

Delete the present section 4.4.3 [renumbered to be 3.3.4.3] and substitute the following:

> Present 4.4.3 [Renumbered to be 3.3.4.3] When an existing USTS is partially or totally removed, a small amount of contaminated backfill may be encountered. Backfill can be contaminated by minor spills and drips during previous operation of the facility or by minor spills and drips during removal of equipment, despite efforts to drain and pump product from the equipment before removal. If severe contamination has occurred, local environmental officials and/or fire officials should be notified. Local officials may require isolation and special handling and/or disposal of contaminated backfill materials (see API Publication 1628). The implementing agency should be consulted about any requirements concerning notification, site assessment, or corrective action.

Page 8

Insert a new "Section 3.4 Change of Service" and add the following material:

> 3.4.1 Before a change of service, the UST must be emptied and cleaned.

3.4.2 Any new service should be compatible with the former service. The precautions described in sections [old numbers] 4.4.4 and 4.4.5, above, should be observed.

Pages 8-9

Renumber SECTIONS 5, 6, and 7 as SECTIONS 4, 5, and 6, and renumber subsections accordingly.

Removal and Disposal of Used Underground Petroleum Storage Tanks

Marketing Department

API RECOMMENDED PRACTICE 1604
SECOND EDITION, DECEMBER 1987

American
Petroleum
Institute

SPECIAL NOTES

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FOREWORD

Underground storage tank systems that have held flammable or combustible liquids should be handled with extreme care during disposal in place, removal, storage, or disposal off site. This is particularly true of underground storage tanks at motor vehicle refueling facilities which are most frequently used for storage of motor fuel or other petroleum products.

The purpose of this recommended practice is to provide procedures for the disposal in place, removal, storage, and the off-site disposal or sale of used underground tanks that have contained flammable or combustible liquids. Although this guide specifically addresses underground storage tank systems at service station facilities, the principles outlined may be applied to similar systems used at other petroleum facilities.

At the time this recommended practice was written, legislation and regulations related to the operation, maintenance, disposal, and removal of underground petroleum storage systems were under development at the federal, state, and municipal levels. The appropriate government agencies should therefore be consulted about regulations that apply to the geographic area of interest before any action suggested in this recommended practice is taken. API will revise this recommended practice from time to time in an effort to ensure consistency with all applicable federal regulations. This edition of API Recommended Practice 1604 supersedes API Publication 1604, *Recommended Practice for the Abandonment and Removal of Used Underground Service Station Systems* (First Edition, 1981) in its entirety.

Suggested revisions are invited and should be submitted to the Director of the Marketing Department, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005.

CONTENTS

Removal and Disposal of Used Underground Petroleum Storage Tanks

SECTION 1—GENERAL

1.1 Introduction

Underground petroleum storage systems that are no longer needed or suitable for product storage must be properly disposed in place or removed in order to avoid future safety or environmental hazards. Because of the nature of the flammable or combustible liquids that are stored in these tanks, hazardous conditions may arise in the work area during disposal in place or removal and subsequent handling of tanks. For this reason, all personnel involved in the procedures outlined in this recommended practice should be familiar with the potential hazards, and be knowledgeable in the appropriate health and safety measures needed to ensure a safe working environment.

1.2 Scope and Purpose

1.2.1 This publication recommends procedures for the disposal in place, removal, storage, and off-site disposal of underground storage tank systems that have contained flammable or combustible fluids. In general, it outlines requirements, procedures, and operating conditions to be followed by contractors, engineers, or other individuals who may be involved in these practices. While this recommended practice specifically addresses underground petroleum storage tank systems at service station facilities, the principles outlined may be applied to similar systems used at other petroleum storage facilities. All such work must be accomplished in accordance with federal, state, and local requirements as well as accepted safety standards. Before initiating work, the appropriate government agencies should be consulted concerning applicable regulatory and permit requirements.

1.2.2 All applicable permits must be obtained prior to beginning any work. Where required, contractors must be approved by local authorities. Contractors, subcontractors, and their employees responsible for tank abandonment or removal should be familiar with: (a) all applicable safety rules and regulations, (b) the use of equipment and procedures for testing and vapor-freeing tanks, (c) the handling and disposal of the types of wastes likely to be encountered, and (d) the applicable sections of the publications referenced in 1.4.

1.2.3 The procedures outlined in this recommended practice can be carried out without the need to enter the tank. Should tank entry be desired, the procedures outlined in API Publications 2015, 2015A, and 2217 and Recommended Practice 1631 should be followed.

1.3 Special Precautions

During the course of underground storage tank removal or in place disposal, workers may be exposed to petroleum hydrocarbon liquids, vapors, or wastes. The precautions in 1.3.1 and 1.3.2 should be observed by all individuals engaged in the procedures discussed in this recommended practice.

1.3.1 TOXICITY CONSIDERATIONS: PETROLEUM SUBSTANCES

Users should be aware of appropriate health precautions. When high concentrations of petroleum hydrocarbon vapors are inhaled, symptoms of intoxication may result. These symptoms, ranging from simple dizziness to excitement or unconsciousness, are similar to those produced by alcohol or anesthetic gases. If such effects occur, the individual should be removed to fresh air. For minor effects of exposure, breathing fresh air or oxygen results in rapid recovery. If breathing has stopped, artificial respiration should be applied promptly. Medical attention should be obtained as soon as possible. Paragraphs 1.3.1.1 and 1.3.1.2 contain special toxicity considerations for benzene and tetraethyl lead, which may be present in petroleum products or wastes found in underground storage tanks. Care should be exercised to minimize exposure to these substances when they are present during the handling of used underground petroleum storage tanks.

WARNING: Tests have shown that prolonged or repeated exposure to some petroleum substances, in liquid or vapor form, may cause serious illness, including cancer, in laboratory animals. Although the significance of these test results to human health is not fully understood, exposure to petroleum substances should be minimized. The following health precautions are suggested:

a. Avoid skin contact and inhaling vapors.

b. Keep petroleum liquids away from eyes, skin, and mouth; they can be harmful or fatal if inhaled, absorbed through the skin, or ingested.
c. Use soap and water or waterless hand cleaner to remove any petroleum product that contacts skin. Do not use gasoline or similar solvents to remove oil and grease from skin.
d. Promptly wash petroleum-soaked clothes and avoid using soaked leather goods. Properly dispose of rags.
e. Keep work areas clean and well ventilated.
f. Clean up spills promptly.

1.3.1.1 Benzene

High occupational exposures to benzene have been associated with various human blood disorders, including an increased risk of leukemia. Very high levels have also been known to affect the central nervous system. Benzene administered by mouth has induced cancer in laboratory animals in long-term tests. Benzene is rapidly absorbed through the skin. The American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit value (TLV) for benzene is 1-part-per-million time-weighted average, with a short term exposure limit of 25 parts-per-million (the latter is designated for deletion in 1986 or 1987). The Occupational Safety and Health Administration (OSHA) 8-hour time-weighted average for benzene is 10 parts-per-million with an acceptable ceiling concentration of 25 parts-per-million and an acceptable peak of 50 parts-per-million for 10 minutes (29 CFR 1910.1000, Table Z-2). OSHA conducted a rulemaking in 1986 with the intent to revise this standard. The latest OSHA *Occupational Safety and Health Standards* should be consulted to determine the current TLV.

1.3.1.2 Tetraethyl Lead

This organic form of lead can cause diseases of the central and peripheral nervous system, the kidney and the blood. Skin absorption of this compound is a major route of entry into the body. The ACGIH time-weighted average is 0.1 milligrams per cubic meter for general room air. The TLV in OSHA's *Occupational Safety and Health Standards* (29 CFR 1910.1000, Table Z-1) is 0.075 milligrams per cubic meter.

1.3.2 FLAMMABILITY AND COMBUSTIBILITY CONSIDERATIONS

1.3.2.1 Flammable or combustible vapors are likely to be present in the work area. The concentration of vapors in the tank, the excavation, or the work area may reach the flammable (explosive) range before venting is completed and a safe atmosphere is reached. Therefore, precautions must be taken to: (a) eliminate all potential sources of ignition from the area (for example, smoking materials, nonexplosion-proof electrical and internal combustion equipment), (b) prevent the discharge of static electricity during venting of flammable vapors, and (c) prevent the accumulation of vapors at ground level. Refer to API Publication 2015 and Recommended Practice 2003 for general precautionary measures to follow during the vapor-freeing procedure.

1.3.2.2 A combustible gas indicator (CGI) should be used to check for hazardous vapor concentrations (see 4.3). All open flame and spark-producing equipment within the vapor hazard area should be shut down. Electrical equipment (for example, pumps and portable hand tools) used in the area must be explosion-proof in accordance with NFPA 70B Class I, Division I, Group D or otherwise approved for use in potentially explosive atmospheres.

1.4 Referenced Publications

Portions of the following documents contain information regarding various engineering and safety procedures that may be applicable to underground storage tank removal or disposal.

API	
Bull 1628	*Underground Spill Cleanup Manual*
RP 1631	*Interior Lining of Underground Storage Tanks*
RP 2003	*Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents*
Publ 2015	*Cleaning Petroleum Storage Tanks*
Publ 2015A	*A Guide for Controlling the Lead Hazard Associated with Tank Entry and Cleaning* (Supplement to API Publ 2015)
Publ 2217	*Guidelines for Confined Space Work in the Petroleum Industry*
Publ 2219	*Safe Operating Guidelines for Vacuum Trucks in Petroleum Service*
NFPA[1]	
327	*Standard Procedure for Cleaning or Safeguarding Small Tanks and Containers*
70B	*Electrical Equipment Maintenance*

[1]National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269.

OSHA[2]

Occupational Safety and Health Standards (29 CFR 1910.1000)

EPA[3]

General Regulations for Hazardous Waste Management (40 CFR 260)

Regulations for Identifying Hazardous Waste (40 CFR 261)

Regulations for Hazardous Waste Generators (40 CFR 262)

Underground Storage Tanks Regulations (40 CFR 280.11, 280.22)

SECTION 2—TEMPORARILY OUT OF SERVICE

2.1 Applicability

Underground petroleum storage tank systems are considered temporarily out of service if they are: (a) idle but will be returned to service within one year, (b) are awaiting abandonment in place, or (c) are awaiting removal.

2.2 Securing Tank Systems

Tanks temporarily out of service must be properly secured for the period they will be out of service. Tanks may be considered properly secured if processed as follows:

a. Observe all special precautions described in 1.3 through 1.3.2.2.

b. Remove stored product from the tank using one of the following methods:

1. Drain all product lines into the tank, then remove all liquids from the tank.
2. Remove all flammable or combustible liquids with the exception of a sufficient quantity (approximately four inches) to assure a saturated vapor space.
3. When high water table or flooding conditions exist, remove all stored liquid and ballast the tank by filling with water.

c. Cap the fill pipe, gauge pipe, tank truck vapor recovery fitting, and vapor return. Secure the tank against tampering.

d. Cap the product lines at the service station island, or elsewhere if the pumps are removed, or leave the pumps connected and locked. Disconnect electric power to the pumps.

e. Leave the vent line open.

f. Consult the appropriate local, state, or federal agencies concerning regulatory notification requirements.

