# Soil Remediation and Site Assessment Report

Delta Western/Former Chevron Fuel Facility 1001467
1417 Peninsula Street
Wrangell, Alaska

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# 1. INTRODUCTION

This report, prepared by Remediation Risk Management, Inc. (RRM) on behalf of Chevron Environmental Management Company (Chevron) and Delta Western, documents the first and second phases of soil remediation and additional site assessment activities performed at the referenced site (Figures 1 and 2). These activities were performed in accordance with SAIC's *Additional Soil Assessment and Excavation Workplan*, dated September 23, 2003, which was subsequently approved verbally by Mr. Bill Janes of Alaska Department of Environmental Conservation (ADEC).

The scope of work was initiated to: (1) remove soils located in areas off site that would impede installation of a new liner in Delta Western's above ground storage tank (AST) farm that contain petroleum hydrocarbon concentrations above cleanup levels as outlined in ADEC's Method Two Soil Cleanup Standards; (2) establish conditions of soil and groundwater within the operating tank farm prior to liner installation; (3) Remove any soil above these cleanup levels remaining on adjoining private property (David Mork property); and (4) monitor and sample existing groundwater monitoring wells following completion of the soil remediation for comparison with ADEC Table C cleanup levels (18 AAC 75) and surface water standards (18 AAC 70).

This report contains discussions of the site setting, historical usage and previous investigations (Section 2), project objectives and scope (Section 3), findings of the investigation (Section 4), conclusions (Section 5), and recommendations (Section 6). Professional certification and signatures are presented as Section 7. Soil and groundwater data are summarized and presented in attached tables and figures. Also attached are appendices, which include field and laboratory procedures (Appendix A), field data sheets (Appendix B), certified analytical reports and chain-of-custody documentation (Appendix C), and soil disposition documentation (Appendix D).

# 2. BACKGROUND

## 2.1 Site Setting

The site is an operating Delta Western Terminal located at 1417 Peninsula Street in Wrangell, Alaska (Figures 1 and 2). The site was developed as a fuel storage facility in the late 1930's and has operated in that capacity to the present. Site facilities have not significantly changed since original construction. These facilities include seven ASTs, which contain aviation gasoline, jet fuel, unleaded gasoline, supreme unleaded gasoline, diesel, and pre-mix gasoline. There is one underground storage tank (UST), which holds heating fuel for the site's shower house. Other site facilities include a fuel loading rack, pump house, a marine fueling dock servicing the Wrangell Harbor, several covered and uncovered drum storage areas, and office and warehouse buildings which are currently being rebuilt. Site facilities are shown on Figure 2.

The site is located on Point Shekesti at an elevation of approximately 35 to 40 feet above mean sea level (MSL). The site topography drops off steeply to the east into the Wrangell Harbor and gently to the west into the tidelands of Zimovia Strait. Topography to the north of the tank farm rises steeply to a flat cut terrace where the Wrangell Oil Bulk Terminal tank farm is located. The site slopes gently to the south along Peninsula Street. Local groundwater flow is inferred to follow topography.

The Delta Western fuel terminal is bordered to the south-southeast by two residential properties owned by Pat and Elmer Mork and David Mork (Son). The location of these properties and surveyed location of the structures are shown on Figure 2.

Based on field observations the site is underlain by unconsolidated imported fine- and coarse-grained fill material and crushed rock. Exposures of dark gray to black schist and gneiss bedrock are exposed along the shoreline to the east and west of the site. The nearest surface water is the Wrangell Harbor, located immediately east and adjacent to the site. The tidelands of Zimovia Strait are located approximately 310 feet west of the site's tank farm.

## 2.2 Previous Investigations

On September 30 and October 1, 1999, RRM, on behalf of Chevron and Delta Western, supervised the excavation of ten test pits (TP-1 through TP-10) and advancement of six soil borings (B-1 through B-6) at locations on Delta Western property and the adjacent David Mork property for the purpose of soil and groundwater sample collection and analyses (Figure 2). Groundwater was encountered at depths ranging from less than 1 foot below ground surface (bgs) to 4 feet bgs. Subsurface material ranged from sandy and gravelly fill with mixed debris to native muskeg, silt, sand, gravel, and schist bedrock. Soil and groundwater samples were analyzed for

gasoline-range organics (GRO), diesel-range organics (DRO), residual-range organics (RRO), and benzene, toluene, ethyl benzene, and xylenes (BTEX). Laboratory analyses of soil samples indicated GRO, DRO, and RRO concentrations as high as 108 parts per million (ppm) (TP-9), 19,100 ppm (TP-5), and 3,640 ppm (TP-5), respectively. Benzene was only detected in the sample collected from TP-4 at a concentration of 0.496 ppm.

