



December 5, 2005

Ms. Anne Marie Palmieri
ADEC
P. O. Box 1542
Haines, AK 99827

SUBJECT: Letter Report for Thorne Bay Warehouse Area Corrective Action

Dear Ms. Palmieri

BNC International, Inc. (BNCI) was contracted by the United States Forest Service (USFS) to perform a Corrective Action at the Thorne Bay Ranger District Warehouse Area under Purchase Order #43-0109-5-0131. This work was completed in June of 2005 in conjunction with other work performed by BNCI for the USFS at the Thorne Bay Housing Complex. The subject area was impacted by waste oil from drums that were improperly stored on a small concrete island by the warehouse facility during the past year. This Letter Report summarizes the work performed and findings of the Corrective Action.

Background

During a site visit to Thorne Bay in April 2005 by Mr. Tim Chittenden (USFS Inspector) and two BNCI representatives, a small area of discolored soil was discovered adjacent to the concrete porch of a small outbuilding (fuel island) to the south of the main USFS Warehouse. The spill area was spatially associated with approximately 6 drums that were on a plastic pallet on the fuel island. At this time, the drums were covered with a blue tarp. It was apparent that at least one of the drums had overtopped its bung after being exposed to intruding rainwater, causing a spill. As can be seen in Photograph #1 (attached) an approximately 10-foot diameter area was impacted by the spill. Mr. Tim Chittenden interviewed a few of the USFS employees from the Thorne Bay Ranger District and verified that the stored material in the drums was used oil, which had been consolidated from various maintenance activities. As BNCI had other contract work to perform for the USFS at the Thorne Bay Administrative Site, the USFS requested that BNCI address this spill during the same mobilization.

Drinking water for the USFS facility and city of Thorne Bay is piped in from Water Lake, a surface source approximately 1.5 miles northeast and uphill from the warehouse facility. The USFS reports that groundwater at the warehouse and housing site is at least 5 feet below surface, but undulating bedrock gets shallower to the south and east (the closer you get to the road, away from the housing complex). The nearest perennial flowing stream to the spill area is Deer Creek, which is located approximately 1/4 mile to the west.

Work Performed

BNCI executed the Corrective Action activities described in the document; *Work Plan for Thorne Bay Warehouse Area Corrective Action*, (dated June 7, 2005), on June 23 and 29, 2005 in conjunction with other work BNCI performed at the Thorne Bay Housing Complex. The intent of the Corrective Action was to characterize and remove the contaminated soil impacted by the waste oil spill and treat/bioremediate these soils in a biocell. The following is a summary of the work activities performed:

- 1 Excavated and removed approximately 2 cubic yards of waste oil-contaminated soil from the source area.
- 2 Collected ambient and headspace photo ionization detector (PID) field-screening samples to guide contaminated soil removal, test the margins of the excavation after the soil removal, and guide analytical sample site selection, as appropriate.
- 3 Collected analytical soil samples to verify that contaminated soil associated with the contemporary spill was removed and/or determine the concentration of residual contamination left in place.
- 4 Transported contaminated soil to a segregated section of the biocell constructed for the petroleum-contaminated soils from the Thorne Bay Housing Complex. Urea was added to the soil to enhance bioremediation of the soil.
- 5 Backfilled and regraded the Warehouse Area excavation after reviewing analytical results.

Cleanup Levels

The soils/shot rock observed in the Warehouse Area excavation were very similar in physical properties to the soils present in the excavations at the Housing Complex just up the hill; therefore no Total Organic Carbon (TOC) samples were collected to establish new Method Three cleanup levels. The same site specific alternative clean up level (ACL) of 441 milligram per kilogram (mg/kg) Diesel Range Organics (DRO) and the Method Two ingestion-pathway cleanup level of 8,300 mg/kg for Residual Range Organics (RRO) are proposed for this site. These ACLs were approved by the ADEC in a letter dated December 22, 2004 included as an appendix in BNCI's *Thorne Bay Housing Complex Final Work Plan, May 2005*. The default Method Two migration-to-groundwater soil clean up levels in 18 AAC 75.341 Table B2 will be applied for Semi-Volatile Organic Compounds (SVOCs) and Resource Conservation and Recovery Act (RCRA) metals.

