ENVIRONMENTAL MONITORING
AND
REMEDIATION STATUS REPORT
CHEVRON U.S.A. INC. BULK FUELS TERMINAL, CRAIG, ALASKA

Prepared for:
Chevron U.S.A. Inc.
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Prepared by:
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201 E. 56th Avenue, Suite 300
Anchorage, Alaska 99518

January 1992

America North Inc.
Environmental Consulting & Engineering • Health & Safety

January 15, 1992

Mr. Randy Rice
Southeast Regional Office
Alaska Department of Environmental Conservation
P.O. Box 32420
Juneau, Alaska 99811

Dear Mr. Rice:

On behalf of Chevron U.S.A. Inc., America North Inc. is pleased to submit two copies of the "Environmental Monitoring and Remediation Status Report, Chevron U.S.A., Inc., Bulk Fuels Terminal, Craig, Alaska" for your review.

It is our understanding that Chevron U.S.A. Inc. would like to schedule a meeting at your convenience to discuss the above-referenced report. Please contact Steve Bruce with Chevron U.S.A. Inc. at (206) 628-5244 to arrange this meeting.

Sincerely,
AMERICA NORTH INC.

for Andrew M. Dimitriou
Staff Geologist

Kevin G. Rattie
Project Manager

AMDi/KGR/jla

cc w/att: S. Bruce; Chevron U.S.A. Inc.

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(America North Inc. is a subsidiary of EMCON Associates Inc.)

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EXECUTIVE SUMMARY

Chevron U.S.A. Inc. formerly operated a bulk fuels terminal located in Craig, Alaska, which is now operated by White Pass Alaska. The terminal is situated approximately 200 feet south of the shoreline of Bucharelli Bay (see Figure 1). The terminal consists of eleven aboveground fuel storage tanks in a tank farm and a separate expansion area to the north. The facility also includes a pump house, a truck trailer loading rack, aboveground piping, and a pipeline that descends to a boat fueling dock. Ground surface elevation in the vicinity of the tanks is approximately 25 feet above mean sea level. The ground surface material consists of predominantly sandy gravel. The fuel pipeline which connects the tank farm with the fueling dock is mostly above ground, with the exception of approximately 100 feet of buried piping adjacent to the tank farm.

Prior to July 1991, the terminal consisted of seven tanks enclosed by a four-foot high earth embankment and a chain link fence. Four additional tanks were installed during late summer 1991 by White Pass Alaska as part of a terminal expansion program in a separate area to the north of the existing tank farm (see Figure 2). These tanks were placed on a six-inch thick rectangular cement pad with approximate dimensions of 20 feet by 70 feet. A four-foot high cement wall surrounds the terminal expansion area.

Previous site investigations and monitoring programs at the terminal have been documented in reports prepared by Geoengineers, Inc. (1987) and Rittenhouse-Zeman and Associates, Inc. (RZA) (1988 through 1990). Findings presented in these documents revealed that soil samples collected from soil borings advanced in the terminal area contained gasoline-range and diesel-range hydrocarbons. Groundwater samples collected from monitoring wells within the terminal contained gasoline-range hydrocarbons, diesel-range hydrocarbons, and benzene at levels above the federal and state drinking water standard at 0.005 parts per million (ppm). Depth to groundwater measured in monitoring wells in February 1987 was less than one foot below ground surface.

In September 1988, RZA submitted a report to Chevron U.S.A. Inc. that documented the installation of a vapor extraction system designed to remove petroleum hydrocarbons (particularly the more volatile fuel components) from the soil and groundwater from the north side of the tank farm. A trackhoe was used to excavate shallow trenches in which four-inch diameter, slotted polyethylene underground piping was installed. This piping was placed approximately one foot below ground surface and the trench was backfilled with approximately 12 inches of crushed rock. The trench was covered with a thin layer of native materials. A thin barrier of plastic sheeting was placed over the area and extended about two to five feet horizontally beyond the piping trench. A flexible hose extended from a riser pipe to a condensation tank, and additional hose connected the condensation tank to a blower and an exhaust stack.

A 1989 RZA report also documents the construction of a passive dewatering trench and treatment system located just outside the north fence of the terminal. The system consists of a French drain constructed at an approximate depth of about eight feet and lying in an east-west direction along the length of the terminal. Operation of the dewatering system has allowed the lowering of the water table surface to generally five feet below ground surface. Groundwater collected in the French drain flows into a groundwater treatment system consisting of an oil/water separator and an air stripping unit. The estimated volume of the oil/water separator is approximately 250 gallons and discharge water is batch-

treated. Treated water is discharged to the ground surface via a piping system with an outlet approximately 80 feet north of the treatment system.

A review of the most recent soil quality data, reveals that gasoline-range hydrocarbons were not detected in soil samples collected beneath the terminal in July 1991. Diesel-range hydrocarbons still remain in soils at levels above the Alaska Department of Environmental Conservation's target cleanup levels at several locations within the terminal. Diesel-range hydrocarbons were detected at concentrations up to 13,100 parts per million (ppm) in soil samples collected on July 8, 1991. Since 1989, phase-separated hydrocarbons have not been detected on the water surface within any monitoring well and analytical testing results reveal that benzene levels in groundwater have been reduced by over 90 percent.

Based on the findings of a qualitative risk assessment documented in this report, the presence of diesel-range hydrocarbons in soil and groundwater beneath the site do not appear to pose a known threat to human health or the environment. Diesel-range hydrocarbons are less toxic, less mobile, and more readily adsorbed onto soil particles than the gasoline-range hydrocarbons which, based on the analytical testing results, are no longer present in soils at the terminal. In addition, the passive dewatering system at the facility is artificially lowering the water table to depths greater than one feet below ground surface within the terminal and is limiting groundwater contact with the soils in which diesel-range hydrocarbons were detected in July 1991.

1 INTRODUCTION

1.1 SITE DESCRIPTION

The bulk fuels terminal is located in Craig, Alaska and approximately 200 feet south of the shoreline of Bucharelli Bay (see Figure 1). Land use immediately surrounding the site consists of a vegetative area (brush, grass and weeds) between the terminal and Bucharelli Bay, residential property to the east and west, and a road to the south. A cannery operation is located approximately 200 feet to the northwest. Various businesses including a restaurant and retail operations are located approximately 100 feet to the northeast. Residential properties are located south of the terminal.

Mean annual precipitation at the site is approximately 106 inches, with a yearly average of approximately 58 percent of the precipitation (61 inches) occurring between September and January, according to data provided by the Alaska Climate Center.

1.2 BULK FUELS TERMINAL LAYOUT

White Pass Alaska operates the bulk fuels terminal. The terminal consists of 11 aboveground fuel storage tanks in a tank farm and a separate expansion area to the north. The facility also includes a pump house, a truck trailer loading rack (TTLR), aboveground piping, and a pipeline that descends to a boat fueling dock. Ground surface elevation in the vicinity of the tanks is approximately 25 feet above mean sea level. The ground surface material consists of predominantly sandy gravel. Prior to July 1991, the tank farm consists of seven tanks enclosed by a four-foot high earth embankment and a chain link fence. The fuel pipeline that connects the tank farm with the fueling dock is mostly above ground, with the exception of approximately 100 feet of buried piping adjacent to the tank farm.

Prior to summer 1991, the terminal consisted of seven tanks enclosed by a four-foot high earth embankment and a chain link fence. Four additional tanks were installed during late summer 1991 by White Pass Alaska as part of a terminal expansion program in a separate area to the north of the existing tank farm (see Figure 2). The new tanks were constructed in the area in which a vapor extraction system (VES) is installed in soils at a depth of approximately four feet below ground surface (bgs). These tanks were placed on a six-inch thick rectangular cement pad with approximate dimensions of 20 feet by 70 feet. A four-foot high cement wall surrounds the terminal expansion area. These tanks did not contain fuel at the time of the ANI site visit on October 9, 1991. We understand that, when filled, the total storage capacity of the terminal will be approximately 80,000 gallons.

1.3 REVIEW OF PREVIOUS SITE ASSESSMENT/REMEDIATION WORK

In March 1987, Geoengineers, Inc. prepared an environmental assessment report on behalf of Chevron U.S.A. Inc. that presented findings of a soils and groundwater investigation at the terminal in February 1987. Findings presented in the report revealed the presence of phase-separated hydrocarbons in monitoring well MW-1, which is located approximately 15 feet north of Tank 7 (see Figure 3). Depth to groundwater measured in the monitoring wells within the tank farm during this sampling event was less than one foot below ground surface. The thickness of phase-separated hydrocarbons in MW-1 on February 11 and 15, 1987, was reported to be 0.69 and 0.26 feet, respectively.

Petroleum-like odors were noted to be present in the soil samples collected while installing monitoring wells designated MW-2 through MW-4, and in soil samples from a boring designated B-5. Gasoline-range hydrocarbons were detected in soil samples collected and analyzed from MW-1 (700 parts per million [ppm]), MW-2 (490 ppm) and MW-3 (800 ppm). Gasoline-range hydrocarbons were not detected above the detection limit (9.0 ppm) in soil samples collected from MW-4 and MW-5. Diesel-range hydrocarbons were not detected above the detection limit (50 ppm) in any of the five soil samples that were analyzed.

Groundwater samples were collected from each of the four monitoring wells in February 1987. The groundwater elevations measured during this sampling event ranged from approximately 0.2 feet below ground surface in MW-1 to approximately 0.9 feet below ground surface in MW-3. Benzene was detected in the groundwater sample collected from MW-1 (12 ppm), MW-2 (4.3 ppm) and MW-3 (0.44 ppm). Benzene was not detected above the detection limit (0.0005 ppm) in the groundwater sample analyzed from MW-4, which is located close to the south wall of the terminal (see Figure 3).

In June 1988, Rittenhouse-Zeman and Associates, Inc. (RZA) prepared a report on behalf of Chevron U.S.A. Inc. that documented the findings of further soil sampling, and the installation of additional monitoring wells designated MW-5 and MW-6 (see Figure 3). It was reported that the phase-separated hydrocarbon thickness in MW-1 on June 2, 1988, was 0.05 feet. Phase-separated hydrocarbons were not reported to be present on the water surface in any of the other five monitoring wells. Based on the analysis of additional soil samples from test pits located outside the terminal, it was stated in the June 1988 report that "no significant soil quality impacts appear to exist downgradient of the facility at this time".

In September 1988, RZA submitted a report to Chevron U.S.A. Inc. that documented the installation of a VES designed to remove petroleum hydrocarbons (particularly the more volatile fuel components) from the soil and groundwater in the vicinity of MW-1, MW-2 and MW-3, which are located in the northern part of the tank farm. A trackhoe was used to excavate shallow trenches in which four-inch diameter, slotted polyethylene underground piping was installed. This piping was placed approximately one foot bgs and the trench was backfilled with approximately 12 inches of crushed rock. The trench was covered with a thin layer of native materials. A thin barrier of plastic sheeting was placed over the area and extended about two to five feet horizontally beyond the piping trench. Aboveground components of the system were located west of MW-1. A flexible hose extended from a riser pipe to a condensation tank, and additional hose connected the condensation tank to a blower and an exhaust stack.

The September 1988 report documented that on August 4, 1988, 0.17 feet of phase-separated hydrocarbons was measured in MW-1. It was concluded that the hydrocarbon thickness may have been greater on August 4, 1988, than measured on June 2, 1988, because the groundwater elevations were lower. Groundwater samples were collected from each of the six monitoring wells in June 1988 and analyzed for total recoverable petroleum hydrocarbons (TRPH) (using EPA Method 418.1) and benzene, toluene, ethylbenzene and xylenes (BTEX) (using U.S. Environmental Protection Agency [EPA] Method 5030/8020). TRPH were detected in each groundwater sample at concentrations ranging from 35,000 ppm in the sample collected from MW-2 to 15.7 ppm in the sample collected from MW-6. Benzene was detected only in the samples collected from MW-1 (0.56 ppm), MW-2 (0.65 ppm) and MW-3 (0.067 ppm).

2 SOIL, GROUNDWATER SAMPLING AND REMEDIATION SYSTEMS

2.1 SOIL SAMPLING

Soil samples were collected by ANI on July 8, 1991, from eight locations at the site as indicated on Figure 4. Four soil sample locations (GT-1 through GT-4) were located immediately to the north of the tank farm within the proposed tank farm expansion area. In these areas, samples were collected from depths of approximately 2.5 feet and 5 feet bgs. Four additional soil samples (GT-5 through GT-8) were collected from locations within the terminal at depths ranging between 1.5 and 2.5 feet bgs. Soil samples were collected from each depth using a clean, stainless-steel sample spoon. The soil samples were placed in laboratory-supplied sample containers, stored on ice, and submitted under ANI chain-of-custody to Columbia Analytical Services, Inc. (CAS) of Kelso, Washington for analysis of TPH using EPA Methods 418.1 and 8015M, and BTEX compounds using EPA Method 8020.

2.2 GROUNDWATER ELEVATIONS

Depth-to-water measurements were obtained in each monitoring well that contained water on May 28 and 29, 1991, July 8, 1991, and October 9, 1991. Relative groundwater elevations were calculated using data from the vertical control survey performed on May 29, 1991, during which a project datum (100.00) was established at a point on the oil/water separator. Groundwater elevations on May 28 and 29, July 8, 1991, and October 9, 1991, are summarized in Table 3.

Inferred direction of groundwater migration beneath the site was to the north during all three sampling events (see Figure 5). Hydraulic gradients determined in the October 9, 1991, monitoring event increase to the north of the tank farm (0.27 foot/foot between monitoring wells MW-12 and MW-13 compared with 0.0076 foot/foot between monitoring wells MW-4 and MW-2 within the tank farm) and appear to be influenced by both the dewatering trench and the topographic change towards Bucharelli Bay. The groundwater migration direction and hydraulic gradients calculated in July and October 1991 are similar to those reported in the previous reports prepared by Geoengineers, Inc. and RZA.

2.3 GROUNDWATER SAMPLING

No phase-separated hydrocarbons were present on the water surface inside any of the monitoring wells in July or October 1991.

Each of the monitoring wells (with the exceptions of MW-7, MW-8 and MW-10) were purged of three well casing volumes using a 2-inch diameter PVC disposable bailer. Groundwater samples were collected on July 8, 1991, and October 9, 1991. Monitoring well MW-7 had been installed as a one-inch diameter piezometer; this prevented the collection of groundwater samples using the two-inch diameter bailer. Monitoring wells MW-8 and MW-10 did not contain water during either of the site visits. Groundwater samples were collected with disposable PVC bailers, placed into laboratory-supplied sample containers, stored on ice and submitted under ANI chain-of-custody to CAS in Kelso, Washington for analysis of TRPH using EPA Method 418.1, fuel hydrocarbons using EPA Method 8015M, and BTEX compound using EPA Method 5030/8020.

2.4 VAPOR EXTRACTION AND DEWATERING/TREATMENT SYSTEMS

Prior to the expansion of the tank farm, a geotechnical study was performed to determine if the placement of the aboveground storage tanks in this area would pose a threat to the integrity of the flexible VES piping that was installed at a depth of approximately two feet bgs in 1989. Based on the findings of this study, replacement rigid PVC piping was installed at a depth of approximately four feet bgs. The VES was re-connected in July 1991 to remove petroleum hydrocarbon vapors that still remain in the soil. On July 9, 1991, following replacement of the piping, organic concentrations were detected ranging from 30 to 35 ppm using a Thermo Environmental Instruments, Model 580B portable organic vapor photoionization detector (PID) calibrated to 250 ppm isobutylene. Measurements were taken in a sampling port located on the emission stack.

The dewatering system and groundwater treatment system have been in operation since 1989. An estimate of the inflow into the oil/water separator was made by measuring the change in water level within the tank on May 30, 1991. The inflow rate on May 30, 1991 during this time interval was calculated to be 0.07 cubic feet per minute or 730 gallons per day.

On October 9, 1991, an "inflow" sample of the water entering into the oil/water separator from the dewatering system was collected and analyzed for TRPH and BTEX compounds. TRPH were detected at 1 ppm using EPA Method 418.1, diesel-range hydrocarbons were reported at 5 ppm using EPA Method 8015M and total BTEX compounds were detected at 0.019 ppm using EPA Method 8020 (see Table 4). On October 9, 1991, there was no discharge of treated water occurring due to the limited "inflow" volume.

3 SUMMARY OF SITE CONDITIONS

3.1 BACKGROUND

Present (January 1992) subsurface conditions have been evaluated based on the groundwater-quality data and other site information obtained as a result of the October 1991 groundwater sampling event. Soil conditions have been evaluated based on the soil-quality results obtained as a result of the soil sampling events that occurred in July 1991 (see Table 2 and Figure 4). However, TRPH levels are likely to have been further reduced by natural degradation over the last six months.

3.2 SOILS

Benzene was not detected in any soil sample collected July 8, 1991. Total BTEX levels ranged from not detected in samples GT-1-2.5, GT-3-2.5 and GT-3-5 to a maximum of 5.2 ppm in sample GT-6. Gasoline-range petroleum hydrocarbons were not detected above the method reporting level (MRL) of 10 ppm in any soil sample collected July 8, 1991.

In summary, the diesel-range hydrocarbons were detected at the highest levels (greater than 10,000 ppm) in soil samples collected from borings GT-5, GT-6, GT-7 and GT-8, which are located within the terminal. Concentrations of diesel-range hydrocarbons were detected at lower levels in soil samples collected from test pits GT-1 (4,310 ppm and 509 ppm) and GT-2 (560 ppm and 4810 ppm) in the terminal expansion area. Diesel-range hydrocarbons were detected at 60 ppm and below the MRL (10 ppm), in soil samples collected from GT-3, and at 874 ppm and below the MRL in samples collected from GT-4 (see Table 2).

