FINAL REPORT

COMPLETION OF SOIL EXCAVATION AND TREATMENT AT CUBE COVE - ADMIRALTY ISLAND

Cube Cove

Prepared For:

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EXECUTIVE SUMMARY

Remediation of the Cube Cove Logging Camp was completed in two phases. The first phase of work was performed in 2001 and 2002 and consisted of the excavation of numerous contaminated sites and the stockpiling of approximately 10,000 CY contaminated soils. DMC Technologies, Inc. completed remediation of the Cube Cove Logging Camp from June to September, 2004. Work performed included excavation of remaining contaminated sites, treatment of contaminated soil and completion of solid waste activities.

Excavation work completed is summarized in the following table. The clean-up limit for all excavations was 230 ppm DRO and 8,300 ppm RRO (ADEC Method 2).

Site	Contaminated Soil Excavated (CY)	Clean-up Confirmation Samples Collected	Results
Trailer #22	4.2	1	1 round of excavation to achieve clean-up limit
Trailer #31	18.2	3	2 rounds of excavation to achieve clean-up limit
Trailer #34	4.2	1	1 round of excavation to achieve clean-up limit
Trailer #38	5.6	1	1 round of excavation to achieve clean-up limit
Trailer #39	4.2	2	1 round of excavation to achieve clean-up limit
Trailer #44	5.6	1	1 round of excavation to achieve clean-up limit
Trailer #47	7	1	1 round of excavation to achieve clean-up limit
Trailer #51	98	4	1 round of excavation to achieve clean-up limit
School House	4.2	3	2 rounds of excavation to achieve clean-up limit
LTF Crane Pad	49	5	1 round of excavation to achieve clean-up limit
Lower Fuel Depot	1746	61	3 rounds of excavation needed. 448 CY treated in-place. Partial smear band left in-place. Contaminated marsh left in-place. ADEC approval granted for contamination left in-place.

Table 1. Summary of Excavations and Clean-Up Confirmation Sampling

No groundwater contamination was detected at Cube Cove during site characterization work. A single surface water sample from the marsh below the lower fuel depot was collected to ensure that groundwater under the lower fuel depot was not leaching contaminants into the lower marshy area. The sample contained traces of naturally occurring DRO and RRO but no total hydrocarbons or total aqueous hydrocarbons.

Contaminated soils at Cube Cove were treated using a proprietary bioaugmentation process augmented with a chemical biostimulant. Contaminated soil was previously stockpiled into two stockpiles, one containing approximately 8,388 CY located on the upper north woodwaste fill (historic and new excavations) and the other containing approximately 6,146 CY located on the upper south woodwaste fill (historic excavations). To preserve funding, it was agreed that these combined stockpiles contained 11,946 CY rather than 14,534 measured CY.

A summary of treatment results is noted in the following table. The treatment limits for contaminated soil were 230 ppm DRO and 8,300 ppm RRO (ADEC Method 2). Statistical methods were following ADEC guidelines and EPA standards were deployed to determine compliance with established limits.

Stockpile	Volume (CY)	Confirmation Samples Collected	Final DRO Treated	Final RRO Treated
North	8,388 CY	66	UCL 95% = 136	UCL 95% = 286
South	6,146 CY	54	UCL 95% = 84	UCL 95% = 118

Table 2. Summary of Contaminated Soil Treatment and Confirmation Sampling

The north stockpile was treated in 21 days and achieved a >98% removal rate. The south stockpile was treated in 37 days and achieved a >99% removal rate. Treatment was successful.

DMC Technologies prepared two 500 CY test plots, as recommended by ADEC, to observe the effectiveness of treatment deployed. Test Plot A was treated, Test Plot B was not, thus establishing a control. Of special interest was the use of a chemical (pentanonic) to degrade petroleum hydrocarbon. The results of the test plot are illustrated below:

Days	Treated DRO (ppm)	Untreated DRO (ppm)
0	14720	14920
1	10020	10060
7	7180	9780
10	5650	9300
12	14.6	8960

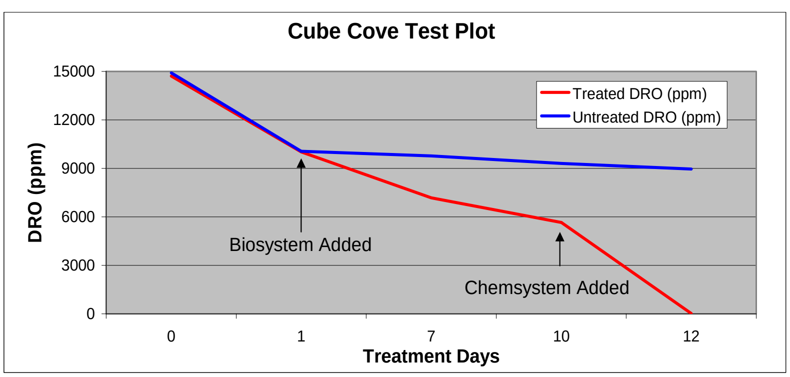


Figure 1. Test Plot Treatment Results

Treatment using a chemical additive following bioaugmentation was shown to be very effective resulting in a very short treatment period – 12 days. No toxic chemical residuals were present in the soil after 24 hours.

Solid waste activities were also completed at the site including a variety of tasks related to grading, reseeding and erosion control.

BACKGROUND INFORMATION

INTRODUCTION

Cube Cove was operated as a 200 person logging camp by Silver Bay Logging until 2001 on lands managed by Atikon Forest Products, Inc. Operations were located at Cube Cove on the northwest side of Admiralty Island - Township 45 South, Range 66 East, Section 28, Copper River Meridian. Camp facilities are generally located along the side of a small valley just south of the Cube Cove tidelands. This area receives between 50” and 150” of rainfall annually. Good surface drainage is present because of the relatively steep topography. Logging activities terminated on-site in 2002 and the camp was demobilized and torn-down by 2003. The general vicinity of the Cube Cove on Admiralty Island is illustrated in Figure 2.

The logging camp consisted of the following six main areas:

A. **Log Transfer Facility:** Located along the east shore of Cube Cove where logs were delivered, sorted, scaled and stored. Stored logs were then placed into water or onto barges for transport to processing facilities at other locations.
B. **Residential and Office Area:** Located about 0.5 miles southeast of the LTF along the main logging road. The area included an electric generator facility, heliport, bunkhouses, cookhouse, school, gymnasium, chapel, chainsaw repair facility, office buildings and 30-40 trailers.
C. **Equipment Repair Area:** Located immediately north of the Residential and Office Area and consisting of an equipment repair building, tire shop, battery shop, drum storage area and a steam cleaning area. Within the same area and across the roadway where the camp incinerator and a 550 ft. long equipment laydown area resides.
D. **Fuel Storage Facility:** Located just east of the Log Transfer Facility on the south side of the main roadway and including both an upper and lower areas where fuel tanks were stored.
E. **Sort Yard Waste Disposal Areas:** Three main locations including the lower camp waste disposal area , north upper camp waste disposal area, and south upper camp waste disposal area.
F. **Other Remote Areas:** Other locations of interest include ash residue disposal site, old campsite, airport, numerous rock quarries, 1997 bunkhouse spill area, Peanut Creek equipment wash down area, original log sort and scaling site, two small water drainages below the main camp area, Kathleen Creek rock crusher site, and Pit #11 scrap metal disposal site.

Figure 3 identifies the majority of the camp areas discussed.

Figure 2. General Location of Cube Cove on Admiralty Island.

Figure 3. General Layout of Cube Cove.

1998 ENVIRONMENTAL ACTIVITIES

In May, 1998; detailed inspections were conducted throughout the Cube Cove Logging Camp by Southeast Management Services to evaluate compliance with environmental regulations. The objective of the inspection was to identify areas needing environmental clean-up. The following table identified the areas recommended for clean-up based on the 43 samples collected. Areas noted in yellow were recommended for immediate clean-up. Those in green for clean-up at closure:

#	Site	Max. Waste Concentration (ppm)	Clean-Up Limits (pm)	Excavation Estimate (CY)
1	Log Bundle Crane	11,100 DRO 62,400 RRO	8,250 DRO 8,300 RRO	100-250
2	Equipment Building – Drum Storage Area	50,000 DRO 73,000 RRO	8,250 DRO 8,300 RRO	200-300
3	Heliport	17,400 DRO	230 DRO	10-35
4	Old Campsite Maintenance Building	7,140 DRO 29,900 RRO	230 DRO 8,300 RRO	15-45
5	Old Campsite Pullout Area	48,100 DRO	230 DRO	100-200
6	Kathleen Creek Rock Crusher	8,600 DRO 19,200 RRO	8,250 DRO 8,300 RRO	20-40
7	Pit #11 Scrap Metal Site	10,000 DRO 50,000 RRO	8,250 DRO 8,300 RRO	5-10
8	Fuel Storage Area	15,000 DRO	8,250 DRO	100-400
9	Upland Fuel Distribution Site	3,000 DRO	230 DRO	120-350
10	Residential Area Fuel Tanks	8,870 DRO	230 DRO	60-90
11	Equipment Building – Outside Front Area	15,000 DRO 25,000 RRO	8,250 DRO 8,300 RRO	60-110
12	Incinerator & Equipment Storage Areas	18,000 DRO 23,000 RRO	8,250 DRO 8,300 RRO	14-56
13	Chainsaw Repair Building	8,700 DRO 12,000 RRO	230 DRO 8,300 RRO	10-30
14	1997 Bunkhouse/Heliport Sill Area	20,000 DRO	230 DRO	70-1500

TOTAL: 1,514 – 3,416

Table 3. 1998 Clean-Up Areas Identified

In summary, 14 sites were identified contaminated with diesel and motor oil representing 1,514 to 3,416 CY of contaminated soil. Details associated with this effort are presented in a report titled, “1998 Environmental Evaluation of the Cube Cove Logging Camp – Admiralty Island, Alaska – Volume I: Analyses”.

2001 TO 2002 ENVIRONMENTAL ACTIVITIES

Subcontracted clean-up activities of contaminated sites commenced in 2001 after logging activities ceased and proceeded in two phases until 2002 when the clean-up was disrupted by Silver Bay Logging bankruptcy. Details associated with this excavation and clean-up effort will be presented in a Final Report developed by Southeast Management Services at a later date.

In summary, the excavations performed produced 10,000 CY of contaminated soil stockpiled in two locations. Excavations at the 1997 Bunkhouse/Heliport Sill Area and the Main Fuel Depot Upper Area were more expansive than expected.

Stockpile	Description	Volume
North Stockpile	Located on the north upper camp waste disposal area. Placed on a 20 mil liner with a sump. Pile size is approximately 100 ft. x 100 ft. x 30 ft. Material is unscreened.	6,000 CY
South Stockpile	Located on the south upper camp waste disposal site. Configured in three separate piles. The main pile includes screened material in a biocell on 20 mil liner with a sump – approximately 70 ft. x 300 ft. x 4 ft. An unscreened pile on a 20 mil liner is also present approximately 80 ft. x 80 ft. x 6 ft. An oversize pile staged on an unlined area (left over rocks and muck from screening) approximately 60 ft. x 30 ft. x 8 ft.	4,000 CY
	TOTAL	**10,000 CY**

Table 4. Stockpiled Contaminated Soils Prior to Final Clean-Up

Excavations were either partially completed or not completed at the following locations:

1. Residential Trailer #22
2. Residential Trailer # 31
3. Residential Trailer #34
4. Residential Trailer #38
5. Residential Trailer #39
6. Residential Trailer #44
7. Residential Trailer #47
8. Residential Trailer #51
9. Schoolhouse
10. LTF Crane Pad
11. Main Fuel Depot – Lower Area

The completion of excavations at each of these eleven (11) sites and the treatment of the stockpiled soils (10,000 CY) as well as the remaining excavated soils (estimated at 250 CY) is the subject of this report.

CLEAN-UP LIMITS

Clean-up limits were recommended during environmental work in 1998 and again in 2001-2002. Total Organic Carbon data was collected to support Method 3 clean-up calculations. However, these calculations were never submitted and approved by ADEC.

Prior to initiating the final phase of clean-up work, which is the subject of this report; a meeting was held with Bill Janes (ADEC), Tom Hanna (representing Atikon) and Dan McNair (DMC). In this meeting a commitment was made by ADEC and Atikon to complete and approve Method 3 clean-up limits for the project. However, to date, no Method 3 limits have been formally established. Calculating these limits may not be necessary so long as the clean-up and treatment meets Method 2 limits. Based on the data collected to date, the following limits have been recommended. Until Method 3 limits calculations are redone and approved, Method 2 limits will be followed for both clean-up and treatment:

#	Site	Maximum Remaining Contamination Remaining	Method 3 Limit Proposed in 1998 & Not Approved	Method 2 Limit Approved
1	Residential Trailer #22	DRO = 1,400	DRO = 230 RRO = 8,300	DRO = 230 RRO = 8,300
2	Residential Trailer #31	DRO = 580	DRO = 230 RRO = 8,300	DRO = 230 RRO = 8,300
3	Residential Trailer #34	DRO = 980	DRO = 230 RRO = 8,300	DRO = 230 RRO = 8,300
4	Residential Trailer #38	DRO = 410	DRO = 230 RRO = 8,300	DRO = 230 RRO = 8,300
5	Residential Trailer #39	DRO = 3,700	DRO = 230 RRO = 8,300	DRO = 230 RRO = 8,300
6	Residential Trailer #44	DRO = 1,400	DRO = 230 RRO = 8,300	DRO = 230 RRO = 8,300
7	Residential Trailer #47	DRO = 4,500	DRO = 230 RRO = 8,300	DRO = 230 RRO = 8,300
8	Residential Trailer #51	DRO = 820	DRO = 230 RRO = 8,300	DRO = 230 RRO = 8,300
9	Schoolhouse	Unknown	DRO = 230 RRO = 8,300	DRO = 230 RRO = 8,300
10	LTF Crane Pad	Unknown	DRO = 8,250 RRO = 8,300	DRO = 230 RRO = 8,300
11	Main Fuel Depot – Lower Area	DRO = 7,000	DRO = 230 RRO = 8,300	DRO = 230 RRO = 8,300
12	Contaminated Stockpiles & Excavated Soils	DRO >10,000 RRO > 20,000	None	DRO = 230 RRO = 8,300

Table 5. Clean-Up Limits for Cube Cove

CLEAN-UP OF REMAINING SITES AND TREATMENT OF CONTAMINATED SOIL

REMEDIATION PREPARATIONS

Contracting

A contract to complete remaining excavations and treat contaminated soils was signed by Silver Bay Logging with DMC Technologies, Inc. on April, 2003. After an on-site visit in March, 2004; an amended contract was signed. A change to the amended contract was then signed May 28th in preparation for on-site remediation activities. Two additional changes to this contract were required, both to accommodate additional soil volume to be treated and expanded work scope to complete solid waste issues identified by ADEC.

Camp Set-Up

On-site work activities commenced at Cube Cove on June 21, 2004 and were completed on August 2, 2004. One additional on-site day was spent September 2, 2004 to collect remaining samples.

Significant effort was required to establish a base of operations. All utilities and buildings at Cube Cove had been removed or demolished in 2001 and 2002. The camp established by DMC Tech was located near the loading dock ramp and included:

- Kitchen and shower facilities and supplies
- Sleeping quarters and bedding
- Portable toilets
- Fridge, freezer, oven
- Camp generator
- Camp gas
- Fuel truck and semi-pup with fuel
- Gasoline drums
- Maintenance supplies including oils, grease, and filters
- Welder and back-up generator
- Cutting torch with gas bottles
- Tools, fittings, and rigging
- Mobile tank pump, hoses
- Bioremediation tanks
- Vacuum pumps, recirculation pumps and heaters
- Bionutrient and microbe stock
- Communications (VHF radio, satellite phone, hand held radios)
- Electronics (PID, computer, GPS, digital camera)
- Sampling containers, coolers, ice packs and supplies
- Personnel protective equipment
- Potable water and food

DMC Technologies contracted with Gumption Freight for expediting and barging services to establish camp operations.

Heavy equipment was provided on-site by Silver Bay Logging and included:

- CAT D7 Dozer
- CAT 330L Excavator
- CAT 680 Loader
- Kenworth 14 CY Dump Truck
- Chevrolet Suburban
- GMC Pick-Up

The equipment present at the site had sat unused for approximately 2 years (since the 2001 and 2002 activities). A mechanic was flown to the site by Silver Bay Logging to place all equipment in good operating condition. A mechanical screen and conveyor had also been left on-site. This equipment was removed via barge by Silver Bay Logging during the set-up of camp.

Records Maintained

DMC Technologies maintained the following set of records during the field work period:

- Hand written field log book
- Electronic daily work record
- Electronic conversation record
- Electronic excavation record
- Electronic treatment record
- Sample log
- Photographic log
- Change log

The appendix to this report contains the electronic daily work record for review.

Critical Documentation

Adherence to Approved Plans

Plans to guide the remediation of Cube Cove were prepared, submitted and approved before work in the field was performed. As necessary field changes to the plan were prepared they were also negotiated and approved.

Remedial Work Plan

A Remedial Work Plan was prepared by DMC Technologies on April 16, 2004, titled, “Remaining Remediation and Soil Treatment Plan – Cube Cove”. This plan was also approved by ADEC on April 22, 2004. Only minor revisions to the plan were needed. ADEC did not require that revisions to the plan be approved prior to remediation work.

Revisions were discussed verbally with ADEC without issue or concern. The Remedial Work Plan was used to guide remedial work performed from on-site between June and August.

Permits Obtained

No permits were required to perform the planned remediation – remaining soil excavation and treatment.

Hazardous Wastes and Exposure Risk Notification

No RCRA hazardous wastes or other regulated hazardous substances with known exposure risks were used or generated during the remediation process (excavation and treatment).

Field Sampling

Field screening methods deployed included (1) visual observations, (2) subjective odor determination, (3) water sheen evaluation and (4) photoionization detection screening.

Visual Screening

Visual screening consists of inspecting soils for petroleum contamination noted in odor and discoloration or staining. Clay and sediment fines in the soil at Cube Cove can turn gray to blue tint with prolonged contact with petroleum product. This discoloration is distinctly different that that associated with natural gray-blue clay especially when accompanied by odor. Discoloration may also appear as dark banding near the surface of the soil with some cementation of particles. Diesel in water can also impart a distinct "shine" to uniform sands and gravels. The shine is caused by adherence of the petroleum to the surface of the media.

Sheen Screening

Water sheen screening involves placing the soil in water and observing the water surface for signs of sheen. This may facilitate detection of both volatile and non-volatile petroleum hydrocarbons. Sheen classification is as follows:

(a) No Sheen: No visible sheen

(b) Slight Sheen: Light, colorless dull sheen; spread is irregular, not rapid; Sheen dissipates rapidly. Natural organic matter in the soil may produce a slight sheen.

(c) Moderate Sheen: Light to heavy sheen; may have some color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas of no sheen on water surface.

(d) Heavy Sheen: Heavy sheen with color/iridescence, spread is rapid; entire water surface may be covered with sheen.

Odor Screening

Subjective odor testing is important in screening potentially contaminated soils. The human olfactory system can sense the presence of petroleum product when a PID cannot detect it. Petroleum odor is distinct and not similar to the acid organic smell of natural humus common in Alaska soils. Sensing by odor is an art developed with experience, but should never be used solely as a determination measure. Odor classification follows:

(a) No Odor: No petroleum odor or only the odor of natural humus.

(b) Slight Odor: Slight petroleum odor and distinguishable from natural humus

(c) Moderate Odor: Moderate petroleum odor clearly distinguishable from natural humus. Odor can be identified as light (volatile) or heavy (oil)

(d) Heavy Odor: Distinguishable petroleum odor with easy identification of fraction as gas, diesel, oil or solvent.

Photoionization Detector (PID) Screening

PID sampling will be accomplished from a hand-held PID. The unit will collect readings from freshly excavated soil at a distance of 2" from the soil until a stable reading is obtained. The unit will be calibrated weekly and can measure vapor concentrations from 0.1 ppm to 10,000 ppm (benzene equivalent). Generally, readings of 5 ppm to 10 ppm suggest DRO concentrations exceeding 250 ppm. This is a rule of thumb and readings at sites vary depending on soil and environmental conditions. Data collected from the PID will be noted in log books. The PID can also be used in a more controlled setting to ensure that exhaust fumes or vapor space discharge immediately following excavation is not falsely considered. In this case, samples are collected and placed in sealed liner bags. The bags are delivered to a room and brought to room temperature. Approximately 200 grams of soil is then placed in a clean sealed 1-liter bag. The PID probe is inserted in the bag and reading recorded at stability.

Laboratory Sampling and Analyses

Grab samples were collected and managed in accordance with accepted commercial practices and EPA's *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846), Third Edition, including Final Update III (1997), adopted by reference. The following requirements were addressed:

- Samples will be preserved after collection in accordance with approved laboratory instructions. Alternatively, the approved laboratory will provide pre-preserved containers for sample collection.
- Representative samples will be collected based on the judgment of a qualified person.
- Sample collection will include the collection of duplicate samples at the discretion of the qualified professional and advice of the approved laboratory (apx. 10% of the total sample volume).
- Samples will be placed in approved containers with labels and seals applied.
- Labels and seals will clearly describe the sample with a unique sample #, date and time of collection, person collecting the sample, and sample description/location.
- Environmental conditions surrounding the collection of the sample will be carefully noted in a logbook.
- Samples will be shipped in a timely manner and will not exceed mandated “holding times”. This will likely require packaging in ice and priority shipments to laboratories coordinated in more than 2 locations.
- A properly executed chain-of-custody form will accompany sample shipments. The chain-of-custody form will clearly identify the analytical methods to be used for the samples collected.
- Sample coolers or containers will be sealed.

North Creek Analytical was contracted to perform analytical work and is approved by the State of Alaska (18 AAC 78.800 - 18 AAC 78.815). The contracted laboratory addressed the following requirements:

- Maintain adequate custody of samples.
- Perform all analyses in accordance with approved procedures and methods specified by the chain-of-custody form.
- Dispose of samples in accordance with applicable federal and state rules and regulations.
- Apply appropriate quality considerations to analyses including analyses of laboratory duplicates, matrix spikes, matrix spike duplicates with notation of percent recoveries as required by the laboratories approved quality assurance program.
- Report results in a timely manner with duplicate copies of analyses – one for the sample requestor and one for ADEC.

Analysis for petroleum contamination followed applicable Alaska methods for the following categories of petroleum hydrocarbons:

> *GRO - gasoline range organics: light-range petroleum products such as gasoline, with petroleum hydrocarbon compounds corresponding to an alkane range from the beginning of C_6 to the beginning of C_{10} and a boiling point range between approximately 60^o Centigrade and 170^o Centigrade;*
>
> *DRO - diesel range organics: mid-range petroleum products such as diesel fuel, with petroleum hydrocarbon compounds corresponding to an alkane range from the beginning of C_{10} to the beginning of C_{25} and a boiling point range between approximately 170^o Centigrade and 400^o Centigrade;*
>
> *RRO - residual range organics: heavy-range petroleum products such as lubricating oils, with petroleum hydrocarbon compounds corresponding to an alkane range from the beginning of C_{25} to the beginning of C_{36} and a boiling point range between approximately 400^o Centigrade and 500^o Centigrade.*

<u>Data Validation and Verification</u>

A qualified professional reviewed, evaluated and assessed the results of the sampling. Both the analytical laboratory and the analytical requestor performed validation and verification to ensure that the data presented was not a false positive or a false negative.

