FINAL REPORT
MATANUSKA RIVER DEBRIS SITE ASSESSMENT
PALMER, ALASKA

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1.0 INTRODUCTION

This report presents the results of our site assessment activities for a debris disposal area along a stretch of the Matanuska River just north of Eagle Avenue in Palmer, Alaska. The general site location and surrounding area are shown on Figure 1.

The first objective of the project is to assess, map, and determine the extent of debris as well as any potential pollutants in a debris disposal area along the Matanuska River. The focus of the site assessment is to estimate the volume of debris and collect information to determine potential impacts to water quality on the Matanuska River adjacent to the site.

The second objective of the project is to develop a debris removal and disposal plan that addresses permits needed, cost estimates, site logistics, and site safety concerns (from contents of debris pile such as contaminants and from the actual debris removal process). A separate document will be prepared in the future to address this second objective.

This work was performed under Contract No. 18-5006-12 for the Alaska Department of Environmental Conservation (ADEC). OASIS Environmental, Inc. (OASIS) performed this work in accordance with our April 6, 2004 proposal and May 18, 2004 ADEC approved work plan and quality assurance project plan (OASIS, 2004).

1.1 PROJECT DESCRIPTION

The purpose of the site assessment is to determine the following items:

1. Map the extent of debris and estimate the volume of debris present. This task will also include determining land ownership(s) for the debris disposal area.

2. Sampling of visible contamination will be performed in accordance with ADEC contaminated site assessment procedures as outlined in 18 ACC 75 and associated guidance. Multiple areas will be screened using a photo-ionization detector (PID) and up to six soil samples will be collected from areas deemed most likely contaminated based on the screening. If evidence of a spill is found the extent of impact will be estimated based on PID results and surface staining.

3. Collect three surface water and sediment sample pairs from the Matanuska River's edge located upstream, adjacent, and downstream of the debris disposal area.

4. No HAZCAT sampling of drum contents will be performed during this site assessment.

5. If a release of hazardous contamination is found during the site assessment activities, OASIS will notify the ADEC project manager and Rich Sundet with the ADEC Contaminated Sites department within 48 hours, or immediately if the release is ongoing.

2.0 PROJECT BACKGROUND

There is an unpermitted active dump located on and in the Matanuska River just north of Eagle Avenue in Palmer, Alaska. The disposal area is accessed from the old railroad bed off of Eagle Avenue that is now part of a hiking trail system. Debris is deposited along a stretch of the Matanuska River approximately ¼ to ½ mile upstream of Eagle Avenue and is mainly concentrated in an area approximately ¼ mile from Eagle Avenue. Visible contents of the dump at the time ADEC inspected it on June 14, 2002, included railroad cars, vehicles, household refuse, fuel cans, possible 55-gallon drums with unknown contents, scrap metal, and other miscellaneous debris. River channels run through and next to the dump at all times of the year. Visible sheens have also been observed in the river. This open dump is within the Drinking Water Protection Area for a minimum of three public water systems. These public water systems include Mountain View Estates (PWSID 226509.001), Palmer Well No. 4 (PWSID 226020.00, and the Palmer Golf Course (PWSID 227482.001).

The ADEC has placed this segment of the Matanuska River on the 2002 Section 303(d) list as an impaired water body and it is in Category 5 on Alaska's 2002 Integrated Water Quality Monitoring and Assessment Report, for non-attainment of the Residues standard for debris as provided for in the Water Quality Standards for Fresh Water Uses [18 AAC 70.020(b)].

Figures 2 through 5 are aerial photos that depict general site features at various times. Figure 2 is a May 1967 aerial photo that shows the site conditions before the Alaska Railroad Corporation reportedly abandoned the Palmer to Sutton rail line in 1969. Figure 3 is a May 1989 aerial photo that shows evidence of debris accumulations within the debris disposal area. Figures 4 and 5 are May 2000 and September 2003 aerial photos of the same area.

2.1 PROPERTY OWNERSHIP

The Alaska Railroad Corporation (ARRC) is the landowner of the former Palmer to Sutton Branchline that parallels the Matanuska River and passes by the debris disposal area at approximately ARRC Milepost A-8.3 of the Palmer Branchline. There is an existing Public Use Trail Permit, ARRC Contract No. 8511, in the vicinity of the debris disposal area with the City of Palmer, the State of Alaska, Department of Natural Resources (DNR), and the Matanuska-Susitna Borough (Borough). The City of Palmer's control ends approximately 425 feet north of the centerline of East Eagle Avenue; at which point DNR and the Borough areas of control begin.

The main debris disposal area is located approximately 1,200 feet north of Eagle Avenue and is therefore in the Public Use Trail Permit region that is controlled by DNR and the Borough.

3.0 SITE ASSESSMENT ACTIVITIES

The site assessment activities for this project included mapping and photographic documentation of the extent of visible debris, surface water and sediment sampling of the Matanuska River, field screening of potential areas of contamination, and soil sampling. The fieldwork was performed in accordance with the *Final Work Plan for Matanuska River Debris Site Assessment and Debris Removal and Disposal Plan, Palmer, Alaska*, dated May 18, 2004. The following sections discuss significant elements of the field activities and list any deviations from the work plan.

Samples were collected in accordance with the detailed sampling procedures provided in the project specific work plan and Quality Assurance Project Plan (QAPP) included as Appendix C to the work plan. Tables 1 and 2 list all soil, surface water, and sediment sample locations (including field duplicates) and the analyses requested for each of the samples. Analytical laboratory services were provided by North Creek Analytical, Inc. (NCA) out of their Portland, Oregon laboratory.

3.1 SITE ACCESS PERMIT

Prior to conducting site assessment activities the Alaska Railroad Corporation (ARRC) was contacted regarding permission for site assess. An entry permit, ARRC Contract No. 8775, was executed which provided the ADEC and its contractor (OASIS Environmental) permission and authority to enter the ARRC property to conduct a site assessment of the debris disposal area.

3.2 SITE DEBRIS ASSESSMENT

A site assessment was performed on May 26 and 27, 2004 to visibly document the debris disposal area and estimate the volume of debris present. Site assessment documentation consisted of performing the following items.

- The extent of visible debris was mapped and documented with a handheld GPS unit and digital photographs.
- Significant debris piles were photographed and described as to the type and quantity of debris. Estimates of the debris volume were made using a cloth tape and GPS measurements. The debris volume estimates were made for the main debris disposal area and the area of debris that is below the ordinary high water level or actually in the Matanuska River.
- Drum piles were noted and location recorded in the field logbook using a handheld GPS. Container markings or labels, if present, were recorded. Digital photographs were used to assist with documentation of the container and the surrounding site conditions.
- Visual observations and PID screening were used to determine if site contamination had occurred. Visual inspections for leaking drums, surface staining, and surface water sheens were performed throughout the debris disposal area. PID readings were collected from all areas of suspected contamination.

3.3 SURFACE WATER AND SEDIMENT SAMPLING

Three surface water and sediment sample pairs were collected from the Matanuska River. The river sample locations were taken from a braided channel of the Matanuska River that passes adjacent to the debris disposal area. These sample locations were located upstream (MD-03), adjacent to (MD-02), and downstream (MD-01) of the debris disposal area. The upstream and downstream locations were placed approximately one hundred feet upstream and one hundred feet downstream of the estimated boundary of the main debris disposal area. The surface water and sediment sample pairs were collected moving from downstream to upstream to minimize impacts due to disturbance of the surface water. Surface water samples were collected prior to sediment sampling to avoid entraining sediment in the water samples.

All surface water samples were collected below the water surface away from any observable sheen. Grab surface water samples were collected by placing a new laboratory-supplied sample bottle under the surface of the water with a minimum of sediment disturbance until filled. Sample bottles with laboratory-supplied preservatives were filled by transferring sample volume from another clean unpreserved sampling container that was filled as described above. The sample contained was then sealed and labeled.

Field measured water-quality parameters (including pH, conductivity, temperature, dissolved oxygen, and turbidity) were measured and recorded at each surface water sample location on the Sample Data Sheets contained in Appendix B. Visual observations and a diagram of the sample location were also recorded on the Surface Water Sample Data Sheets. These field measured water quality parameters results are summarized in Table 3.

Sediment samples were collected from the upper three to six-inches of sediment using a pre-cleaned stainless steel sample scoop. Samples for analysis of volatile organic compounds (VOCs) and gasoline range organics (GRO) were collected first and methanol was added to the container for sample preservation. The remaining parameters were then collected in the order of diesel range organics (DRO) and residual range organics (RRO), pesticide and PCBs, RCRA Metals, and percent solids. Sediment characteristics and sampling information including material type, odor, depth, and location were recorded on the Sample Data Sheets contained in Appendix B.

3.4 FIELD SCREENING AND SOIL SAMPLING

Prospective soil sample locations were field screened for volatile compounds using a photoionization detector (PID) calibrated with a 100 ppm isobutylene standard gas. The PID was used to sample volatile vapors released from the soil using headspace sampling methods performed in accordance with the ADEC *Underground Storage Tank Procedures Manual* (ADEC, 2002). Laboratory analytical sample locations were selected from the sampling locations that exhibited the greatest PID readings. The headspace screening results are presented in Table 3.

Surface soil samples were collected by digging a small hole at the desired location to a depth of at least six inches below, but not more than 12 inches below, the ground surface where possible. Due to underlying metal debris some samples had to be collected at less than six inches below the ground surface. Samples for analysis of VOCs and GRO were collected first and methanol was added to the container for sample preservation. The remaining parameters were then collected in the order of DRO/RRO, pesticide and PCBs, RCRA Metals, and percent solids. Soil characteristics and sampling information including material type, odor, depth, and location will be recorded on the Surface Soil Sample Data Sheet Appendix B.

The number, location, and analyses requested of the soil samples selected for laboratory analysis are summarized in Table 1.

3.5 GPS LOCATION SURVEY

A horizontal survey of significant site locations and all sample locations was performed using a handheld GPS unit. The horizontal coordinates were recorded based on latitude and longitude in degrees, minutes, and decimal seconds. The horizontal coordinates of physical site features (e.g. road intersections) were used to correlate the coordinate system with the aerial photos. The accuracy of the horizontal locations is estimated to be within approximately 50 feet.

The U.S Army Topographic Engineering Center program CORPSCON was used to translate the GPS latitude and longitude values into the Alaska State Plan coordinate system (NAD 83, Zone 4). The latitude and longitude values and corresponding Alaska State Plan coordinates for each of the surveyed locations are presented in Appendix C.

3.6 LABORATORY ANALYSES

Three sediment samples and five soil samples were collected and analyzed for VOCs (SW8260B), GRO (AK101), DRO (AK102), RRO (AK103), pesticides and polychlorinated biphenyls (SW8081/SW8082), RCRA metals (SW6020/7000) and percent solids (SW3550). The samples were analyzed by the Portland division of NCA which is an ADEC approved analytical laboratory. Table 1 provides a complete listing of the sample identification, location, and analyses requested. Quality control samples consisted of a field duplicate, with extra volume for a matrix spike and matrix spike duplicate, and a methanol trip blank.

Three groundwater samples were collected and submitted for laboratory analysis of VOC, polynuclear aromatic hydrocarbons (PAH), pesticides and PCBs, and RCRA Metals (Table 2). These samples were also analyzed by SGS Environmental. Quality control samples consisted of a field duplicate, with extra volume for a matrix spike and matrix spike duplicate, and a trip blank. The trip blank was used to evaluate potential cross contamination of volatile constituents during shipping.

All samples were submitted to the laboratory under chain-of-custody procedures.

3.7 DEVIATIONS FROM WORK PLAN

The following is a list of deviations with regards to the work plan.

- A total of five soil sample locations were collected whereas the work plan called for up to six sample locations. Field observations showed no evidence of drum leakage, soil staining, or other indications of soil contamination.
- A turnaround time of five days was requested for all laboratory analyses. However due to the Memorial Day holiday and analytical difficulties some analytical results were reported after the five day reporting time limit. The laboratory reduced their fees to correspond with the turnaround times provided. All analyses were preformed within the recommended holding times.

Table 1: Matanuska River Debris Site Assessment Soil Sample Analyses Summary

Sample Number	Location ID Sample Point	Comments	Matrix	Location Type	Analytical Methods					
					Alaska Method AK102/103 DRO/RRO	Alaska Method AK 101 GRO	EPA Method 8260B VOCs	EPA Method 8081A/8082 Pest & PCB	EPA Method 6020/7000 RCRA metals	EPA Method SW3550 Percent Solids
04MD-001SE	MD-01	Downstream	Sediment	Grab	1	1	1	1	1	1
04MD-002SE	MD-02	Adjacent	Sediment	Grab	1	1	1	1	1	1
04MD-003SE	MD-03	Upstream	Sediment	Grab	1	1	1	1	1	1
04MD-004SO	MD-04	Near drum	Soil	Grab	1	1	1	1	1	1
04MD-005SO	MD-05	Drainage	Soil	Grab	1	1	1	1	1	1
04MD-006SO	MD-06	Near auto	Soil	Grab	1	1	1	1	1	1
04MD-007SO	MD-07	Near drum/auto	Soil	Grab	1	1	1	1	1	1
04MD-008SO	MD-08	Near drum/rail car	Soil	Grab	1	1	1	1	1	1
04MD-009SO	Not Collected		Soil	Grab	1	1	1	1	1	1
04MD-501SO	MD-05-D	Duplicate	Soil	Grab	1	1	1	1	1	1
03MD-501SO	MD-05-D	MS/MSD	Soil	Grab	2	2	2	2	2	
04MW-TB-801SO	Project Trip Blanks	Methanol Blank	Methanol/ Sand	QA/QC		1	1			
SAMPLE ANALYSES TOTALS					**12**	**13**	**13**	**12**	**12**	**10**

Notes: * Sample numbers for these locations will be incremented by 1 for each succesive sample (e.g., 801, 802, 803, etc.)