SECTION 3—DISPOSAL IN PLACE

3.1 Criteria for Disposal in Place

3.1.1 This section describes a safe method for the in place disposal of underground tanks. Removal of the tank is preferred (see Section 4). Disposal of the tank in place should be considered in the following circumstances: (a) because of the tank location adjacent equipment or structures may be damaged or weakened if the tank is removed, (b) removal may be physically impossible, or (c) removal may incur excessive costs. A determination of whether to dispose of a tank in place or to remove it will depend upon: (a) local regulations which may prohibit abandonment in place, (b) the location of the facility and tank, (c) the availability of equipment, and (d) cost. Additional considerations include the length of service the equipment has provided and its reuse or salvage value.

3.1.2 The federal *Resource Conservation and Recovery Act* (RCRA) (40 CFR 260-265) places restrictions on disposal of certain residues that may be present in some underground storage tanks. Residues from tanks that have held leaded gasoline should be treated with extreme caution. Lead compounds and other residues in the tank may be classified as hazardous wastes. All liquids and residues removed from the tank should be handled in accordance with appropriate federal, state, and local regulations. Product removed from the tank can usually be reused or recycled.

3.2 Procedures for Disposal in Place

3.2.1 Tanks may be effectively and safely disposed in place by using the procedures in 3.2.2 through 3.2.11.

[2]Occupational Safety and Health Administration, U.S. Department of Labor, Washington, D.C. 20402.

[3]U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460.

3.2.2 Observe the special precautions described in 1.3 through 1.3.2.2.

3.2.3 Drain product piping into the tank, being careful to avoid any spillage to the excavation area. Disconnect product piping from the tank, and cap or remove the piping.

3.2.4 Remove liquids and residues from the tank by using explosion-proof or air-driven pumps. Pump motors and suction hoses must be bonded to the tank or otherwise grounded to prevent electrostatic ignition hazards. It may be necessary to use a hand pump to remove the last few inches of liquid from the bottom of the tank. If a vacuum truck is used for removal of liquids or residues, the area of operation for the vacuum truck must be vapor-free. The truck should be located upwind from the tank and outside the path of probable vapor travel. The vacuum pump exhaust gases should be discharged through a hose of adequate size and length downwind of the truck and tank area. See API Publication 2219 for vacuum truck operating and safety practices.

3.2.5 Excavate to the top of the tank.

3.2.6 Remove the drop tube, fill pipe, gauge pipe, vapor recovery truck connection, submersible pumps, and other tank fixtures. Cap or remove all non-product lines, such as vapor recovery lines, except for the vent line. The vent line should remain connected until the tank is purged (see 4.2.2 through 4.2.7). Temporarily plug all other tank openings.

3.2.7 Purge the tank of flammable vapors. This may be accomplished using methods outlined in 4.2.2 through 4.2.7. Vent all vapors a minimum of 12 feet above grade and 3 feet above any adjacent roof lines. Monitor the tank for flammable vapor with a combustible gas indicator until the tank atmosphere has been brought to less than 20 percent of the lower flammable limit (see 4.3).

3.2.8 One or more holes may be cut in the tank top if existing tank openings are not adequate for introduction of the inert material to be used to fill the tank.

3.2.9 Proceed to introduce a suitable solid inert material through openings in the top of the tank. It is important to fill the tank as full as possible with the sand or other inert material. The procedures in 3.2.9.1 through 3.2.9.3 are intended to minimize any surface settling subsequent to disposal of the tank in place.

3.2.9.1 Sand will flow readily and is generally available. Any kind of sand is suitable if it is free of rocks, which might limit leveling-out in the tank. The sand may be introduced dry as long as it flows in freely. When the sand cone nears the top of the tank, the sand can be washed into the tank with a nominal amount of water and puddled to cause it to flow to the ends. The use of larger amounts of water should be avoided since the tank might be filled with water before it is filled with sand.

3.2.9.2 Almost complete filling of the tank can be achieved by using a combination of sand and earth. Fill the tank with sand to approximately 80 percent of calculated capacity. Mix soil and water to make a free-flowing mud and pour the mixture into the tank opening. Puddle the mixture until the tank is full and overflows the fill opening.

3.2.9.3 Other types of inert materials, slurries, or expandable materials such as polyurethane-type foams may be used when approved by regulatory officials.

3.2.10 After the tank is filled with an inert material, all tank openings should be plugged or capped unless it was necessary to cut open the tank top (see 3.2.8).

3.2.11 Disconnect and cap or remove the vent line.

3.3 Recordkeeping

3.3.1 When underground tanks are disposed in place, the owner of the tank should keep a permanent record of the tank location, the date of disposal in place, and the method of conditioning the tank for disposal. All local, state, and federal regulatory requirements for tank disposal/closure and notification must be observed.

3.3.2 It is recommended that the tank owner inform a potential buyer of the presence of abandoned underground tanks when properties are sold. A property owner should also be informed at the termination of the property lease. In some areas this may be a regulatory requirement. It may be desirable to obtain an acknowledgement or a release from the property owner.

SECTION 4—REMOVAL OF UNDERGROUND TANKS

4.1 Preparation

4.1.1 Observe the special safety precautions in 1.3 through 1.3.2.2.

4.1.2 Drain product piping into the tank, being careful to avoid any spillage. Cap or remove product piping.

4.1.3 Remove residues and liquids from the tank as described in 3.2.4. Also observe the restrictions in 3.1.2.

4.1.4 Excavate to the top of tank.

4.1.5 Remove the fill pipe, gauge pipe, vapor recovery truck connection, submersible pumps, and other tank fixtures. Remove the drop tube, except when it is planned to vapor-free the tank by using an eductor as in 4.2.5. Cap or remove all non-product lines, such as vapor recovery lines, except the vent line. The vent line should remain connected until the tank is purged. Temporarily plug all other tank openings so that all vapors will exit through the vent line during the vapor-freeing process.

4.2 Purging

4.2.1 Remove flammable vapors by one of the methods described in 4.2.2 through 4.2.7, or as required by local codes. These methods provide a means for temporary vapor-freeing of the tank atmosphere. However, it is important to recognize that the tank may continue to be a source of flammable vapors even after following the vapor-freeing procedures described in 4.2.2 through 4.2.7. For this reason, caution must always be exercised when handling or working around tanks that have stored flammable or combustible liquids. Before initiating work in the tank area or on the tank, a combustible gas indicator should be used to assess vapor concentrations in the tank and work area.

4.2.2 Vent all vapors from the tank at a minimum height of 12 feet above grade and 3 feet above any adjacent roof lines until the tank is purged of flammable vapors. The work area should be free from sources of ignition (see 1.3.2).

4.2.3 Flammable and combustible vapors may be purged with an inert gas such as carbon dioxide (CO_2) or nitrogen (N_2). This method should not be utilized if the tank is to be entered for any reason, as the tank atmosphere will be oxygen deficient. The inert gas should be introduced through a single tank opening at a point near the bottom of the tank at the end of the tank opposite the vent. When inert gases are used, they should be introduced under low pressure to avoid the generation of static electricity. When using CO_2 or N_2, pressures in the tank should not exceed 5 pounds per square inch gauge.

CAUTION: The process of introducing compressed gases into the tank may create a potential ignition hazard as the result of the development of static electrical charges. The discharging device must therefore be grounded. Explosions have resulted from the discharging of CO_2 fire extinguishers into tanks containing a flammable vapor-air mixture. CO_2 extinguishers should not be used for inerting flammable atmospheres.

4.2.4 If the method described in 4.2.3 is not practical, the vapors in the tank may be displaced by adding solid carbon dioxide (dry ice) to the tank in the amount of at least 1.5 pounds per 100 gallons of tank capacity. The dry ice should be crushed and distributed evenly over the greatest possible area in the tank to promote rapid evaporation. As the dry ice vaporizes, flammable vapors will flow out of the tank and may surround the area. Therefore, where practical, plug all tank openings except the vent after introducing the solid CO_2 and continue to observe all normal safety precautions regarding flammable or combustible vapors. Make sure that all of the dry ice has evaporated before proceeding.

CAUTION: Skin contact with dry ice may produce burns.

4.2.5 Flammable vapors may be exhausted from the tank by one of two methods of tank ventilation listed below:

a. Ventilation using an eductor-type air mover usually driven by compressed air is illustrated in Figure 1. The eductor-type air mover must be properly bonded to prevent the generation and discharge of static electricity. When using this method, the fill (drop) tube should remain in place to ensure ventilation at the bottom of the tank. Tanks equipped with fill (drop) tubes that are not removable should be purged by this method. An eductor extension shall be used to discharge vapors a minimum of 12 feet above grade.

b. Ventilation with a diffused air blower is illustrated in Figure 2. When using this purging method, it is imperative that the air-diffusing pipe is properly bonded to prevent the discharge of a spark. Fill (drop) tubes must be removed to allow proper diffusion of the air in the tank. Air supply should be from a compressor that has been checked to ensure a clean air supply and is free

