SITE-WIDE PROJECT WORK PLAN-PART I
PART 2: CURRENT CONDITIONS REPORT
PRUDHOE BAY FACILITY, ALASKA

ADMINISTRATIVE ORDER ON CONSENT: RCRA-10-2007-0222

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ACRONYMS, ABBREVIATIONS, AND TERMINOLOGY

ADEC ..... Alaska Department of Environmental Conservation
AOC ..... Areas of Concern
ARCO..... Atlantic Richfield Corporation
AST ..... Above-ground storage tank
AWQS ..... Alaska Water Quality Standards
BOC ..... Base Operations Center
BPXA..... BP Exploration Alaska, Inc.
BTEX..... Benzene, toluene, ethylbenzene, and total xylenes
CCR ..... Current Conditions Report
CGF..... Central Gathering Facility
Charter ..... Charter for the Development of the Alaskan North Slope
CMP ..... Corrugated Metal Pipe
DRO ..... Diesel-range organics
DS ..... Drill Site
DSM ..... Drill Site Maintenance
EOA..... Eastern Operating Area
FS..... Flow station
FTG ..... Fire training grounds
G&I ..... Grind and inject
GC..... Gathering center
GRO ..... Gasoline-range organics
IM ..... Interim measures
MCC ..... Main Construction Camp
mg/kg ..... Milligrams per kilograms
mg/L ..... Milligrams per liter
MOFW..... Main Operations Facility Warehouse
NOV ..... Notice of Violation
NRDC..... Natural Resource Defense Counsel
Order ..... Administrative Order on Consent
OTL ..... Oil Transit Line
PBOC ..... Prudhoe Bay Operations Center
PBU..... Prudhoe Bay Unit
RCRA ..... Resource Conservation and Recovery Act
SDL ..... Sand Dunes Landfill
SVE ..... Soil vapor extraction
SWB ..... Site-Wide Background
SWMU..... Solid Waste Management Unit
TAH ..... Total aromatic hydrocarbons
TPH ..... Total petroleum hydrocarbons
US ACOE ..... United State Army Corps of Engineers
US EPA ..... United States Environmental Protection Agency

WC ..... Well cellars
WOA..... Western Operating Area

TERMINOLOGY

In this document the terms Prudhoe Bay oil field, Prudhoe Bay field and Prudhoe Bay Unit (PBU) are synonymous and relate to descriptions of the oil field, oil field operations and ownership. The term Prudhoe Bay facility is used extensively throughout the document and describes the area of the PBU that contains the SWMUs and AOCs being investigated under this Order. The term “Site” is defined in the Order and is used to describe the physical area of the Prudhoe Bay facility. Both the descriptions of the Prudhoe Bay facility and Site do not include 6 square miles of the Eastern Operating Area of the PBU.

1. INTRODUCTION

This Current Conditions Report (CCR) for the Prudhoe Bay facility (or Site) is a component of Part I of the Site-Wide Project Work Plan, which is a requirement of the Resource Conservation and Recovery Act (RCRA), Section 3008(h) Administrative Order on Consent [EPA Docket No. RCRA-10-2007-0222] (Order), for corrective action, executed between the United States Environmental Protection Agency (US EPA) and BP Exploration Alaska, Inc. (BPXA). This report presents a summary of existing conditions for the facility's SWMUs and AOCs as required by Attachment D to the Order.

1.1. Background

As presented in Figure 1-1, the Prudhoe Bay facility is located on the North Slope of Alaska, approximately 250 miles north of the Arctic Circle and 175 miles west of the Alaska-Canada border. The Site is approximately 379 square miles in size and is comprised of an Eastern Operating Area (EOA) and a Western Operating Area (WOA). The EOA is 192 square miles in size and the WOA is 193 square miles. Approximately six square miles of land within the EOA encompass the Deadhorse lease tracts, which are not part of the RCRA Corrective Action Program. Figure 1-1 presents the Prudhoe Bay Unit Prudhoe Bay Facility Map. Activities within this excluded area include the Deadhorse Airport, the North Slope Borough's Oxbow Landfill, and facilities owned and operated by oil industry support contractors such as Frontier Pad, Service City, select pipeline and roadway corridors to non-Prudhoe Bay Unit facilities and the Trans-Alaska Pipeline corridor,

Prudhoe Bay Unit (PBU) operations include, but are not limited to, oil and gas production wells, water and gas injection wells, operations centers, several flow stations/gathering centers, a central compressor plant, a central power plant, a seawater treatment plant, a seawater injection plant, a Grind and Inject (G&I) plant and a crude oil topping unit. Support facilities include vehicle shops, paint shops, warehouses, living quarters, dining facilities, pipelines, and electrical power transmission lines.

1.2. Purpose

For the purposes of conducting the work required by the Order, a number of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) have been identified at the Site. A SWMU is defined as any unit at which solid wastes have been placed at any time irrespective of whether the unit was intended for the management of solid or hazardous wastes, including those areas of, or at the facility where, solid waste has been treated, stored, disposed of, managed, or released. An AOC is an area where a release (spill) to the environment of hazardous waste or hazardous constituents has occurred, regardless of the frequency or duration of the release.

The objectives of the Order between the US EPA and BPXA are defined as follows:

- To recognize and utilize, to the extent possible, data and information collected during voluntary investigations or corrective action activities conducted at the Site under oversight of the Alaska Department of Environmental Conservation (ADEC).
- To conduct site investigations as necessary to determine the nature and the extent of contamination and any threat to the public health or the environment caused by the release or threatened release of hazardous wastes and/or hazardous constituents at or from SWMUs and/or AOCs at the Site, to report those investigations, as needed, and to provide sufficient data and information to design and implement any necessary corrective measures.
- To conduct Corrective Measures Studies as necessary to identify and evaluate, in accordance with the results of the site investigation and other such data as may be relevant or necessary, the Corrective Measures alternatives necessary to mitigate, remedy or otherwise respond to any release, threatened release or migration of hazardous wastes and/or hazardous constituents at or from the site.
- To design and implement the Corrective Measures selected by US EPA in accordance with the process and requirements established by the Order.
- To implement any Interim Measures that may be required to control or abate immediate threats to human health and/or the environment and to prevent or minimize the potential release or spread of hazardous wastes and/or hazardous constituents into the environment at or from the Site throughout the implementation of the Order.
- To perform any other activities necessary to address, correct, or evaluate actual or potential threats to human health and/or the environment resulting from the release or potential release of hazardous waste and/or hazardous constituents at or from the Site.
- To recognize to the extent possible the ongoing and long-term nature of the operations of the Prudhoe Bay Facility while at the same time, requiring Respondent to prioritize and expedite necessary Corrective Measures on a media- and Project Area-specific basis based on risk to human health and the environment.

