WILDER CONSTRUCTION COMPANY

CLOSURE REPORT

Contract DACA67-93-C-0098
Explosives Washout Lagoons
Contaminated Soil Remediation - Phase I
Umatilla Depot Activity
Hermiston, Oregon

Prepared For

U.S. Army Corps of Engineers
Seattle District

Prepared By

WILDER ENVIRONMENTAL
A Division of Wilder Construction Company

March 1, 1995

CONTRACTOR:
WILDER CONSTRUCTION COMPANY
CONTRACT NO. DACA67-93-C-0098
TRANSMITTAL NO. 14A
ITEM NO. 1
SPECIFICATION SECTION 01735
PARAGRAPH NO. 1.4
APPROVED: YES _____ NO _____
APPROVED WITH CORRECTIONS AS NOTED
ON SUBMITTAL DATA _____
ON ATTACHED COMMENT SHEET _____
SIGNATURE: Stephen C. Field
TITLE: Project Manager DATE 3/20/95

CLOSURE REPORT

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1.0 PROJECT DESCRIPTION

1.1 Site History. The Umatilla Army Depot Activity (UMDA) was established as an Army ordnance depot in 1941 for the purpose of storing and handling munitions. From the 1950's until 1965, UMDA operated an on-site explosives washout plant. The plant processed munitions to remove and recover explosives using a pressurized hot water system. The principal explosives consisted of 2, 4, 6 - trinitrotoluene (TNT), hexahydro - 1, 3, 5 - trinitro - 1, 3, 5 - triazine (commonly referred to as Royal Demolition Explosive or RDX), octahydro - 0 1, 3, 5, 7 tetranitro - 1,3, 5, 7 - tetraazocine (commonly referred to as High Melting Explosive or HMX), and 2, 4, 6 - tetranitro-N-methylaniline (N-Tetryl). In addition, the munitions contained small quantities of 2, 4-dinitrotoluene (2, 4-DNT); 2, 6-dinitrotoluene (2, 6-DNT); 1, 3, 5-trinitrobenzene (TNB); 1, 3-dinitrobenzene (DNB); and nitrobenzene (NB), occurring as either impurities or degradation products of TNT.

Operation of the plant included flushing and draining the explosive washout system. The washwater produced was discharged via an open metal trough to two infiltration lagoons located to the northwest of the plant. The lagoons were constructed in the 1950's and used until 1965, when the plant operations and all discharges to the lagoons ended. A total of 85,000,000 gallons of effluent is estimated to have been discharged to the lagoons during the period of plant operation.

Environmental investigations of the explosives washout lagoons concluded that discharges to the lagoons had caused contamination of the underlying soil and alluvial aquifer. In 1987, the lagoons were listed on the National Priorities List (NPL).

A remedial investigation and feasibility study (RI/FS) of the entire UMDA installation, including the lagoons, was initiated in 1990 to determine the nature and extent of contamination and to identify alternatives available to clean up the facility. In September 1992, a Record of Decision (ROD) presented the selected remedial action for the Explosive Washout Lagoons Soils Operable Unit at the UMDA. The remedy was selected by the U.S. Army and the U.S. Environmental Protection Agency (EPA), with concurrence of the selected remedy by the State of Oregon.

The major components of the selected remedy included the following:

1. Excavation of soils, to the extent practicable, in the lagoon and Explosives Washout Plant (Building 489) areas which have concentrations of TNT or RDX greater than 30 ug/g each.

2. On-site biological treatment of soils, via windrow composing, to TNT and RDX concentrations of 30 ug/g or less; and

3. Replacement of the composted soils into the excavation, covering the area with two feet of clean soil, and revegetating.

4. Soils under the washout trough and around the washout plant with greater than 30 PPM each of TNT and RDX were later added to the soil to be excavated.

The remediation will be conducted in two phases. This Closure Report describes the Phase I (excavation and stockpiling of soil) remediation activities. Phase II will be the composting of the soil and stockpiling the treated soil adjacent to the lagoons.