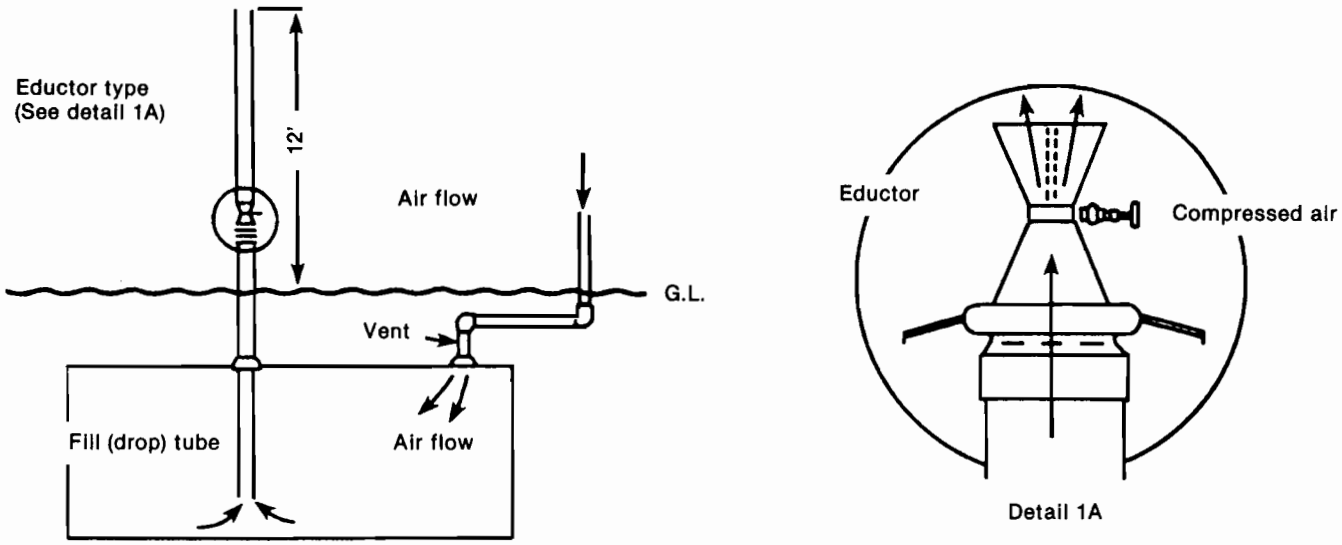
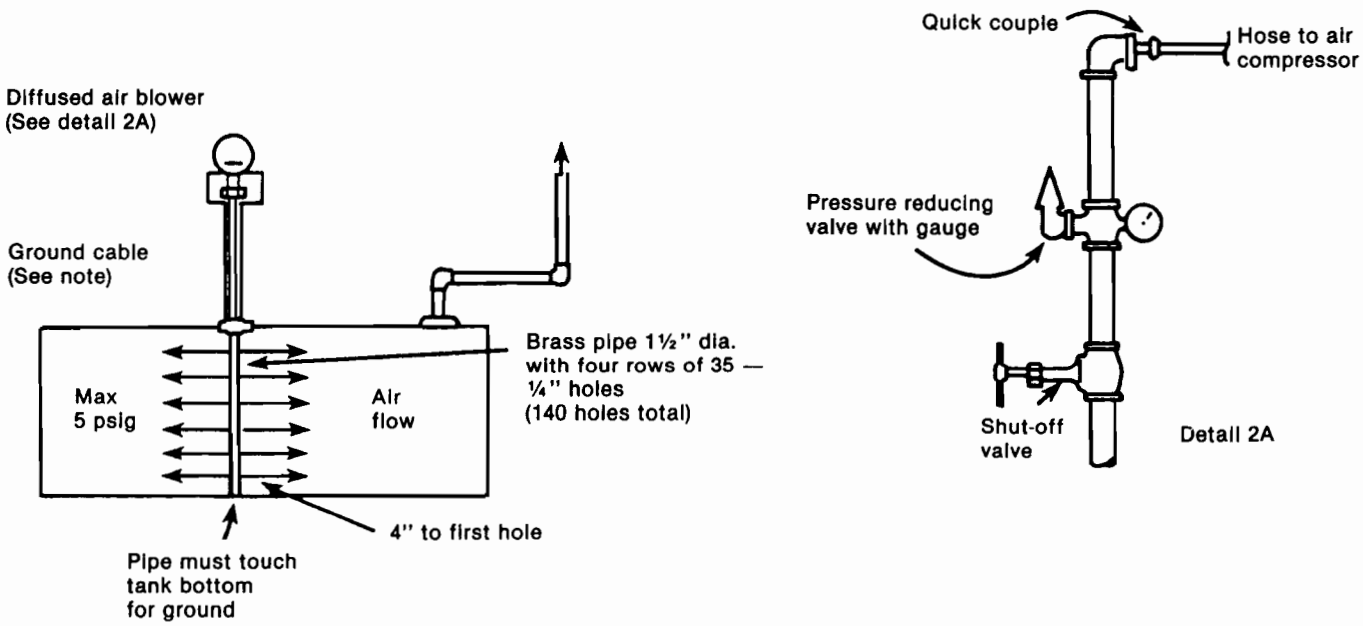


Figure 1—Eductor-Type Air Mover



Note: Ground cable brazed to pipe must be clamped to fill pipe. Use 12 gauge ground wire from fill pipe to water pipe or ground rod.

Figure 2—Diffused Air Blower

from volatile vapors. Air pressure in the tank must not exceed 5 pounds per square inch gauge.

4.2.6 One of the safest and simplest methods for vapor-freeing a tank is to fill the tank with water. However, in certain areas, regulatory requirements for treatment/disposal of water used in the vapor-freeing process may make this method cost-prohibitive. Before employing the method described in 4.2.6.1 through 4.2.6.3, consult local regulations.

4.2.6.1 Fill the tank with water until the floating product nears the fill opening. Remove the floating product and place it in a suitable container for proper disposal. Care should be exercised to ensure that neither product nor water is spilled into the tank excavation.

4.2.6.2 In the process of filling the tank with water, flammable vapors will be expelled through both the vent and fill openings, but primarily at the fill opening. Normal safety precautions should be observed. To minimize this escape of vapor through the fill opening, the opening may be temporarily capped.

4.2.6.3 When the tank is free of vapor, pump out the water and dispose of it in accordance with local regulations.

4.2.7 Steam can be used to clean and vapor-free a tank. However, a large static charge can build up on the nozzle of the steam jet. Insulated objects on which the steam impinges can also become charged. If steam is to be used for either purging or cleaning a tank or other equipment, the steam discharge nozzle and all conductive insulated objects subject to impingement or condensation should be bonded to the tank or be grounded. Steam purging of tanks should be avoided when suitable alternatives are available. Further reference to steam cleaning of tanks is found in NFPA 327.

4.3 Testing

4.3.1 The tank atmosphere and the excavation area should be regularly tested for flammable or combustible vapor concentrations until the tank is removed from both the excavation and the site. Such tests are to be made with a combustible gas indicator which is properly calibrated according to the manufacturer's instructions (typically on pentane or hexane in air), and which is thoroughly checked and maintained in accordance with the manufacturer's instructions. Persons responsible for testing must be completely familiar with the use of the instrument and the interpretation of the instrument's readings.

4.3.2 The tank vapor space is to be tested by placing the combustible gas indicator probe into the fill opening with the drop tube removed. Readings should be taken at the bottom, middle, and upper portions of the tank, and the instrument should be cleared after each reading. If the tank is equipped with a non-removable fill tube, readings should be taken through another opening. Liquid product must not enter the probe. Readings of 20 percent or less of the lower flammable limit must be obtained before the tank is considered safe for removal from the ground.

4.3.3 Combustible gas indicator readings may be misleading where the tank atmosphere contains less than 5 percent by volume oxygen, as in a tank vapor-freed with CO_2, N_2, or another inert gas. In general, readings in oxygen-deficient atmospheres will be on the high, or safe, side. It may be desirable to use an oxygen indicator to assess the oxygen concentration.

4.4 Removal

4.4.1 After the tank has been freed of vapors and before it is removed from the excavation, plug or cap all accessible holes. One plug should have a 1/8-inch vent hole to prevent the tank from being subjected to excessive differential pressure caused by temperature changes. The tank should always be positioned with this vent plug on top of the tank during subsequent transport and storage.

4.4.2 Excavate around the tank to uncover it for removal. Remove the tank from the excavation and place it on a level surface. Use wood blocks to prevent movement of the tank after removal and prior to loading on a truck for transportation. Use screwed (boiler) plugs to plug any corrosion holes in the tank shell.

4.4.3 When partially or totally removing an existing underground storage system, a small amount of contaminated backfill may be encountered. The contamination can be due to minor spills and drips during previous operation of the facility or from drips and minor spills that may occur during removal. Contaminated backfill may be a potential safety and environmental hazard. Spills or drips should be contained to minimize contamination during removal. If contamination is severe, consult local environmental officials, the fire marshal, or the USEPA for assistance and requirements. See API Bulletin 1628 for further information.

4.4.4 Tanks should be labeled after removal from the ground but prior to removal from the site. Regardless of the condition of the tank, the label should contain a

warning against certain types of reuse. The former contents and present vapor state of each tank, including vapor-freeing treatment and date should also be indicated. The label should be similar to the following in legible letters at least 2 inches high:

TANK HAS CONTAINED LEADED GASOLINE*

NOT VAPOR FREE

NOT SUITABLE FOR STORAGE OF FOOD OR LIQUIDS INTENDED FOR HUMAN OR ANIMAL CONSUMPTION

DATE OF REMOVAL: MONTH/DAY/YEAR

*Or other flammable/combustible liquid. Use the applicable designation, for example, DIESEL.

4.4.5 Tanks that have held leaded motor fuels (or whose service history is unknown) should also be clearly labeled with the following information (see API Publication 2015A for additional guidelines):

TANK HAS CONTAINED LEADED GASOLINE
LEAD VAPORS MAY BE RELEASED IF HEAT IS APPLIED TO THE TANK SHELL

4.4.6 Tanks should be removed from the site as promptly as possible after vapor-freeing procedures have been completed, preferably on the day of tank removal from the excavation. If a tank remains at the site overnight or longer, additional vapor may be released from any liquid absorbed in the tank walls or residues remaining in the tank.

4.4.6.1 Before the tank is removed from the site, the tank atmosphere should be checked with a combustible gas indicator as specified in 4.3 to ensure that it does not exceed 20 percent of the lower flammable limit.

4.4.6.2 The tank should be secured on a truck for transportation to the storage or disposal site with the 1/8-inch vent hole located at the uppermost point on the tank. Tanks should be transported in accordance with all applicable local, state, and federal regulations.

SECTION 5—STORAGE OF USED TANKS

5.1 Storage Considerations

Even though used tanks that have contained flammable or combustible liquids have been vapor-freed at one time, they cannot be guaranteed to remain vapor-free. Hydrocarbons may be retained in crevices and under scale and may be released when disturbed or over a period of time. It is important, therefore, that appropriate safety precautions be observed at all times.

5.2 Storage Procedures

5.2.1 Tanks should be vapor-freed before being placed in storage (see 4.2). Tanks should also be free of all liquids and residues. All tank openings should be tightly plugged or capped, with one plug having a 1/8-inch vent hole to prevent the tank from being subjected to excessive differential pressure caused by temperature changes. Tanks should be stored with the vented plug at the highest point on the tank. All tanks should be labeled as described in 4.4.4 and 4.4.5.

5.2.2 Used tanks should be stored in secure areas on the premises of persons familiar with any attendant hazards and where the general public will not have access. A fenced yard, apart from other facilities, is desirable.

SECTION 6—SALE FOR REUSE

6.1 Considerations for Reuse

Careful consideration should be given to the reuse of tanks that have been in petroleum storage service. If a tank is sold for reuse, the purchaser should be given a very clear understanding of the former use and present condition of the tank. The seller of a tank to be returned to service in an underground petroleum storage system must inform the purchaser of the tank of the owner's notification requirements under applicable federal regulations (40 CFR 280.11 and 40 CFR 280.22). There may also be similar state or local regulations. Buyers of such tanks should check with the original manufacturer of the tank to determine its suitability for reuse. It is advisable to test the tanks for flammable vapors (see 4.3) before they are transported.

CAUTION: Tanks that previously contained gasoline must not be used for the subsequent storage of food or liquids intended for animal or human consumption.

6.2 Conditions of Sale

A bill of sale should be used to transfer tank ownership. The bill of sale should include the purchaser's acknowledgement that he assumes all liability related to the tank. Bills of sale should indicate the former use of the tank and carry the following warning regardless of the former contents of the tank:

TANK HAS CONTAINED LEADED GASOLINE*

NOT VAPOR FREE

NOT SUITABLE FOR STORAGE OF FOOD OR LIQUIDS INTENDED FOR HUMAN OR ANIMAL CONSUMPTION

*Or other flammable/combustible liquid. Use the applicable designation, for example, DIESEL.

SECTION 7—DISPOSAL

7.1 Disposal Criteria

7.1.1 Tanks should be disposed of when they are no longer fit for the storage of flammable or combustible liquids or any other appropriate use. Whether sold to a scrap dealer or disposed of at an acceptable facility, sufficient holes should be made in the tanks to render them unfit for further use.

