APPENDIX C

ESSENTIAL FISH HABITAT ASSESSMENT

Essential Fish Habitat Assessment for Wastewater Discharges Associated with the Osprey Platform in the Redoubt Shoal Unit Development Project

Cook Inlet, Alaska

Submitted to
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March 16, 2001

Contract No. 68-W7-0050, Delivery Order 2004
SAIC Project No. 06-5050-01-9695-005

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1.0 INTRODUCTION

The Clean Water Act , PL-92-500, as amended, authorizes the U.S. Environmental Protection Agency (EPA) to administer the National Pollutant Discharge Elimination System (NPDES) permit program. The NPDES program regulates discharges from point sources to waters of the United States. While the majority of states are currently authorized to administer the NPDES program, the State of Alaska is not among them. Thus, EPA regulates the point source discharges in the state by issuing NPDES permits.

The 1996 amendments to the Magnuson-Stevens Act, PL-104-267, which regulate fishing in U.S. waters, included substantial new provisions to protect important habitats for all federally managed species of marine and anadromous fish. The amendment created a new requirement to describe and identify "essential fish habitat" (EFH) in each fishery management plan. EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." All federal agencies are required to consult with the National Marine Fisheries Service (NMFS) on all actions undertaken by the agency that may adversely affect EFH.

Forest Oil (formerly Forcenergy Inc.) has proposed the development of a new oil and gas project in the waters of Cook Inlet, Alaska to access reserves in the Redoubt Shoal Unit. As a result of the development, Forest Oil is proposing to convert the offshore Osprey Platform from a manned exploratory platform to a production platform. Forest Oil has applied to EPA for an NPDES permit for the discharge of wastewater from the Osprey Platform in Cook Inlet, Alaska. These discharges include deck drainage, sanitary wastewater, domestic wastewater (gray water), boiler blowdown, fire control system test water, and non-contact cooling water.

This document provides an assessment of the impacts of the wastewater discharges on the essential fish habitat of the federally managed species in the vicinity of the discharge in Cook Inlet, Alaska. This document is prepared and submitted in compliance with the consultation requirements of the 1996 amendments to the Magnuson-Stevens Act.

2.0 DESCRIPTION OF THE PROPOSED ACTION

The Osprey Platform, by design, is a movable drilling platform that has been constructed to support exploration and eventually production drilling operations for the Redoubt Shoal Unit (Figure 1). The platform was placed onsite during late June 2000, approximately 1.8 miles southeast of the end of the West Foreland (Latitude 60º 41' 46" N, Longitude 151º 40' 10" W) (Figure 2). The West Foreland is considered the northernmost boundary of lower Cook Inlet. The platform is approximately 12 miles northwest of Kenai, Alaska and approximately 70 miles southwest of Anchorage, Alaska. The water depth at the platform is approximately 45 feet (referenced to mean lower low water). The platform is designed to handle anticipated oceanographic, meteorological, and seismic design conditions for the area.

At the completion of exploration drilling operations, which are currently being conducted under the general NPDES permit for Oil and Gas Exploration (AKG285024), the Osprey Platform will be used to either support offshore production operations (as addressed in this document) or be removed if oil and gas are not found in commercial quantities. Platform conversion would include the addition of limited production equipment and the installation of offshore pipelines and utility lines.

If the platform is not converted to production, wells will be plugged, abandoned, the piling and conductors will be cut, and the platform floated off-location (similar to the manner in which it was floated on-location). These operations would be conducted in accordance with applicable regulations and with appropriate approvals from the Alaska Oil and Gas Conservation Commission (AOGCC), the Alaska Department of Natural Resources (ADNR), and the Minerals Management Service (MMS).

2.1 LOCATION OF THE PROPOSED ACTION

The action area for this project is Forest Oil's Osprey Platform in the Forelands area of central Cook Inlet, Alaska (60º 41' 46" N latitude and 151º 40' 10" W longitude) (Figure 2). The platform is located 1.8 miles southeast of the tip of the West Foreland, Alaska.

2.2 PRODUCTION ACTIVITIES

2.2.1 Completion

After confirmation of a successfully producing formation, the well will be prepared for hydrocarbon extraction, or "completion." The completion process includes: setting and cementing of the production casing; packing the well; and installing the production tubing. During the completion process, equipment is installed in the well that allows hydrocarbons to be extracted from the reservoir. Completion methods are determined based on the type of producing formation, such as hard or loose sand, and consist of four steps: wellbore flush, production tubing installation, casing perforation, and wellhead installation.