3.3 GROUNDWATER

The groundwater analytical results for samples collected between August 1988 and October 1991 are summarized in Table 4. A review of the groundwater analytical data from the October 9, 1991 sampling event revealed that benzene concentrations ranged from not detected above the MRL (0.001 ppm) in MW-4 and MW-9, to a maximum of 0.045 ppm in MW-2. Gasoline range petroleum hydrocarbons were not detected above the MRL (1 ppm) in any groundwater sample collected from any well. Concentrations of diesel-range hydrocarbons ranged from not detected above the MRL (1 ppm) in MW-6 and MW-13, to 180 ppm in the groundwater sample collected from MW-4. Concentrations of total recoverable petroleum hydrocarbons were detected at concentrations ranging from not detected above the MRL (1 ppm) in the groundwater sample collected from MW-13 to 190 ppm in the sample collected from MW-4.

Figure 7 presents the time versus concentration plot for benzene levels detected in groundwater samples collected from MW-1 and MW-2 since 1988, and shows the decline of benzene levels in groundwater. This reduction in benzene in groundwater samples collected from MW-1 and MW-2 is considered representative of the overall groundwater quality improvement that has occurred over the last few years. BTEX and TRPH have not been detected above either a state or federal drinking water standard in groundwater samples collected from monitoring wells located between the terminal and Bucharelli Bay.

3.4 SUMMARY

Based on the findings of the October 1991 sampling event, phase-separated hydrocarbons were not present on the water surface within any of the monitoring wells. A review of the groundwater-quality data reveals that benzene concentrations in samples collected from the monitoring wells between the years 1987 and 1991 have decreased to less than 0.05 ppm (see Table 4 and Figure 7). Benzene was not detected above the state maximum contaminant level in groundwater samples collected in 1991 from monitoring wells located downgradient of the tank farm expansion area. TRPH concentrations in groundwater samples have generally decreased between August 1988 and October 1991.

The maximum diesel-range hydrocarbon concentration in July 1991 was 705 ppm in the sample collected from MW-4, and 180 ppm in October 1991, also in the sample collected from MW-4. Gasoline-range hydrocarbons have not been detected in any groundwater sample analyzed in 1991. The maximum TRPH concentration in July 1991 was 1600 ppm in the sample collected from MW-4, and 190 ppm in October 1991, also in the sample collected from MW-4 (see Table 4). TRPH and diesel-range hydrocarbons were detected at lower levels in groundwater samples collected from monitoring wells downgradient of the tank farm in 1991, see Table 4.

4 SITE CLOSURE RATIONALE

A review of the analytical testing results, reveals that diesel-range hydrocarbons were detected in several soil samples collected in July 1991, at levels which exceed the Alaska Department of Environmental Conservation's (ADEC's) "Interim Guidance for Non-UST Soil Cleanup Levels" (July 17, 1991). Benzene was detected at levels that exceeded the state and federal maximum contaminant level of 0.005 ppm in groundwater samples collected from three monitoring wells. In MW-1, MW-2 and MW-3 benzene concentrations were detected at 0.01 ppm, 0.045 ppm and 0.023 ppm respectively on October 9, 1991. The following information is provided to address the nature of these hydrocarbons.

4.1 SITE USAGE

It is our understanding that White Pass Alaska will continue to operate the bulk fuels terminal as a "controlled industrial site". As such, the land use in the area within which petroleum hydrocarbons have been detected in the subsurface is not expected to change in the foreseeable future.

4.2 DISTRIBUTION OF PETROLEUM HYDROCARBONS

Petroleum hydrocarbon levels have been detected at highest levels in soil samples and groundwater samples collected from soil borings and monitoring wells in the immediate vicinity of the tanks and within the perimeter of the terminal. The depth to groundwater measured in July and October 1991 in the monitoring wells within the tanks farm ranged between one and two feet. The depth to groundwater increases to the north beneath the tank farm expansion area as indicated by a groundwater depth of three feet below ground surface in MW-5, which is the closest monitoring well to the tank farm expansion area. Benzene was only detected above the state maximum contaminant level in groundwater samples collected from monitoring wells within the existing tank farm.

4.3 SITE ACCESS

The highest levels of petroleum hydrocarbons have been detected in soil and groundwater in the immediate vicinity of the aboveground storage tanks, distribution piping, walkways and storage facilities. Access for vehicular or other equipment that would be required for the excavation, transportation, stockpiling, and the treatment of soil in which petroleum hydrocarbons may be present at levels exceeding state of Alaska target cleanup levels, is very restricted. Further, the operation of such equipment or the removal of soil inside the terminal could pose a potential threat to the structural integrity of the tanks and other related structures.

4.4 POTENTIAL MIGRATION/EXPOSURE PATHWAYS

The diesel-range hydrocarbons present in the soil do not appear to have the chemical characteristics that represent a health threat based on toxicity or leachability. Therefore, the potential exposure pathways for these hydrocarbons to come into contact with humans are discussed qualitatively. Typically, diesel-range hydrocarbons pose a lesser threat to human health and the environment than gasoline-range hydrocarbons, and can be naturally degraded in soil by micro-organisms provided that nutrients, oxygen and moisture are readily available. The diesel-range components which remain in the soil and

groundwater beneath the site, are considered to be less volatile, less toxic, less mobile, and more readily adsorbed onto soil particles than gasoline-range hydrocarbons which have been removed from the soil by the completed remediation.

4.4.1 Soil as the Exposure Source

Authorized access to the terminal is restricted to White Pass Alaska or their representatives only. Unauthorized access is prevented through the use of either perimeter fencing or walls. Children, who are potentially the primary population of concern with regard to soil ingestion of less-volatile and non-volatile petroleum hydrocarbons, cannot readily access the site. Site worker exposure to the petroleum hydrocarbons would be expected to be by dermal contact, if subsurface soils were to be disturbed; which appears unlikely if land use remains the same. It is our opinion, based on the available soil and groundwater quality data, inhalation (either as vapor or as a contaminant of ambient dust) will not constitute a route of entry which will affect human health based on the available soil quality results.

4.4.2 Groundwater as the Exposure Source

The monitoring well network at the terminal has allowed Chevron U.S.A. Inc. and its representatives to obtain hydrogeologic data both within, and at a number of locations hydraulically downgradient of the terminal. A review of this data indicates that petroleum hydrocarbons in groundwater are limited to localized areas in the vicinity of monitoring wells MW-1, MW-2, MW-3 and MW-4. These monitoring wells are located within the terminal. Provided that no new releases of petroleum hydrocarbons occur, BTEX and TRPH levels are expected to further decrease with time.

Given the available information that has been used to identify the localized presence of petroleum hydrocarbons in groundwater and no known usage of the uppermost saturated zone beneath, or hydraulically downgradient from the site, it is concluded that human health is not at risk from the hydrocarbons in groundwater beneath the site.

As previously mentioned, the storage capacity of the terminal increased in 1991 with the installation of additional aboveground storage tanks in the area north of the former perimeter fence. Placement of these tanks has decreased the surficial area over which infiltration of surface water can occur into the soil. Together with the continued operation of the dewatering system, the soils in which diesel-range hydrocarbons occur will be in limited contact with groundwater. The potential for residual hydrocarbons to be released from the subsurface soils into the groundwater appears limited.

4.5 MONITORING

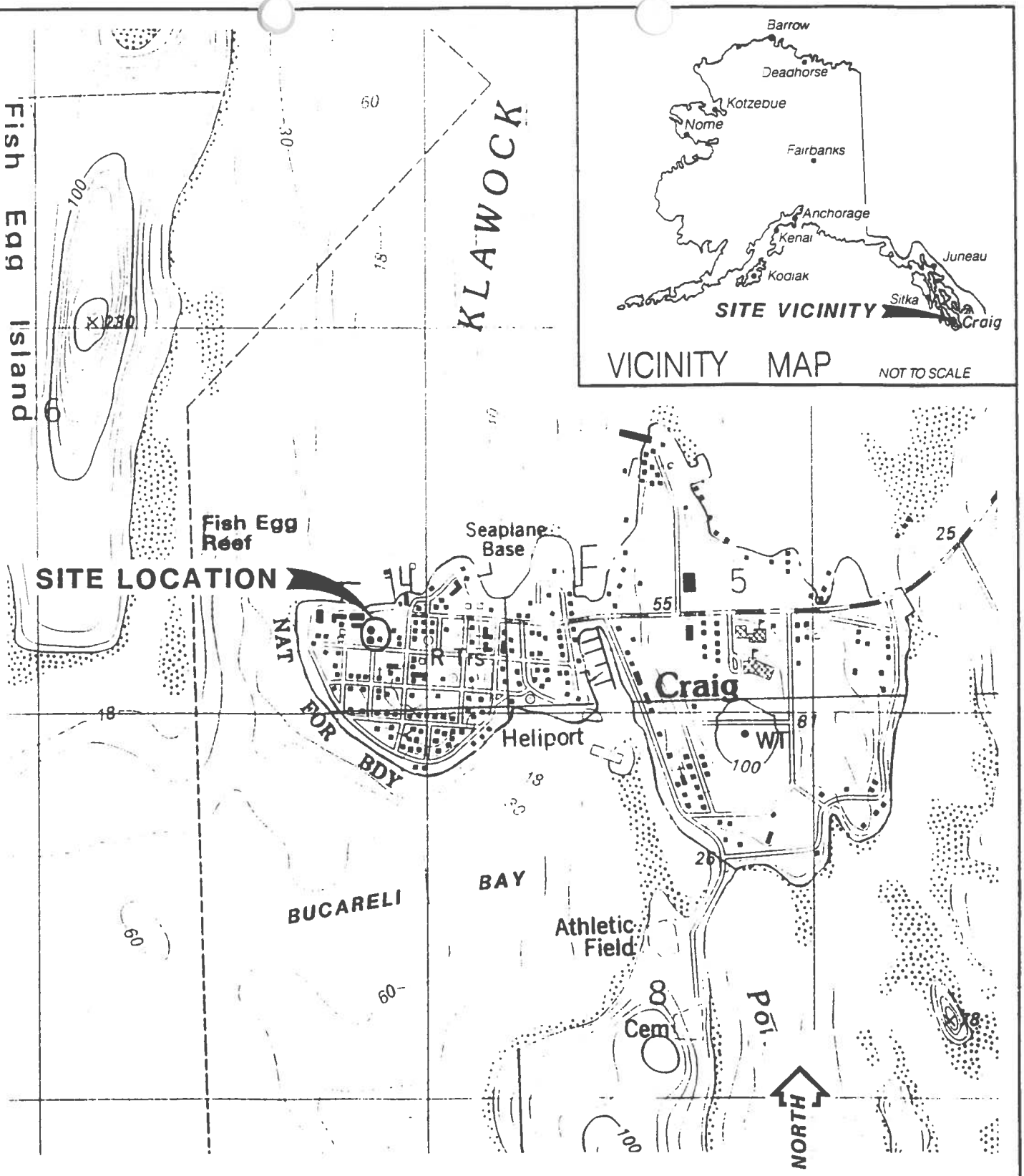
We understand that Chevron U.S.A. Inc. plans to continue operating the VES until approval to remove the system is granted by ADEC. The dewatering system will continue to operate together with the oil/water separator. Chevron U.S.A. Inc. is proposing that the air-stripping unit be removed from the system. Analysis of an "inflow" sample entering into the oil/water separator from the French drain on October 9, 1991, detected benzene at 0.016 ppm and ethylbenzene at 0.003 ppm. Toluene and xylenes

were not detected in this inflow sample. TRPH were reported at 1 ppm using EPA Method 418.1, and at 5 ppm (as diesel-range hydrocarbons) and non-detect (as gasoline-range hydrocarbons) using EPA Method 8015M.

Respectfully submitted,
AMERICA NORTH INC.

Andrew M. Dimitriou
Staff Geologist

Kevin G. Rattue
Project Manager



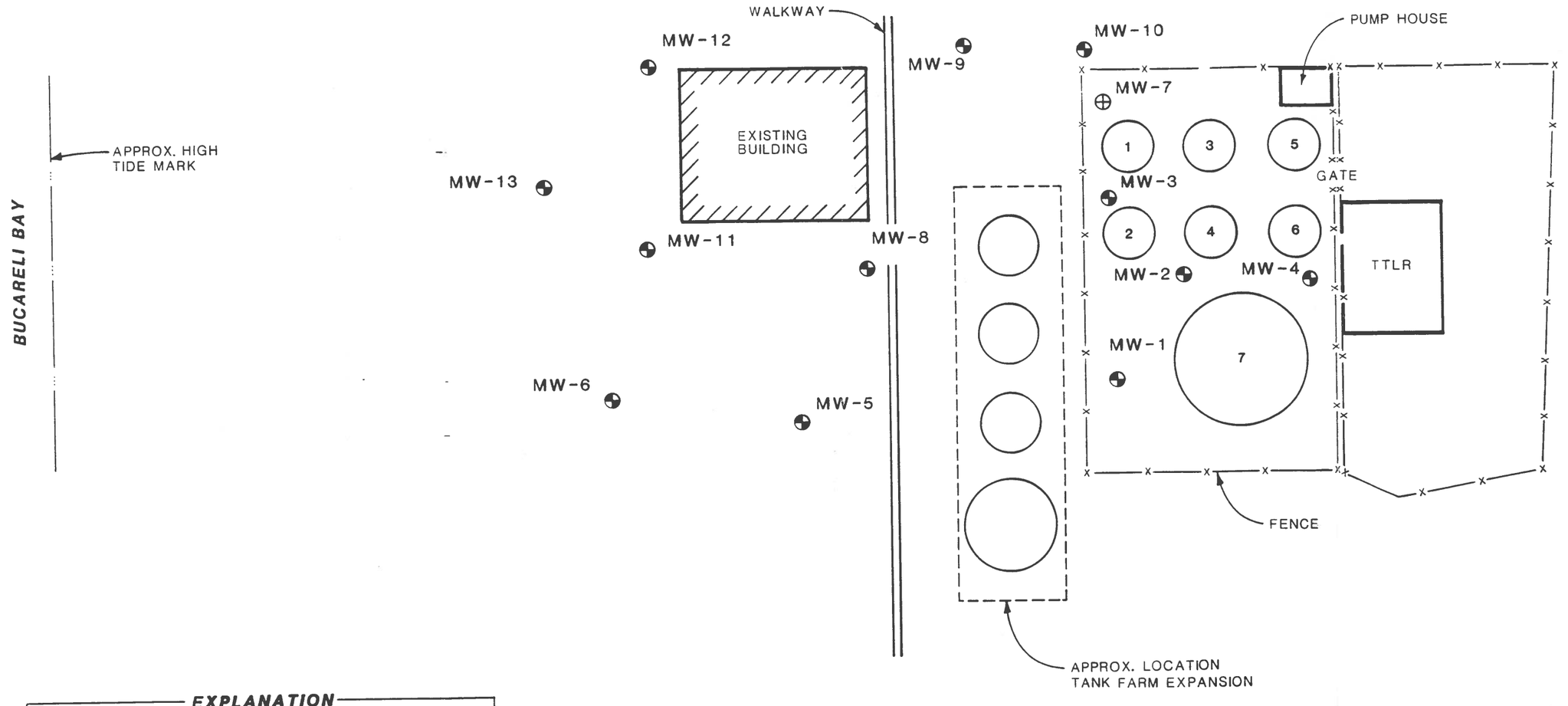
America North Inc.

DATE NOV. 1991
DWN. CDS 91069
CKD. A.D.
REV. JAN. 1992
PROJECT No. 13902.00

CHEVRON USA
BULK FUELS TERMINAL
Craig, Alaska

SITE LOCATION MAP

FIGURE 1



EXPLANATION

- 2-INCH DIAMETER PIEZOMETER
- 1-INCH DIAMETER PIEZOMETER
- 2-INCH DIAMETER MONITORING WELLS

NORTH

0 20 40

APPROX. SCALE IN FEET

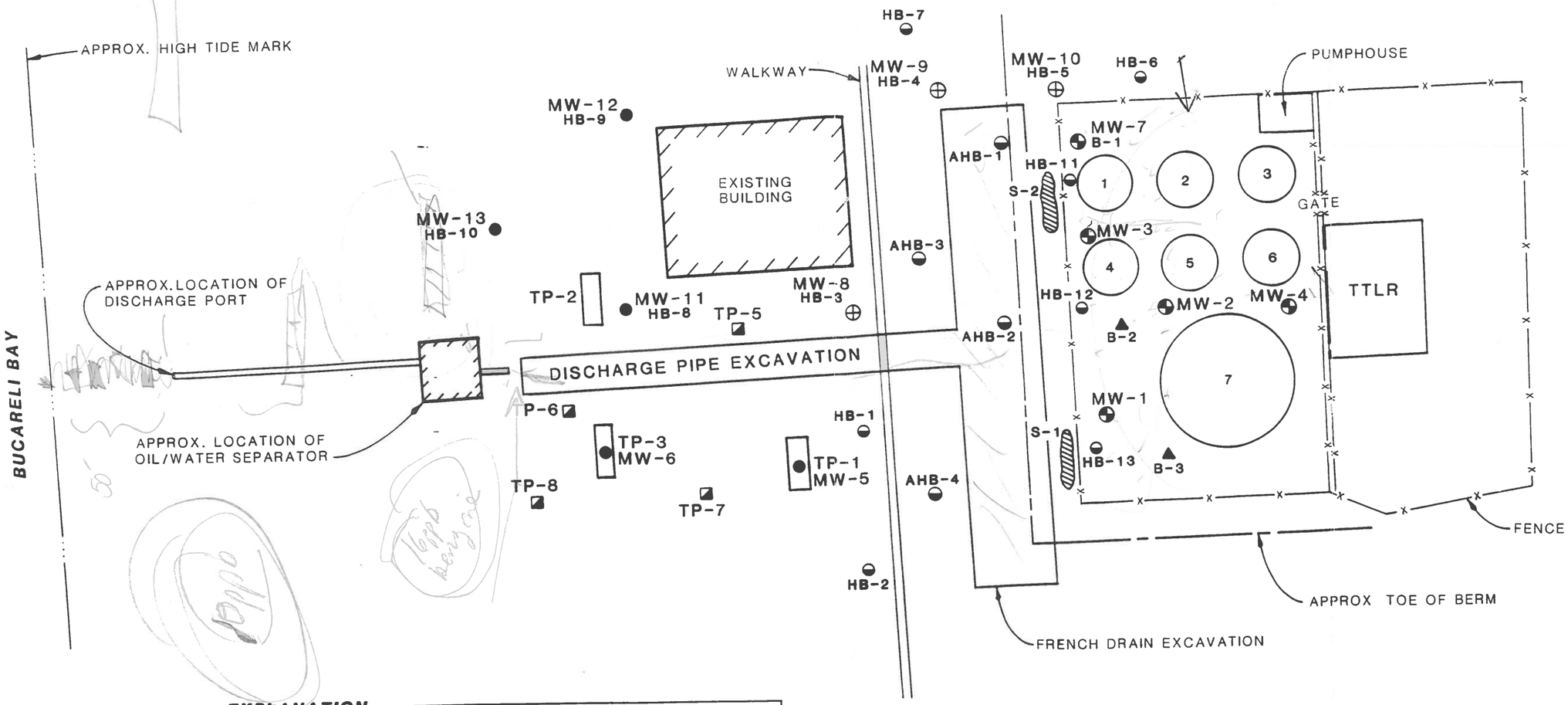
America North Inc.

