

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Alaska Gasline Development Corporation Docket
BP Alaska LNG, LLC
Conoco Phillips Alaska LNG Company
ExxonMobil Alaska LNG, LLC
TransCanada Alaska Midstream, LP

No. PF14-21-000

**COMMENTS REGARDING ALTERNATIVE ROUTE AND SITE ANALYSIS
FOR THE AKLNG PROJECT**

**THE CITY OF VALDEZ, ALASKA
THE MAYOR OF THE FAIRBANKS NORTH STAR BOROUGH, ALASKA
THE MAYOR OF THE CITY OF FAIRBANKS, ALASKA
THE MAYOR OF THE CITY OF NORTH POLE, ALASKA
THE ALASKA GASLINE PORT AUTHORITY**

Dated: February 1, 2017

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GLOSSARY OF TERMS

ADF&G	Alaska Department of Fish and Game
AGDC	Alaska Gasline Development Corporation
AGPA	Alaska Gasline Port Authority
AKLNG	Alaska Liquefied Natural Gas
AKLNG Project	The plan to construct one integrated liquefied natural gas (LNG) Project (Project) with interdependent facilities for the purpose of liquefying supplies of natural gas from Alaska, in particular from the Point Thomson Unit (PTU) and Prudhoe Bay Unit (PBU) production fields on the Alaska North Slope (North Slope), for export in foreign commerce and opportunities for in-state deliveries of natural gas.
ANILCA	The Alaska National Interest Lands Conservation Act
Beluga Critical Habitat	Endangered Cook Inlet Beluga Whale Critical Habitat
BLM	Bureau of Land Management
CEQ	Commission on Environmental Quality
COE	Army Corps of Engineers
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FNSB	Fairbanks North Star Borough
GTP	Gas Treatment Plant
LNG Facility	Natural gas liquefaction facility
LWCF	Land and Water Conservation Fund
Mainline	An approximately 800-mile pipeline to transport processed natural gas south to tidewater
Marine Terminal	Marine terminal with loading berths to load LNG tankers for export
MOF	Material Offloading Facility
NEPA	National Environmental Policy Act

GLOSSARY OF TERMS (Cont.)

Nikiski Alternative	Alternative pipeline route that runs within the Trans Alaska Pipeline System (TAPS) utility corridor from the North Slope south to Livengood, Alaska. At Livengood, the Nikiski Alternative deviates from the TAPS utility corridor, travels to the west side of Cook Inlet, crosses Cook Inlet, and makes landfall near Nikiski where the LNG Facility and Marine Terminal would be located.
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PM _{2.5}	Particulate matter pollution smaller than 2.5 microns
Project Applicants	The Alaska Gasline Development Corporation BP Alaska LNG LLC, ConocoPhillips Alaska LNG Company ExxonMobil Alaska LNG LLC
TAPS	Trans Alaska Pipeline System
Valdez	The City of Valdez, Alaska
Valdez Alternative	The previously FERC-approved alternative from Livengood south along the TAPS utility corridor to an LNG Facility and Marine Terminal at Anderson Bay near Valdez
WSRA	Wild and Scenic Rivers Act

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I. INTRODUCTION

The City of Valdez, the Mayor of the Fairbanks North Star Borough, the Mayor of the City of Fairbanks, the Mayor of the City of North Pole, and the Alaska Gasline Port Authority hereby submit these comments to the Federal Energy Regulatory Commission (“FERC”) in Docket No. PF14-21, regarding the Draft Resource Reports filed by the project applicants as a precursor to the Environmental Impact Statement (“EIS”) required by the National Environmental Policy Act (“NEPA”) for the Alaska Liquefied Natural Gas Project (“AKLNG Project”). These comments are intended to protect and advance the vital interests of the State of Alaska and the United States of America implicated in the development of the AKLNG Project by promoting a thorough review of project alternatives.

The project applicants are the Alaska Gasline Development Corporation (“AGDC”), which manages the State of Alaska’s interest in the AKLNG Project, BP Alaska LNG LLC, ConocoPhillips Alaska LNG Company, and ExxonMobil Alaska LNG LLC (together “Project Applicants”). AGDC and the other Project Applicants recently entered into an agreement to transfer sole control over the AKLNG Project to the State of Alaska. Accordingly, although the Resource Reports to which these comments apply were filed by the Project Applicants, AGDC is now the only entity listed as an applicant on the FERC docket for the AKLNG Project.

The purpose of the AKLNG Project is “to commercialize the vast natural gas resources on Alaska’s North Slope.”¹ The project includes three major components: (1) a gas treatment plant (“GTP”) within the Prudhoe Bay Unit of the North Slope and attendant feeder lines to deliver gas thereto; (2) an approximately 800-mile pipeline to transport processed natural gas south to tidewater (“Mainline”); and (3) a natural gas liquefaction facility (“LNG Facility”) and a marine terminal with loading berths to load LNG tankers for export (“Marine Terminal”).