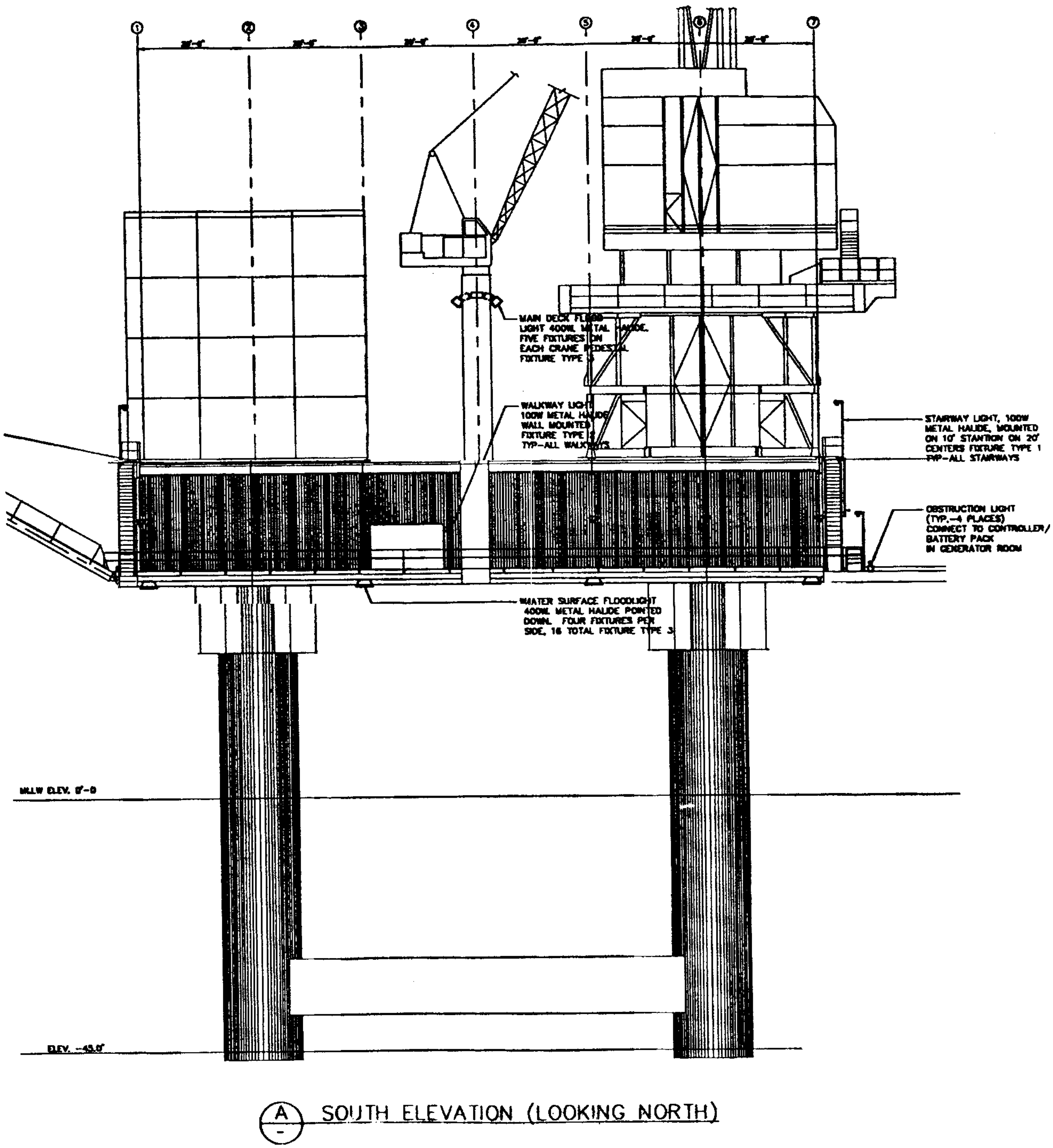

Figure 1. General Schematic of Osprey Offshore Drilling Platform

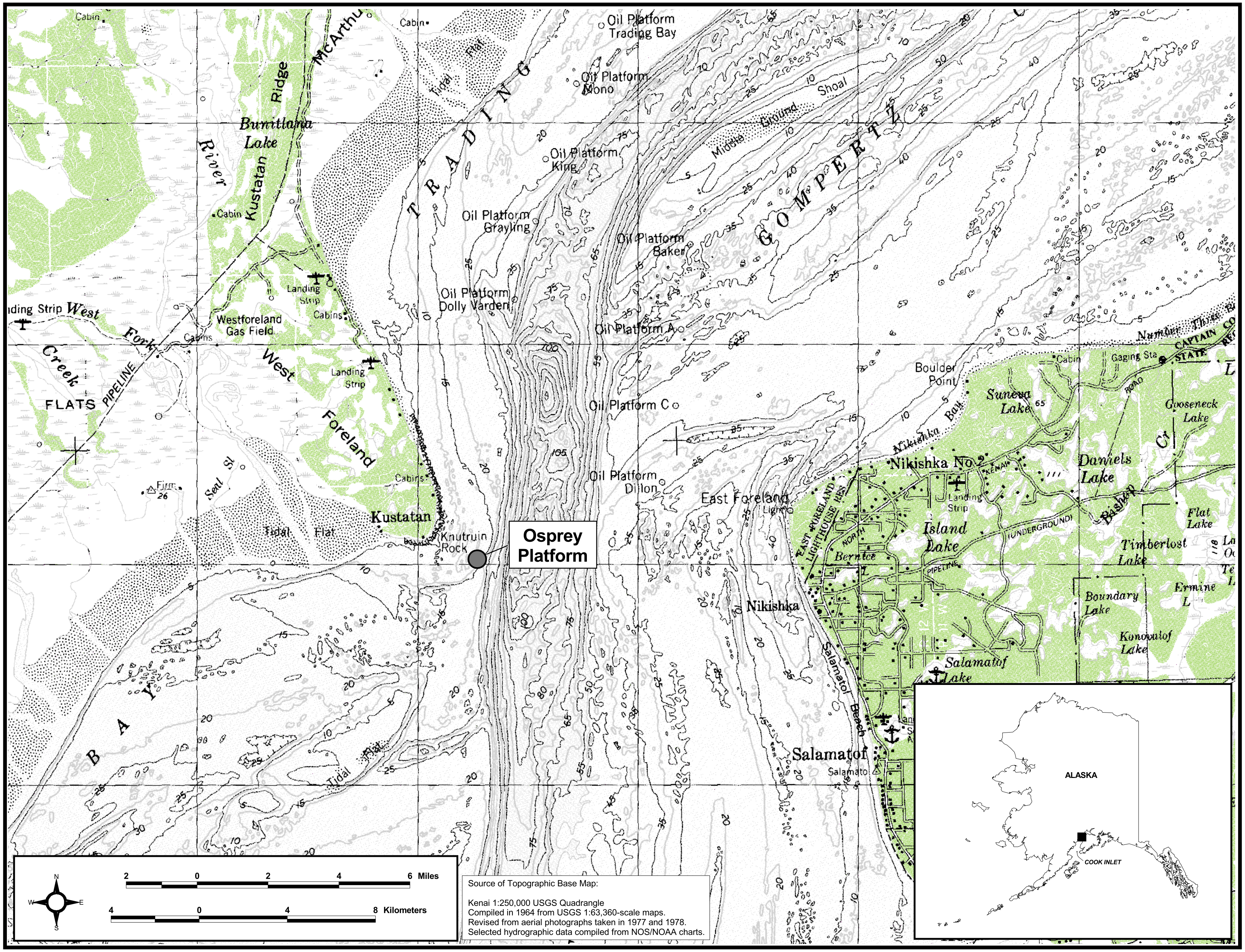

Figure 2. Location of the Osprey Platform in the Redoubt Shoal Development Area, Cook Inlet, Alaska.

2.2.2 Fluid Extraction

The fluid that will be produced from the oil reservoir consists of crude oil, natural gas, and produced water. Production fluids will flow to the surface, through tubing inserted within the cased borehole, using electric submersible pumps. As hydrocarbons are produced, the natural pressure in the reservoir decreases and additional pressure must be added to the reservoir to continue production of the fluids. The additional pressure will be provided artificially to the reservoir using waterflooding, which is the injection of water into the reservoir to maintain formation pressure that would otherwise drop as the withdrawal of the formation fluids continues.

2.2.3 Fluid Separation

As the produced fluids (natural gas, crude oil, and produced water) surface from the wells, the gas will be separated from the liquids in a two-phase separator on the platform. The wet gases from the separator will pass through a glycol dehydrator to remove water and then will be used to support platform heating or will be shipped by pipeline to the onshore production facility. The liquids will be pumped to the Wet Oil Surge Vessel and then pumped to the onshore production facility for oil-water separation. There will be no storage capacity onboard the Osprey Platform for separated liquids. The produced water separated from the crude oil at the onshore production facility will then be pumped back to the Osprey Platform by pipeline for downhole injection to maintain formation pressures within the Redoubt Shoal Unit.