Results of groundwater analyses indicated detected concentrations of GRO, DRO, and RRO as high as 161,000 parts per billion (ppb) (B-2), 936,000 ppb (B-2), and 4,570 ppb (TP-3), respectively. Benzene was detected in groundwater samples collected from test pits TP-1, TP-4, and TP-5 at concentrations of 1.70 ppb, 8.12 ppb, and 2.33 ppb, respectively. Results of this investigation are presented in a report titled *Soil and Groundwater Investigation Results*, prepared by RRM and dated November 22, 1999.

On July 19 and 20, 2000, James Clare performed soil sampling activities on behalf of Wrangell Oil at locations designated SS1 through SS6 on Figure 2. A total of nine soil samples were submitted for laboratory analyses of DRO. Two composite samples from SS4 and SS5 were submitted for analyses of GRO. Laboratory results indicated concentrations of DRO ranging from 411 ppm in Sample SS4 (3.5 feet bgs) to 5,340 ppm in Sample SS2 (0.67 feet bgs). GRO were detected in composite samples from SS4 and SS5 at concentrations of 209 ppm and 56.6 ppm, respectively. Results of this Investigation are presented in a report titled *Site Soil Screening Characterization Report*, prepared by James Clare and dated September 2000.

During June and July 2001, Greg Scheff and Associates of Wrangell, Alaska, performed a survey of surface and bedrock topography across properties owned by Wrangell Oil, Delta Western, David Mork, and Elmer Mork. The purpose of the survey was to aid in understanding the nature of groundwater and potential petroleum hydrocarbon migration over surficial and bedrock interfaces across these properties.

In October 2001, RRM performed excavation of 18 test pits for the purpose of soil sampling and subsequent groundwater monitoring well installation. A total of nine test pits were completed as groundwater monitoring wells. The results of this investigation are presented in RRM's *Additional Site Characterization Report*, dated June 19, 2002. Elevated DRO concentrations were detected in soil during this investigation at 4,520 ppm in Test Pit P-7 to 7,860 ppm in Test Pit P-18. Based on a screening of historic and current analytical data, DRO concentrations in soil were found above Method Two cleanup values in the area between Wrangell Oil and Delta Western properties and south of the Delta Western tank farm onto the David Mork property (Figure 2).

Based on these findings, a scope of work was developed to remove soil concentrations above Method Two values found on the adjoining Mork property and to establish subsurface conditions within the active AST farm as documented in SAIC's *Additional Soil Assessment and Excavation Workplan*, submitted on September 23, 2003

# 3. SCOPE OF WORK

## 3.1 Site Cleanup Goals

**Soil Cleanup Levels:** The ADEC Method 2 soil cleanup levels (Tables B1 and B2) are presented below. Fraction of organic carbon (FOC) samples were also collected and analyzed should the need arise to develop site-specific cleanup levels.

| ***ADEC Method 2 Soil Cleanup Levels (Tables B1 and B2)*** | | |
|---|---|---|
| ***Compound*** | ***Ingestion/Inhalation*** (mg/kg) | ***Maximum Allowable Concentration*** (mg/kg) |
| GRO (AK101) | 1,400/1,400 | 1,400 |
| DRO (AK102) | 8,250/12,500 | 12,500 |
| RRO (AK103) | 8,300/22,000 | 22,000 |
| Benzene | 230/6.4 | NA |
| Toluene | 17,000/180 | NA |
| Ethylbenene | 8,300/89 | NA |
| Xylenes (total) | 166,000/81 | NA |

Notes: mg/kg = milligrams per kilogram
GRO = Gasoline range organics
DRO = Diesel range organics
RRO = Residual range organics
NA = Not applicable

**Groundwater Cleanup Levels:** The Table C groundwater cleanup levels as approved by ADEC are summarized below:

| ***Table C Groundwater Cleanup Levels*** | |
|---|---|
| ***Compound*** | ***Cleanup Level*** |
| GRO | 1,300 ppb |
| DRO | 1,500 ppb |

| *Table C Groundwater Cleanup Levels* | |
|---|---|
| ***Compound*** | ***Cleanup Level*** |
| RRO | 1,100 ppb |
| Benzene | 5 ppb |
| Toluene | 1,000 ppb |
| Ethylbenzene | 700 ppb |
| Xylenes | 10,000 ppb |

Notes: ppb = parts per billion
GRO = Gasoline range organics
DRO = Diesel range organics
RRO = Residual range organics

**Surface Water Cleanup Levels:** Alaska Water Quality Standards (AWQS), for petroleum hydrocarbons, oils and grease for a marine water class and an aquaculture water supply subclass are summarized below:

| *Surface Water Cleanup Levels* | |
|---|---|
| ***Compound*** | ***Cleanup Level*** |
| TAqH | 15 ppb |
| TAH | 10 ppb |

Notes: ppb = parts per billion
TAqH = total aqueous hydrocarbons (sum of PAH and BTEX Compounds)
TAH = total aromatic hydrocarbon (sum of BTEX Compounds)
PAH = polynuclear aromatic hydrocarbons
BTEX= benzene, toluene, ethylbenzene, xylenes

1. The AWQS for marine water· uses with an aquaculture water supply subclass states that there may be no concentrations of petroleum hydrocarbons, animal fats, or vegetable oils in shoreline or bottom sediments that cause deleterious affects to aquatic life. Surface waters and adjoining shorelines must be virtually free from floating oil, film, sheen, or discoloration.