The purpose of this Current Conditions Report, completion of which is among the first steps in the process required by the Order, is to summarize existing information for the Facility's SWMUs and Areas of Concern (AOC). The Site-Wide Background (SWB) Report (January 2008) presents information regarding ownership and operation for the Prudhoe Bay Facility and the waste management and environmental setting for the SWMUs and AOCs. Conceptual Site Models for the SWMUs/AOCs and SWMU/AOC Groupings will be provided in a separate report and delivered in Part III of the Site-Wide Project Work Plan. This report will define chemicals of potential concern, potential receptors, and human and ecological exposure pathways (complete and incomplete).

2. SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN

This Current Conditions Report uses some of the information presented in the Site-Wide Background Report (January 2008) to briefly define the ten separate SWMU/AOC Project Groupings. The associated SWMUs and AOCs may be discussed in more than one group, because in some instances, multiple activities have been performed on a pad or area. The sections discussing the SWMUs are sometimes further divided into subsections that reflect the status of remediation efforts (e.g. active sites, sites with ADEC closure, sites closed by both ADEC and US EPA, etc.).

A summary list of the number of identified SWMUs and AOCs by Project Group is presented in Table 2-1 below. Information presented in this table reflects the status of the sites as of November 2007. This table incorporates corrective measures implemented during 2007 at nine SWMU/AOC sites, which resulted in adjustment for these sites from Project Groups where remedial measures were not complete to Project Groups where corrective measures were complete pending ADEC approval. Table A-1 in Appendix A provides a revised listing of individual SWMUs/AOCs by Project Group.

TABLE 2-1. LIST OF SOLID WASTE MANAGEMENT UNITS & AREA OF CONCERNS

SWMU #	Description	# of Sites
Project Group I - Inactive Production Reserve Pits		**113**
1.1	Inactive Reserve Pits-Final ADEC Closure Approved, EPA Determination of Corrective Action Complete to Be Requested	59
1.2	Inactive Reserve Pits-Awaiting Final ADEC Closure Approval	12
1.3	Inactive Reserve Pits – Remedial Measure Not Complete, Scheduled to be Closed by 2014	42
Project Group II - Inactive Exploration Sites within Prudhoe Bay Boundary (entire 'site' including reserve pit and flare pit)		**43**
2.1	Sites that have received ADEC closure-wastes buried in place	10
2.2	Sites that have received ADEC closure-waste removed	7
2.3	Sites where remedial actions still pending or ongoing, no ADEC closure	6
2.4	Sites where remedial actions have not yet occurred	20
Project Group III - Inactive Oily Waste Cells		**4**
Project Group IV - Tuboscope Site, WOA		**1**
Project Group V - Contaminated Sites or Potential Areas of Concern, Alaska Charter[1] Sites		**15**
5.1	Sites with ADEC closure	3
5.2	Sites awaiting ADEC closure	5
5.3	Sites with remedial actions in progress - No closure	7
Project Group VI - Contaminated Sites or Potential Areas of Concern, Non-Charter[1] Sites		**10**
6.1	Sites with ADEC closure	2
6.2	Sites with remedial actions in progress - No closure	8
Project Group VII - Old Landfill Waste Accumulation Sites		**5**

SWMU #	Description	# of Sites
Project Group VIII - Other Inactive Impoundments (no waste contained in impoundments, study may be required to determine if remedial measures required)		**85**
8.1	Drill Site Flare Pits	39
8.2	Seawater Displacement Pits	3
8.3	Drill Site Relief Pits	38
8.4	Drill Site Wastewater Lagoons	5
Project Group IX - Active Operational Sites Where Releases May Have Occurred, Potential Areas of Concern		**1573**
9.1	Well Cellars (52 pads with well cellars)	1560
9.2	Fire Training Grounds / Permitted Open Burn Areas	3
9.3	Facility Flare Pits	10
9.4	Active Relief Pits	0
Project Group X - Other Active Operational Sites (Solid Waste Storage Cells)		**5**
	T Pad, CC-2A, G&I Storage Cells, W Pad Drilling Storage Cell, West Pit at Pad 3,	5
	Totals	**1854**

[1] "Charter" refers to the Charter for the Development of the Alaskan North Slope agreement between the State of Alaska and BP.

2.1. Inactive Production Reserve Pits – Project Group I

Those sites included in Project Group I are all inactive production reserve pits and are grouped into sets based on the original unit boundaries: EOA drill sites, Lisburne drill sites, and WOA drill pads. The sites are in various stages of site closure and the SWMU locations are identified on Figure 2-1 according to their closure status: inactive production reserve pits, SWMUs with final ADEC closure approved, SWMUs waiting for ADEC closure, and SWMUs with remedial measures that are not complete. Table 2-2 presents the three subgroups and the units that are associated. The Assessment Tables for each SWMU are provided in Appendix A.

Drilling waste, consisting of drilling muds and cuttings, generated when production wells were first drilled in the Prudhoe Bay field was typically discharged into reserve pits that were constructed adjacent to the wells in accordance with State of Alaska requirements. The pits were constructed by placement of gravel berms on the tundra. Each production pad (and the injection pads) at Prudhoe Bay typically have from two or more reserve pits.

Removal of the production reserve pit wastes began in the early 1990's by ARCO, which formerly operated the EOA of PBU, as a result of a lawsuit settlement agreement with the National Resources Defense Council (NRDC). The wastes are processed and disposed of with ADEC approval through underground injection at the G&I facility, built specifically for this waste stream. Removal of the EOA production reserve pit wastes was completed at the end of 2004. Removal of the WOA production reserve pit wastes is mandated by the Charter for the Development of the Alaskan North Slope (Charter)

agreement between BP and the State of Alaska, executed when BP bought ARCO in 2000.