2.2.4 Well Treatment

Well treatment is the process of stimulating a producing well to improve oil or gas productivity. It is not anticipated that stimulation will be needed for the wells. However, if well treatment is required at the Osprey Platform, the method used will be acid treatment. Acid stimulation is performed by injecting acid solutions into the formation. The acid solution dissolves portions of the formation rock, thus enlarging the openings in the formation. The acid solution must be water soluble, safe to handle, inhibited to minimize damage to the well casing and piping, and inexpensive.

2.2.5 Workover

Workovers or treatment jobs occur approximately once per year. Workover operations are performed on a well to improve or restore productivity, repair or replace downhole equipment, evaluate the formation, or abandon the well. Workover operations include well pulling, stimulation (acidizing and fracturing), washout, reperforating, reconditioning, gravel packing, casing repair, and replacement of subsurface equipment. The four general classifications of workover operations are pump, wireline, concentric, and conventional. Workovers can be performed using the original derrick. The operations begin by using a workover fluid to force the production fluids back into the formation, to prevent them from exiting the well during the operation.

2.2.6 Well Drilling

Rotary drilling is the process that is used to drill the well. The rotary drill consists of a drill bit attached to the end of a drill pipe. The most significant waste streams, in terms of volume and constituents associated with the drilling activities, are drilling fluids and drill cuttings. Drill cuttings are particles (e.g., sand, gravel, etc.) generated by drilling into subsurface geological formations and carried to the surface with the drilling fluid. The drilling fluid, or mud, is a mixture of water, special clays, and certain minerals and chemicals used to cool and lubricate the bit, stabilize the walls of the borehole, and maintain equilibrium between the borehole and the formation pressure. The drilling fluid is pumped downhole through the drill string and is ejected through the nozzles in the drill bit and then circulated to the surface through the annulus. The drilling fluids will be separated from the drill cuttings on the platform for use as make-up drilling fluids.

2.3 Waste streams Associated with the Proposed Activity

The Final NPDES General Permit for Oil and Gas Exploration, Development, and Production Facilities in Cook Inlet, Alaska (AKG285000) identified 19 waste streams. According to Forest Oil's Environmental Information Document (NCG 2001), the following waste streams will not be generated at the Osprey Platform: desalination unit wastes (Discharge No. 005); uncontaminated ballast water (Discharge No. 010); bilge water (Discharge No. 011), and muds, cuttings, cement at seafloor (Discharge No. 013). The remaining waste streams are discussed in the following sections.

2.3.1 Drilling Fluids (Discharge No. 001)

Drilling fluids are the circulating fluids (muds) used in the rotary drilling of wells to clean and condition the hole, to counterbalance formation pressure, and to transport drill cuttings to the surface. A water-based drilling fluid is the conventional drilling mud in which water is the continuous phase and the suspending medium for solids, whether or not oil is present. An oil-based drilling fluid has diesel, mineral, or some other oil as its continuous phase with water as the dispersed phase. Production drilling operations onboard the Osprey Platform will use a combination of both freshwater-based and oil-based drilling fluids. The freshwater-based drilling fluids will typically be used for the upper 2,500 feet of the well and the oil-based drilling fluids will be used for depths below 2,500 feet (NCG 2001). The drilling fluids will be separated from the drill cuttings on the platform for use as make-up drilling fluids.

2.3.2 Drill Cuttings (Discharge No. 001)

Drill cuttings are the particles generated by drilling into subsurface geologic formations and carried to the surface with the drilling fluid. The separated drill cuttings will be disposed of in a Class II injection well that has been permitted with the Alaska Oil and Gas Conservation Commission (AOGCC).

2.3.3 Dewatering Effluent (Discharge No. 001)

Dewatering effluent is wastewater from drilling fluid and drill cutting dewatering activities. The dewatering effluent will be disposed of with the separated drill cuttings into a Class II injection well that has been permitted with the AOGCC.

2.3.4 Deck Drainage (Discharge No. 002)

Deck drainage refers to any waste resulting from platform washing, deck washing, spillage, rainwater, and runoff from curbs, gutters, and drains, including drip pans and wash areas. This could also include pollutants, such as detergents used in platform and equipment washing, oil, grease, and drilling fluids spilled during normal operations (Avanti 1992). On the Osprey Platform, contaminated deck drainage will be treated through an oil-water separator prior to discharge (Amundsen 2000a). Non-contaminated deck drainage will be discharged with no treatment. The average flow of deck drainage from the platform will be 108,000 gallons per day (NCG 2001), depending on precipitation. This discharge will be in accordance with the appropriate water quality standards for the state of Alaska (18 AAC 70.020).

2.3.5 Sanitary Waste (Discharge No. 003)

Sanitary waste is human body waste discharged from toilets and urinals. The sanitary waste system on the Osprey Platform, an aerated marine sanitation device, will serve a 3- to 55-person crew residing on the platform at any one time. The expected maximum quantity of sanitary waste discharged is 2,020 gallons per day (United Industries Group 1998 and NCG 2001). The pollutants associated with this discharge include suspended solids, 5-day biochemical oxygen demand (BOD_5), fecal coliform, and residual chlorine. All sanitary discharges will be in accordance with the appropriate water quality standards and effluent treatability requirements for the state of Alaska (18 AAC 70, 18 AAC 72, and 40 CFR 133.105).

2.3.6 Domestic Waste (Discharge No. 004)

Domestic waste (gray water) refers to materials discharged from sinks, showers, laundries, safety showers, eyewash stations, and galleys. Gray water can include kitchen solids, detergents, cleansers, oil and grease. Domestic waste will not be treated prior to discharge. The expected quantity of domestic waste discharged is 4,000 gallons per day (NCG 2001). All domestic discharges will be in accordance with the appropriate water quality standards for the state of Alaska (18 AAC 70).

2.3.7 Blowout Preventer Fluid (Discharge No. 006)

Blowout preventer fluid is hydraulic fluid used in blowout preventer stacks during well drilling. According to Forest Oil’s Environmental Information Document (NCG 2001), blowout preventer fluid will not be discharged from the Osprey Platform.