The presently proposed alternative (“Nikiski Alternative”) runs within the Trans Alaska Pipeline System (“TAPS”) utility corridor from the North Slope south to Livengood, Alaska. At Livengood, the Nikiski Alternative deviates from the TAPS utility corridor, travels to the west side of Cook Inlet, crosses Cook Inlet, and makes landfall near Nikiski where the LNG Facility and Marine Terminal would be located. In addition to requiring analysis of the Nikiski Alternative, NEPA requires that any EIS “[r]igorously explore and objectively evaluate all reasonable alternatives” and “identify the agency’s preferred alternative.”² These comments focus specifically on the importance of analyzing the historically preferred alternative route from Livengood south along the TAPS utility corridor to an LNG Facility and Marine Terminal at Anderson Bay near Valdez, Alaska (“Valdez Alternative”). A robust analysis of the Valdez Alternative is required in order to determine if the Project Applicants have justified deviating from the decade’s worth of analysis that previously led FERC to choose the Valdez Alternative as the preferred alternative.

¹ Second Draft Resource Report 1 (June 14, 2016) at 1-4 (footnote omitted).

² 40 C.F.R. § 1502.14; Forty Most Asked Questions Concerning CEQ’s National Environmental Policy Act Regulations, 46 Fed. Reg. 18026 (March 23, 1981) (“The “agency’s preferred alternative” is the alternative which the agency believes would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors.”)

II. NEPA REQUIRES THOROUGH ANALYSIS OF THE VALDEZ ALTERNATIVE

NEPA mandates rational decision making based on considerations of impacts and alternatives. The “heart” of the NEPA process is to “present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public.”³ In furtherance of this purpose, FERC has a duty to “[r]igorously explore and objectively evaluate all reasonable alternatives.”⁴ In addition to studying all “reasonable alternatives,” FERC must also analyze “significant alternatives suggested by other agencies or the public during the comment period.”⁵

Regarding the level of detail required for analysis of reasonable alternatives:

It is absolutely essential to the NEPA process that the decisionmaker be provided with a detailed and careful analysis of the relative environmental merits and demerits of the proposed action and possible alternatives, a requirement that we have characterized as the linchpin of the entire impact statement.⁶

In other words, “a thorough discussion of the alternatives is imperative”⁷ and “[w]hat is required is information sufficient to permit a reasoned choice of alternatives as far as environmental aspects are concerned.”⁸ “The degree of analysis devoted to each alternative considered in the EIS is to be substantially similar to that devoted to the proposed action.”⁹ Thus, the EIS for the AKLNG

³ 40 C.F.R. § 1502.14.

⁴ *Id.*

⁵ *Dubois v. U.S. Dep’t of Agric.*, 102 F.3d 1273, 1286 (1st Cir. 1996) (quotations omitted).

⁶ *Id.* at 1286-87 (quoting *Nat’l Res. Def. Council v. Callaway*, 524 F.2d 79, 92 (2d Cir.1975)).

⁷ *All Indian Pueblo Council v. United States*, 975 F.2d 1437, 1444 (10th Cir. 1992).

⁸ *Id.* at 1444 (quoting *Nat’l Res. Def. Council, Inc. v. Morton*, 458 F.2d 827, 836 (D.C. Cir.1972)).

⁹ Forty Most Asked Questions Concerning CEQ’s National Environmental Policy Act Regulations, 46 Fed. Reg. 18026 (March 23, 1981).

Project must provide sufficient data and analysis of the alternatives to allow a reasoned choice between the Nikiski Alternative and the Valdez Alternative.

A. The Valdez Alternative Is the Most Reasonable Alternative.

Reasonable alternatives are those “that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant.”¹⁰ For an alternative to be reasonable, it need only meet the “underlying” or “general goals” of the project.¹¹ A reviewing agency’s failure to analyze viable, reasonable alternatives renders an EIS inadequate,¹² and disregarding an otherwise reasonable alternative because it does not offer a complete solution is inappropriate.¹³

The Valdez Alternative is undoubtedly a reasonable alternative requiring robust and thorough analysis. First, the Valdez Alternative satisfies the underlying project purpose and need of the AKLNG Project, which is “to commercialize the vast natural gas resources on Alaska’s North Slope.”¹⁴ Second, several stakeholders and state and federal agencies, including the Environmental Protection Agency (“EPA”), have requested that the Project provide a detailed study of the Valdez Alternative based upon a variety of concerns.¹⁵ Third, previous studies and readily available data provide compelling evidence that the Valdez Alternative is less costly and less environmentally impactful than the Nikiski Alternative as a result of its collocation with the

¹⁰ *Id.*

¹¹ *Sierra Club v. Marsh*, 714 F. Supp. 539, 574-75 (D. Me. 1989).