The explosives washout lagoons, designated the north and south lagoons, are located in Coyote Coulee, a linear depression in the center of UMDA as shown in the drawings. The dimensions of the top perimeters of the north and south lagoons were approximately 54 to 98 feet and 41 to 97 feet, respectively. The lagoons were 5 feet deep with sandy bottoms and gravely sides. They were separated by a gravel berm

approximately 15 feet in width. The depth to the groundwater is 45 to 50 feet below the bottom of the lagoons.

Contamination by TNT, RDX, HMX, TNB, and 2, 4 - DNT is present throughout the vertical extent of the unsaturated soil column directly beneath the lagoons. Tetryl, 2, 6, - DNT, DNB and NB were rarely detected, and then at only low (<5 ug/g) concentrations. No additional organic compounds were detected and inorganic compounds were within general soil background levels. RDX and TNT concentrations typically range from 100 to 2,000 ug/g to a depth of 3.5 feet, and are generally less than 30 ug/g below that. TNT concentrations exceeding 2,000 ug/g have been observed in the top inch of soil, with a maximum of 88,000 ug/g (8.8 percent) detected. The U.S. Army Toxic and Hazardous Material Agency (USATHAMA) has set a 10 percent concentration of explosive components by weight in soil as the level at which reactivity (explosion potential) should be of concern. HMX concentrations generally range below detection (<1 ug/g to 100 ug/g) throughout the soil column. TNB concentrations vary from 2 to 47 ug/g throughout the soil column. 2, 4 - DNT is typically not observed in the upper 6 feet of soil, and is relatively low throughout the remainder of the soil column (below detection [<1 ug/g] to 5 ug/g).

Soil with elevated 2,4 - DNT and RDX (16 ug/g and 80 to 90 ug/g, respectively) concentrations occurs at depth of 15 to 20 feet in the western end of the south lagoon.

TNT and RDX concentrations up to 5,500 ug/g have been detected in the central berm dividing the two lagoons. Explosives concentrations measured in the area immediately surrounding the lagoons are less than 20 ug/g.

Analytical results for soil sampling conducted around the Explosives Washout Plant and adjacent to the discharge trough indicate that TNT and RDX was present at concentrations well below 10 percent. Approximately 42 surface samples were collected in these areas by Dames and Moore in 1990 and 1992. TNT was detected 18 times at concentrations ranging from 1.02 ug/g to 9,900 ug/g. The highest concentrations of TNT were detected in samples collected from outside the eastern portion of the Washout Plant.

RDX was detected 28 times at concentrations ranging from 0.963 ug/g. The highest concentrations were detected in samples collected from the southeast corner of the Washout Plant.

Sample results for several soil borings drilled outside the lagoon area indicate that explosives contaminated soil does not extend 25 feet below ground surface.

Other compounds detected in these areas include 1, 3, 5 - TNB, 1, 3 - DNB, 2, 4 - DNT, HMX, and tetryl. Of these compounds, only HMX was detected at a concentration exceeding 100 ug/g.

This site is a hazardous waste site as identified on the National Priorities List. This listing was established pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 2986 (SARA) and National Contingency Plan. The site is located on a military installation and inside a security area on the installation. All work utilized trained hazardous waste site workers and was in compliance with an approved Site Safety and Health Plan (SSHP) and installation security and safety requirements. The work consisted primarily of excavating explosives contaminated soil, followed by placement in a storage building, and included the following activities:

Submit Remedial Action Management Plans (RAMP) for review and approval.

Develop site work areas (i.e., grubbing and clearing, road development, decontamination pads, temporary support facilities, temporary utilities, and asphalt pad for storage building).

Construct building for storage of contaminated soils.

Collect sump water and place into temporary storage containers.

Disassemble and wash steel overflow trough and transport to Explosives Washout Plant for storage.

Conduct excavation in lagoons, below the steel trough (excavation on steep incline), and adjacent to Building 489 and conduct field and laboratory chemical analysis of the soils.

Screen soils from the excavation on a mechanical 1/4 inch sieve at the excavation site to separate fine-grained material from coarse-grained material.