Closure of the reserve pits began in late 1995 with the construction of the G&I plant. With the G&I plant operating, it became practicable to excavate and haul the waste from the production reserve pits to the G&I plant, where it is slurried and injected into the subsurface via one of three injection wells. To-date, more than 2,500,000 cubic yards of material from Prudhoe Bay production reserve pits have been excavated and injected.

Closure of the production reserve pits require that they first be closed under ADEC regulatory oversight. The ADEC closure standard (Alaska Administrative Code 18 Chapter 60, Section 440 [18 AAC 60]) for inactive reserve pits is based on protection of surface and groundwater and the prevention of impacts to human health or the environment. The closure standard requires containment of the drilling waste to ensure that contaminants do not migrate off site. Therefore, waste constituents can not exceed the Alaska Water Quality Standards (AWQS) for some metals (arsenic, barium, cadmium, chromium, lead, magnesium, nickel, sodium, and zinc), benzene, toluene, ethylbenzene, and total xylenes (BTEX), and diesel-range organics (DRO). In order to meet this standard, all reserve pit waste is required to be capped or removed prior to reserve pit closure and ADEC approval. In order to comply with the ADEC closure standards, BPXA implements the flow process depicted in Figure 2-2 and excavates the Prudhoe Bay production reserve pits to an appropriate depth below the drilling waste/tundra contact. Total petroleum hydrocarbons (TPH) confirmation sampling is then conducted to ensure that any residual impacts are less 400 mg/kg. After a production reserve pit has been excavated, surface water sampling is conducted to confirm that the water meets the relevant AWQS. After ADEC grants closure to a production reserve pit, it is eligible for closure by the US EPA and US Army Corps of Engineers (US ACOE). Under a pilot program currently in place, once US EPA and US ACOE closure is granted, the reserve pits are culverted to the tundra and are returned to the status of "waters of the United States."

Currently, the inactive production reserve pits at 19 of the Prudhoe Bay drill sites have received ADEC approval for final closure and reserve pits at five drill sites are awaiting final ADEC closure. The production reserve pits at 17 other drill sites, where remedial measures are incomplete, remain open. The status of the reserve pits at each drill site is presented in Table 2-2.

TABLE 2-2. INACTIVE PRODUCTION RESERVE PITS

Final ADEC Closure Approved		Waiting Final ADEC Closure	Corrective Measures Not Complete	
Drill Site 1	Drill Site 14	G Pad	A Pad	R Pad
Drill Site 2	Drill Site 15	K Pad	B Pad	S Pad
Drill Site 3	Drill Site 18	N Pad	C Pad (WOA)	T Pad
Drill Site 4	Lisburne 1	W Pad	D Pad	U Pad
Drill Site 5	Lisburne 2	Z Pad	E Pad	X Pad
Drill Site 6	Lisburne 3		F Pad	Y Pad
Drill Site 7	Lisburne 4		H Pad	Lisburne Gas Injection

Final ADEC Closure Approved		Waiting Final ADEC Closure	Corrective Measures Not Complete	
Drill Site 11	Lisburne 5		J Pad	
Drill Site 12	N Gas Injection		M Pad	
Drill Site 13	W Gas Injection		Q Pad	

2.2. Inactive Exploration Sites within Prudhoe Bay Boundary – Project Group II

The SWMUs included in Project Group II are inactive exploration sites within the Prudhoe Bay unit where exploration activities took place and no production activities were initiated. The location of the sites associated with Project Group II presented on Figure 2-3 are as follows: sites having received ADEC closure with wastes buried in place, sites that received ADEC closure with waste removed, sites where remedial actions are still pending or ongoing and no ADEC closure has been received, and sites where remedial actions have not occurred. Exploration sites are typically composed of a gravel pad, with a reserve pit and a flare pit. Occasionally, a gravel road or runway is also present. The remediation of exploration site requires closure of the exploration reserve pits under Alaska Administrative Code 18 Chapter 60, Section 440 [18 AAC 60]), as described in Section 2.1 above. Removal of impacted gravel from the exploration site pad is often also a component of the remediation. Depending upon the degree to which the gravel was impacted, it may be classified as "contaminated," "restricted use", "conditional use" or "clean". Depending upon its classification, gravel from exploration sites may be sent to the G&I plant, land-farmed or re-used without treatment. The four gravel classifications are summarized below and are based on a gravel reuse plan for the GPB area:

TABLE 2-3. GPB GRAVEL REUSE PLAN

Classification	DRO Concentration Range (mg/kg)	Re-use or Treatment
Clean	≤200 mg/kg	Unrestricted reuse
Conditional Use	>200 mg/kg, ≤500 mg/kg	For use in well cellars, as reserve pit backfill, and construction of new gravel pads or roads where gravel is placed at least 20 feet from edge of pad.
Restricted Use	>500 mg/kg, ≤2,000 mg/kg	For use in well cellars only
Contaminated	>2,000 mg/kg	Must be treated

This section of the Current Conditions Report includes 10 sites that have received ADEC closure with waste buried in place. One of ten sites (West Kuparuk State 3-11-11) is also a Charter Site that is not discussed in Section 2.5. Seven sites have received ADEC closure and waste was removed, three sites have remedial actions still pending or ongoing and do not have ADEC closure and remedial actions have not yet occurred at 20 sites in Project Group II. Table 2-3 provides the list Project Group II sites.