7.1.2 Tanks that have been lined internally or coated externally with epoxy-based or similar materials may not be accepted by scrap processors. Prior inquiries should be made as to the requirements of the processor accepting the tank for scrap.

7.2 Disposal Procedures

7.2.1 After a tank has been vapor-freed, it should be rendered unsuitable for future use as a storage tank by puncturing, cutting, or drilling numerous holes in all sections of the tank.

7.2.2 All tanks should be labeled as described in 4.4.4 and 4.4.5.

7.2.3 A bill of sale should be used to transfer tank ownership (see 6.2).

7.2.4 Prior to disposal of used tanks, current federal, state, and local regulations should be checked to determine if special procedures or preparations are required.

SPECIFICATION PS-666

REMOVAL OF TWELVE (12) UNDERGROUND STORAGE TANKS (UST)

FOR THE
RAVENNA ARMY AMMUNITION PLANT

Ravenna Arsenal, Inc. August 17, 1989

I. SCOPE

Subcontractor shall supply all labor, materials, and equipment necessary to remove twelve (12) underground storage tanks.

II. LOCATIONS AND SPECIFICATIONS

A. Subcontractor shall receive area map A-109 showing locations of all tanks upon sight visitation prior to bid submittal.

B. Subcontractor shall receive:

1. Underground Storage Tank (UST) Removal Specification.
2. Construction Drawing On Tanks To Be Removed.

III. DETAIL OF WORK

A. All work shall be done in accordance with UST Removal Specifications by Havens and Emerson, July 1989.

B. All work shall be done in accordance with all OSHA and RAI Regulations.

IV. ACCEPTANCE

Final acceptance shall be given only after:

A. Approval by State Fire Marshal.
B. Walk thru with Subcontractor and RAI Engineer.

V. GENERAL

A. With his bid, the subcontractor will state, in writing, the number of men he intends to use on the job, and his starting and estimated completion dates (subject to change only because of weather or other conditions beyond his control).

B. Disposition of Material:

1. Title to Materials: Title to all materials and equipment to be demolished, excepting Government salvage and historical items, which are identified below, is vested in the subcontractor upon receipt of notice to proceed. The Government will not be responsible for the condition, loss or damage to such property after notice to proceed. Salvage and historical items to remain the property of the Government are: None.

2. Material for Subcontractor Salvage: Material for salvage shall be stored as approved by the Ravenna Arsenal, Inc., Engineering Division. Salvage materials shall be removed from Government property before completion of the Contract. On extended projects salvage material shall be removed at least once per month. Material for salvage shall not be sold on the site.

3. Unsalvageable Materials: Concrete, masonry, wood, roofing, and other nonsalvageable materials other than concrete permitted to remain in place, shall be disposed of off the installation. Material contaminated with explosives as determined by the Project and Safety Engineer shall be hauled to the designated flashing area.

4. A DA Form 1818 - Individual Property Pass - shall be completed for all materials to be removed from Government property. Passes shall be signed by the Plant or Supervisory Engineer.

C. Clean-up:

1. Debris Control: Debris shall be removed, disposed off the installation, and transported in a manner as to prevent spillage on installation streets or adjacent areas.

2. Burning: The use of burning at the project site for the disposal of refuse and debris will not be permitted.

D. Work will not be considered complete until accepted by Ravenna Arsenal, Inc., Engineering division.

E. The subcontractor will be responsible for:

1. Acquainting himself with the work areas.

2. His materials and equipment brought on site.

3. Keeping the work area neat and orderly at all times.

4. Complying will all safety and security regulations as stipulated in the Ravenna Arsenal, Inc. Pamphlet "Safety and Security Rules" dated 1986.

5. Avoiding any interference with Arsenal activities.

F. Normal working hours shall be between 8:00 a.m. and 4:30 p.m., Monday thru Friday, excluding designated plant holidays. Arrangements to work other than normal hours must be approved in advance.

Supervisory Engineer Concurrence D. J. Judrinak

Olin
ORDNANCE

RAVENNA ARSENAL, INC.
8451 STATE ROUTE 5, RAVENNA, OHIO 44266-9297
TELEPHONE: (216) 358-7111 • FAX: (216) 297-3216

August 13, 1990

THRU: Contracting Officer's Representative
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266-9297

TO: Ohio Department of Commerce
Division of State Fire Marshal
Bureau of Underground Storage Tank Regulations
ATTN: Michelle Tarka, Site Coordinator
7510 East Main Street
P.O. Box 525
Reynoldsburg, Ohio 43068-3395

Subject: Formal Closure Report for the Removal of Twelve (Nine Registered) Underground Storage Tanks

Dear Ms. Tarka:

In June of 1989, Havens and Emerson, Inc., on behalf of Ravenna Arsenal, Inc. submitted a permit application to remove 12 underground fuel storage tanks (9 registered) at Ravenna Army Ammunition Plant (RVAAP). The removal of the 12 tanks has been completed; attached you will find the closure report detailing the removal activities. Also attached is a modified Registration Permit Application for underground storage tanks which reflects the closure of the registered tanks.

Please contact Susan McCauslin at (216)297-3220 if you have any questions or require further information regarding this subject.

Sincerely,

RAVENNA ARSENAL, INC.

H. R. Cooper D.J.

H.R. Cooper
Plant Engineer

HRC/SM/ad/90021

Attachment

cc: N. Wulff
W. Carkido
S. McCauslin
B. Jenkins
File
J. Watson

Olin
ORDNANCE

RAVENNA ARSENAL, INC.
8451 STATE ROUTE 5, RAVENNA, OHIO 44266-9297
TELEPHONE: (216) 358-7111 • FAX: (216) 297-3216

AUGUST 13, 1990

THRU: Contracting Officer's Representative
Ravenna Army Ammunition Plant
8451 State Route 5
Ravenna, Ohio 44266-9297

TO: Commander
U.S. Army Armament, Munitions and Chemical Command
ATTN: AMSMC-ISE (Mr. Cyril Onewokae)
Rock Island, IL 61299-6000

Subject: Underground storage tanks project completion reports

Dear Sir:

On the 17 registered underground storage tanks at Ravenna Army Ammunition Plant, nine were declared abandoned and were removed; three failed a tank tightness test and were removed; and five remain in service.

FY89 Environmental Restoration Project 5892910-007 (Clin 46AD, MOD 88) provided $186,100 for the removal of twelve underground storage tanks (nine registered and three non-registered). FY90 Environmental Restoration Project 5902910-04 (Clin 46AE, MOD 92) provided $94,000 to remove four underground storage tanks (three registered and one non-registered) which were found to be leaking by tank tightness tests.

All work on both projects has now been completed. Attached you will find detailed reports on these tank removal projects. The report prepared by R&R International Inc. addresses removal of the four leaking underground storage tanks; the report prepared by Cardamone Construction Company addresses removal of the twelve abandoned underground storage tanks.

The point of contact at this installation for this subject is Susan McCauslin, DSN 346-3220.

Sincerely,

RAVENNA ARSENAL, INC.

H.R. Cooper
Plant Engineer

HRC/SM/ade/90022

cc: N. Wulff
W. Carkido
S. McCauslin
J. Watson
File

MONEY 186100

183 359
2 750 BOND
186 109
2 300 ENG (NEW)
7181 FEE
195590 ←
- 186 100
9490 NEED TO COVER → 9490

① +

② 2 samp @ 450 → 900

10,390.

10400 ÷ 46 yd = 226 yd³ → 10400

1000 yd (BID) - 230 yd³

770 yd³ TO REMOVE.

ACT REM. LEFT
770 yd - 435.8 = 334.2

334.2 x 46.00 = 15373.20

15373.20
- ~~900~~ 1350 (3 TESTS) @ 450 EA
14023 ~~14473~~ 20
- 3500 SLAB/EXCAVTE & BACK-FILL
10523.20 ~~10973.20~~
÷ 46 yd³
228.7 ~~238~~.5 yd³ can be removed.

+ USE 225 yd³ ADDITIONAL REMOVAL +

225
-56
167

76
58
134
6168

7682

1.5 TON PER C.Y.

907 AM

3/8/90

EMPTY

28820 DRIVER IN/CAB [signature]
28640 DRIVER OUT OF CAB

LOAD # 1

10 AM

73500 NO DRIVER

73500
28640
44860 lbs

22.43 TON (1.5 CY/TON) = 33.64 CY [signature]

EMPTY 3/9/80

DRIVER IN 28380
DRIVER OUT 28200

LOAD #2

NO DRIVER 98940
DRIVER
70740 lbs
35.37 TON (1.5) = 53.06 yd^3

TOTAL REMOVED 33.64 + 53.06
86.7 yd^3

[signature]
[signature]

Cardamone
CONSTRUCTION INC.

4865
Chamcraft Road
Garfield Heights
Ohio 44125
216•581•1133
1•800•686•2476

ITEM II

B. J. JENKINS
APR 4 1990
cc: Wayne Carbide

SEND TO FAX NUMBER: 1-297-3216 DATE: 4/4/90

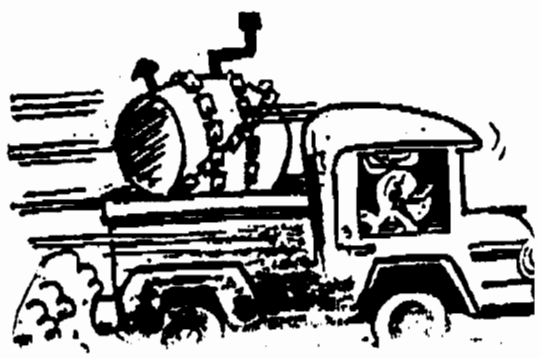
MESSAGE TO : BILL JENKINS

MESSAGE FROM: CARDAMONE CONSTRUCTION

NUMBER OF PAGES: 1

AS PER DIRECTION of WAYNE CARKIDO (2) ADDITIONAL SAMPLES WERE TAKEN ON 3/23/90. RESULTS WERE GIVEN ON 3/26 AND 3/27.

ADDITIONAL COST @ 450.00 EACH PER CONTRACT



Cardamone
CONSTRUCTION INC
4865
Chaincraft Road
Garfield Heights
Ohio 44125
216•581•1133
1•800•686•2176

B. J. JENKINS
APR 4 1990
cc: Wayne Carbide

SEND TO FAX NUMBER 1-297-3216 DATE: 4/4/90

MESSAGE TO : BILL JENKINS

MESSAGE FROM: CARDAMONE CONSTRUCTION

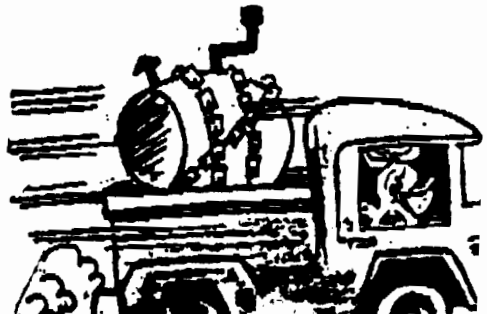
NUMBER OF PAGES: 1

PER VERBAL PHONE CONVERSATION; WE WILL REMOVE AREA UNDER THE CONCRETE PAD WHERE THE CHARLESTOWN GATE HOUSE WAS. AS PER PLAN # 6988-519 AREA TO BE REMOVED IS OUTLINED BY THE CONCRETE WALK AROUND THE GATE HOUSE. ALL MATERIAL TO BE STOCKPILED; CONCRETE TO BE PLACED BACK IN HOLE AFTER COMPLETE 20 TONS OF #304 TO BE PLACED AT GRADE LEVEL AFTER EXCAVATION IS BACKFILLED. OTHERS TO SUPPLY ALL REMAINING BACKFILL.