The following considerations were made relative to validation and verification:

- If there is more than one analytical method for a hazardous substance, a responsible person may select any of those methods with a practical quantitation limit less than the applicable cleanup level. If only one analytical method has a practical quantitation limit less than the applicable cleanup level, that method must be used.

- If a hazardous substance is suspected at the site because of empirical evidence or prior analysis, but is not detected or is detected at a concentration below the practical quantitation limit, and the practical quantitation limit is higher than the cleanup level for that substance, ADEC will determine the responsible person to have attained the cleanup level, if additionally the more stringent of the following conditions is met:

    A. The practical quantitation limit is no greater than 10 times the method detection limit for all hazardous substances other than polychlorinated biphenyls where the practical quantitation limit is no greater than five times the method detection limit.

    B. the practical quantitation limit is no greater than the practical quantitation limit established in EPA's *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846), Third Edition, including Final Update III (1997), adopted by reference;

Quality Assurance

Applicable commercial practices for quality assurance were applied to all sample collection and analyses as well as verification and validation of results. Quality was assured by:

- Using qualified and trained personnel (OSHA familiarity)
- Following approved procedures
- Stopping work in the event of unresolved questions
- Maintaining an accurate filing system
- Facilitating communications to avoid unnecessary delays

Project Sample Log

A summary of sample results is included as an appendix to this report. Raw data is available upon request.

STOCKPILE MEASUREMENTS

As previously noted, several stockpiles of soil remained on-site after the termination of work in the 2001-2002 work period. No estimates were provided regarding the volume of these piles. Prior to excavating, DMC Tech calculated the volumes of piles and also subcontracted an independent Alaska Professional Engineer (Evensen Engineering) to calculate stockpile volumes. Excavation records were then solicited from Southeast Management Services from the 2001-2002 efforts. The combined data was then tabulated and agreement reached on the volumes present in the piles.

North Unscreened Contaminated Stockpile

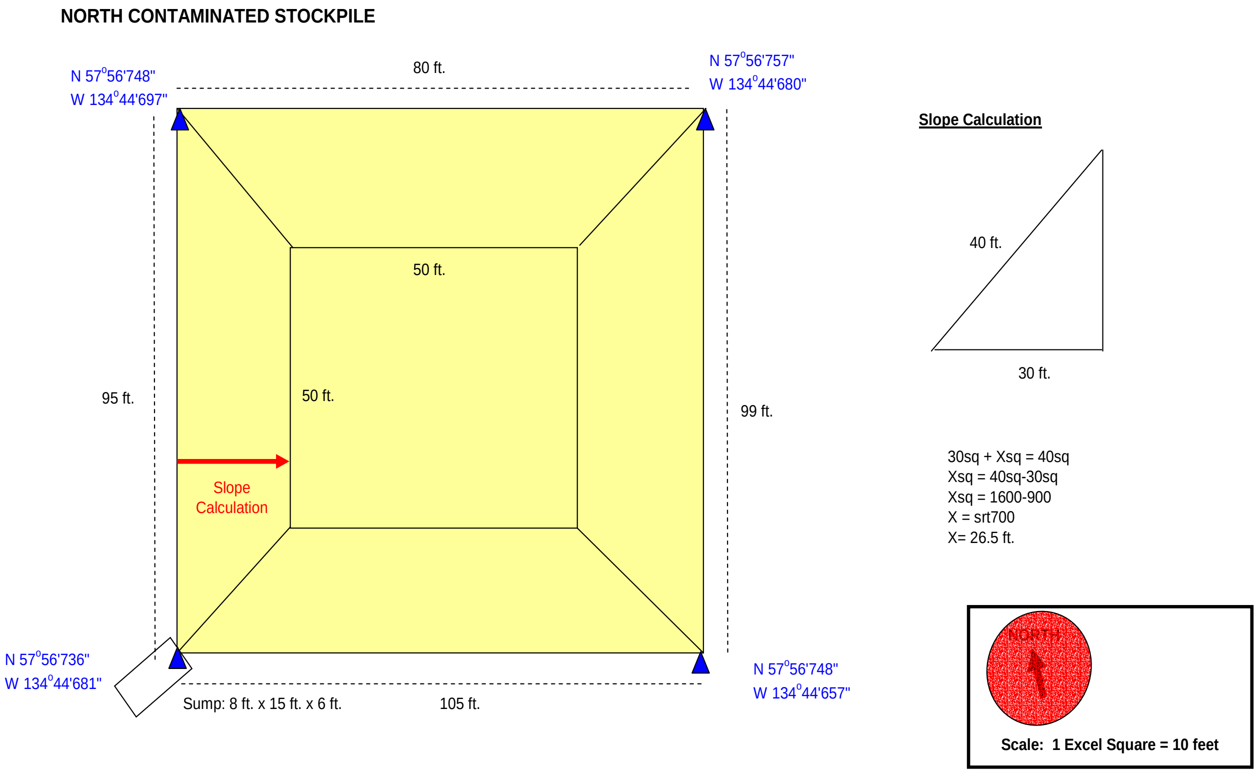


Figure 4. North Unscreened Stockpile Configuration Before Remediation

Calculated volumes for this stockpile are noted below:

DMC Tech Sectional Analysis:	6,625 CY
DMC Tech Rectangular Analysis:	5,926 CY
Evensen Engineering Analysis:	5,860 CY
Load Count – 567 @ 12 CY/Truck:	6,804 CY
Load Count - 567 @ 14 CY/Truck:	7,938 CY
Southeast Management Services Analysis:	5,500 CY
AVERAGE:	6,442 CY

Agreement was reached that this pile contained 6,000 CY. Material in the pile is unscreened and rocks, sands, gravels and some silty loam. DMC Tech estimated that this material had a density of 1.7 tons/CY and the contract was written with this density factor applied.

Field measurements were conducted validating the density factor. The results of these measurements are noted below utilizing the following equation: (X lbs/gal) * (0.1009867) = (Y tons/CY)

Test	Field Measurement	Value (T/CY)
1	17 pounds per gallon	1.717
2	18 pounds per gallon	1.817
3	16 pounds per gallon	1.616
4	15 pounds per gallon	1.515
5	16 pounds per gallon	1.616
Avg.	Average of 5 samples	**1.656**

Table 6. Soil Density Field Measurements

Based on 1.7 tons per CY as a correct density factor, the North Contaminated Stockpile contains 10,200 tons of soil assuming a 6,000 CY pile.

South Unscreened Contaminated Stockpile

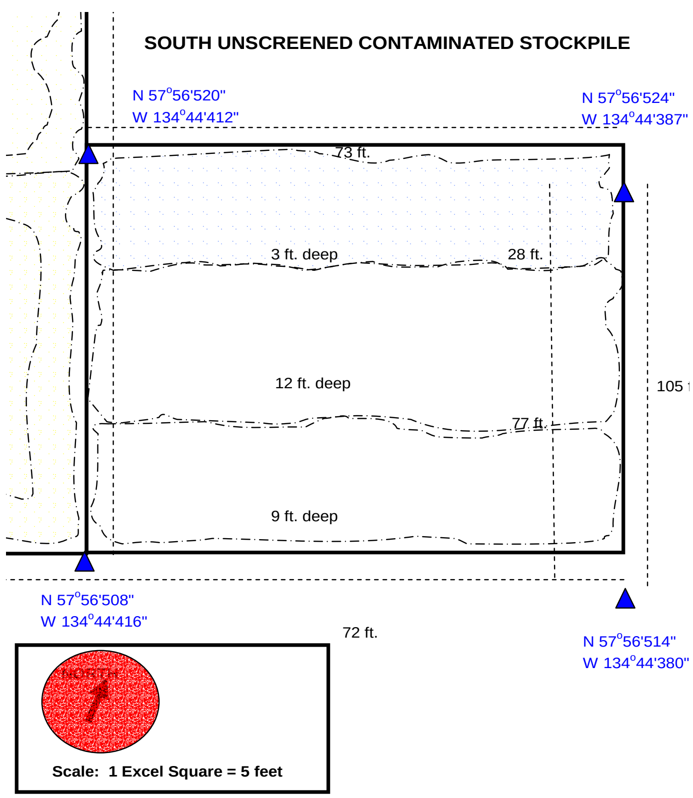


Figure 5. South Unscreened Contaminated Stockpile Configuration Before Remediation

Agreement was reached that the volume of this pile would be included with the volume of the screened pile.

South Screened Contaminated Stockpile

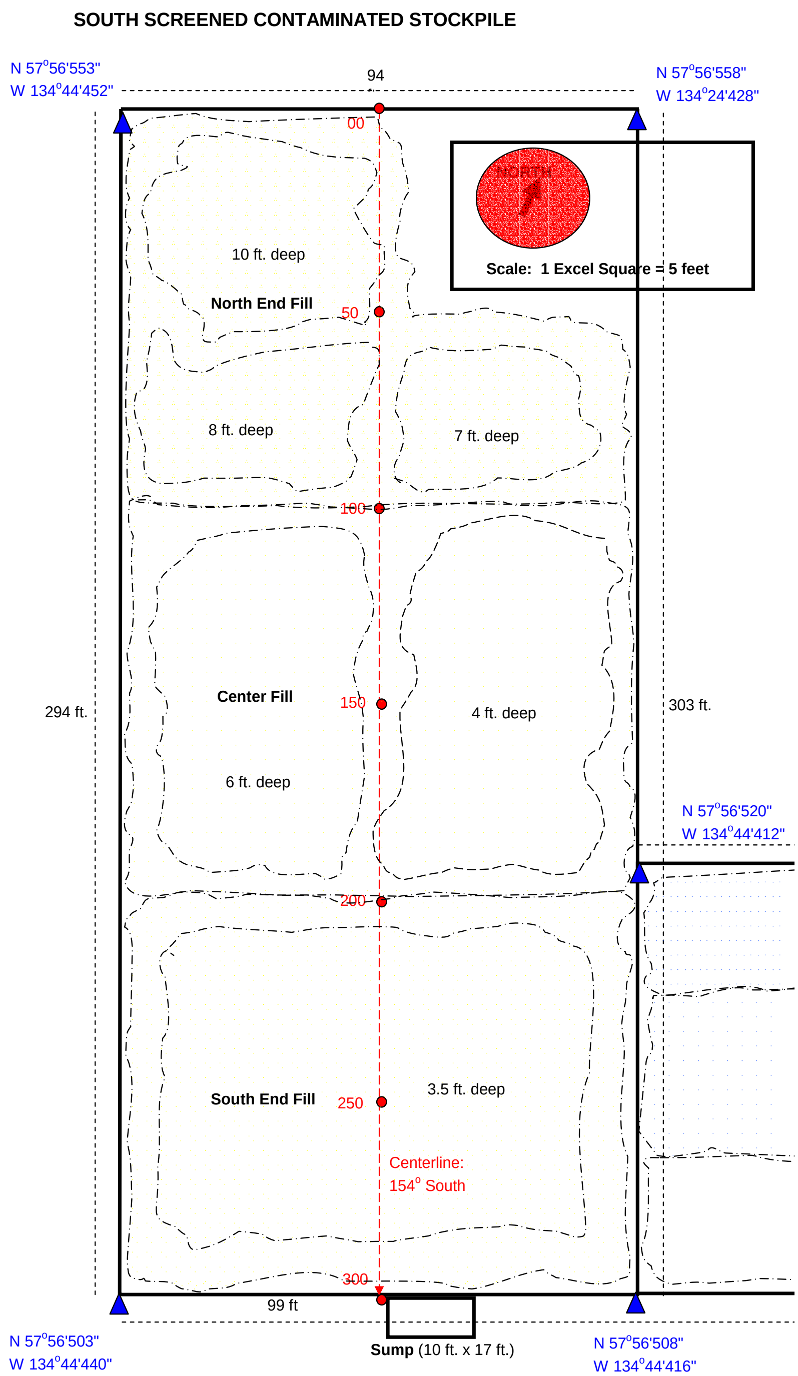


Figure 6. South Screened Stockpile Configuration Before Remediation

Calculated volumes for the unscreened and screened stockpiles are noted below:

DMC Tech Sectional Analysis:	2,417 CY + 4,713 CY = 7,130 CY
Evensen Engineering Analysis:	1,000 CY + 3,109 CY = 4,109 CY
Southeast Management Services Analysis:	1,200 CY + 3,000 CY = 4,200 CY
AVERAGE:	5,146 CY

Agreement was reached that this pile contained only 4,000 CY. With a density factor of 1.7 tons/CY applied, this pile contains 6,800 tons of material.

Two other stockpiles known as the Upper and Lower Screen Debris Stockpiles were located in the south area consisting of the rocks and muck mechanically screened during waste processing to reduce soil volume. The upper pile contains approximately 1,000 CY of screen debris. The lower pile contains approximately 2,000 CY of screen debris. During the removal of the upper screen debris pile, petroleum hydrocarbon odor was apparent and samples of this pile were collected indicating that the material exceeded the Method 2 clean-up limit. Similar samples were collected from the lower pile. The upper debris was treated along with the other unscreened and screened contaminated soil.

The following photograph identifies the north unscreened contaminated stockpile:

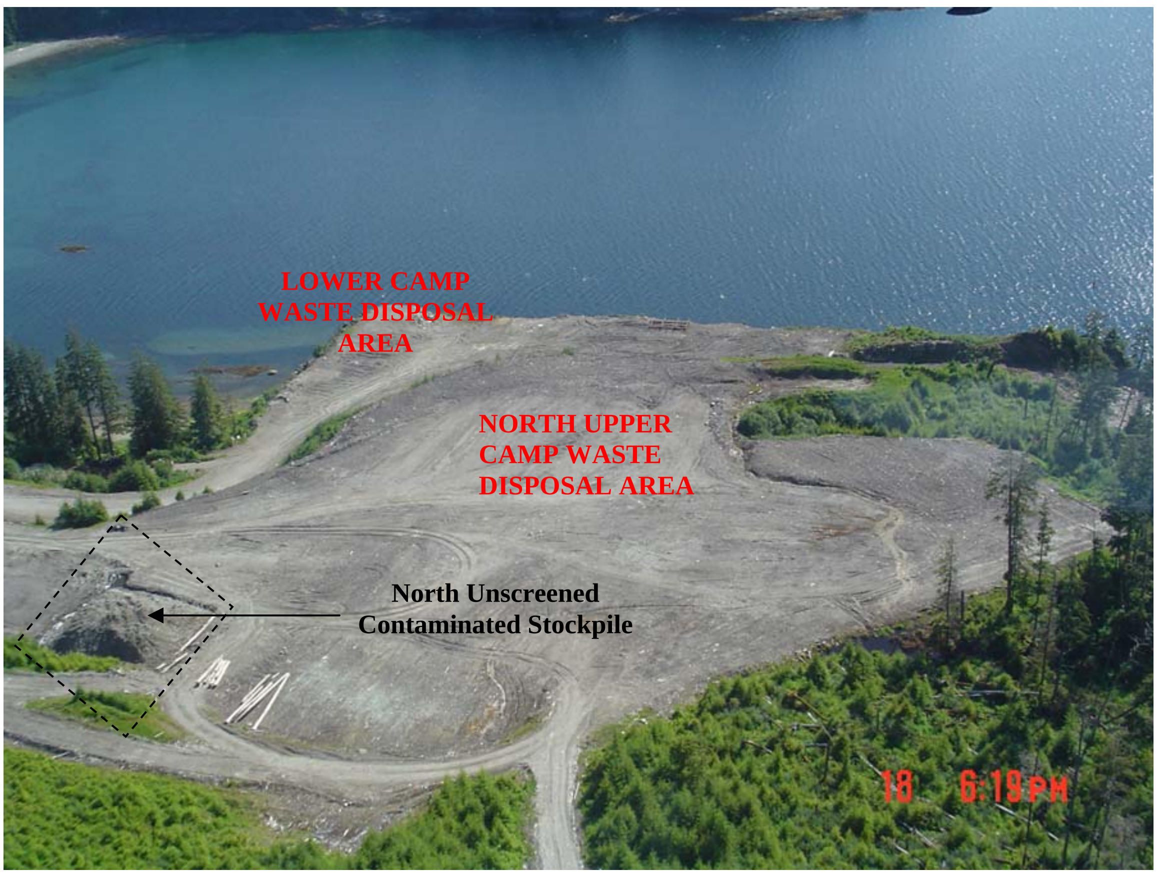


Photo 1. North Unscreened Contaminated Stockpile

The Following photograph identifies the stockpiles located on the South Upper Camp Waste Disposal Area.

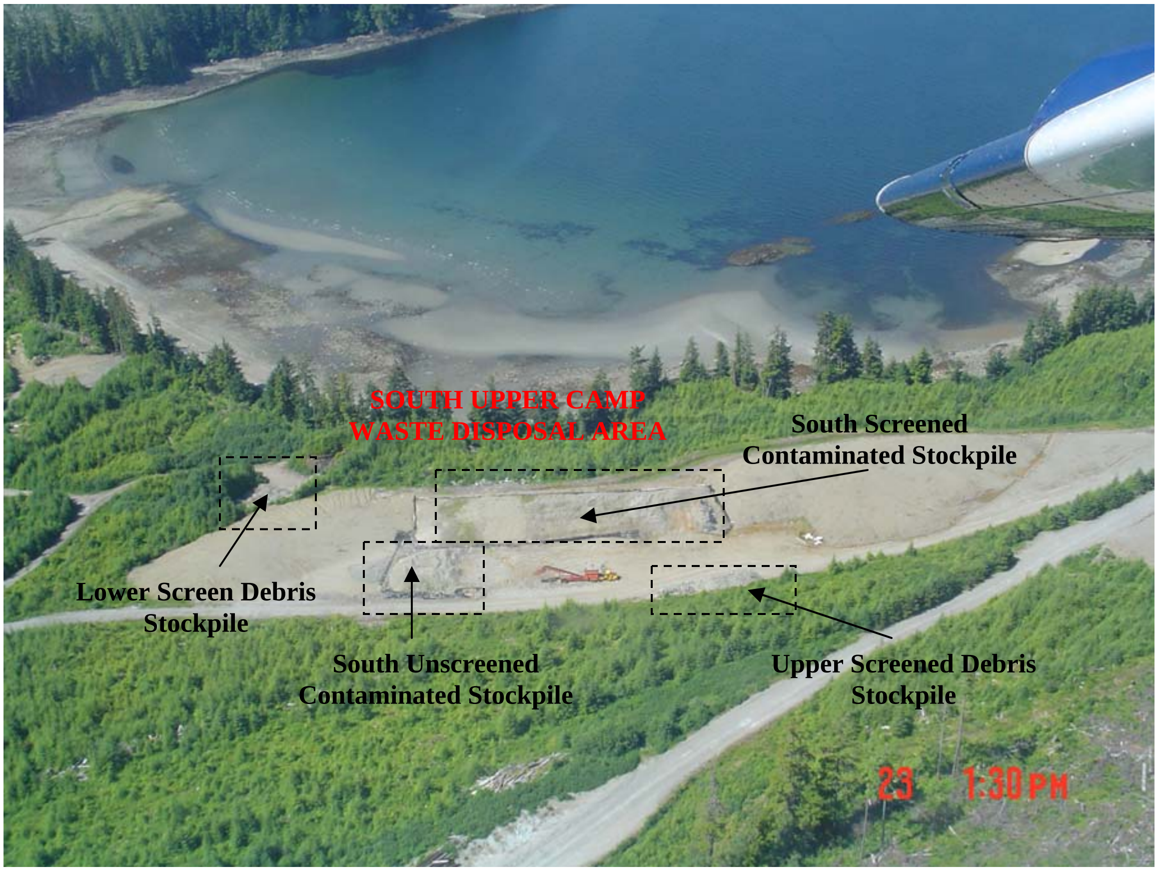


Photo 2. Stockpiles Located in the South Area

In summary, prior to remediation the following contaminated stockpiles were measured and evaluated:

- North Unscreened Contaminated Stockpile – 6,000 CY (10,200 tons)
- South Unscreened and Screened Contaminated Stockpile – 4,000 CY (6,800 tons)

Approximately 3,000 CY of screen debris was also observed in upper and lower stockpiles. The upper screen debris pile was considered for treatment with the other south stockpiles. The lower screen debris pile was sampled but never considered for treatment.

STOCKPILE LEVELING

North Contaminated Stockpile Area

The North Unscreened Contaminated stockpile was leveled using heavy equipment to an approximate depth of 21” over a period of 7 days. The resulting stockpile is illustrated in the following table:

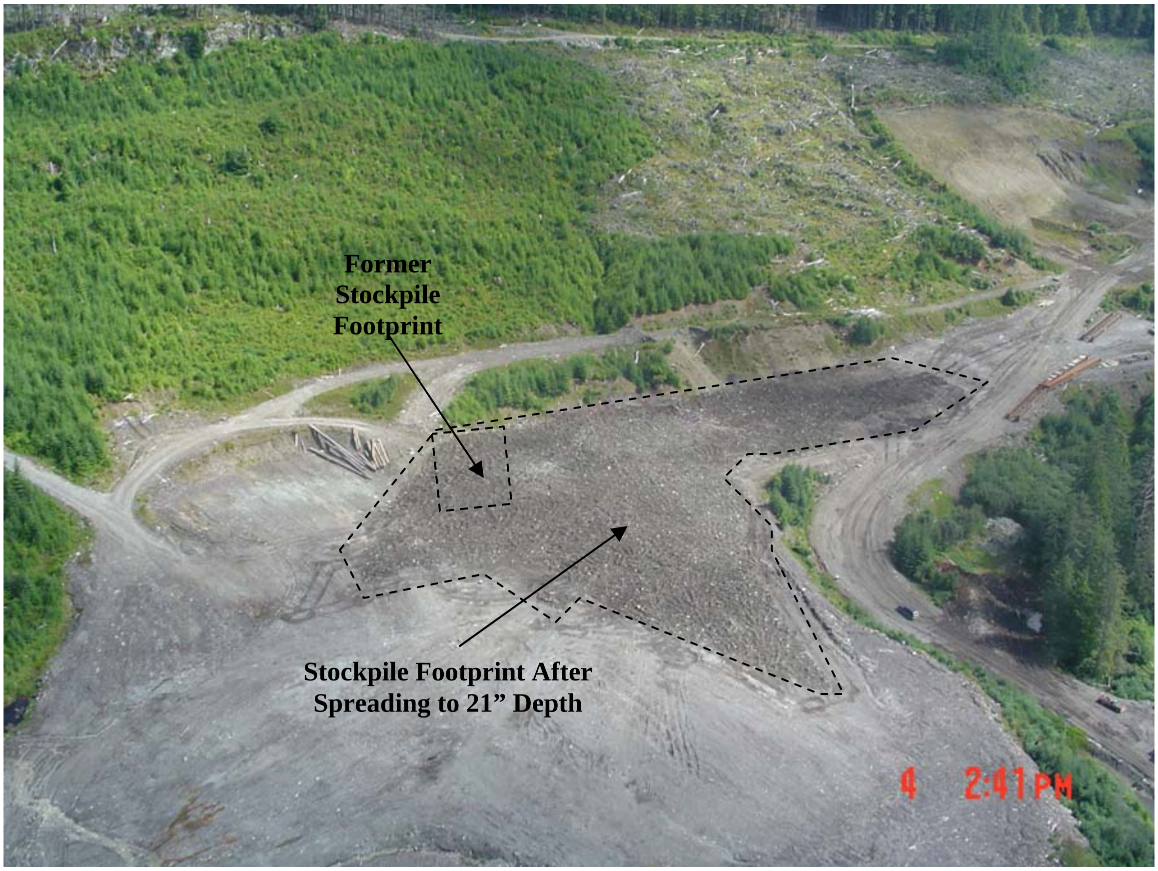


Photo 3. Dismantled North Unscreened Contaminated Stockpile

After spreading the stockpile area was divided into 6 quadrants and 2 test plots to facilitate further volume calculations, treatment and confirmation sampling.