2.3.8 Boiler Blowdown (Discharge No. 007)

Boiler blowdown is the discharge of water and minerals drained from boiler drums to minimize solids build-up in the boiler. Boiler blowdown discharges are "not planned or likely, but possible to occur intermittently" (Amundsen 2000a). The expected quantity of boiler blowdown is 100 gallons per event. Boiler blowdown will be treated through an oil-water separator prior to discharge (Amundsen 2000a). This discharge will be in accordance with the appropriate water quality standards for the state of Alaska (18 AAC 70).

2.3.9 Fire Control System Test Water (Discharge No. 008)

Fire control system test water is sea water that is released during the training of personnel in fire protection, and the testing and maintenance of fire protection equipment on the platform. This discharge is intermittent, and is expected to occur approximately 12 times per year. The expected quantity of fire control system test water is 750 gallons per minute for 30 minutes, for a total discharge per event of 22,500 gallons. Contaminated fire control system test water will be treated through an oil-water separator prior to discharge. This discharge will be in accordance with the appropriate water quality standards for the state of Alaska (18 AAC 70).

2.3.10 Non-Contact Cooling Water (Discharge No. 009)

Non-contact cooling water is sea water that is used for non-contact, once-through cooling of various pieces of machinery on the platform. The expected quantity of non-contact cooling water is 300,000 gallons per day. This discharge will be in accordance with the appropriate water quality standards for the state of Alaska (18 AAC.70).

2.3.11 Excess Cement Slurry (Discharge No. 012)

Excess cement slurry will result from equipment washdown after cementing operations. This waste stream will be discharged intermittently while drilling, depending on drilling, casing, and testing program/problems (Amundsen 2000a). Approximately 30 discharge events are anticipated per year, with a maximum discharge of 100 bbl per event. Excess cement slurry will not be treated prior to discharge. Discharge of this waste stream will be in accordance with the appropriate water quality standards for the state of Alaska (18 AAC 70).

2.3.12 Waterflooding Discharges (Discharge No. 014)

Waterflooding discharges are discharges associated with the treatment of seawater prior to its injection into a hydrocarbon-bearing formation to improve the flow of hydrocarbons from production wells, and prior to its use in operating physical/chemical treatment units for sanitary waste. These discharges include strainer and filter backwash water. All waterflooding discharges will be disposed of in a Class II injection well that has been permitted with the AOGCC.

2.3.13 Produced Water (Discharge No. 015)

Produced water refers to the water (brine) brought up from the hydrocarbon-bearing strata during the extraction of oil and gas, and can include formation water, injection water, and any chemicals added downhole or during the oil/water separation process. The produced water will be disposed of in a Class II injection well that has been permitted with the AOGCC.

2.3.14 Well Completion Fluids (Discharge No. 016)

Well completion fluids are salt solutions, weighted brines, polymers, and various additives used to prevent damage to the well bore during operations which prepare the drilled well for hydrocarbon production. The well completion fluids will be disposed of in a Class II injection well that has been permitted with the AOGCC.

2.3.15 Workover Fluids (Discharge No. 017)

Workover fluids are salt solutions, weighted brines, polymers, or other specialty additives used in a producing well to allow safe repair and maintenance or abandonment procedures. The workover fluids will be disposed of in a Class II injection well that has been permitted with the AOGCC.

2.3.16 Well Treatment Fluids (Discharge No. 018)

Well treatment fluid refers to any fluid used to restore or improve productivity by chemically or physically altering hydrocarbon-bearing strata after a well has been drilled. The well treatment fluids will be disposed of in a Class II injection well that has been permitted with the AOGCC.

2.3.17 Test Fluids (Discharge No. 019)

Test fluids are discharges that occur if hydrocarbons located during exploratory drilling are tested for formation pressure and content. This would consist of fluids sent downhole during testing, along with water from the formation. The test fluids will be disposed of in a Class II injection well that has been permitted with the AOGCC.

2.3.18 Produced Solids (Discharge No. 021)

Produced solids are sands and other solids deposited from produced water which collect in vessels and lines and which must be removed to maintain adequate vessel and line capacities. The produced solids will be disposed of in a Class II injection well that has been permitted with the AOGCC.

3.0 DESCRIPTION OF PROJECT AREA

The Cook Inlet basin is an elongated depression of the earth's crust between two major parallel mountain ranges, the Kenai Range in the southeast and the Alaska Range to the northwest. The basin is underlain by thick sedimentary deposits that exceed 30,000 feet in some places (Wilson and Torum 1968). Sedimentary rocks, such as conglomerates, sandstones, siltstones, limestone, chert, volcanics, and clastics make up the Cook Inlet basin.

Plate movement was responsible for creating the basin and mountain ranges. Several major glaciations have altered the landscape of the region. During the Pleistocene age, glaciers pushed beyond the mountain fronts into the lowlands, depositing sediment and debris up to several thousand feet thick. As the glaciers receded, Cook Inlet assumed its present form (USCOE 1993). Active volcanoes and earthquakes are common to the area as well (USCOE 1993).

Sea floor soils in upper Cook Inlet typically consist of silts, sands, gravels, cobbles, and boulders. Underlying soils are generally glacial till with occasional bedrock outcrops. Beaches surrounding the inlet may also be covered by glacial silts and muds. Most of the sea floor is covered by a gravel, cobble, and boulder armor layer as a result of the high tidal currents. Other features of high current regimes, including sand and gravel waves, are also common in the upper inlet.

Cook Inlet is characterized by extreme tidal fluctuations of up to 12.2 meters that produce strong currents in excess of eight knots (Tarbox and Thorne 1996). Tides wash in and out of the Cook Inlet basin like a very long wave. Fluid motion on this large scale is affected by the rotation of the earth, causing incoming currents in Cook Inlet to veer toward the east coast and outgoing currents to veer to the west coast. Tidal ranges on the east shore are generally larger than ranges on the western shore because incoming currents have more energy. In the deeper, broader areas of the lower Inlet, the tidal current changes directions in an elliptical pattern, known as rotary tides.

Water quality in upper Cook Inlet is influenced by the high currents and large volumes of seasonally varying freshwater inflows. The high tidal currents tend to keep the entire water column well mixed and little vertical stratification is present except near the mouths of major rivers. Large, glacier-fed rivers, such as the Susitna and Knik rivers, which flow into the inlet, contribute large amounts of freshwater and suspended sediments.

The climate of the central Cook Inlet region is transitional between maritime and continental regimes. Regional topography and water bodies heavily influence area climate. The Kenai Mountains to the south and east act as a barrier to warm, moist air from the Gulf of Alaska. Cook Inlet precipitation averages less than 20 percent of that measured on the Gulf of Alaska side of the Kenai Mountains. The Alaska Range to the north provides a barrier to the cold winter air masses that dominate the Alaska Interior. Cook Inlet waters tend to moderate temperatures in the area. Occasionally, short periods of extreme cold and/or high winds occur when strong pressure gradients force cold air southward from the Interior.