¹² *Westlands Water Dist. v. U.S. Dep’t of Interior*, 376 F.3d 853, 868 (9th Cir. 2004) (“The existence of a viable but unexamined alternative renders an environmental impact statement inadequate.”).

¹³ *Nat’l Res. Def. Council, Inc. v. Morton*, 458 F.2d 827, 836 (D.C. Cir. 1972).

¹⁴ Second Draft Resource Report 1 (June 14, 2016) at 1-4.

¹⁵ Second Draft Resource Report 10 (June 14, 2016) at iii-xxix.

TAPS utility corridor,¹⁶ avoidance of environmentally sensitive areas, and other characteristics.¹⁷ In fact, both FERC and the Bureau of Land Management (“BLM”)/Army Corps of Engineers (“COE”) issued final EISs (in Yukon Pacific and TAGS, respectively) designating the Valdez Alternative as the preferred alternative and determining that the Valdez Alternative was superior to a project substantially similar to the Nikiski Alternative based upon objective criteria.¹⁸ Accordingly, any EIS for the AKLNG Project must “[r]igorously explore and objectively evaluate” the Valdez Alternative.¹⁹

B. The Project Applicants Have a Duty to Provide Sufficient Data to Objectively Compare the Nikiski Alternative to the Valdez Alternative.

Although FERC, as the lead NEPA agency for the AKLNG Project, has the ultimate responsibility for complying with the mandates of NEPA and accompanying regulations, the Project Applicants have a responsibility to provide information necessary to analyze the project including project alternatives.²⁰ Specifically, the Project Applicants are required to file resource reports addressing specific subject matter in order to facilitate FERC’s review of the project.²¹ In Resource Report 10, which addresses alternative analyses, the Project applicants “must describe alternatives to the project and compare the environmental impacts of such alternatives to those of the proposal” and “must demonstrate how environmental benefits and costs were weighed against economic benefits and costs, and technological and procedural constraints.”²² FERC should

¹⁶ *Id.* at 10-127 (The Project Applicants define collocation as within 500 feet of existing ROWs).

¹⁷ Appendix A at 7-10 (Yukon Pacific LNG Project, Final Environmental Impact Statement, FERC Docket No. CP88-105-000, dated March 1995).

¹⁸ *Id.*

¹⁹ 40 C.F.R. § 1502.14(a).

²⁰ 18 C.F.R. § 380.12.

²¹ *Id.*

²² *Id.*

enforce NEPA's mandate with regard to the Project Applicant's duty to produce sufficient data and analysis to objectively compare the Valdez Alternative and the Nikiski Alternative.

C. The Project Applicant's Preference for the Nikiski Alternative Has No Effect on the Scope of the Analysis Required for the Valdez Alternative.

The project's principal goal of commercializing Alaska's North Slope natural gas resources overrides the Project Applicants preference for the Nikiski Alternative and requires a thorough analysis of the most reasonable alternative for accomplishing the purpose of the AKKLNG project, the Valdez Alternative.²³ The Valdez Alternative must be thoroughly analyzed and compared to the Nikiski Alternative regardless of the Project Applicant's preference for the Nikiski Alternative. FERC is not constrained in its analysis to the alternatives presented by the project applicant. In fact, overreliance on data provided by an applicant or too much deference to the applicant's own determination of reasonable alternatives may render an EIS inadequate.²⁴ Accordingly, even if the formal application for the AKLNG Project fails to provide a thorough analysis of the Valdez Alternative, FERC is nevertheless required to conduct such analysis.

D. NEPA Sets out Distinct Alternative Analysis Requirements for Route and Site Alternatives.

NEPA, the Commission on Environmental Quality's ("CEQ") regulations implementing NEPA,²⁵ FERC regulations,²⁶ case law, and internally developed FERC guidelines provide specific guidance to agencies and applicants in fulfilling their obligations under NEPA. These sources set out distinct requirements for analysis of major route and site alternatives such as the

²³ *Sierra Club*, 714 F. Supp. at 557.

²⁴ *See, e.g., Van Abbema v. Fornell*, 807 F.2d 633, 639-43 (7th Cir. 1986); *Sierra Club*, 714 F. Supp. at 586-87, 589-90.

²⁵ 40 C.F.R. §§ 1500-08.

²⁶ 18 C.F.R. § 380.

alternative mainline pipeline route from Livengood south to Anderson Bay and the alternative LNG Facility and Marine Terminal site at Anderson Bay associated with the Valdez Alternative.