TABLE 2-4. INACTIVE EXPLORATION SITES

ADEC Closure - Waste Buried in Place	ADEC Closure – Waste Removed	Corrective Measures Pending or Ongoing - No ADEC Closure	Corrective Measures Not Complete
Put River 24-10-14	Kuparuk River State #1	PBU Tract T3C	Kuparuk 33-11-12
N. Prudhoe Bay St.#2	Sag Delta #1	PBU Term Well A	N. Prudhoe Bay State No. 1
Sag River State 1	Sag Delta #2	Pingut State 1	Lake State 1
PBU PWDW1-1	NW Eileen #1/#2	Kuparuk State 24-11-12	Beechey Pt St 1/2
PBU PWDW1-2	Kuparuk 7-11-12	Hurl State 5-10-13	East Bay State 1
PBU PWDW1-3	Highland State #1	Kuparuk 30-11-13	East Dock Storage Cell
Pt. McIntyre 01/02	Eileen West End		Getty State #1
Sag Delta 6 (DS L5 Pad)			Kuparuk State #1
Put River 19-10-15 (S. Pit only)			N. Kuparuk State #1
West Kuparuk State 3-11-11			Prudhoe Bay Unit 31-11-13
			PBU Term Well C
			Abel State #1
			Put River 1-, 11- & 12 (10-14)
			Put River 19-10-15
			Put River 33-12-13
			Put River St 1
			SE Eileen ST#1/#2
			South Bay State 1 (DS L3 Pad)
			South Point St 1 (DS L2 Pad)
			West Beach St 1/1-A/2/3/4

2.3. Inactive Oily Waste Cells – Project Group III

Project Group III is composed of the four following SWMUs: Cell 1 at Pad 3, Cell 2 at Pad 3, East pit at Pad 3 and Pingut Pit. The locations of these sites are presented on Figure 2-4. The Pingut Pit was originally constructed as an exploratory reserve pit and subsequently used to store storage tank washing wastes, production separator sludge parafins, natural gas liquids, oil-based drilling muds, lost circulation material wastes from drilling, wastes from well maintenance and containment of contaminated snow and gravel. The pit was used to reclaim frozen oily and non-oily solid material. Frozen wastes were stored in the pit during the winter. Liquids from the pit were removed and used for road oiling. The Pingut Pit was closed after some liquids and solids were removed and 850 cubic yards of sludge was buried nine feet below grade. Closure involved freeze-back of the pit within the permafrost, capping and monitoring. Monitoring results confirm that buried wastes continue to be contained.

Pad 3 Cells 1, 2, and East Pit are located near Drill Site 6. Cell 1 was constructed for disposal of solid waste and was initially closed with oily wasted buried in place. Cell 2, a permitted oily waste disposal cell, was a permanent disposal monocell designed to freeze waste in-place. Liquid and solid wastes were removed from both Cell 1 and Cell 2 by 2007. The East Pit, a monofill permitted under the ADEC Solid Waste Program was closed after the contents of the pit, liner and impacted soils below the liner were removed. Surface water down gradient of the pad does not appear to be impacted by pad activities.

2.4. Tuboscope Site Project Group IV

Project Group IV includes one SWMU, the Tuboscope site, which was used to inspect new and used tubulars. This site location is presented on Figure 2-4. The operators used chlorinated solvents to remove pipe dope from the threaded well piping. Activities were performed on bare ground since the facility did not have a floor. An above ground diesel storage tank supplied fuel to the building generator. A fire destroyed the Tuboscope facility and subsequent investigations were performed to evaluate environmental impacts. Testing indicates surface water was impacted by chlorinated solvents most likely from past activities. Interim measures were employed to stabilize the site and numerous assessments were conducted to define the extent of contamination and determine remedial alternatives. Remedial investigation continues for the evaluation and selection of final corrective measures. In 2006 and 2007 in-situ treatment pilot testing was conducted to evaluate the use of nonoscale, bi-metallic particles (iron and palladium) to remediate the remaining contaminants in the Pad. Results of the field pilot testing found bi-metallic nano-scale particle treatment technology capable of reducing mean TCA concentrations in soil by 90%. The effectiveness of two distinct treatment methods, physical mixing and slurry injection, was also evaluated as part of the field test. Physical mixing with the bi-metallic nano-scale particles in slurry at shallow depths (four feet to five feet below ground surface) proved much more effective. Work conducted at the Tuboscope site is done so under an Administrative Order on Consent (US EPA Docket: RCRA-10-99-0179) that provides for the implementation of Interim Measures. Interim measures and monitoring at this site will continue under the existing Tuboscope Order until approval by US EPA of the revised Tuboscope Interim Measures Work Plan, at which time the Tuboscope Order will be terminated and work continued under the Prudhoe Bay facility Order.

2.5. Contaminated Sites or Potential Areas of Concern – Alaska Charter Sites – Project Group V

Project Group V includes SWMUs that are managed under the ADEC Contaminated Sites program and that are also included in the Charter for the Development of the Alaskan North Slope (Charter). On December 2, 1999, concurrent with the acquisition of Atlantic Richfield Corporation (ARCO) by BP, a Charter Agreement was entered among the State of Alaska, BPXA, and ARCO. Among the requirements of the Charter Agreement was the commitment to improve the environment on the North Slope. This commitment included cleaning up abandoned (orphaned) sites and sites that were already involved in site assessment or having a greater concern or priority. Orphaned sites are those sites for which there is no known viable responsible party able to conduct the required cleanup. Visual inspections and inventories have been conducted at the sites, and solid, liquid and hazardous wastes have been removed. The sites included in the Charter Agreement are managed under the ADEC Contamination Sites Program.

The locations of the following Alaska Charter SWMUs sites are depicted on Figure 2-4. This section discusses three sites having received ADEC closure (ARCO EOA C Pad

Stoddard Solvent Site, Niakuk #4 Island, and ARCO Building U5A); five sites waiting for ADEC to grant closure (ARCO Drill Site 2, ARCO Drill Site L2 Bioremediation, ARCO Point McIntyre PM-1, ARCO Pad 10, and ARCO Drill Site Maintenance [DSM] Warm Storage Facility); and seven sites with active remedial measures or monitoring ongoing (BPXA WOA D Pad, ARCO Crude Oil Topping Unit, ARCO DSM Shop Site, ARCO East Dock Bioventing Site, Kuparuk River State 1, ARCO CGF NGL Flare Pit and ARCO Pad 3 [East End]). Some SWMUs that were identified under the Charter agreement are discussed in other sections (such as the ARCO CGF NGL Flare Pit is discussed in Project Group VI in the section that discusses the Therminol® spill) and are not included in Project Group V.