4.0 IDENTIFICATION OF SPECIES

To initiate the preparation of the EFH Assessment, those species whose habitat may be affected by the proposed action were identified. The action under consideration in this assessment is the issuance of a permit to Forest Oil to discharge wastewater to Cook Inlet from the Osprey Platform during production operations. The Environmental Assessment for Essential Fish Habitat (NPFMC 1999) and the Essential Fish Habitat Assessment Reports (NMFS 1998a-e) were used for the identification of species. These documents identify EFH species relative to the location of proposed actions and describe the general distribution of the species life stages.

Based on a review of the documents identified above and the location of the Forest Oil Osprey Platform, a list of EFH species was generated (Table 1); the habitat occupied by each species life stage was also identified. While only a few of the species listed in Table 1 are depicted on maps as having adult and/or late juvenile distributions in the vicinity of the discharge, discussions with NMFS indicate a broader interpretation of the distributions. For example, NMFS prepared the following paragraph for an action in Cook Inlet:

> *"The Sustainable Fisheries Act of 1996 amends the Magnuson Act of 1976, now renamed to the Magnuson-Stevens Act of 1996 (MSA), to include provisions related to fishery habitat. One such provision is the definition of Essential Fish Habitat (EFH). The MSA mandates each Regional Fishery Management Council to amend their Fishery Management Plans (FMP) to include a description of EFH for all life stages of an FMP species. EFH has been broadly defined by MSA to include 'those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.' Groundfish and anadromous species that range throughout the Gulf of Alaska which include Cook Inlet waters are: walleye pollock, pacific cod, deepwater flatfish (dover sole), shallow water complex (yellowfin sole, rock sole) rex sole, flathead sole, arrowtooth flounder, sablefish, pacific ocean perch, slope rockfish (shortraker, rougheye, northern), pelagic rockfish (dusky), yelloweye rockfish, thornyhead rockfish, atka mackerel, skates, sculpins, shark, squid, octopus, forage fish (eulachon, capelin, sand lance, myctophid and bathylagids, sand fish, euphausids, pholids, stichaeid, gonostomatids) and five Pacific salmon stocks (chinook, chum, coho, pink sockeye)."*

As indicated in Table 1, a total of 35 species were identified as EFH species: five species of salmon, two groundfish, two shallow water flatfish, 18 other fish species, and eight species from the forage fish complex. Of the salmonids, only late juvenile and adult stages utilize the habitat of Cook Inlet, and then predominantly during migration. Of the 35 species, eight are associated with soft muddy or sandy bottoms, unlike those found at the site. Many of the species are benthic or demersal in water of substantially greater depths than the 45 feet (13.6 meters) in which the platform is located and therefore are not likely to be exposed to the discharge from the platform. Table 2 provides information on the prey of the EFH species. As will be discussed in Section 5.0, the wastewater discharges are not anticipated to have any direct or indirect adverse impacts on prey near the Osprey Platform.

Table 1 (Page 1 of 4)
Essential Fish Habitat Species in the Vicinity of Osprey Platform, Cook Inlet, Alaska

Common Name	Habitat				Comments
	Eggs	Larvae	Juvenile	Adult	
Salmon					
Pink salmon	freshwater, < 2mm diameter gravel	< 15% fines	IT to P < 50m	P < 200m	Eggs/larvae in freshwater only. Juvenile and adult habitats in marine areas only.
Chum salmon	freshwater, < 2mm diameter gravel	< 15% fines	IT to P < 50m	P < 200m	Eggs/larvae in freshwater only. Juvenile and adult habitats in marine areas only.
Sockeye salmon	freshwater, < 2mm diameter gravel	< 15% fines	IT to P < 50m	P < 200m	Eggs/larvae in freshwater only. Juvenile and adult habitats in marine areas only.
Chinook salmon	freshwater, < 2mm diameter gravel	< 15% fines	IT to P < 50m	P < 200m	Eggs/larvae in freshwater only. Juvenile and adult habitats in marine areas only.
Coho salmon	freshwater, < 2mm diameter gravel	< 15% fines	IT to P < 50m	P < 200m	Eggs/larvae in freshwater only. Juvenile and adult habitats in marine areas only.
Groundfish					
Walleye pollock	P	EP	P	P 70-200m	Adults associated with fronts and upwelling.
Pacific cod	D 40-265m	EP	MC	MC up to 500m	Juveniles and adults in areas of mud, sandy mud, muddy sand, and in the lower portion of the water column.
Shallow Water Flatfish					
Rock sole	D 125-250m, areas of pebble, sand	P, upper 30m	D < 250m	D < 250m	All stages, excluding larval, found in areas of pebbles and sand.
Yellowfin sole	P, inshore waters	P, inshore waters	B down to 250m, areas of sandy bottom	B down to 250m, areas of sandy bottom	Adults migrate to deeper waters in the winter.
Other Fish Species					
Rex sole	P nearshore and offshore	P offshore	D > 300m	D > 300m	Juveniles and adults in areas of gravel, sand, and mud in the lower portion of the water column.

Table 1 (Page 2 of 4)
Essential Fish Habitat Species in the Vicinity of Osprey Platform, Cook Inlet, Alaska

Common Name	Habitat				Comments
	Eggs	Larvae	Juvenile	Adult	
Flathead sole	P	P	D < 300m	D < 300m	Juveniles and adults in areas of sand and mud in the lower portion of the water column.
Arrowtooth flounder	P	P	D 50-500m	D 50-500m	Juveniles and adults in areas of gravel, mud, and sand in the lower portion of the water column.
Black cod (Sablefish)	P 200-3000m	D to P	P > 100m areas of soft bottom	P > 200m areas of soft bottom	Juveniles and adults associated with deep shelf gullies and fjords.
Pacific ocean perch	V	P	P to D	D 180-420m	Juveniles and adults associated with areas of cobble, gravel, mud, sandy mud, and muddy sand.
Shortraker rockfish	V	P	shallower than adults	D 200-500m	Adults associated with mud, sand, rock, sandy mud, cobble, muddy sand, and gravel.
Rougheye rockfish	V	P	shallower than adults	D 200-500m	Adults associated with mud, sand, rock, sandy mud, cobble, muddy sand, and gravel.
Northern rockfish	V	P	P	MC to D	Juveniles and adults associated with areas of cobble and rock.
Dusky rockfish	V	P	P	MC to D < 50m	Juveniles and adults associated with areas of cobble, rock, and gravel.
Yelloweye rockfish	V	EP	D	D	Juveniles and adults associated with areas of rock and coral along nearshore bays and island passages.
Thornyhead rockfish	P gel coated egg sac floats to the surface	P	D	D	Juveniles and adults associated with areas of mud, sand, rock, sandy mud, cobble, muddy sand, and gravel.
Atka mackerel	shallow water, gravel, rock, kelp	EP	NI	entire water column, gravel, rock, kelp	Perform diurnal/tidal movements between D and P areas.