A comparison of measurements before and after spreading is noted below:

Original Stockpile:	6,442 CY
Excavated Soil Placed in Stockpile:	1,448 CY (448 CY removed)
Total Stockpile Volume Before Spreading:	7,890 CY
Total Stockpile Volume After Spreading:	7,649 CY

The difference in the measurements is only 3.2% - indicative of measurement reliability and accountability in tracking loads. A map of the spreadout stockpile follows:

North Unscreened Contaminated Stockpile - Spread to a Depth of 24"

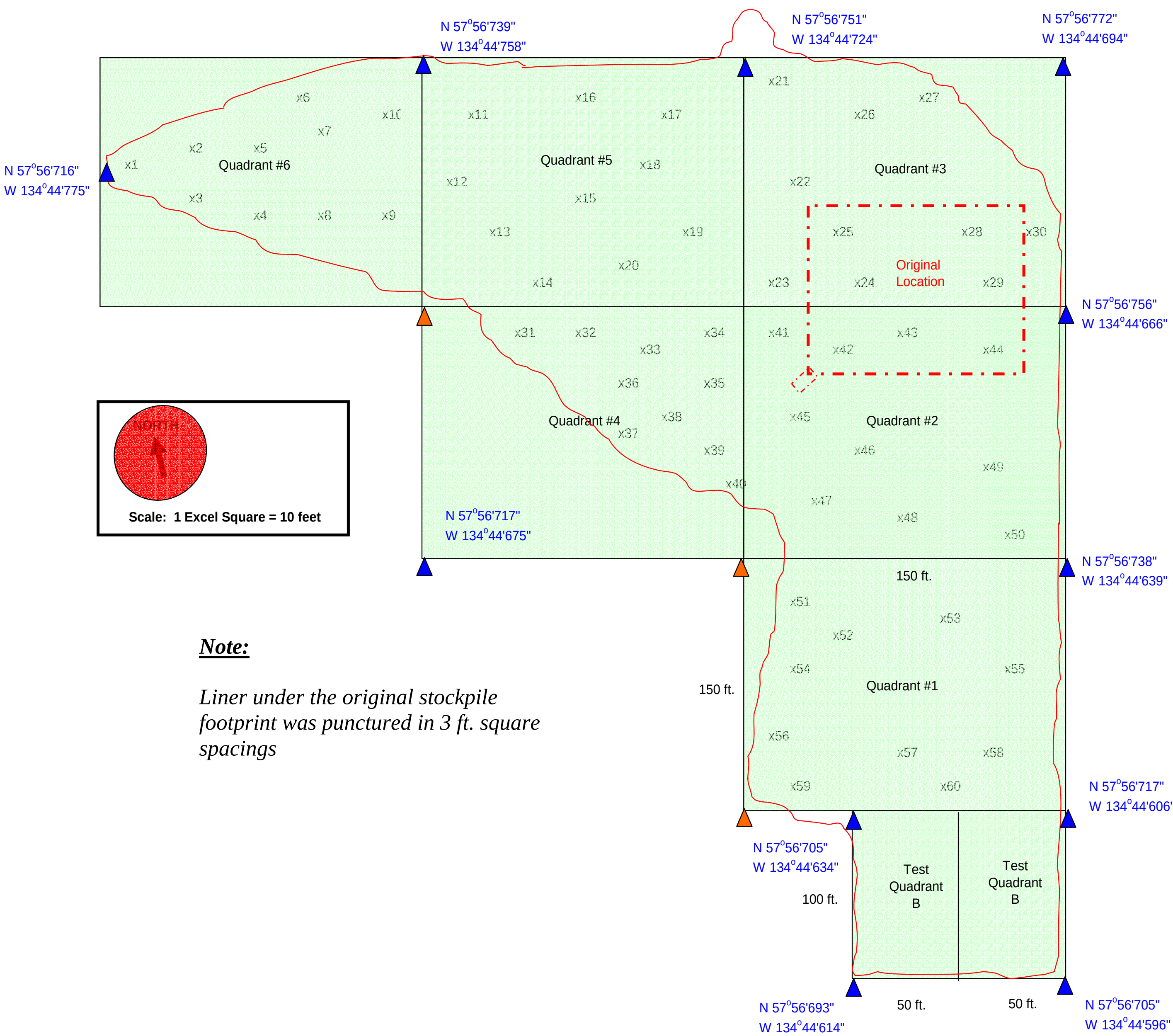


Figure 7. North Stockpile and Excavated Soil Spread to 21" Depth

In a similar manner the stockpiles in the south area were spread out to a depth of 24". The configuration of the south area after spreading is illustrated below:

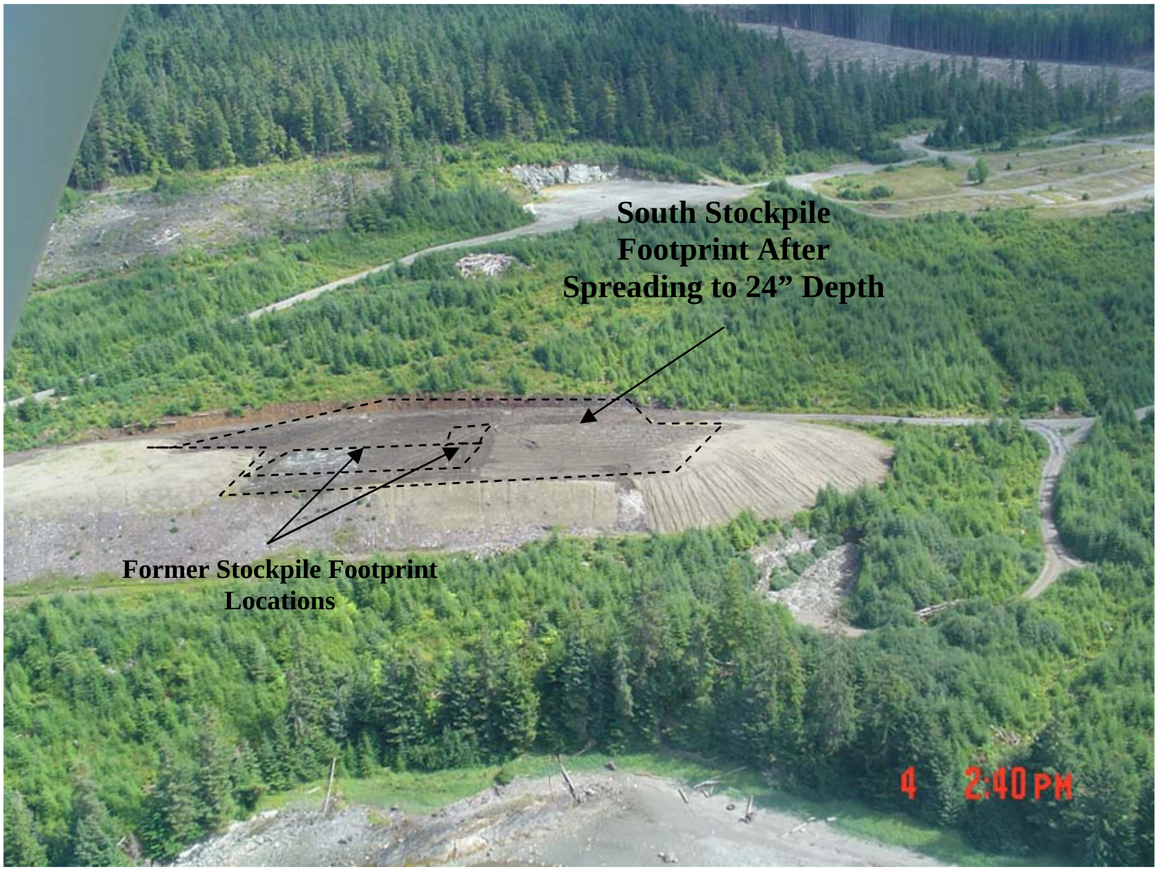


Photo 4. Configuration of South Stockpile Following Spreading.

After spreading the stockpile area was divided into 9 quadrants to facilitate further volume calculations, treatment and confirmation sampling.

A comparison of measurements before and after spreading is noted below:

Original Stockpile (Including Screen Debris):	6,146 CY
Stockpile Volume After Spreading w/ Debris:	5,778 CY

The difference in the measurements is only 6.4% indicative of measurement reliability and accountability in tracking loads. Establishing the volume of this pile at 4,000 CY was overly conservative. A map of the south area follows.

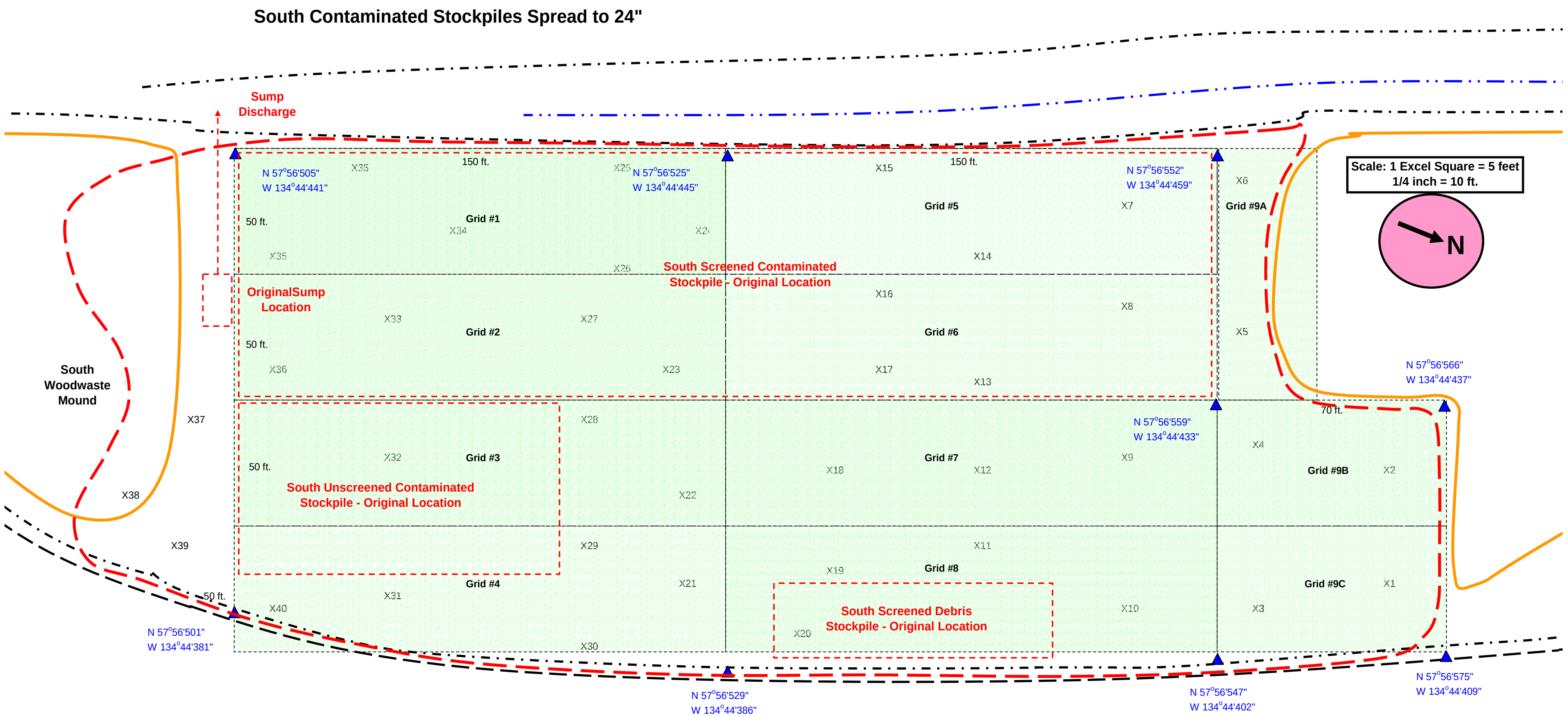


Figure 8. South Contaminated Stockpiles Area Spread to 24”

REMAINING EXCAVATIONS

Excavations & Confirmation Sampling

Excavation and confirmation sampling of 11 sites was performed at Cube Cove. Excavations were tracked throughout the project as noted in the following summary table:

Date	Day	Location	Characterization Data	PID Data From Excavation	Truck Loads	CY Removed	Observations
6/24/2004	Thu	Trailer 51	CR-14: DRO=820 @ 18"	73.8 highest L1 @ 24" 9.5 highest L2 @ 72"	7	98	Persistent solvent odor present with very high PID readings (30-100). Soil includes sand and peat with gray clay lenses near the puncheon layer. Numerous logs and stumps removed. Excavation proceeded to 8 feet deep. No water encountered.
6/24/2004	Thu	Trailer 47	CR-15: DRO=4500 @ 24"	0.1 highest L1 @ 36"	0.5	7	Rocky with some sand and sediment. No contamination noted during excavation. Excavation is dry.
6/25/2004	Fri	Trailer 22	CR-15: DRO=1400 @ 18"	0.7 highest L1 @ 36"	0.3	4.2	Fractured rock - dry excavation and no visible signs of contamination.
6/25/2004	Fri	School	None	9.2 highest L1 @ 36"	1	14	Sand and clay to 5 feet. Contamination removed around sorm drainage pipe at rear centerline of former school. 6 trenches yielded no former tank position.
6/25/2004	Fri	Trailer 34	CR-8: DRO=980 @ 24"	0.1 highest L1 @ 36"	0.3	4.2	Fractured rock - dry excavation and no visible signs of contamination.
6/25/2004	Fri	Trailer 44	CR-8: DRO=1400 @ 32"	0.7 highest L1 @ 60"	0.4	5.6	Fractured rock with moderate sediment - dry excavation and no visible signs of contamination.
6/25/2004	Fri	Trailer 31	CR-11: DRO=580 @ 24"	16 highest L1 @ 42" 0.2 highest L2 @ 48"	1.3	18.2	Fractured rock and sediment surrounding a tree stump situted in a pocket of peat, and dark brown clay. No sign of contamination.
6/25/2004	Fri	Trailer 39	CR-5: DRO=3700 @ 18"	0.2 highest L1 @ 48"	0.3	4.2	Fractured rock - dry excavation and no visible signs of contamination.
6/25/2004	Fri	Trailer 38	CR-6: DRO=410 @ 24"	0.1 highest L1 @ 60"	0.4	5.6	Fractured rock - dry excavation and no visible signs of contamination.
6/25/2004	Fri	LTF Crane	None	22 highest L1 @ 24" 1.2 highest L2 @ 60"	3.5	49	Fractured fill with buff sediment. Dark coloring with trace of diesel smell in center area and slightly north of pad. May be a diesel drum spilll over old hydraulic oil.
6/25/2004	Fri	Fuel Depot-1	See Report (Significant Site)	South End & Bottom: 15.5 @ 96"	4	56	Brown to orangish sediment mixed with dark brown clayey material. Traces of peat and lenses of gray clay. Worked around tree roots. Ramp extended into excavation by cutting and lowering acess road detected additional contamination.
6/26/2004	Sat	Fuel Depot-1	See Report (Significant Site)	North End & Bottom: 23 @ 84"	6	84	Mixed sediment and fractured fill from roadway sloping on top of brown to orangish sediment mixed with dark clayery material. Blending northward into fractured rock and sediment. Contamination is under roadway.
6/26/2004	Sat	Fuel Depot-1	See Report (Significant Site)	Under North Roadway	8	112	Fractured rock and sediment. Pockets of brownish clay lenses. Contamination pesists under the road and is deeper than the former SEMS
6/26/2004	Mon	Fuel Depot-1	See Report (Significant Site)	Under North Roadway	9	126	Distinct smear band detected under the entore depot. Contamination persists at depth. Excavation is near complete. Sample flags set out.
6/26/2004	Fri	Fuel Depot-2	See Report (Significant Site)	Under North Roadway	12	168	Additional northward Excavation
7/3/2004	Sat	Fuel Depot-2	See Report (Significant Site)	Under North Roadway	19	266	Additional northward excavation
7/23/2004	Fri	Spill	None	Refuel Area	12	168	35 gal diesel spill excavated in roadway near camp. Over excavation performed to ensure removal and no migration to boat ramp.
7/27/2004	Tue	Fuel Depot-3	See Report (Significant Site)	East & West Sidewalls, North end	22	308	Removed island and overburden, Excated closer to trees on west and under the island. Removed soils in north entrance area. ADEC aproval to treat in-
7/28/2204	Thu	Fuel Depot-3	See Report (Significant Site)	East & West Sidewalls, Exit startegy	32	448	Removed upper road and expanded to east and west. Discover west exit and excavated a trench out. Expanded bottom of excavation.
				TOTALS	139 Trucks	1946 CY (14)	

Table 7. Excavation Log

Excavation of the identified sites resulted in the removal of 1,946 CY (3,308 tons) of contaminated soil. Excavated soils were placed with the soils from the North Unscreened Contaminated Stockpile.

The Residential Area is illustrated in the following photograph. Although the structures have been removed, the locations can still be mapped and are noted on the photograph.

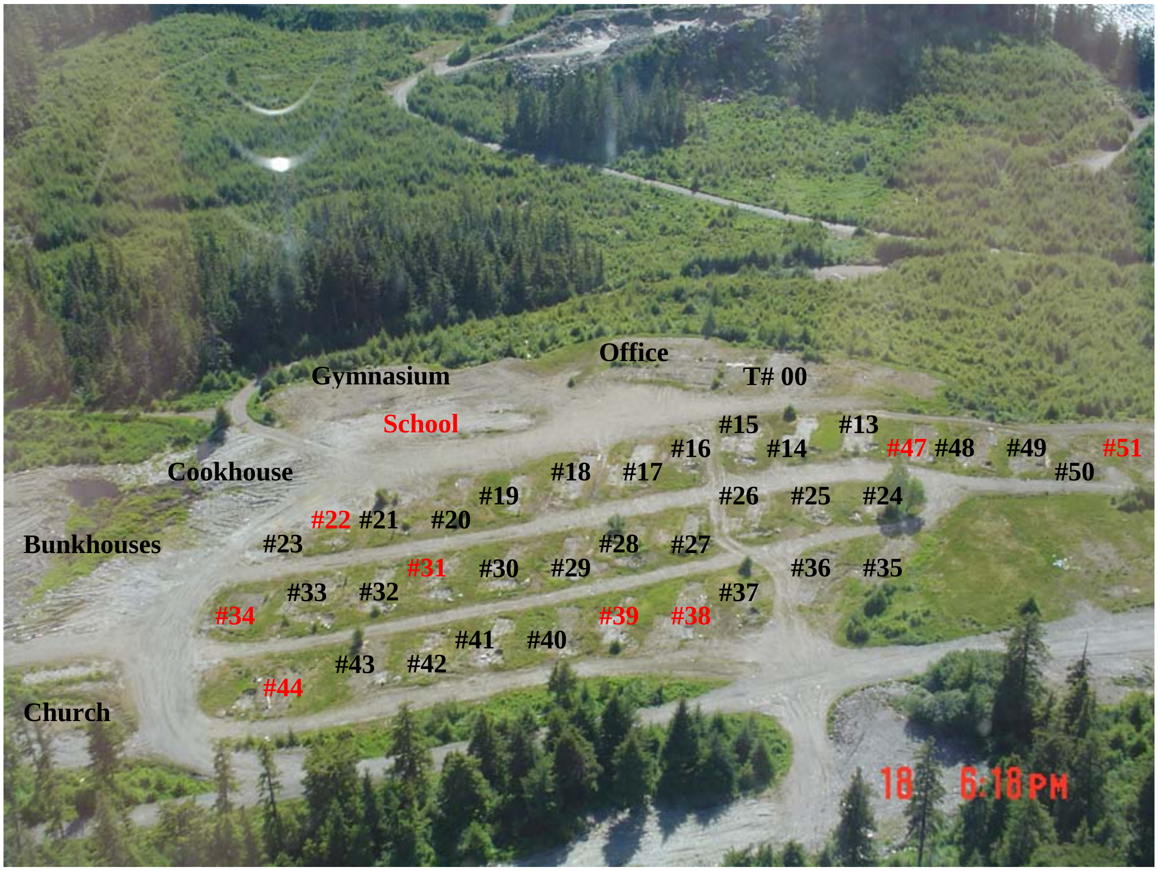


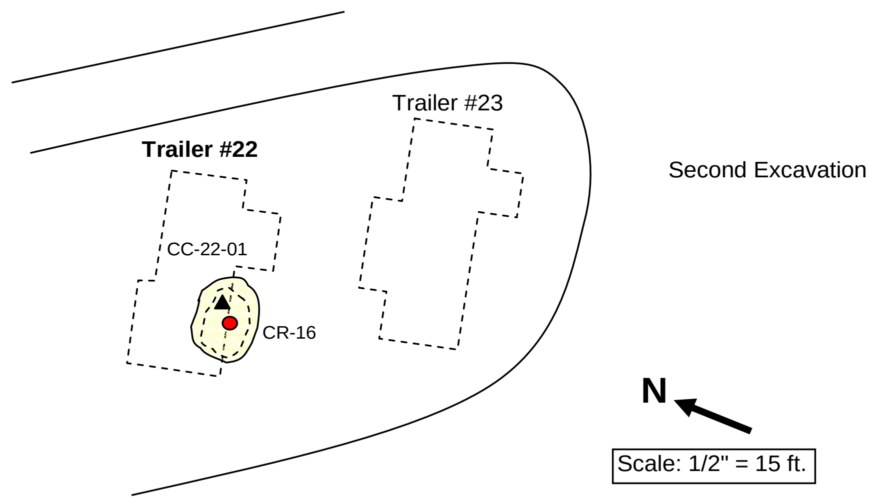
Photo #5. Residential Area Trailers and School Requiring Excavation

Each of the excavations (noted in red) are discussed below relative to additional excavation needed and confirmation samples collected. In general, the effort needed to achieve clean-up limits required that the previous excavations be widened by 1-2 feet and deepened by 1-2 feet.

After performing the excavations, confirmation samples were collected. In the information presented below former sampling and excavation boundaries conducted by Southeast Management Services are illustrated for clarity.