Table 2: Matanuska River Debris Site Assessment Water Sample Analyses Summary

Sample Number	Location ID Sample Point	Comments	Matrix	Location Type	Analytical Methods					
						EPA Method 610 PAH	EPA Method 624 VOCs	EPA Method 608 Pest & PCB	EPA 6020/7000 RCRA metals	
04MD01-001SW	MD-01	Downstream	Surface Water	River		1	1	1	1	
04MD02-002SW	MD-02	Adjacent	Surface Water	River		1	1	1	1	
04MD03-003SW	MD-03	Upstream	Surface Water	River		1	1	1	1	
04MD04-104SW	MD-02-D	Duplicate	Surface Water	River		1	1	1	1	
04MD04-104SW	MD-02-D	MS/MSD	Surface Water	River		1	1	1	1	
04MD-TB-901WS *	Project Trip Blanks	Trip Blank	Water	QA/QC		1	1			
WATER ANALYSES TOTALS					**0**	**6**	**6**	**5**	**5**	**0**

Notes: * Sample numbers for these locations will be incremented by 1 for each succesive sample (e.g., 901, 902, 903, etc.)
Method 624 will be used to determine TAH (benzene, toluene, ethylbenzene, and xylenes) based on ADEC 18 AAC 70
Method 610 will be used to determine TAqH (TAH + PAH) based on ADEC 18 AAC 70

TABLE 3 - Field Measurement Results Summary
Matanuska River Debris Site Assessment, Palmer, Alaska

Sample Point ID	Date Sampled	Total Depth of Water (inches)	Sample Depth (inches)	pH	Temp (^{o}C)	Cond (μS)	Dissolved Oxygen (mg/L)	Turbidity (NTU)
04MD01-101SW	5/26/2004	4	3	8.4	9.3	NA	12.0	544
04MD02-102SW	5/26/2004	18	6	8.5	8.8	NA	12.0	590
04MD03-103SW	5/26/2004	4	3	8.6	8.3	NA	12.3	583

Sample Point ID	Test Sample ID	Date Sampled	Sample Depth (inches)	PID Reading (ppm)	Location Description
04MD-004SO	Test # 1	5/27/2004	12	1.4	Next to old drums on S side
	Test # 2	5/27/2004	12	1.0	Empty Drum "ANTI" written on top
04MD-005SO	Test # 3	5/27/2004	12	2.5	In drainage at base of dump area
04MD-006SO	Test # 4	5/27/2004	12	4.4	Auto by river, next to 04MD02-102SW
	Test # 5	5/27/2004	6	0.9	Empty drum at base of dump
04MD-007SO	Test # 6	5/27/2004	3 - 4	1.0	Next to old drums and autos on N side
04MD-008SO	Test # 7	5/27/2004	3	0.4	Next to old drum and rail car on N side

NM - Not measured

4.0 FINDINGS

4.1 DEBRIS ASSESSMENT

On May 26 and 27, 2004, OASIS Environmental performed a site assessment of the debris disposal area. The site assessment included mapping the extent of the main debris disposal area, estimating the amount of debris, and collection surface water, sediment, and soil samples. Photographic documentation of the site assessment is provided in Appendix A.

The debris disposal area is located along the old Palmer to Sutton railroad line where it parallels the Matanuska River just north of Palmer. Debris was observed to be scattered along the old railroad line for approximately one-half mile but is mainly concentrated in one area where the old railroad line meets up with the Matanuska River as shown on Figure 1.

The estimated extent of the main debris disposal area is shown on Figure 6. The mapped extent of the debris disposal area is based on handheld GPS coordinates and visual observations from the aerial photographs. The main debris disposal area is estimated to be approximately 20,000 square feet or just less than one-half acre in size, of which approximately half is heavily covered with debris. Buried debris was found near the bottom of the bluff along the Matanuska River. Sloughing of the bluff material appeared to be the main cause for debris burial.

The main debris disposal area was found to be comprised of primarily metal debris consisting of old railroad cars, automobile bodies, empty drums, metal lath cuttings, miscellaneous appliances (washing machines, refrigerators, etc.), and other metal debris. Wooden rail car pieces, train car axels and wheels, metal rails, and other metal railroad car pieces were found along the northern edge of the main debris disposal area. Photos #1 through #10 in Appendix A provide photographic documentation of the debris disposal area contents.

No visible signs (e.g., surface staining, discoloration, etc.) of potential contamination to the environment from the debris items were observed. Car batteries and engines had been removed from the several automobiles that we inspected.

Additional debris consisting primarily of old railroad cars was observed to be scattered along the old Palmer to Sutton railroad line for approximately one-half mile upstream of the main debris disposal area which is the distance upstream that we walked. We did not investigate the possibility that debris may be found along the remainder of the old Palmer to Sutton railroad line.

4.1.1 Estimation of Quantity of Debris

The focus of this site assessment was directed at the debris present below the ordinary high water level; this includes debris that is in the Matanuska River and debris along the river bank up to the imaginary mark represented by the ordinary high water level. However, in estimating

the quantity of debris we believe that the entire debris disposal area as shown of Figure 6 needs to be considered. The primary reason for this belief is due to the instability of the debris pile and high probability that the debris higher up the bluff will migrate downwards towards the river as any debris is removed from this lower area either immediately or just naturally over time.

The actual quantity of debris that is below the ordinary high water line is rather small (less than a 5 foot width along the length of the debris disposal area). For instance during a July 16, 2004, site visit when the Matanuska River daily mean stream flow was reported at 13,800 cubic feet per second (cfs) the only debris below the high water level was a few railcars and a couple of automobile bodies. This flow event is considered representative of the ordinary high water level since the maximum daily mean stream flow occurs on July 12 and is 13,890 cfs for 31 years of record (Appendix D). Assuming that each of the railcar frames weight approximately 2 tons and the automobile frames weight 1 ton, we estimate that the quantity of debris below the ordinary high water level to be at most ten to twenty tons.

During the site assessment we observed over 30 automobiles, over 20 railroad cars or portions of a railroad car, 26 empty drums, two large piles of metal debris cuttings, and a number of other miscellaneous debris items such as household appliances. The area covered by the main debris pile (Figure 6) is estimated to be 150 feet long at the top and 250 feet long along the river and approximately 100 feet wide which is 20,000 square feet or approximately one-half acre. However the entire region inside this border is not covered with debris. Therefore, assuming the debris covered region is one half of the area shown on Figure 6 (10,000 square feet) and averages roughly two to four feet in thickness then volume of debris is estimated to be 20,000 to 40,000 cubic feet or approximately 750 to 1,500 cubic yards. The density of recycled scrap metal that has been compacted, shredded, or processed in some other manner is in the range of 45 to 70 pounds per cubic foot. Because the debris pile is comprised of uncompacted and nonprocessed scrap metal we estimate the debris density to be on the order of 10 to 30 pounds per cubic foot. Using an estimated density of 20 pounds per cubic foot the weight of the debris is estimated at 200 to 400 tons of debris.

The estimated quantity of debris within the main debris disposal area does not include the various scattered pieces of railroad car debris located within the wooded areas of the bluff upstream of the main debris disposal site (Figure 1).

4.2 ANALYTICAL RESULTS

The applicable ADEC surface water cleanup levels are contained in the June 26, 2003 18 AAC 70 – *Water Quality Standards* (ADEC, 2003a). The applicable water quality standards for fresh water uses were obtained from the Alaska Water Quality Standards Table (18 AAC 70.020) and the *Alaska Water Quality Criteria Manual* (ADEC, 2003b). One of the criteria under the Alaska Water Quality Standards for Fresh Water Uses [18 AAC 70.020(b)] applies to residues which are defined as floating solids, debris, sludge, deposits, foam, scum, or other residues. This regulation states that residues *May not, alone or in combination with other substances or*

wastes, make the water unfit or unsafe for the use; cause a film, sheen, or discoloration on the surface of the water or adjoining shorelines; cause leaching of toxic or deleterious substances; or cause a sludge, solid, or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines. Additionally, since this dump site is within the Drinking Water Protection Area for a minimum of three public water systems the 18 AAC 80 – Drinking Water regulations (ADEC, 2002a) were also used to determine appropriate cleanup levels.

The applicable ADEC soil cleanup levels are contained in the January 30, 2003 18 AAC 75 - *Oil and Other Hazardous Substances Pollution Control Regulations* (ADEC, 2003c). The applicable cleanup levels for soil were developed using Tables B1 and B2 of 18 AAC 75.341 for Method Two cleanup criteria. Because sediment cleanup levels are not provided in the Alaska Water Quality Standards (18 AAC 70), the National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Tables (SQuiRTs) for freshwater sediments (NOAA, 1999) were used to provide screening levels for analytical results as recommended by ADEC (ADEC, 2004). The surface water cleanup levels are shown in Table 4. The soil cleanup levels are shown in Table 5. The sediment benchmark screening levels are provided in Table 5. Appendix F contains the laboratory analytical data reports for both the surface water, sediment, and soil samples. The surface water, sediment, and soil analytical results are discussed below.

Under the sample numbering scheme used for this project, typical analytical sample numbers consist of the year (04), site designation (MD), a sequential sample number (101), and the sample matrix (e.g., 04MD-004SO). The samples are identified by the sample location as indicated in Tables 1 and 2 (e.g., MD-02).

The surface water, sediment, and soil sample locations were recorded using a handheld GPS unit. The U.S Army Topographic Engineering Center program CORPSCON was used to translate the GPS latitude and longitude values into the Alaska State Plan coordinate system (NAD 83, Zone 4) for mapping purposes. In general the mapped locations agreed with visual placement on the aerial photographs, with two exceptions. The coordinates for soil sample locations MD-07 and MD-08 are incorrect and these locations had to be determined visually using the aerial photographs.

4.2.1 Surface Water Sampling Results

Surface water analytical results are summarized in Table 4. All surface water sample results for VOC, PAH, total aromatic hydrocarbons (TAH), total aqueous hydrocarbons (TAqH), and pesticides and PCB analyses were below the laboratory reporting limit. Several RCRA metals (As, Ba, Cr, and Pb) were detected in the surface water samples. All of these results are below their applicable ADEC MCLs.

The applicable ADEC cleanup level (most stringent criteria) for TAH and TAqH is based on the Water Quality Standards Table (18 AAC 70.020). The applicable cleanup level for the individual

constituents of the VOC, PAH, and RCRA metals analyses are based on the Drinking Water Standards (Table I in the Alaska Water Quality Criteria Manual or 18 AAC 80).

4.2.2 Sediment and Soil Sample Results

Sediment and soil analytical results are summarized in Table 5. All sediment sample results for VOC, GRO, DRO, RRO, and Pesticides and PCBs were below the laboratory reporting limit. Several RCRA metals (As, Ba, Cr, Pb, Hg, and Se) were detected in the sediment samples. All of these RCRA metals results are below their NOAA sediment screening levels with the exception of arsenic. Arsenic was present in all three sediment samples at concentrations above the NOAA freshwater sediment threshold effects level of 5.9 mg/Kg.

All soil sample results for VOC, GRO, DRO, RRO, and Pesticides and PCB analyses were below the laboratory reporting limit with the exception of soil sample taken at location MD-07. This soil sample (04MD-007SO) contained 40.1 mg/kg of DRO, 257 mg/kg of RRO, and 0.00121 mg/kg of trichlorofloromethane. Several RCRA metals (As, Ba, Cd, Cr, Pb, and Se) were detected in the soil samples as listed in Table 5. All of these results are below their applicable ADEC cleanup levels with the exception of arsenic. Arsenic was present in all of the soil samples at concentrations above the ADEC cleanup level of 2.0 mg/Kg.

The United States Geological Survey (USGS) performed streambed sediment studies to determine the naturally occurring concentrations of arsenic in the Cook Inlet Basin. Streambed-sediment samples have been collected in the Cook Inlet Basin as part of the National Uranium Resource Evaluation (NURE) Hydrogeochemical and Streambed Sediment Reconnaissance program as well as for the National Water-Quality Assessment (NAWQA) program and studies with the National Park Service. NURE samples had arsenic concentrations from less than 5 to 184 mg/Kg, in 94 samples collected in 1977 (USGS, 2001). NAWQA samples and samples collected for the National Park Service had arsenic concentrations from 1.7 to 88 mg/Kg in samples collected from 47 sites during 1998 to 2000 (USGS, 2001). The arsenic concentrations in the soil and sediment samples collected from the dump site are all within the range of these studies; therefore, it appears likely that the arsenic is naturally occurring in the soil/sediment and does not represent contamination from the debris disposal area.

4.2.3 Analytical Data Quality

A quality assurance review (QAR) of the analytical results for this project is presented in Appendix E. The QAR discusses the data quality assurance/quality control (QA/QC) measures that were taken to ensure data integrity. The QAR also presents the results of the analytical data quality review and discusses any limitations in the data. Overall, QA/QC results for this project indicate that the analytical data are acceptable and defensible for project use with the following qualifications:

- Surrogate recovery for the DRO/RRO analysis of soil sample 04MD-007SO was biased high and the results for this sample have been qualified as estimated (VJ).
- Agreement between the primary and duplicate soil sample was outside of acceptance criteria for lead (Pb). Therefore all soil and sediment sample results for lead have been qualified as estimated (VJ).
- The surface water sample results were compliant with all QA/QC acceptance criteria.
- Overall project completeness is estimated at 100 percent, which is above the ADEC requirement of 85 percent.

TABLE 4 - Surface Water Analytical Results Summary
Matanuska River Debris Site Assessment, Palmer, Alaska

Sample ID	Date Sampled	VOCs (µg/L)	TAH (µg/L)	PAH (µg/L)	TAqH (µg/L)	Pesticides and PCBs (µg/L)	RCRA Metals (mg/L)
04MD01-101SW	5/26/2004	All ND	< 2.00	All ND	< 4.0	All ND	As - 0.00684 Ba - 0.102 Cr - 0.0144 Pb - 0.00492
04-MD02-102SW	5/26/2004	All ND	< 2.00	All ND	< 4.0	All ND	As - 0.00651 Ba - 0.0978 Cr - 0.0136 Pb - 0.0049
04MD04-104SW Dup of MD-02	5/26/2004	All ND	< 2.00	All ND	< 4.0	All ND	As - 0.00644 Ba - 0.0901 Cr - 0.0126 Pb - 0.00449
04MD03-103SW	5/26/2004	All ND	< 2.00	All ND	< 4.0	All ND	As - 0.0054 Ba - 0.0823 Cr - 0.00997 Pb - 0.00461
Trip Blank	5/26/2004	All ND	-	-	-	-	-
ADEC Cleanup Level		Varies see (18 AAC 70)	10	Varies see (18 AAC 70)	15	Varies see (18 AAC 75)	As - 0.05 Ba - 2.0 Cr - 0.1 Pb - 0.015
Source			18 AAC 70		18 AAC 70		18 AAC 80

ND - Not Detected
All ND - No analytes were detected
< - Less than PQL value shown.
As - Arsenic
Ba - Barium
Cr - Chromium
Analytical results shown in **Bold** exceed ADEC cleanup level
Pb - Lead
VOCs - Volatile Organic Compounds
TAH - Total Aromatic Hydrocarbons (BTEX)
PAH - Polynuclear Aromatic Hydrocarbon
TAqH - Total Aqueous Hydrocarbons (BTEX + PAH)
PCBs - Polychlorinated biphenyls

TABLE 5 - Sediment and Soil Analytical Data Summary
Matanuska River Debris Site Assessment, Palmer, Alaska