COST 3500.00

TAKE (3) SOIL SAMPLES @ 450.00 EA

ALL MATERIAL HAULED AWAY AT DISPOSAL PRICE ALREADY ESTABLISHED



DAN

When The UST
Closure Report
Comes From
CARDAMONE
Please Forward
These Invoices
With The Credits
The Total ~~Degree~~ Cost
Will Be 168,534.80
Under The Orginal
186109 I have Sent A
P.O.C. To Reflect The Savings

3.1-96,Rev. 1/88

"SB" **PURCHASE ORDER CHANGE**

WAC

RAVENNA ARSENAL, INC.
Ravenna, Ohio 44266
(216) 358-7111
Contract No. DAAA09-88-Z-0001

0C099X

CARDAMONE CONSTRUCTION, INC.
4865 CHAINCRAFT RD.
GARFIELD HTS., OHIO 44125

Date 7-13-90

P. O. No. 19506 CH-1

ACCT. No. OLD: 01-2519
NEW: 6390-7999

Please amend our Purchase Order No. 19506, Dated 1-3-90, as follows:

CHANGE ITEM 1 TO: NOT TO EXCEED $165,784.80

TOTAL REVISED COST: $168,534.80

ENGR/BJJ/co

All terms, except as herein amended, shall in all other respects remain as before, unless completely cancelled.

RAVENNA ARSENAL, INC.

By _____
Contract/Procurement & Purchasing

Approved By _____
For Contracting Officer

INVOICE

INV. NO. 0116

DATE 2/28/90

JOB NO. 7990

YOUR P.O. DAAA09-88-Z-0001

P.O. 19506

GENERAL CONTRACTING, INC.
4865 Chaincraft Rd.
Garfield Hts., Ohio 44125
PHONE (216) 581-1133 FAX (216) 581-1136

B. J. JENKINS

MAR 8 1990

SOLD TO

RAVENNA ARSENAL
8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297

JOB LOCATION

~~PROJECT MO 01-2519~~
RAVENNA ARSENAL
8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297
BLDG. 1035
F/ATTN: W. CARKIDO-1030

DESCRIPTION	AMOUNT
PROVIDE ALL LABOR MATERIAL AND EQUIPMENT NECESSARY TO REMOVE (12) TWELVE UNDERGROUND STORAGE TANKS FROM RAVENNA ARMY AMMUNITION PLANT.	
CONTRACT AMOUNT $183,359.00	
PER OUR QUOTATION #5366. THE FOLLOWING ITEMS ARE BEING BILLED TO YOU ON A PERCENTAGE OF COMPLETION BASIS.	
ITEM 1. DISPOSE OF TANK CONTENTS	
CONTRACT PRICE $26,500.00 20% COMPLETION 5,300.00	
AMOUNT DUE	$5300.00
ITEM 2. REMOVE, CLEAN AND DISPOSE OF (12) TWELVE UNDERGROUND STORAGE TANKS AND ASSOCIATED PIPING.	
CONTRACT PRICE $72,821.00 60% COMPLETION 43,692.60	
AMOUNT DUE	$ 43692.60
ITEM 4. FIRM COST OF COLLECTING AND ANALYZING (28) SOIL SAMPLES	
CONTRACT PRICE $14,250.00 20% COMPLETION 2,850.00	
AMOUNT DUE	$ 2850.00
ITEM 8. PREPARATION OF TANK CLOSURE REPORT	
CONTRACT PRICE $3,500.00 20% COMPLETION 700.00	
AMOUNT DUE	$700.00
COST TO FURNISH PERFORMANCE BOND PER YOUR REQUEST. AMOUNT DUE	2,750.00 ~~$5565.00~~
RAI to pay only 2,750.00 for Performance Payment Bond B. Jenkins 3/8/90	
TOTAL AMOUNT DUE THIS INVOICE	$ ~~58,107.60~~ 55,292.60
WAIVERS OF LIENS ENCLOSED.	
+ OK TO PAY 55,252.60 WAC 12MAR.90 +	
2% PER MONTH (24% PER YEAR SERVICE CHARGE ON ACCOUNTS PAST DUE)	

TOTAL LABOR	MATERIAL	EQUIPMENT	SUB TOTAL	TAX	MILEAGE	TERMS: NET 10 DAYS TOTAL DUE
			~~$58,107.60~~			~~$58,107.60~~ 55,292.60

I certify that all the terms and conditions to the Purchase Order _____ have been met for the material and/or labor covered by this invoice

I certify the articles, commodities, or services covered by this invoice have been received; that such charges represent proper cost to Contract NO. DAAA09-88-Z-0001

1. _____ Originating Division Date

2. _____ Purchasing Division

CARDAMONE
GENERAL CONTRACTING, INC.
4865 Chaincraft Rd.
Garfield Hts., Ohio 44125
PHONE (216) 581-1133 FAX (216) 581-1136

INVOICE

INV. NO. 0209
DATE 03/27/90
JOB NO. 7990
YOUR P.O. DAAA09-88-Z0001 19506
PROJECT #01-2519

SOLD TO

RAVENNA ARSENAL
8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297

JOB LOCATION

RAVENNA ARSENAL
8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297
BUILDING 1035
F/ATTN: W. CARKIDO - 1030

DESCRIPTION	AMOUNT
PROVIDE ALL LABOR, MATERIAL AND EQUIPMENT TO REMOVE (12) TWELVE UNDERGROUND STORAGE TANKS FROM RAVENNA ARMY AMMUNITION PLANT CONTRACT AMOUNT $183,359.00	
PER OUR QUOTATION #5366 THE FOLLOWING ITEMS ARE BEING BILLED TO YOU ON A PERCENTAGE OF COMPLETION BASIS.	
ITEM 1 DISPOSE OF TANK CONTENTS CONTRACT AMOUNT $26,500.00 INVOICE #116 5,300.00 BALANCE $21,200.00 AMOUNT DUE-TEN PERCENT OF CONTRACT	$ 2,650.00
ITEM 2 REMOVE, CLEAN AND DISPOSE OF (12) TWELVE UNDERGROUND STORAGE TANKS AND ASSOCIATED PIPING CONTRACT AMOUNT $72,821.00 INVOICE #116 43,692.60 BALANCE $29,128.40 AMOUNT DUE-TWENTY-FIVE PERCENT OF CONTRACT	18,205.25
ITEM 4 FIRM COST OF COLLECTING AND ANALYZING (28) TWENTY-EIGHT SOIL SAMPLES CONTRACT AMOUNT $14,250.00 INVOICE #116 2,850.00 BALANCE $11,400.00 AMOUNT DUE-THIRTY PERCENT OF CONTRACT	4,275.00
ITEM 8 PREPARATION OF TANK CLOSURE REPORT CONTRACT AMOUNT $ 3,500.00 INVOICE #116 700.00 BALANCE $2,800.00 AMOUNT DUE-THIRTY PERCENT OF CONTRACT	1,050.00
TOTAL AMOUNT DUE THIS INVOICE	$26,180.25

WAIVER OF LIENS ENCLOSED

I certify that all the terms and conditions for Purchase Order _____ have been met for the material and/or labor covered by this invoice.

2. _____ Purchasing Division _____ Date

Wac 4/2/90 2% PER MONTH (24% PER YEAR SERVICE CHARGE ON ACCOUNTS PAST DUE)

TOTAL LABOR	MATERIAL	EQUIPMENT	SUB TOTAL	TAX	MILEAGE	TERMS: NET 10 DAYS TOTAL DUE
I certify the articles, commodities, or services covered by this invoice have been received; that said charges represent proper cost to Contract NO. DAAA09-88-Z-0001			$26,180.25			$26,180.25

1 _____ Originating Division _____ Date

cf. bb

CARDAMONE CONSTRUCTION &
GENERAL CONTRACTING, INC.
4865 Chaincraft Rd.
Garfield Hts., Ohio 44125
PHONE (216) 581-1133 FAX (216) 581-1136

INVOICE

INV. NO. 0234

DATE 04/15/90

JOB NO. 7990

YOUR P.O. DAAA09-88-Z0001
19506

PROJECT #01-2519

SOLD TO

RAVENNA ARSENAL
8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297

JOB LOCATION

RAVENNA ARSENAL
8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297
BUILDING 1035
ATTN: W. CARKIDO-1030

DESCRIPTION	AMOUNT
PROVIDE LABOR MATERIAL AND EQUIPMENT TO REMOVE TWELVE (12) UNDERGROUND STORAGE TANKS FROM RAVENNA ARMY AMMUNITION PLANT.	
CONTRACT AMOUNT $183.359.00	
PER OUR QUOTATION #5366, THE FOLLOWING ITEMS ARE BEING BILLED TO YOU ON A PERCENTAGE OF COMPLETION BASIS.	
ITEM 3 BACKFILLING, GRADING AND SEEDING OF TANK EXCAVATION, PIPING TRENCHES AND BORROW AREAS	
CONTRACT AMOUNT $12,975.00	
INVOICE #217 (9,731.25)	
90% COMPLETED (1,946.25)	
BALANCE DUE $1,297.50	
COMPLETED AMOUNT DUE	$ 1,946.25 ✓
ITEM 4 COLLECTING AND ANALYZING TWENTY-EIGHT (28) SOIL SAMPLES	
CONTRACT AMOUNT $14,250.00	
No → INVOICE #116 2850 (700.00)	
INVOICE #209 (4,275.00)	
INVOICE #217 (5,000.00)	
100% COMPLETION $ 4,275.00	
COMPLETED AMOUNT DUE	✓ 4,275.00
BALANCE DUE - 0 -	
ITEM 5 ALTERNATE A TRANSPORTATION AND DISPOSAL OF THE TANK SLUDGES AND CLEANING FLUIDS	
EIGHTEEN (18) 55 GALLON DRUMS @ $350.00/DRUM $6,300.00	
INVOICE #217 (630.00)	
30% COMPLETED (1,260.00)	
BALANCE DUE $4,410.00	
COMPLETED AMOUNT DUE	✓ 1,260.00
ITEM 7 TRANSPORTATION AND DISPOSAL OF CONTAMINATED EXCAVATION SOIL	
250 YARDS @ $46.00 PER YARD $11,500.00	
INVOICE #217 (2,300.00)	
100% COMPLETED $ 9,200.00	
BALANCE DUE -0- COMPLETED AMT DUE	✓ 9,200.00

2% PER MONTH (24% PER YEAR SERVICE CHARGE ON ACCOUNTS PAST DUE)