Trailer #22

4.2 CY of contaminated soil was removed from Trailer #22 pad on 6/25/2004. The former excavation hole was widened and deepened. One confirmation sample (CC-22-01) was collected and analyzed. Results indicated that the site had achieved the Method 2 limit of 230 ppm DRO. No further action was performed.

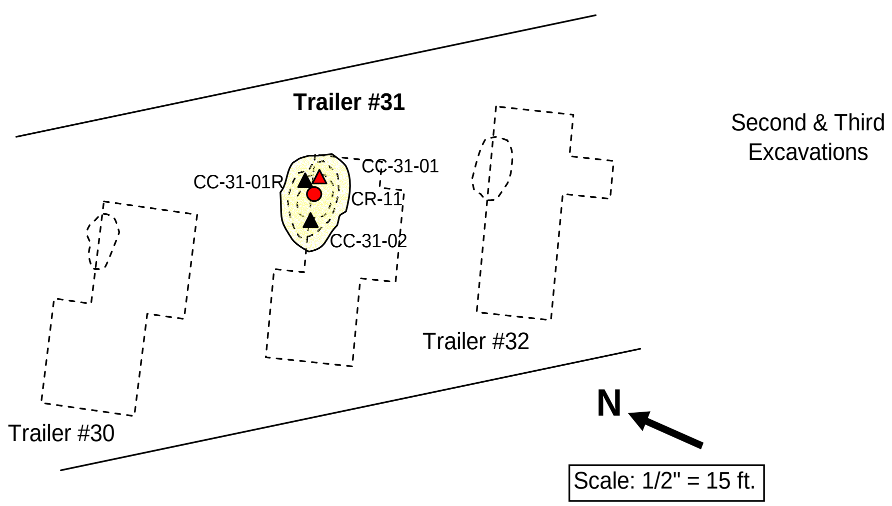


	Sample	Date	Depth	DRO	RRO	PID	Odor	Sheen
●	CR-16	9/24/2002	18"	1,400	<100	NR	NR	NR
▲	CC-22-01	6/28/2004	36"	128	ND	24	m	s

Figure 9. Trailer #22 Excavation and Confirmation Sampling

Trailer #31

Two rounds of excavation were required to clean-up the contaminated soil from Trailer #31 pad. 18.2 CY of contaminated soil was removed on 6/25/2004. The former excavation hole was widened and deepened. Two confirmation samples (CC-31-01 & 02) were collected and analyzed. Results indicated that one of the samples (CC-31-01) failed the clean-up criteria (284 ppm DRO). On 7/27/2004, an additional 0.1 CY was removed from the bottom of the excavation and another confirmation sample was collected. This sample (CC-31-03), indicated that the site had achieved the Method 2 limit of 230 ppm DRO. No further action was performed.

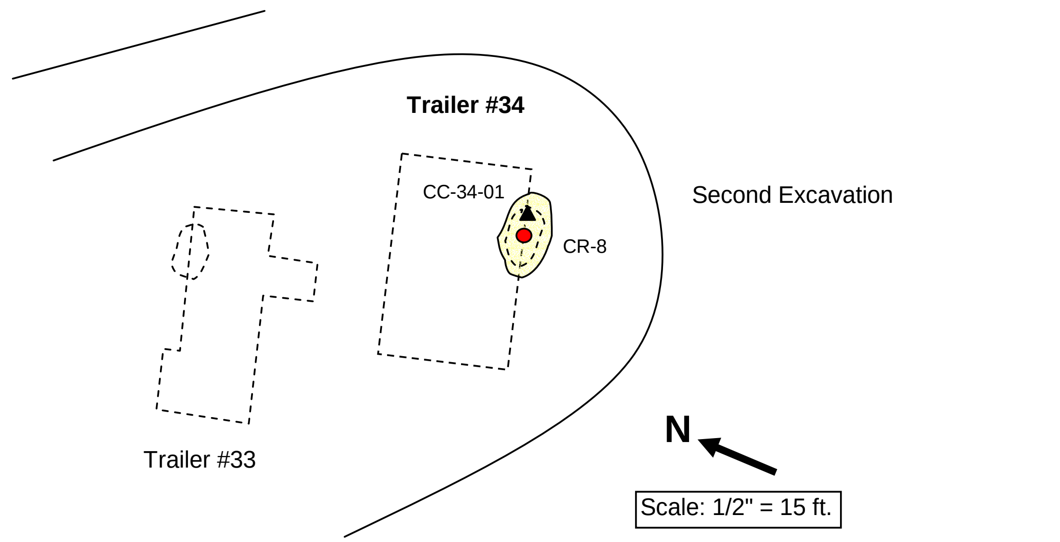


Sample	Date	Depth	DRO	RRO	PID	Odor	Sheen
● CR-16	9/24/2002	24"	580	62	NR	NR	NR
▲ CC-31-01	6/28/2004	36"	284	138	24	m	s
▲ CC-31-02	6/28/2004	36"	54	ND	7	s	n
▲ CC-31-01R	7/28/2004	54"	ND	ND	0.1	n	n

Figure 10. Trailer #31 Excavation and Confirmation Sampling

Trailer #34

4.2 CY of contaminated soil was removed from Trailer #34 pad on 6/25/2004. The former excavation hole was widened and deepened. One confirmation sample (CC-34-01) was collected and analyzed. Results indicated that the site had achieved the Method 2 limit of 230 ppm DRO. No further action was performed.



Sample	Date	Depth	DRO	RRO	PID	Odor	Sheen
● CR-8	9/24/2002	24"	980	100	NR	NR	NR
▲ CC-34-01	6/28/2004	36"	ND	ND	0.1	n	n

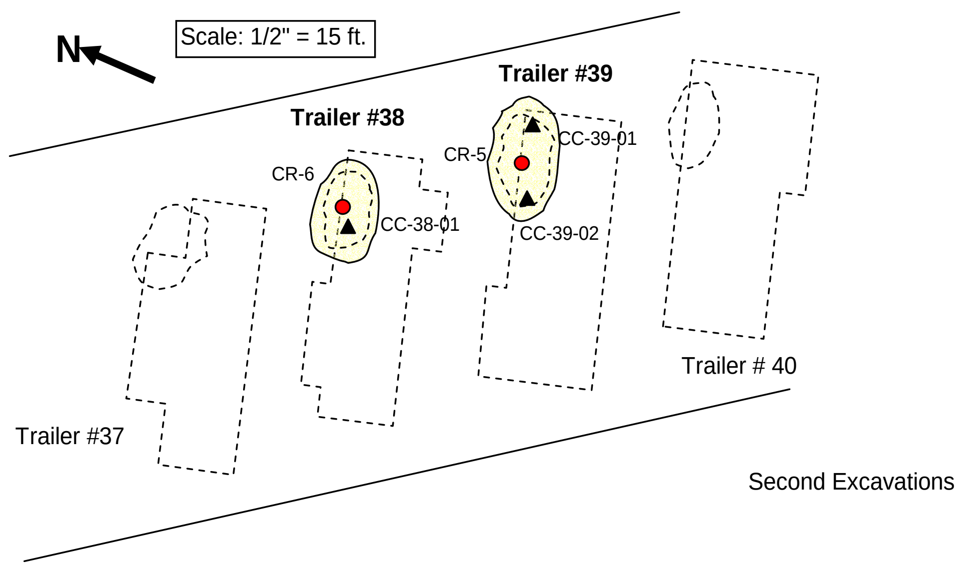
Figure 11. Trailer #34 Excavation and Confirmation Sampling

Trailer #38

5.6 CY of contaminated soil was removed from Trailer #38 pad on 6/25/2004. The former excavation hole was widened and deepened. One confirmation sample (CC-38-01) was collected and analyzed. Results indicated that the site had achieved the Method 2 limit of 230 ppm DRO. No further action was performed.

Trailer #39

4.2 CY of contaminated soil was removed from Trailer #39 pad on 6/25/2004. The former excavation hole was widened and deepened. Two confirmation samples (CC-39-01 & CC-39-02) were collected and analyzed. Results indicated that the site had achieved the Method 2 limit of 230 ppm DRO. No further action was performed.

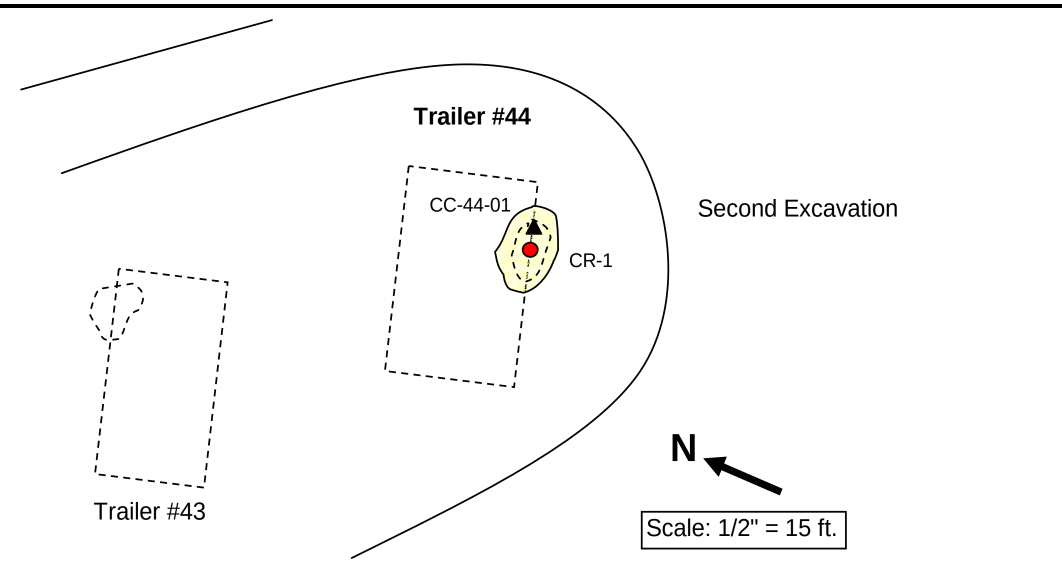


	Sample	Date	Depth	DRO	RRO	PID	Odor	Sheen
●	CR-5	9/24/2002	18"	3,700	<400	NR	NR	NR
●	CR-6	9/24/2002	24"	410	<50	NR	NR	NR
▲	CC-38-01	6/28/2004	42"	ND	ND	0.1	n	n
▲	CC-39-01	6/28/2004	48"	77	ND	4	s	n
▲	CC-39-02	6/28/2004	24"	ND	ND	0.1	n	n

Figure 12. Trailers #38 & #39 Excavation and Confirmation Sampling

Trailer #44

5.6 CY of contaminated soil was removed from Trailer #44 pad on 6/25/2004. The former excavation hole was widened and deepened. One confirmation sample (CC-44-01) was collected and analyzed. Results indicated that the site had achieved the Method 2 limit of 230 ppm DRO. No further action was performed.

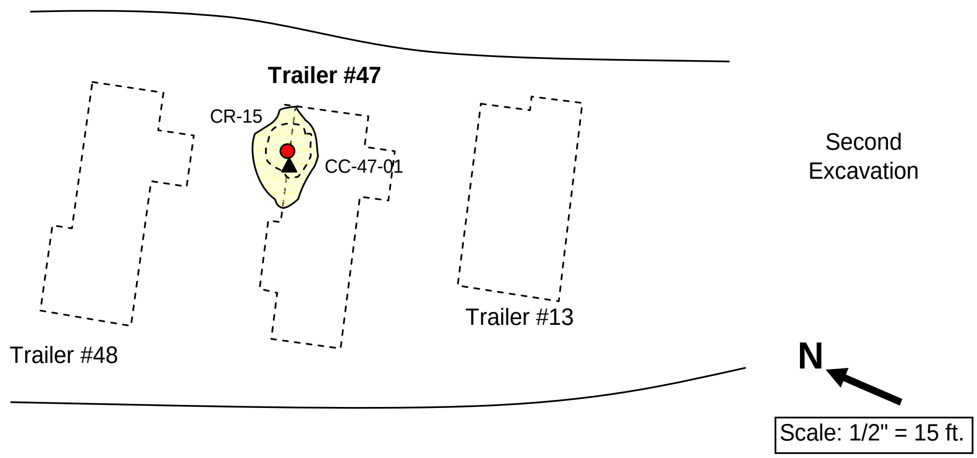


Sample	Date	Depth	DRO	RRO	PID	Odor	Sheen
● CR-1	9/24/2002	32"	1,400	72	NR	NR	NR
▲ CC-44-01	6/28/2004	48"	ND	ND	0.1	n	n

Figure 13. Trailer #44 Excavation and Confirmation Sampling

Trailer #47

7.0 CY of contaminated soil was removed from Trailer #47 pad on 6/25/2004. The former excavation hole was widened and deepened. One confirmation sample (CC-47-01) was collected and analyzed. Results indicated that the site had achieved the Method 2 limit of 230 ppm DRO. No further action was performed.

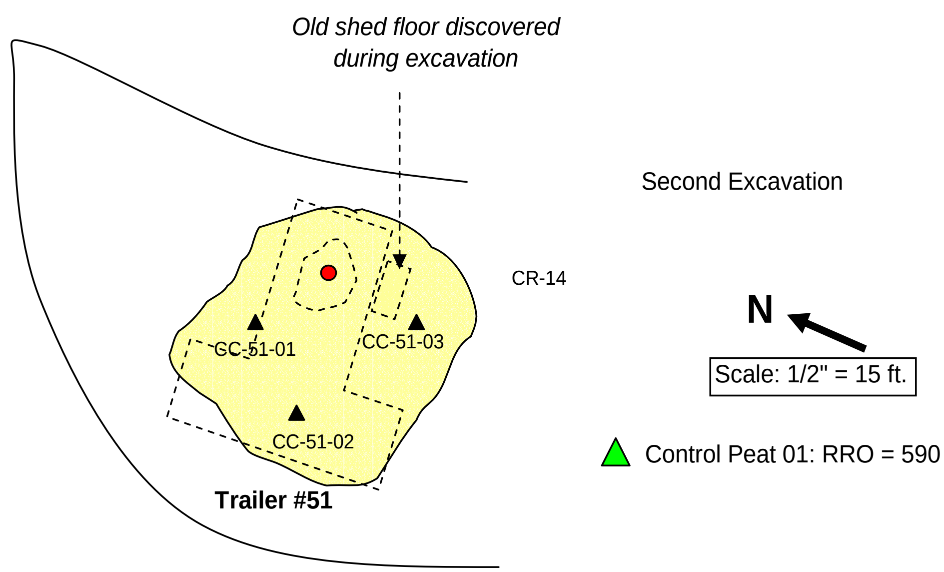


	Sample	Date	Depth	DRO	RRO	PID	Odor	Sheen
●	CR-16	9/24/2002	24"	4,500	300	NR	NR	NR
▲	CC-47-01	6/28/2004	36"	ND	ND	0.1	n	n

Figure 14. Trailer #47 Excavation and Confirmation Sampling

Trailer #51

98.0 CY of contaminated soil was removed from Trailer #51 pad on 6/25/2004. The former excavation hole was significantly widened and deepened. The southeast corner of the excavation revealed flooring boards to a small shed slightly buried under the surface. A strong petroleum odor – likely Stoddard solvent – was detected under the boards and into the main excavation. Excavation proceeded through the underlying puncheon to the water table. No contamination was observed on the water table. A thick layer of peat was also detected at the puncheon line underlying tree roots. A sample of the peat was then collected at an adjacent trailer in a non-contaminated zone for background data. The peat read 0 ppm DRO, but did give a positive reading for RRO of 590 ppm. It is not anticipated that eat in samples will negatively effect DRO readings. At the completion of excavation, three confirmation samples (CC-51-01, 02, 03) were collected and analyzed. Results indicated that the site had achieved the Method 2 limit of 230 ppm DRO. No further action was performed.

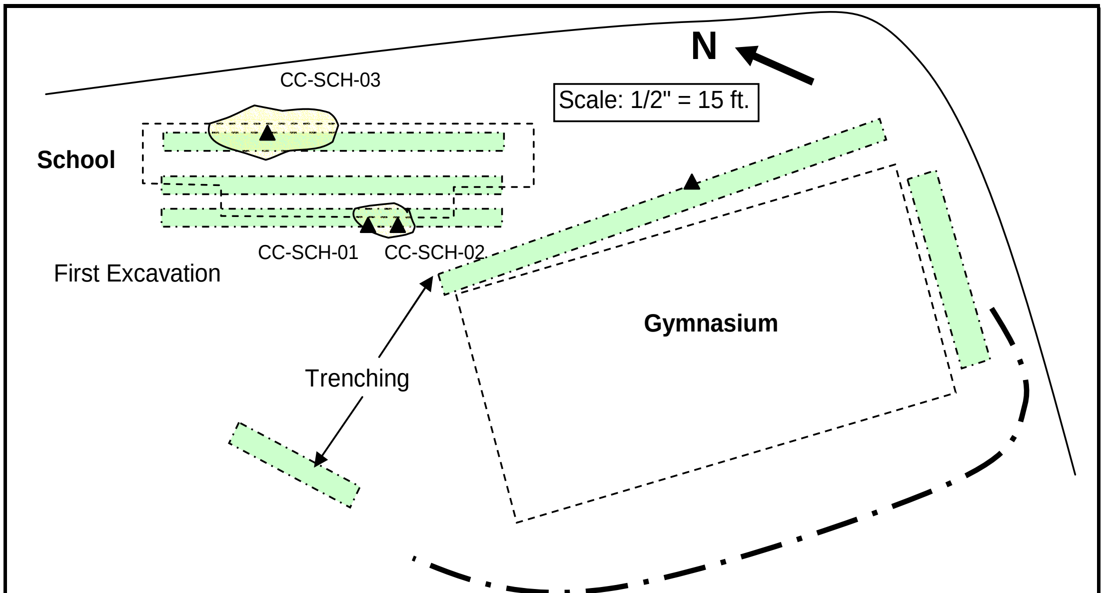


	Sample	Date	Depth	DRO	RRO	PID	Odor	Sheen
●	CR-14	9/24/2002	18"	820	49	NR	NR	NR
▲	CC-51-01	6/28/2004	72"	ND	ND	0.1	n	n
▲	CC-51-02	6/28/2004	96"	ND	ND	0.1	n	n
▲	CC-51-03	6/28/2004	36"	ND	ND	0.1	n	n

Figure 15. Trailer #51 Excavation and Confirmation Sampling

School

4.2 CY of contaminated soil was removed from the school on 6/25/2004 and 7/27/2004. No previous excavation work in this area had been performed during the 1998 characterization effort and preliminary remediation work in 2001-2002. During the June excavation, exploratory trenching was conducted around both the school and the gymnasium. No evidence of a storage tank was noted. A trench line along the back of the school and front of the gymnasium was excavated and uncovered a buried drain line. A small pocket of soil with PID readings exceeding 10 ppm was encountered along the center of this line, likely from a small spill above the drain line. This pocket was removed and two conformation samples were collected. In July, aerial photographs of the site were thoroughly reviewed and identified the position of the fuel tank feeding the school. The area in around the location where the tank sat was excavated and an additional confirmation sample was collected. None of the confirmation samples revealed contamination and the site work was considered complete.



	Sample	Date	Depth	DRO	RRO	PID	Odor	Sheen
▲	CC-SC-01	6/28/2004	60"	ND	ND	0.1	n	n
▲	CC-SC-02	6/28/2004	60"	ND	ND	0.1	n	n
▲	CC-SC-03	7/10/2004	48"	ND	58.6	9	s	n

Figure 16. School Exploratory Trenching, Excavation and Confirmation Sampling

Log Transfer Facility Crane Pad (LTF)

49.0 CY of contaminated soil was removed from the LTF Crane Pad on 6/25/2004 No previous excavation work in this area had been performed during the 1998 characterization effort and preliminary remediation work in 2001-2002. Based on historic aerial photographs, the crane pad was identified and excavations commenced at the crane upright and proceeded in an outward fashion. The soils immediately under the crane pad appeared darker at 60”, but without significant field measurements indicators to suggest it represented contamination. The discoloring at depth is likely the high tide influence line. Five confirmation samples were collected all indicating that the contaminated soil in the area was effectively removed. No further action was taken at the site.

The following photograph depicts the former location of the LTF Crane.