Sample ID	Date Sampled	Sample Depth (inches)	Matrix	GRO *(mg/Kg)*	DRO *(mg/Kg)*	RRO *(mg/Kg)*	Pesticides & PCBs *(μg/Kg)*	RCRA Metals *(mg/Kg)*	VOCs (μg/Kg)
04MD-001SE	5/27/2004	3 - 6	Sediment	< 1.10	< 25.0	< 50.0	All ND	**As - 7.08** Ba - 70.4 Cr - 16.7 Pb - 5.6 VJ Hg - 0.0374 Se - ND	All ND
04MD-002SE	5/27/2004	3 - 6	Sediment	< 0.925	< 25.0	< 50.0	All ND	**As - 11.3** Ba - 79.4 Cr - 23.0 Pb - 7.47 VJ Hg - ND Se - ND	All ND
04MD-003SE	5/27/2004	3 - 6	Sediment	< 1.31	< 25.0	< 50.0	All ND	**As - 11.3** Ba - 117 Cr - 24.4 Pb - 8.75 VJ Hg - 0.0657 Se - 0.535	All ND
04MD-004SO	5/27/2004	12	Soil	< 1.36	< 25.0	< 50.0	All ND	**As - 9.26** Ba - 66.8 Cr - 24.7 Pb - 22.6 VJ Hg - ND Se - ND	All ND
04MD-005SO	5/27/2004	12	Soil	< 1.69	< 25.0	< 50.0	All ND	**As - 7.90** Ba - 69.8 Cr - 22.2 Pb - 10.4 VJ Hg - ND Se - ND	All ND
04MD-501SO Dup of MD-05	5/27/2004	12	Soil	< 1.68	< 25.0	< 50.0	All ND	**As - 6.86** Ba - 58.2 Cr - 22.6 Pb - 6.85 VJ Hg - ND Se - ND	All ND

TABLE 5 - Sediment and Soil Analytical Data Summary
Matanuska River Debris Site Assessment, Palmer, Alaska

Sample ID	Date Sampled	Sample Depth (inches)	Matrix	GRO *(mg/Kg)*	DRO *(mg/Kg)*	RRO *(mg/Kg)*	Pesticides & PCBs *(μg/Kg)*	RCRA Metals *(mg/Kg)*	VOCs (μg/Kg)
04MD-006SO	5/27/2004	12	Soil	< 1.10	< 25.0	912	All ND	**As - 9.68** Ba - 95.6 Cr - 22.2 Pb - 7.17 VJ Hg - ND Se - 0.594	All ND
04MD-007SO	5/27/2004	3 - 6	Soil	< 1.48	40.1 VJ	257 VJ	All ND	**As - 9.35** Ba - 138 Cd - 2.92 Cr - 29.1 Pb - 103 VJ Hg - ND Se - 0.532	TFM - 121 All Others ND
04MD-008S0	5/27/2004	3	Soil	< 1.25	< 25.0	< 50.0	All ND	**As - 13.6** Ba - 88.7 Cr - 27.4 Pb - 7.75 VJ Hg - ND Se - ND	All ND
04MD-TB-801SO	5/27/2004		TB	< 3.56	-	-	-		All ND
ADEC Soil Cleanup Level		-	-	300	250	11,000	Varies see (18 AAC 75)	As - 2.0 Ba - 1100 Cd - 5.0 Cr - 26 Pb - 400 Hg - 1.4 Se - 3.5	Varies see (18 AAC 75)

ND - Not Detected
All ND - No analytes were detected
< - Less than PQL value shown.
VJ - Estimated value.
Analytical results shown in **Bold** exceed ADEC cleanup level or ORNL screening

GRO - Gasoline range organics
DRO - Diesel range organics
RRO - Residual range organics
PCBs - Polychlorinated biphenyls
TFM - Trichlorofluoromethane
Se - Selenium

As - Arsenic
Ba - Barium
Cd - Cadmium
Cr - Chromium
Pb - Lead
Hg - Mercury

As - 5.90 [1]
Ba - NA [1]
Cd - 0.596 [1]
Cr - 37.3 [1]
Pb - 35.0 [1]
Hg - 0.174 [1]

1 - NOAA Screening Quick Reference Tables (SQuiRTs), Threshold Effects Level (TEL) for freshwater sediments

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

The main debris disposal area was found to be comprised of primarily metal debris consisting of old railroad cars, automobile bodies, empty drums, metal lath cuttings, miscellaneous appliances (washing machines, refrigerators, etc.), and other metal debris. The main debris disposal area as shown on Figure 6 is estimated to be approximately 20,000 square feet or just less than one-half acre in size, of which approximately half is heavily covered with debris. Assuming the size of the debris pile is 10,000 square feet and is roughly two to four feet in thickness the volume of debris is estimated to be 20,000 to 40,000 cubic feet or approximately 750 to 1,500 cubic yards. Using an estimated density of 20 pounds per cubic foot the weight of the debris is estimated at 200 to 400 tons of debris. The portion of this debris pile that is below the ordinary high water level is estimated to be 10 to 20 tons. This estimate does not include the additional scattered railroad car debris that was noted upstream of the main debris pile.

Surface water, sediment, and soil samples collected during this site assessment show no indications of contaminant impacts from the debris to these media. All surface water sample results for VOC, PAH, TAH, TAqH, pesticides and PCB, and RCRA metals analyses were either below the laboratory reporting limit or their applicable ADEC cleanup level. All sediment sample results for VOC, GRO, DRO, RRO, and pesticides and PCBs are below their laboratory reporting limits. Arsenic was present in all three sediment samples at concentrations above the NOAA freshwater sediment screening level of 5.9 mg/Kg. All other RCRA metals results are below their NOAA sediment screening levels.

All soil sample results for VOC, GRO, DRO, RRO, and pesticides and PCB analyses are below the laboratory reporting limit with the exception of the soil sample taken at location MD-07. This soil sample (04MD-007SO) contained 40.1 VJ mg/kg of DRO, 257 VJ mg/kg of RRO, and 0.00121 mg/kg of trichlorofloromethane. All of these results are below their applicable ADEC cleanup levels. Several RCRA metals (As, Ba, Cd, Cr, Pb, and Se) were detected in the soil samples as listed in Table 5. All of these results are below their applicable ADEC cleanup levels with the exception of arsenic. Arsenic was present in all of the soil samples at concentrations above the ADEC cleanup level of 2.0 mg/Kg. Based on a comparison with naturally occurring arsenic concentrations in streambed sediments from the Cook Inlet Basin, it appears likely that the arsenic is naturally occurring in the soil/sediment and does not represent contamination from the debris disposal area.

Several pieces of debris consisting primarily of portions of railroad cars were observed to be within the Matanuska River water column. This represents a violation of the Water Quality Standards for residues [18 AAC 70.020(b)]. However, no indication of surface water sheening or other visible evidence of degradation of the water quality was observed during our site visits.

While the debris disposal area does not appear to represent any type of potential contamination threat to the environment, it does represent a safety hazard particularly for children. During our site assessment two groups of children came out to the debris disposal area to investigate and horse around. Similarly on a subsequent visit to the site we observed graffiti on pieces of debris that had not previously been present. Therefore, the debris disposal area does represent a potentially dangerous attractive public hazard that will require some active measures be taken to mitigate this hazard - although not by the ADEC as this is outside of its jurisdictional authority.

5.2 RECOMMENDATIONS

Before debris removal is selected as a course of action, the following items need to be considered for their potential impacts on the project:

- Heavy equipment access to the site will require cutting down trees along the public use trail and a temporary widening and leveling of trail.
- Disturbance of a well established vegetative cover and the erosional impacts to the bluff as a result of any debris removal effort.
- Due to the instability of the debris pile it is probable that additional debris above the ordinary high water level will also need to be removed. The quantity of additional debris requiring removal is likely to greatly exceed the quantity that is below the ordinary high water level.
- The debris removal effort may disturb the potential erosional protection offered by the large pieces of metal debris along the banks of the Matanuska River. However, if bank erosion is determined to be a potential problem other measures could be taken to mitigate any erosional problems associated with the river bank. This would also include evaluation of potential erosional impacts to locations outside of the debris removal area (i.e., residential area just downstream of the debris disposal site).

While outside the ADEC's responsibility and authority we would also present the following recommendations to prevent further open dumping at this site and to reduce the potential safety hazardous presented by this debris area:

- Install bollards or another suitable barrier to prevent vehicular access to the dump site by the hiking trail at the Eagle Avenue access point and any other points of public access.
- The debris site presents a potential hazard for children and steps should be taken to minimize the potential for harm. Debris removal is the preferred alternative for minimizing risk but may be cost prohibitive. Other alternatives may include installation of a fence around the debris area to restrict public access.

6.0 REFERENCES

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ADEC, 2002b. *Underground Storage Tank Procedures Manual. Guidance for Treatment of Petroleum-Contaminated Soil and Water and Standard Sampling Procedures.* November 7, 2002.

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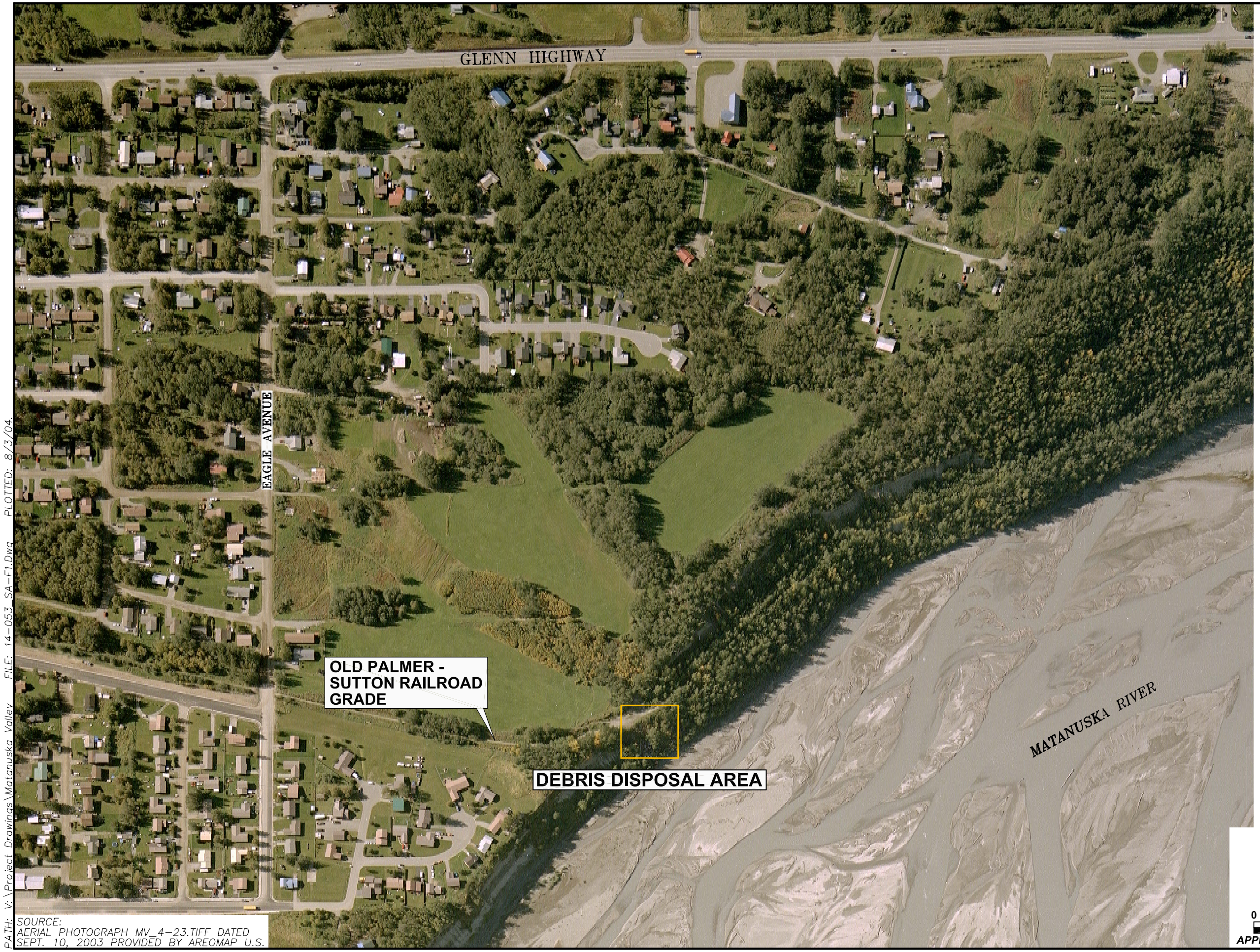
Oak Ridge National Laboratory (ORNL), 1997. *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment-Associated Biota: 1997 Revision*. November 1997.

U.S. Geological Survey (USGS), 2001. *Distribution of Arsenic in Water and Streambed Sediments, Cook Inlet Basin, Alaska.* USGS Fact Sheet FS-083-01. September 2001.

FIGURES



SOURCE:
AERIAL PHOTOGRAPH MV_4-23.TIFF DATED SEPT. 10, 2003 PROVIDED BY AREOMAP U.S.

NORTH

0 150 300

APPROX. SCALE IN FEET

SITE LOCATION MAP
SEPTEMBER 10, 2003 PHOTOGRAPH

MATANUSKA RIVER DEBRIS SITE ASSESSMENT
Palmer, Alaska

FIGURE
1

oasis ENVIRONMENTAL
807 G STREET, SUITE #250
ANCHORAGE, ALASKA 99501

DATE AUGUST 2004
CHKD T.M.
DRAWN C.E.H.
PROJ. NO 14-053

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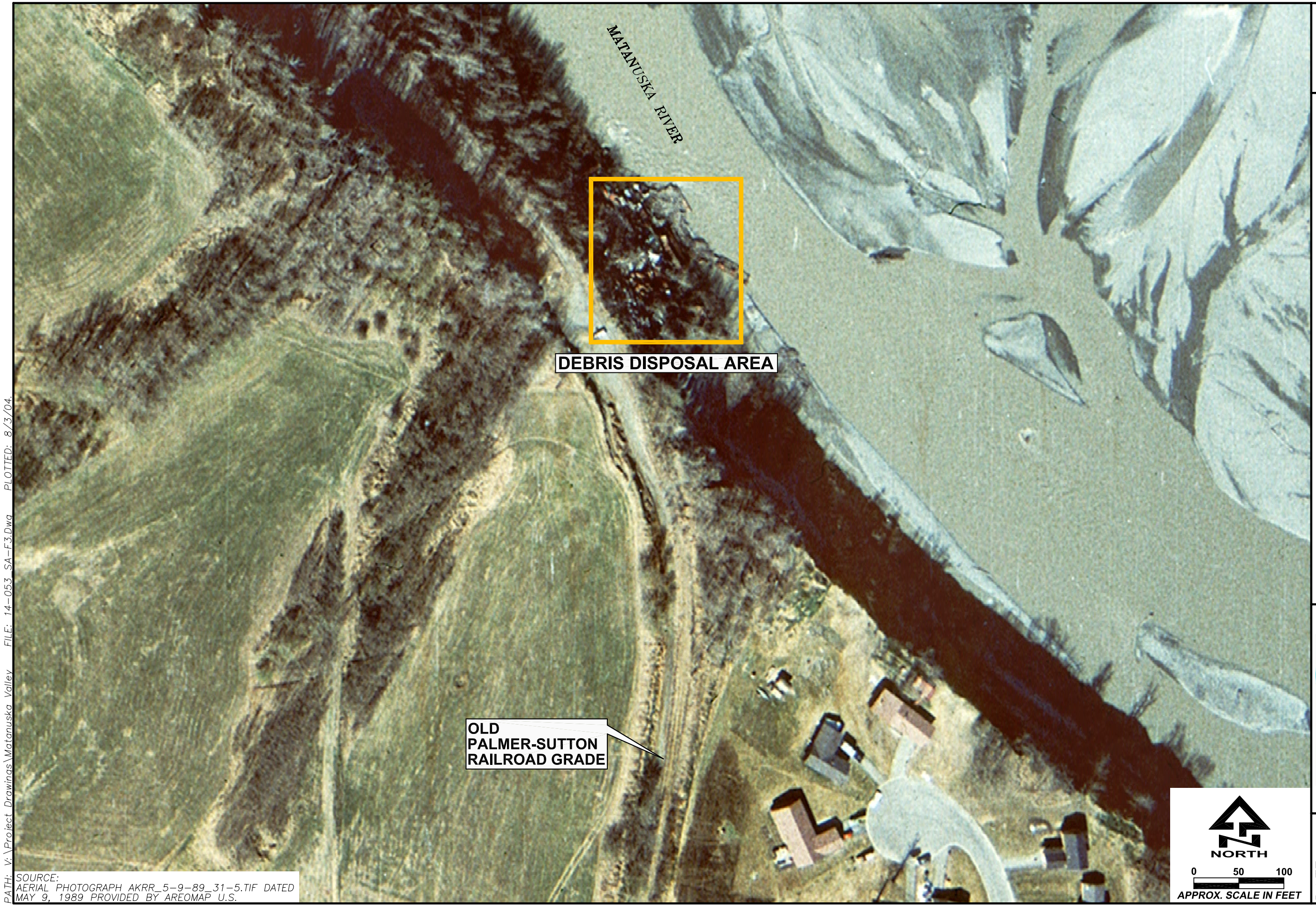
SITE MAP
MAY 17, 1967 PHOTOGRAPH