DATE JULY 1991
DWN. CDS 91069
CKD. A.D.
REV. JAN. 1992
PROJECT No. 13902.00

CHEVRON U.S.A. BULK FUELS TERMINAL
CRAIG, ALASKA

SITE DIAGRAM

FIGURE 2



EXPLANATION

- MW-4 — 2-INCH MONITORING WELLS BY RZA GEOENGINEERS, INC
- MW-6 — PREVIOUS 2-INCH MONITORING WELLS BY RZA
- TP-4 — PREVIOUS TEST PITS BY RZA
- B-3 — PREVIOUS BORING/SOIL SAMPLES BY RZA
- TP-7 — APPROX. LOCATION OF RECENTLY COMPLETED TEST PITS BY RZA
- S-2 — APPROX. LOCATION OF COMPOSIT SAMPLE COLLECTED FROM EXCAVATED SOIL PLACED ON BERM
- MW-10 — APPROX. LOCATION OF RECENTLY COMPLETED MONITORING WELLS BY RZA
- HB-7 — APPROX. LOCATION OF COMPLETED HAND BORINGS BY RZA
- AHB-4 — APPROX. LOCATION OF HAND BORINGS COMPLETED BY RZA APRIL, 1990

NOTE: TANK FARM EXPANSION AREA NOT SHOWN.
SOIL QUALITY DATA SHOWN ON FIGURE 1.

NORTH

0 20 40

APPROX. SCALE IN FEET

SOURCE: RZA SITE & EXPLORATION PLAN DATED MAY 1990.

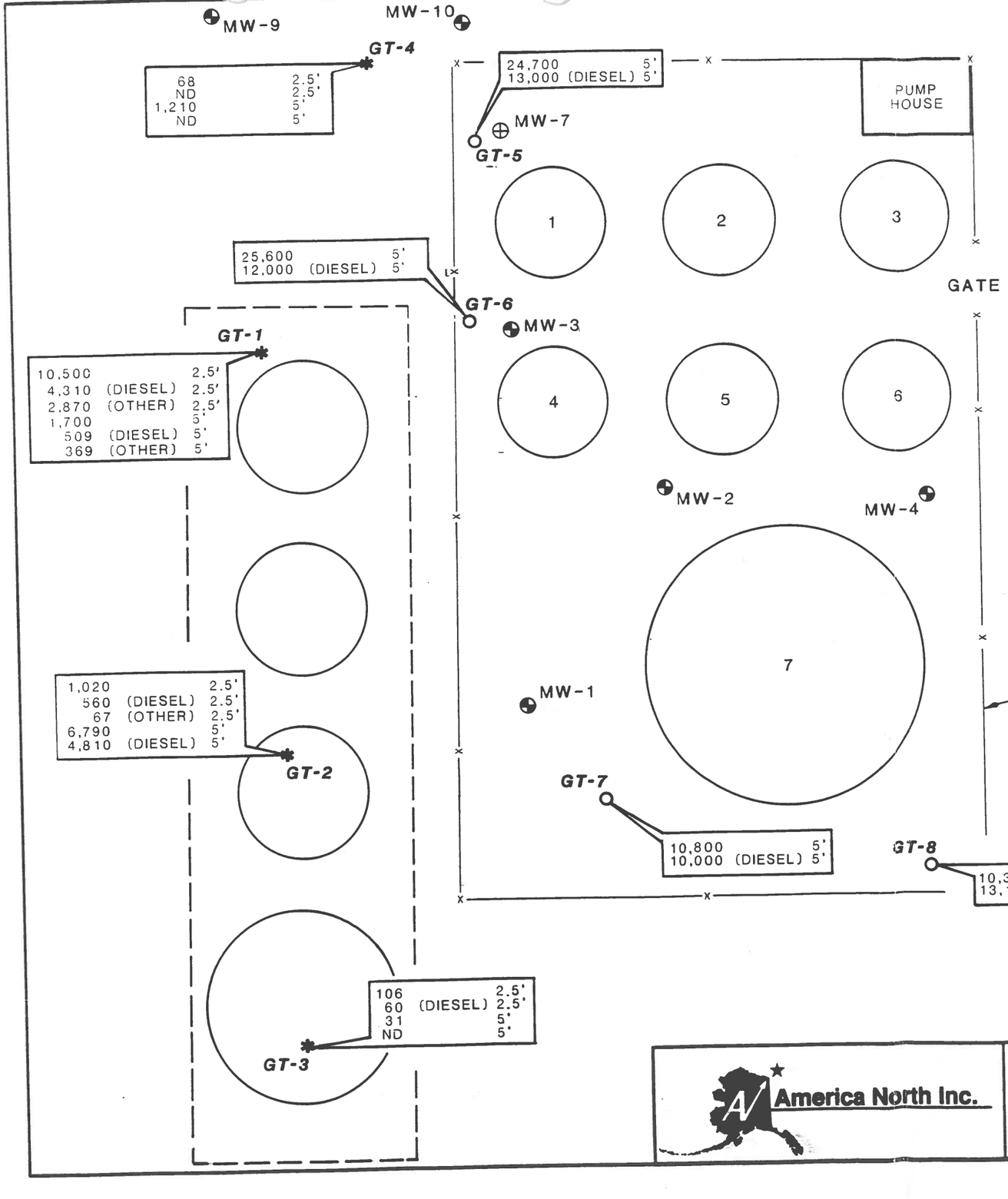
America North Inc.

DATE JAN. 1992
DWN. CDS 91069
CKD. A.D.
REV.
PROJECT No. 13902.00

CHEVRON U.S.A. BULK FUELS TERMINAL
CRAIG, ALASKA

MONITORING WELLS AND SOIL BORINGS LOCATIONS (PRE -1991)

FIGURE 3



EXPLANATION

GT-1

CONCENTRATIONS OF:

TRPH
(METHOD 418.1) IN ppm SAMPLE DEPTH

DIESEL
(METHOD 8015M) IN ppm SAMPLE DEPTH

OTHER
(METHOD 8015M) IN ppm SAMPLE DEPTH

ND - NON DETECTED
(WITH METHOD 8015M) AT MRL

ALL SAMPLES COLLECTED 7/8/1991

NOTES:

BENZENE NOT DETECTED IN ALL SOIL SAMPLES

GASOLINE NOT DETECTED IN ALL SOIL SAMPLES BY METHOD 8015M ANALYSIS

OTHER (METHOD 8015) QUANTIFIED AGAINST HYDRAULIC OIL

SEE TABLE 2 FOR COMPLETE 1991 SOIL-QUALITY DATA

NORTH

0 10 20

APPROX. SCALE IN FEET

America North Inc.

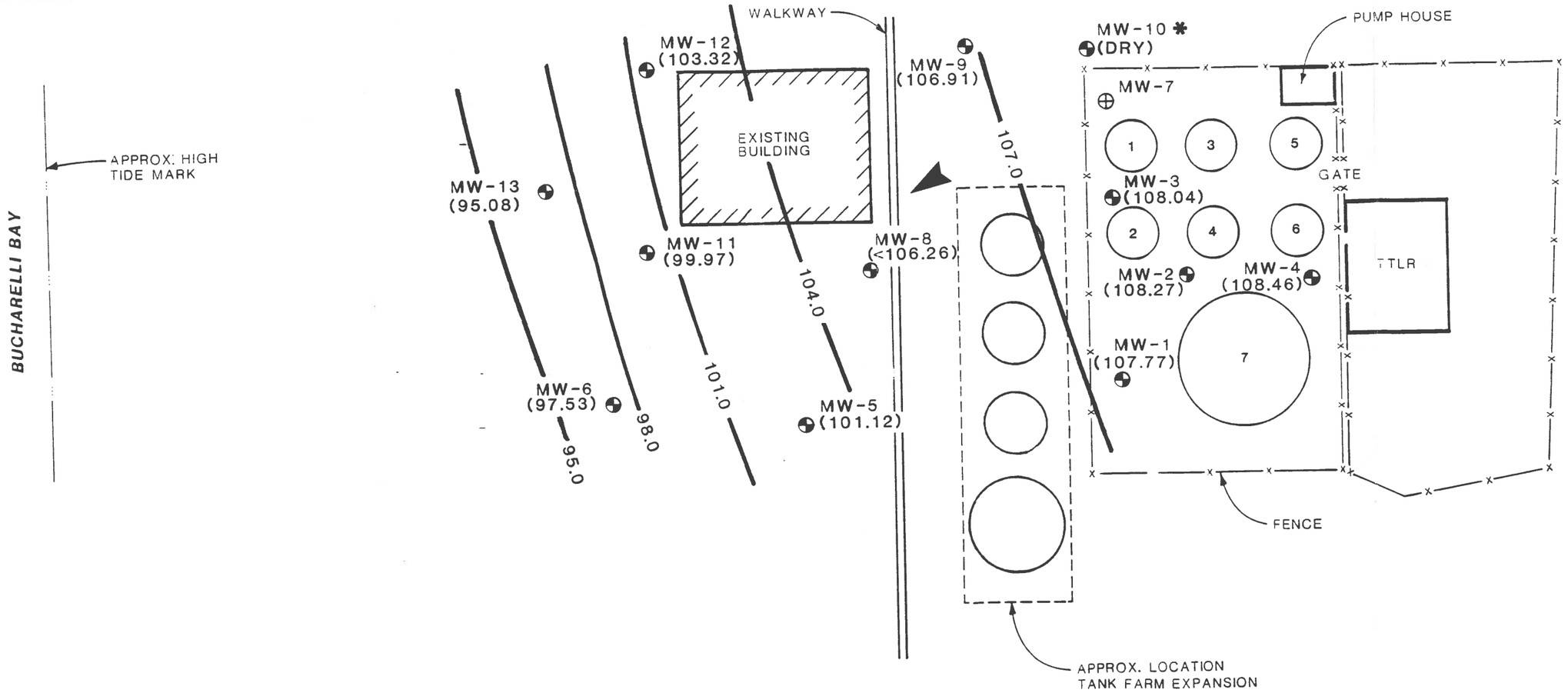
DATE JAN. 1992
DWN. CDS 91069
CKD. A.D.
REV.
PROJECT No. 13902.00

CHEVRON U.S.A. BULK FUELS TERMINAL
CRAIG, ALASKA

1991 ANI SOIL SAMPLING LOCATIONS AND SOIL QUALITY DATA

(BASED ON SAMPLES COLLECTED ON 7/8/1991)

FIGURE 4



EXPLANATION

- ⊕ 1-INCH DIAMETER PIEZOMETER
- ◒ 2-INCH DIAMETER MONITORING WELLS
- * NO WELL CONSTRUCTION DETAILS AVAILABLE. DATA FROM THIS WELL WAS NOT USED IN INFERRING LOCAL GROUND-WATER MIGRATION DIRECTION
- ◢ INFERRED GROUND-WATER MIGRATION DIRECTION
- (101.0) GROUND–WATER ELEVATION RELATIVE TO LOCAL PROJECT DATUM

NORTH

0 20 40

APPROX. SCALE IN FEET

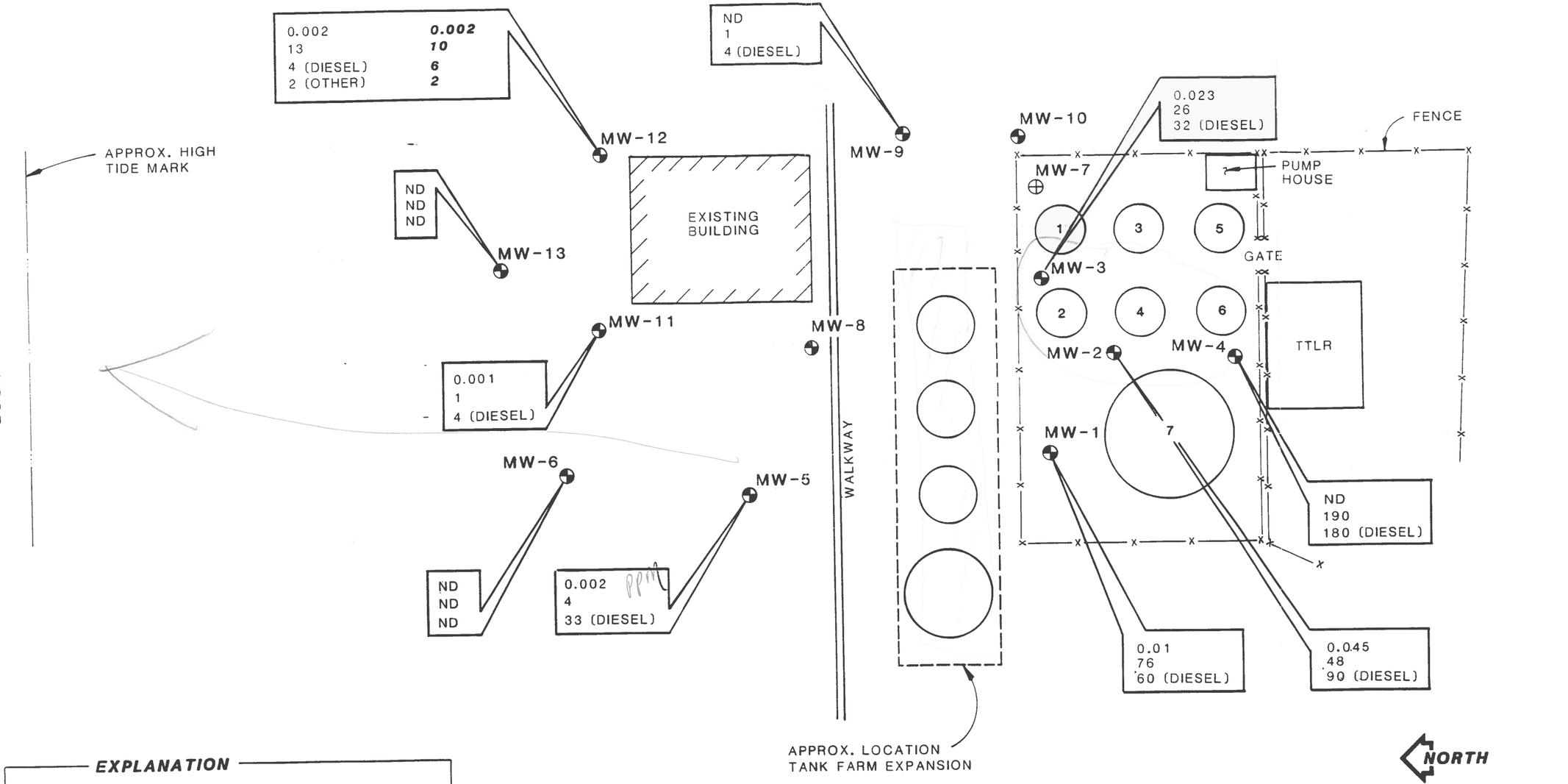
America North Inc.