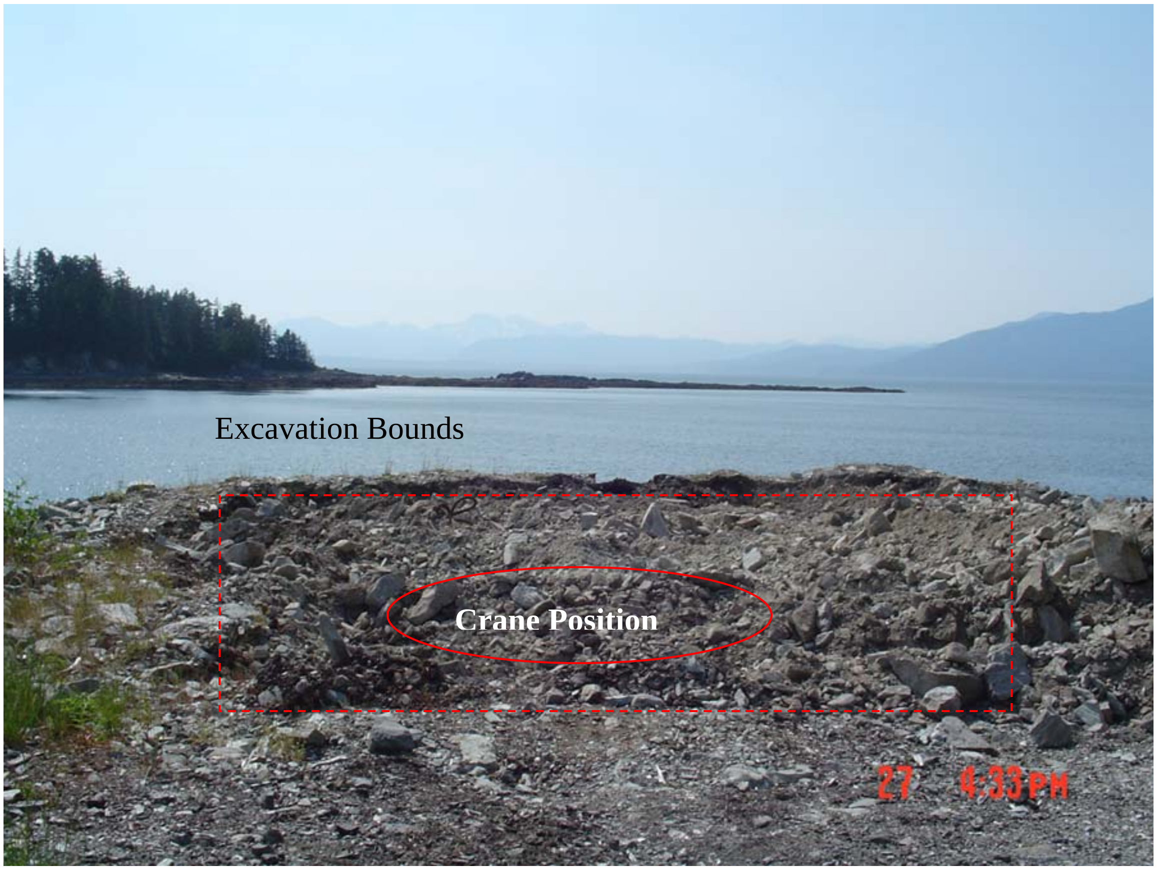
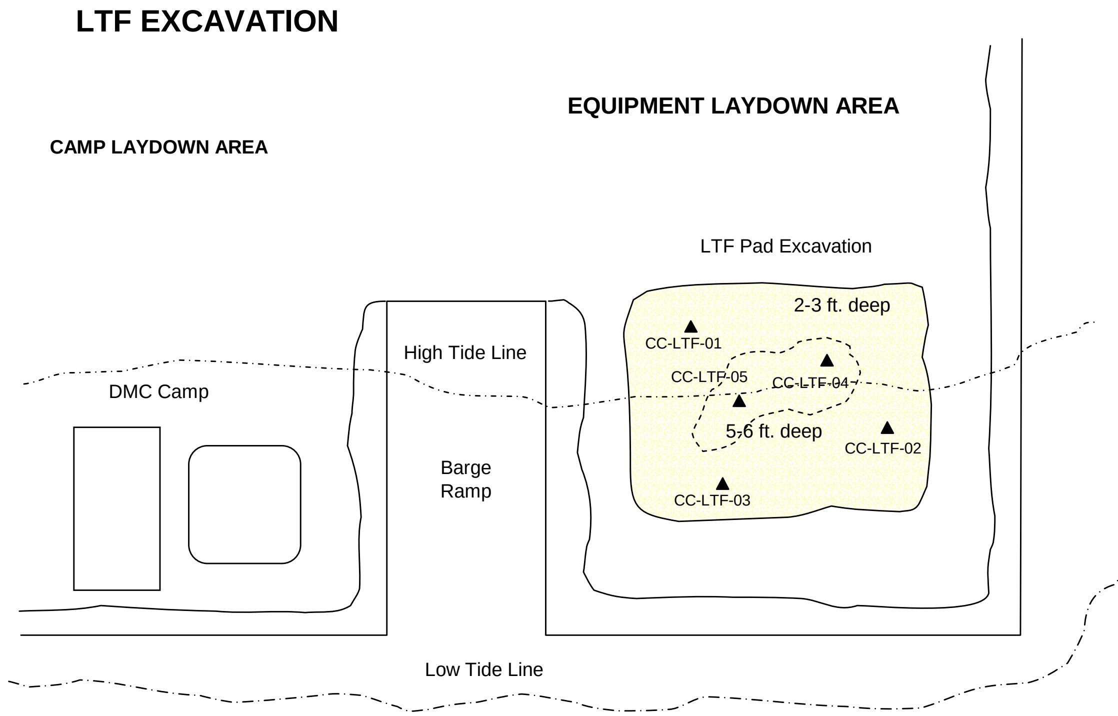


Photo 6. LTF Crane Pad Excavation

Excavation and sampling data is illustrated in the following figure.



	Sample	Date	Depth	DRO	RRO	PID	Odor	Sheen
▲	CC-LT-01	6/28/2004	18"	ND	ND	0.1	n	n
▲	CC-LT-02	6/28/2004	18"	113	434	12	m	m
▲	CC-LT-03	6/28/2004	18"	ND	ND	0.1	n	n
▲	CC-LT-04	6/28/2004	72"	ND	ND	1.2	s	n
▲	CC-LT-05	6/28/2004	72"	96	200	12	m	s

Figure 17. LTF Crane Pad Excavation and Sampling

MAIN CAMP LOWER FUEL DEPOT

The Main Fuel Depot facility consists of an upper and lower level. The upper level contained 4 – 15,000 gallon diesel tanks and 1 – 20,000 diesel tank. The 5 tanks were manifolded together to enhance refueling capability. The tanks were refilled by barge and had secondary containment features. Samples collected during 1998 confirmed the presence of diesel in the upper area at concentrations higher than Method 2 clean-up limits.

Excavation of the fuel depot commenced in 2002. Truck load counts indicate that 678 CY of contaminated soil was removed from the upper level. Only minor excavations were performed in the lower level. The lower level excavations exposed a smear band at approximately 5 ft. BGS on the west side of the excavation extending into large trees bordering tidelands. Correspondence with ADEC associated with the excavation indicated that the trees should not be removed, but additional excavation would be needed throughout the lower area to ensure that as much as the smear band as possible is removed.

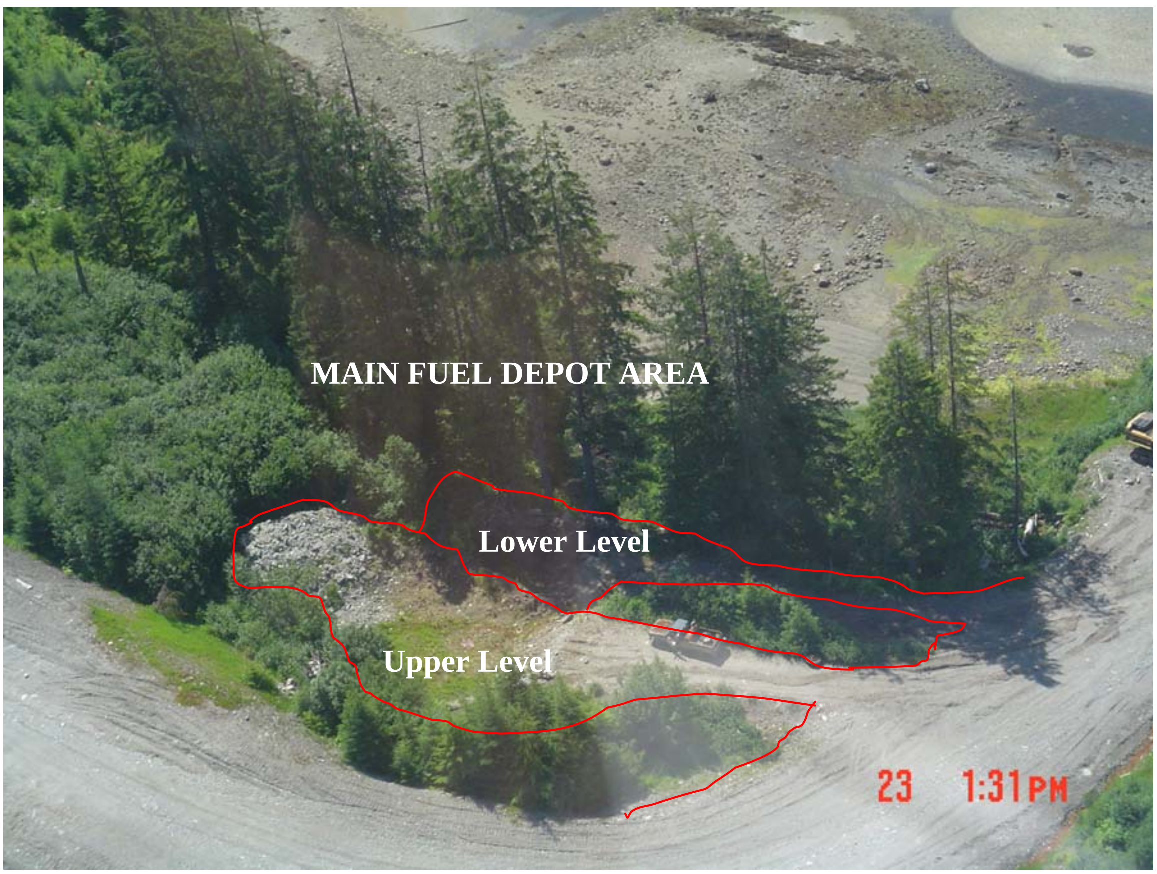
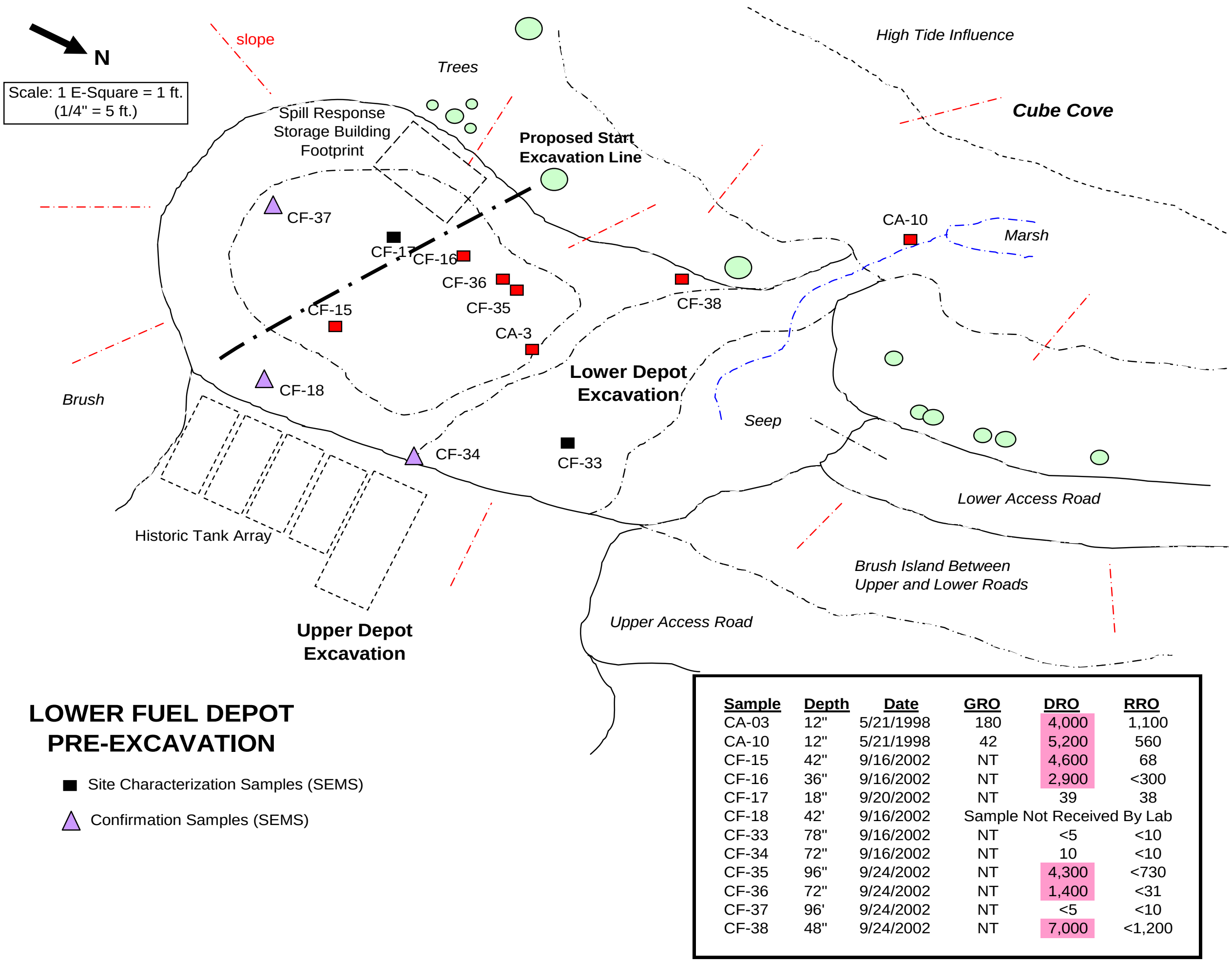


Photo 7. View of Upper and Lower Levels of Main Fuel Depot

The following figure illustrates the upper and lower levels of the depot and identifies the locations of samples collected and footprints of historic tanks and buildings associated with use of the depot.



Sample	Depth	Date	GRO	DRO	RRO
CA-03	12"	5/21/1998	180	4,000	1,100
CA-10	12"	5/21/1998	42	5,200	560
CF-15	42"	9/16/2002	NT	4,600	68
CF-16	36"	9/16/2002	NT	2,900	<300
CF-17	18"	9/20/2002	NT	39	38
CF-18	42'	9/16/2002	Sample Not Received By Lab		
CF-33	78"	9/16/2002	NT	<5	<10
CF-34	72"	9/16/2002	NT	10	<10
CF-35	96"	9/24/2002	NT	4,300	<730
CF-36	72"	9/24/2002	NT	1,400	<31
CF-37	96'	9/24/2002	NT	<5	<10
CF-38	48"	9/24/2002	NT	7,000	<1,200

Figure 18. Upper and Lower Levels of Fuel Depot Prior to Excavation

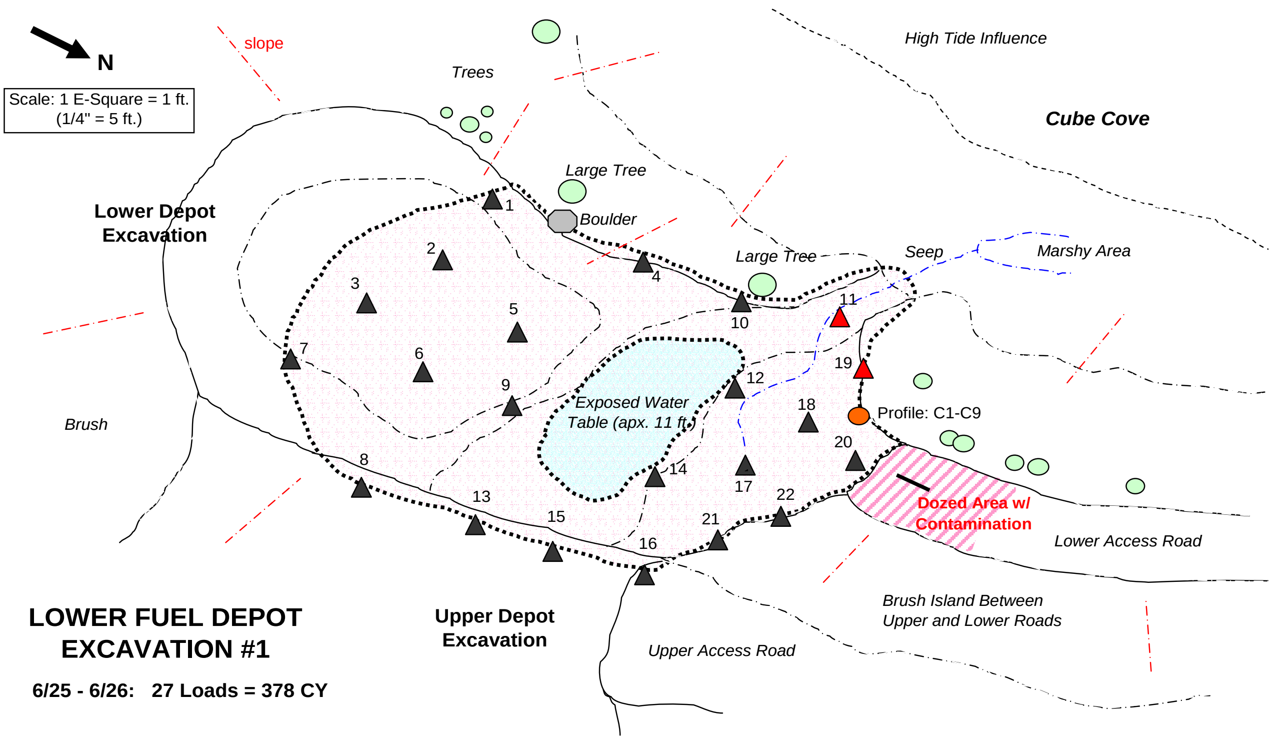
Excavations in 2004 were performed in three iterations or rounds. The first round of excavation required filling the north end of the lower depot level with access roadway soils. A dozer pushed the fill from the entrance roadway into the north end of the lower level thus allowing access the far south end of the lower level. This access ensured proper positioning of an excavator with reach toward areas requiring excavation. After positioning the excavator on the pad of fill provided, the west sidewall was excavated and the entire north half of the former excavation deepened. This excavation covered the entire area where former characterization samples identified contamination. The water table was encountered at about 11 ft. BGS based on the roadway surface as a benchmark. An extensive smear band was detected at the water table consistent with former observations noted by Tom Hanna. The exposed water table released a small amount of fuel to the water surface, which was immediately adsorbed and thereafter did not appear.

After performing the excavations as described, the excavator worked its way back out of the excavation northward to the access road and removed the fill that placed into the excavation for access. 378 CY of soil was removed during this excavation.

During the dozing of the roadway into the north end of the lower level, it was determined that contamination was present beginning about 1 foot below the surface of the roadway. PID readings in this area frequently exceeded 25 ppm and the soil had a high diesel odor and sheen reading. A single sample (#C1), collected in this layer, had a DRO concentration of 2,970 ppm. The source of this contamination was unknown, but was expected to be either an old tank pad or a location where the pipe from the refueling by barge frequently leaked, possibly from uncoupling hoses.

After excavation, 22 confirmation samples were collected from the bottom and sidewalls of the excavation. Only 2 samples had DRO levels exceeding the Method 2 clean-up standard of 230 ppm (#12 – 889 ppm and #19 – 7,890 ppm). Both these samples were located adjacent to a large tree where the lower level depot appeared to drain into a nearby marshy area. Both samples were also collected near the exposed visible smear band at the water table. It was determined that additional excavation would be needed in this area to further scratch off the west sidewall of the excavation to the tree roots and to dig deeper in the location where the depot drains into the marsh. As mentioned, the excavation would also need to progress northward to remove contamination in the access roadway. The following figure illustrates the excavation performed.

To better understand the geology of the site, each distinct layer of soil from the surface to below the water table was mapped, inspected and evaluated. A sample of each layer was also collected (A-J). Data from the sampling is noted in the attached figure. The exposed lithology is illustrated in the following photo. This investigation denoted a contaminated surface to 24” and a contaminated smear band at the water table about 24” thick. Oxidation zones from both surface water leaching and water table vertical fluctuations were identified. Based on the porosity of the soils in the various layers, contaminants will migrate to the groundwater and create a smear band fluctuating between high and low water table levels. It appears the water table can move as much as 3 to 4 feet from it’s standard position of 11 ft. BGS (benchmarked in the roadway). Because of the steepness of the terrain towards the bay, the water table/smear band will be exposed about 3 ft. above sea level. This is observed in the nearby marsh.



SAMPLES

#	Location	Date	Time	PID	Odor	Sheen	DRO	RRO	
CC-FD-01	Sidewall - 48"	6/26	1230	7	n	n	61.3	ND	
CC-FD-02	Bottom - 96"	6/26	1235	0.1	n	s	ND	ND	
CC-FD-03	Bottom - 96"	6/26	1240	0.1	n	n	ND	ND	
CC-FD-04	Sidewall - 48"	6/26	1244	0.1	s	s	ND	ND	
CC-FD-05	Bottom - 108"	6/26	1247	0.1	n	n	ND	ND	
CC-FD-06	Bottom - 114"	6/26	1249	30	n	n	206	ND	
CC-FD-07	Sidewall - 54"	6/26	1251	0.1	s	n	ND	ND	
CC-FD-08	Sidewall - 60"	6/26	1253	0.1	n	n	ND	ND	
CC-FD-09	Bottom - 72"	6/26	1256	0.1	n	n	ND	ND	
CC-FD-10	Sidewall - 36"	6/26	1259	34	n	n	223	92.5	
CC-FD-11	Bottom - 36"	6/26	1302	65	s	s	**889**	260	In exit to marsh
CC-FD-12	Bottom - 60"	6/26	1305	0.1	n	n	ND	ND	
CC-FD-13	Sidewall - 60"	6/26	1307	0.1	s	n	ND	ND	
CC-FD-14	Bottom - 84"	6/26	1310	0.1	s	n	ND	ND	
CC-FD-15	Sidewall - 96"	6/26	1316	0.1	n	n	ND	ND	
CC-FD-16	Sidewall - 84"	6/26	1318	0.1	n	n	ND	ND	
CC-FD-17	Bottom - 132"	6/26	1320	4.5	m	s	39.8	ND	
CC-FD-18	Sidewall - 120'	6/26	1324	0.1	n	n	ND	ND	
CC-FD-19	Sidewall - 96"	6/26	1330	122	h	m	**7680**	ND	Sidwall at smear band
CC-FD-20	Sidewall - 48"	6/26	1335	0.1	n	n	ND	ND	
CC-FD-21	Sidewall - 60"	6/26	1340	0.1	s	s	ND	ND	
CC-FD-22	Sidewall - 36"	6/26	1345	0.1	n	n	ND	ND	
CC-FD-C1	Layer A - 24"	6/26	1600	99	h	s-m	**2970**	144	Roadway surface
CC-FD-C2	Layer B - 18"	6/26	1603	27	s	s-m	229	193	
CC-FD-C3	Layer C - 18"	6/26	1605	0.1	n-s	n-s	ND	ND	
CC-FD-C4	Layer D/E - 18	6/26	1607	0.5	n-s	n-s	ND	ND	
CC-FD-C5	Layer F - 30"	6/26	1609	0.3	n-s	n-s	ND	ND	
CC-FD-C6	Layer G - 3"	6/26	1611	4.6	s	s-m	40.2	ND	
CC-FD-C7	Layer H - 24"	6/26	1613	0.1	n	n-s	ND	ND	
CC-FD-C8	Layer I - 24" SB	6/26	1615	3	s-m	s-m	ND	ND	
CC-FD-C9	Layer J - 36"+	6/26	1617	0.1	n	n	ND	ND	

NOTE:

Roadway was pushed into the excavation to form a pad allowing acess to the south end of the excavation. During dozing of the pad, contamination was detected in the roadway from 6" to 24" BGS. The profile sample CC-FD-C1 identifies this contamination. As the water table was reached at apx. 11 ft. diesel fuel was detected on the surface. Free product was removed with pads and booms. Extensive smear band removal and roadway ramp excavation planned.