MATANUSKA RIVER DEBRIS SITE ASSESSMENT
Palmer, Alaska

FIGURE
2

oasis
ENVIRONMENTAL
807 G STREET, SUITE #250
ANCHORAGE, ALASKA 99501

DATE AUGUST 2004
CHKD T.M.
DRAWN C.E.H.
PROJ. NO 14-053



SOURCE:
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SITE MAP
MAY 9, 1989 PHOTOGRAPH

MATANUSKA RIVER DEBRIS SITE ASSESSMENT
Palmer, Alaska

FIGURE
3

oasis
ENVIRONMENTAL
807 G STREET, SUITE #250
ANCHORAGE, ALASKA 99501

DATE AUGUST 2004
CHKD T.M.
DRAWN C.E.H.
PROJ. NO 14-053

PLOTTED: 8/3/04
FILE: 14-053_SA-F3.Dwg
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PATH: V:\Project Drawings\Matanuska Valley FILE: 14-053_SA-F4.Dwg PLOTTED: 6/25/04

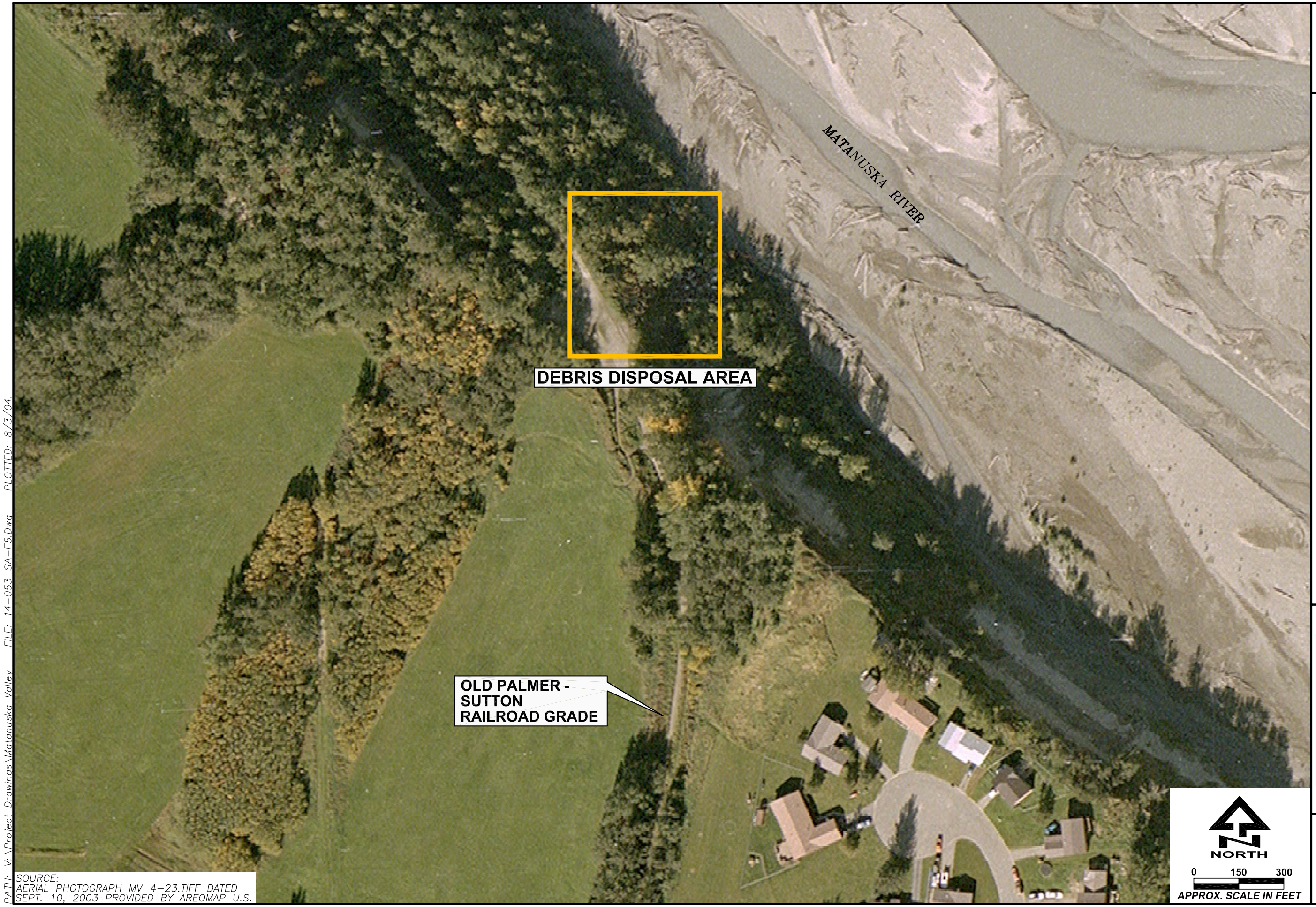
SITE MAP
MAY 10, 2000 PHOTOGRAPH

MATANUSKA RIVER DEBRIS SITE ASSESSMENT
Palmer, Alaska

FIGURE
4

oasis
ENVIRONMENTAL
807 G STREET, SUITE #250
ANCHORAGE, ALASKA 99501

DATE AUGUST 2004
CHKD T.M.
DRAWN C.E.H.
PROJ. NO 14-053



SOURCE:
AERIAL PHOTOGRAPH MV_4-23.TIFF DATED SEPT. 10, 2003 PROVIDED BY AREOMAP U.S.

SITE MAP
SEPTEMBER 10, 2003 PHOTOGRAPH

MATANUSKA RIVER DEBRIS SITE ASSESSMENT
Palmer, Alaska

FIGURE
5

oasis
ENVIRONMENTAL
807 G STREET, SUITE #250
ANCHORAGE, ALASKA 99501

DATE AUGUST 2004
CHKD T.M.
DRAWN C.E.H.
PROJ. NO 14-053

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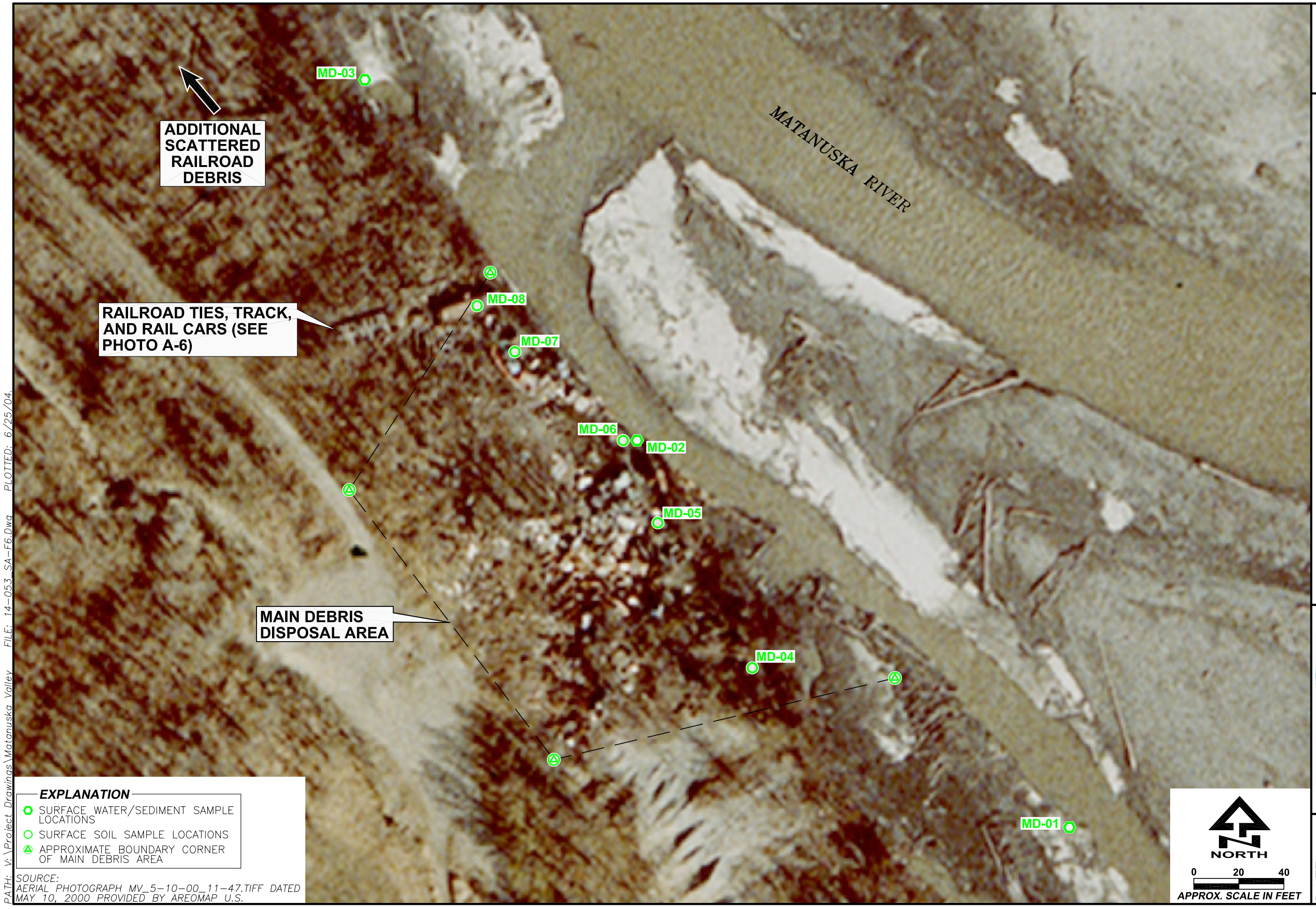

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FIGURE 6

SITE MAP AND SAMPLING LOCATIONS MAY 10, 2000 PHOTOGRAPH

MATANUSKA RIVER DEBRIS SITE ASSESSMENT
Palmer, Alaska

ENVIRONMENTAL
807 G STREET, SUITE #250
ANCHORAGE, ALASKA 99501

DATE AUGUST 2004
CHKD T.M.
DRAWN C.E.H.
PROJ. NO 14-053

APPENDIX A

PHOTOGRAPHIC DOCUMENTATION

Photo # 1 - Looking west at southern edge of debris disposal area from Matanuska River. (5/26/2004)

Photo # 2 - Looking northwest at north side of main debris disposal area. (5/26/2004)

SITE ASSESSMENT MATANUSKA RIVER DEBRIS AREA PALMER, ALASKA	Photo Page No. 1	Date: June 2004 Project No. 14-053

Photo # 3 - Looking at main debris pile area from the Matanuska River. Note railroad cars in the foreground and automobiles and other miscellaneous debris in background. (5/26/2004)

SITE ASSESSMENT MATANUSKA RIVER DEBRIS AREA PALMER, ALASKA	Photo Page No. 2	Date: June 2004 Project No. 14-053

Photo # 4 – Looking west at northern edge of main debris disposal area. (5/26/2004)

Photo # 5 – Looking west just north of main debris area at additional automobile bodies near the Matanuska River. (5/26/2004)

SITE ASSESSMENT MATANUSKA RIVER DEBRIS AREA PALMER, ALASKA	Photo Page No. 3	Date: June 2004 Project No. 14-053

Photo # 6 – Further north looking west at railroad cars and automobile bodies. Note railroad ties and rails on upper portion of bluff in the trees. (5/26/2004)

SITE ASSESSMENT MATANUSKA RIVER DEBRIS AREA PALMER, ALAKSA	Photo Page No. 4	Date: June 2004 Project No. 14-053

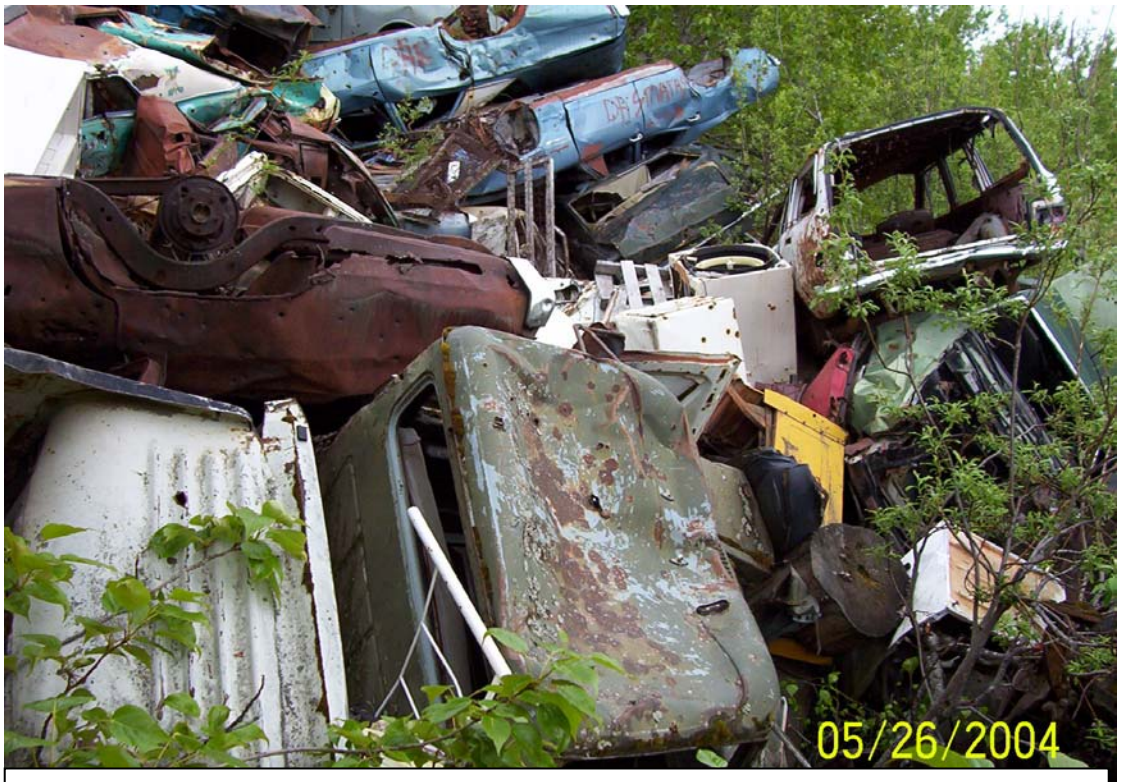


Photo #7 – Close up view of automobiles near center of main dump area. (5/26/2004)