Table 1 (Page 3 of 4)
Essential Fish Habitat Species in the Vicinity of Osprey Platform, Cook Inlet, Alaska

Common Name	Habitat				Comments
	Eggs	Larvae	Juvenile	Adult	
Capelin	IT	EP	P	P	Eggs associated with sand and cobble intertidal beaches down to 10m depth. Adults associated with intertidal beaches of sand and cobble down to 10m depth during spawning.
Sculpins	all substrates, rocky, shallow waters	P	D	D	Juveniles and adults associated with a broad range of demersal habitats from intertidal pools, all shelf substrates and rocky areas
Skates	egg cases on bottom of adult habitat, all substrates	N/A	D	D	Juveniles and adults associated with a broad range of substrate types (mud, sand, gravel, and rock).
Red Squid	B	N/A	P	P	Eggs associated with areas of mud and sand.
Octopus	B all substrates	N/A	D	D down to 500m	Juveniles and adults associated with a broad range of substrate types, including rocky shores and tidepools.
Sharks	NI	N/A	all waters and substrates	all waters and substrates	
Forage Fish Complex					
Eulachon	eggs deposited in rivers	P	P	P	Eggs on bottom substrates of sand, gravel and cobble in rivers during April-June. Adults in rivers during spawning.
Sand lance	B	P and surface	entire water column, over soft bottom	entire water column	Adults associated with soft bottom substrates (sand, mud).

Table 1 (Page 4 of 4)
Essential Fish Habitat Species in the Vicinity of Osprey Platform, Cook Inlet, Alaska

Common Name	Habitat				Comments
	Eggs	Larvae	Juvenile	Adult	
Myctophids	NI	NI	P	P	Juveniles and adults associated with pelagic waters ranging from near surface to lower portion of the water column.
Bathylagids	NI	NI	P	P	Juveniles and adults associated with pelagic waters ranging from near surface to lower portion of the water column.
Sand fish	B nearshore	NI	B	B	Juveniles and adults associated with bottom substrates of mud and sand.
Euphausiids	surface	EP	P	P	Juveniles and adults associated with upwelling, or nutrient-rich areas.
Pholids	NI	NI	IT to D, KEB	IT to D, KEB	Certain species associated with vegetation such as eelgrass and kelp.
Stichaeids	NI	NI	IT to D, KEB	IT to D, KEB	Certain species associated with vegetation such as eelgrass and kelp.

Notes:

B - Benthic
D - Demersal
EP - Epipelagic
IT - Intertidal or tidepools
KEB - Associated with kelp or eelgrass beds
MB - Mesobenthal (just above the bottom)
MC - Midcolumn
P - Pelagic
NI - No information
V - Viviparous, young released as larvae

Sources:

NPFMC 1999
NPFMC Web Site

Table 2 (Page 1 of 2)
Prey Species Associated with EFH Species

Common Name	Prey Species
Salmon	
Pink salmon	J: planktivore; A: piscivore (herring, anchovies, sand lance, surf smelt)
Chum salmon	J: planktivore; A: piscivore (herring, anchovies, sand lance, surf smelt)
Sockeye salmon	J: planktivore; A: piscivore (herring, anchovies, sand lance, surf smelt)
Chinook salmon	J: planktivore; A: piscivore (herring, anchovies, sand lance, surf smelt)
Coho salmon	J: planktivore; A: piscivore (herring, anchovies, sand lance, surf smelt)
Groundfish	
Walleye pollock	J: crustaceans, copepods, and euphausiids; A: crustaceans, copepods, and ephausiids
Pacific cod	J: mysids, euphausiids, and shrimp; A: pollock, flatfish, and crab
Shallow Water Flatfish	
Rock sole	J: polychaetes, bivalves, amphipods, and crustaceans; A: polychaetes, bivalves, amphipods, and crustaceans
Yellowfin sole	J: polychaetes, bivalves, amphipods, and echiurids; A: polychaetes, bivalves, amphipods, and echiurids
Other Fish Species	
Rex sole	J: polychaetes, amphipods, euphausiids, and Tanner crab; A: polychaetes, amphipods, euphausiids, and Tanner crab
Flathead sole	J: polychaetes, bivalves, ophiuroids, pollock, small Tanner crab; A: polychaetes, bivalves, ophiuroids, pollock, small Tanner crab, and other small invertebrates
Arrowtooth flounder	J: euphausiids, crustaceans, amphipods, and pollock; A: euphausiids, crustaceans, amphipods, and pollock
Black cod (Sablefish)	J: mesopelagic and benthic fishes, benthic invertebrates, and jellyfish; A: mesopelagic and benthic fishes, benthic invertebrates and jellyfish; a large portion of the adult diet is comprised of gadid fishes, mainly pollock
Pacific ocean perch	J: euphausiids; A: euphausiids
Shortraker rockfish	J: NI; A: shrimps, squid, and myctophids
Rougheye rockfish	J: NI; A: shrimps, squid, and myctophids
Northern rockfish	NI
Dusky rockfish	A: euphausiids
Yelloweye rockfish	A: fish, shrimp and crab
Thornyhead rockfish	A: shrimp, fish (cottids), and small crabs
Atka mackerel	A: copepods, euphausiids, and meso-pelagic fish (myctophids)
Capelin	NI
Sculpins	NI
Skates	NI
Red squid	J: euphausiids, shrimp, forage fish, and other cephalopods; A: euphausiids, shrimp, forage fish, and other cephalopods
Octopus	J: crustaceans and mollusks; A: crustaceans and mollusks

Table 2 (Page 2 of 2)
Prey Species Associated with EFH Species

Common Name	Prey Species
Sharks	NI
Forage Fish Complex	
Eulachon	A: euphausiids and copepods
Sand lance	J: zooplankton, calanoid copepods, mysid shrimps, crustacean larvae, gammarid amphipods, and chaetognaths; A: zooplankton, calanoid copepods, mysid shrimps, crustacean larvae, gammarid amphipods, and chaetognaths
Myctophids	NI
Bathylagids	NI
Sand fish	NI
Euphausiids	NI
Pholids	NI
Stichaeids	NI

Notes:
NI - No information
J - Juvenile
A - Adult

Table 3
Characteristics of Sanitary Discharge from Osprey Platform and Water Quality Criteria