Description of Spill Area and Cleanup

The spill was located adjacent to the southeast end of the fuel island structure located south of the USFS Warehouse. The location was readily apparent as a dark surface-stain on the soil (crushed rock pad fill and cap material) immediately adjacent to the concrete fuel island slab (Figure 1). The stain was approximately 10 feet in diameter and extended from the surface to a

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depth of up to 10 inches below ground surface (bgs), and penetrated deepest immediately adjacent to the slab where the product spilled off of the concrete onto the ground (Photograph #1). It appeared that the stained soils continued beneath the slab, but this removal action was not intended to chase contamination and compromise the integrity of the structure. The intent was to remove surface contamination and prevent further migration of the petroleum during precipitation events.

Contaminated Soil Removal

A Samsung 50 rubber tracked excavator was used to remove the contaminated soil. The contaminated material was loaded into a 10-yard dump truck for transport to the biocell. The removal operation was directed by an ADEC Qualified Person (as defined in 18 AAC 78.995 [118]). Based on visual observation, cleanup of the waste oil-contaminated soils was largely accomplished with removal of the first cubic yard of material. PID readings did not reveal the presence of additional contamination. An additional cubic yard of soil was excavated to ensure that the entire limits of the contamination were removed, including non-stained but potentially contaminated underlying soil, and stained material that was inadvertently mixed into the clean surrounding soils with the teeth of the excavator bucket. However, visually stained, contaminated soil was left in place below the concrete slab near the spill source so as not to undermine the concrete slab and compromise its structural integrity. Staining at the slab's footing appeared to merge with older pre-existing petroleum, oil, and lubricant (POL) contaminated soils as evidenced by a darker, more weathered appearance and stronger odor below the lower limits of the surface staining approximately 10-12 inches below the surface.

This underlying layer of moderately stained soil with a moderate, weathered-petroleum odor was encountered at approximately 8 inches bgs across the entire excavation area. This area also exhibited a light sheen when the exposed surface became wet with rain. Given the historic use of this concrete structure as a fuel island and a staging area for drums of petroleum products, historic spills are likely to have occurred. The current removal effort did not address these pre-existing petroleum spills unrelated to the April 2005 release as there were many buried utilities surrounding the concrete island. The depth of these legacy impacts was not determined but is known to locally extend beyond 17 inches bgs (the maximum depth of soil sampling). Groundwater was not encountered in the excavation and is reported by USFS personnel to be at least 5 feet bgs in the area.

After the surface soil removal was completed, the excavation area was secured with orange safety fencing around the perimeter pending analytical results.

Soil Handling/Treatment

The contaminated soil was trucked directly to the biocell that was constructed to treat petroleum-contaminated soil excavated from the Thorne Bay Housing Complex. The biocell was constructed with a 10-mil liner with earthen berms placed on top of the liner to filter and attenuate runoff from the treated soils. The soils were placed in a segregated corner of the biocell and the entire cell was amended with 50 pounds of urea to enhance the remediation process. The soils were well mixed to evenly distribute the urea and to aerate the soils. The

soils remained segregated until analytical results were received and contaminants of concern were identified. The size of the biocell was reduced to approximately 20 feet by 20 feet to accommodate the Warehouse Area soils.

PID Field Screening

Ambient PID field screening was performed to guide/confirm the removal of contaminated soil, however due to the very low volatile content of the spilled product (waste lubricating oil) a deflection could not be obtained on the instrument. Similarly, headspace screening of the three confirmation screening sites from the excavation margins did not yield results above background (0.0 parts per million [ppm]). Therefore, soil removal was guided entirely by visual observation with a considerable amount of over-excavation to ensure all surface impacted material was removed.

Analytical Sampling

Two primary analytical soil samples and one duplicate sample were collected from margins of the excavation to verify that contaminated soil was removed to ADEC cleanup levels and to characterize the material remaining. Primary sample 05TB-WH-SL1 and duplicate sample 05TB-WH-SL2 were collected 8 inches below the original ground surface immediately below the base of the cement slab where the bulk of the waste oil release had occurred (Figure 1). These samples represent the worst-case visually stained material left in place so as not to undermine the concrete slab. Both samples were analyzed for Diesel-Range Organics (DRO) by method AK102, Residual Range Organics (RRO) by method AK103, SVOCs by method SW8270C, and RCRA metals by methods SW6020/7471A.

Sample 05TB-WH-SL3 was collected 17 inches bgs near the southern extent of the excavation and represents legacy contamination beneath the limits of the contemporary waste oil spill.