## 3.2 Pre-field Activities

Prior to soil excavation and well installation activities, the limits of the excavations and pit locations were marked; and the Locate Call Center of Alaska and the Public Works Department of Wrangell were notified for underground utility clearance. A site-specific health and safety plan was prepared for the project in accordance with the Occupational Safety and Health Administration guidelines. A Chevron-required Job Safety Analysis form was also filled out

prior to conducting work and was amended to reflect actual on-site conditions. Additionally, a Delta Western representative continually oversaw all work within the active AST farm.

## 3.3 Soil Excavation Activities

The following activities were conducted between September 2003 and August 2004 to further assess soil conditions and remediate impacted soil to below cleanup levels. Results of these activities are presented below in the findings section of this report (Section 4). Sample locations and excavation outlines are presented on Figure 3. Field and laboratory procedures are described in Appendix A.

### 3.3.1 Southern Berm Soil Excavation

**Excavation and Sampling:** On September 30, 2003, soils were excavated in the area of the AST farm's southern berm vertically to bedrock to remove source soils and laterally onto the David Mork property until Method Two soil cleanup levels (Section 3.1) were achieved for compounds detected during earlier test pit sampling within the berm. Limited groundwater was encountered at the vertical limits of the excavation above bedrock at approximately 4 to 6.5 feet below ground surface (bgs). To define the lateral limits of the excavation above groundwater/bedrock, a total of six confirmation soil samples (SW-1 through SW-6) were collected for laboratory analyses. Confirmation soil samples were collected at depths ranging from approximately 2.0 feet to 6.0 feet bgs. Additionally, four soil pits (FOC-1 through FOC-4) were excavated at locations shown on Figure 3 in order to collect samples for FOC analyses. Confirmation soil samples and pit samples were analyzed for the presence of DRO and RRO by Methods AK102 and 103, respectively. Excavation bottom samples were not collected due to the occurrence of shallow groundwater in the excavation pit. Excavation outline and sampling locations are shown on Figure 3.

A total of approximately 65 tons of soil were excavated during the berm excavation, and were stockpiled on site and encompassed using 10-mil Visqueen plastic pending completion of subsequent excavation.

**Excavation Backfill and Compaction:** Clean imported fill material, shot-rock from the local quarry, was used to backfill the excavation. One-foot minus crushed shot-rock was placed at depth to approximately one to three feet below original grade. Three-inch minus crushed rock was placed to grade above the coarser rock. A loader and an excavator backfilled and compacted the fill material.

### 3.3.2 Extended Mork Property Excavation

**Excavation and Sampling:** On August 10 and 11, 2004, soils were excavated extending from the previous excavation within the AST farm berm south and west in areas of known impact on the David Mork property. The excavation was expanded laterally until Method Two soil cleanup levels (Section 3.1) were achieved for compounds detected during the previous soil sampling events. The excavation was extended laterally adjacent to the house to the extent practical (Figure 3). Limited groundwater was again encountered at the vertical limits of the excavation above bedrock at approximately 6 to 7 feet bgs. To define the lateral limits of the excavation

above groundwater/bedrock, a total of seventeen confirmation soil samples (SW-7 through SW-14 at depths ranging from 2.5 to 5.0 feet bgs) were collected by hand or excavator bucket. Confirmation soil samples were collected at depths ranging from approximately 2.5 feet to 5.0 feet bgs. Samples collected at depths over 4.5 feet bgs were wet and were likely in or below the capillary fringe. Confirmation soil samples were analyzed for the presence of DRO and RRO. Additionally, samples collected near the residence were analyzed for GRO and BTEX compounds as benzene was previously detected in soil samples collected during the installation of Well MW-3 (P-7). Excavation bottom samples were not collected due to the occurrence of shallow groundwater in the excavation pit. Excavation outline and sampling locations are shown on Figure 3.

Prior to completion of the excavation, Well MW-3 was gauged and sampled as part of the August 2004 groundwater sampling event. It was completely removed during the August 2004 excavation activities. A total of approximately 85 tons of soil were excavated during the August 2004 excavation, and were added to the stockpile on site and encompassed using 10-mil Visqueen plastic pending subsequent disposition.

**Excavation Backfill and Compaction:** Clean imported fill material, shot-rock from the local quarry, was used to backfill the excavation. One-foot minus crushed shot-rock was placed at depth to approximately one foot below original grade. Three-inch minus crushed rock was placed to grade above the coarser rock. A loader and an excavator backfilled and compacted the fill material.