Figure 19. View of Lower Fuel Depot Level After First Round of Excavation

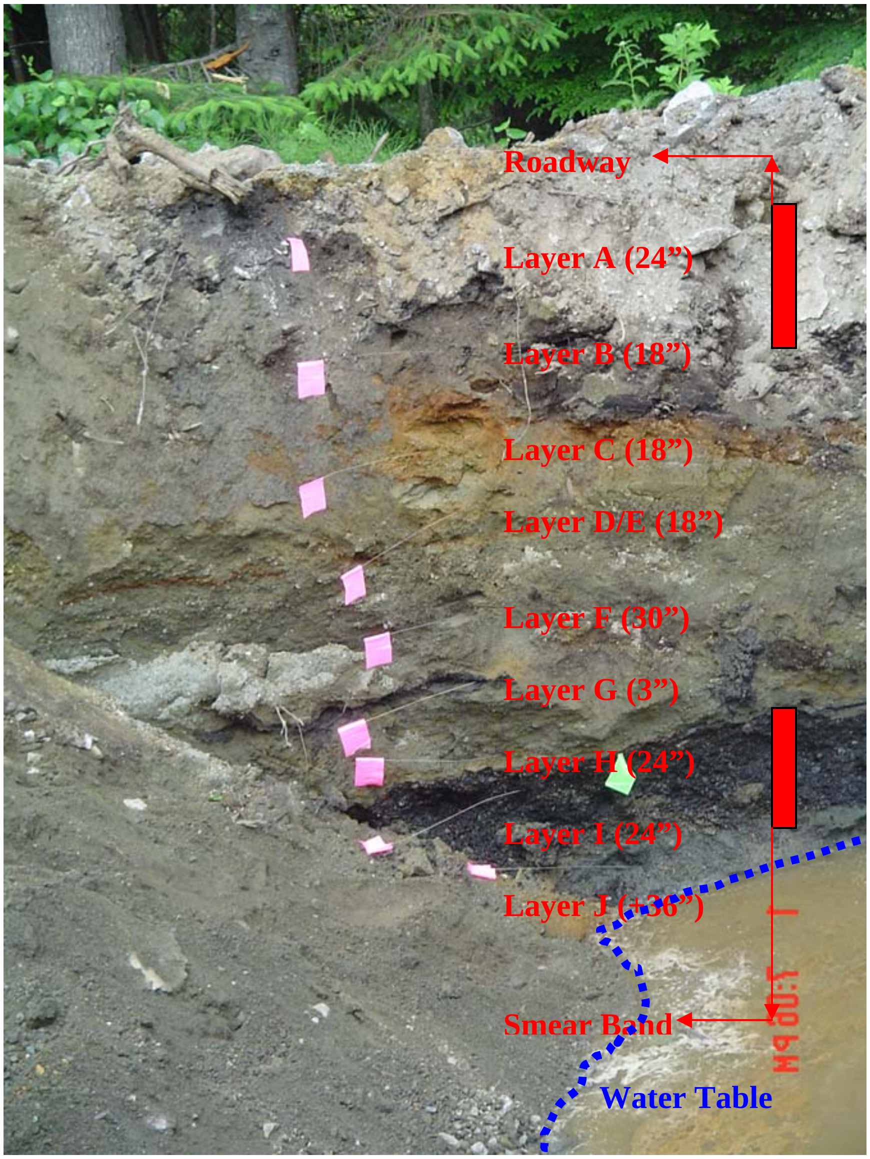
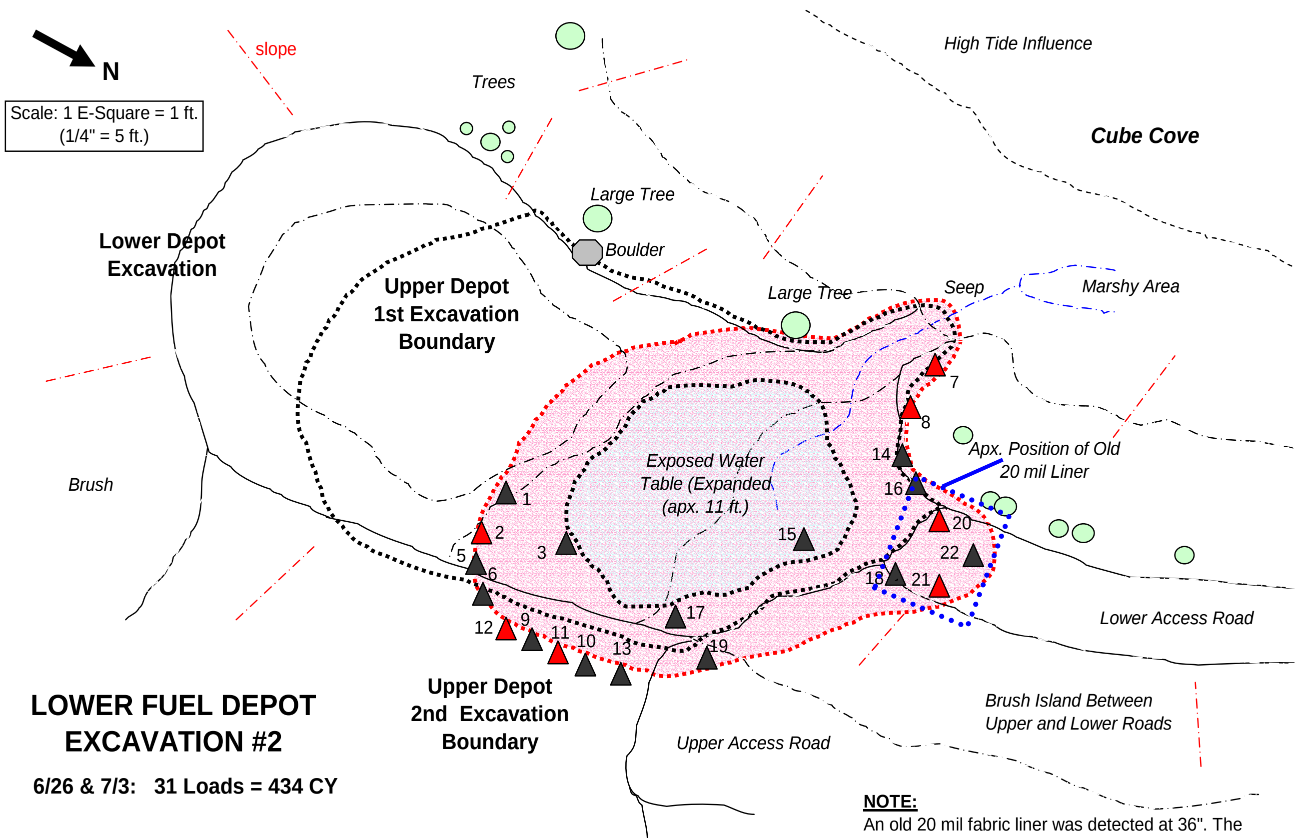


Photo 8. Lithology at Lower Level Fuel Depot

As mentioned, most of the lithology consists of highly permeable soil containing sands and fine to medium gravels. Some bedrock in the area is noted. At bedrock, large boulders can be found as is noticed near the roots of the trees along the west boundary of the depot.

A second round of excavation was planned to remove contamination associated with the smear band both along the east and west site boundaries, at the bottom of the excavation through the water table and northward toward the access roadway. The following figure illustrates the nature of the second round of excavation.



NOTE:
An old 20 mil fabric liner was detected at 36". The liner was removed in parts. It's position is estimated as shown. During ther second round of excavation, the water table remained clean. Additional smearband and roadway removal planned. Exploration of marsh recommended.

SAMPLES

	#	Location		Date	Time	PID	Odor	Sheen	DRO	RRO	
	CC-FDX-01	Bottom - 132"		7/10	1100	14	s	n	60.3	ND	
▲	CC-FDX-02	Sidewall - 36"		7/10	1103	41	m	s	**394**	ND	New exposed sidewall
	CC-FDX-03	Sidewall - 108"		7/10	1106	0.1	n	n	ND	ND	
	CC-FDX-04	None		None	NA	NA	NA	NA	NA	NA	Not collected
	CC-FDX-05	Sidewall - 96"	SB	7/10	1112	0.1	n	n	ND	ND	
	CC-FDX-06	Sidewall - 78"		7/10	1115	0.1	n	n	ND	ND	
▲	CC-FDX-07	Sidewall - 24"		7/10	1118	40	m	s	**354**	91.5	New exposed sidewall below roadway - Repeat of CC-FD- 1
▲	CC-FDX-08	Sidewall - 48"	SB	7/10	1121	145	h	m	**5580**	ND	New exposed sidewall at smearband - Repeat of CC-FD-19
	CC-FDX-09	Sidewall - 96"	SB	7/10	1124	0.1	n	n	ND	ND	
	CC-FDX-10	Sidewall - 108"		7/10	1127	0.1	n	n	ND	92.5	
▲	CC-FDX-11	Sidewall - 96"	SB	7/10	1130	36	m	s	**293**	260	New exposed sidewall at smearband
▲	CC-FDX-12	Sidewall - 60"		7/10	1133	111	h	m	**1310**	ND	New exposed sidewall above smearband
	CC-FDX-13	Sidewall - 60"		7/10	1136	0.1	n	n	ND	ND	
	CC-FDX-14	Sidewall - 72"	SB	7/10	1139	0.1	n	n	ND	ND	
	CC-FDX-15	Bottom - 132"		7/10	1142	7.6	s	n	85.6	ND	
	CC-FDX-16	Sidewall - 36"		7/10	1145	0.1	n	n	ND	ND	
	CC-FDX-17	Bottom - 72"		7/10	1148	15	s	n	98.2	ND	
	CC-FDX-18	Bottom - 48"		7/10	1151	14	s	n	89.8	ND	
	CC-FDX-19	Bottom - 24"		7/10	1154	0.1	n	n	ND	ND	
▲	CC-FDX-20	Bottom - 24"		7/10	1157	34	m	s	**236**	95.7	
▲	CC-FDX-21	Bottom - 24"		7/10	1200	38	m	s	**227**	250	Ramp into excavation from roadway
	CC-FDX-22	Bottom - 18"		7/10	1203	27	s	n	139	97.8	

Figure 20. View of Lower Fuel Depot Level After Second Round of Excavation

The second round of excavation expanded the western boundary to as close to the tree roots as possible. The excavation was deepened through the water table in the area where the lower level drains westward towards the tidelands. The eastern boundary was also expanded to expose the underlying smear band enabling sampling. Finally, the north end was excavated northward to remove roadway contamination. During this excavation old pieces of a 20 mil liner were uncovered. The liner definitely pegs the presence of contamination to the lower level either through the presence of tanks or refueling hardware. 434 CY were removed from this round of excavation. 22 confirmation samples were collected from sidewall and bottom of the excavation including seven samples from smear band layers.

Seven samples failed the clean-up criteria. These samples indicated:

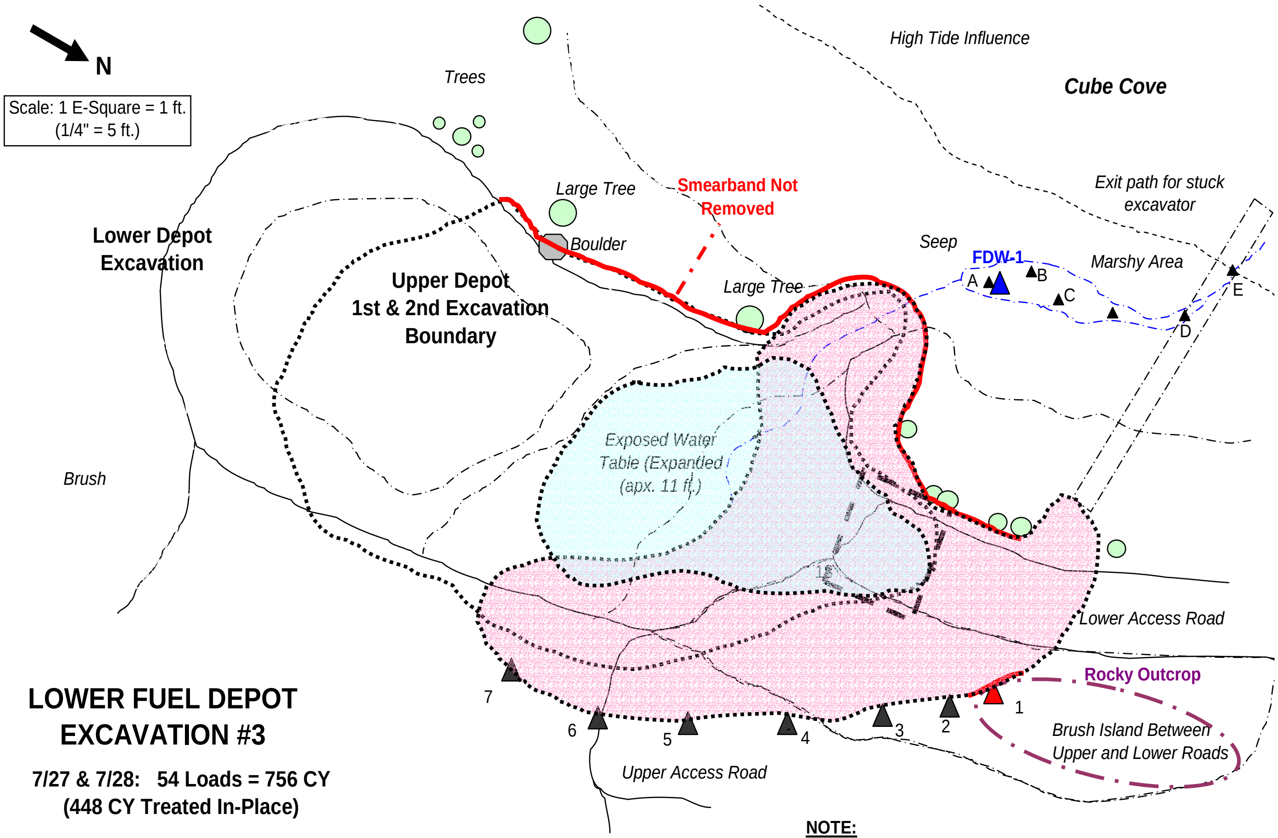
- The smear band along the east wall was contaminated (#2- 394 ppm, #11- 293 ppm, #12- 1310 ppm)
- The smear band along the west wall was contaminated (#7- 354 ppm, #8- 5,580 ppm)
- The roadway was still contaminated – although only slightly #20- 236 ppm, #21- 237 ppm

Interestingly, three smear band samples (#14, #9, #5) were analyzed that were not contaminated, suggesting that the smear band was diminishing and that the excavations being performed are effective in removing contamination.

ADEC and Atikon (Tom Hanna) were able to inspect this round of excavation and recommended additional excavation westward – to as close to the trees as possible and to excavate the east sidewall uphill as far as possible until the smear band disappears. It was recognized that the upward excavation would require removal of an island of vegetation and stockpile placement. A small amount of excavation would also be necessary to complete the removal of contamination in the roadway. DMC Tech was directed to proceed.

A determination was also made to further explore the marshy area serving as drainage to the lower level of the depot both by collecting cores for observation and field analyses and by collecting a water sample for analyses.

Results of the third and final round of excavation are noted in the following figure.



NOTE:
Rocky outcropping detected which could not be removed. Smear band tail under the outcropping could not be excavated. Remaining smearband removed to tree roots.

SAMPLES

#	Location	Date	Time	PID	Odor	Sheen	DRO	RRO	
▲ CC-FDX-01	Sidewall - 96" SB	7/28	1510	3	s	n	345	845	New exposed sidewall at smearband
CC-FDX-02	Sidewall - 96" SB	7/28	1515	2.5	s	n	ND	ND	New exposed sidewall at smearband
CC-FDX-03	Sidewall - 84"	7/28	1520	0.1	n	n	ND	ND	
CC-FDX-04	Sidewall - 84"	7/28	1525	0.1	n	n	NA	NA	
CC-FDX-05	Sidewall - 108'	7/28	1530	0.1	n	n	ND	ND	
CC-FDX-06	Sidewall - 108'	7/28	1535	0.1	n	n	ND	ND	
CC-FDX-07	Sidewall - 102'	7/28	1540	5.2	s	s	ND	ND	
▲ CC-FDW-1	Marsh - 12"	7/28	1200	0.1	n	n	26.8	2.62	DRO present
Core A	Core - 36"	7/28	1300	22	m	s	NT	NT	Visible discoloration and odor
Core B	Core - 36"	7/28	1320	26	m	s	NT	NT	Visible discoloration and odor
Core C	Core - 36"	7/28	1340	31	m	s	NT	NT	Visible discoloration and odor
Core D	Core - 36"	7/28	1400	18	m	s	NT	NT	Visible discoloration and odor
Core E	Core - 36"	7/28	1420	24	m	s	NT	NT	Visible discoloration and odor

Figure 21. View of Lower Fuel Depot Level After Third Round of Excavation

As much of the west sidewall as possible was excavated without creating a tree fall. Excavations proceeded towards the roadway with depth. A seep/spring was detected along the east sidewall in poorly sorted medium sand. The excavator became mired in the bottom of this excavation in the wet sand. Three days were spent removing the excavator, which eventually dug itself out towards the beachhead. Of the 756 CY excavated, 448 CY remained in the bottom of the excavation with no access for removal. Visually, the west sidewall smear band appeared to be diminishing and PID readings of the smear band were < 5 ppm. ADEC was contacted and agreed to leave the contamination in-place with a commitment to perform in-situ treatment. In-situ treatment was recommended to address remaining smear band, treat the bottom of the excavation and perhaps allow some treatment of the adjacent marsh soils through leaching and migration of treatment additives.

After extraction, the excavator repositioned and then removed additional roadway contamination with depth to just under the water table. After removing the roadway, excavations concentrated on the east sidewall. The steepness between upper and lower depots (15 ft. to 20 ft. of drop in a 10 ft. run) and the softness of the soils at the bottom of the excavation where the excavator was stuck (see Photo 10), eliminated access from the bottom and westside.

The east sidewall was removed from the top of the excavation along the upper depot access roadway. Contamination was excavated moving northward long the island separating the depots. The smear band was noted under the island. As recommended by ADEC, the island was then removed as clean fill to gain access to the underlying smear band. As much smear band as was exposed was removed. However, during the removal of the north end of island, a rock outcropping was encountered. The size of the outcrop prohibited removal of a 5 foot section of smear band.

After the excavation, 7 confirmation samples were collected along the east sidewall. All of the samples were clean except the sample of the smear band under the rock outcropping (#1 – 345 ppm), which was almost clean in consideration of a 230 ppm DRO limit. No confirmation samples were collected along the west sidewall, since all possible material there had been excavated.

<u>Remaining Contamination After Excavation</u>

The following contamination was left in-place:

- West sidewall smear band (likely 300 – 500 ppm DRO remaining) extending towards the marsh near the tidelands (very narrow strip).
- East sidewall smear band (likely 300 ppm DRO) in a short 5 foot section.
- 448 CY of soils in the bottom of the excavation off the access roadway – too soft to remove. This soil will be treated in-place

The land owner and regulatory agencies agree with leaving the smear band in these locations is appropriate. The thick red line in Figure 21 identifies the smear band that will not be removed.

Free Product

Exposure of the water table near the north end of the lower level immediately after the first round of excavation released free product to the water in small quantities. The oily film was adsorbed with pads and thereafter the water table surface remained clean. All traces of free product has been removed. This action often suggests an “old” smear band with advanced biodegradation occurring. The following photograph identifies the oily residue on the surface of the water table immediately after exposing the smear band.

Marsh Area West of the Lower Depot

Based on the three rounds of excavation performed and the presence of the smear band, it appears that groundwater migrates westward from the depot and discharges into a small marshy area (40 ft. x 10 ft.) adjacent to tidelands. The marshy area then drains into the nearby bay. There is no point source discharge from the marsh – only general seepage along a 100 ft. stretch of beach. A soil sample collected at the input mouth to the marsh from the lower level depot in 1998 revealed DRO contamination of 5,200 ppm.

In 2001 and 2002, correspondence with ADEC indicated that no action would be required at the marsh because of its proximity to the tidelands, inaccessibility from large trees, smear band left in place along the west boundary and the removal of the majority of contamination in the body of the lower level depot with subsequent in-situ treatment. It was recommended that a water sample be collected to ensure that contamination in surface water was not present and was not entering the bay.

In July 2004, 5 soil cores were collected from the marshy area to a depth of 36”. PID readings from each core read 22-31 ppm on the PID indicating the presence of contamination (see Figure 20). These readings are consistent with the level of contamination detected in 1998. A surface water sample was collected from the marshy area to determine if contamination was present, with the following results:

Sample Data	DRO/RRO	VOCs (TH)	SVOCs (TaqH)
FW-01	26.8 ppm / 262 ppm	ND	ND

Table 8. Results of Surface Water Sampling in the Marsh

Results of the sampling indicate that natural organics are present in the water – likely wood rot derived; but no manmade petroleum contamination was detected. There appears to be no risk that contaminated water will leach from the marsh into the nearby tidelands. Contamination in the marsh area will naturally degrade and will be aided in degradation by in-situ treatment of soils in the bottom of the depot at the water table.

Photo 9. View of Oil on Water Table After First Round of Excavation

Photo 10. Excavator Stuck In Bottom of Excavation

BIOAUGMENTATION TREATMENT PROCESS

Bioaugmentation Process

A bioaugmentation process was selected for treating soils at Cube Cove. The system is appliesd in two parts: (1) microorganisms are grown in tanks on-site and are sprayed onto the soil (2) bionutrients are shipped to the site and are spread by hand onto the surface of the soil. Heavy equipment is then used to aggressively mix the nutrients and microbes into the soil matrix. The aggressive mixing promotes aeration. Treatment can be accomplished in lifts or 1 foot layers at a time starting at the top of the contaminated pile and working downward. Each treated lift is then placed a layer at a time into a configured biopile, which eventually reaches the same size as the contaminated pile. Thus, as the contaminated pile is reduced a layer at a time, the biopile is raised a layer at a time. Alternatively, the soil can be spread out into one large layer, which receives a single application. At Cube Cove sufficient space was available to spread the piles out into a single layer to achieve treatment. At DRO concentrations of 10,000 ppm or less only one application of bugs and nutrient is needed to achieve treatment. To ensure that applications are controlled, the contaminated soil is gridded into control plots of known size. In this manner a calculation can be made to determine how much microbe and nutrient to spread into the mapped area.

Microbes

9 proprietary strains of natural bacteria are grown in 1,000 gallon capacity yellow plastic tanks on-site to a concentration of 1XE8 organisms/ml. Tanks are retrofitted with vacuum pumps, recirculation pumps and heaters. Bacteria from the site itself is also extracted by proprietary means and placed with the natural strains. The growth media for the combined organisms is a carefully controlled mixture of oxygen, heat, bionutrient and diesel fuel. A vacuum tube filled with agar and color indictor is used to determine when organisms are ready to use. A red color in the agar indicates that organisms are ready for inoculation. Microbe stock was pumped into a spray tank with a 500 gallon capacity. 500 gallons of microbes were used to treat 500 CY of contaminated soil.

Bionutrient

A three-part proprietary formulation of non-water soluble nutrient (N-1) is provided in 50 lb bags. The nutrient is colored blue so that it can be easily seen on the surface of the soil. The nutrient base is formulated solely for the 9 strains of bacteria. Water soluble phosphate and urea were also mixed with the nutrient base to speed up the treatment process. The phosphate and urea were also provided in 50 lb bags. N1 nutrient base is applied by hand-spreading onto the soil in a concentration of 1 lb per CY of soil. Phosphate and urea were also spread by hand in the same concentration – 1 lb per CY of soil.

The following table summarizes the actions relative to providing controlled treatment.