Transport contaminated soils to storage area.

Conduct temporary closure of lagoons (i.e., backfill clean soils except gravel into lagoon).

Stockpile non-contaminated soil adjacent to the lagoon for later use in lagoon backfill.

Decontaminate work equipment at the excavation site, collect rinsate and place in drums or tanks.

Transport the decontamination water to storage building site for temporary storage in tanks or drums.

Remove the decontamination pads at the excavation site and dispose.

Maintain storage site until the Phase I remedial action contract is completed or Phase II remedial action contract is awarded (approximately 18 February 1994), whichever is later.

2.0 PRE-REMEDIATION

Wilder Environmental received Notice to Proceed (NTP) regarding Contract Number DACA67-93-C-0098, Contaminated Soil Remediation, Explosives Washout Lagoons - Phase I, on November 24, 1993. After receiving the NTP, Wilder prepared and submitted a Remedial Action Management Plan (RAMP). The RAMP contained.

- Work Plan
- Site Safety and Health Plan
- Contractor Quality Control Management Plan
- Environmental Protection Plan
- Spill Prevention, Control and Countermeasures Plan
- Security and Access Control Plan
- Hazard Analyses
- Wilder Safety Program
- Wilder Field Supervisor's Safety and Health Manual
- Letter of Authorization and Appointment
- Resumes' and Certifications
- Equipment Specifications
- Construction Layout Plans

Wilder received comments pertaining to the RAMP from the U.S. Army Corps of Engineers (USACE) and addressed each concern individually at the RAMP review conference at Ft. Lewis, Washington. Wilder resubmitted the final RAMP in mid April. The RAMP was approved on June 3, 1994.

On March 14, 1994, Wilder mobilized a small crew to set office trailers, clear, grub, and grade the area where the contaminated storage building was to be built and delineated the exclusion zones. Shortly after mobilization, it was determined that the existing asphalt pad currently in place would have to be removed in order to accommodate the desired slope for the building floor.

After removing the existing asphalt, Wilder's building subcontractor, Adams Construction Company, of Walla Walla, Washington, mobilized to the site and began construction of the concrete footings and foundation. Concrete was furnished by Boardman Redi-Mix, Boardman, Oregon, and all concrete testing and inspection was performed by Huntingdon, Inc. from Pasco, Washington. The concrete testing results met the strength requirements in the project specifications. Appendix A contains the analytical reports for these tests.

After completing the building concrete work, the subbase was prepared for placement of crushed rock and asphalt. Blue Mountain Asphalt, of Hermiston, Oregon, was subcontracted to place the asphalt floor in the building and to place the storage area east of the building. Huntingdon performed testing and inspection services on the asphalt. These results are included in Appendix B.

Construction of the steel building commenced after the asphalt was placed. The steel columns and ceiling girders were placed in position first, followed by the siding, and roof. The building was all factory pre-drilled and no cutting or re-drilling was required. The construction of the building was complete on June 16, 1994.

3.0 REMEDIATION

Wilder began remediation by decontaminating and removing the steel overflow trough that ran from Building 489 down the hill to the explosives washout lagoons. The trough was cut into 30 foot lengths and placed against the east edge of Building 489. The inlet and outlet ends of the concrete sump, located in between the upper and lower sections of the steel overflow trough, were sealed with non-shrink grout.

Excavation of the first 730 cubic yards (cy) of TNT contaminated soil from the lagoons was performed on June 20 and 21. This soil was excavated after Wilder hand picked the large chunks of visible TNT from the surface of the lagoons. The hand picked TNT was turned over directly to the Umatilla Army Depot. The 730 cy of TNT contaminated soil was placed directly into the storage building without mechanical or chemical screening because of the suspected high concentration of TNT.