DATE OCT. 1991
DWN. CDS 91069
CKD. A.D.
REV. JAN 1992
PROJECT No. 13902.00

CHEVRON U.S.A. BULK FUELS TERMINAL
CRAIG, ALASKA

PIEZOMETRIC SURFACE MAP
(BASED ON DATA COLLECTED ON 10/9/91)

FIGURE 5



EXPLANATION

- 2-INCH DIAMETER PIEZOMETER
- 1-INCH DIAMETER PIEZOMETER
- 2-INCH DIAMETER MONITORING WELLS

CONCENTRATIONS OF:

BENZENE (METHOD 8020) IN ppm
TRPH (METHOD 418.1) IN ppm
DIESEL (METHOD 8015m) IN ppm
OTHER (METHOD 8015m) IN ppm

0.002 CONCENTRATIONS REPORTED IN DUPLICATE SAMPLE COLLECTED AT MW-12

NOTES:

GASOLINE NOT DETECTED IN ALL GROUNDWATER SAMPLES BY METHOD 8015m ANALYSIS

OTHER ONLY DETECTED IN SAMPLE MW-12 AND DUPLICATE SEE TABLE 4 FOR COMPLETE GROUNDWATER QUALITY DATA

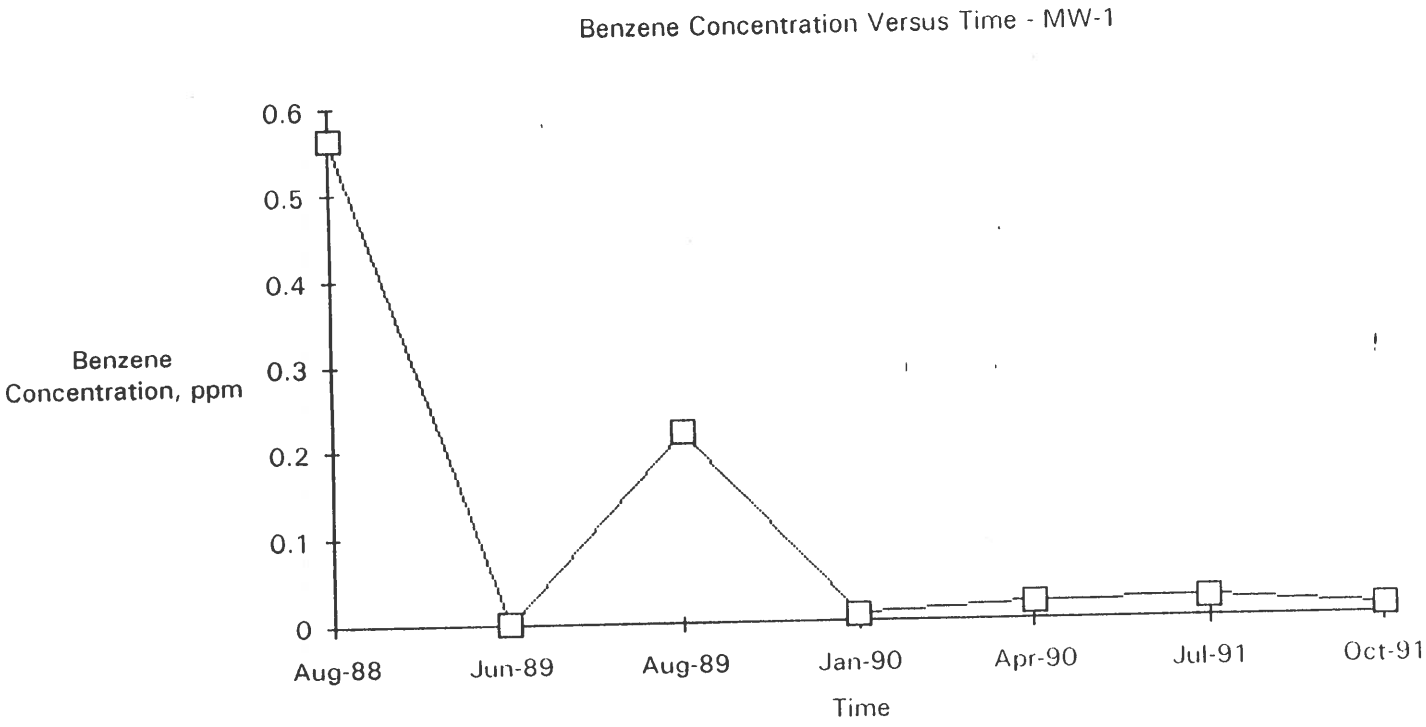
America North Inc.

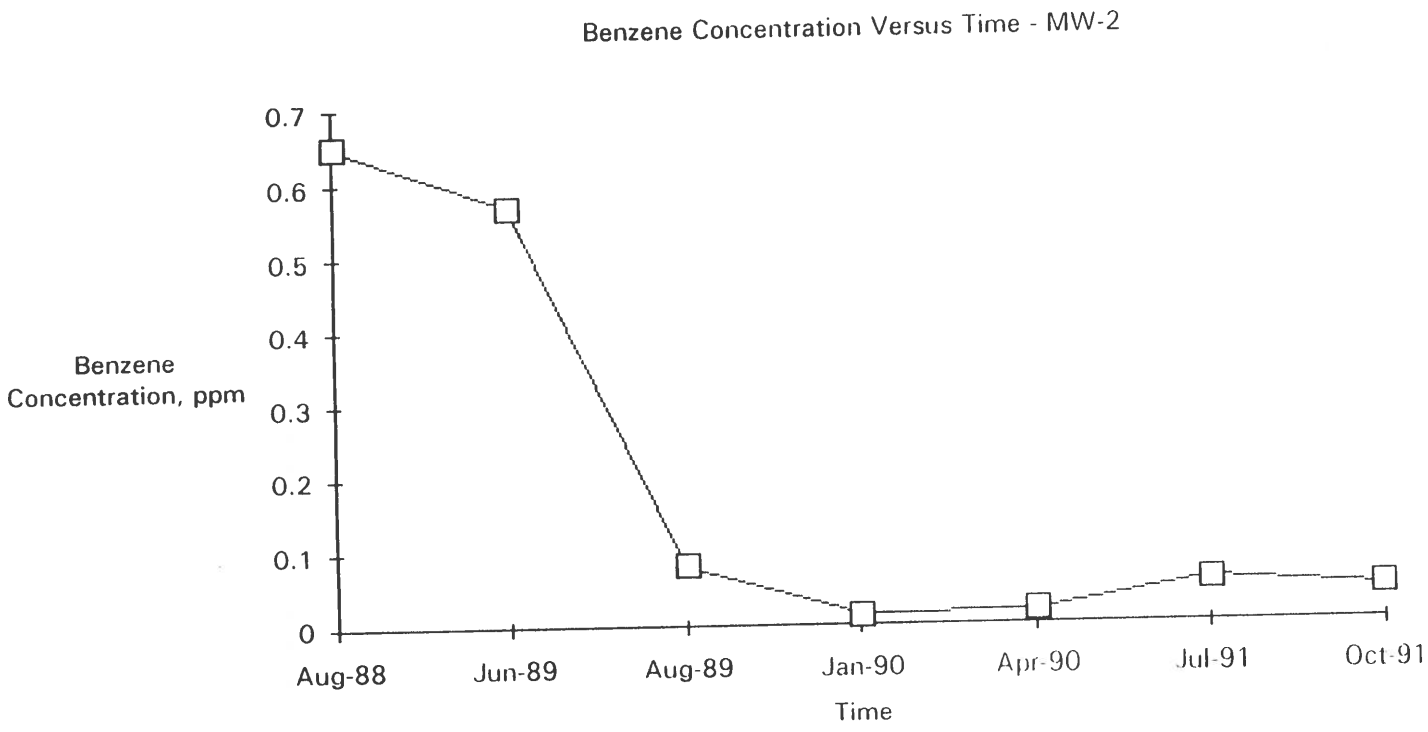
DATE JAN. 1992
DWN. CDS 91069
CKD. A.D.
REV.
PROJECT No. 13902.00

CHEVRON U.S.A. BULK FUELS TERMINAL
CRAIG, ALASKA

GROUNDWATER QUALITY DATA

FIGURE 6





America North Inc.

DATE	JAN. 1992
DWN.	CDS 91069
CKD.	A.D.
REV.	
PROJECT No.	13902.00

CHEVRON U.S.A. BULK FUELS TERMINAL
CRAIG, ALASKA

BENZENE CONCENTRATIONS VS TIME IN GROUND-WATER SAMPLES
(COLLECTED FROM MW-1 AND MW-2)

FIGURE 7

TABLE 1
SOIL-QUALITY DATA FOR SOIL SAMPLES ANALYZED BETWEEN 1989 AND 1990

SAMPLE NUMBER	DATE COLLECTED	DEPTH (feet)	PETROLEUM HYDROCARBON CONCENTRATIONS (mg/kg)					
			EPA METHOD 8020				TPH EPA Method 8015	TPH EPA Method 418
			Benzene	Toluene	Ethylbenzene	Xylenes		
TP-5, S-1	10/89	3.5	<0.05	<0.05	<0.05	0.92	526	NT
TP-5, S-2	10/89	5.5	<0.05	<0.05	<0.05	<0.05	174	NT
TP-6, S-1	10/89	3.5	NT	NT	NT	NT	NT	10
TP-6, S-2	10/89	5.5	NT	NT	NT	NT	NT	21
TP-7, S-1	10/89	2.0	<0.05	<0.05	<0.05	<0.05	167	NT
TP-7, S-2	10/89	4.0	NT	NT	NT	NT	NT	53
TP-8, S-1	10/89	2.0	NT	NT	NT	NT	NT	14
TP-8, S-2	10/89	4.5	NT	NT	NT	NT	NT	5
COMP S-1	10/89		<0.05	<0.05	1.15	4.14	1,121	NT
COMP S-2	10/89		<0.05	0.63	0.76	2.00	975	NT
HB-1, OS-9	10/89	4.5	NT	NT	NT	NT	3,337.00	
HB-2, OS-10	10/89	3.0	NT	NT	NT	NT	<10	
HB-3, OS-11	10/89	4.0	NT	NT	NT	NT	<10	
HB-4, OS-12	10/89	4.5	NT	NT	NT	NT	197.00	
HB-5, OS-13	10/89	4.5	NT	NT	NT	NT	<10	
HB-6, OS-14	10/89	4.0	NT	NT	NT	NT	<10	
HB-7, OS-15	10/89	4.0	NT	NT	NT	NT	<10	
HB-8	1/26/90	4.0	NT	NT	NT	NT	<10	

TABLE 1 (continued)
SOIL-QUALITY DATA FOR SOIL SAMPLES
ANALYZED BETWEEN 1989 AND 1990

SAMPLE NUMBER	DATE COLLECTED	DEPTH (feet)	PETROLEUM HYDROCARBON CONCENTRATIONS (mg/kg)					
			EPA METHOD 8020				TPH EPA Method 8015	TPH EPA Method 418.1
			Benzene	Toluene	Ethylbenzene	Xylenes		
HB-9	1/26/90	3.5	NT	NT	NT	NT	103.00	
HB-10	1/26/90	4.0	NT	NT	NT	NT	951.00	
AHB-1	4/16/90	3.0	<0.05	<0.05	<0.05	0.12	1,275.00	4,204
AHB-2	4/16/90	4.0	<0.05	0.14	0.11	1.30	2,234.00	7,307
AHB-3	4/16/90	3.5	<0.05	0.09	<0.05	0.20	507.00	1,966
AHB-4	4/16/90	3.0	<0.05	<0.05	<0.05	<0.05	369.00	1,376
WITHIN TANK YARD								
B-1, S-1	6/13/89	2.0	NT	NT	NT	NT	NT	4,970
B-1, S-2	6/13/89	4.3	0.92	0.76	3.60	44.70	11,200	NT
B-2, S-1	6/13/89	2.0	NT	NT	NT	NT	10,700	NT
B-2, S-2	6/13/89	3.2	NT	NT	NT	NT	NT	9,720
B-3, S-1	6/13/89	2.0	NT	NT	NT	NT	3,300	NT
B-3, S-2	6/13/89	3.2	<0.85	28.00	12.00	130.00	NT	7,070
HB-11	1/26/90	2.0	NT	NT	NT	NT	NT	21,365
HB-12	1/26/90	2.0	NT	NT	NT	NT	NT	27,703
HB-13	1/26/90	2.0	NT	NT	NT	NT	NT	2,435

NT = Not tested

TABLE 2
SOIL-QUALITY DATA FOR SAMPLES ANALYZED IN 1991

			5030/8020					3550/8015M			5520E/418.1
SAMPLE DESIGNATION	Sample Depth	Date Sampled	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Xylenes (ppm)	Total BTEX (ppm)	Gasoline (ppm)	Diesel (ppm)	Other* (ppm)	TRPH (ppm)
GT-1-2.5	2.5	7/8/91	ND	ND	ND	ND	0.00	ND	4,310	2,870	10,500
GT-1-5	5	7/8/91	ND	ND	0.145	0.591	0.736	ND	509	369	1,700
GT-2-2.5	2.5	7/8/91	ND	ND	0.033	0.117	0.15	ND	560	67	1,020
GT-2-5	5	7/8/91	ND	0.277	1.03	3.28	4.587	ND**	4810**	ND**	6,790
GT-3-2.5	2.5	7/8/91	ND	ND	ND	ND	0.00	ND	60	ND	106
GT-3-5	5	7/8/91	ND	ND	ND	ND	0.00	ND	ND	ND	31
GT-4-2.5	2.5	7/8/91	ND	0.048	0.585	2.87	3.503	ND	ND	ND	68
GT-4-5	5	7/8/91	ND	ND	0.128	0.866	0.994	ND**	874**	ND**	1,210
GT-5	2	7/8/91	ND	0.071	0.38	1.98	2.431	ND**	13000**	ND**	24,700
GT-6	2	7/8/91	ND	0.201	0.86	4.15	5.211	ND**	12000**	ND**	25,600
GT-7	2	7/8/91	ND	0.223	0.634	2.51	3.367	ND**	10000**	ND**	10,800
GT-8	2	7/8/91	ND	0.078	0.295	1.67	2.043	ND**	13100**	ND**	10,300
US EPA Method			5030/8020	5030/8020	5030/8020	5030/8020	5030/8020	3550/8015M	3550/8015M	3550/8015M	5520E/418.1
Method Reporting Limit (MRL)			0.025	0.025	0.025	0.025		10	10		25

* Quantified against hydraulic oil. The MRL for this product is four times the listed MRL.

** Sample dilution necessitated elevated MRL of 20 ppm.

ND - Not Detected at MRL

TABLE 3
GROUNDWATER ELEVATION DATA

MONITORING WELL	TOP OF CASING ELEVATION* (feet)	GROUNDWATER ELEVATION* (5/28/91) (feet)	GROUNDWATER ELEVATION* (7/8/91) (feet)	GROUNDWATER ELEVATION* (10/9/91) (feet)
MW-1	113.26	107.39	106.41	107.77
MW-2	114.22	107.51	106.87	108.27
MW-3	114.24	107.51	106.89	108.46
MW-4	111.68	107.83	106.99	108.04
MW-5	108.64	100.79**	100.36	101.12
MW-6	103.40	96.55**	96.50	97.53
MW-7	112.16	Not Sampled +	Not Sampled +	Not Sampled +
MW-8	109.39	< 106.26	< 106.26	< 106.26
MW-9	112.54	105.46	105.82	106.91
MW-10 ++	114.61	DRY	DRY	DRY
MW-11	105.02	99.09	99.22	99.97
MW-12	108.37	101.60**	101.77	103.32
MW-13	98.68	93.53**	93.63	95.08

* Relative to project datum of 100 ft.
** Measurements taken on 5/29/91.
\+ One-inch diameter piezometer - not sampled.
++ No well construction details available -
Data not used in inferring local groundwater migration direction.

TABLE 4
SUMMARY OF GROUNDWATER-QUALITY DATA
MW-1 THROUGH MW-6

			3510/8015M			418.1
SAMPLE DESIGNATION	Date Sampled	Benzene (ppm)	Gasoline (ppm)	Diesel (ppm)	Other (ppm)	TRPH (ppm)
MW-1*	Feb-87	12	NA	NA	NA	NA
MW-1**	Aug-88	0.564	NA	NA	NA	4710
MW-1**	Jun-89	ND	NA	NA	NA	NA
MW-1**	Aug-89	0.22	NA	NA	37	NA
MW-1**	Jan-90	0.007	NA	NA	NA	14,000
MW-1**	Apr-90	0.02	NA	222	NA	NA
MW-1***	Jul-91	0.023	ND	182	ND	183
MW-1***	Oct-91	0.01	ND	60	ND	76
MW-2*	Feb-87	4.3	NA	NA	NA	NA
MW-2**	Aug-88	0.651	NA	NA	NA	33,000
MW-2**	Jun-89	0.57	NA	NA	NA	NA
MW-2**	Aug-89	0.08	NA	NA	110	NA
MW-2**	Jan-90	0.013	NA	NA	NA	215
MW-2**	Apr-90	0.018	NA	NA	25	NA
MW-2***	Jul-91	0.058	ND	300	ND	704
MW-2***	Oct-91	0.045	ND	90	ND	48
MW-3*	Feb-87	0.44	NA	NA	NA	NA
MW-3**	Aug-88	0.067	NA	NA	NA	2,611
MW-3**	Jun-89	1.0	NA	NA	NA	NA
MW-3**	Aug-89	0.024	NA	NA	NA	135
MW-3**	Jan-90	ND	NA	NA	NA	340
MW-3**	Apr-90	0.006	NA	NA	NA	92
MW-3***	Jul-91	0.034	ND	238	ND	546
MW-3***	Oct-91	0.023	ND	32	ND	26
MW-4*	Feb-87	ND	NA	NA	NA	NA
MW-4**	Aug-88	ND	NA	NA	NA	4,780
MW-4**	Jun-89	NA	NA	NA	NA	18
MW-4**	Aug-89	NA	NA	NA	NA	NA
MW-4**	Jan-90	ND	NA	NA	NA	ND
MW-4**	Apr-90	NA	NA	NA	NA	NA
MW-4***	Jul-91	ND	ND	705	ND	1,600
MW-4***	Oct-91	ND	ND	180	ND	190
MW-5*	Feb-87	NA	NA	NA	NA	NA
MW-5**	Aug-88	ND	NA	NA	NA	ND
MW-5**	Jun-89	NA	NA	NA	NA	NA
MW-5**	Aug-89	ND	NA	NA	NA	32
MW-5**	Jan-90	ND	NA	NA	NA	30
MW-5**	Apr-90	0.006	NA	NA	NA	ND
MW-5***	Jul-91	0.01	ND	14	ND	9
MW-5***	Oct-91	0.002	ND	33	ND	4
MW-6*	Feb-87	NA	NA	NA	NA	NA
MW-6**	Aug-88	ND	NA	NA	NA	ND
MW-6**	Jun-89	NA	NA	NA	NA	NA
MW-6**	Aug-89	ND	NA	NA	NA	8
MW-6**	Jan-90	ND	NA	NA	NA	ND
MW-6**	Apr-90	ND	NA	NA	NA	16
MW-6***	Jul-91	0.001	ND	1	ND	ND
MW-6***	Oct-91	ND	ND	ND	ND	ND

* GeoEngineers Inc., March , 1987. Report of Geotechnical Services Site Contamination Assessment Existing Petroleum Bulk Storage Facility for Craig, Alaska, for Chevron, U.S.A., Inc.

** RZA, Oct., 1990. Quarterly Status Report, Bulk Fuels Storage Facility, Craig, Alaska

*** ANI, Dec.,1991. Report of Ground Water Sampling Activities Performed at the Chevron U. S. A. Inc. Bulk Fuels Terminal, Craig, Alaska, October 1991.