Parameter	Maximum Concentration	Water Quality Criterion
Biochemical Oxygen Demand (BOD)	30 mg/L (a)	Surface dissolved oxygen may not be less than 6.0 mg/L
Total Suspended Solids	50 mg/L (b)	No measurable increase in settleable solids concentration above natural conditions
Fecal coliform	none (a)	14 FC/100 mL in one sample, and no more than 10% of the samples may exceed a median of 43 FC/100 mL
Total Residual Chlorine	2 ug/L (a)	2 ug/L

(a) Amundsen 2000b
(b) United Industries Group 1998

5.0 ANALYSIS OF EFFECTS OF PROPOSED ACTION

Exploration drilling activities are currently being conducted at the Osprey Platform in Cook Inlet, under the general NPDES permit for Oil and Gas Exploration (AKG285024), to determine the magnitude of potential hydrocarbon reserves. Once a hydrocarbon reserve has been discovered and delineated, the Osprey Platform will be converted into an oil and gas production platform and development drilling will commence. Production drilling will require an individual NPDES permit, since the general permit for Cook Inlet does not authorize discharges from "new sources."

As identified in Section 2.3 above, the following discharges are expected to occur from the Osprey Platform: sanitary waste, deck drainage, domestic waste, boiler blowdown, fire control system test water, non-contact cooling water, and excess cement slurry.

5.1 DIRECT IMPACTS

5.1 Sanitary Waste

One potential impact of the sanitary waste discharge is the possible reduction in ambient dissolved oxygen concentrations in the receiving waters when sanitary waste is discharged (Tetra Tech 1994). The dissolved oxygen standard for aquatic life is usually 6 mg/L (Jones and Stokes 1989), while the ambient dissolved oxygen in the receiving waters of Cook Inlet is assumed to be higher than 8 mg/L (EPA 1984). In an analysis of a worst case scenario, EPA (1984) concluded that the discharge of treated sewage effluent during offshore exploratory drilling should not significantly impact aquatic life when ambient dissolved oxygen concentrations are at least 1 mg/L above the dissolved oxygen standard for aquatic life of 6 mg/L. Because the sanitation device is an aerated system capable of providing a minimum of 2,100 cubic feet of air per pound of BOD, dissolved oxygen in the effluent is anticipated to meet this requirement when the system is properly operated in accordance with the operating manual (United Industries Group 1998).

The effluent is anticipated to have concentrations of total suspended solids (TSS) of less than 50 mg/L. This concentration is less than the daily maximum concentrations permitted for sanitary discharges from the oil and gas production platforms in Cook Inlet that operate under the NPDES General Permit (EPA1999). Operated properly, TSS of the Osprey Platform sanitary discharge will be less than the ambient TSS in Cook Inlet of 100 mg/L (Brandsma 1999).

The wastewater will be chlorinated to remove fecal coliform bacteria. Effluent from the clarifier will flow through a chlorinator and into a 65-gallon chlorine detention tank where chlorine will dissipate for 30 minutes to an hour. Operated in accordance with the operating manual, the chlorine will reduce the fecal coliform bacteria to levels at or below the Alaska Water Quality Standard of 14 FC/100 ml.

The NPDES General Permit for Oil and Gas Production Platforms in Cook Inlet (EPA 1999) requires a total residual chlorine concentration of at least 1 mg/L to ensure proper disinfection of the sanitary waste without causing harm to the aquatic life. In the case of the Osprey Platform sanitary waste, it appears that sodium sulfite will be used to dechlorinate the effluent in-line immediately prior to discharge (United Industries Group 1998). The sodium sulfite reacts with free and residual chlorine instantaneously, consuming a small amount of alkalinity (1.38 mg of $CaCO_3$/ml chlorine consumed) (United Industries Group 1998). The concentration of total residual chlorine in the final effluent is anticipated to be less than or equal to 2 ug/L (Amundsen 2000b). Thus the water quality standards for residual chlorine will be met at the end-of-pipe, causing no direct or indirect impacts on aquatic life.

In addition to meeting water quality standards or anticipated NPDES effluent limits, the sanitary wastewater from the Osprey Platform will be discharged to a section of Cook Inlet which has been demonstrated to be a non-depositional, high-energy environment characterized by a cobble and sand bottom. Fast tidal currents and tremendous mixing produce rapid dispersion of the minimal concentrations of soluble and particulate pollutants. Brandsma (1999) determined that the high suspended solids discharge of drilling muds would be reduced more than two orders of magnitude within 100 meters under the least turbulent conditions, and three orders of magnitude under more turbulent conditions. It is expected that pollutants in the sanitary waste will be dissipated to undetectable concentrations within a few feet of the discharge.

5.1.2 Other Waste Streams

Oil is the primary pollutant found in deck drainage, with concentrations estimated at 24 to 450 mg/L (EPA 1996). Other potential contaminants include detergents and spilled drilling fluids. Contaminated deck drainage will be treated through an oil-water separator prior to discharge and will be required to meet state water quality standards. Therefore, no direct impacts on essential fish habitat is anticipated to result from discharge of deck drainage.

Domestic waste, which may contain kitchen solids and trace amounts of detergents, cleansers, and oil and gas, does not represent a significant discharge flow. Potential effects of domestic waste discharges are difficult to determine given the absence of analytical data, but are expected to be minimal.

Non-contact cooling water is not significantly different in composition than ambient seawater, except for an elevated temperature (estimated at 62° to 84°F; EPA 1996). Forest Oil's permit application indicates that non-contact cooling water will be discharged at an average temperature of less than 60°F, with a maximum daily value of 70°F, and therefore no environmental impacts are anticipated.

Boiler blowdown and fire control system test water are intermittent discharges that will be treated through an oil-water separator to remove oil and grease. No direct impacts on essential fish habitat are anticipated due to these discharges.

Excess cement slurry represents another intermittent discharge. This waste stream may contain up to 200,000 mg/L of total suspended solids (daily maximum). The pH may be as high as 12, with temperatures up to 80°F and oil and grease up to 50 ppm (Amundsen 2000a). Although the exact composition of the cement is not documented, given the small waste volume and intermittent nature of the discharge, it is not expected to represent a significant pollution source and is not likely to result in adverse impacts.

5.2 Indirect Impacts

The low concentrations of BOD and nutrients in the sanitary waste discharge may stimulate primary productivity to a negligible extent and enhance zooplankton production to an even more negligible extent. There should be no indirect adverse impacts on any of the EFH species due to the waste stream discharges from the Osprey Platform. The total residual chlorine (the only toxic contaminant of concern) will be discharged at concentrations that meet water quality criteria designed to protect both human health and aquatic life.