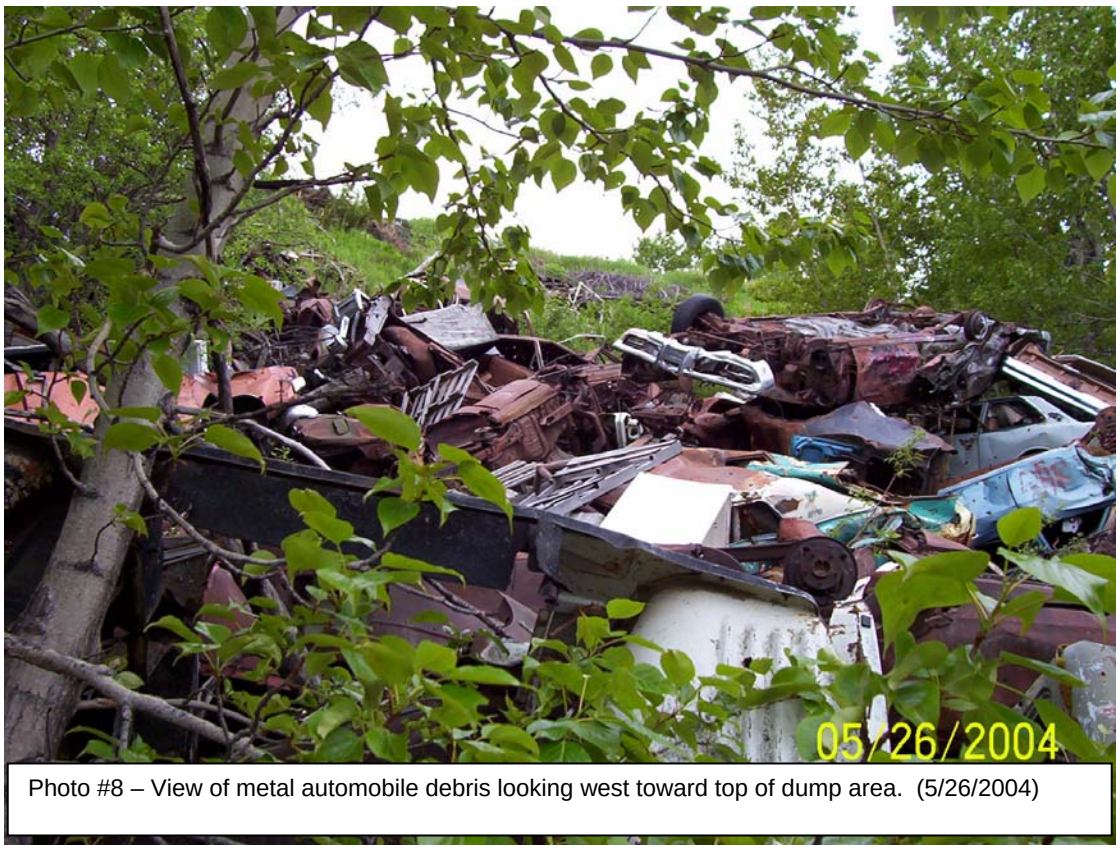


Photo #8 – View of metal automobile debris looking west toward top of dump area. (5/26/2004)

SITE ASSESSMENT MATANUSKA RIVER DEBRIS AREA PALMER, ALASKA	Photo Page No. 5	Date: June 2004 Project No. 14-053

Photo #9 - Coiled metal debris present at the upper portion of the dump site. Note this debris appears to be from metal lath and other machine shop operations. (5/26/2004)

Photo #10 - View of the metal debris from the top of the dump looking east towards the Matanuska River. (5/26/2004)

SITE ASSESSMENT MATANUSKA RIVER DEBRIS AREA PALMER, ALASKA	Photo Page No. 6	Date: June 2004 Project No. 14-053

Photo #11 - Close up view of soil sample location MD-04. (5/26/2004)

SITE ASSESSMENT MATANUSKA RIVER DEBRIS AREA PALMER, ALAKSA	Photo Page No. 7	Date: June 2004 Project No. 14-053

Photo #12 - General overview of soil sample location MD-04 (5/27/2004)

Photo #13 – View of soil sample location MD-05. Note this location is a drainage area near the bottom of the main dump site. (5/27/2004)

SITE ASSESSMENT MATANUSKA RIVER DEBRIS AREA PALMER, ALASKA	Photo Page No. 8	Date: June 2004 Project No. 14-053

Photo #14 – Close up view of soil sample location MD-06. Note that this sample location is adjacent to the surface water and sediment location MD-02. (5/27/2004)

SITE ASSESSMENT MATANUSKA RIVER DEBRIS AREA PALMER, ALAKSA	Photo Page No. 9	Date: June 2004 Project No. 14-053

Photo #15 – View of soil sample location MD-07 within the northern portion of debris area along Matanuska River. Note that sample location is underlain by sheet metal. (5/27/2004)

SITE ASSESSMENT MATANUSKA RIVER DEBRIS AREA PALMER, ALASKA	Photo Page No. 10	Date: June 2004 Project No. 14-053

Photo #16 – Overview of soil sampling location MD-08 showing metal debris from old railroad car. (5/27/2004)

Photo #17 – Close up view of soil sample location MD-08. Note old drums in the upper portion of photograph. (5/27/2004)

SITE ASSESSMENT MATANUSKA RIVER DEBRIS AREA PALMER, ALASKA	Photo Page No. 11	Date: June 2004 Project No. 14-053

Photo #18 – Looking southeast at the downstream surface water and sediment sample location MD-01. (5/27/2004)

SITE ASSESSMENT MATANUSKA RIVER DEBRIS AREA PALMER, ALASKA	Photo Page No. 12	Date: June 2004 Project No. 14-053

Photo #19 – Looking east at surface water and sediment sample location MD-02. Samples were collected on the far side (debris site) of the Matanuska River. (5/26/2004)

Photo #20 – Close up view of filling a surface water sample container. (5/26/2004)

SITE ASSESSMENT MATANUSKA RIVER DEBRIS AREA PALMER, ALASKA	Photo Page No. 13	Date: June 2004 Project No. 14-053

Photo #21 – View of upstream surface water and sediment sample location MD-03. (5/27/2004)

SITE ASSESSMENT MATANUSKA RIVER DEBRIS AREA PALMER, ALASKA	Photo Page No. 14	Date: June 2004 Project No. 14-053

APPENDIX B

Surface Water/Soil/Sediment SAMPLE DATA SHEETS and FIELD NOTES

Calibrate DO meter
451 55
9.48 @ 17.4°C

Figure B-1

Surface Water/Soil/Sediment Sample Data Sheet

Sample ID 04MD01-1015W
Date 5/26/04 Time 2:30
Site Matanuska Debris Assessment
Sampler Tim McDougall
Location Palmer Alaska
☐ QA/QC Sample
Weather Overcast 50°f
☐ Associated QA/QC Sample
Split
Duplicate

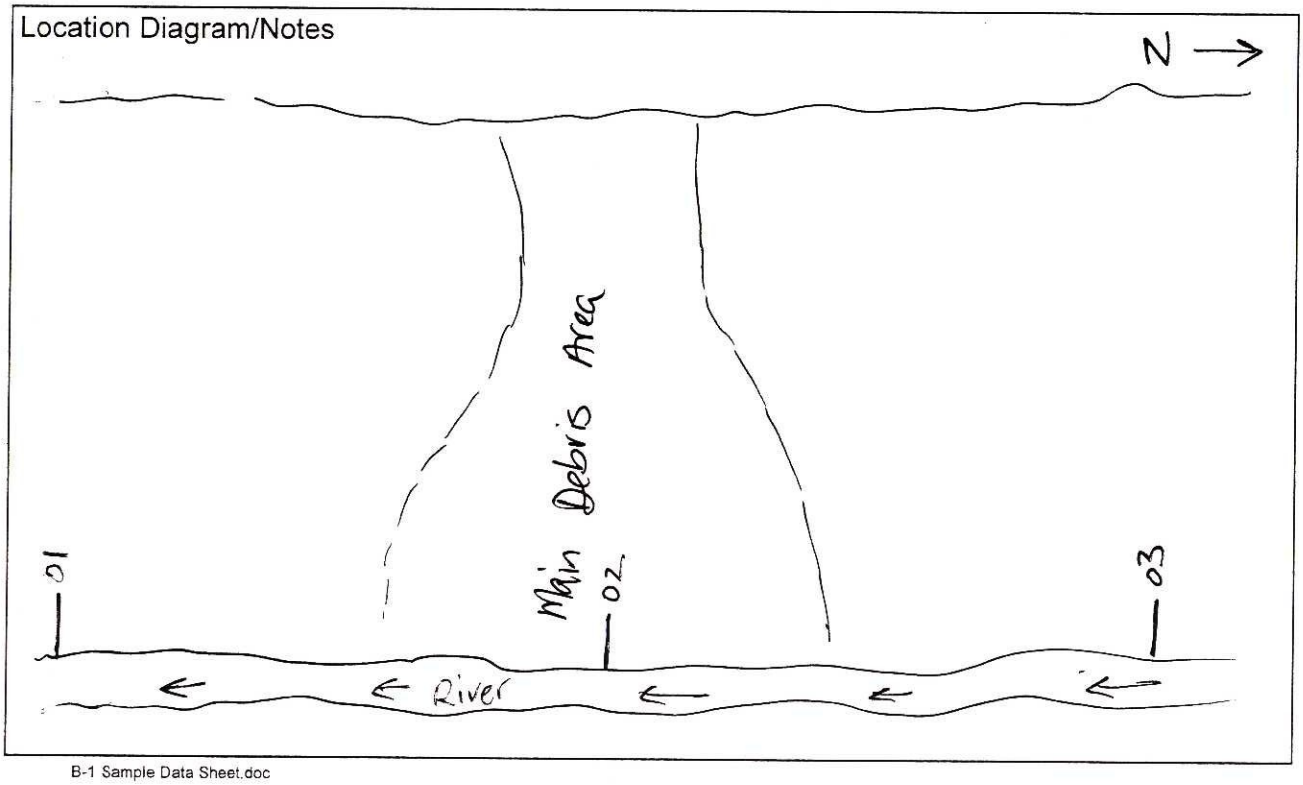
☐ Marine ☐ Lake/Pond (LK)
☐ Brackish ☒ River (RV)
☐ Freshwater ☐ Stream/Creek (SP)
☐ Seep/Spring (SE) ☐ Other
☐ Emergent Vegetation

Sample Depth 3"
Total Depth 3-4"
Velocity (ft./Sec.) ?
Flow Direction South

Temperature °C 9.3
pH 8.37
Conductance (mS) N/A
Dissolved O_2 11.99 @ 7.2°C

☐ Color light grey / milky
☐ Odor No
☐ Sheen No
☐ Debris
☐ Turbidity 544

Location Diagram/Notes



Sediment Sample Sheet
OASIS Environmental

Project No: 14-053

Sample ID 04MT-001 SE
Site Matsu Debris Assessment
Location Palmer, AK

Date 5/27/04 Time 2:50
Sampler Tim McDougall
☐ QA/QC Sample
☐ Associated QA/QC Sample
Split _____
Duplicate _____

☐ Marine ☐ Lake/Pond (LK)
☐ Brackish ☐ River (RV)
☐ Freshwater ☐ Stream/Creek (SP)
☐ Seep/Spring (SE) ☒ Other River Sediment

Sample Depth 3-6"
~~Total Depth~~ _____

☐ Clay _____ ☐ Color _____
☐ Silt _____ ☐ Odor _____
☐ Sand _____ ☐ Sheen _____
☐ Gravel _____ ☐ Debris _____
☐ Organic _____ ☐ Other _____

Location Diagram/Notes See diagram from 04MD01-101SW
fine Sand, dark gray with some silt, clay & roots.

Figure B-1

Surface Water/Soil/Sediment Sample Data Sheet

Sample ID 04MD02-102SW
Site Matanuska Debris Assessment
Location Palmer Alaska
Weather Overcast ~50°f

Date 5/26/04 Time 3:15
Sampler Tim McDougall
☒ QA/QC Sample
☒ Associated QA/QC Sample
Split
Duplicate 04MD04-104SW

☐ Marine ☐ Lake/Pond (LK)
☐ Brackish ☒ River (RV)
☐ Freshwater ☐ Stream/Creek (SP)
☐ Seep/Spring (SE) ☐ Other
☐ Emergent Vegetation

Sample Depth 6"
Total Depth 2 ft
Velocity (ft./Sec.) ?
Flow Direction South

Temperature °C 8.8°C
pH 8.53
Conductance (mS) N/A
Dissolved O_2 12.05 @ 7.5°C

☐ Color light gray/milky
☐ Odor NO
☐ Sheen NO
☐ Debris
☐ Turbidity 590

Location Diagram/Notes
See diagram on sample ID sheet 04MD01-101SW

Sediment Sample Sheet
OASIS Environmental

Project No: 14-053

Sample ID 04MD-002 SE
Site Matsu Debris Assessment
Location Palmer, Ak

Date 6/27/04 Time 1:15
Sampler Tim McDougall
☐ QA/QC Sample
☐ Associated QA/QC Sample
Split _____
Duplicate _____

☐ Marine ☐ Lake/Pond (LK) Sample Depth ≥3-6"
☐ Brackish ☐ River (RV) ~~Total Depth~~ _____
☐ Freshwater ☐ Stream/Creek (SP)
☐ Seep/Spring (SE) ☒ Other River Sediment

☐ Clay _____ ☐ Color _____
☐ Silt _____ ☐ Odor _____
☐ Sand _____ ☐ Sheen _____
☐ Gravel _____ ☐ Debris _____
☐ Organic _____ ☐ Other _____