ABBREVIATIONS: ND - Not Detected NA - Not Analyzed

TABLE 4
SUMMARY OF GROUNDWATER-QUALITY DATA
MW-9 THROUGH MW-13

			3510/8015M			418.1
SAMPLE DESIGNATION	Date Sampled	Benzene (ppm)	Gasoline (ppm)	Diesel (ppm)	Other (ppm)	TRPH (ppm)
MW-9***	Jul-91	ND	ND	11	ND	7
MW-9***	Oct-91	ND	ND	4	ND	1
MW-11***	Jul-91	0.001	1	9	ND	29
MW-11***	Oct-91	0.001	ND	4	ND	1
MW-12***	Jul-91	0.002	ND	27	10	2.2
MW-12*** Duplicate	Jul-91	ND	ND	30	10	39.0
MW-12***	Oct-91	0.002	ND	4	2	13.0
MW-12*** Duplicate	Oct-91	0.002	ND	6	2	10.0
MW-13***	Jul-91	ND	ND	ND	ND	ND
MW-13***	Oct-91	ND	ND	ND	ND	ND
INFLOW-1	Oct-91	0.016	ND	5	ND	1

* GeoEngineers Inc., March , 1987. Report of Geotechnical Services Site Contamination Assessment Existing Petroleum Bulk Storage Facility for Craig, Alaska, for Chevron, U.S.A., Inc.

** RZA, Oct., 1990. Quarterly Status Report, Bulk Fuels Storage Facility, Craig, Alaska

*** ANI, Dec.,1991. Report of Ground Water Sampling Activities Performed at the Chevron U. S. A. Inc. Bulk Fuels Terminal, Craig, Alaska, October 1991.

ABBREVIATIONS: ND - Not Detected NA - Not Analyzed

REPORT OF GROUNDWATER SAMPLING ACTIVITIES PERFORMED AT THE CHEVRON U.S.A. INC. BULK FUELS TERMINAL, CRAIG, ALASKA

Prepared for:
Chevron U.S.A. Inc.
1301 5th Avenue, Suite 2900
Seattle, Washington 98101

Prepared by:
America North Inc.
201 E. 56th Avenue, Suite 200
Anchorage, Alaska 99518

January 1992

America North Inc.
Environmental Consulting & Engineering • Health & Safety

January 27, 1992

Mr. Randy Rice
Southeast Regional Office
Alaska Department of Environmental Conservation
P.O. Box 32420
Juneau, Alaska 99811

Dear Mr. Rice:

On behalf of Chevron U.S.A. Inc., America North Inc. is pleased to submit two copies of the "Report of Groundwater Sampling Activities Performed at the Chevron U.S.A. Inc., Bulk Fuels Terminal, Craig, Alaska, October 1991", for your review.

Please contact the undersigned with any questions or comments regarding this report.

Sincerely,
AMERICA NORTH INC.

Julie L. Anne (for)

Andrew M. Dimitriou
Staff Geologist

Kevin G. Rattue
Project Manager

AMDi/KGR/jla

cc w/att: S. Bruce; Chevron U.S.A. Inc.

1390200\012792.ltr

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(America North Inc. is a subsidiary of EMCON Associates Inc.)

CONTENTS

FIGURES, TABLES, AND APPENDICES

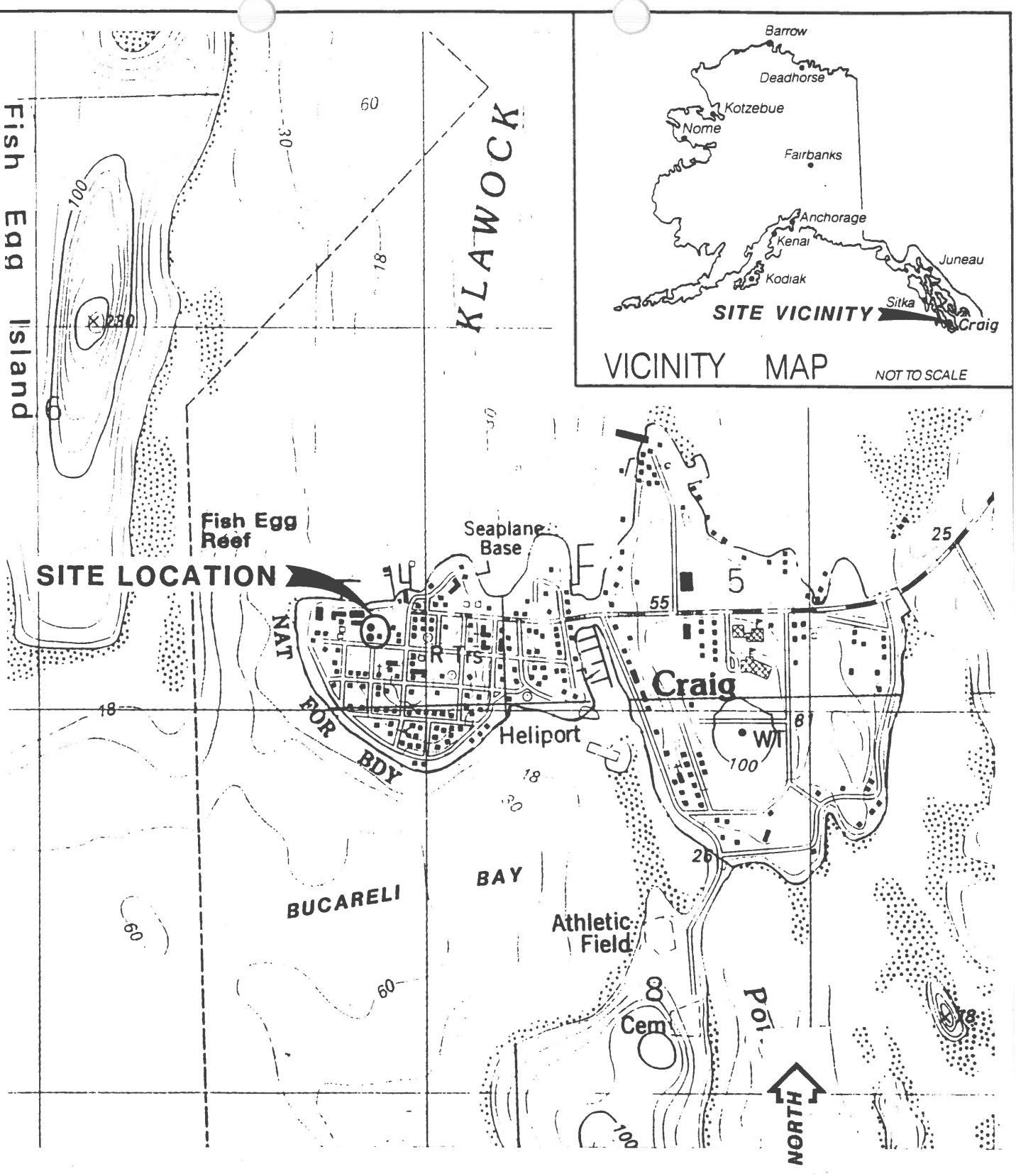
FIGURES

TABLES

APPENDICES

1 INTRODUCTION

America North Inc. (ANI) is pleased to submit this report summarizing the findings of the groundwater sampling activities at the Chevron U.S.A. Inc. Bulk Fuels Terminal in Craig, Alaska, see Figure 1. Groundwater samples were collected from each of the monitoring wells which contained water on October 9, 1991. The scope of work was performed in general accordance with the proposal submitted by ANI to Chevron U.S.A. Inc. on April 29, 1991 under Contract #P16CNW02031X and Release #5646410.



America North Inc.

DATE NOV. 1991
DWN. CDS 91069
CKD. A.D.
REV. JAN. 1992
PROJECT No. 13902.00

CHEVRON USA
BULK FUELS TERMINAL
~~Craig, Alaska~~

SITE LOCATION MAP

FIGURE 1

2 BACKGROUND

2.1 SITE DESCRIPTION

The bulk fuels terminal is located in Craig, Alaska and approximately 200 feet south of the shoreline of Bucharelli Bay (see Figure 1). Land use immediately surrounding the site consists of a vegetative area (brush, grass and weeds) between the terminal and Bucharelli Bay, residential property to the east and west, and a road to the south. A cannery operation is located approximately 200 feet to the northwest. Various businesses including a restaurant and retail operations are located approximately 100 feet to the northeast. Residential properties are located south of the terminal.

Mean annual precipitation at the site is approximately 106 inches, with a yearly average of approximately 58 percent of the precipitation (61 inches) occurring between September and January, according to data provided by the Alaska Climate Center.

2.2 BULK FUELS TERMINAL LAYOUT

White Pass Alaska operates the bulk fuels terminal. The terminal consists of 11 aboveground fuel storage tanks in a tank farm and a separate expansion area to the north. The facility also includes a pump house, a truck trailer loading rack (TTLR), aboveground piping, and a pipeline that descends to a boat fueling dock. Ground surface elevation in the vicinity of the tanks is approximately 25 feet above mean sea level. The ground surface material consists of predominantly sandy gravel. Prior to July 1991, the tank farm consisted of seven tanks enclosed by a four-foot high earth embankment and a chain link fence. The fuel pipeline that connects the tank farm with the fueling dock is mostly above ground, with the exception of approximately 100 feet of buried piping adjacent to the tank farm.

Prior to summer 1991, the terminal consisted of seven tanks enclosed by a four-foot high earth embankment and a chain link fence. Four additional tanks were installed during late summer 1991 by White Pass Alaska as part of a terminal expansion program in a separate area to the north of the existing tank farm (see Figure 2). The new tanks were constructed in the area in which a vapor extraction system (VES) is installed in soils at a depth of approximately four feet below ground surface (bgs). These tanks were placed on a six-inch thick rectangular cement pad with approximate dimensions of 20 feet by 70 feet. A four-foot high cement wall surrounds the terminal expansion area. These tanks did not contain fuel at the time of the ANI site visit on October 9, 1991. We understand that, when filled, the total storage capacity of the terminal will be approximately 80,000 gallons.

2.3 REVIEW OF PREVIOUS SITE ASSESSMENT/REMEDIATION WORK

In March 1987, Geoengineers, Inc. prepared an environmental assessment report on behalf of Chevron U.S.A. Inc. that presented findings of a soils and groundwater investigation at the terminal in February 1987. Findings presented in the report revealed the presence of phase-separated hydrocarbons in monitoring well MW-1, which is located approximately 15 feet north of Tank 7 (see Figure 2). Depth

to groundwater measured in the monitoring wells within the tank farm during this sampling event was less than one foot below ground surface. The thickness of phase-separated hydrocarbons in MW-1 on February 11 and 15, 1987, was reported to be 0.69 and 0.26 feet, respectively.

Petroleum-like odors were noted to be present in the soil samples collected while installing monitoring wells designated MW-2 through MW-4, and in soil samples from a boring designated B-5. Gasoline-range hydrocarbons were detected in soil samples collected and analyzed from MW-1 (700 parts per million [ppm]), MW-2 (490 ppm) and MW-3 (800 ppm). Gasoline-range hydrocarbons were not detected above the detection limit (9.0 ppm) in soil samples collected from MW-4 and MW-5. Diesel-range hydrocarbons were not detected above the detection limit (50 ppm) in any of the five soil samples that were analyzed.

Groundwater samples were collected from each of the four monitoring wells in February 1987. The groundwater elevations measured during this sampling event ranged from approximately 0.2 feet below ground surface in MW-1 to approximately 0.9 feet below ground surface in MW-3. Benzene was detected in the groundwater sample collected from MW-1 (12 ppm), MW-2 (4.3 ppm) and MW-3 (0.44 ppm). Benzene was not detected above the detection limit (0.0005 ppm) in the groundwater sample analyzed from MW-4, which is located close to the south wall of the terminal (see Figure 2).

In June 1988, Rittenhouse-Zeman and Associates, Inc. (RZA) prepared a report on behalf of Chevron U.S.A. Inc. that documented the findings of further soil sampling, and the installation of additional monitoring wells designated MW-5 and MW-6 (see Figure 2). It was reported that the phase-separated hydrocarbon thickness in MW-1 on June 2, 1988, was 0.05 feet. Phase-separated hydrocarbons were not reported to be present on the water surface in any of the other five monitoring wells. Based on the analysis of additional soil samples from test pits located outside the terminal, it was stated in the June 1988 report that "no significant soil quality impacts appear to exist downgradient of the facility at this time".

In September 1988, RZA submitted a report to Chevron U.S.A. Inc. that documented the installation of a VES designed to remove petroleum hydrocarbons (particularly the more volatile fuel components) from the soil and groundwater in the vicinity of MW-1, MW-2 and MW-3, which are located in the northern part of the tank farm. A trackhoe was used to excavate shallow trenches in which four-inch diameter, slotted polyethylene underground piping was installed. This piping was placed approximately one foot bgs and the trench was backfilled with approximately 12 inches of crushed rock. The trench was covered with a thin layer of native materials. A thin barrier of plastic sheeting was placed over the area and extended about two to five feet horizontally beyond the piping trench. Aboveground components of the system were located west of MW-1. A flexible hose extended from a riser pipe to a condensation tank, and additional hose connected the condensation tank to a blower and an exhaust stack.

The September 1988 report documented that on August 4, 1988, 0.17 feet of phase-separated hydrocarbons was measured in MW-1. It was concluded that the hydrocarbon thickness may have been greater on August 4, 1988, than measured on June 2, 1988, because the groundwater elevations were lower. Groundwater samples were collected from each of the six monitoring wells in June 1988 and

analyzed for total recoverable petroleum hydrocarbons (TRPH) (using EPA Method 418.1) and benzene, toluene, ethylbenzene and xylenes (BTEX) (using U.S. Environmental Protection Agency [EPA] Method 5030/8020). TRPH were detected in each groundwater sample at concentrations ranging from 35,000 ppm in the sample collected from MW-2 to 15.7 ppm in the sample collected from MW-6. Benzene was detected only in the samples collected from MW-1 (0.56 ppm), MW-2 (0.65 ppm) and MW-3 (0.067 ppm).

In 1989, RZA prepared several documents describing the installation and sampling of additional monitoring wells that were designated MW-8 and MW-9, and the advancement of 11 soil borings to the north of the tank farm. Based on the findings of these investigations, the VES was expanded to include an area on the north side of the tank farm fence. Petroleum hydrocarbons were reported in soils approximately 40 feet north of the terminal fence at concentrations ranging from not detected to 3,337 ppm using Method 8015M, 5 ppm to 53 ppm using Method 418.1, and 0.2 ppm to 5.39 ppm total BTEX using Method 8020.

RZA's 1989 report also documents the construction of a passive dewatering trench and treatment system located just outside the north fence of the terminal. The system consists of a French drain which lies in an east-west direction along the length of the terminal, constructed to an approximate depth of about eight feet. Groundwater collected in the French drain is directed into a groundwater treatment system consisting of an oil/water separator and an air-stripping unit. Treated water is discharged to the ground surface via a piping system with an outlet approximately 80 feet north of the treatment system.

Since the installation of the groundwater recovery/treatment system in 1989, groundwater samples have been collected from monitoring wells on a regular basis. In June 1989 depth to groundwater at the site ranged between three and four feet below ground surface. Quarterly monitoring results have been presented in reports prepared by RZA (September and October 1990) and ANI (July and December 1991). RZA's 1990 report also include details on additional soil samples collected from the vicinity of the French drain in April 1990 and designated AHB-1 through AHB-4.

ANI was contracted in April 1991 by Chevron U.S.A. Inc. to conduct quarterly sampling of the groundwater monitoring wells, and the first monitoring event took place in July 1991. This report summarizes the groundwater quality results from the sampling events performed in July 1991 and also from the most recent event in October 1991. Information on groundwater elevations from both sampling events, and the migration direction inferred from the October groundwater elevations are also included.

3 SCOPE OF WORK

ANI's Scope of Work performed in October 1991 included the following tasks:

- Measuring the depth to groundwater and checking for phase separated hydrocarbons in each of the monitoring wells on October 9, 1991;
- Calculating the relative groundwater elevation and estimating the approximate direction of groundwater migration beneath the site;
- Collecting groundwater samples from all monitoring wells which contained water on October 9, 1991 together with one duplicate, and one trip blank;
- Coordinating groundwater chemical analyses for benzene, toluene, ethylbenzene and total xylenes (BTEX, EPA Method 5030/8020), total petroleum hydrocarbons (EPA Method 3510/8015 Modified), and total petroleum hydrocarbons (TPH-IR, EPA Method 418.1).

4 FINDINGS

4.1 GROUNDWATER ELEVATIONS

Depth-to-water measurements were obtained in each monitoring well that contained water on October 9, 1991. Relative groundwater elevations were calculated using data from the vertical control survey performed on May 29, 1991 during which a project datum of (100.00 feet) was established. Groundwater elevations on May 29, July 8, and October 9, 1991 are summarized in Table 1.

Inferred direction of groundwater migration beneath the site was to the north during the October 1991 sampling event. Hydraulic gradients steepen to the north of the tank farm (0.27 foot/foot between monitoring wells MW-12 and MW-13 compared with 0.0076 foot/foot between monitoring wells MW-4 and MW-2 within the tank farm) and appear to be influenced by the topography which slopes towards Bucharelli Bay. These gradients are generally similar to those inferred from the July 1991 monitoring event.

4.2 GROUNDWATER SAMPLING

All monitoring wells (except MW-7, MW-8 and MW-10) were purged by removing three well volumes and groundwater samples collected on October 9, 1991. Monitoring well MW-7 was installed as a one-inch diameter piezometer; this prevented the collection of groundwater samples using the two-inch diameter bailer. Monitoring wells MW-8 and MW-10 did not contain water during the site visits in May, July, and October 1991. Groundwater samples were collected with disposable polyvinyl chloride (PVC) bailers. A water sample (INFLOW-1) was collected directly from the inflow to the oil-water separator system on October 9, 1991. All water samples were placed into laboratory-supplied sample containers, stored on ice, and submitted under ANI standard chain-of-custody procedure to Columbia Analytical Services, Inc. of Kelso, Washington for analysis of TPH-IR, BTEX and fuel hydrocarbons. The ANI Water Sample Field Data Sheets are included as Appendix A.