Wilder performed continuous soil excavation of the explosives washout lagoons through the first week of July. The TNT contaminated soil was transported to the asphalt pad east of the storage building (material handling area), where the soil was screened to remove rocks and debris. A double deck box screen was used for screening where the first screen separated material greater than 2 inches in diameter and the second screen separated material greater than one quarter inch in diameter. The screening, subsequently, created three different material sizes, 2 inch plus material, material less than 2 inches but greater than one quarter inch in diameter, and fines which were less than one quarter inch in diameter.

The fines were suspected to be contaminated and were, therefore, placed directly into the contaminated storage building. The other two remaining material sizes were placed into 20 cy stockpiles. These stockpiles were sampled and analyzed, using EPA method 8330, for TNT and RDX. If the sample analysis resulted in a concentration greater than 30 part per million (ppm) for either contaminant, the stockpile was considered contaminated and moved into the storage building. If the stockpile was less than 30 ppm, it was transported back to the explosive washout lagoons and used for backfill. The 30 ppm concentration was established by USACE as the health based cleanup level for TNT and RDX.

In order to guide excavation depths and widths the site was subdivided into 61 different grids of various sizes (refer to Project Plans and Specifications). Each grid was excavated to its minimum excavation

depth and sampled from a five point composite location. The five points were previously determined by USACE. The composite sample for each grid analyzed on-site in a mobile laboratory using EPA method 8510 for RDX and 8515 for TNT, commonly referred to as the Jenkins Method.

The sample results from the Jenkins Method determined the next step for each grid. If either the TNT or RDX concentration was greater than 30 ppm for the composite sample, then another excavation lift of 1 to 2 feet was removed and the grid re-sampled and analyzed from the same five point composite locations. If the concentration was less than 30 ppm for TNT or RDX, then the composite sample was sent off-site for confirmation at a laboratory. The laboratory, Precision Analytics of Pullman, Washington, utilized EPA Method 8330 for analysis of TNT and RDX. Similar to the on-site Jenkins Method, if the off-site laboratory sample was greater than 30 ppm concentration for either TNT or RDX the grid excavation continued to the next lower depth. This sampling and analysis scenario continued until the grid was either determined clean or the grid excavation reached its maximum depth as determined by USACE in the Project Specifications. Table 3.1 illustrates the grid number versus the depth of excavation and the final concentration for each grid at the explosives washout lagoons. Appendix C provides the Precision Analytics Results for the excavated grids.

During the time frame while Precision Analytics were performing initial confirmation analysis from the first round of excavation (July 8 to July 24), Wilder began removing drums from Magazine Buildings 411, 412 and 413. The drums were loaded with a forklift onto a 40 foot flatbed trailer and transported to the material hauling area. At the material handling area, the drums were emptied into 20 cy stockpiles and field screened for TNT and RDX. The drummed soil was moved into the building if the concentration of either contaminant was greater than 30 ppm.

It was determined that 160 drums were moved that were not intended to be part of the contract. Wilder segregated the soil from these drums and handled the soil under a future contract modification.

After completion of the drum removal and receiving confirmational analytical results back from Precision Analytics, it was determined that additional soil excavation would be required. Wilder received a contract modification to excavate the additional volume of contaminated soil. This second round of excavation and screening was performed from July 25 through August 2.

Upon completion of screening, Wilder began decontamination and demobilization of the screen. The maximum contract depths had been achieved for the excavation. Although the field screen and confirmation samples indicated that the grids surrounding the perimeter of the lagoons were less than the 30 ppm cleanup level, it was evident from visual observation that major volumes of TNT and RDX contaminated soil was still present. Wilder prepared a proposal for USACE under which the clean soil would be excavated and side-cast adjacent to the lagoons and the remaining contaminated soil would be handled in accordance with the original contract specifications.

While USACE and Wilder completed this scope of work and negotiated the price for the third round of excavation, Wilder returned to handle the 160 drums of soil that were stockpiled in the material handling area.

Wilder re-filled 144 drums with the stockpiled soil. Each drum was sampled at two points and composited for field screen analysis (Jenkins Method). It was determined that none of the 144 drums contained concentrations of TNT or RDX greater than 30 ppm. The drums were re-sealed and transported back to Magazine Building 412. This activity was completed on August 18.