Location Diagram/Notes

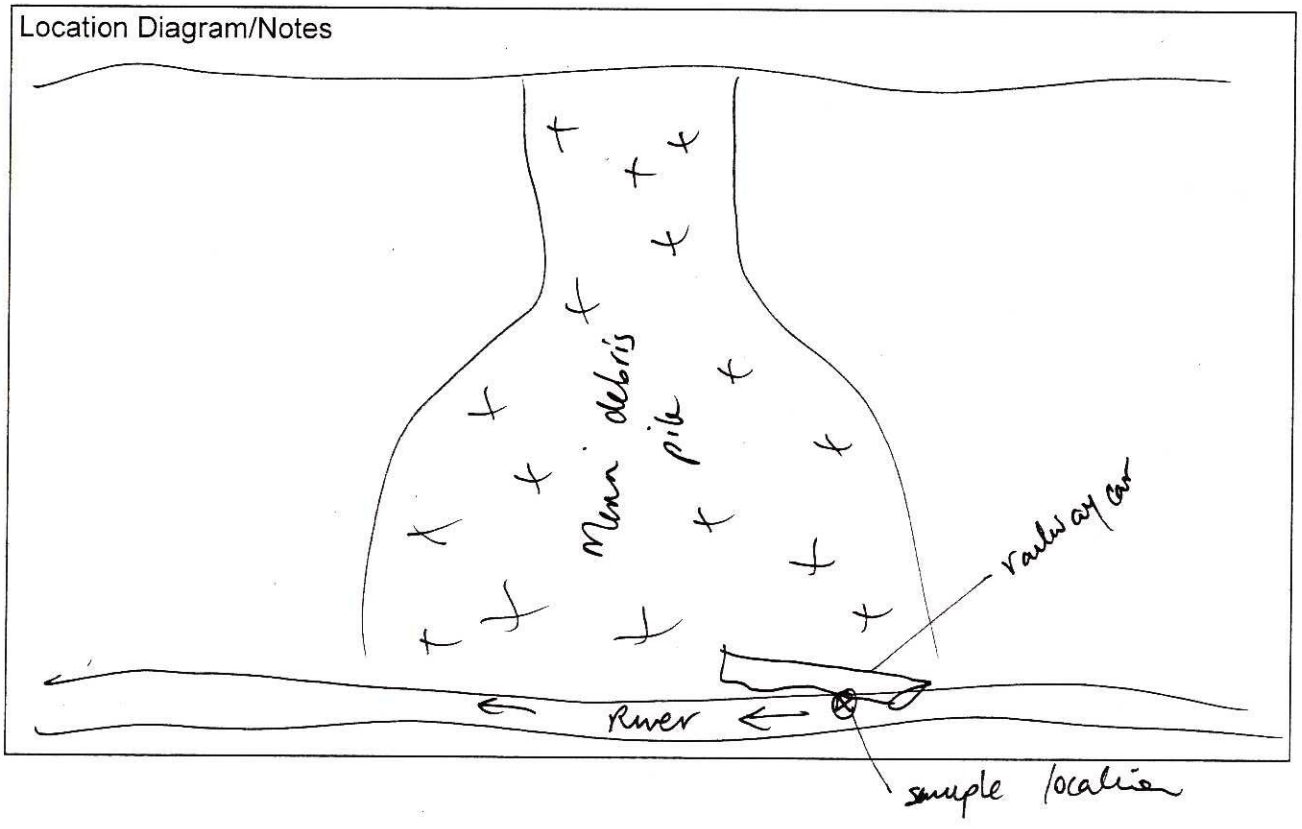


Figure B-1

Surface Water/Soil/Sediment Sample Data Sheet

Sample ID 04MD03-103 SW
Date 5/26/04 Time 5:45
Site Matanuska Debris Assessment
Sampler Tim McDougall
Location Palmer Alaska
☐ QA/QC Sample
Weather Overcast ~50°F
☐ Associated QA/QC Sample
Split
Duplicate

☐ Marine ☐ Lake/Pond (LK) Sample Depth 3"
☐ Brackish ☒ River (RV) Total Depth 4"
☐ Freshwater ☐ Stream/Creek (SP) Velocity (ft./Sec.)
☐ Seep/Spring (SE) ☐ Other Flow Direction South
☐ Emergent Vegetation

Temperature °C 8.3
pH 8.58
Conductance (mS) N/A
Dissolved O_2 12.27 @ 7.2°C

☐ Color light grey/milky
☐ Odor No
☐ Sheen No
☐ Debris
☐ Turbidity 583

Location Diagram/Notes
Water is moving much faster here than at the other 2 locations further South.

Sediment Sample Sheet
OASIS Environmental

Project No: 14-053

Sample ID 04MD-003SE
Site Matsu Debris Assessment
Location Palmer AK

Date 5/27/04 Time 3:10
Sampler Tim McDougall
☐ QA/QC Sample
☐ Associated QA/QC Sample
Split _____
Duplicate _____

☐ Marine ☐ Lake/Pond (LK)
☐ Brackish ☐ River (RV)
☐ Freshwater ☐ Stream/Creek (SP)
☐ Seep/Spring (SE) ☒ Other River Sediment

Sample Depth 3-6"
Total Depth _____

☐ Clay _____
☐ Silt _____
☐ Sand _____
☐ Gravel _____
☐ Organic _____

☐ Color Dark gray
☐ Odor NO
☐ Sheen _____
☐ Debris _____
☐ Other _____

Location Diagram/Notes
Sandy silt with some clay

Figure B-1

Surface Water/Soil/Sediment Sample Data Sheet

Sample ID 04MO-00450 Date 5/27/04 Time 12:00

Site Matanuska Debris Assessment Sampler TLM

Location Palmer Alaska ☐ QA/QC Sample

Weather Partly Cloudy 65° ☐ Associated QA/QC Sample

Split _____

Duplicate _____

☐ Marine	☐ Lake/Pond (LK)	Sample Depth 12"
☐ Brackish	☐ River (RV)	~~Total Depth~~ _____
☐ Freshwater	☐ Stream/Creek (SP)	Velocity (ft./Sec.) _____
☐ Seep/Spring (SE)	☒ Other SOIL	Flow Direction _____
☐ Emergent Vegetation	sandy, gray with some roots	

Temperature °C _____	☒ Color gray
pH _____	☐ Odor none
Conductance (mS) _____	☐ Sheen _____
	☐ Debris _____
Dissolved O_2 _____	☐ Turbidity _____

Location Diagram/Notes

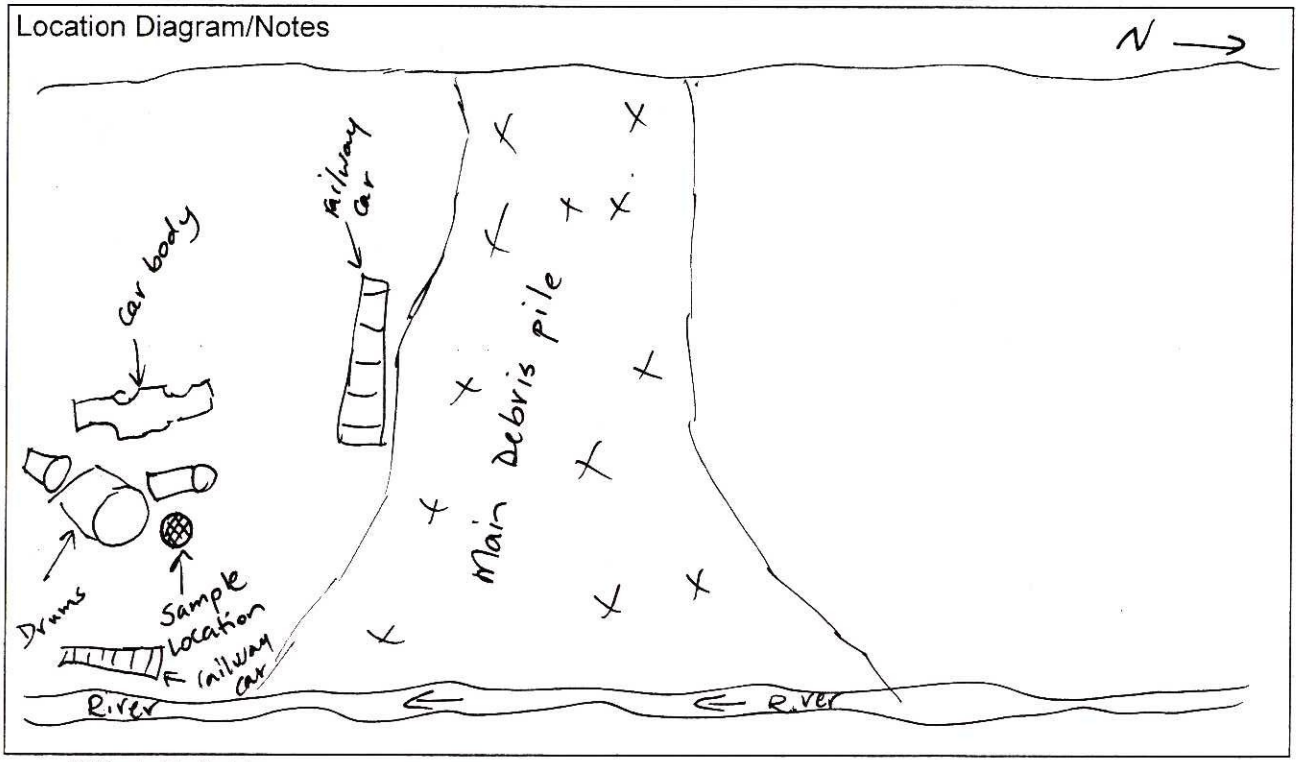


Figure B-1

Surface Water/Soil/Sediment Sample Data Sheet

Sample ID 04MD-00550 Date 5/27/04 Time 12:30

Site Matanuska Debris Assessment Sampler Tim McDougall

Location Palmer Alaska ☐ QA/QC Sample

Weather _____ ☒ Associated QA/QC Sample

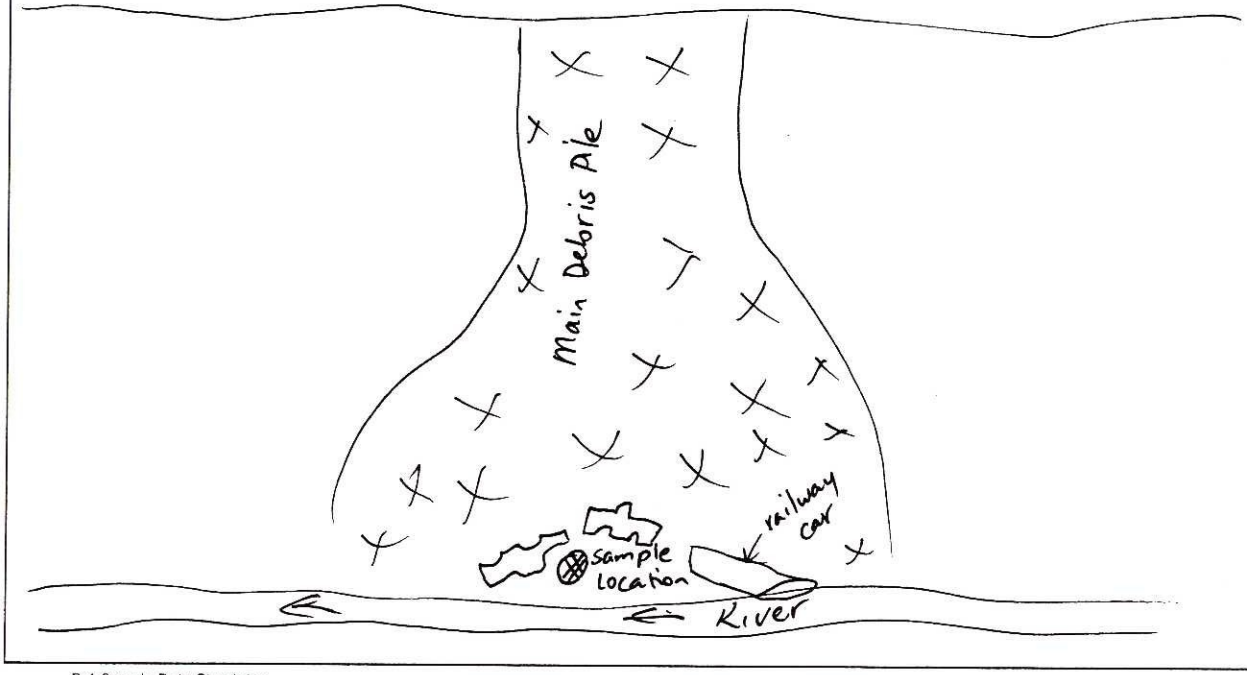
Split _____

Duplicate 04MD-50150

☐ Marine	☐ Lake/Pond (LK)	Sample Depth 12"
☐ Brackish	☐ River (RV)	~~Total Depth~~ _____
☐ Freshwater	☐ Stream/Creek (SP)	Velocity (ft./Sec.) _____
☐ Seep/Spring (SE)	☒ Other soil	Flow Direction _____
☐ Emergent Vegetation	gray, sandy with some roots	

Temperature °C _____	☒ Color gray
pH _____	☐ Odor none
Conductance (mS) _____	☐ Sheen _____
	☐ Debris _____
Dissolved O_2 _____	☐ Turbidity _____

Location Diagram/Notes



Sediment Sample Sheet
OASIS Environmental

Project No: 14-053

Sample ID 04 MD - 006 SO
Site Matson, Palmer
Location _____

Date 5/27/04 Time 1:00
Sampler Tim McDougall
☐ QA/QC Sample
☐ Associated QA/QC Sample
Split _____
Duplicate _____

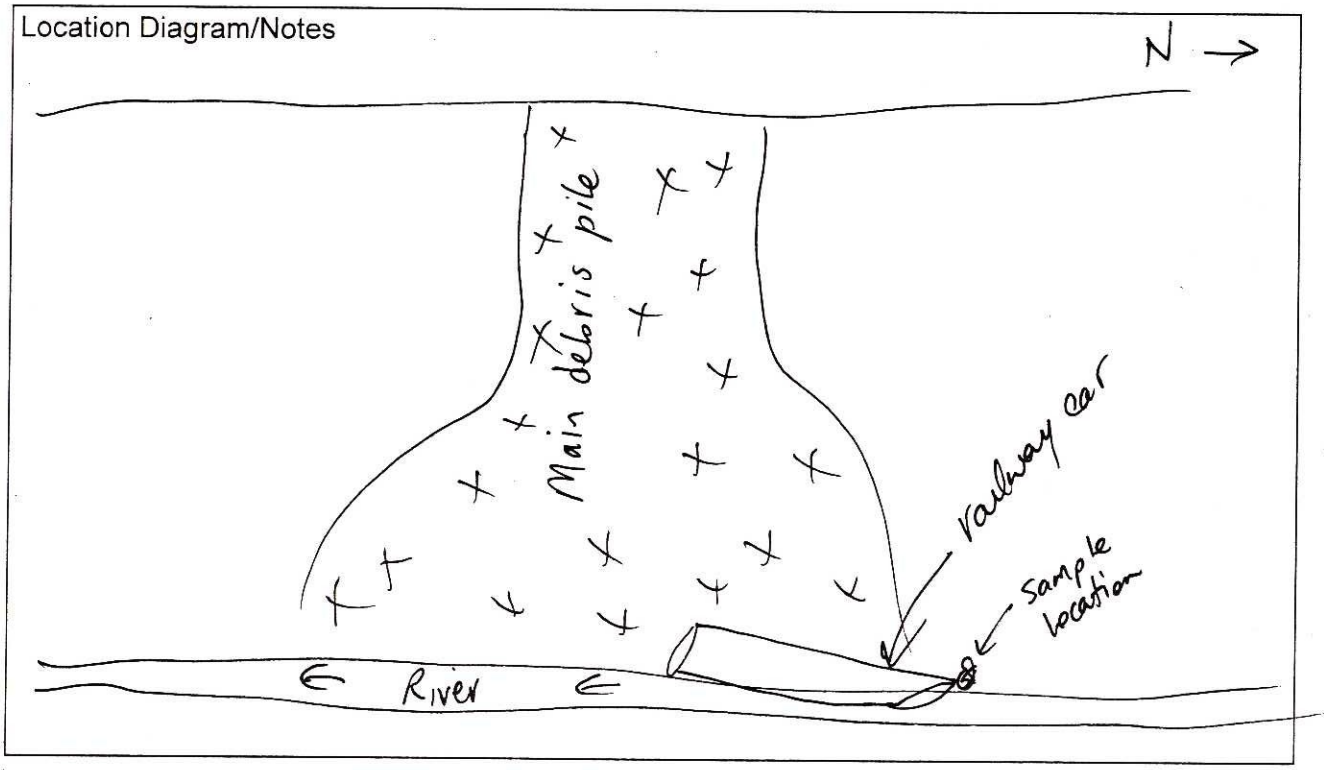
☐ Marine
☐ Brackish
☐ Freshwater
☐ Seep/Spring (SE)
☐ Lake/Pond (LK)
☐ River (RV)
☐ Stream/Creek (SP)
☒ Other Soil
Fine Sand, brown rusty mottling