TOTAL LABOR	MATERIAL	EQUIPMENT	SUB TOTAL	TAX	MILEAGE	TERMS: NET 10 DAYS TOTAL DUE
						SEE PAGE TWO

CARDAMONE CONSTRUCTION &
GENERAL CONTRACTING, INC.
4865 Chaincraft Rd.
Garfield Hts., Ohio 44125
PHONE (216) 581-1133 FAX (216) 581-1136

INVOICE

INV. NO. 0234 PAGE TWO
DATE 04/15/90
JOB NO. 7990
YOUR P.O. DAAA09-88-Z0001
19506
PROJECT #01-2519

SOLD TO

RAVENNA ARSENAL
8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297

JOB LOCATION

RAVENNA ARSENAL
8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297
BUILDING 1035
ATTN: W. CARKIDO-1030

DESCRIPTION	AMOUNT
ITEM 7 CONT'D TRANSPORTATION AND DISPOSAL OF CONTAMINATED EXCAVATION SOIL.	
ADDITIONAL 185.8 YARDS @ $46.00 PER YARD $8,546.80	
100% COMPLETED $8,546.80	
COMPLETED AMOUNT DUE	✓$8,546.80
ITEM 8 PREPARATION OF TANK CLOSURE REPORT	
CONTRACT AMOUNT $3,500.00	
INVOICE #116 (700.00)	
INVOICE #209 (1,050.00)	
INVOICE #217 (350.00)	
75% COMPLETED (525.00)	
BALANCE DUE $ 875.00	
COMPLETED AMOUNT DUE	✓525.00
ADDITIONAL WORK ABOVE ORIGINAL CONTRACT	
ITEM 4 C. ADDITIONAL SOIL SAMPLES FOR CHARLESTON GATE	
FIVE SOIL SAMPLES @ $475.00 EACH	✓2,375.00
ADDITIONAL EXCAVATION AT CHARLESTON GATE AS DIRECTED BY WAYNE CARKIDO	
CONTRACT AMOUNT $3,500.00	
100% COMPLETED $3,500.00	
COMPLETED AMOUNT DUE	✓3,500.00
ADDITIONAL DISPOSAL OF CONTAMINATED MATERIAL FROM CHARLESTON GATE	
58 YARDS @ $46.00 PER YARD $2,668.00	
100% COMPLETED $2,668.00	
COMPLETED AMOUNT DUE	✓2,668.00
**PAGES (2) TOTAL AMOUNT DUE	$34,296.05

+ WAC 3MAY 90 +

2% PER MONTH (24% PER YEAR SERVICE CHARGE ON ACCOUNTS PAST DUE)

TOTAL LABOR	MATERIALS, commodities, or services EQUIPMENT	SUB TOTAL	TAX	MILEAGE	TERMS: NET 10 DAYS TOTAL DUE
					$34,296.05

I certify that all the terms and conditions for Purchase Order _____ have been met for the material and/or labor covered by this invoice.

covered by this invoice have been received; that said charges represent proper cost to Contract NO. DAAA09-88-Z-0001

1. _____ Originating Division Date

2. _____ Purchasing Division Date

CARDAMONE CONSTRUCTION &
GENERAL CONTRACTING, INC.
4865 Chaincraft Rd.
Garfield Hts., Ohio 44125
PHONE (216) 581-1133 FAX (216) 581-1136

ORIGINAL
INVOICE

INV. NO. 0217
DATE 03/30/90
JOB NO. 7990
YOUR P.O. DAAA09-88-Z-0001
19506
Project 01-2519

SOLD TO

RAVENNA ARSENAL
8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297

JOB LOCATION

RAVENNA ARSENAL BLDG-1035
8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297
ATTN: W. CARKIDO - 1030

DESCRIPTION	AMOUNT
PROVIDE ALL MATERIAL, LABOR AND EQUIPMENT NECESSARY TO REMOVE (12) TWELVE UNDERGROUND STORAGE TANKS FROM RAVENNA ARMY AMMUNITION PLANT.	
CONTRACT AMOUNT $183.359.00	
PER OUR QUOTATION #5366, THE FOLLOWING ITEMS ARE BEING BILLED TO YOU ON A PERCENTAGE OF COMPLETION BASIS.	
ITEM I DISPOSE OF TANK CONTENTS: CONTRACT PRICE $26,500.00 INVOICE #116 (5,300.00) INVOICE #209 (2,650.00) BALANCE DUE $18,550.00	
100% COMPLETED-AMOUNT DUE ✓	$18,550.00
ITEM 2 REMOVE,CLEAN AND DISPOSE OF (12) TWELVE UNDERGROUND STORAGE TANKS AND ASSOCIATED PIPING CONTRACT AMOUNT $72,821.00 INVOICE #116 (43,692.60) INVOICE #209 (18,205.00) BALANCE DUE $10,923.40	
90% COMPLETED - AMOUNT DUE ✓	3,641.30
ITEM 3 BACKFILLING, GRADING AND SEEDING OF TANK EXCAVATIONS, PIPING TRENCHES AND BORROW AREAS CONTRACT AMOUNT $12,975.00 AMOUNT DUE - 75% COMPLETED ✓ (9,731.25) BALANCE DUE 3,243.75	✓ 9,731.25
ITEM 4 COLLECTING AND ANALYZING (28) TWENTY-EIGHT SOIL SAMPLES CONTRACT AMOUNT $14,250.00 * INVOICE #116 2850 (700.00) NO INVOICE #209 (4,275.00) AMOUNT DUE - 70% COMPLETED (5,000.00) BALANCE DUE $4,275.00	✓ 5,000.00
CONT'D PAGE TWO	

WAC(4/12/90)

2% PER MONTH (24% PER YEAR SERVICE CHARGE ON ACCOUNTS PAST DUE)

*TWO PAGE INVOI

TOTAL LABOR	MATERIAL	EQUIPMENT	SUB TOTAL	TAX	MILEAGE	TERMS: NET 10 DAYS TOTAL DUE
						$40,202.55

I certify the articles, commodities, or services covered by this invoice have been received; that said charges represent proper cost to Contract NO. DAAA09-88-Z-0001

I certify that all the terms and conditions for Purchase Order 19506 have been met for the material and/or labor covered by this invoice

CARDAMONE CONSTRUCTION &
GENERAL CONTRACTING, INC.
4865 Chaincraft Rd.
Garfield Hts., Ohio 44125
PHONE (216) 581-1133 FAX (216) 581-1136

ORIGINAL
INVOICE

INV. NO. #0217-2 CONT'D
DATE 03/30/90
JOB NO. 7990
YOUR P.O. DAAA09-88-Z-0001
19506
PROJECT 01-2519

SOLD TO

RAVENNA ARSENAL
8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297

JOB LOCATION

RAVENNA ARSENAL BLDG 1035
8451 STATE ROUTE 5
RAVENNA, OHIO 442-9297
ATTN: W. CARKIDO - 1030

DESCRIPTION	AMOUNT
CONT'D FROM PAGE ONE	
ITEM 5 ALTERNATE A TRANSPORTATION AND DISPOSAL OF THE TANK SLUDGES AND CLEANING FLUIDS	
(18) EIGHTEEN FIFTY-FIVE GALLON DRUMS @ $350.00 PER DRUM $6,300.00	
AMOUNT DUE - 10 % COMPLETED (630.00) BALANCE DUE $5,670.00	$ 630.00
ITEM 7 TRANSPORTATION AND DISPOSAL OF CONTAMINATED EXCAVATION SPOILS	
250 YDS @ $46.00 PER YARD $11,500.00	
TRUCKING - 20%-AMOUNT DUE (2,300.00) BALANCE DUE $ 9,200.00	2,300.00
ITEM 8 PREPARATION OF TANK CLOSURE REPORT	
CONTRACT AMOUNT $3,500.00	
INVOICE #116 (700.00)	
INVOICE #209 (1,050.00)	
60% COMPLETED (350.00) AMOUNT DUE $1,400.00	(?) 350.00
	TWO PAGE INVOI

2% PER MONTH (24% PER YEAR SERVICE CHARGE ON ACCOUNTS PAST DUE)

TOTAL LABOR	MATERIAL	EQUIPMENT	SUB TOTAL	TAX	MILEAGE	TERMS: NET 10 DAYS TOTAL DUE
						$40,202.55

CARDAMONE CONSTRUCTION &
GENERAL CONTRACTING, INC.
4865 Chaincraft Rd.
Garfield Hts., Ohio 44125
PHONE (216) 581-1133 FAX (216) 581-1136

INVOICE

INV. NO. 0361

DATE June 12, 1990

JOB NO. 7990

YOUR P.O. DAAA09-88-Z0001-19506

SOLD TO

Ravenna Arsenal
8451 State Route 5
Ravenna, Ohio 44266-9297

JOB LOCATION

Ravenna Arsenal
8451 State Route 5 , Bldg.1035
Ravenna, Ohio 44266-9297
Attention: W. Carkido 1030

DESCRIPTION			AMOUNT
Provide all labor, material and equipment necessary to remove (12) underground storage tanks from Ravenna Army Ammunition Plant.			
Contract Amount	$183,359.00		
Item 2. Remove, clean and dispose of (12) underground storage tanks and associated piping.			
Contract Price	✓$72,821.00		
Invoice #116	✓(43,692.60)		
Invoice #209	✓(18,205.00)		
Invoice #217	✓(3,641.30)		
100% Completed	(7,282.10)	AMT. DUE	✓$7,282.10
-0-			
Item 3. Backfilling, grading and seeding of tank excavation, piping trenches and borrow areas.			
Contract Price	✓$12,975.00		
Invoice #217	✓(9,731.25)		
Invoice #234	✓(1,946.25)		
100% Completed	(1,297.50)	AMT. DUE	✓$1,297.50
-0-			
Item 5. ALTERNATE A Transportation and disposal of the tank sludges and cleaning fluids.			
(18) 55 gallon drums @ $350.00 per drum		$6,300.00	
Invoice #217		✓(630.00)	
Invoice #234		✓(1,260.00)	
100% Completed		(4,410.00)	
-0-			
		AMT. DUE	✓$4,410.00

VOID per John Cardamone Revised invoice being issued by Cardamone 6/14/90

OK WAC 13 July 90

2% PER MONTH (24% PER YEAR SERVICE CHARGE ON ACCOUNTS PAST DUE)

TOTAL LABOR	MATERIAL	EQUIPMENT	SUB TOTAL	TAX	MILEAGE	TERMS: NET 10 DAYS TOTAL DUE
						$12,989.60

I certify the articles, commodities, or services covered by this invoice have been received; that said charges represent proper cost to Contract NO. DAAA09-88-Z-0001

I certify that all the terms and conditions for Purchase Order _____ have been met for the material and/or labor covered by this invoice.

1. _____ Originating Division _____ Date

2. _____ Purchasing Division _____ Date

CARDAMONE CONSTRUCTION &
GENERAL CONTRACTING, INC.
4865 Chaincraft Rd.
Garfield Hts., Ohio 44125
PHONE (216) 581-1133 FAX (216) 581-1136

INVOICE
CREDIT MEMO

INV. NO. 0401
DATE 6/30/90
JOB NO. 7990
YOUR P.O.