Wilder re-focused on completing the excavation to handle clean soil and transport contaminated soil to the material handling area. The clean soil was excavated and place on visqueen plastic along the south boundary of the lagoons. The contaminated soil was excavated and transported to the material handling area. Due to the excess volume of contaminated soil after screening, Wilder was directed to store the contaminated soil outside the building on the asphalt pad material handling area. The stockpile was

surrounded by ecology blocks and covered with a Griffolyn liner to provide adequate weather protection. This final excavation was complete on August 31.

The total excavation volume of contaminated soil transported to the material handling area was 9,013 cy. The volume of clean soil that was sidecast during excavation was 176 cy. During the excavation and screening Wilder performed personnel and perimeter air monitoring. These were no detectable levels of contaminants found during these operations. Wilder placed 2 feet of backfill material obtained on-site on the floor of the lagoons. The 2 foot of backfill included screened material returned from the material handling area that contained concentration of TNT and RDX less than 30 ppm.

To complete the scope of work for excavation of the explosives washout lagoons, Wilder obtained 40 discrete samples from the 8 grids representing the bottom of the excavation. These samples were analyzed for TNT and RDX off-site. A total of three submissions of data were presented to USACE for these 40 samples for statistical analysis. The first two submissions of data were rejected by USACE (see section 4.0 of this report, Data Validation) due to uncertainty of the data. These results are not included in this report since the data is not considered valid. These samples were analyzed by Precision Analytics. The third data set of 40 discrete samples were sent to a different laboratory, Environmental Science and Engineering, Inc. (ESE) of Denver, Colorado. The analytical results from ESE are included in Appendix D and are summarized in Table 3.2. Wilder collected these samples in February of 1995.

When Wilder returned to the Umatilla Army Depot in February of 1995, the sump remaining in the decontamination pond at the material/handling area was removed. After removing the sump, the soil surrounding the sump was collected into three samples and analyzed by ESE for TNT and RDX. These samples results were non-detectable for the contaminates of concern.

4.0 DATA VALIDATION

A total of 202 confirmation samples were obtained from the established grids at the explosives washout lagoons. The objective of these samples was to verify the field screen analytical results which indicated the particular grid was less than the 30 ppm cleanup level. A total of 10 percent, or 20 samples were split from the 202 samples and submittal to the USACE laboratory in Troutdale, Oregon.

In summary, 162 sample analyses were accepted based on internal QC data performed by USACE. The other 40 samples were not accepted based on absence of QC acceptance criteria. The 40 rejected samples were the 40 discrete samples taken after completion of all excavation and confirmation sampling and analyses. Appendix E contains the Chemical Quality Assurance Report from USACE. An Addendum to this Section of this report will be submitted which summarizes the quality assurance from the re-sampling and analyization of the rejected samples.

Re-sampling was performed by Wilder with the samples submitted to a different subcontract laboratory. The laboratory chosen was Environmental Science and Engineering (ESE) of Denver, Colorado. As previously, discussed ESE sample results are summarized in Table 3.2 and included in Appendix D.

5.0 CLOSURE

Wilder and USACE performed a final inspection on September 20, 1994. A punch list of field and administrative requirements was subsequently developed. All field and administrative requirements have been completed with the exception of final USACE data validation of the ESE analytical results. This QA report will be submitted as an attachment when complete.

As part of project closure, Wilder returned to the site in February 1995, to remove the 55 gallon drum used as a sump in the decontamination pad next to the storage building and asphalt material handling area. The soil surrounding the drum was analyzed in three samples for TNT and RDX. All three samples were less than the detection limits, indicating no contamination beneath the decontamination pad. To

complete all field activities, Wilder backfilled the area north of the explosives washout lagoons. This was done at the request of USACE.