2.6. Contaminated Sites or Potential Areas of Concern – Non-Charter Sites – Project Group VI

The sites included in Project Group VI are managed under the ADEC Contaminated Sites Program. The location of the following non-charter sites are presented on Figure 2-4: non-charter contaminated sites with ADEC closure and non-charter contaminated sites with remedial actions in progress that have not received ADEC closure. These sites were not included in the Charter Agreement previously described in Section 2.5. These sites may have been already involved in assessment, investigation or remediation prior to the establishment of the Charter. This section discusses two sites with ADEC closure (BOC Fueling Island Site [WOA] and MOFW Bulk Fuel Island [BOC Pad, WOA]) and seven sites still involved in the remediation process (PBOC Generator Site, Building U-21, CGF Flare Pit Therminol Spill, DS L-2 Pipeline Spill to Tundra, Main Construction Camp [MCC] Fuel Loading Dock [Old & New], GC-2 OTL Release, and FS-2 OTL Release).

2.6.1. Base Operations Center Fueling Island Site Release

This AOC is located in the WOA at the Base Operations Center (BOC) fueling island. The original fueling station located at this site has a documented history of diesel spills dating back to 1989. A soil vapor extraction (SVE) system was installed at the same time the new fuel station was built to remediate existing contamination in the gravel pad. The SVE was shut down in 1997 after analytical data confirmed DRO, gasoline-range organics (GRO) and total BTEX concentrations were below the target cleanup criteria of 500 mg/kg, 100 mg/kg, and 10 mg/kg, respectively. The ADEC determined no further action was necessary and granted site closure in June 1998.

Additional analytical sampling of the fuel island gravel pad identified two areas of contamination where concentrations exceeded ADEC criteria. Contaminated soil was excavated and samples confirmed contamination levels were below ADEC criteria in the excavation, side walls and perimeter of the fuel island.

2.6.2. Main Operations Facility Warehouse Bulk Fuel Island

This AOC is located in the WOA at the BOC Main Operations Facility Warehouse (MOFW) bulk fuel island. A fuel spill from the lined containment area of the MOFW

resulted in a Notice of Violation (NOV) by the ADEC. The NOV required reconstruction of the bulk fuel loading area. During demolition/reconstruction activities soil contamination was identified and excavated. Contaminated soil was thermally treated and liner material was disposed as solid waste.

2.6.3. Prudhoe Base Operations Center Generator Site Diesel Fuel Storage Tank Release

This AOC is located in the EOA and area of concern is the Prudhoe Bay Operations Center (PBOC) generator module site. Investigations conducted since 1996 indicate contamination is present in the gravel pad material, active layer of water, and impounded water beneath the generator module. The source of contamination appears to be a 2,500-gallon diesel fuel storage tank used to supply the PBOC emergency generators.

Three groundwater wells installed in 1998 are sampled annually to monitor the contamination in the active layer groundwater. Analytical data indicate that contamination levels in the groundwater and surface water are gradually declining.

2.6.4. Building U-21 Diesel Fuel Storage Tank Release

This AOC is located in the EOA at the MCC. Preliminary Assessments of this SWMU have been conducted over the last five years. Diesel fuel contamination was identified in a trench excavated outside the northeastern corner of Building U-21 in 1997 during routine maintenance. Soil assessments identified two areas of soil contamination near the site of a former above-ground storage tank (AST). The GRO and DRO concentrations in the north area and DRO and RRO concentrations in the south area exceed ADEC cleanup criteria. Additionally, historical BTEX levels in surface water exceeded water quality standards and BTEX, GRO and DRO exceeded groundwater criteria in monitoring well MW01. The source of contamination was excavated in July of 2005. This involved removing soil from the gravel pad and the tundra near the toe of the pad. During excavation of soil contamination the groundwater monitoring well MW01 was destroyed and the two low areas in the tundra, the historical location of two surface water sample points (SW03 and SW04), were excavated and filled with clean organic over-burden. Consequently MW01, SW03 and SW04 could not be sampled during the August 2005 monitoring event. The water samples collected in August 2005 confirmed that the active layer water and surface water were not contaminated at levels exceeding ADEC groundwater criteria or water quality standards.

2.6.5. ARCO Prudhoe Bay Central Gathering Facility Flare Pit Therminol Spill

Natural gas liquids and carryover/additives are flared at the flare pit at this location. In 1995 a Therminol® (petroleum product) spill was discovered at the end of an access road leading to the Central Gathering Facility (CGF) Flare Pit within the EOA. The Therminol® leaked beyond the dike surrounding the pit and migrated onto the tundra. In 1998, fluids were found to be leaking through the flare casing in the vicinity of the 1995 spill. The casing was repaired in 1999. Investigations were completed in 1995, 1997,

2000, and 2002 to investigate off pad tundra soil and surface water impact from contaminants migrating off the gravel pad. Six monitoring wells were installed in 2002 to further assess hydrocarbon impacts within and emanating from the flare pit gravel berms. Water quality monitoring was performed from 2003 through 2005. Historically benzene and total aromatic hydrocarbons (TAH) concentrations have exceeded ADEC Water quality standards in surface water samples. Contamination in surface water decreased significantly since the thermosiphons were repaired and the flare pit was dewatered. The ADEC Water Quality Standards were not exceeded in surface water samples collected in 2005. However, separate phase product has been noted in groundwater monitoring well MW03 since it was installed in 2002 and DRO concentrations have historically exceeded ADEC groundwater criteria (1.5 mg/L) in all active-layer water samples.

2.6.6. Drill Site Lisburne 2 2001 Pipeline Spill to Tundra

The Lisburne 2 (L-2) pipeline spill AOC site is located within the EOA. This area of contamination was the result of oil released from a pipeline on July 2001 located 100 feet from the gravel pad between L-2 and the Lisburne Production Center. Approximately one-half acre was impacted. The most heavily impacted area was beneath and near the pipeline. Removal of some contaminated material and remediation occurred; however, the contamination appears to remain in this area. More information is needed to fully evaluate extent of contamination and current conditions.