SOLD TO

RAVENNA ARSENAL
8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297

JOB LOCATION

RAVENNA ARSENAL
8451 STATE RT. 5
RAVENNA, OHIO 44266-9297

ATTN: BILL JENKINS

DESCRIPTION	AMOUNT
CREDIT FOR THE REPAIR OF THE TELEPHONE DAMAGED WHILE OUR MEN WERE WORKING AT THE FACILITY.	
PER YOUR INSTRUCTIONS THE CREDIT AMOUNT IS	(101.00)

WAC OK 13 JULY 90

I certify the articles, commodities, or services c[illegible] by this invoice have been received; that [illegible]s represent proper cost to Contract No. [illegible]

I _____ _____
Originating Division Date

I certify that all the terms and conditions of Purchase Order _____ have been met for the material and/or labor covered by this invoice.

2. _____ _____
Purchasing Division Date

2% PER MONTH (24% PER YEAR SERVICE CHARGE ON ACCOUNTS PAST DUE)

TOTAL LABOR	MATERIAL	EQUIPMENT	SUB TOTAL	TAX	MILEAGE	TERMS: NET 10 DAYS TOTAL DUE
						($101.00)

CARDAMONE CONSTRUCTION &
GENERAL CONTRACTING, INC.
4865 Chaincraft Rd.
Garfield Hts., Ohio 44125
PHONE (216) 581-1133 FAX (216) 581-1136

INVOICE
CREDIT MEMO

INV. NO. 0400
DATE 6/30/90
JOB NO. 7990
YOUR P.O. DAAA09-88-Z-0001
P.O. 19506
PROJECT MO-01-2519

SOLD TO	JOB LOCATION
RAVENNA ARSENAL 8451 STATE ROUTE 5 RAVENNA, OHIO 44266-9297	RAVENNA ARSENAL 8451 STATE RT. 5 RAVENNA, OHIO 44266-9297 BLDG. 1035 F/ATTN: W. CARKIDO 1030

DESCRIPTION			AMOUNT
PROVIDE ALL LABOR, MATERIAL AND EQUIPMENT NECESSARY TO REMOVE (12) UNDERGROUND STORAGE TANKS FROM RAVENNA ARMY AMMUNITION PLANT.			
ITEM 4. COLLECTING AND ANALYZING 28 SOIL SAMPLES; INCORRECT CALCULATIONS ON INVOICE #0234			($2,150.00)
ITEM 6. COST FOR EXCAVATING SPOILS CHARACTERIZATION SAMPLING NECESSARY TO COORDINATE DISPOSAL;			
CONTRACT AMOUNT	$950.00		
100% COMPLETION	(950.00)	AMOUNT DUE	950.00
ITEM 8. PREPARATION OF TANK CLOSURE REPORT;			
CONTRACT AMOUNT	$3,500.00		
INV #116	(700.00)		
INV #209	(1,050.00)		
INV #217	(350.00)		
INV #234	(525.00)		
100% COMPLETION	(875.00)	AMOUNT DUE	875.00
ITEM 2. REMOVE, CLEAN AND DISPOSE OF (12) UNDERGROUND STORAGE TANKS;			
CONTRACT AMOUNT	$72,821.00		
INV #116	(43,692.60)		
INV #209	(18,205.25)		
INV #217	(3,641.30)		
INV #361	(7,282.10)		
	(.25)	CREDIT DUE	(.25)

WAC 13 July 90

I certify ... commodities, or services covered ... have been received; that sai... ent proper cost to Contract ... 001

1 Or... Date

I certify that all the terms and conditions Purchase Order ____ have been me[t] the material and/or labor covered by this invo[ice]

2. Purchasing Division Date

2% PER MONTH (24% PER YEAR SERVICE CHARGE ON ACCOUNTS PAST DUE)

TOTAL LABOR	MATERIAL	EQUIPMENT	SUB TOTAL	TAX	MILEAGE	TERMS: NET 10 DAYS
						~~TOTAL DUE~~ XXXXXXX CREDIT AMOUNT ($325.25)

RA-121

RAVENNA ARSENAL, INC.

REQUEST FOR PURCHASE ORDER CORRECTION

Date JULY 13, 1990

Purchase Order No. 19506

To: PURCHASING DIVISION

Account No.

Please change Purchase Order dated 3 JANUARY 1990

M.O. No. 01-2519

on CARDAMONE CONST (Company)

Original Estimated Cost 186,109.

In the following respect:

Revised Estimated Cost 168,534.

REDUCE PO BY 17,574.20

Reason for Change: COST SAVINGS ON DISPOSED MATERIALS.

Approvals: (must be the same as on original requisition.)

_____ _____ Dept.

_____ _____ Dept.

_____ Purchasing Division

_____ Contract Officer's Represent

Ravenna Arsenal, Inc.

Signed WAYNE CARKIDO

Department Requesting Correction

Wayne A. Carkido

Cardamone
CONSTRUCTION INC.

4865
Chaincraft Road
Garfield Heights
Ohio 44125
216•581•1133
1•800•686•2476

B. J. JENKINS
FEB 2 1990
cc: T. Chanda
W. Carbaugh
S. McCauslin

SEND TO FAX NUMBER 1-297-3216 DATE: 2/1/90

MESSAGE TO: Bill Jenkins - Ravenna Arsenal

MESSAGE FROM: John Cardamone - Cardamone Const

NUMBER OF PAGES: 1

as per my phone conversation with Wayne on 2/1/90 at 4:00 P.m., enclosed are the people we plan to use for the sludge at the bottom of the tank.

Enviroway Inc.
33 Industry Dr.
Bedford, Oh 44146
216/439-2955

OK

Industrial Waste Handling & Processing
EPA ID# OHD 055522429

OK Per Chris Coder (425-9197)
OHEPA 8:15 AM 2/2/90
OK FOR HAZARDOUS & NON-HAZARDOUS

① What Service is going to take Samples (PIDECT)

② What Service is going to Analysis Soil Samples

③ Before Any Soil is Moved

a) Must know what Analysis Lake County Wants

OK → b) All Analysis for Soils must be reviewed & Approved by OHEPA

i Approval must be received by RAI first verbal than followed by ~~with~~ writing

— Wadsworth Lab —

Sample Requirements

1) 1 - typical Fuel Oil Sludge
1 - typical gasoline Sludge

2 Screening Samples
1 - @ possible leaks (1)
1 - @ each end of tank excavation (2)
1 - under pump island supply side (1)
1 - every 20 ft pipe run ≈(4)
1 - under leak pipe (1)
1 - for ground water if found.

Also Screening excavation With PID during excavation

3 samples with highest reading sent for analysis

PID operator 40hr OSHA Approve Courses.

3 4 - Back Ground Samples (Fill Area)

4 Excavated Spoils Samples (Disposal)

Number & type determined by facility

All ~~samples~~ analysis ~~must~~ is called out in the spec. by Havens & Emerson & ~~must be~~ results must be presented to RAI before continuing with job.

RA-21 Supplement Rev. 10/80

"SB"

PURCHASE ORDER

RAVENNA ARSENAL, INC.

RAVENNA, OHIO 44266
(216) 358-7111

P. O. NO. 19506

This Number and Shipper's Name Must Appear on All Shipments & Papers Relating To This Order.

581-1133

CONTRACT NO. DAAA09 -88-Z-0001 RELEASE NO. _____

DATE	1-3-90	TERMS	NET 30	F.O.B.	DEST.
SHIP VIA	VENDOR	PER YOUR QUOTATION	DATED 9-13-89	ACCT. NO.	01-2519

TO CARDAMONE CONSTRUCTION, INC.
4865 Chaincraft Rd.
Garfield Heights, Ohio 44125

SHIP TO BLDG 1035
F/ATTN: W. CARKIDO - 1030

P.O. 19506

ITEM	QUANTITY	UNIT	DESCRIPTION	PRICE
4.			THE FOLLOWING LABOR CLASSIFICATIONS AND RATES ARE APPLICABLE TO THIS CONTRACT. THE SUBCONTRACTOR WILL BE REQUIRED TO PAY HIS EMPLOYEES IN ACCORDANCE WITH U.S. DEPARTMENT LABOR DECISION OH89-1 WITH MODIFICATIONS 1 THRU 3 AND MUST IDENTIFY THE CLASSIFICATIONS. LABORERS - AREA 3 GROUP 1: $15.57 + $3.10 FRINGE/HR. POWER EQUIPMENT OPERATORS - AREA 2 GROUP A: $17.74 + $3.57 FRINGE/HR. GROUP B: $17.58 + $3.57 FRINGE/HR. GROUP C: $17.23 + $3.57 FRINGE/HR. GROUP E: $16.09 + $3.57 FRINGE/HR. GROUP F: $13.38 + $3.57 FRINGE/HR. TRUCK DRIVERS - AREA 2 GROUP 1: $18.01 + $1.42 FRINGE/HR. GROUP 2: $18.11 + $1.42 FRINGE/HR. GROUP 4: $18.46 + $1.42 FRINGE/HR.	
4A.			PAYMENT TERMS AS FOLLOWS: NET 30 DAYS. PROGRESS PAYMENTS ON THE 15TH AND 30TH OF SAID MONTH. HOLD 5% IF ANY WORK CANNOT BE COMPLETED UNTIL SPRING. CONTINUED PAGE THREE.....	

DELIVERY REQUIRED START 1-22-90 FINISH 3-30-90 TOTAL

SEE PAGE FIV

DO NOT OVERSHIP
OVERSHIPMENTS WILL BE RETURNED

RAVENNA ARSENAL, INC.

BY B. J. Jenkins
Purchasing Dept.

B. J. JENKINS, ADMINISTRATOR
CONTRACT/PROCUREMENT & PURCHASING

"SB"

RA-21 Supplement Rev. 10/80

PURCHASE ORDER

RAVENNA ARSENAL, INC.

RAVENNA, OHIO 44266
(216) 358-7111

P. O. NO. 19506
This Number and Shipper's Name Must Appear on All Shipments & Papers Relating To This Order.

1 PAGE 3 OF 5

581-1133

CONTRACT NO. DAAA09-88-Z-0001 RELEASE NO.