### 3.3.3 Soil Disposition

A total of approximately 150 tons of petroleum hydrocarbon-impacted soil was removed from the site and transported to Rabanco's Tacoma, Washington facility. The certificate of disposition is presented as Appendix B.

## 3.4 Additional Assessment

### 3.4.1 Tank Farm Sampling

**Soil Sampling:** In order to ascertain the absence or presence of petroleum hydrocarbon-impacted soil in the vicinity of the active Delta Western AST farm, a total of eight test pits (TF-1 through TF-8) were advanced on October 2 and 3, 2003, at locations shown on Figure 3. These test pits were advanced through gravelly fill soil until bedrock was encountered. Soils encountered within the test pits included fill material with occasional wood debris, re-worked bluish gray gravelly sand, slate clasts and slate bedrock to the total depth explored of approximately 3.8 feet bgs. Groundwater was encountered in each pit at depths ranging from approximately 1.5 feet bgs in Pit TF-4 to approximately 3 feet bgs in pits TF-2 and TF-5. Soil samples were collected for laboratory analyses at intervals above standing water in each pit. These samples were submitted to the laboratory and analyzed for the presence of GRO, DRO, RRO, and BTEX compounds.

**Grab Water Sampling:** On October 1, 2003, two grab water samples (TF-2 and TF-4) were collected from the two corresponding pits along the northern end of the tank farm (Figure 3). These grab samples were collected by submerging laboratory-supplied glass sample containers

below the water surface until full. The samples were then labeled, logged onto chain-of-custody documentation and placed in a cooler with ice. Grab water samples were analyzed for the presence of GRO, DRO, RRO, and BTEX compounds.

## 3.5 Groundwater Monitoring

### 3.5.1 Quarterly Groundwater Monitoring – August 2004

On August 10, 2004, prior to decommissioning Well MW-3, the depth to groundwater was measured in all site wells (MW-1 through MW-9) using an oil/water interface probe and Seep 1 and 2 were monitored and groundwater samples from Well MW-3 were collected. Following the remedial excavation, all remaining wells were sampled on August 12, 2004. As described in Appendix A, samples were poured into laboratory-supplied containers, logged onto chain-of-custody documentation, and placed into coolers with ice for transportation to the laboratory. Groundwater samples were analyzed for the presence of GRO, DRO, RRO, and BTEX compounds. Groundwater samples from Wells MW-3 through MW-6 were also analyzed for polynuclear aromatic hydrocarbons (PAHs). The locations of Seep 1 and Seep 2 were found to be dry during the event and, therefore, were not sampled. Results are presented in Section 4. Field data sheets are presented in Appendix C.

### 3.5.2 Quarterly Groundwater Monitoring – February 2005

On February 21, 2005, the depth to groundwater was measured in site wells MW-1, and MW-5 through MW-9 using an oil/water interface probe and Seep 1 and 2 were monitored. Wells MW-2 and MW-4, which are covered by flush-mounted well boxes, could not be located due to snow cover. Groundwater samples from all wells monitored were subsequently collected. As described in Appendix A, samples were poured into laboratory-supplied containers, logged onto chain-of-custody documentation, and placed into coolers with ice for transportation to the laboratory. Groundwater samples were analyzed for the presence of GRO, DRO, RRO, and BTEX compounds. Groundwater samples from Wells MW-1, MW-5 and MW-6 were also analyzed for PAHs. The locations of Seep 1 and Seep 2 were found to be dry during the event and, therefore, were not sampled. Results are presented in Section 4. Field data sheets are presented in Appendix C.

# 4. FINDINGS

## 4.1 Soil Excavation Activities

Soil analytical data is presented in Table 1. Soil sample locations and petroleum hydrocarbon concentrations are shown on Figures 3. Certified analytical reports and chain of custody documentation is presented in Appendix D.

### 4.1.1 Southern Berm Soil Excavation

**Excavation Confirmation Samples**: A total of six excavation confirmation soil samples (SW-1 through SW-6) were collected from the sidewalls of the southern berm area remedial excavation. DRO was detected in all six samples analyzed at concentrations ranging from 183 ppm in Sample SW-1, 6.0' to 2,300 ppm in Sample SW-4, 3.0'. RRO was only detected in sample SW-4, 3.0' at a concentration of 314 ppm. These results confirm that soil excavation activities were successful at removing DRO concentrations detected above site cleanup levels on the David Mork property in areas critical for tank farm liner installation. No cleanup levels were exceeded in these samples.

**Soil Pits**: A total of nine soil samples were collected from four pit locations (FOC-1 through FOC-4) and were analyzed for DRO and RRO. DRO was detected in all nine samples analyzed at concentrations ranging from 107 ppm in Sample FOC-2, 1.0' to 99,500 ppm in Sample FOC-3, 2.5'. RRO was detected in five of nine samples ranging from concentrations of 697 ppm in Sample FOC-2, 2.0' to 7,720 ppm in Sample FOC-3, 1.5'. These results indicate DRO concentrations in samples from pit FOC-3 were above Method 2 cleanup levels; however these numbers are attributed to the high percentage of foC caused by muskeg deposits. During the subsequent excavation, the excavation sidewall was extended to the FOC-3 location to ensure that DRO above cleanup levels was removed.