Date	Day	Tank 1	Tank 2	Tank 3	Nutrient	Notes/Treatment
6/26/2004	Sat	Set-Up + 500 gal H2O, 63F	Set-Up + 500 gal H2O, 63F	Set-Up + 500 gal H2O, 63F	NA	1 recirculation pump gone bad.
6/27/2004	Sun	Added 500 gal, 68F, added salt, sugar and bugs	64F	64F	NA	1 recirculation pump gone bad.
6/28/2004	Mon	Added N, 72F, 2nd Heater Added	65F	64F	NA	NA
6/29/2004	Tue	Added N&D, 81F	65F	65F	NA	NA
6/30/2004	Wed	Added N&D, 83F	66F	65F	NA	NA
7/1/2004	Thu	Added N&D, 88F	Added N&D, 66F	66F	NA	NA
7/2/2004	Fri	1XE8, Move 500 g to Tank #2, Added N&D, 78F, Installed 110V heater, replaced recirc pump	Added N&D, 2nd heater added from Tank #1, 76F, replaced recirc pump	67F, Installed 110V Heater	NA	NA
7/3/2004	Sat	Added N&D	Added N&D	68F	NA	NA
7/4/2004	Sun	1XE8, Move 250 gal to Tank #3, Added N&D, 81F, Added 250 gal H2O	1XE8, Move 250 gal to Tank #3, Added N&D, 80F, Added 250 gal H2O	Added N&D, 78F	NA	Bug poop evident
7/5/2004	Mon	Added N&D, 88F	Added N&D, 82F	Added N&D, 87F	NA	NA
7/6/2004	Tue	Added N&D, 1EX8, Pumped 500 gal to treat, Added 500 gal H2O, Added N&D, 84F then to 92F	Added N&D, 1EX8, Pumped 500 gal to treat, Added 500 gal H2O, Added N&D, 84F then to 92F	Added N&D, 1EX8, Pumped 500 gal to treat, Added 500 gal H2O, Added N&D, 84F then to 92F	30 bags N1, 30 bags P/U added to Grid #1 north	Removed 450 gal bugs from each tank and added 50 gal H2O for spraying, treated Grid #1 - 1500 CY
7/7/2004	Wed	Added N&D, 1XE6, 86F	Added N&D, 1XE6, 80F	Added N&D, 1XE6, 88F	NA	Will wait 1 day to spray. Jack's inspection indicates that spraying should commence when sheen from diesel feeding is no longer visible
7/8/2004	Thu	Added 50%N&D, 1EX8, Pumped 500 gal to treat, Added 500 gal H2O, Added N&D, 82F then to 90F	Added 50%N&D, 1EX8, Pumped 500 gal to treat, Added 500 gal H2O, Added N&D, 78F then to 84F	Added 50%N&D, 1EX8, Pumped 500 gal to treat, Added 500 gal H2O, Added N&D, 84F then to 94F	30 bags N1, 30 bags P/U added to Grid #2 north	Removed 450 gal bugs from each tank and added 50 gal H2O for spraying, treated Grid #2 - 1500 CY
7/9/2004	Fri	Added 50%N&D, 1EX8, Pumped 500 gal to treat, Added 500 gal H2O, Added N&D, 82F then to 91F	Added 50%N&D, 1EX8, Pumped 500 gal to treat, Added 500 gal H2O, Added N&D, 78F then to 82F	Added 50%N&D, 1EX8, Pumped 500 gal to treat, Added 500 gal H2O, Added N&D, 84F then to 92F	30 bags N1, 30 bags P/U added to Grid #4 north	Removed 450 gal bugs from each tank and added 50 gal H2O for spraying, treated Grid #4 - 1500 CY
7/10/2004	Sat	Added 50%N&D, 1EX8, Pumped 500 gal to treat, Added 500 gal H2O, Added N&D, 82F then to 91F	Added 50%N&D, 1EX8, Pumped 500 gal to treat, Added 500 gal H2O, Added N&D, 78F then to 82F	Added 50%N&D, 1EX8, Pumped 500 gal to treat, Added 500 gal H2O, Added N&D, 84F then to 92F	30 bags N1, 30 bags P/U added to Grid #3 north	Removed 450 gal bugs from each tank and added 50 gal H2O for spraying, treated Grid #3 - 1500 CY
7/11/2004	Sun	1EX8, Pumped 1000 gal to treat, Added 1000 gal H2O and shut down.	1EX8, Pumped 1000 gal to treat, Added 1000 gal H2O and shut down.	1EX8, Pumped 1000 gal to treat, Added 1000 gal H2O and shut down.	Double bugs on Grids #3, #4, and #5 north	Removed 3000 gal bugs from all tanks for spraying, treated Grids #4 - 750 gal, Grid #5 - 750 gal and test plot 1,000 gal and again on grid #3 - 500 gal. Treated apx. 4,000 CY
7/21/2004	Wed	Added 1 qt. sugar, salt, nutrient and diesel. Added 1/3 bugs.	Added 1 qt. sugar, salt, nutrient and diesel. Added 1/3 bugs.	Added 1 qt. sugar, salt, nutrient and diesel. Added 1/3 bugs.	NA	Restarted generator. Tank temperatures were 80F on start-up
7/24/2004	Thu	NA	NA	NA	Test Plot chemcially dosed @ 1 gal per CY	Mixed 55 gal of Pentanonic and added 450 gal. of water. Sprayed entire test plot surface.

Date	Day	Tank 1	Tank 2	Tank 3	Nutrient	Notes/Treatment
7/22/2004	Thu	Fed 1 Qt. nutrient and diesel. Air line undone and repaired. 86F	Fed 1 Qt. nutrient and Diesel. 80F	Fed 1 Qt. nutrient and Diesel. 86F	NA	NA
7/23/2004	Fri	Fed 1 Qt. nutrient and Diesel. 1XE6 count obtained. 96F	Fed 1 Qt. nutrient and Diesel. Breaker on pump #2 off - restarted at 5 am. 86F	Fed 1 Qt. nutrient and Diesel. 96F	NA	Tank #3 heating up
7/24/2004	Sat	Fed 1 Qt. nutrient and Diesel. 98F. Pulled 220 heater plug and went with 110V only.	Fed 1 Qt. nutrient and Diesel. 88F	Fed 1 Qt. nutrient and Diesel. 101F. Pulled 220 heater plug and went with 110V only.	NA	Tank #3 heating up
7/25/2004	Sun	No feed in morning. 85F. 1XE8 reading	No feed in morning. 80F	No feed in morning. 85F. 1EX8 reading	NA	Wll treat tommorrow startting at low end.
7/26/2004	Mon	Removed 500 gal for treatment and then refilled. 86F and then down to 78F. Count at 1XE8. Refed bugs.	Removed 500 gal for treatment and then refilled. 82F and then down to 72F. Count at 1XE8. Refed bugs.	Removed 500 gal for treatment and then refilled. 88F and then down to 77F. Count at 1XE8. Refed bugs.	Per grid: 30 bags N1 and 30 bags P/U - Grid #1, #2 and #3 South	Removed 1500 gal bugs from all tanks for spraying, treated Grids #1 - 500 gal, Grid #2 - 500 gal and grid #3 - 500 gal. Treated apx. 2,500 CY including deep lifts.
7/27/2004	Tue	Fed bugs. 82F	Fed Bugs - 76F	Fed Bugs - 86F	NA	NA
7/28/2204	Wed	Removed 500 gal for treatment and then refilled. 86F and then down to 78F. Count at 1XE8. Refed bugs.	Removed 500 gal for treatment and then refilled. 82F and then down to 72F. Count at 1XE8. Refed bugs.	Removed 500 gal for treatment and then refilled. 88F and then down to 77F. Count at 1XE8. Refed bugs.	Per grid: 30 bags N1 and 30 bags P/U - Grid #4, #5 and #6 South	Removed 1500 gal bugs from all tanks for spraying, treated Grids #4 - 500 gal, Grid #5 - 500 gal and grid #6 - 500 gal. Treated apx. 2,500 CY including deep lifts.
7/29/2004	Thu	86F, fed diesel and nutrient	76F, fed diesel and nutrient	88F, fed diesel and nutrient	NA	NA
7/30/2004	Fri	Removed 500 gal for treatment and then refilled. 88F and then down to 74F. Count at 1XE8. Refed bugs.	Removed 500 gal for treatment and then refilled. 80F and then down to 72F. Count at 1XE8. Refed bugs.	Removed 500 gal for treatment and then refilled. 90F and then down to 76F Count at 1XE8. Refed bugs.	Per grid: 30 bags N1 and 30 bags P/U - Grid #7, #8 and #9 South; Placed an additional 10 bags of N1 onto Grid #8 for double treatment	Removed 1500 gal bugs from all tanks for spraying, treated Grids #7 - 500 gal, Grid #8 - 500 gal and grid #9 - 500 gal. Treated apx. 2,500 CY including deep lifts.
7/31/2004	Sat	86F, fed diesel and nutrient	76F, fed diesel and nutrient	88F, fed diesel and nutrient	Placed 15 bags of N-1 and 5 bags of P/U onto the surface of the water table in the depot	NA
8/1/2004	Mon	Removed 1,000 gallons for fuel depot. Count at 1XE8.	Removed 1,000 gallons for fuel depot. Count at 1XE8.	Removed 1,000 gallons for fuel depot. Count at 1XE8.	NA	Pumped 3,000 gallons into fuel depot.

Table 9. Treatment Control Data

The following photographs illustrate the process used to apply nutrient and microbes to contaminated soil.

Photo 11. Hand Spread N- Nutrient Across a Typical Grid.

Photo 12. Spraying Microbes Across a Typical Grid.

Soil Mixing

An excavator was used to mix the nutrients and microbes into the soil. The bucket on the hoe rakes the material into a small pile. The pile is then lifted and back-cat onto the ground. This process is then repeated until the entire pile is mixed. This form of aggressive mixing greatly enhances aeration and is most effective in unscreened materials. In many cases, the heat of reaction (bugs, nutrient, air and soil) produces steam, which can visibly be seen rising from the surface. The soil then remains undisturbed for at least ten days before confirmation sampling sampling is performed.

Alternatively, a manufactured rake welded to the blade of a dozer was used to mix soils. The mechanical is rake is very effective o significant depth in mixing soils, but works best for screened materials. Mixing methods are noted in the following photos.

Photo 13. Mixing Soil Using an Excavator Bucket

Photo 14. Mixing Soil Using a Dozer Rake.

<u>In-Situ Treatment of Fuel Depot</u>

448 CY of slightly contaminated soil (DRO = <500). Were treated in-place in the lower fuel depot. Treatment was achieved by adding 500 lbs of N-1 bionutrient and 500 lbs o phosphate and urea. After application of the nutrient base, 3,000 gallons of microbes at a concentration of 1XE8 microbes/ml were sprayed onto the surface of the water table.

The following photo illustrates the water table at the lower fuel depot after the application of 3,000 gallons of organisms.

Photo 15. Microbes and Nutrient Added to Lower Fuel Depot.

Photo 16. Fuel Depot Water Table 30 Days Post Treatment

30 days after in-situ treatment the depot was inspected. The water table was lower and non-soluble nutrient was observable on the ground surface. The ponded water was clear indicative of treatment.

STATISTICAL ANALYSES OF TREATMENT DATA

Random Sampling

Random sampling methodology was selected to ensure statistical validity of confirmation sampling sets from both the north and south areas. Each area was formerly gridded to ensure effective dosing of nutrient and microbes. These treatment grids were subgridded into 25 foot squares. Each square was assigned a number.

Treated Stockpile	Major Grids	Minor Grids	# Samples Collected
North	6	216	60 + 6 QA
South	9	108	40 + 4 QA

Table 10. Gridding of Stockpiles for Confirmation Sampling

A random number generator computer program was used to select which 60 grids or which 40 grids would be used for collecting treatment confirmation samples. In the event the grid selected contained empty space, the program was queried to add additional grids until the selected grid fell upon contaminated soil. A hand held GPS and taper were used to establish the selected subgrids. A colored flag marked each collection location.

Sample Collection

Samples were collected at the center of the defined grid using a stainless steel coring tool. A core was extracted through the treated pile (generally 24" from top to bottom) and placed in a stainless steel pan. The sample was mixed well and then placed in an amber bottle. Field data was also collected from the pan including odor, sheen and PID. Samples were managed in accordance with the previously approved Sampling and Analyses Plan.

Statistical Analyses

Statistical analyses of the data was performed in accordance with both ADEC published guidelines and EPA SW-846 methodology to define the statistical mean after transformation at the 95% upper confidence interval.

North Stockpile

60 samples and 6 duplicates were collected from the north stockpile. Sample locations are noted in Figure 7. The respective analyses and statistical calculations are illustrated in the following table:

NORTH TREATED STOCKPILE - DRO ANALYSES

Original Data Set → **Duplicate Adjusted Data Set**

					Not Transformed		Transformed	
Sample	**Units**	**Result**	**Detection**		**x**	**x2**	**ln(x)**	**[ln(x)]2**
NP-001	mg/kg	163	29	1	163	26569	5.09	25.95
NP-002	mg/kg	138	29	1	138	19044	4.93	24.28
NP-003	mg/kg	148	29	1	148	21904	5.00	24.97
NP-004	mg/kg	174	29	1	174	30276	5.16	26.62
NP-005	mg/kg	159	29	1	159	25281	5.07	25.69
NP-006	mg/kg	209	29	1	108	11664	4.68	21.92
NP-007	mg/kg	202	29	1	202	40804	5.31	28.18
NP-008	mg/kg	116	29	1	116	13456	4.75	22.60
NP-009	mg/kg	108	29	1	108	11664	4.68	21.92
NP-010	mg/kg	121	29	1	121	14641	4.80	23.00
NP-011	mg/kg	148	29	1	148	21904	5.00	24.97
NP-012	mg/kg	139	29	1	139	19321	4.93	24.35
NP-013	mg/kg	136	29	1	136	18496	4.91	24.13
NP-014	mg/kg	98.1	29	1	98.1	9623.61	4.59	21.03
NP-015	mg/kg	123	29	1	123	15129	4.81	23.16
NP-016	mg/kg	140	29	1	140	19600	4.94	24.42
NP-017	mg/kg	157	29	1	106	11236	4.66	21.75
NP-018	mg/kg	268	29	1	268	71824	5.59	31.26
NP-019	mg/kg	148	29	1	148	21904	5.00	24.97
NP-020	mg/kg	180	29	1	180	32400	5.19	26.97
NP-021	mg/kg	186	29	1	186	34596	5.23	27.31
NP-022	mg/kg	125	29	1	125	15625	4.83	23.31
NP-023	mg/kg	180	29	1	180	32400	5.19	26.97
NP-024	mg/kg	162	29	1	121	14641	4.80	23.00
NP-025	mg/kg	152	29	1	152	23104	5.02	25.24
NP-026	mg/kg	172	29	1	172	29584	5.15	26.50
NP-027	mg/kg	159	29	1	159	25281	5.07	25.69
NP-028	mg/kg	235	29	1	235	55225	5.46	29.81
NP-029	mg/kg	166	29	1	166	27556	5.11	26.13
NP-030	mg/kg	104	29	1	104	10816	4.64	21.57
NP-031	mg/kg	81.1	29	1	81.1	6577.21	4.40	19.32
NP-032	mg/kg	14.6	29	1	14.6	213.16	2.68	7.19
NP-032R	mg/kg	14.5	29	1	14.5	210.25	2.67	7.15
NP-033	mg/kg	194	29	1	194	37636	5.27	27.75
NP-034	mg/kg	38.9	29	1	38.9	1513.21	3.66	13.40
NP-035	mg/kg	146	29	1	146	21316	4.98	24.84
NP-036	mg/kg	154	29	1	154	23716	5.04	25.37
NP-037	mg/kg	55.6	29	1	55.6	3091.36	4.02	16.15
NP-038	mg/kg	134	29	1	134	17956	4.90	23.99
NP-039	mg/kg	101	29	1	101	10201	4.62	21.30
NP-040	mg/kg	141	29	1	141	19881	4.95	24.49
NP-041	mg/kg	248	29	1	248	61504	5.51	30.40
NP-042	mg/kg	141	29	1	141	19881	4.95	24.49
NP-043	mg/kg	140	29	1	140	19600	4.94	24.42
NP-044	mg/kg	105	29	1	105	11025	4.65	21.66
NP-045	mg/kg	225	29	1	136	18496	4.91	24.13
NP-046	mg/kg	85	29	1	85	7225	4.44	19.74
NP-047	mg/kg	71.6	29	1	71.6	5126.56	4.27	18.24
NP-048	mg/kg	78.3	29	1	78.3	6130.89	4.36	19.01
NP-049	mg/kg	58.7	29	1	58.7	3445.69	4.07	16.58
NP-050	mg/kg	71.5	29	1	71.5	5112.25	4.27	18.23
NP-051	mg/kg	180	29	1	180	32400	5.19	26.97
NP-052	mg/kg	169	29	1	169	28561	5.13	26.32
NP-053	mg/kg	84.5	29	1	84.5	7140.25	4.44	19.68
NP-054	mg/kg	56.3	29	1	56.3	3169.69	4.03	16.25
NP-055	mg/kg	163	29	1	163	26569	5.09	25.95
NP-056	mg/kg	153	29	1	153	23409	5.03	25.31

-Continued-

NP-057	mg/kg	309	29
NP-058	mg/kg	195	29
NP-059	mg/kg	109	29
NP-060	mg/kg	124	29
NP-Dup-A (6)	mg/kg	108	29
NP-Dup-B (17)	mg/kg	106	29
NP-Dup-C (24)	mg/kg	121	29
NP-Dup-D (45)	mg/kg	136	29
NP-Dup-E (57)	mg/kg	104	29
NP-Dup-F (58)	mg/kg	83.7	29

1	104	10816	4.64	21.57
1	83.7	7005.69	4.43	19.60
1	109	11881	4.69	22.01
1	124	15376	4.82	23.24
61		1191753.82		1402.40

99.42%	**Log Normal Distribution Probability**
98.70%	Normal Distribution Probability

Higher of duplicates eliminated

NDs replaced with 1/2 LOD value

61	Samples	61	Samples
60	Deg. Frdm.	60	Deg. Frdm.
130.48	Mean	4.76	Mean
29.00	Detect Limit	3.37	Detect Limit
136	Median	4.91	Median
2553.26	Variance	0.29	Variance
50.53	Std. Dev.	0.54	Std. Dev.
6.47	Std. Error	0.07	Std. Error
1.74	T-test Value	1.86	H-test Value
141.74	UCL	**135.78**	**UCL**
119.22	LCL	**101.34**	**LCL**

Field DQOs	Met
Lab DQOs	Met
NDs Changed	2
High Dupes Out	6

Calculations Methodology

Ref. (a) *EPA Statistical Method - Publication SW-846, Volume II, Part III, Chapter 9*

Ref. (b) *ADEC Draft Statistical Methods for Determining the Mean Soil Concentration - 8/16/2001 (SPAR\CS\STP\02-001)*

ADEC Regulatory Limits

No additional treatment required	<230 ppm
Free release as clean soil	<230 ppm
All VOCs Detected Under Published Limits	Yes

98.19% **reduction in** **21 days**

6,612 CY **11,240 Tons**

Treatment Data

High DRO Treated	15,000
Avg. DRO Treated	7,500

Start Treatment	7/6/2004
Test Treatment	7/27/2004
Days Treated	21

Table 11. North Stockpile Confirmation Sampling and Statistical Anayses for DRO

Based on the analyses the stockpile has met the Method 2 Limit of 230 ppm DRO with a 95% UCL of 136 ppm.

Similar data for RRO values is presented in the following table.

NORTH TREATED STOCKPILE - RRO ANALYSES

Original Data Set → **Duplicate Adjusted Data Set**

					Not Transformed		Transformed	
Sample	Units	Result	Detection		x	x2	ln(x)	[ln(x)]2
NP-001	mg/kg	276	57	1	276	76176	5.62	31.59
NP-002	mg/kg	318	57	1	318	101124	5.76	33.20
NP-003	mg/kg	300	57	1	300	90000	5.70	32.53
NP-004	mg/kg	271	57	1	271	73441	5.60	31.38
NP-005	mg/kg	498	57	1	498	248004	6.21	38.57
NP-006	mg/kg	529	57	1	318	101124	5.76	33.20
NP-007	mg/kg	494	57	1	494	244036	6.20	38.47
NP-008	mg/kg	287	57	1	287	82369	5.66	32.03
NP-009	mg/kg	296	57	1	296	87616	5.69	32.38
NP-010	mg/kg	283	57	1	283	80089	5.65	31.87
NP-011	mg/kg	372	57	1	372	138384	5.92	35.03
NP-012	mg/kg	317	57	1	317	100489	5.76	33.16
NP-013	mg/kg	338	57	1	338	114244	5.82	33.91
NP-014	mg/kg	267	57	1	267	71289	5.59	31.22
NP-015	mg/kg	229	57	1	229	52441	5.43	29.53
NP-016	mg/kg	282	57	1	282	79524	5.64	31.83
NP-017	mg/kg	467	57	1	296	87616	5.69	32.38
NP-018	mg/kg	339	57	1	339	114921	5.83	33.94
NP-019	mg/kg	336	57	1	336	112896	5.82	33.84
NP-020	mg/kg	263	57	1	263	69169	5.57	31.05
NP-021	mg/kg	356	57	1	356	126736	5.87	34.51
NP-022	mg/kg	264	57	1	264	69696	5.58	31.09
NP-023	mg/kg	240	57	1	240	57600	5.48	30.04
NP-024	mg/kg	461	57	1	312	97344	5.74	32.98
NP-025	mg/kg	398	57	1	398	158404	5.99	35.84
NP-026	mg/kg	325	57	1	325	105625	5.78	33.45
NP-027	mg/kg	406	57	1	406	164836	6.01	36.08
NP-028	mg/kg	405	57	1	405	164025	6.00	36.05
NP-029	mg/kg	199	57	1	199	39601	5.29	28.02
NP-030	mg/kg	349	57	1	349	121801	5.86	34.28
NP-031	mg/kg	243	57	1	243	59049	5.49	30.17
NP-032	mg/kg	105	57	1	105	11025	4.65	21.66
NP-032R	mg/kg	81.4	57	1	81.4	6625.96	4.40	19.35
NP-033	mg/kg	411	57	1	411	168921	6.02	36.22
NP-034	mg/kg	163	57	1	163	26569	5.09	25.95
NP-035	mg/kg	281	57	1	281	78961	5.64	31.79
NP-036	mg/kg	352	57	1	352	123904	5.86	34.38
NP-037	mg/kg	241	57	1	241	58081	5.48	30.08
NP-038	mg/kg	473	57	1	473	223729	6.16	37.93
NP-039	mg/kg	278	57	1	278	77284	5.63	31.67
NP-040	mg/kg	479	57	1	479	229441	6.17	38.09
NP-041	mg/kg	320	57	1	320	102400	5.77	33.27
NP-042	mg/kg	146	57	1	146	21316	4.98	24.84
NP-043	mg/kg	244	57	1	244	59536	5.50	30.22
NP-044	mg/kg	312	57	1	312	97344	5.74	32.98
NP-045	mg/kg	525	57	1	260	67600	5.56	30.92
NP-046	mg/kg	210	57	1	210	44100	5.35	28.59
NP-047	mg/kg	221	57	1	221	48841	5.40	29.14
NP-048	mg/kg	280	57	1	280	78400	5.63	31.75
NP-049	mg/kg	139	57	1	139	19321	4.93	24.35
NP-050	mg/kg	99.5	57	1	99.5	9900.25	4.60	21.16
NP-051	mg/kg	238	57	1	238	56644	5.47	29.95
NP-052	mg/kg	331	57	1	331	109561	5.80	33.66
NP-053	mg/kg	167	57	1	167	27889	5.12	26.19
NP-054	mg/kg	93.1	57	1	93.1	8667.61	4.53	20.55
NP-055	mg/kg	197	57	1	197	38809	5.28	27.91

-Continued-

NP-056	mg/kg	254	57
NP-057	mg/kg	718	57
NP-058	mg/kg	618	57
NP-059	mg/kg	240	57
NP-060	mg/kg	297	57
NP-Dup-A (6)	mg/kg	318	57
NP-Dup-B (17)	mg/kg	296	57
NP-Dup-C (24)	mg/kg	312	57
NP-Dup-D (45)	mg/kg	260	57
NP-Dup-E (57)	mg/kg	272	57
NP-Dup-F (58)	mg/kg	204	57

1	254	64516	5.54	30.66
1	272	73984	5.61	31.43
1	204	41616	5.32	28.28
1	240	57600	5.48	30.04
1	297	88209	5.69	32.42
61		5410463.82		1909.09

99.86%	**Log Normal Distribution Probability**
99.77%	Normal Distribution Probability

61	Samples	61	Samples
60	Deg. Frdm.	60	Deg. Frdm.
283.05	Mean	5.58	Mean
57.00	Detect Limit	4.04	Detect Limit
281	Median	5.64	Median
8722.28	Variance	0.15	Variance
93.39	Std. Dev.	0.39	Std. Dev.
11.96	Std. Error	0.05	Std. Error
1.74	T-test Value	1.86	H-test Value
303.86	UCL	**286.16**	**UCL**
262.24	LCL	**246.07**	**LCL**

(yellow)	Higher of duplicates eliminated
(grey)	NDs replaced with 1/2 LOD value

Field DQOs	Met
Lab DQOs	Met
NDs Changed	None
High Dupes Out	6

ADEC Regulatory Limits

No additional treatment required	< 8,300 ppm
Free release as clean soil	< 8,300 ppm
All VOCs Detected Under Published Limits	Yes

Calculations Methodology

Ref. (a) *EPA Statistical Method - Publication SW-846, Volume II, Part III, Chapter 9*

Ref. (b) *ADEC Draft Statistical Methods for Determining the Mean Soil Concentration - 8/16/2001 (SPAR\CS\STP\02-001)*

98.57% reduction in 21 days

6,612 CY 11,240 Tons

Treatment Data

High RRO Treated	50,000
Avg. RRO Treated	20,000

Start Treatment	7/6/2004
Test Treatment	7/27/2004
Days Treated	21

Table 12. North Stockpile Confirmation Sampling and Statistical Anayses for RRO

Based on the analyses the stockpile has met the Method 2 Limit of 8,300 ppm RRO with a 95% UCL of 286 ppm. Background samples of peat exhibit higher values than this UCL.