4.3 ANALYTICAL TESTING RESULTS

The analytical results for the groundwater samples collected on October 9, 1991 and July 8, 1991 are summarized in Table 2.

Benzene concentrations for water samples collected October 9, 1991 ranged from not detected in MW-4, MW-6, MW-9 and MW-13 to a maximum of 0.045 ppm in MW-2. Total BTEX concentrations for water samples collected October 9, 1991 ranged from not detected for MW-9 and MW-13 to a maximum of 0.371 ppm in MW-3. TPH quantified as gasoline were not detected in any water sample collected October 9, 1991. TPH quantified as diesel for water samples collected October 9, 1991 ranged from not detected in MW-6 and MW-13 to a maximum of 180 ppm in MW-4. TPH quantified

TABLE 1

GROUNDWATER ELEVATION DATA
CHEVRON U.S.A., INC. BULK FUELS TERMINAL
CRAIG, ALASKA

MONITORING WELL	TOP OF CASING ELEVATION* (feet)	GROUNDWATER ELEVATION* (5/28/91) (feet)	GROUNDWATER ELEVATION* (7/8/91) (feet)	GROUNDWATER ELEVATION* (10/9/91) (feet)
MW-1	113.26	107.39	106.41	107.77
MW-2	114.22	107.51	106.87	108.27
MW-3	114.24	107.51	106.89	108.46
MW-4	111.68	107.83	106.99	108.04
MW-5	108.64	100.79**	100.36	101.12
MW-6	103.40	96.55**	96.50	97.53
MW-7	112.16	Not Sampled +	Not Sampled +	Not Sampled +
MW-8	109.39	< 106.26	< 106.26	< 106.26
MW-9	112.54	105.46	105.82	106.91
MW-10 ++	114.61	DRY	DRY	DRY
MW-11	105.02	99.09	99.22	99.97
MW-12	108.37	101.60**	101.77	103.32
MW-13	98.68	93.53**	93.63	95.08

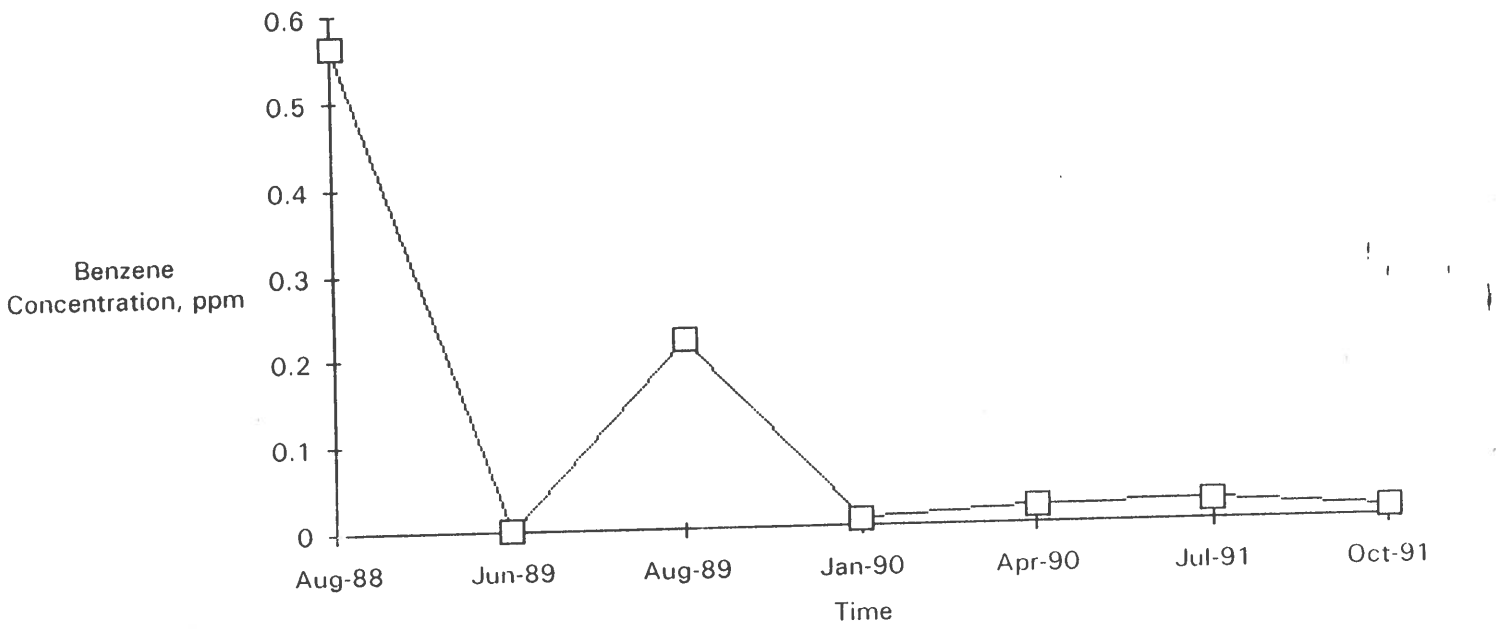
* Relative to project datum of 100 ft.
** Measurements taken on 5/29/91.
\+ One-inch diameter piezometer - not sampled.
++ No well construction details available -
Data not used in inferring local groundwater migration direction.

Chevron U.S.A. Inc. Bulk Fuels Terminal, Craig, Alaska: Groundwater Sample Analytical Results

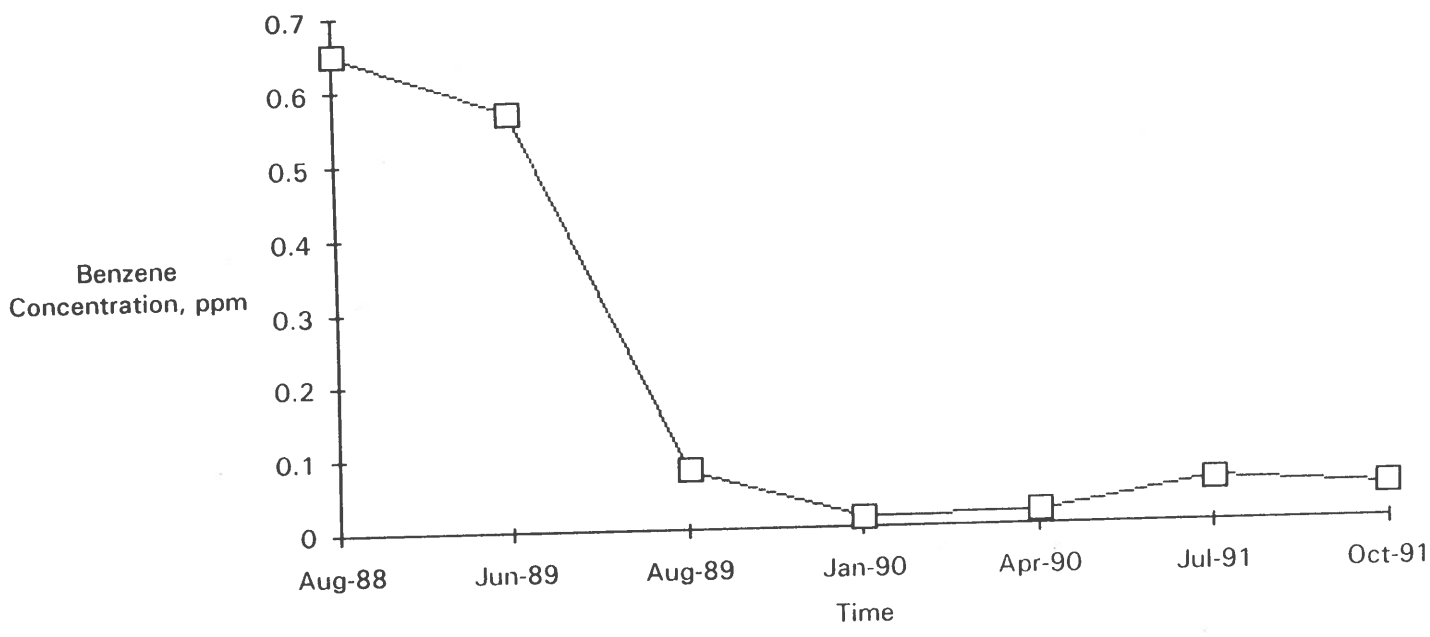
		5030/8020					3510/8015M			418.1
SAMPLE DESIGNATION	Date Sampled	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Xylenes (ppm)	Total BTEX (ppm)	Gasoline (ppm)	Diesel (ppm)	Other* (ppm)	TRPH (ppm)
MW-1	7/8/91	0.023	0.026	0.025	0.128	0.202	ND**	182**	ND**	183
MW-1	10/9/91	0.01	0.025	0.006	0.034	0.075	ND	60	ND	76***
MW-2	7/8/91	0.058	0.159	0.048	0.451	0.716	ND**	300**	ND**	704
MW-2	10/9/91	0.045	0.032	0.015	0.133	0.225	ND	90	ND	48***
MW-3	7/8/91	0.034	0.011	0.027	0.185	0.257	ND**	238**	ND**	546
MW-3	10/9/91	0.023	0.069	0.025	0.254	0.371	ND	32	ND	26
MW-4	7/8/91	ND	ND	ND	0.003	0.003	ND**	705**	ND**	1,600
MW-4	10/9/91	ND	ND	ND	0.002	0.002	ND	180	ND	190***
MW-5	7/8/91	0.01	ND	0.002	ND	0.012	ND	14	ND	9
MW-5	10/9/91	0.002	ND	ND	ND	0.002	ND	33	ND	4
MW-6	7/8/91	0.001	0.006	ND	ND	0.007	ND	1	ND	ND
MW-6	10/9/91	ND	0.004	ND	ND	0.004	ND	ND	ND	ND
MW-9	7/8/91	ND	ND	ND	ND	ND	ND	11	ND	7
MW-9	10/9/91	ND	ND	ND	ND	ND	ND	4	ND	1
MW-11	7/8/91	0.001	0.681	0.004	ND	0.686	1	9	ND	29
MW-11	10/9/91	0.001	0.345	0.002	ND	0.348	ND	4	ND	1
MW-12	7/8/91	0.002	ND	ND	ND	0.002	ND	27	10	2.2
MW-12 (duplicate)	7/8/91	ND	ND	ND	ND	ND	ND	30	10	39
MW-12	10/9/91	0.002	0.003	ND	ND	0.005	ND	4	2	13
MW-12 (duplicate)	10/9/91	0.002	0.006	ND	ND	0.008	ND	6	2	10
MW-13	7/8/91	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-13	10/9/91	ND	ND	ND	ND	ND	ND	ND	ND	ND
RINSE BLANK	7/8/91	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRAVEL BLANK	7/8/91	ND	ND	ND	ND	ND	NA	NA	NA	NA
TRAVEL BLANK	10/9/91	ND	ND	ND	ND	ND	NA	NA	NA	NA
INFLOW-1	10/9/91	0.016	ND	0.003	ND	0.019	ND	5	ND	1
US EPA Method		5030/8020	5030/8020	5030/8020	5030/8020	5030/8020	3510/8015M	3510/8015M	3510/8015M	418.1
Method Reporting Limit (MRL)		0.001	0.001	0.001	0.002	Not Applicable	1	1	1	1

* Quantified against hydraulic oil.
** Sample dilution necessitated elevated MRL of 5ppm. 25 ppm for MW-4.
*** Sample dilution necessitated elevated MRL of 10 ppm
ND - Not Detected at MRL
NA - Not Analyzed

Benzene Concentration Versus Time - MW-1



Benzene Concentration Versus Time - MW-2



DATE JAN. 1992
DWN. CDS 91069

CHEVRON U.S.A. BULK FUELS TERMINAL
CRAIG, ALASKA

FIGURE

as hydraulic oil for water samples collected October 9, 1991 was only detected in MW-12 at a concentration of **two** ppm. TRPH concentrations for water samples collected October 9, 1991 ranged from not detected in MW-13 to a maximum of 190 ppm in MW-4.

Figure 3 presents the time versus concentration plot for benzene levels detected in groundwater samples collected from MW-1 and MW-2 since 1988, and shows the decline of benzene levels in groundwater. This reduction in benzene in groundwater samples collected from MW-1 and MW-2 is considered representative of the overall groundwater quality improvement that has occurred over the last few years. BTEX and TRPH have not been detected above either a state or federal drinking water standard in groundwater samples collected from monitoring wells located between the terminal and Bucharelli Bay.

Sincerely,
AMERICA NORTH INC.

Andrew M. Dimitriou
Staff Geologist

Kevin G. Rattue
Project Manager

APPENDIX A

ANI WATER SAMPLE FIELD DATA SHEETS

America North Inc.

Environmental Consulting & Engineering • Health & Safety

WATER SAMPLE FIELD DATA SHEET

Project Number: 13902.00
Client: Chevron
Location: Craig Bulk Fuels
Sampler: Andy Dimitriou

Sample ID: MW-1
Date: 10/9/91
Sample Point Designation: MW1

[X] Ground Water [ ] Surface Water [ ] Other (NR) _____

Casing Diameter: [X] 2 inch [ ] 3 inch [ ] 4 inch [ ] 6 inch [ ] Other _____

Casing Elevation (feet/datum): _____
Depth to Water (feet/TOC): 5.49
Depth of Well (feet/TOC): 9.73
Calculated Purge Vol. (gal.): 2.25
Actual Purge Vol. (gal.): 2.5

FIELD MEASUREMENTS

Time	Volume (Gal.)	pH (Units)	E.C. (x100) (umhos/cm @ 25°C)	Temperature (°F)	Color (Visual)	Other
11:50	0.75	6.16	1.68	56.7	Brown	Silty
11:55	1.50	6.15	1.54	54.3	Brown	Silty
12:00	2.50	6.22	1.65	53.8	Brown	Silty

Odor: Hydrocarbon like odor. Sheen on purge water.

PURGE METHOD

[ ] 2" Bladder Pump
[ ] Submersible Pump
[ ] Peristaltic Pump
[ ] Bailer (Teflon)
[X] Bailer (PVC)
[ ] Dipper
[ ] Well Wizard
[ ] Centrifugal Pump
[ ] Pneumatic Displacement Pump
[ ] Dedicated
[ ] Other _____

SAMPLE METHOD

[ ] 2" Bladder Pump
[ ] Surface Sampler
[ ] Peristaltic Pump
[ ] Bailer (Teflon)
[X] Bailer (PVC)
[ ] Submerisble Pump
[ ] Well Wizard
[ ] Dipper
[ ] Dedicated
[ ] Other _____

Well Integrity: Good - No Lock
Remarks: _____

Signature _____ Page 1 of 1

America North Inc.

Environmental Consulting & Engineering • Health & Safety

WATER SAMPLE FIELD DATA SHEET

Project Number: 13902.00
Client: Chevron
Location: Craig Bulk Fuels
Sampler: Andy Dimitriou

Sample ID: MW-2
Date: 10/9/91
Sample Point Designation: MW2

[X] Ground Water [ ] Surface Water [ ] Other (NR) _____

Casing Diameter: [X] 2 inch [ ] 3 inch [ ] 4 inch [ ] 6 inch [ ] Other _____

Casing Elevation (feet/datum): _____
Depth to Water (feet/TOC): 5.95
Depth of Well (feet/TOC): 8.80
Calculated Purge Vol. (gal.): 1.00
Actual Purge Vol. (gal.): 1.00

FIELD MEASUREMENTS

Time	Volume (Gal.)	pH (Units)	E.C. (x100) (umhos/cm @ 25°C)	Temperature (°F)	Color (Visual)	Other
12:10	0.3	6.55	2.16	53.4	Brown	Silty
12:15	0.6	6.65	2.21	53.0	Brown	Silty
12:20	1.0	6.67	2.22	52.8	Brown	Silty

Odor: Hydrocarbon like odor. Sheen on purge water.

PURGE METHOD

[ ] 2" Bladder Pump
[ ] Submersible Pump
[ ] Peristaltic Pump
[ ] Bailer (Teflon)
[X] Bailer (PVC)
[ ] Dipper
[ ] Well Wizard
[ ] Centrifugal Pump
[ ] Pneumatic Displacement Pump
[ ] Dedicated
[ ] Other _____

SAMPLE METHOD

[ ] 2" Bladder Pump
[ ] Surface Sampler
[ ] Peristaltic Pump
[ ] Bailer (Teflon)
[X] Bailer (PVC)
[ ] Submerisble Pump
[ ] Well Wizard
[ ] Dipper
[ ] Dedicated
[ ] Other _____

Well Integrity: Good - No Lock
Remarks: _____

Signature _____ Page 1 of 1

America North Inc.

Environmental Consulting & Engineering • Health & Safety

WATER SAMPLE FIELD DATA SHEET

Project Number: 13902.00
Client: Chevron
Location: Craig Bulk Fuels
Sampler: Andy Dimitriou

Sample ID: MW-3
Date: 10/9/91
Sample Point Designation: MW3

[X] Ground Water [ ] Surface Water [ ] Other (NR) _____

Casing Diameter: [X] 2 inch [ ] 3 inch [ ] 4 inch [ ] 6 inch [ ] Other _____

Casing Elevation (feet/datum): _____
Depth to Water (feet/TOC): 6.20
Depth of Well (feet/TOC): 8.90
Calculated Purge Vol. (gal.): 1.25
Actual Purge Vol. (gal.): 1.5

FIELD MEASUREMENTS

Time	Volume (Gal.)	pH (Units)	E.C. (x100) (umhos/cm @ 25°C)	Temperature (°F)	Color (Visual)	Other
12:35	0.5	7.92	1.87	53.2	Brown	Silty
12:40	1.0	7.96	1.97	52.3	Brown	Silty
12:45	1.5	7.98	1.96	53.0	Brown	Silty

Odor: Hydrocarbon like odor. Sheen on purge water.