### 4.1.2 Extended Mork Property Excavation

**Excavation Confirmation Samples:** A total of seventeen confirmation soil samples were collected from the sidewalls of the extended remedial excavation. GRO was detected in three of the nine samples analyzed at concentrations ranging from 7.76 ppm in Sample SW-8, 4.5' to 147 ppm in sample SW-9, 2.5'. Benzene was detected in six of the nine samples analyzed at concentrations ranging from 0.0141 ppm in Sample SW-9, 4.5' to 0.428 ppm in sample SW-7, 2.5'. The only other BTEX compounds detected were 0.479 ppm ethylbenzene in Sample SW-8, 2.5'and 1.13 ppm and 0.101 ppm total xylenes in Samples SW-9, 2.5' and SW-9, 4.5', respectively. DRO concentrations were detected in seven samples ranging from 4.45 ppm in Sample SW-13, 4.0' to 443 ppm in Sample SW-8, 2.5'. RRO was detected in three samples at

concentrations ranging from 270 ppm in Sample SW-9, 2.5' to 336 ppm in Sample SW-8, 2.5'. Soil excavation activities were successful at removing petroleum hydrocarbon concentrations above cleanup levels and confirmation samples collected show compliance with Method Two cleanup levels.

## 4.2 Additional Assessment

Soil analytical data is presented in Table 1, and grab groundwater analytical data is presented in Table 2. Soil sample locations and petroleum hydrocarbons are shown on Figures 3. Certified analytical reports and chain of custody documentation is presented in Appendix C.

### 4.2.1 Tank Farm Sampling

**Soil Sampling:** A total of twelve confirmation soil samples were collected from the eight pits (TF-1 through TF-8) advanced within the AST tank farm complex. GRO was detected in eleven of the twelve samples analyzed at concentrations ranging from 9.25 ppm in Sample TF-2, 1.5' to 4,440 ppm in Sample TF-1, 1.5'. Benzene was detected in five of the twelve samples analyzed at concentrations ranging from 0.239 ppm in Sample TF-4, 1.5' to 1.70 ppm in Sample TF-1, 1.5'. Other BTEX compounds were detected at concentrations ranging from 0.0846 ppm total xylenes in Sample TF-5, 2.8' to 87.6 ppm total xylenes in Sample TF-1, 1.5'. DRO concentrations were detected **in** all samples ranging from 193 ppm in Sample TF-5, 2.8' to 20,200 ppm in Sample TF-4, 1.5'. RRO was only detected in one sample**,** TF-7, 1.5' at a concentration of 1,540 ppm.

ADEC Method 2 cleanup levels were exceeded for GRO (inhalation, ingestion and maximum allowable) in samples from pit TF-1 and for DRO (inhalation, ingestion and maximum allowable) in sample TF-4, 1.5'.

**Grab Water Sampling:** A total of two unfiltered grab groundwater samples (TF-2 and TF-4) were collected from test pits advanced along the northern border of the tank farm. GRO was detected at concentrations of 1,110 ppb and 1,240 ppb in samples TF-2 and TF-4, respectively. Benzene was detected at concentrations of 1.64 ppb and 5.81 ppb in samples TF-2 and TF-4, respectively. Other BTEX compounds were detected at concentrations ranging from 1.09 ppb toluene in Sample TF-2 to 102 ppb total xylenes in Sample TF-4. DRO was detected at concentrations of 4,380 ppb and 53,900 ppb in samples TF-2 and TF-4, respectively. RRO was only detected in Sample TF-4 at a concentration of 2,550 ppb. Table C cleanup levels for benzene, DRO and RRO were exceeded in the grab groundwater sample from pit TF-4.

## 4.3 Groundwater Monitoring

Groundwater monitoring and analytical data are presented in Tables 2 and 3. Groundwater elevation contours, GRO/Benzene concentrations, DRO/RRO concentrations, and TAH, TAqH concentrations are shown on Figures 4 through 15.

### 4.3.1 Quarterly Groundwater Monitoring – August 2004

On August 10, 2004, groundwater elevations ranged from 20.64 feet-MSL in Well MW-5 to 35.72 feet MSL in Well MW-9. Based on groundwater elevations across the site, local groundwater flow trends south towards Zimovia Strait at an approximate gradient of

0.08 foot/foot (Figure 4). This flow direction and gradient is consistent with all previous monitoring events. Groundwater samples were collected from site wells from August 10 and 12, 2004.