Sample Depth 18"
~~Total Depth~~ _____

☐ Clay _____
☐ Silt _____
☐ Sand _____
☐ Gravel _____
☐ Organic _____

☒ Color wet, dark gray
☐ Odor None
☐ Sheen _____
☐ Debris _____
☐ Other _____

Location Diagram/Notes



Sediment Sample Sheet
OASIS Environmental

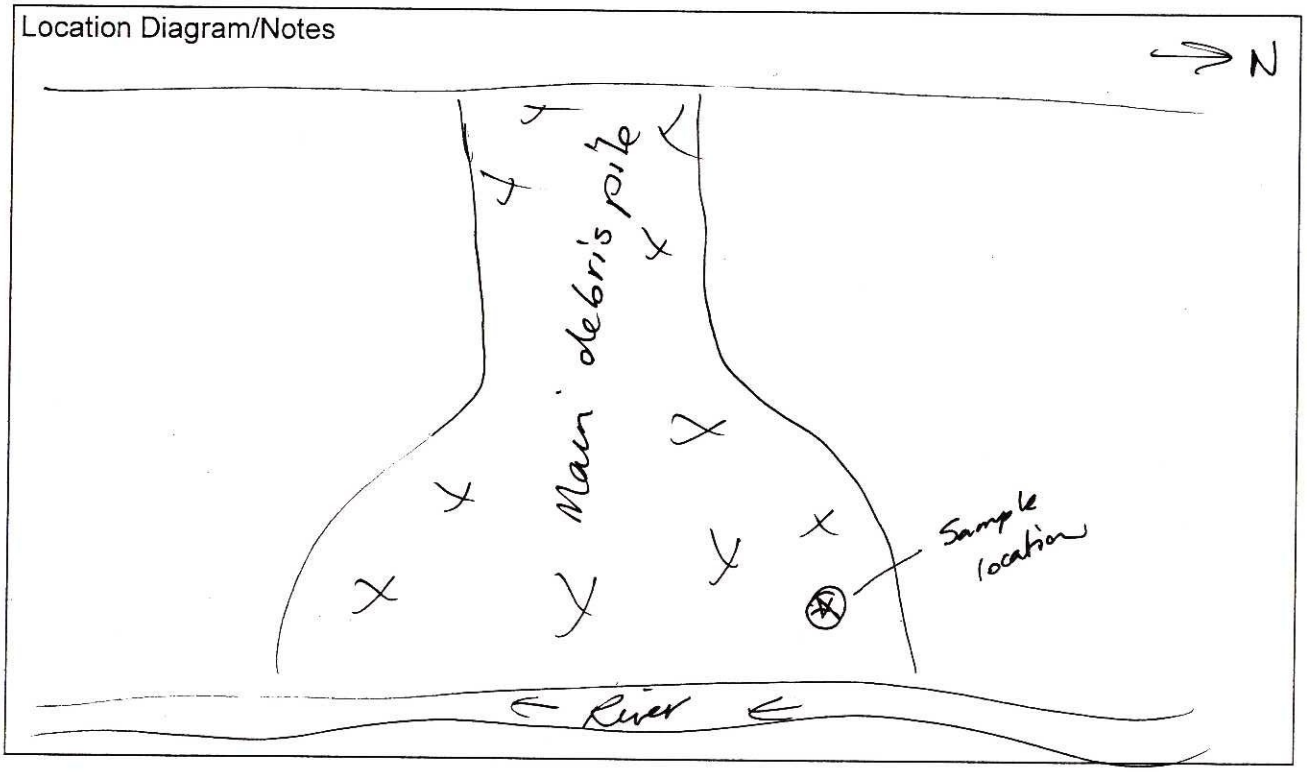
Project No: 14-053

Sample ID 04MD-00750 Date 5/27/04 Time 3:40
Site Matsu Debris Assessment Sampler Tim McDougall
Location Palmer, Ak ☐ QA/QC Sample
☐ Associated QA/QC Sample
Split _____
Duplicate _____

☐ Marine ☐ Lake/Pond (LK) Sample Depth 3-4"
☐ Brackish ☐ River (RV) ~~Total Depth~~ _____
☐ Freshwater ☐ Stream/Creek (SP)
☐ Seep/Spring (SE) ☒ Other Soil medium fine Sand, gray underlain by metal

☐ Clay _____ ☐ Color ~~Dark~~ gray
☐ Silt _____ ☐ Odor None
☐ Sand _____ ☐ Sheen _____
☐ Gravel _____ ☐ Debris Broken glass
☐ Organic _____ ☐ Other _____

Location Diagram/Notes



Sediment Sample Sheet
OASIS Environmental

Project No: 14-053

Sample ID 04MD-00850 Date 5/27/04 Time 4:05

Site Matsu Debris Assessment Sampler Tim McDougall

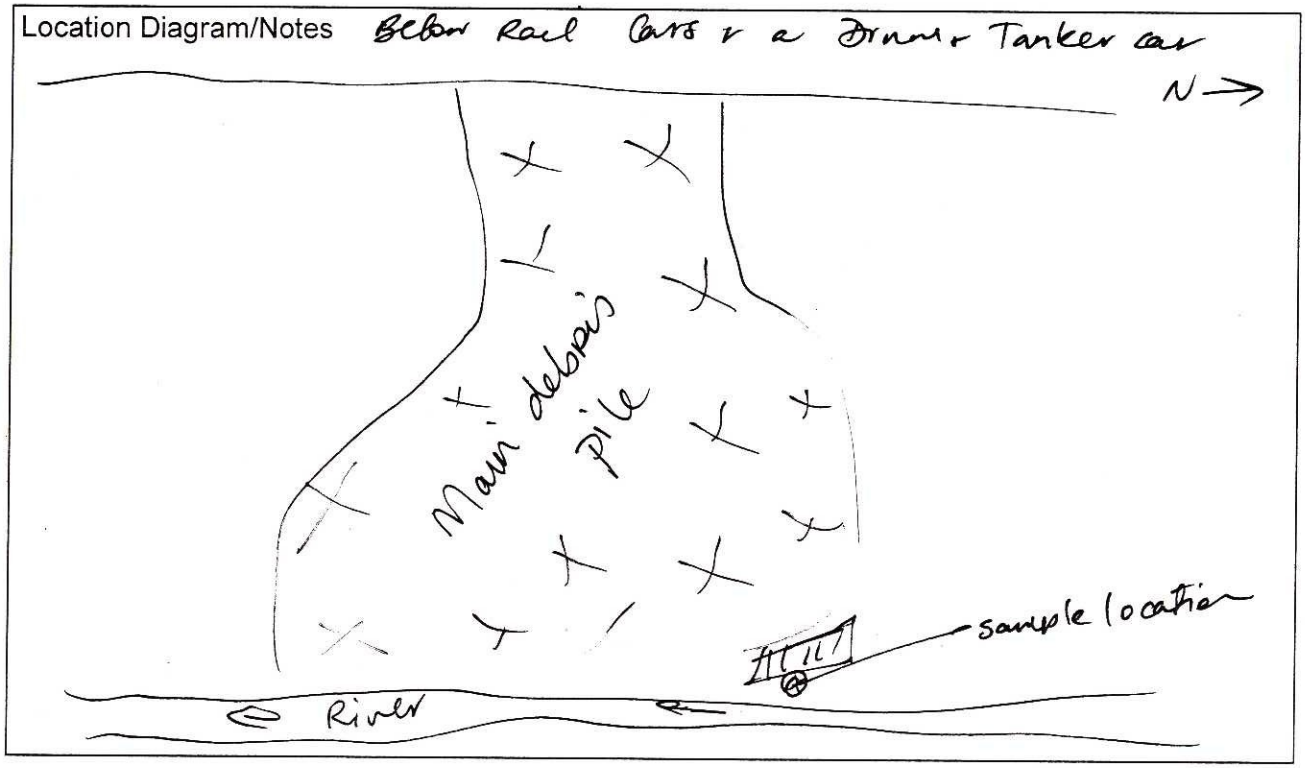
Location Palmer, Ak ☐ QA/QC Sample

☐ Associated QA/QC Sample
Split _____
Duplicate _____

☐ Marine ☐ Lake/Pond (LK) Sample Depth 4 3".
☐ Brackish ☐ River (RV) ~~Total Depth~~ _____
☐ Freshwater ☐ Stream/Creek (SP)
☐ Seep/Spring (SE) ☒ Other Soil sample Silty, sand, finer than 04MD-00850

☐ Clay _____ ☐ Color dark gray
☐ Silt _____ ☐ Odor n/o
☐ Sand _____ ☐ Sheen _____
☐ Gravel _____ ☐ Debris some rocks
☐ Organic _____ ☐ Other _____

Location Diagram/Notes Below Rail Cars & a Drum or Tanker car



MAT DEBRIS 5/12/04
Overcast 50°

10:00 Arrive at site

GPS Coordinate Data

Pt A Intersection 3rd St & Eagle
N 61° 36' 52.1"
E 149° 06' 43.6"

Pt B Intersection Eagle & Trail
N 61° 36' 52.0" Alt 300 ft
E 149° 06' 17.1"

① Upstream North SED/SW Location Alt 260
N 61° 37' 05.7"
E 149° 06' 16.5"

F North Edge Debris Pile at River
N 61° 37' 05.0"
E 149° 06' 15.0"

② Debris Pile SED/SW Location
N 61° 37' 4.0"
E 149° 06' 13.7"

GPS Data Cont.

① Downstream SED/SW Location
N 61° 37' 2.5"
E 149° 06' 10.0"

E South End Debris Area at River
N 61° 37' 3.2"
E 149° 06' 11.4"

C South End Debris Pile Top
N 61° 37' 2.7"
E 149° 06' 14.6"

D North End Debris Pile Top
N 61° 37' 3.6"
E 149° 06' 16.3"

MAT DEBRIS 5/27/04

Arrive @ 10:30 Partly Cloudy 65°

Screen Soil Sample Locations

Loc ID	PID (ppm)	DESCRIPTION
Test #1 004	1.4	Next to Old Drums
Test #2	1.0	Drum Area written on TSP
Test #3 005	2.5	Drainage at base of dump
Test #4 006	4.4	Area by River Sample is wet Next to sed/sep 02
Test #5	0.9	Drum at base of dump
Test #6 007	1.0	Below Drums & Areas on North Side Debris Pile
Test #7 008	0.4	Below Drums & Rail Cars N/ Side

Soil Sample Locations

LocID — Description / Coordinates

004 SO — Drum near S edge dump
N 61° 37' 3.1"
E 149° 06' 13.2"

005 SO — Drainage at base of dump
N 61° 37' 3.6"
E 149° 06' 13.7"

Next to 002 SW/SED 3

006 SO — Auto Body near River
N 61° 37' 4.1"
E 149° 06' 13.8"

007 SO — Below Cars & Drums — North Side
N 61° 37' 3.5"
E 149° 06' ~~13.3~~ 15.1"

008 SO — Below Rail Cars & Drums — North Side
N 67° 37' 5.3"
E 149° 06' 14.3"

APPENDIX C

GPS HORIZONTAL SURVEY INFORMATION

GPS SURVEY COORDINATES
Matanuska River Debris Site Assessment, Plamer, Alaska

				Alaska Zone 4	
Point #	Description	Latitude	Longitude	Northing	Easting
1	Intersection Third and Eagle	61-36-52.1	149-06-43.6	2,783,088	1,794,960
2	Intersection Eagle and Trail	61-36-52.0	149-06-17.1	2,783,096	1,796,241
3	North Edge Debris Pile at River	61-37-05.0	149-06-15.0	2,784,417	1,796,325
4	South Edge Debris Pile at River	61-37-03.2	149-06-11.4	2,784,237	1,796,501
5	North Edge Debris Pile at Trail	61-37-03.6	149-06-16.3	2,784,274	1,796,264
6	South Edge Debris Pile at Trail	61-37-02.7	149-06-14.6	2,784,184	1,796,347
7	SW/SED Location #1 - downstream	61-37-02.5	149-06-10.0	2,784,167	1,796,570
8	SW/SED Location #2 - debris pile	61-37-04.0	149-06-13.7	2,784,317	1,796,389
9	SW/SED Location #3 - upstream	61-37-05.7	149-06-16.5	2,784,487	1,796,251
10	SOIL Location #4	61-37-03.1	149-06-13.2	2,784,226	1,796,414
11	SOIL Location #5	61-37-03.6	149-06-13.7	2,784,276	1,796,389
12	SOIL Location #6 - next to # 2	61-37-04.1	149-06-13.8	2,784,327	1,796,384
13	SOIL Location #7 - north side	61-37-03.5	149-06-15.7	2,784,264	1,796,293
14	SOIL Location #8 - north side	61-37-05.3	149-06-14.3	2,784,448	1,796,358
15					
16					
17					
18					
19					
20					
22					
23					

APPENDIX D

USGS Discharge Data for Matanuska River

APPENDIX E

Analytical Quality Assurance Report

1 QUALITY ASSURANCE REPORT

The QA/QC data evaluated during this review process indicate that the sample results are acceptable for their intended project use. Unless otherwise indicated, the analytical results meet the precision and accuracy requirements for the associated analytical methods. The QA/QC data indicate that the quality control mechanisms were generally effective in ensuring measurement data reliability within the expected limits of sampling and analytical error. The overall calculated completeness of the May 2004 assessment monitoring data set is 99%.

The data review procedures, calculations, and qualifications used for this project are based on the Alaska Department of Environmental Conservation (ADEC) and U.S. Environmental Protection Agency (USEPA) procedural guidance documents. The reference documents used include ADEC *Underground Storage Tanks Procedures Manual, Guidance for Treatment of Petroleum-Contaminated Soil and Water, and Standard Sampling Procedures* dated November 7, 2002, USEPA *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA 540/R-99/008), October 1999; and the USEPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 540/R-01/008), July 2002.