DATE	1-3-90	TERMS	NET 30	F.O.B.	DEST.
SHIP VIA	VENDOR	PER YOUR QUOTATION	DATED 9-13-89	ACCT. NO.	01-2519

TO CARDAMONE CONSTRUCTION, INC.
4865 Chaincraft Rd.
Garfield Heights, Ohio 44125

SHIP TO BLDG 1035
F/ATTN: W. CARKIDO - 1030

P.O. 19506

ITEM	QUANTITY	UNIT	DESCRIPTION	PRICE
5.			SUBCONTRACTOR TO PROVIDE RAVENNA ARSENAL, INC. CONTRACT/PROCUREMENT & PURCHASING ADMINISTRATOR WITH WORK SCHEDULE SHOWING STARTING AND ESTIMATED COMPLETION DATES, TOGETHER WITH A COMPLETED ADVANCE PASS REQUEST (FORM RA-588) FOR EACH EMPLOYEE SCHEDULED TO WORK AT THE SITE, AT LEAST ONE WEEK PRIOR TO COMMENCEMENT OF WORK.	
6.			SCHEDULING SHALL BE ARRANGED THROUGH THE RAVENNA ARSENAL, INC., PROJECT ENGINEER. PERMISSION MUST BE SECURED WHENEVER IT IS DESIRED TO WORK HOURS OTHER THAN 8:00 A.M. TO 4:30 P.M., MONDAY THROUGH FRIDAY.	
7.			ALL EQUIPMENT AND MATERIALS BROUGHT INTO THE AREA SHALL BE THE RESPONSIBILITY OF THE SUBCONTRACTOR. RAVENNA ARSENAL, INC. PROJECT ENGINEER MAY BE CONTACTED FOR INFORMATION CONCERNING STORAGE OF MATERIALS AND THE DESIGNATED AREA.	
8.			ALL SUBCONTRACTOR TOOLS MUST BE MARKED WITH SUBCONTRACTOR'S DISTINGUISHING MARKS IN ORDER TO PROVIDE RAVENNA ARSENAL, INC. WITH EVIDENCE OF PROOF OF OWNERSHIP. EGRESS WILL BE CHECKED BY RAVENNA ARSENAL, INC. SECURITY, AND A PACKAGE PASS FOR ALL SUBCONTRACTOR-OWNED TOOLS, EQUIPMENT AND MATERIAL LEAVING THE SITE MUST BE OBTAINED EACH DAY FROM THE PROJECT ENGINEER, RAVENNA ARSENAL, INC.	
9.			TECHNICAL PROBLEMS WILL BE BROUGHT TO THE ATTENTION OF THE RAVENNA ARSENAL, INC. PROJECT ENGINEER BY THE SUBCONTRACTOR, AND ANY DISPUTES ARISING SHALL BE SETTLED BY THE CONTRACT/ PROCUREMENT & PURCHASING ADMINISTRATOR, RAVENNA ARSENAL, INC.	
			DELIVERY REQUIRED START 1-22-90 FINISH 3-30-90 TOTAL	SEE PAGE FIV

DO NOT OVERSHIP
OVERSHIPMENTS WILL BE RETURNED

RAVENNA ARSENAL, INC.
B. J. JENKINS, ADMINISTRATOR
CONTRACT/PROCUREMENT & PURCHASING

"SB"

RA-21 Supplement Rev. 10/80

1 PAGE 4 OF 5

PURCHASE ORDER

RAVENNA ARSENAL, INC.

RAVENNA, OHIO 44266
(216) 358-7111

P. O. NO. 19506
This Number and Shipper's Name Must Appear on All Shipments & Papers Relating To This Order.

581-1133

CONTRACT NO. DAAA09-88-Z-0001 RELEASE NO.

DATE	1-3-90	TERMS	NET 30	F.O.B.	DEST.
SHIP VIA	VENDOR	PER YOUR QUOTATION	DATED 9-13-89	ACCT. NO.	01-2519

TO CARDAMONE CONSTRUCTION, INC.
4865 Chaincraft Rd.
Garfield Heights, Ohio 44125

SHIP TO BLDG 1035
F/ATTN: W. CARKIDO - 1030

P.O. 19506

ITEM	QUANTITY	UNIT	DESCRIPTION	PRICE
10.			SAFETY REQUIREMENTS WILL BE REVIEWED WITH PERSONNEL ASSIGNED TO PERFORM THE WORK ON THIS CONTRACT AND ONLY APPROVED METHODS AND EQUIPMENT WILL BE ALLOWED. SUBCONTRACTOR SHALL COMPLY WITH SAFETY AND SECURITY REGULATIONS OF RAVENNA ARSENAL, INC., AS SET FORTH IN THE ATTACHED BOOKLET DATED AUGUST, 1986. ALL REGULATIONS WILL BE STRICTLY ENFORCED.	
11.			THE ATTACHED TERMS AND CONDITIONS FOR MAINTENANCE, CONSTRUCTION, AND ENGINEERING CONTRACTS AND SPECIAL TERMS AND CONDITIONS APPLICABLE TO SUBCONTRACTS AND PURCHASE ORDERS ISSUED UNDER GOVERNMENT PRIME CONTRACTS OR GOVERNMENT SUBCONTRACTS, WILL APPLY.	
12.			PLEASE PAY PARTICULAR ATTENTION TO CLAUSES 11 AND 16; ALSO 18 THROUGH 25 WHICH ARE APPLICABLE TO THE DAVIS-BACON ACT.	
13.			SUBCONTRACTOR MUST COMPLY WITH U.S. DEPARTMENT OF LABOR DECISION OH89-1 WITH MODIFICATIONS 1 THRU 3 AND MUST IDENTIFY THEIR CLASSIFICATIONS.	
14.			COPIES OF PAYROLLS TO BE SUBMITTED WEEKLY TO RAVENNA ARSENAL, INC. CONTRACT/PROCUREMENT & PURCHASING ADMINISTRATOR.	
15.			SUBCONTRACTOR IS ADVISED THAT RAVENNA ARSENAL, INC. AND/OR GOVERNMENT PERSONNEL WILL PERFORM DAVIS-BACON COMPLIANCE CHECKS, ESPECIALLY IN THE AREA OF REQUIRED HOURLY PAY RATES FOR EMPLOYEES. ANY VIOLATION WILL CAUSE CANCELLATION OF THIS CONTRACT AND PENALTIES AS PRESCRIBED BY LAW.	
16.			SUBCONTRACTOR TO SUBMIT A WAIVER OF LIEN WITH EACH INVOICE.	
			DELIVERY REQUIRED START 1-22-90 FINISH 3-30-90 TOTAL	SEE PAGE FIVE

DO NOT OVERSHIP
OVERSHIPMENTS WILL BE RETURNED

RAVENNA ARSENAL, INC.

B. J. JENKINS, ADMINISTRATOR
CONTRACT/PROCUREMENT & PURCHASING

"SB"

RA-21 Supplement Rev. 10/80

1 PAGE 5 OF 5

PURCHASE ORDER
RAVENNA ARSENAL, INC.

RAVENNA, OHIO 44266
(216) 358-7111

P. O. NO. 19506
This Number and Shipper's Name Must Appear on All Shipments & Papers Relating To This Order.

581-1133

CONTRACT NO. DAAA09-88-Z-0001 RELEASE NO.

DATE	1-3-90	TERMS	NET 30	F.O.B.	DEST.
SHIP VIA	VENDOR	PER YOUR QUOTATION	DATED 9-13-89	ACCT. NO.	01-2519

TO CARDAMONE CONSTRUCTION, INC.
4865 Chaincraft Rd.
Garfield Heights, Ohio 44125

SHIP TO BLDG 1035
F/ATTN: W. CARKIDO - 1030

P.O. 19506

ITEM	QUANTITY	UNIT	DESCRIPTION	PRICE
17.			THE SUBCONTRACTOR WILL BE REQUIRED TO COMPLY WITH THE OCCUPATIONAL SAFETY AND HEALTH ACT AND THE SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION (VOLUME 36, NUMBER 75, PART II OF THE FEDERAL REGISTER). ANY PENALTIES ASSESSED RESULTING FROM AN ALLEGED VIOLATION FOR YOUR FAILURE TO COMPLY WILL BE YOUR RESPONSIBILITY TO PAY. ANY ASSESSMENT OF PENALTIES AGAINST RAVENNA ARSENAL, INC. RESULTING FROM YOUR FAILURE TO COMPLY WILL BE CHARGED TO YOUR ACCOUNT AND THE ASSESSED AMOUNT WITHHELD FROM YOUR PAYMENT. IN THE EVENT OF A PENALTY ASSESSED RAVENNA ARSENAL, INC. DUE TO FAILURE TO COMPLY BY MORE THAN ONE (1) SUBCONTRACTOR, AMOUNTS OF ASSESSMENT FOR SAID PENALTY WILL BE PROPORTIONATE IN ACCORDANCE WITH THE BEST JUDGMENT OF THE CONTRACT/PROCUREMENT & PURCHASING ADMINISTRATOR, RAVENNA ARSENAL, INC. CONFIRMING/QUOTE DATED 9-13-89 DO NOT DUPLICATE PROMISED: START 1-22-90 FINISH 3-30-90 ENGR/BJJ/co	
			DELIVERY REQUIRED START 1-22-90 FINISH 3-30-90 TOTAL	$186,109.00

DO NOT OVERSHIP
OVERSHIPMENTS WILL BE RETURNED

RAVENNA ARSENAL, INC.
B. J. JENKINS, ADMINISTRATOR
CONTRACT/PROCUREMENT & PURCHASING

RA-21, Rev. 1/88

PURCHASE ORDER

RAVENNA ARSENAL, INC

8451 STATE ROUTE 5
RAVENNA, OHIO 44266-9297
(216) 358-7111
CONTRACT NO. DAAA09-88-Z-0001

7 PAGE 1 OF 3

P.O. NO. 19506
This Number and Shipper's Name Must Appear on All Shipments & Papers Relating To This Order.

DO NOT OVERSHIP — OVERSHIPMENTS WILL BE RETURNED

RELEASE NO.

361-1133

DATE	TERMS	F.O.B.
1-3-90	NET 30	DEST.

SHIP VIA	PER YOUR QUOTATION	ACCT. NO.
VENDOR	DATED 9-13-89	81-2519

TO
GARDAHOUR CONSTRUCTION, INC.
4065 Chainecraft Rd.
Garfield Heights, Ohio 44125

SHIP TO
BLDG 1035
F/ATTN: M. GARKIDO - 1030

M/F
P.O. 19506

ITEM	QUANTITY	UNIT	DESCRIPTION	PRICE UNIT	PRICE TOTAL
1.			PROVIDE ALL LABOR, MATERIAL, AND EQUIPMENT NECESSARY TO REMOVE (12) TWELVE UNDERGROUND STORAGE TANKS FROM RAVENNA ARMY AMMUNITION PLANT.	NOT TO EXCEED $183,359.00	
2.			ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE UNDERGROUND STORAGE TANK REMOVAL SPECIFICATIONS BY HAVENS & EMERSON DATED JULY, 1989, AND RAVENNA ARSENAL, INC. SPECIFICATION PS-446 DATED AUGUST 17, 1989.		
3.			A PERFORMANCE AND PAYMENT BOND IS REQUIRED AND SHALL BE PROVIDED RAVENNA ARSENAL, INC. PURCHASING PRIOR TO COMMENCING ANY WORK.	$2,750.00/LOT	
			DELIVERY REQUIRED START 1-22-90 FINISH 3-30-90 TOTAL	SEE PAGE FIVE	

ALL MATERIAL FURNISHED ON THIS ORDER MUST BE IN COMPLIANCE WITH THE BUY AMERICAN ACT.

PRIORITY RATING | DO-C3 | . CERTIFIED FOR NATIONAL DEFENSE USE UNDER DMS REGULATION I.

RAVENNA ARSENAL, INC.

BY _____ ADMINISTRATOR
CONTRACT/PROCUREMENT & PURCHASING

AUTHORIZED SIGNATURE AND TITLE

CONCURRENCE: _____
CONTRACTING OFFICER'S REPRESENTATIVE

DEPT. COPY