END OF REPORT

TABLE 3.1
EXCAVATION DEPTH AND CONCENTRATIONS

		Concentration (ppm)	
GRID #	DEPTH (FT)	TNT	RDX
G1	3	0.08	0.64
G2	3	ND	2.86
G3	2	0.42	1.69
G4	2	ND	0.28
G5	2	ND	0.57
G6	5	ND	1.30
G6A	3	0.10	6.00
G7	3	0.03	3.18
G7A	3	0.07	2.85
G8	15	22.05	85.63
G9	15	17.61	30.99
G10	5	0.18	1.63
G11	5	0.12	20.82
G12	4	0.45	4.12
G13	2	18.42	4.07
G14	4	ND	16.75
G15	4	3.24	11.83
G16	10	2.8	10.3
G17	10	2.6	25.6
G18	11	2.9	16.2
G19	11	3.5	6.3
G20	10	6.3	31.7
G21	10	5.4	17.3
G22	0	0.23	0.55
G23	0	0.56	2.95
G24	0	1.08	3.79
G25	0	2.11	9.34
G26	1	0.13	2.27
G27	2	3.30	2.50
G28	2	17.16	0.85
G29	0	2.54	15.78
G30	0	ND	1.90
G31	0	0.13	0.22
G32	1	1.52	0.78
G33	1	0.90	0.47
G34	0	ND	0.10
G35	0	0.03	0.17
G36	0	0.31	5.55
G37	0	0.14	0.06
G38	0	ND	2.05
G39	2	0.30	0.84
G40	2	0.58	1.54
G41	0	0.04	1.46
G42	1	0.04	0.73
G43	0	0.12	ND
G44	0	ND	ND
G45	0	ND	ND
G46	0	ND	ND
G47	0	ND	0.26
G48	0	ND	0.12
G49	0	1.12	0.42
G50	2	3.30	16.30
G51	2	8.30	6.50
G52	0	0.12	ND
G53	0	ND	ND
G54	1	5.75	3.78
G55	3	3.43	11.94
G56	2	0.39	3.49
		Concenration (ppm)	
GRID #	DEPTH (FT)	TNT	RDX
G57	1	6.23	4.80
G58	2	ND	0.88

		Concenration (ppm)	
GRID #	DEPTH (FT)	TNT	RDX
G57	1	6.23	4.80
G58	2	ND	0.88
G59	1	ND	0.46
G60	1	ND	6.42
G61	0	0.10	2.03
SNAKEPIT	3	0.18	1.61

TABLE 3.2

DISCRETE SAMPLE RESULTS

	Concentration (ppm)	
Grid #	TNT	RDX
G 8 NW	0.25	2.6
G 8 SW	7.31	10.4
G 8 NE	5.92	7.5
G 8 SE	1.33	14.1
G 8 C	3.17	11.4
G 9 NW	0.99	10.9
G 9 SW	2.42	7.2
G 9 NE	0.94	5.5
G 9 SE	0.77	14.1
G 9 C	4.39	6.6
G 16 NW	1.90	6.2
G 16 SW	3.67	2.9
G 16 NE	0.52	2.8
G 16 SE	23.0	6.4
G 16 C	1.49	2.0
G 17 NW	0.84	20.6
G 17 SW	1.0	3.1
G 17 NE	0.55	45.1
G 17 SE	0.79	3.5
G 17 C	4.09	2.6
G 18 NW	0.82	5.7
G 18 SW	2.22	75.1
G 18 NE	9.76	12.6
G 18 SE	2.15	23.4
G 18 C	1.41	8.4
G 19 NW	0.58	3.4
G 19 SW	3.29	2.9
G 19 NE	2.21	11.4
G 19 SE	0.62	1.4
G 19 C	0.48	0.5
G 20 NW	6.17	2.3
G 20 SW	0.94	2.1
G 20 NE	2.45	3.7
G 20 SE	3.86	3.3
G 20 C	0.98	1.5
G 21 NW	2.36	34.3
G 21 SW	4.37	6.2
G 21 NE	1.00	5.0
G 21 SE	0.90	3.4
G 21 C	0.96	2.6
KEY: NW = NORTHWEST		
SW = SOUTHWEST		
NE = NORTHEAST		
SE = SOUTHEAST		
C = CENTER		