5.3 Cumulative Impacts

Other discharges of similar quality in Cook Inlet include: sanitary, domestic, deck drainage, and other waste discharges from oil and gas platforms in Cook Inlet; and municipal waste streams from Anchorage, Homer, Kenai, and other smaller cities. Given the minimal nature of the discharges from the Osprey Platform, its contributions to the cumulative loading in Cook Inlet are anticipated to be negligible. The volume and concentration of pollutants in the discharges from the Osprey Platform are expected to be minimal. All contaminants of concern will be discharged at concentrations that meet water quality criteria and the requirements of the General Permit (EPA 1999). In addition, the strong tidal fluxes associated with Cook Inlet and the West Foreland area will disperse discharges very rapidly (Haley et al. 2000). Thus, there would be no cumulative impacts to EFH species from the discharges associated the Osprey Platform.

6.0 MITIGATION

The discharges will meet human health water quality criteria at the end-of-pipe. These criteria are designed to protect humans from accumulation of harmful contaminant concentrations based on consumption of fish and shellfish. The discharges will also meet the water quality criteria at the end-of-pipe for protection of aquatic life. Monitoring is anticipated to be required by the NPDES permit that will be issued for the Osprey Platform to ensure compliance with the water quality standards. No water quality-based limits are needed to provide protection to aquatic life.

Wastewater from the Osprey Platform will be discharged to a section of Cook Inlet which has been demonstrated to be a non-depositional, high-energy environment characterized by a cobble and sand bottom. Fast tidal currents and tremendous mixing produce rapid dispersion of the minimal concentrations of soluble and particulate pollutants. Brandsma (1999) determined that the high suspended solids discharge of drilling muds would be reduced more than two orders of magnitude within 100 meters under the least turbulent conditions and three orders of magnitude under more turbulent conditions. Therefore, the minimal concentrations of TSS and BOD that will be discharged from the sanitary wastewater stream at the Osprey Platform are anticipated to be rapidly dissipated and have no potential direct, indirect, or cumulative impacts on any of the essential fish habitats of Cook Inlet. No mitigation measures are necessary to protect EFH species.

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APPENDIX A

EFH ASSESSMENT CORRESPONDENCE

Matthew.Eagleton@noaa.gov

08/28/2000 11:29 AM

To: Matthew Harrington/R10/USEPA/US

cc: fen5@pcbox.alaska.net, Arthur_Davenport@fws.gov, wintersn@orcalink.com

Subject: Re: esa and efh for force energy

I am not sure if this will help, but may. ESA and EFH are consultations between agencies unless otherwise delegated by the federal agency.

Some differences between ESA and EFH:

ESA:

Federal action agency requests a list from NMFS or other for which T&E species may be found in/near the action along with brief description of the action.

EPA determines no effect or may effect. If no effect, then done. Also, if no adverse effect and want NMFS to concur with this, then we can and have in the past done this.

If a may effect, then BA (or similar) discusses action, determines whether or not there is an adverse effect, and is sent to NMFS or other. However, if BA determines an adverse effect, then we step into a more formal process which may lead to a NMFS Biological Opinion (BO). However, it gets a little "gray" if NMFS disagrees with a no adverse effect determination. In this case, NMFS would probably ask for some discussion with the action agency.

EFH:

Federal action agency investigates which EFH species are in/near action and determines if there may be an adverse effect to EFH (no species list request). If federal action determines no effect, then no EFH Assessment needs to prepared by action agency.

If there is an adverse effect then the EFH Assessment is submitted to NMFS. An EFH Assessment can either be a separate stand alone or folded into environmental document. If copmpleted alone, it must contain the requirements in 50 CFR Part 600. If folded, then it must be referenced as such and contain all the requirements. NMFS must review and offer any EFH Conservation Recommendations to lessen impact, if needed. However, if the action agency determines no effect and NMFS learns of the action through other means, such as a public notice, and feels the action may adversely effect EFH, then NMFS is required to offer EFH Conserve Rec's anyway.

I suspect EPA has determined there may be some effect or a BA would not be at this stage. I agree it would be best to list your determinations for ESA and EFH in whatever NEPA document you prepare. NMFS will review, offer comment and rec's and concur/not concur where needed. Most documents label the ESA sections, I suggest to clearly label the EFH section also.

I apologize if my above review is a repeat, but I feel it helps see the difference between the ESA and EFH. Please let me know if there are any questions.

ATTN: Matthew Harrington

The following preliminary information is per your telephone request regarding Threatened and Endangered species in the vicinity of the Force Energy project in Cook Inlet. The National Marine Fisheries Service (NMFS) is responsible for the administration of the Endangered Species Act (ESA) as it applies to certain cetaceans and pinnipeds in Alaska and the Magnuson Stevens Fisheries Conservation and Management Act as it applies to Essential Fish Habitat (EFH).

Marine Mammals

Marine mammals that range throughout the Gulf of Alaska, including Cook Inlet waters, include the Steller sea lion, harbor seal, Dall's and harbor porpoise, and minke, beluga, killer, humpback, fin, blue, and right whale.

Candidate Species

The Cook Inlet population of beluga whale is currently listed as a candidate species under the ESA.

Endangered Species

Endangered marine mammal species are as follows: fin, right, humpback, blue, sperm, sei, and bowhead whales and the western stock of the northern Steller sea lion (west of 144 degrees longitude). Humpback and fin whales are occasionally sighted offshore during summer months, and have been documented within one-mile of shore. Also, few (and rare) sightings of fin, blue, and right whales in the northern Gulf of Alaska have been reported. Steller sea lions may forage and transit waters of Cook Inlet during peak salmon returns. The closest listed Steller sea lion rookery is in the Barren Islands, specifically the Sugarloaf Islands Rookery at 58 53.0 N, 152 02.0 W. The closest major Steller sea loin haulout is the Ushagat Island Haulout at 58 55.0 N,152 22.0 W.

Essential Fish Habitat

Additionally, NMFS is responsible for provisions regarding Essential Fish Habitat (EFH) within the administration of the Magnuson Stevens Fishery *Conservation and Management Act* (MSFCMA) (16 U.S.C. 1801 et seq.). The MSFCMA states that each federal agency shall consult with NMFS with respect to any federal action authorized, funded, undertaken, or proposed by such agency that may adversely affect EFH. Therefore, your review should also include an EFH assessment as required by the MSFCMA and detailed in 50 CFR Part 600.920 (g). Please visit our website for specific information such as EFH species habitat associations, EFH species maps, and the EFH Environmental Assessment at http://www.fakr.noaa.gov/habitat.

Please call Matthew P. Eagleton in the NMFS Anchorage field office at (907) 271-6354 for any questions.