Laboratory analyses indicate GRO was only detected in the samples from Wells MW-3 and MW-6 during this event at concentrations of 305 ppb and 307 ppb, respectively (Figure 5). Benzene was detected in samples from five of the nine wells ranging in concentrations from 0.210 ppb in Well MW-1 to 5.06 ppb in Well MW-3 (Figure 5). Other BTEX compounds were detected in four of the nine wells ranging in concentrations from 0.808 ppb toluene in MW-5 to 128 ppb toluene in Well MW-6. DRO was detected in samples from five of the nine wells at concentrations ranging from 188 ppb in Well MW-2 to 2,470 ppb in Well MW-3 (Figure 6). RRO concentrations were only detected in the sample from Well MW-6 at a concentration of 792 ppb (Figure 6). PAHs were detected in samples from all four wells sampled at total concentrations ranging from 0.251 ppb in Well MW-5 to 4.84 ppb in Well MW-3. TAH concentrations were found in samples from seven of the nine wells and ranged from 0.808 ppb in Well MW-5 to 135 ppb in Well MW-6 (Figure 7). TAqH concentrations ranged from 1.06 ppb in Well MW-5 to 139 ppb in Well MW-6 (Figure 7).

The benzene Table C groundwater cleanup value of 5 ppb was exceeded in Well MW-3 (5.06 ppb). The DRO Table C groundwater cleanup value of 1,500 ppb was exceeded in Wells MW-3 (2,470 ppb) and Well MW-6 (2,420 ppb). Surface water standards for TAH/TAqH (10 ppb/15 ppb) were exceeded in Wells MW-3 (13.5/18.3 ppb) and MW-6 (135/139 ppb). No other groundwater cleanup levels were exceeded during this monitoring event.

### 4.3.2 Quarterly Groundwater Monitoring – February 2005

On February 21, 2005, groundwater elevations ranged from 21.69 feet-MSL in Well MW-5 to 40.02 feet MSL in Well MW-8. Based on groundwater elevations across the site, local groundwater flow trends south towards Zimovia Strait at an approximate gradient of 0.08 foot/foot (Figure 8). This flow direction and gradient is consistent with all previous monitoring events. Groundwater samples were collected from all accessible site wells on February 21, 2005.

Laboratory analyses indicate GRO was only detected in the sample from Well MW-6 during this event at a concentration of 740 ppb (Figure 9). Benzene was only detected in the sample from Well MW-6 at a concentration of 1.12 ppb (Figure 9). Other BTEX compounds were detected in samples from four of the six accessible wells ranging in concentrations from 0.808 ppb toluene in MW-7 to 433 ppb toluene in Well MW-6. DRO was only detected in samples from wells MW-6 and MW-9 at concentrations of 265 ppb and 143 ppb, respectively (Figure 10). RRO concentrations were not detected in any samples collected from wells during this event (Figure 10). PAHs were detected in samples from all three wells sampled at total concentrations ranging from 0.690 ppb in Well MW-1 to 2.09 ppb in Well MW-6. TAH concentrations were found in samples from four of the six accessible wells and ranged from 0.808 ppb in Well MW-7 to 446 ppb in Well MW-6 (Figure 11). TAqH concentrations ranged from 2.11 ppb in Well MW-5 to 448 ppb in Well MW-6 (Figure11).

Surface water standards for TAH/TAqH (10 ppb/15 ppb) were exceeded in the sample from Well MW- 6 (446/448 ppb). No other groundwater cleanup levels were exceeded during this monitoring event.

### 4.3.3 Quarterly Groundwater Monitoring – May 2005

On May 22, 2005, groundwater elevations ranged from 20.53 feet-MSL in Well MW-5 to 35.06 feet MSL in Well MW-9. Based on groundwater elevations across the site, local groundwater flow trends south towards Zimovia Strait at an approximate gradient of 0.09 foot/foot (Figure 12). This flow direction and gradient is consistent with all previous monitoring events. Groundwater samples were collected from all accessible site wells on May 22, 2005; however, Well MW-8 contained an insufficient volume of water to analyze for DRO, RRO, and PAH compounds.

Laboratory analyses indicate GRO was only detected in the samples from wells MW-5 and MW-6 during this event at concentrations of 75.2ppb and 756 ppb, respectively (Figure 13). Benzene was detected at concentrations ranging from 0.402 ppb in Well MW-6 to 0.907 ppb in Well MW-2 (Figure 13). Other BTEX compounds were detected in samples from three of the eight wells ranging in concentrations from 1.48 ppb ethyl benzene in Well MW-6 to 276 ppb toluene in Well MW-6. DRO was only detected in samples from wells MW-2 and MW-4 at concentrations of 140 ppb and 871 ppb, respectively (Figure 14). RRO concentrations were not detected in any samples collected from wells during this event (Figure 14). PAHs were detected in samples from three of the four wells sampled at total concentrations ranging from 0.972 ppb in Well MW-5 to 4.98 ppb in Well MW-4. TAH concentrations were found in samples from six of the eight wells and ranged from 0.602 ppb in Well MW-4 to 283 ppb in Well MW-6 (Figure 15). TAqH concentrations ranged from 5.58 ppb in Well MW-4 to 291 ppb in Well MW-6 (Figure15).