PURGE METHOD

[ ] 2" Bladder Pump
[ ] Submersible Pump
[ ] Peristaltic Pump
[X] Bailer (PVC)
[ ] Bailer (Teflon)
[ ] Dipper
[ ] Well Wizard
[ ] Centrifugal Pump
[ ] Pneumatic Displacement Pump
[ ] Dedicated
[ ] Other _____

SAMPLE METHOD

[ ] 2" Bladder Pump
[ ] Surface Sampler
[ ] Peristaltic Pump
[X] Bailer (PVC)
[ ] Bailer (Teflon)
[ ] Submerisble Pump
[ ] Well Wizard
[ ] Dipper
[ ] Dedicated
[ ] Other _____

Well Integrity: Good - No Lock
Remarks: _____

Signature _____

America North Inc.

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WATER SAMPLE FIELD DATA SHEET

Project Number: 13902.00
Client: Chevron
Location: Craig Bulk Fuels
Sampler: Andy Dimitriou

Sample ID: MW-4
Date: 10/9/91
Sample Point Designation: MW4

☒ Ground Water ☐ Surface Water ☐ Other (NR) _____

Casing Diameter: ☒ 2 inch ☐ 3 inch ☐ 4 inch ☐ 6 inch ☐ Other _____

Casing Elevation (feet/datum): _____
Depth to Water (feet/TOC): 3.22
Depth of Well (feet/TOC): 4.94
Calculated Purge Vol. (gal.): 0.85
Actual Purge Vol. (gal.): 1.0

FIELD MEASUREMENTS

Time	Volume (Gal.)	pH (Units)	E.C. (x100) (umhos/cm @ 25°C)	Temperature (°F)	Color (Visual)	Other
1:00	0.3	9.16	2.21	53.1	Brown	Silty
1:05	0.6	9.46	2.36	52.4	Brown	Silty
1:10	1.0	9.98	2.33	52.3	Brown	Silty

Odor: Hydrocarbon like odor. Sheen on purge water.

PURGE METHOD

☐ 2" Bladder Pump ☐ Bailer (Teflon) ☐ Well Wizard ☐ Dedicated
☐ Submersible Pump ☒ Bailer (PVC) ☐ Centrifugal Pump ☐ Other _____
☐ Peristaltic Pump ☐ Dipper ☐ Pneumatic Displacement Pump _____

SAMPLE METHOD

☐ 2" Bladder Pump ☐ Bailer (Teflon) ☐ Well Wizard ☐ Dedicated
☐ Surface Sampler ☒ Bailer (PVC) ☐ Dipper ☐ Other _____
☐ Peristaltic Pump ☐ Submerisble Pump _____

Well Integrity: Good - No Lock
Remarks: pH Meter reading high - recalibrated - No change in readings.

Signature _____ Page 1 of 1

America North Inc.

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WATER SAMPLE FIELD DATA SHEET

Project Number: 13902.00
Client: Chevron
Location: Craig Bulk Fuels
Sampler: Andy Dimitriou

Sample ID: MW-5
Date: 10/9/91
Sample Point Designation: MW5

[X] Ground Water [ ] Surface Water [ ] Other (NR) _____

Casing Diameter: [X] 2 inch [ ] 3 inch [ ] 4 inch [ ] 6 inch [ ] Other _____

Casing Elevation (feet/datum): _____
Depth to Water (feet/TOC): 7.52
Depth of Well (feet/TOC): 10.1
Calculated Purge Vol. (gal.): 1.25
Actual Purge Vol. (gal.): 1.25

FIELD MEASUREMENTS

Time	Volume (Gal.)	pH (Units)	E.C. (x100) (umhos/cm @ 25°C)	Temperature (°F)	Color (Visual)	Other
2:00	0.3	6.85	2.23	54.7	Brown	Silty
2:05	0.9	8.53	3.07	54.9	Brown	Silty
2:10	1.25	8.93	3.08	54.8	Brown	Silty

Odor: Hydrocarbon like odor. Sheen on purge water.

PURGE METHOD

[ ] 2" Bladder Pump
[ ] Submersible Pump
[ ] Peristaltic Pump
[ ] Bailer (Teflon)
[X] Bailer (PVC)
[ ] Dipper
[ ] Well Wizard
[ ] Centrifugal Pump
[ ] Pneumatic Displacement Pump
[ ] Dedicated
[ ] Other _____

SAMPLE METHOD

[ ] 2" Bladder Pump
[ ] Surface Sampler
[ ] Peristaltic Pump
[ ] Bailer (Teflon)
[X] Bailer (PVC)
[ ] Submerisble Pump
[ ] Well Wizard
[ ] Dipper
[ ] Dedicated
[ ] Other _____

Well Integrity: Good - No Lock
Remarks: Recalibrated pH Meter again. Still no change in readings.

Signature _____

America North Inc.

Environmental Consulting & Engineering • Health & Safety

WATER SAMPLE FIELD DATA SHEET

Project Number: 13902.00
Client: Chevron
Location: Craig Bulk Fuels
Sampler: Andy Dimitriou

Sample ID: MW-6
Date: 10/9/91
Sample Point Designation: MW6

[X] Ground Water [ ] Surface Water [ ] Other (NR) _____

Casing Diameter: [X] 2 inch [ ] 3 inch [ ] 4 inch [ ] 6 inch [ ] Other _____

Casing Elevation (feet/datum): _____
Depth to Water (feet/TOC): 6.05
Depth of Well (feet/TOC): 10.1
Calculated Purge Vol. (gal.): 2.0
Actual Purge Vol. (gal.): 2.0

FIELD MEASUREMENTS

Time	Volume (Gal.)	pH (Units)	E.C. (x100) (umhos/cm @ 25°C)	Temperature (°F)	Color (Visual)	Other
2:30	0.7	8.86	2.92	54.9	Brown	Silty
2:35	1.4	8.65	2.99	53.8	Brown	Silty
2:40	2.0	8.87	2.96	53.9	Brown	Silty

Odor: Hydrocarbon like odor.

PURGE METHOD

[ ] 2" Bladder Pump
[ ] Submersible Pump
[ ] Peristaltic Pump
[X] Bailer (Teflon)
[ ] Bailer (PVC)
[ ] Dipper
[ ] Well Wizard
[ ] Centrifugal Pump
[ ] Pneumatic Displacement Pump
[ ] Dedicated
[ ] Other _____

SAMPLE METHOD

[ ] 2" Bladder Pump
[ ] Surface Sampler
[ ] Peristaltic Pump
[ ] Bailer (Teflon)
[X] Bailer (PVC)
[ ] Submerisble Pump
[ ] Well Wizard
[ ] Dipper
[ ] Dedicated
[ ] Other _____

Well Integrity: Good - No Lock
Remarks: pH meter suspect.

Signature _____

America North Inc.

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WATER SAMPLE FIELD DATA SHEET

Project Number: 13902.00
Client: Chevron
Location: Craig Bulk Fuels
Sampler: Andy Dimitriou

Sample ID: MW-9
Date: 10/9/91
Sample Point Designation: MW9

[X] Ground Water [ ] Surface Water [ ] Other (NR) _____

Casing Diameter: [X] 2 inch [ ] 3 inch [ ] 4 inch [ ] 6 inch [ ] Other _____

Casing Elevation (feet/datum): _____
Depth to Water (feet/TOC): 5.63
Depth of Well (feet/TOC): 7.65
Calculated Purge Vol. (gal.): 1.0
Actual Purge Vol. (gal.): 1.0

FIELD MEASUREMENTS

Time	Volume (Gal.)	pH (Units)	E.C. (x100) (umhos/cm @ 25°C)	Temperature (°F)	Color (Visual)	Other
1:40	0.3	9.67	1.81	54.6	Clear	
1:45	0.6	9.81	1.79	54.1	Clear	
1:50	1.0	9.88	1.79	53.9	Clear	

Odor: Hydrocarbon like odor.

PURGE METHOD

[ ] 2" Bladder Pump
[ ] Submersible Pump
[ ] Peristaltic Pump
[X] Bailer (PVC)
[ ] Bailer (Teflon)
[ ] Dipper
[ ] Well Wizard
[ ] Centrifugal Pump
[ ] Pneumatic Displacement Pump
[ ] Dedicated
[ ] Other _____

SAMPLE METHOD

[ ] 2" Bladder Pump
[ ] Surface Sampler
[ ] Peristaltic Pump
[X] Bailer (PVC)
[ ] Bailer (Teflon)
[ ] Submerisble Pump
[ ] Well Wizard
[ ] Dipper
[ ] Dedicated
[ ] Other _____

Well Integrity: Good - No Lock
Remarks: pH meter suspect.

Signature _____

America North Inc.

Environmental Consulting & Engineering • Health & Safety

WATER SAMPLE FIELD DATA SHEET

Project Number: 13902.00
Client: Chevron
Location: Craig Bulk Fuels
Sampler: Andy Dimitriou

Sample ID: MW-10
Date: 10/9/91
Sample Point Designation: MW10

[X] Ground Water [ ] Surface Water [ ] Other (NR) _____

Casing Diameter: [X] 2 inch [ ] 3 inch [ ] 4 inch [ ] 6 inch [ ] Other _____

Casing Elevation (feet/datum): _____
Depth to Water (feet/TOC): 5.05
Depth of Well (feet/TOC): 10.07
Calculated Purge Vol. (gal.): 2.0
Actual Purge Vol. (gal.): 2.5

FIELD MEASUREMENTS

Time	Volume (Gal.)	pH (Units)	E.C. (x100) (umhos/cm @ 25°C)	Temperature (°F)	Color (Visual)	Other
2:55	0.7	9.77	3.87	54.8	Brown	Silty
3:00	1.7	9.26	3.51	52.9	Brown	Silty
3:05	2.5	9.48	3.22	52.5	Brown	Silty

Odor: H_2S - like odor.

PURGE METHOD

[ ] 2" Bladder Pump [ ] Bailer (Teflon) [ ] Well Wizard [ ] Dedicated
[ ] Submersible Pump [X] Bailer (PVC) [ ] Centrifugal Pump [ ] Other _____
[ ] Peristaltic Pump [ ] Dipper [ ] Pneumatic Displacement Pump _____

SAMPLE METHOD

[ ] 2" Bladder Pump [ ] Bailer (Teflon) [ ] Well Wizard [ ] Dedicated
[ ] Surface Sampler [X] Bailer (PVC) [ ] Dipper [ ] Other _____
[ ] Peristaltic Pump [ ] Submerisble Pump _____

Well Integrity: Good - No Lock
Remarks: pH meter suspect.

Signature _____ Page 1 of 1

America North Inc.

Environmental Consulting & Engineering • Health & Safety

WATER SAMPLE FIELD DATA SHEET

Project Number: 13902.00
Client: Chevron
Location: Craig Bulk Fuels
Sampler: Andy Dimitriou

Sample ID: MW-11
Date: 10/9/91
Sample Point Designation: MW11

[X] Ground Water [ ] Surface Water [ ] Other (NR) _____

Casing Diameter: [X] 2 inch [ ] 3 inch [ ] 4 inch [ ] 6 inch [ ] Other _____

Casing Elevation (feet/datum): _____
Depth to Water (feet/TOC): 5.05
Depth of Well (feet/TOC): 10.07
Calculated Purge Vol. (gal.): 2.0
Actual Purge Vol. (gal.): 2.5

FIELD MEASUREMENTS

Time	Volume (Gal.)	pH (Units)	E.C. (x100) (umhos/cm @ 25°C)	Temperature (°F)	Color (Visual)	Other
2:55	0.7	9.77	3.87	54.8	Brown	Silty
3:00	1.7	9.26	3.51	52.9	Brown	Silty
3:05	2.5	9.48	3.22	52.5	Brown	Silty

Odor: Hydrocarbon like odor. Sheen on purge water

PURGE METHOD

[ ] 2" Bladder Pump
[ ] Submersible Pump
[ ] Peristaltic Pump
[X] Bailer (PVC)
[ ] Bailer (Teflon)
[ ] Dipper
[ ] Well Wizard
[ ] Centrifugal Pump
[ ] Pneumatic Displacement Pump
[ ] Dedicated
[ ] Other _____

SAMPLE METHOD

[ ] 2" Bladder Pump
[ ] Surface Sampler
[ ] Peristaltic Pump
[X] Bailer (PVC)
[ ] Bailer (Teflon)
[ ] Submerisble Pump
[ ] Well Wizard
[ ] Dipper
[ ] Dedicated
[ ] Other _____

Well Integrity: Good - No Lock
Remarks: ph Meter suspect

Signature _____

America North Inc.

Environmental Consulting & Engineering • Health & Safety

WATER SAMPLE FIELD DATA SHEET

Project Number: 13902.00
Client: Chevron
Location: Craig Bulk Fuels
Sampler: Andy Dimitriou

Sample ID: MW-12
Date: 10/9/91
Sample Point Designation: MW12

[X] Ground Water [ ] Surface Water [ ] Other (NR) _____

Casing Diameter: [X] 2 inch [ ] 3 inch [ ] 4 inch [ ] 6 inch [ ] Other _____

Casing Elevation (feet/datum): _____
Depth to Water (feet/TOC): 5.05
Depth of Well (feet/TOC): 8.62
Calculated Purge Vol. (gal.): 1.75
Actual Purge Vol. (gal.): 2.0

FIELD MEASUREMENTS

Time	Volume (Gal.)	pH (Units)	E.C. (x100) (umhos/cm @ 25°C)	Temperature (°F)	Color (Visual)	Other
2:30	0.7	2.0	3.03	54.1	Brown	Silty
3:35	1.4	NA	1.80	52.3	Brown	Silty
3:40	2.0	NA	1.86	51.9	Brown	Silty

Odor: Faint hydrocarbon odor

PURGE METHOD

[ ] 2" Bladder Pump [ ] Bailer (Teflon) [ ] Well Wizard [ ] Dedicated
[ ] Submersible Pump [X] Bailer (PVC) [ ] Centrifugal Pump [ ] Other _____
[ ] Peristaltic Pump [ ] Dipper [ ] Pneumatic Displacement Pump

SAMPLE METHOD

[ ] 2" Bladder Pump [ ] Bailer (Teflon) [ ] Well Wizard [ ] Dedicated
[ ] Surface Sampler [X] Bailer (PVC) [ ] Dipper [ ] Other _____
[ ] Peristaltic Pump [ ] Submerisble Pump

Well Integrity: Good - No Lock
Remarks: ph Meter malfunctioning
Refuse to calibrate
Duplicate MW5, 5:00

Signature _____ Page 1 of 1

America North Inc.

Environmental Consulting & Engineering • Health & Safety

WATER SAMPLE FIELD DATA SHEET

Project Number: 13902.00
Client: Chevron
Location: Craig Bulk Fuels
Sampler: Andy Dimitriou

Sample ID: MW-13
Date: 10/9/91
Sample Point Designation: MW13

[X] Ground Water [ ] Surface Water [ ] Other (NR) _____

Casing Diameter: [X] 2 inch [ ] 3 inch [ ] 4 inch [ ] 6 inch [ ] Other _____

Casing Elevation (feet/datum): _____
Depth to Water (feet/TOC): 3.60
Depth of Well (feet/TOC): 6.75
Calculated Purge Vol. (gal.): 1.5
Actual Purge Vol. (gal.): 1.5

FIELD MEASUREMENTS

Time	Volume (Gal.)	pH (Units)	E.C. (x100) (umhos/cm @ 25°C)	Temperature (°F)	Color (Visual)	Other
4:00	0.5	NA	1.66	53.5	Brown	Silty
4:05	1.0	NA	1.62	52.3	Brown	Silty
4:10	1.5	NA	1.76	51.8	Brown	Silty

Odor: _____

PURGE METHOD

[ ] 2" Bladder Pump [ ] Bailer (Teflon) [ ] Well Wizard [ ] Dedicated
[ ] Submersible Pump [X] Bailer (PVC) [ ] Centrifugal Pump [ ] Other _____
[ ] Peristaltic Pump [ ] Dipper [ ] Pneumatic Displacement Pump _____

SAMPLE METHOD

[ ] 2" Bladder Pump [ ] Bailer (Teflon) [ ] Well Wizard [ ] Dedicated
[ ] Surface Sampler [X] Bailer (PVC) [ ] Dipper [ ] Other _____
[ ] Peristaltic Pump [ ] Submerisble Pump _____

Well Integrity: Good - No Lock
Remarks: ph Meter not functional

Signature _____ Page 1 of 1

APPENDIX B

ANALYTICAL DATA FOR GROUNDWATER SAMPLES COLLECTED OCTOBER 9, 1991

Columbia Analytical Services, Inc.

November 4, 1991

Andrew Dimitriou
America North, Inc.
201 East 56th, Suite 200
Anchorage, AK 99518

Re: **Chevron - Craig/Project #13902.00**

Dear Andrew:

Enclosed are the results of the samples submitted to our lab on October 11, 1991. Preliminary results were transmitted via facsimile on October 25, 1991. For your reference, our service request number for this work is K915926.