The footprint of the biocell was sampled to establish the concentration of contaminants in soil beneath the cell prior to its construction (sample 05TB-BC-SL1). In addition, a composite sample and field duplicate were collected from the contaminated soil stockpile to establish the level of contaminants prior to treatment (samples 05TB-BC-SL2 and 05TB-BC-SL3, respectively). The composite sample also includes soil removed from a UST excavation from the housing area of the Thorne Bay Site as part of work performed by BNCI for the USFS under a separate contract.

The samples were submitted to North Creek Analytical (NCA) in Anchorage, Alaska for analyses on a rush turnaround basis. Samples were maintained at the proper temperature ($4^{\circ} \pm 2^{\circ}$ C) and shipped under appropriate chain-of-custody procedures.

Analytical Results

Analytical results from sample 05TB-WH-SL1 were 2,940 mg/kg DRO, 11,500 mg/kg RRO, and non-detect for SVOCs. Results from the duplicate sample were 3,340 mg/kg DRO, 13,100 mg/kg RRO, and non-detect for SVOCs. The results from both samples exceed the proposed ACL of 441 mg/kg DRO and the Method Two cleanup level of 8,300 mg/kg RRO. RCRA metals were non-detect or below the ADEC Method Two cleanup level except for arsenic which exceeded the Method Two cleanup level of 1.8 mg/kg with a concentration of 7.01 mg/kg in the primary sample and 4.56 mg/kg in the duplicate. These arsenic values likely represent local background conditions and are not considered anomalous at this site. Analytical results from sample 05TB-WH-SL3 are 716 mg/kg DRO and 3,010 mg/kg RRO, exceeding the proposed ACL cleanup level for DRO. These results are summarized in Table 1 (attached). A copy of NCA's laboratory final report is also attached.

The pre-construction sample (05TB-BC-SL1) from the footprint of the cell contained 63.6 mg/kg RRO and was non-detect for DRO. Primary composite sample 05TB-BC-SL2 from contaminated soil stockpile contained 219 mg/kg DRO and 968 mg/kg RRO. The field duplicate (05TB-BC-SL3) contained 279 mg/kg DRO and 1,160 mg/kg RRO.

Backfilling

When analytical results were received, they were reviewed by the BNCI Project Manager, the USFS Onsite Inspector, and the USFS Contracting Officer Representative. BNCI was directed by the USFS to backfill the warehouse excavation for safety reasons using clean crushed rock already onsite. BNCI backfilled and regraded the warehouse excavation on June 29, 2005 (Photograph #2).

Summary and Conclusion

BNCI completed removal of contemporary waste-oil contaminated surface soils at the USFS Warehouse fuel island to the extent practical and placed the soil into a biocell amended with urea to encourage remediation. Contaminated soils containing elevated concentrations of DRO and RRO associated with the spill were left in place immediately adjacent to and below the concrete slab so as not to undermine the structure. A deeper and more widespread zone of petroleum-impacted soils underlies the surface zone, but was not fully delineated because of the presence of buried utility lines. This location should be noted by the USFS on their GIS database so that if reconstruction or other maintenance activities require excavating this area, the potential for unearthing contamination is understood and an environmental engineer is present to direct activities.

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If you have any questions regarding this report, please do not hesitate to contact me at (907) 522-6103 or (907) 697-2850.

Sincerely,

Karen F. Pearson
Kathy Lochman
Project Manager *for*



Photograph #1 Warehouse Area spill. Note staining on fuel island slab and adjacent ground surface; view north (5/25/05).