Surface water standards for TAH/TAqH (10 ppb/15 ppb) were exceeded in the sample from wells MW- 5 (23.2/24.2) and MW-6 (283/291 ppb). No other groundwater cleanup levels were exceeded during this monitoring event. The groundwater sample from Well MW-6 was additionally analyzed for volatile organic compounds (VOCs) by EPA Method 8260B and found no detectable concentrations of VOCs other than toluene (278 ppb).

# 5. CONCLUSIONS

Based on the observations and findings of this investigation, RRM concludes the following:

## 5.1 Site Soil

- Off-site soils have been successfully remediated through the excavation, removal and off-site disposition of approximately 150 tons of soil from areas of hydrocarbon impact above Method Two cleanup levels known to previously exist on the David Mork property. Excavations were extended vertically to bedrock and laterally to concentrations below established cleanup levels.
- Laboratory analytical results indicate that concentrations of GRO and DRO exist above Method Two cleanup goals in the northern section of the Delta Western AST farm. Samples TF-1, 1.5' and TF-1, 2.5' contained GRO concentrations above the 1,400 ppm limit (maximum allowable concentration), at 4,440 ppm and 2,440 ppm, respectively. Sample TF-4, 1.5' contained DRO concentrations above the 12,500-ppm limit (maximum allowable concentration) at 20,200 ppm.
- As referenced in Section 2.3, previous investigations indicate DRO concentrations in soil above Method Two cleanup goals also exist on the slope between the Delta Western and Wrangell Oil AST farms.

## 5.2 Site Groundwater

- Laboratory analyses of groundwater samples from historical events and sampling events documented in this report show gradual reductions in petroleum hydrocarbons due to natural attenuation, with the exception of Well MW-6. Additional migration to groundwater from source areas on site may be substantially reduced due to the installation of the liner within the Delta Western AST farm.
- Samples from all off-site wells indicate levels below Table C and surface water cleanup levels. Although former Well MW-3 contained concentrations of DRO and TAH/TAqH just above Table C and surface water cleanup levels, it is likely that groundwater now found in that location is below those levels after removing much of the source above and below groundwater that contributed to the dissolved petroleum hydrocarbon concentrations.
- Laboratory analyses of grab groundwater samples collected from within the AST farm indicate that Table C cleanup levels for benzene, DRO and RRO were exceeded in the grab groundwater sample from pit TF-4 prior to liner installation.

- Samples from all on-site wells indicate levels below Table C and surface water cleanup levels. Exceptions have been identified on Delta Western property where groundwater and surface water cleanup levels have been exceeded. During the August 2004 event, the DRO Table C groundwater cleanup value of 1,500 ppb was exceeded in Well MW-6 (2,420 ppb). Surface water standards for TAH/TAqH were also exceeded in Well MW-6 (135/139 ppb). With the exception of Well MW-3, as discussed previously, no other groundwater cleanup levels were exceeded during this monitoring event.

- Similarly, during the February 2005 event, surface water standards for TAH/TAqH were exceeded in the sample from Well MW- 6 (446/448 ppb). Well MW-6 was the only well that indicates an exceedence of cleanup goals. No other groundwater cleanup levels were exceeded during this monitoring event.

- During the May 2005 event, surface water standards for TAH/TAqH were exceeded in the sample from wells MW- 5 (23.2/24.2 ppb) and MW-6 (283/291). Well MW-5 has periodically contained TAH/TAqH levels above surface water standards, which may be explained by influence from surface water and/or the high toluene found in groundwater near Well MW-6. Well MW-6 is the only well that indicates a persistent exceedence of surface water standards. No other groundwater cleanup levels were exceeded during this monitoring event.

- Based on a thorough review of the entire groundwater monitoring and sampling data set, a second source not related to the bulk fuel facility appears to exist at or near Well MW-6. Several factors indicate that contamination detected in groundwater from Well MW-6 is different than that detected in other wells sampled at the site. One distinguishing factor is the extremely high concentration of toluene detected in groundwater samples from Well MW-6. The data set average toluene concentration for Well MW-6 is 299 ppb, whereas the data set average toluene concentration for the other wells ranges from 0.7 ppb for Well MW-2 to 91 ppb for Well MW-7. In addition, the data set maximum toluene concentration, 991 ppb, was detected in a groundwater sample from Well MW-6. The next highest toluene concentration, 170 ppb, was detected in a sample from Well MW-7. A second factor that distinguishes impact at Well MW-6 is the color of groundwater collected from that well. Unlike groundwater from the other site wells, groundwater collected at Well MW-6 is greenish-gray and cloudy. The third factor that distinguishes impacted groundwater from Well MW-6 is the odor. Groundwater from Well MW-6 was described as having a strong septic odor. Given the distinguishing factors, it is reasonable to conclude that the source of impact identified at Well MW-6 is separate from the source of impact for the other site wells, or possibly a mix from different sources.