2.6.7. Main Construction Camp Fuel Loading Dock

There are two fuel loading dock AOCs located at the MCC within the EOA. The former MCC fuel loading dock and the current (or new) fuel loading dock both have experienced spills or releases. The concern at the former MCC fuel loading dock is fuel contamination in soil reported at depths ranging from 1 to 5.4-feet below ground surface. Contamination is also present in three active layer monitoring wells. The source of contamination appears to be localized spills since contamination appears to be isolated to a few hot spots within the gravel pad. Investigations were performed to determine if contamination presented a human health risk. As of 1994 both soil and groundwater risk based criteria were exceeded. Additional information is needed to assess current conditions. The concern at the current MCC fuel loading dock is also fuel contamination resulting from one 3,600 gallon diesel fuel spill in 2003 and a series of other smaller spills. Assessment activities have not yet been undertaken at the current MCC fuel loading dock site.

2.6.8. Gathering Center 2 Oil Transit Line Release

The Gathering Center 2 (GC-2) Oil Transit Line (OTL) Release AOC is located in the WOA of Prudhoe Bay. On March 2, 2006 a crude oil release was discovered at a caribou crossing located along the GC-2 transit line. The spill impacted approximately two acres and cleanup was completed by the end of April 2006. All soils contaminated with DRO at levels greater than 1,000 mg/kg were removed. The area was backfilled with 4-6 inches

of frozen tundra transplanted from another location. Preliminary assessment activities have been completed.

2.6.9. Flow Station 2 Oil Transit Line Release

The Flow Station 2 (FS-2) OTL Release AOC is located in the EOA of Prudhoe Bay. On August 4, 2006 a smart pig operation revealed anomalies at 12 locations along the transit pipeline between FS-1 and FS-2. As a result of the inspection data, BPXA began shutting down the pipeline on August 6, 2006. During this shut down a release was discovered near FS-2. The area was flooded to float the crude oil and allow collection of the product. Impacted tundra grasses were burned with a weed-burner. Surface soil samples were collected from beneath the vegetative material to characterize the area of the release. The ADEC Arctic Zone Method One criteria (200 mg/kg) for DRO was used to characterize the site. The DRO level at six locations exceeded 200 mg/kg. Surface water was not characterized. Preliminary assessment activities have been completed and interim measures were appropriate and effective.

2.7. Old Landfill Waste Accumulation Sites – Project Group VII

The five SWMU sites included in Project Group VII and briefly discussed in the following subsections were solid waste disposal sites used by Prudhoe Bay operators in the 1970s and 1980s for the disposal of non-exempt solid waste including residual ash from historic burning operations and inert materials and debris. Figure 2-4 depicts the location of the old landfill accumulation sites.

2.7.1. Sand Dunes Landfill

The Sand Dunes Landfill (SDL) has been inactive since the early 1980s and served as ARCO's solid waste disposal site from 1969 to 1980 and on two occasions in 1981 and 1983. The SDL includes an area used for fire training and another used for resource recovery/material storage. The landfill was also the location of a natural gas flare used to treat metal contaminated with hydrocarbons. This site is also on the list of Charter sites, but not discussed in Section 2.5.

2.7.2. Surfcote Waste Pile

The Surfcote Landfill Site was used as a one-time burial of approximately 9,300 to 20,000 cubic yards of scrap metal in 1980. No releases of hazardous constituents are known to have occurred.

2.7.3. Pad 13 Waste Pile

Pad 13 was historically used as a storage and staging area for excess equipment and drilling mud components. The pad may have been used to bury leftover construction materials from 1982 to 1983. Conclusive evidence of buried metal debris and a source for a reported surface water seep is not available. Unsuccessful attempts were made to confirm the previous reports.

2.7.4. ARCO Hangar Site

This landfill was used for the disposal of oil exploration wastes collected by ARCO during North Slope tundra cleanup operations for 1971 to 1973. The landfill appears to have been limited to the area of the old sewage lagoon and may be the location of buried drums.

2.7.5. C Pad

The eastern end of the WOA C pad was used as a solid waste burn pit from 1974 through 1978. Buried ash from the burn pit activities was discovered during closure of the RCRA Hazardous Waste Storage Unit in 2000. This ash was removed and closure certification report submitted to US EPA in August 2004.

2.8. Other Inactive Impoundments – Project Group VIII

Other inactive impoundments are discussed Project Group VIII and include inactive drill site flare pits, drill site seawater displacement pits, drill site relief pits, and drill site drill rig waste water lagoons. The locations of these impoundments are depicted, where known, in the Appendix A figures associated with the individual SWMU or AOC Assessment Tables. These impoundments are briefly discussed in the following subsections. Table 2-4 lists the units included in this Project Group.

TABLE 2-5. OTHER INACTIVE IMPOUNDMENTS

WOA Drill Site (DS)		EOA DS		Lisburne		DS Sea Water Displacement Pits	DS Drill Rig Wastewater Lagoons
Flare Pits	Relief Pits	Flare Pits	Relief Pits	Flare Pits	Relief Pits		
A Pad	A Pad	DS 1	DS 1	DS L1	DS L1	AGI	EOA
B Pad	B Pad	DS 2	DS 2	DS L2	DS L2	NGI	WOA
C Pad	C Pad	DS 3	DS 3	DS L3	DS L3	WGI	
D Pad	D Pad	DS 4	DS 4	DS L4	DS L4		
E Pad	E Pad	DS 5	DS 5	DS L5	DS L5		
F Pad	F Pad	DS 6	DS 6				
G Pad	G Pad	DS 7	DS 7				
H Pad	H Pad	DS 9	DS 9				
J Pad	J Pad	DS 11	DS 11				
K Pad	K Pad	DS 12	DS 12				
M Pad	M Pad	DS 13	DS 13				
N Pad	N Pad	DS 14	DS 14				
Q Pad	Q Pad	DS 15	DS 15				
R Pad	R Pad	DS 16	DS 16				
S Pad	S Pad	DS 17	DS 17				
T Pad	T Pad	DS 18	DS 18				
U Pad	U Pad						
X Pad	W Pad						
Y Pad	X Pad						
	Y Pad						
	Z Pad						

Notes:
EOA – Eastern Operating Area
WOA – Western Operating Area

2.8.1. Inactive Drill Site Flare Pits

Flare pits are present at most drill sites constructed between 1969 and 1980. Flare pits were also constructed at flow stations, production facilities, and gathering centers. These impoundments were constructed of compacted gravel fill and provided a location to flare large volumes of well fluids.