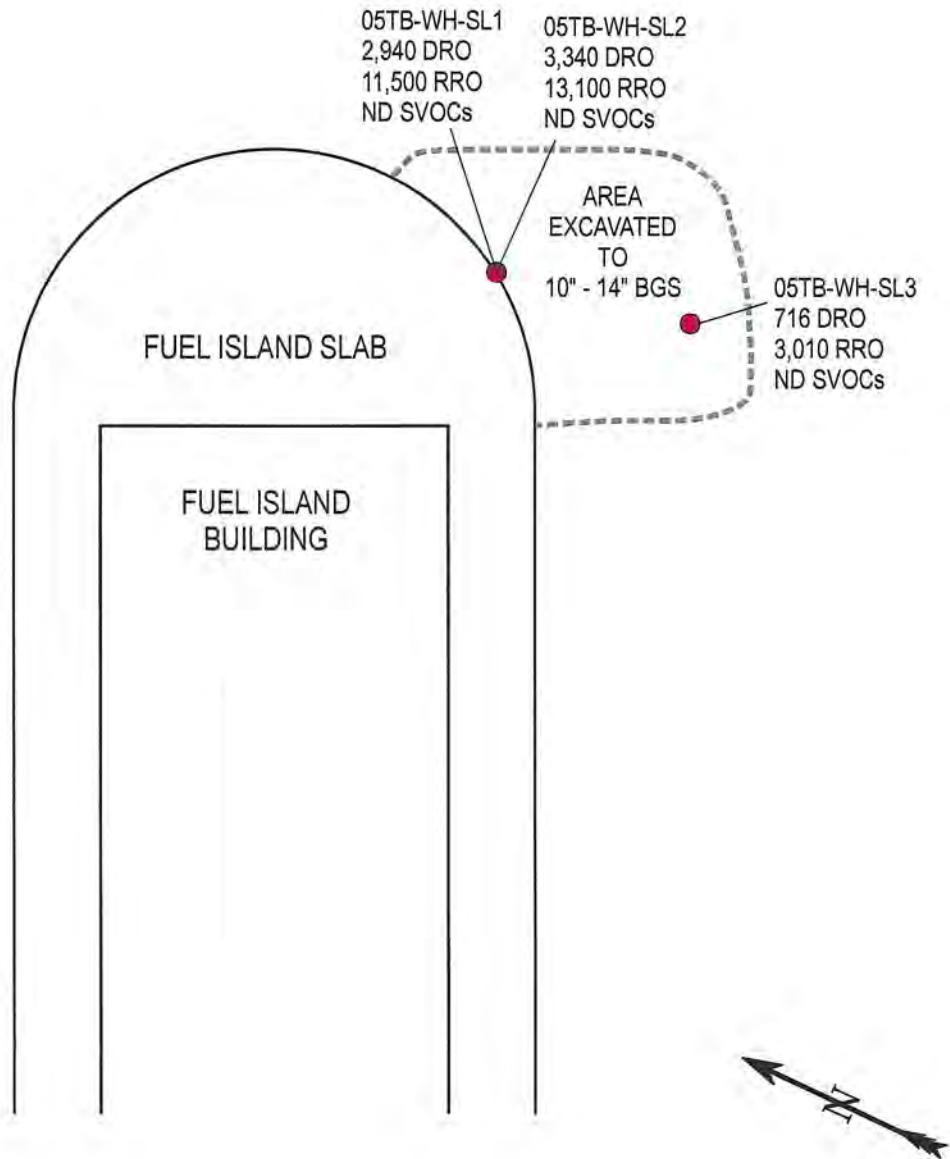


Photograph #2 Spill/excavation site after backfilling and grading. Excavator used for soil removal is along side building; view south (6/29/05).

Table 1 Analytical Soil Sample Results

Sample ID	05TB-WH-SL1	05TB-WH-SL2	05TB-WH-SL3	05TB-BC-SL1	05TB-BC-SL2	05TB-BC-SL3
Depth bgs	8"	8"	17"	4"	-	-
Visual impact/odor	mod weathered odor, mod gray staining	duplicate of SL1	mod-mild odor	Biocell Footprint	Composite Biocell sample	Composite Biocell sample dup
PID (ppm)	0.0	0.0	0.0	-	-	-
Sample ID	ADEC Method 2 Cleanup Level					
DRO AK102	2,940	3,340	716	ND	219	279
RRO AK103	11,500	13,100	3,010	63.6	968	1,160
SVOCs SW8270C	ND	ND	-	-	-	-
Arsenic ¹	7.01	4.56	-	-	-	-
Barium ¹	13.5	9.27	-	-	-	-
Cadmium ¹	ND	ND	-	-	-	-
Chromium ¹	15.5	8.26	-	-	-	-
Lead ¹	15.6	10.1	-	-	-	-
Mercury ²	ND	ND	-	-	-	-
Selenium ¹	ND	ND	-	-	-	-
Silver ¹	ND	ND	-	-	-	-

¹ Method EPA 6020; ² Method EPA 7471A



EXPLANATION

● Soil Sample Location
 Results Shown In mg/kg



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 Tongass National Forest, Alaska

FIGURE 1 WAREHOUSE SPILL EXCAVATION

SCALE: 1" = 5'	JOB NO: 301	DATE: DEC 2005	FILE:
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