South Stockpile

40 samples and 4 duplicates were collected from the south stockpile. Sample locations are noted in Figure 8. The respective analyses and statistical calculations are illustrated in the following table:

SOUTH TREATED STOCKPILE - DRO ANALYSES

Original Data Set → **Duplicate Adjusted Data Set**

Sample	Units	Result	Detection
SP-001	mg/kg	58.5	29
SP-002	mg/kg	82.9	29
SP-003	mg/kg	215	29
SP-004	mg/kg	243	29
SP-005	mg/kg	32.3	29
SP-006	mg/kg	29	29
SP-007	mg/kg	44.3	29
SP-008	mg/kg	52.1	29
SP-009	mg/kg	45.5	29
SP-010	mg/kg	47.9	29
SP-011	mg/kg	83.6	29
SP-012	mg/kg	275	29
SP-013	mg/kg	104	29
SP-014	mg/kg	46.6	29
SP-015	mg/kg	327	29
SP-016	mg/kg	59.3	29
SP-017	mg/kg	39	29
SP-018	mg/kg	63.6	29
SP-019	mg/kg	561	29
SP-020	mg/kg	168	29
SP-021	mg/kg	99.6	29
SP-022	mg/kg	91.4	29
SP-023	mg/kg	283	29
SP-024	mg/kg	77.7	29
SP-025	mg/kg	111	29
SP-026	mg/kg	74.8	29
SP-027	mg/kg	155	29
SP-028	mg/kg	135	29
SP-029	mg/kg	58.3	29
SP-030	mg/kg	45	29
SP-031	mg/kg	62.9	29
SP-032	mg/kg	113	29
SP-033	mg/kg	99.2	29
SP-034	mg/kg	227	29
SP-035	mg/kg	132	29
SP-036	mg/kg	52.4	29
SP-037	mg/kg	95	29
SP-038	mg/kg	86.2	29
SP-039	mg/kg	50.5	29
SP-040	mg/kg	44.8	29
SP-DUP-F	mg/kg	29	29
SP-DUP-G	mg/kg	29	29
SP-DUP-H	mg/kg	29	29
SP-DUP-I	mg/kg	29	29

	Not Transformed		Transformed	
	x	x2	ln(x)	[ln(x)]2
1	58.5	3422.25	4.07	16.56
1	82.9	6872.41	4.42	19.52
1	215	46225	5.37	28.84
1	29	841	3.37	11.34
1	32.3	1043.29	3.48	12.08
1	29	841	3.37	11.34
1	44.3	1962.49	3.79	14.37
1	52.1	2714.41	3.95	15.63
1	45.5	2070.25	3.82	14.57
1	47.9	2294.41	3.87	14.97
1	83.6	6988.96	4.43	19.59
1	275	75625	5.62	31.55
1	104	10816	4.64	21.57
1	46.6	2171.56	3.84	14.76
1	29	841	3.37	11.34
1	59.3	3516.49	4.08	16.67
1	39	1521	3.66	13.42
1	63.6	4044.96	4.15	17.24
1	29	841	3.37	11.34
1	168	28224	5.12	26.26
1	99.6	9920.16	4.60	21.17
1	91.4	8353.96	4.52	20.39
1	29	841	3.37	11.34
1	77.7	6037.29	4.35	18.95
1	111	12321	4.71	22.18
1	74.8	5595.04	4.31	18.62
1	155	24025	5.04	25.44
1	135	18225	4.91	24.06
1	58.3	3398.89	4.07	16.53
1	45	2025	3.81	14.49
1	62.9	3956.41	4.14	17.15
1	113	12769	4.73	22.35
1	99.2	9840.64	4.60	21.13
1	227	51529	5.42	29.43
1	132	17424	4.88	23.84
1	52.4	2745.76	3.96	15.67
1	95	9025	4.55	20.74
1	86.2	7430.44	4.46	19.86
1	50.5	2550.25	3.92	15.38
1	44.8	2007.04	3.80	14.46
40		412896.36		736.12

92.21%	Log Normal Distribution Probability
87.62%	Normal Distribution Probability

40	Samples	40	Samples
39	Deg. Frdm.	39	Deg. Frdm.
84.34	Mean	4.25	Mean
29.00	Detect Limit	3.37	Detect Limit
63.25	Median	4.15	Median
3292.32	Variance	0.36	Variance
57.38	Std. Dev.	0.60	Std. Dev.
9.07	Std. Error	0.10	Std. Error
1.74	T-test Value	1.86	H-test Value
100.12	UCL	84.13	UCL
68.55	LCL	58.17	LCL

Yellow: Higher of duplicates eliminated
Grey: NDs replaced with 1/2 LOD value

Field DQOs	Met
Lab DQOs	Met
NDs Changed	5
High Dupes Out	4

ADEC Regulatory Limits

No additional treatment required	<230 ppm
Free release as clean soil	<230 ppm
All VOCs Detected Under Published Limits	Yes

Calculations Methodology

Ref. (a) *EPA Statistical Method - Publication SW-846, Volume II, Part III, Chapter 9*

Ref. (b) *ADEC Draft Statistical Methods for Determining the Mean Soil Concentration - 8/16/2001 (SPAR\CS\STP\02-001)*

Treatment Data

High DRO Treated	25,000
Avg. DRO Treated	12,500

Start Treatment	7/27/2004
Test Treatment	9/2/2004
Days Treated	37

99.33% reduction in 37 days

5,146 8,748 Tons

Table 13. South Stockpile Confirmation Sampling and Statistical Analyses for DRO

SOUTH TREATED STOCKPILE - RRO ANALYSES

Original Data Set → **Duplicate Adjusted Data Set**

Sample	Units	Result	Detection
SP-001	mg/kg	84.1	57
SP-002	mg/kg	126	57
SP-003	mg/kg	165	57
SP-004	mg/kg	160	57
SP-005	mg/kg	61.5	57
SP-006	mg/kg	29	57
SP-007	mg/kg	86.1	57
SP-008	mg/kg	92.5	57
SP-009	mg/kg	70.3	57
SP-010	mg/kg	79.6	57
SP-011	mg/kg	91.1	57
SP-012	mg/kg	103	57
SP-013	mg/kg	129	57
SP-014	mg/kg	83.6	57
SP-015	mg/kg	120	57
SP-016	mg/kg	92	57
SP-017	mg/kg	84.2	57
SP-018	mg/kg	107	57
SP-019	mg/kg	183	57
SP-020	mg/kg	121	57
SP-021	mg/kg	206	57
SP-022	mg/kg	140	57
SP-023	mg/kg	151	57
SP-024	mg/kg	131	57
SP-025	mg/kg	140	57
SP-026	mg/kg	167	57
SP-027	mg/kg	110	57
SP-028	mg/kg	159	57
SP-029	mg/kg	118	57
SP-030	mg/kg	102	57
SP-031	mg/kg	65.7	57
SP-032	mg/kg	96	57
SP-033	mg/kg	91.6	57
SP-034	mg/kg	131	57
SP-035	mg/kg	122	57
SP-036	mg/kg	81.4	57
SP-037	mg/kg	99.3	57
SP-038	mg/kg	84.4	57
SP-039	mg/kg	94.5	57
SP-040	mg/kg	90.3	57
SP-DUP-F	mg/kg	57	57
SP-DUP-F	mg/kg	57	57
SP-DUP-F	mg/kg	57	57
SP-DUP-F	mg/kg	57	57

	Not Transformed		Transformed	
	x	x2	ln(x)	[ln(x)]2
1	84.1	7072.81	4.43	19.64
1	126	15876	4.84	23.39
1	165	27225	5.11	26.07
1	57	3249	4.04	16.35
1	61.5	3782.25	4.12	16.97
1	318	101124	5.76	33.20
1	86.1	7413.21	4.46	19.85
1	92.5	8556.25	4.53	20.50
1	70.3	4942.09	4.25	18.09
1	79.6	6336.16	4.38	19.16
1	91.1	8299.21	4.51	20.36
1	103	10609	4.63	21.48
1	129	16641	4.86	23.62
1	83.6	6988.96	4.43	19.59
1	57	3249	4.04	16.35
1	92	8464	4.52	20.45
1	296	87616	5.69	32.38
1	107	11449	4.67	21.84
1	57	3249	4.04	16.35
1	121	14641	4.80	23.00
1	206	42436	5.33	28.39
1	140	19600	4.94	24.42
1	57	3249	4.04	16.35
1	312	97344	5.74	32.98
1	140	19600	4.94	24.42
1	167	27889	5.12	26.19
1	110	12100	4.70	22.09
1	159	25281	5.07	25.69
1	118	13924	4.77	22.76
1	102	10404	4.62	21.39
1	65.7	4316.49	4.19	17.52
1	96	9216	4.56	20.83
1	91.6	8390.56	4.52	20.41
1	131	17161	4.88	23.77
1	122	14884	4.80	23.08
1	81.4	6625.96	4.40	19.35
1	99.3	9860.49	4.60	21.14
1	84.4	7123.36	4.44	19.67
1	94.5	8930.25	4.55	20.69
1	90.3	8154.09	4.50	20.28
40		723272.14		880.04

96.43%	Log Normal Distribution Probability
94.15%	Normal Distribution Probability

40	Samples	40	Samples
39	Deg. Frdm.	39	Deg. Frdm.
118.60	Mean	4.67	Mean
57.00	Detect Limit	4.04	Detect Limit
97.65	Median	4.58	Median
4118.81	Variance	0.19	Variance
64.18	Std. Dev.	0.44	Std. Dev.
10.15	Std. Error	0.07	Std. Error
1.74	T-test Value	1.86	H-test Value
136.26	UCL	117.63	UCL
100.94	LCL	96.86	LCL

(yellow)	Higher of duplicates eliminated
(grey)	NDs replaced with 1/2 LOD value

Field DQOs	Met
Lab DQOs	Met
NDs Changed	5
High Dupes Out	4

ADEC Regulatory Limits

No additional treatment required	< 8,300 ppm
Free release as clean soil	< 8,300 ppm
All VOCs Detected Under Published Limits	Yes

Calculations Methodology

Ref. (a) *EPA Statistical Method - Publication SW-846, Volume II, Part III, Chapter 9*

Ref. (b) *ADEC Draft Statistical Methods for Determining the Mean Soil Concentration - 8/16/2001 (SPAR\CS\STP\02-001)*

Treatment Data

High RRO Treated	65,000
Avg. RRO Treated	25,000

Start Treatment	7/27/2004
Test Treatment	9/2/2004
Days Treated	37

99.53% **reduction in** **37 days**

5,146 CY **8,748 Tons**

Table 14. South Stockpile Confirmation Sampling and Statistical Analyses for RRO

TEST PLOT FOR BIOCHEMICAL TREATMENT

ADEC recommended and DMC accepted an opportunity to develop a test plot demonstrating that DMCs Technologies truly reduces contamination concentrations. Since the technologies are new there is concern that control plots promoting aeration would perform as well as DMC Technologies systems. Both bioaugmentation and biochemical augmentation practices were performed. The layout of the plots is shown in previous tables outlining stockpiles.

Two plots measuring 100 ft. x 50 ft. and 2 ft. deep were prepared. Cells were established side by side above the same type of soil. Both cells received the same type of waste – excavated soils from the fuel depot. Test Plot A was treated by DMC. Test Plot B was not treated. Both test plots received the same mechanical work. When soils were mixed in Test Plot A, the same actions were performed in Test Plot B.

Results of the testing are illustrated below:

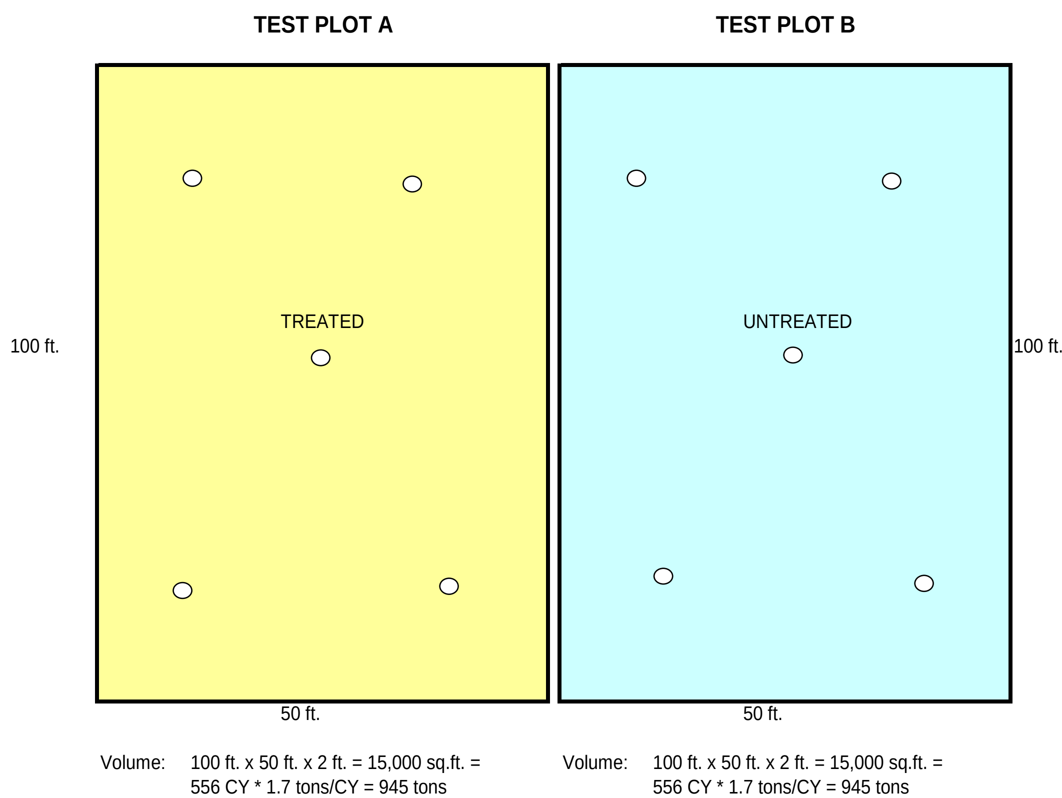


Figure 22. Layout and Volume of Test Plots

The test plot volumes are as large as most small bioremediation projects in Alaska.

Data collected during the testing is noted below:

T0- Excavation

Sample	DRO (ppm)
A1	12400
A2	13800
A3	17900
A4	15700
A5	13800
Avg.	**14720**

6/26: Soils excavated from fuel depot using an excavator and placed via dump truck into test plot. Dozer used to level soils to a depth of 2 ft.

T0 - Excavation

Sample	DRO (ppm)
B1	16500
B2	13300
B3	12200
B4	18100
B5	14500
Avg.	**14920**

6/26: Soils excavated from fuel depot using an excavator and placed via dump truck into test plot. Dozer used to level soils to a depth of 2 ft.

T1 - Baseline

Sample	DRO (ppm)
A6	10200
A7	11100
A8	9900
A9	8900
A10	10000
Avg.	**10020**

7/11: Added 1,000 tons of bionutrient to soil and then added 1,000 gallons of concentrated microbes. Mixed soil using and excavator.

T1- Baseline

Sample	DRO (ppm)
B6	11000
B7	10500
B8	9800
B9	8900
B10	10100
Avg.	**10060**

7/11: No treatment regime applied. Mixed soil using an excavator

T7

Sample	DRO (ppm)
A11	7500
A12	7700
A13	6900
A14	7000
A15	6800
Avg.	**7180**

7/18: No physical work performed for treatment. Samples Collected

T7

Sample	DRO (ppm)
B11	9900
B12	9400
B13	9900
B14	10000
B15	9700
Avg.	**9780**

7/18: No physical work performed for treatment. Samples Collected

T10

Sample	DRO (ppm)
A16	5800
A17	5400
A18	5450
A19	5600
A20	6000
Avg.	**5650**

7/21: Samples collected and then 500 gallons of pentanonic sprayed on plot and then worked in using an excavator.

T10

Sample	DRO (ppm)
B16	9500
B17	9300
B18	9100
B19	9000
B20	9600
Avg.	**9300**

7/21: Samples collected and then Plot mixed well using an excavator. No treatment applied.

T12

Sample	DRO (ppm)
A21	0
A22	38
A23	0
A24	0
A25	35
Avg.	**14.6**

7/23: Samples collected

T12

Sample	DRO (ppm)
B21	9200
B22	9000
B23	8800
B24	9100
B25	8700
Avg.	**8960**

7/23: Samples collected

T15

Sample	DRO (ppm)
None	NA
None	NA
None	NA
None	NA
None	NA
Avg.	**NA**

7/26: Plot treated with biosystem and left.

REACTION RESIDUALS

Chemical Pentanonic

DRO	2,380
RRO	1,650
VOCs	None
SVOCs	None

50% Diesel + 50% Pentanonic: 24 Hour Reaction

DRO	None
RRO	None
VOCs	None
SVOCs	None

50% Diesel + 50% Pentanonic: 5 Minute Reaction

DRO	39,600	
RRO	0	
VOCs	Benzene	2.79
	sec-Butylbenzene	5.85
	Ethylbenzene	6.48
	Isopropylbenzene	3.1
	p-Isopropylbenzene	3.66
	Napththalene	7.36
	n-Propylbenzene	5.63
	Toluene	13.8
	1,2,4 - Trimethylbenze	28
	1,3,5-Trimethlybenzen	6.7
	o-Xylene	8.82
	m,p-Xylene	20.9
SVOCs	2-Methylnaphthalene	467

Table 15. Test Plot Analytical Data

A Plot of the data is illustrated below. The plot clearly indicates that the systems used by DMC tech actually achieve treatment. Chemical residuals from the chemical reaction have lives less than 24 hours and do not add compounded toxicity to the system.

Days	Treated DRO (ppm)	Untreated DRO (ppm)
0	14720	14920
1	10020	10060
7	7180	9780
10	5650	9300
12	14.6	8960

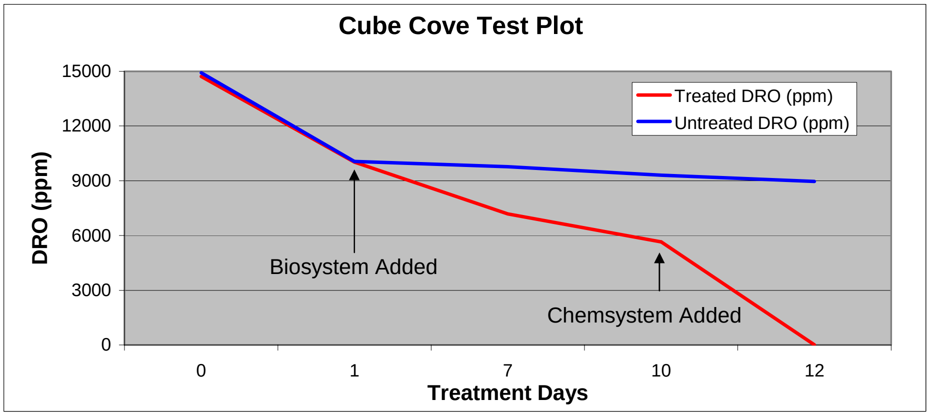


Figure 23. Test Plot Data Demonstrating Treatment

The systems used by DMC Technologies act quickly and are clearly more efficient that mechanical treatment mechanisms. Treatment using Pentanonic as an additive shows promise in cold temperatures since the reaction is not temperature dependent.

SOLID WASTE ACTIVITIES

The following solid waste activities were performed by DMC Technologies as part of the remediation project. The formal closure of these activities is being managed by Southeast Management Services and will be reported in a separate project.

The following list is noted:

1. Reseed contaminated contaminated soil piles – north and south
2. Recontour basic shape of the south stockpiles area
3. Remove exposed culvert east of the roadway above the south woodwaste fill, redevelop the roadway run-off channel and regrade the area at the bottom of the sand quarry.
4. Perform additional contouring of the south treated fill including interior ditches and a large ditch along the eastern extremity
5. Reseed the Peanut Lake quarry.
6. Reseed the rock quarry south and north of the residential area
7. Remove tires and excess liner
8. Develop a roadway to the bottom toe of the south woodwaste fill from the north end and block and cut the lower ditch
9. Place a drainage ditch along the north upper toe of the south woodwaste fill
10. Fill erosion channels on the surface and western face of the south woodwaste landfill
11. Remove water line
12. Remove the three-wheeler and trailer from the airport

APPENDICES

ELECTRONIC DAILY WORK RECORD

SAMPLING LOG