All analyses were performed in accordance with our laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Colin Elliott

Colin B. Elliott
Senior Project Chemist

CBE/das

4317 South 43rd Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, INC.

Laboratory Chronicle

Client: America North, Inc.
Project: Chevron - Craig

Date Collected: 10/09/91
Date Received: 10/11/91
Date Refrigerated: 10/11/91
Work Order #: K915926

Extractions and Preparations

	Analyte/Method	Date
1.	Hydrocarbon Scan/3510	10/13/91
2.	BTEX/5030	10/15,16/91
3.	TRPH/418.1	10/14/91

Analyses

	Analyte/Method	Date
1.	Hydrocarbon Scan/Modified 8015	10/21-24/91
2.	BTEX/8020	10/15,16/91
3.	TRPH/418.1	10/15/91

Project Chemist Review & Approval:
(Signature) Jane F. Whitsett
(Print Name) Jane F. Whitsett
(Date) 11-5-91

QA Coordinator Review & Approval:
(Signature) Lawrence J Jacoby
(Print Name) Lawrence J Jacoby
(Date) 11/4/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	America North, Inc.	**Date Collected:**	10/09/91
Project:	Chevron - Craig	**Date Received:**	10/11/91
Sample Matrix:	Water	**Date Extracted:**	10/13/91
		Date Analyzed:	10/21-24/91
		Work Order #:	K915926

Hydrocarbon Scan
EPA Methods 3510/Modified 8015
mg/L (ppm)

Sample Name	Lab Code	MRL	Gasoline	Diesel	Other♦
MW1	K5926-1	1	ND	60	ND
MW2	K5926-2	1	ND	90	ND
MW3	K5926-3	1	ND	32	ND
MW4	K5926-4	1	ND	180	ND
MW5	K5926-5	1	ND	33	ND
MW6	K5926-6	1	ND	ND	ND
MW9	K5926-7	1	ND	4	ND
MW11	K5926-8	1	ND	1	ND
MW12	K5926-9	1	ND	4	2
MW13	K5926-10	1	ND	ND	ND

MRL Method Reporting Limit, equal to the contract-specified detection limit
♦ Quantitated using hydraulic oil as a standard.
ND None Detected at or above the method reporting limit

Approved by Chris Elliott Date 11/4/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	America North, Inc.	**Date Collected:**	10/09/91
Project:	Chevron - Craig	**Date Received:**	10/11/91
Sample Matrix:	Water	**Date Extracted:**	10/13/91
		Date Analyzed:	10/21-24/91
		Work Order #:	K915926

Hydrocarbon Scan
EPA Methods 3510/Modified 8015
mg/L (ppm)

Sample Name	Lab Code	MRL	Gasoline	Diesel	Other♦
Inflow-1	K5926-11	1	ND	5	ND
MW-15	K5926-12	1	ND	6	2
Method Blank	K5926-MB	1	ND	ND	ND

MRL Method Reporting Limit, equal to the contract-specified detection limit
♦ Quantitated using hydraulic oil as a standard.
ND None Detected at or above the method reporting limit

Approved by John Elliott Date 11/4/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	America North, Inc.	**Date Collected:**	10/09/91
Project:	Chevron - Craig	**Date Received:**	10/11/91
Sample Matrix:	Water	**Work Order #:**	K915926

BTEX
EPA Methods 5030/8020
mg/L (ppm)

Sample Name:		MW1	MW2	MW3
Lab Code:		K5926-1	K5926-2	K5926-3
Date Analyzed:		10/16/91	10/16/91	10/16/91
Analyte	**MRL**			
Benzene	0.001	0.010	0.045	0.023
Toluene	0.001	0.025	0.032	0.069
Ethylbenzene	0.001	0.006	0.015	0.025
Total Xylenes	0.002	0.034	0.133	0.254

MRL Method Reporting Limit, equal to the contract-specified detection limit

Approved by Chris Elliott Date 11/4/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	America North, Inc.	**Date Collected:**	10/09/91
Project:	Chevron - Craig	**Date Received:**	10/11/91
Sample Matrix:	Water	**Work Order #:**	K915926

BTEX
EPA Methods 5030/8020
mg/L (ppm)

Sample Name:		MW4	MW5	MW6
Lab Code:		K5926-4	K5926-5	K5926-6
Date Analyzed:		10/15/91	10/16/91	10/16/91
Analyte	**MRL**			
Benzene	0.001	ND	0.002	ND
Toluene	0.001	ND	ND	0.004
Ethylbenzene	0.001	ND	ND	ND
Total Xylenes	0.002	0.002	ND	ND

MRL Method Reporting Limit, equal to the contract-specified detection limit
ND None Detected at or above the method reporting limit

Approved by John Elliott Date 11/4/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	America North, Inc.	**Date Collected:**	10/09/91
Project:	Chevron - Craig	**Date Received:**	10/11/91
Sample Matrix:	Water	**Work Order #:**	K915926

BTEX
EPA Methods 5030/8020
mg/L (ppm)

Sample Name:		MW9	MW11	MW12
Lab Code:		K5926-7	K5926-8	K5926-9
Date Analyzed:		10/16/91	10/16/91	10/15/91
Analyte	**MRL**			
Benzene	0.001	ND	0.001	0.002
Toluene	0.001	ND	0.345	0.003
Ethylbenzene	0.001	ND	0.002	ND
Total Xylenes	0.002	ND	ND	ND

MRL Method Reporting Limit, equal to the contract-specified detection limit
ND None Detected at or above the method reporting limit

Approved by Chris Elliott Date 11/4/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	America North, Inc.	**Date Collected:**	10/09/91
Project:	Chevron - Craig	**Date Received:**	10/11/91
Sample Matrix:	Water	**Work Order #:**	K915926

BTEX
EPA Methods 5030/8020
mg/L (ppm)

Sample Name:		MW13	Inflow-1	MW-15
Lab Code:		K5926-10	K5926-11	K5926-12
Date Analyzed:		10/15/91	10/16/91	10/15/91
Analyte	**MRL**			
Benzene	0.001	ND	0.016	0.002
Toluene	0.001	ND	ND	0.006
Ethylbenzene	0.001	ND	0.003	ND
Total Xylenes	0.002	ND	ND	ND

MRL Method Reporting Limit, equal to the contract-specified detection limit
ND None Detected at or above the method reporting limit

Approved by John Elliott Date 11/4/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	America North, Inc.	**Date Collected:**	10/09/91
Project:	Chevron - Craig	**Date Received:**	10/11/91
Sample Matrix:	Water	**Work Order #:**	K915926

BTEX
EPA Methods 5030/8020
mg/L (ppm)

Sample Name:		Trip Blank	Method Blank	Method Blank
Lab Code:		K5926-13	K5926-MB1	K5926-MB2
Date Analyzed:		10/15/91	10/15/91	10/16/91
Analyte	**MRL**			
Benzene	0.001	ND	ND	ND
Toluene	0.001	ND	ND	ND
Ethylbenzene	0.001	ND	ND	ND
Total Xylenes	0.002	ND	ND	ND

MRL Method Reporting Limit, equal to the contract-specified detection limit
ND None Detected at or above the method reporting limit

Approved by Chris Elliott Date 11/4/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	America North, Inc.	**Date Collected:**	10/09/91
Project:	Chevron - Craig	**Date Received:**	10/11/91
Sample Matrix:	Water	**Date Extracted:**	10/14/91
		Date Analyzed:	10/15/91
		Work Order #:	K915926

Total Recoverable Petroleum Hydrocarbons
EPA Method 418.1
mg/L (ppm)

Sample Name	Lab Code	MRL	Result
MW1	K5926-1	*10	76
MW2	K5926-2	*10	48
MW3	K5926-3	1	26
MW4	K5926-4	*10	190
MW5	K5926-5	1	4
MW6	K5926-6	1	ND
MW9	K5926-7	1	1
MW11	K5926-8	1	1
MW12	K5926-9	1	13
MW13	K5926-10	1	ND

MRL Method Reporting Limit, equal to the contract-specified detection limit
***** Elevated MRL because the sample required dilution.
ND None Detected at or above the method reporting limit

Approved by Colin Elliott Date 4/4/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	America North, Inc.	**Date Collected:**	10/09/91
Project:	Chevron - Craig	**Date Received:**	10/11/91
Sample Matrix:	Water	**Date Extracted:**	10/14/91
		Date Analyzed:	10/15/91
		Work Order #:	K915926

Total Recoverable Petroleum Hydrocarbons
EPA Method 418.1
mg/L (ppm)

Sample Name	Lab Code	MRL	Result
Inflow-1	K5926-11	1	1
MW-15	K5926-12	1	10
Method Blank	K5926-MB	1	ND

MRL Method Reporting Limit, equal to the contract-specified detection limit
ND None Detected at or above the method reporting limit

Approved by Chris Ellwood Date 4/4/91

APPENDIX A

LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	America North, Inc.	**Date Collected:**	10/09/91
Project:	Chevron - Craig	**Date Received:**	10/11/91
Sample Matrix:	Water	**Date Extracted:**	10/13/91
		Date Analyzed:	10/21-24/91
		Work Order #:	K915926

QA/QC Report
Surrogate Recovery Summary
Hydrocarbon Scan
EPA Methods 3510/Modified 8015

Sample Name	Lab Code	Spike Level (mg/L)	Percent Recovery *p*-Terphenyl
MW1	K5926-1	0.500	NA
MW2	K5926-2	0.500	NA
MW3	K5926-3	0.500	80.3
MW4	K5926-4	0.500	NA
MW5	K5926-5	0.500	73.6
MW6	K5926-6	0.500	83.1
MW9	K5926-7	0.500	88.5
MW11	K5926-8	0.500	88.5
MW12	K5926-9	0.500	85.7
MW13	K5926-10	0.500	81.1
		CAS Acceptance Criteria	66-120

NA Not Applicable because of the sample matrix. Analysis of this sample required a dilution such that the surrogate concentration was diluted below the MRL.

Approved by Calvin Elliott Date 11/4/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	America North, Inc.	**Date Collected:**	10/09/91
Project:	Chevron - Craig	**Date Received:**	10/11/91
Sample Matrix:	Water	**Date Extracted:**	10/13/91
		Date Analyzed:	10/21-24/91
		Work Order #:	K915926

QA/QC Report
Surrogate Recovery Summary
Hydrocarbon Scan
EPA Methods 3510/Modified 8015

Sample Name	Lab Code	Spike Level (mg/L)	Percent Recovery *p*-Terphenyl
Inflow-1	K5926-11	0.500	82.3
MW-15	K5926-12	0.500	84.2
Method Blank	K5926-MB	0.500	88.2
Laboratory Control Sample	K5926-LCS	0.500	89.0
		CAS Acceptance Criteria	66-120

Approved by Colin Elliott Date 11/4/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	America North, Inc.	**Date Extracted:**	10/13/91
Project:	Chevron - Craig	**Date Analyzed:**	10/22/91
Sample Matrix:	Water	**Work Order #:**	K915926

QA/QC Report
Laboratory Control Sample Summary
Hydrocarbon Scan
EPA Methods 3510/Modified 8015
mg/L (ppm)

Sample Name: Laboratory Control Sample

Analyte	Spike Level	Spike Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Diesel	5.0	5.4	108	55-110

Approved by Chris Ellwitt Date 11/4/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client: America North, Inc.
Project: Chevron - Craig
Sample Matrix: Water

Date Collected: 10/09/91
Date Received: 10/11/91
Date Analyzed: 10/15,16/91
Work Order #: K915926

QA/QC Report
Surrogate Recovery Summary
BTEX
EPA Methods 5030/8020

Sample Name	Lab Code	Spike Level (mg/L)	Percent Recovery 4-Bromofluorobenzene
MW1	K5926-1	0.05	97.8
MW2	K5926-2	0.05	90.4
MW3	K5926-3	0.05	112
MW4	K5926-4	0.05	87.4
MW5	K5926-5	0.05	99.6
MW6	K5926-6	0.05	103
MW9	K5926-7	0.05	99.6
MW11	K5926-8	0.05	100
MW12	K5926-9	0.05	103
MW13	K5926-10	0.05	115
		CAS Acceptance Criteria	60-120

Approved by John Elliott Date 11/4/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	America North, Inc.	**Date Collected:**	10/09/91
Project:	Chevron - Craig	**Date Received:**	10/11/91
Sample Matrix:	Water	**Date Analyzed:**	10/15,16/91
		Work Order #:	K915926

QA/QC Report
Surrogate Recovery Summary
BTEX
EPA Methods 5030/8020

Sample Name	Lab Code	Spike Level (mg/L)	Percent Recovery 4-Bromofluorobenzene
Inflow-1	K5926-11	0.05	120
MW-15	K5926-12	0.05	*124
Trip Blank	K5926-13	0.05	**122
Laboratory Control Sample	K5926-LCS	0.05	82.4
Laboratory Control Sample	K5926-DLCS	0.05	89.2
Method Blank	K5926-MB1	0.05	117
Method Blank	K5926-MB2	0.05	100
		CAS Acceptance Criteria	60-120

* Outside acceptance limits. No obvious matrix interferences were observed. This value is assumed to be part of the expected five percent of results normally outside the acceptance limits (95 percent confidence levels).

** Outside acceptance limits. Since no target analytes were detected in the sample, the elevated percent recovery does not adversely impact the data.

Approved by Ann Elliott Date 11/4/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client: America North, Inc.
Project: Chevron - Craig
Sample Matrix: Water

Date Analyzed: 10/16/91
Work Order #: K915926

QA/QC Report
Laboratory Control Sample/Duplicate Laboratory Control Sample Summary
BTEX
EPA Methods 5030/8020
mg/L (ppm)

Sample Name: Laboratory Control Sample

Analyte	Spike Level LCS	Spike Level DLCS	Spike Result LCS	Spike Result DLCS	Percent Recovery LCS	Percent Recovery DLCS	CAS Acceptance Criteria	Relative Percent Difference
Benzene	0.100	0.100	0.122	0.134	122	134	39-150	9.4
Toluene	0.100	0.100	0.123	0.132	123	132	46-148	7.1
Ethylbenzene	0.100	0.100	0.125	0.132	125	132	32-160	5.4

Approved by Chris Elliott Date 11/4/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	America North, Inc.	**Date Extracted:**	10/08/91
Project:	Chevron - Craig	**Date Analyzed:**	10/15/91
Sample Matrix:	Water	**Work Order #:**	K915926

QA/QC Report
Laboratory Control Sample Summary
Total Recoverable Petroleum Hydrocarbons
EPA Method 418.1
mg/Kg (ppm)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
TRPH	20.0	20.5	103	75-125

Approved by Chris Elliott Date 11/4/91

America North Inc.

Environmental Consulting/Natural Resources Management
201 East 56th, Suite 200 • Anchorage, AK 99518
(907) 562-3452 • FAX (907) 563-2814

Chain of Custody / Laboratory Analysis Request

DATE 10/9/91 PAGE 1 OF 2

PROJECT CHEVRON CRAIG # 13902-00
CLIENT INFO. CONTACT ANDY DIMITRIOU
ADDRESS ANI
TELEPHONE# ANI
SAMPLERS NAME ANDY DIMITRIOU PHONE# ANI
SAMPLERS SIGNATURE Andy Dimitriou

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	418.1	8020 BETX	8015m				NUMBER OF CONTAINERS
1. MW1	10/9/91	12:00		WATER														X	X	X				5
2. MW2	"	12:20		"														X	X	X				5
3. MW3	"	12:45		"														X	X	X				5
4. MW4	"	1:10		"														X	X	X				5
5. MW5	"	2:10		"														X	X	X				5
6. MW6	"	2:40		"														X	X	X				5
7. MW9	"	1:50		"														X	X	X				5
8. MW11	"	3:05		"														X	X	X				5

ANALYSIS REQUESTED — GENERAL CHEMISTRY (Specify) — OTHER (Specify)

Relinquished By America North Inc.	Relinquished By	Relinquished By	PROJECT INFORMATION	SAMPLE RECEIPT
Signature: Andy Dimitriou	Signature:	Signature:	Shipping I.D. No.:	Total No. of Containers:
Printed Name: ANDY DIMITRIOU	Printed Name:	Printed Name:	VIA:	Chain of Custody Seals:
Firm: ANI	Firm:	Firm:	Project:	Received in good condition:
Date/Time: 10/9/91	Date/Time:	Date/Time:		LAB NO.:
Received By Lori K. Hawn	**Received By**	**Received By**		
Signature: Lori K. Hawn	Signature:	Signature:		
Printed Name: CAS	Printed Name:	Printed Name:		
Firm: 10/11/91 8:00am	Firm:	Firm:		
Date/Time:	Date/Time:	Date/Time:		

SPECIAL INSTRUCTIONS/COMMENTS

8015m: "CHEVRON METHOD" H/C SCAN
GASOLINE, DIESEL, OTHER
DO NOT REPORT VPH PER 8020
BILL CHEVRON DIRECTLY
Rec'd 1 VOA MW3 broken 10/11/91 CAS LKH

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

America North Inc.

Environmental Consulting/Natural Resources Management
201 East 56th, Suite 200 • Anchorage, AK 99518
(907) 562-3452 • FAX (907) 563-2814

Chain of Custody / Laboratory Analysis Request

DATE 10/9/91 PAGE 2 OF 2

PROJECT CHEVRON CRAIG # 13902.00
CLIENT INFO. CONTACT ANDY DIMITRION
ADDRESS ANI
TELEPHONE# ANI
SAMPLERS NAME ANDY DIMITRION PHONE# ANI
SAMPLERS SIGNATURE Andy Dimitrion

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	418.1	8020 BETX	8015M				NUMBER OF CONTAINERS
1. MW12	10/9/91	3:40		WATER														X	X	X				5
2. MW13	"	4:10		"														X	X	X				5
3. INFLOW-1	"	4:20		"														X	X	X				5
4. MW15	10/9/91	5:00		"														X	X	X				5
5.																								
6.																								
7.																								
8.																								

Relinquished By America North Inc.	Relinquished By	Relinquished By	PROJECT INFORMATION	SAMPLE RECEIPT
Signature Andy Dimitrion	Signature	Signature	Shipping I.D. No.	Total No. of Containers
Printed Name ANI	Printed Name	Printed Name	VIA	Chain of Custody Seals
Firm 10/9/91	Firm	Firm	Project	Received in good condition
Date/Time	Date/Time	Date/Time		LAB NO.

Received By Lori K. Hawn	Received By	Received By	SPECIAL INSTRUCTIONS/COMMENTS
Signature Lori K. Hawn	Signature	Signature	8015M: "CHEVRON METHOD" 1ft SCAN GASOLINE, DIESEL, OTHER
Printed Name CAS	Printed Name	Printed Name	DO NOT REPORT VPH PER 8020
Firm 10/11/91 8:00am	Firm	Firm	BILL CHEVRON DIRECTLY
Date/Time	Date/Time	Date/Time	Trip Blank not listed on chain

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.