- As has been discussed in previous reports, Mr. Bob Caldwell with the City of Wrangell Public Works Department, has stated that no wells exist or have existed on the peninsula where the site is located which is most likely due to the poor water quality due to muskeg and low yield of naturally occurring groundwater in the site vicinity. The bedrock in the site vicinity is very shallow and forms a localized basin trending toward Zimovia

Straight, further isolating this groundwater on the peninsula from any potentially potable water sources. In addition, Mr. Caldwell stated that there is an ordinance under the City of Wrangell municipal code that requires hookup to City water supply, with the exception of rainwater collection systems. Based on the site conditions and the nonpotable designation criteria, nonpotable designation appears appropriate for the AST plant and adjacent properties.

# 6. RECOMMENDATIONS

Based on the results of this and previous investigations, RRM recommends the following:

- RRM recommends one additional groundwater monitoring event be conducted in the fourth quarter 2005. The purpose of this monitoring would be to demonstrate compliance with surface water cleanup levels specified in 18 AAC 70, and to further ascertain the nature of impact found in groundwater from Well MW-6.
- RRM recommends that a limited assessment be performed east of the known soil and groundwater impact residing within the northern portion of the Delta Western AST farm and southern portion of the Wrangell Oil property to ascertain the flow direction and quality of groundwater under 18 AAC 70 that may be migrating to Wrangell Harbor. Due to complications that may arise due to historic releases underneath Peninsula Street, this request may not be practical and/or solely the responsibility of current and former operators of the neighboring facility.
- RRM requests that no further assessment or remediation of soil impacts on the Delta Western and Mork Properties be performed and kindly suggests that ADEC prepare a final 'NFA' letter pertaining to the David Mork property.
- Pending the additional evaluation of MW-6 groundwater, RRM recommends that the groundwater sampling program be reduced to a semi-annual frequency in preparation for site closure and that only wells critical to surface water compliance be gauged and sampled.

# 7. PROFESSIONAL CERTIFICATION

**SOIL REMEDIATION AND SITE ASSESSMENT REPORT**
**Delta Western/Former Chevron Fuel Facility 1001467**
**1417 Peninsula Street**
**Wrangell, Alaska**

We certify under penalty of law that this document and all attachments have been prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on our inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, to the best of our knowledge and belief the information submitted is true, accurate and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Evaluation of the conditions at the site for the purpose of this investigation is inherently limited due to the number of observation points. There may be variations in subsurface conditions in areas away from the sample points. Data from this report reflect the sample conditions at specific locations at a specific point in time. No other interpretations, representations, warranties, guarantees, express or implied, are included.

Should you have any questions or comments regarding the contents of this report, please call RRM at (831) 475-8141.

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# APPENDIX A
# FIELD AND LABORATORY PROCEDURES

## SOIL EXCAVATION AND CONFIRMATION SAMPLING PROCEDURES

Soil was excavated in accordance with state and local guidelines using a subcontracted backhoe and operator. Soil samples were collected from the excavation sidewalls using the bucket of the backhoe at depths greater than 5 feet. A new laboratory-provided glass container was filled with the undisturbed soil contained in the bucket or excavation sidewall. The container was then sealed, labeled, sealed in a plastic bag, and logged onto a chain-of-custody. The soil samples were then placed in cold storage and transported to a state-certified laboratory, accompanied by chain-of-custody documentation.

## GROUNDWATER SAMPLING PROCEDURES

Groundwater sampling procedures consist of initially measuring and documenting the water level in each well and checking each well for the presence of separate-phase hydrocarbon (SPH) using a oil/water interface probe. The wells that do not contain SPH were then purged a minimum of three casing volumes or until dry through the use of a disposable bailer. During purging, well stabilization parameters (temperature, pH, and electrical conductivity) were monitored. After purging and prior to sampling, groundwater in the wells was allowed to recharge to within 80% of the original groundwater level. Groundwater samples were then collected using clean disposable Teflon bailers and appropriate EPA-approved containers. The samples were then labeled, and transported on ice to the laboratory using appropriate chain-of-custody documentation. Purge water generated during on-site groundwater sampling was directly discharged onto the ground surface. Purge water generated during off-site groundwater sampling was processed through Delta Western's oil/water separator.

## LABORATORY PROTOCOL

Soil and groundwater sample analyses were performed by North Creek Analytical Laboratory, an Alaska Department of Environmental Conservation-approved laboratory located in Bothell, Washington. Selected soil and all groundwater samples were submitted to the laboratory and analyzed for the presence of gasoline range organics using Method AK101; diesel range organics using Method AK103; residual range organics using Method AK103; and benzene, toluene, ethyl benzene and xylenes using EPA Method 8021B. Select groundwater samples were also analyzed for polynuclear aromatic hydrocarbons using EPA Method 8270 with selected ion monitoring. Certified Analytical Reports and Chain-of-Custody Documentation are presented in Attachment D.