1.1 Project Summary

A single project laboratory was used for this monitoring event. North Creek Analytical provided project laboratory services for both the soil/sediment and water sampling. No quality assurance (QA) laboratory services were provided for this project.

The two analytical data packages (P4F0006 and P4E0934) provided by the project laboratory were reviewed to evaluate the integrity of the associated results. Sampling was conducted on May 26, 2004 for surface water samples in work order P4E0934, and on May 27, 2004 for the soil/sediment samples in work order P4F0006.

1.2 Data Review Process

This QAR identifies problems with the project specific laboratory analytical data and describes the related effect on data usability. Data review has been conducted using a two-step process. The first step is performed by the analytical laboratory and is based on its standard operating and quality control procedures. After the laboratory analyses have been completed and the data have been reported, OASIS performs the second step of the data review process, which is presented in this QAR. The data review and activities completed for all sample results generated during the monitoring event include:

- Initial review of sample handling procedures, as well as analytical and field data for completeness, accuracy, holding time compliance, and QC sample frequency compliance.
- Evaluation of trip blank and method blank sample results to identify systematic contamination.
- Evaluation of the accuracy and precision of field duplicate samples, laboratory control samples (LCS), and matrix spike/matrix spike duplicate (MS/MSD) samples.
- Assigning of data qualifier flags, as necessary, to reflect limitations identified by the data review process.
- Estimation of data completeness.

1.3 Data Quality Objectives

Data Quality Objectives (DQOs) have been established for this project to ensure that the soil/sediment and surface water data is of sufficient quantity and quality to accomplish the following:

- Surface water cleanup standards as set out in State of Alaska regulations 18 AAC 75.
- Soil cleanup standards as established in 18 AAC 75.
- Alaska Drinking Water Standards 18 AAC 80.
- Ensure that the integrity of the results is legally defensible.

The laboratory analytical DQOs for the monitoring activities are tabulated below in a Table 1. The practical quantitation limits (PQLs) for the individual samples may be affected by sample dilution caused by elevated target analyte concentrations. This effect shall be minimized to the extent practical by the laboratory during sample analysis.

Table 1 Analytical Methods and Data Quality Objectives

Parameters	Method	Reporting Limit	Precision (Relative Percent Difference)	Accuracy (Percent Recovery)	Completeness (%)
Soil Samples					
GRO	AK101	20 mg/kg	≤ 30	50 - 150	85
DRO	AK102	20 mg/kg	≤ 30	50 - 150	85
RRO	AK103	100 mg/kg	≤ 30	50 - 150	85
VOCs	EPA 8260B	5.0 – 20.0 µg/kg	≤ 30	59-172	85
PCBs	EPA 8082	0.05 mg/kg	≤ 30	50 - 150	85
TOC	EPA 9060	20 mg/kg	≤ 20	85 - 115	85
Groundwater Samples					
GRO	AK101	100 µg/L	≤ 20	60 - 120	85
DRO	AK102	800 µg/L	≤ 20	60 - 120	85
RRO	AK103	500 µg/L	≤ 20	60 - 120	85
Benzene	EPA 8260B	5.0 µg/L	≤ 20	70 - 130	85
Toluene		5.0 µg/L	≤ 20	70 – 130	85
Ethylbenzene		5.0 µg/L	≤ 20	70 - 130	85
Total Xylenes		5.0 µg/L	≤ 20	70 - 130	85
Trichloroethene		5.0 µg/L	≤ 20	70 - 130	85
Other VOCs		2 - 5 µg/L	≤ 20	70 - 130	85
PCBs	EPA 8082	5 µg/L	≤ 20	50 - 150	85

1.4 Data Qualification

Based on the data assessment the analytical data results are flagged with qualifiers to indicate potential problems with the qualified results. The following is a list of data qualifiers that were used in this report. A definition of the data qualifier meaning is also provided.

Table 2 Data Qualifiers

Qualifier	Description
J	The analyte was positively identified, the quantitation is an estimation.
ND/U	The analyte was analyzed for, but not detected. The associated numerical value is at or below the method reporting limit. The method reporting limit is shown in brackets.
F	The analyte was positively identified but the associated numerical value is below the laboratory's reporting limit.
H	Holding time was exceeded for a particular analytical method.
R	The data are unusable due to deficiencies in the ability to analyse the sample and meet QC criteria.
B	The analyte was found in an associated blank, as well as in the sample.
V	Indicates that the data qualifier was assigned during the data review process, as opposed to being assigned by the laboratory.

2 DATA QUALITY REVIEW

Samples consisting of soil/sediment and surface water were collected and analyzed in accordance with appropriate EPA methods. QC procedures associated with these samples included the evaluation of sample holding times, blank samples, laboratory control samples, matrix spikes, surrogate spikes, and field duplicate samples. Results of this data quality review are discussed in this section.

2.1 Holding Times

Holding times for all analytical sample requests were reviewed and found to be consistent with the USEPA recommended holding times.

2.2 Containers and Preservation

Samples were received in containers with preservation consistent with requested analyses to be performed at the laboratory. Upon receipt at North Creek Analytical, the samples for this project were received within the recommended temperature range of 4 ± 2 degrees Celsius.

2.3 Gasoline-Range Organics (GRO)

2.3.1 Soil/Sediment

Eight soil/sediment samples and one methanol trip blank were analyzed for GRO using Alaska Method AK 101. All associated field and laboratory QA/QC results met established criteria for the target analytes without exception.

Method blanks and methanol trip blanks were analyzed for GRO compounds. GRO compounds were not detected in the method blank and trip blank samples.

One LCS sample and one LCS Dup sample was analyzed to assess method accuracy and precision. LCS and LCS Dup recoveries were within the QC acceptance criteria for GRO compounds.

The surrogate compound (a,a,a-TFT) was added to each blank, QC sample, and project sample prior to analysis by method AK 101. Surrogate recoveries were within the QC acceptance criteria.

One field duplicate was submitted for GRO analysis. The reported GRO concentrations did not exceed the analytical reporting limit. Therefore a comparison of these results could not be performed.

2.4 Diesel Range Organics (DRO) and Residual Range Organics (RRO)

2.4.1 Soil/Sediment

Eight soil samples were analyzed for DRO/RRO using Alaska Methods AK102 and AK103. All associated field and laboratory QA/QC results met established criteria with the following qualifications.

A method blank was analyzed with the above referenced samples for DRO and RRO compounds. DRO/RRO compounds were not detected in the method blank.

One LCS/LCSD sample and one Duplicate sample were analyzed to assess method accuracy and precision. DRO/RRO compound recoveries in the LCS/LCSD and Duplicate samples met percent recovery and RPD acceptance criteria.

Two surrogate spike compounds, 1-chlorooctadecane and Triacontane, were added to each blank, QC sample, and project sample to assess the sample extraction recovery. All surrogate recoveries were within acceptable QC control limits except for one sample, 04MD-007SO. Recovery of surrogate compound 1-chlorooctadecane was biased high. The analytical results for this sample were flagged VJ to indicate an estimated value.

One field duplicate was submitted for DRO/RRO analysis. The reported DRO/RRO concentrations did not exceed the analytical reporting limits. Therefore a comparison of these results could not be performed.

2.5 Organochlorine Pesticides and Polychlorinated Biphenyls (PCBs)

2.5.1 Soil/Sediment

Eight soil samples were analyzed for PCB's using EPA Method 8081A/8082. All associated field and laboratory QA/QC results met established criteria for the target analytes without exception.

Method blanks were analyzed with the above referenced samples for Organochlorine Pesticides and PCB compounds. Organochlorine Pesticides and PCB compounds were not detected in any of the method blank samples.

One LCS sample was analyzed to assess method accuracy. Organochlorine Pesticides and PCB recoveries in the LCS met percent recovery acceptance criteria.

One MS/MSD sample pair was analyzed to assess matrix effects on method accuracy and precision. Dieldrin recoveries in the MS/MSD pair were biased low. Based on EPA guidance failure of a matrix spike QC sample does not represent an out-of-control condition for the batch and no data qualification was performed.

Two surrogate spike compounds (2,4,5,6-Tetrachloro-m-xylene and Decachlorobiphenyl) were added to each blank, QC sample, and project sample to assess the sample extraction recovery. All surrogate recoveries were within acceptable QC control limits.

One field duplicate was submitted for Organochlorine Pesticides and PCB analysis. The reported Organochlorine Pesticide and PCB concentrations did not exceed the analytical reporting limits. Therefore a comparison of the results could not be performed.

2.5.2 Surface Water

Three surface water samples and one duplicate were analyzed for Organochlorine Pesticides and PCB's using EPA Method 608. All associated field and laboratory QA/QC results met established criteria for the target analytes with the following qualifications.

Method blanks were analyzed with the above referenced samples for Organochlorine Pesticides and PCB compounds. Organochlorine Pesticides and PCB compounds were not detected in the method blank sample.

One LCS sample was analyzed to assess method accuracy. Organochlorine Pesticides and PCB recoveries in the LCS met percent recovery acceptance criteria.

One MS/MSD sample pair was analyzed to assess matrix effects on method accuracy and precision. Organochlorine Pesticide and PCB recoveries in the MS/MSD pair met percent recovery and RPD acceptance criteria.

The surrogate spike compounds (2,4,5,6-Tetrachloro-m-xylene and Decachlorobiphenyl) were added to each blank, QC sample, and project sample prior to analysis by EPA Method 608 to assess the sample extraction recovery. All surrogate recoveries were within acceptable QC control limits.

One field duplicate was submitted for Organochlorine Pesticide and PCB analysis. The reported Organochlorine and PCB concentrations did not exceed the analytical reporting limits. Therefore a comparison of these results could not be performed.

2.6 Volatile Organic Compounds (VOCs)

2.6.1 Soil/Sediment

Eight soil samples and one methanol trip blank were analyzed for VOCs using EPA method 8260B. All associated field and laboratory QA/QC results met established criteria for the target analytes without exceptions.

Method blanks and a methanol trip blank were analyzed with the above referenced samples for VOC compounds. VOC compounds were not detected in any of the blank samples.

One LCS sample was analyzed to assess method accuracy. VOC recoveries in the LCS sample met percent recovery acceptance criteria.

One MS/MSD sample pair was analyzed to assess matrix effects on method accuracy and precision. VOC recoveries in the MS/MSD pair met percent recovery and RPD acceptance criteria.

Four surrogate spike compounds (4-BFB, 1,2-DCA-d4, Dibromofluoromethane, and toluene-d8) were added to each blank, QC sample, and project sample to assess the sample extraction recovery. All surrogate recoveries were within acceptable QC control limits.

One field duplicate was submitted for VOC analysis. The reported VOC concentrations did not exceed the analytical reporting limits. Therefore a comparison of these results could not be performed.

2.6.2 Surface Water

Three surface water samples, one duplicate sample, and one trip blank were analyzed for VOCs using EPA Method 624. All associated field and laboratory QA/QC results met established criteria for the target analytes.

Method blanks and a trip blank were analyzed with the above referenced samples for VOC compounds. VOC compounds were not detected in any of the blank samples.

One LCS sample was analyzed to assess method accuracy. VOC recoveries in the LCS sample met percent recovery acceptance criteria.

One MS/MSD sample pair was analyzed to assess matrix effects on method accuracy and precision. VOC recoveries in the MS/MSD pair met percent recovery and RPD acceptance criteria.

Four surrogate spike compounds (4-BFB, 1,2-DCA-d4, dibromofluoromethane, and toluene-d8) were added to each blank, QC sample, and project sample to assess the sample extraction recovery. All surrogate recoveries were within acceptable QC control limits.

One field duplicate was submitted for VOC analysis. The reported VOC concentrations did not exceed the analytical reporting limit. Therefore a comparison of the results could not be performed.

2.7 Polynuclear Aromatic Hydrocarbons (PAH)

2.7.1 Surface Water

Three surface water samples and one field duplicate were analyzed for PAH using EPA method 610. All associated field and laboratory QA/QC results met established criteria for the target analytes.

A method blank was analyzed for PAH compounds. PAH compounds were not detected in the method blank.

One LCS sample was analyzed to assess method accuracy. PAH recovery for indeno(1,2,3-cd)pyrene was biased high, however, as this analyte was not detected in any of the associated samples no data qualification was required.

One MS/MSD sample pair was analyzed to assess matrix effects on method accuracy and precision. PAH recoveries in the MS/MSD pair met recovery and RPD acceptance criteria.

The surrogate spike compound (2-Fluorobiphenyl) was added to each blank, QC sample, and project sample to assess the sample extraction recovery. All surrogate recoveries were within acceptable QC control limits.

One field duplicate was submitted for PAH analysis. The reported PAH concentration did not exceed the analytical reporting limit. Therefore a comparison of these results could not be performed.

2.8 Total Metals

2.8.1 Soil/Sediment

Eight soil/sediment samples and one methanol trip blank were analyzed for Total Metals (As, Ba, Cd, Cr, Pb, Se, Ag, and Hg) using EPA 6000/7000 series methods. All associated field and laboratory QA/QC results met established criteria for the target analytes without exception.

One method blank was analyzed with the above referenced samples for Total Metal compounds. No metals were detected in the method blank sample.

One LCS/LCSD sample and one Duplicate sample were analyzed to assess method accuracy and precision. LCS/LCSD and Duplicate recoveries met percent recovery and RPD acceptance criteria.

One MS/MSD sample pair was analyzed to assess matrix effects on method accuracy and precision. MS/MSD recoveries for mercury were within acceptable limits, however RPD values could not be calculated accurately because the spike amounts were different in the sample pair. MS/MSD recoveries for arsenic, barium, chromium, and lead were biased high. Based on EPA guidance failure of a matrix spike QC sample does not represent an out-of-control condition for the batch and no data qualification was performed.

One field duplicate sample was submitted for Total Metal analysis. The RPD for As, Ba, and Cr were below the acceptable limit of 30 percent and reported concentrations for Hg and Se did not exceed the analytical reporting limit meaning that these data are acceptable. However the RPD (41%) for the primary and duplicate Pb results was above the acceptable criteria and the associated sample results for Pb have been qualified "VJ" to indicate estimated values.

2.8.2 Surface Water

Three surface water samples were analyzed for Total Metals per EPA 6000/7000 Series Methods. All associated field and laboratory QA/QC results met established criteria for the target analytes.

A method blank was analyzed with the above referenced samples for Total Metal compounds. Total Metal compounds were not detected in the method blank sample.

An LCS/LCSD sample and one Duplicate sample were analyzed to assess method accuracy and precision. LCS/LCSD and Duplicate recoveries met percent recovery and RPD acceptance criteria.

One MS/MSD sample pair was analyzed to assess matrix effects on method accuracy and precision. MS/MSD recoveries for Total Metals met percent recovery and RPD acceptance criteria.

One field duplicate sample was submitted for Total Metal analysis. The RPD values for reported Total Metal concentrations were below the acceptable limit.

APPENDIX F

Laboratory Analytical Data Reports