2.8.2. Inactive Drill Site Seawater Displacement Pits

Seawater displacement pits were used to provide a containment area for seawater displaced from the main injection lines in the event of an imminent freeze up or pigging operation. Limited information is available for these pits in the Prudhoe Bay area.

2.8.3. Inactive Drill Site Relief Pits

Relief pits were located at each active drill site to contain fluids released from the drill sites manifold building, as part of operational safety systems.

2.8.4. Inactive Drill Site Drill Rig Waste Water Lagoons

Disposal practices on drilling pads involved the discharge of sewage from rig camps to gravel-diked surface sewage lagoons adjacent to the pads. Treated wastewater from the drill rig and residential camps was generally discharged under ADEC permit to the adjacent lagoons.

2.9. Active Operational Sites – Potential Areas of Concern – Project Group IX

Project Group IX includes active operation sites where releases may have occurred and related potential areas of concern. The four units included in this Project Group are briefly discussed in the following subsections. The locations for the following sites are depicted in Appendix A figures associated with the individual SWMU or AOC Assessment Tables. Ongoing operations at the facility limit the scope of work that can be performed at SWMUs within this Project Group. In most instances, investigations of a limited scope to characterize the SWMU/AOC and to demonstrate that contaminants are not migrating outside the boundary of the SWMU/AOC may be the only work possible while the areas remain operational. Table 2-5 provides a list of all units included in this Project Group.

TABLE 2-6. ACTIVE OPERATIONAL SITES WHERE RELEASES MAY HAVE OCCURRED, POTENTIAL AOC

WOA Well Cellars (WC)		EOA WC		Lisburne WC		FTG and Permitted Open Burn Areas	Flare Pits at Facilities
Site	No. of WC	Site	No. of WC	Site	No. of WC		
A Pad	42	DS 1	35	DS L1	14	EOA FTG	FS 1
B Pad	35	DS 2	40	DS L2	26	WOA T Pad	FS 2
C Pad	44	DS 3	36	DS L3	19	WOA CC-2A	FS 3
D Pad	32	DS 4	49	DS L4	13		GC 1
E Pad	42	DS 5	39	DS L5	25		GC 2
F Pad	47	DS 6	28				GC 3
G Pad	29	DS 7	41				LPC

WOA Well Cellars (WC)		EOA WC		Lisburne WC		FTG and Permitted Open Burn Areas	Flare Pits at Facilities
Site	No. of WC	Site	No. of WC	Site	No. of WC		
H Pad	36	DS 9	51				NG1
J Pad	28	DS 11	32				WGI
K Pad	18	DS 12	36				CGF
L Pad	25	DS 13	36				COTU
M Pad	33	DS 14	44				CCP
N Pad	24	DS 15	43				
P Pad	26	DS 16	31				
Q Pad	7	DS 17	20				
R Pad	35	DS 18	34				
S Pad	66						
T Pad	7						
U Pad	14						
V Pad	10						
W Pad	43						
X Pad	38						
Y Pad	39						
Z Pad	37						

Notes:
EOA – Eastern Operating Area
WOA – Western Operating Area
FTG – Fire Training Grounds

2.9.1. Active Well Cellars

Well cellar designs have undergone three design changes over the life time of the Prudhoe Bay Unit. The design changes are summarized as follows:

- Well cellars constructed before 1981, “First-Generation”, were excavated into the gravel pad at a depth of eight feet and eight feet by eight feet wide. A 2-inch by 12-inch timber crib was constructed around the cellar. Annular space between the outside wall of the crib and the excavation limits was backfilled with gravel and compacted.
- The “Second-Generation” well cellars constructed from 1981 to 1984 were designed to use corrugated metal pipe (CMP) instead of wood cribs. The excavation depth was reduced to five feet and the width remained the same as the First-Generation cellars. Annular space between the CMP and the excavation limits was backfilled with gravel and compacted.
- “Third-Generation” well cellars constructed after 1984 continue to use CMP. However, cellar construction has incorporated a concrete floor (thickness ranges from 8 to 24 inches) at the base of the well cellar. Annular space between the CMP and the excavation limits was backfilled with gravel and compacted.

Many well cellars constructed before 1981 have been retrofitted with CMP well cellars as well workovers occurred throughout the Prudhoe Bay unit. A few wood cellars still exist; however, if the workover was done between 1981 and 1984, the retrofitted cellar may not have a concrete floor.

The well cellars were used for the temporary storage of drilling muds and other drilling fluids. Fluids were routinely pumped from the well cellar into unlined reserve pits until

1986. After 1986 fluids or muds would have been placed in a lined reserve pit or pumped into an injection well. The well cellar was backfilled after drilling was completed and the rig moved off the well. Since 1994 all drilling fluids are pumped into slop tanks or drums. Drilling fluids are no longer allowed to drain into a well cellar.

Other activities to be considered when evaluating impacts from drilling or maintenance activities include the following:

- Determine if solvent wash fluids used for dissolution of paraffin and asphaltene scaling have drained into well cellars.
- Crude oil drained during perforation jobs was drained into the well cellar prior to 1984 for temporary storage.
- Fluids generated during the scale inhibition treatments used since 1981 are typically left downhole and were not drained into well cellars.
- Inhibitor fluids used during tubing displacement treatments may have dripped into the well casing during installation or removal of the corrosion coupon. In 1991, an expanded spill prevention program was implemented to capture dripping fluids.
- Determine if mechanical stimulation fluids have been drained into well cellars.
- Hot oil used to remove paraffin solids from the near surface tubing and surface well lines have not been drained into the well cellars. These oils are either allowed to flow back into the production stream or separated out at the flow station.
- Prior to 1984 the fluids generated during steam cleaning, preventive maintenance, freeze protection, and bleeddowns were allowed to drain into the well cellar for temporary storage. Starting in 1984, fluids were either bled off into the well line, into slop tanks or into upright tanks through the companion valve at the wellhead. Steam cleaning fluids were still drained into the well cellar after 1984. In 1991, an expanded spill prevention program was implemented and fluids were not allowed to drip or drain into the well cellar during bleeddown. Steam cleaning was discontinued in 1993.

Typical contaminants of concern that may be found in well cellar gravel are those connected with activities previously summarized. The following contaminants may be found in well cellar gravel: six metals: aluminum, barium, cadmium, complex chromium, mercury, and zinc, petroleum hydrocarbons, BTEX, formaldehyde, and chlorides.

2.9.2. Fire Training Areas / Permitted Open Burn Areas

Diesel fuel is used to set fires at the sites for training exercises, potentially contaminating the gravel pad. The contamination appears to be the result of water used to extinguish the fires spreading residual diesel fuel on the gravel pads.

2.9.3. Facility Flare Pits

In addition to the flare pits constructed at most of the drill sites between 1969 and 1980, flare pits were also constructed at flow stations, production facilities, and gathering

centers. These impoundments were constructed of compacted gravel fill and provided a location to flare large volumes of well fluids.

2.9.4. Active Relief Pits

Relief pits were located at each active drill site to contain fluids released from the drill site's manifold building, as part of operational safety systems. Relief pits were used intermittently and following use the fluids were removed and added to the crude oil production stream or re-injected. There are no known active relief pits in use within the PBU.

2.10. Other Active Operational Sites – Solid Waste Storage Cells - Project Group X

Project Group X includes five active, permitted storage impoundments that are currently used at the facility. The locations of these sites identified as potential SWMUs or having had known releases are presented on Figure 2-4. Ongoing operations at the five active sites limit the scope of work that can be performed at SWMUs within this Project Group. In most instances, investigations of a limited scope to characterize the SWMU/AOC and to demonstrate that contaminants are not migrating outside the boundary of the SWMU/AOC may be the only work possible while the areas remain operational. The five units are briefly discussed in the following subsections.

2.10.1. T Pad Solid Waste Facility

This facility located on T Pad is similar to most North Slope production drilling sites. The solid waste facility is on a gravel pad for drilling and oil production activities. Reserve pits containing drilling mud and formation cuttings are located at the facility along with dry storage area for storing equipment, a lined pit for temporary storage of petroleum-contaminated wastes and fire training exercises. No remedial activities have been performed at this site and monitoring activities indicate surface water is not impacted by waste stored at the site.

2.10.2. Construction Camp 2A

The construction camp was dismantled in 1989 and is no longer in use. Two timber crib storage pits previously used at the camp are no longer present. However, there is an active storage pit associated with the facility. The pad is currently used for dry storage. An active monocell permitted through 2008 is used to store RCRA exempt exploration and production wastes and non-exempt non-hazardous wastes. Surface water monitoring results indicate surface water has not been impacted by site solid waste management operations.

2.10.3. Drill Site 4 Grind and Inject Storage Cells, Material Transfer Stations #1 and #2

The Drill Site 4 facility uses two material transfer station storage cells. Both cells are currently active and store RCRA-exempt, non-hazardous exploration and production

wastes for injection into three designated Class II disposal wells. Surface water monitoring indicates that surface water has not been impacted by the site solid waste management operations.

2.10.4. W Pad Drilling Storage Cell

The solid waste storage cell at W Pad is in the southwest corner of an impoundment facility previously used as a reserve pit. Reserve pit wastes were removed from the impoundment and closure requested (SWMU Section 1.2.2 provides more information on this unit). The primary purpose of the lined storage cell is to provide temporary storage for drilling wastes west of the Kuparuk River when the Bridge is not passable due to spring flooding. This cell continues to be active and surface water monitoring confirms surface water has not been impacted by storage activities.

2.10.5. West Pit at Pad 3

Pad 3 is located adjacent to Drill Site 6. West Pit was constructed for temporary storage of non-RCRA hazardous and non-exempt solid waste materials. It is currently permitted for long-term containment of non-hazardous, RCRA-exempt petroleum contaminated gravel and soil. The permit was valid until November 2007.

3. SWMU/AOC DESCRIPTION AND ASSESSMENT

A Description and Assessment Summary Table (Assessment Table) was completed for each SWMU or AOC as it appears in each Project Group, as originally identified in Appendix I to Attachment C of the Order. The Assessment Tables and associated analytical data tables and figures are provided in Appendix A and appear in the order shown on Table A-1. The amount of information available for the SWMUs/AOCs varies among the groups. In some instances, there are data gaps for SWMUs/AOCs or SMWU/AOC project groupings.

The Assessment Tables provide the following information for each SWMU and AOC:

- Identifies the location of the unit on a facility map and/or current aerial photograph when available.
- Provides an estimate of the quantities of solid and hazardous waste (both managed and released).
- Lists the type of hazardous waste and hazardous waste constituents (both causing and potentially causing contamination) to the extent known.
- Identifies and describes any investigation/characterization activities performed involving soil (surface and subsurface), surface water, and the active water layer.
- Provides a summary of findings from the investigations (citing the appropriate documentation) including constituents identified, the highest levels of those constituents, and the extent of contamination. Current and applicable historical analytical and field data collected for soil (surface and subsurface), surface water, and the active water layer are presented in associated tables by matrix, and sample locations are presented on a current site map. Results are compared against the US EPA or ADEC standards or cleanup criteria applicable to the activity that caused the data to be collected.
- Provides a summary of any remedial work performed (citing appropriate documentation) including the type of work performed, the affected media, the physical extent of the action, the disposition of any remediation wastes, the results of any confirmation sampling and any physical changes to the area or unit (i.e. fill material placed in unit).
- Identifies additional information US EPA will need to meet other purposes of the Order.
- Provides a preliminary assessment of the nature and extent of contamination for each SWMU or AOC.
- Provides an assessment regarding previously implemented interim measures and the need for initial or additional interim measures at each SWMU, AOC, or Project

Group consistent with Subsection B Interim Measures (IM)/Stabilization, in Section VIII: Work to be Performed, of the Order.

4. REFERENCE LIST

A listing of the references used to prepare the Current Conditions Report was generated and is provided in Appendix B and on the CD provided inside the front cover of this report. The reference list is organized by SWMU and/or AOC, which lists all documents relating to background, investigation and/or remediation of the unit/area, including those prepared in response to the Order. Documents on the list are numbered sequentially.

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FIGURES

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APPENDIX A

Current Condition Assessment Tables

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APPENDIX B

Reference List

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