As a major route alternative, the pipeline route for the Valdez Alternative “should be addressed in sufficient detail to justify the decision to eliminate [it] from detailed consideration” and include analysis of “the environmental characteristics of the major route alternative and the corresponding segment of the proposed route.”²⁷ For each route alternative, the Project Applicants must “provide clear statements regarding the relative advantages and disadvantages” upon direct, indirect, and cumulative impacts, including the reasoning behind the route selection.²⁸ In furtherance of this requirement, the Project Applicants are required to file “environmental comparison tables that include all of the resource data that is pertinent and useful for comparing the alternatives.”²⁹ To allow an objective comparison, the data used for comparing the route alternatives must be consistent.³⁰ In addition to providing objective information required to compare the environmental characteristics of the routes associated with the Valdez Alternative and

²⁷ Appendix B at 7-8 (Guidance Manual for Environmental Report Preparation for Applications Filed under the Natural Gas Act, FERC, dated Dec. 2015).

²⁸ *Id.* at 7.

²⁹ Appendix B at 3 and 8 (The information ordinarily required for major route alternative comparison charts includes the following: (1) total length; (2) length of new right-of-way vs. existing right-of-way; (3) amount of affected wetlands; (4) total waterbody crossings; (5) major river crossings; (6) affected significant fisheries; (7) affected endangered and threatened species and their habitat; (8) affected cultural resources; (9) affected forest, agricultural, open recreation and historic, residential, and commercial and industrial lands; (10) number of residences and other structures within 50 feet of construction area; (11) amount of affected federal lands, national forests, national parks, and BLM land; (12) amount of affected state lands, state parks, and wildlife management areas; (13) affected trails; (14) affected recreation or other land use areas; and (15) the number of affected paleontological sites.).

³⁰ *Id.* at 5.

the Nikiski Alternative, the Project Applicants must also discuss the technical and economic characteristics of the routes.³¹

NEPA also sets out distinct guidelines for analyzing site alternatives such as the presently proposed LNG Facility and Marine Terminal site at Boulder Point for the Nikiski Alternative and at Anderson Bay for the Valdez Alternative. Alternative sites should be analyzed “for all new major aboveground facilities, particularly LNG facilities,”³² especially where critical habitat or threatened or endangered species are present.³³ Because the Nikiski Alternative’s site is located within the critical habitat of the endangered Cook Inlet Beluga Whale, analysis of the AKLNG Project must include thorough consideration of alternative sites that avoid the critical habitat such as the Valdez Alternative’s site. Alternative site analysis must include a comparison of environmental characteristics of the alternative sites, should provide a table comparing relevant factors,³⁴ must “[i]dentify and discuss the decision criteria and weighting used at each decision point and clearly state the basis for each decision”³⁵ and “provide a clear statement of why each alternative site was are [sic] considered less preferable or rejected.”³⁶

³¹ *Id.* at 7.

³² *Id.* at 10.

³³ *Id.*

³⁴ *Id.* at 11 (The information ordinarily required for alternative site (e.g. LNG facilities nad compressor stations) comparison charts includes the following: (1) area (acres) required; (2) land availability; (3) presence of wetlands; (4) presence of critical habitat or federally endangered or threatened species; (5) zoning (*e.g.*, industrial, residential, agriculture); (6) miles of pipeline required to reach the site; (7) number of noise sensitive areas within one mile of the site; (8) air quality considerations; (9) noise considerations; (10) access to electric power and/or additional facilities required; (11) technical considerations; and (12) economic considerations.).

³⁵ *Id.*

³⁶ *Id.*

III. COMPARATIVE ADVANTAGES OF THE VALDEZ ALTERNATIVE

The Valdez Alternative offers several advantages over the Nikiski Alternative, none of which have been acknowledged or analyzed by AKLNG. These advantages are primarily attributable to the Valdez Alternative's comparatively high percentage of collocation to existing rights-of-way, utilization of existing infrastructure, and avoidance of environmentally sensitive areas. Despite the existence of the previously completed TAGS and Yukom Pacific EISs identifying some of these advantages, the Project Applicants have not included these advantages in its analysis of the Valdez Alternative. As a result, the Project Applicants have not satisfied the duty under NEPA to objectively analyze reasonable alternatives.

A. The Valdez Alternative's Collocation with Existing Rights-of-Way and Use of Existing Infrastructure Minimizes Greenfield Construction.

The Nikiski Alternative deviates from the TAPS utility corridor and the Valdez Alternative at Livengood before travelling 402.7 miles south to Nikiski, including a 28.4-mile section of offshore pipeline crossing Cook Inlet.³⁷ As a result, the Nikiski Alternative has a substantially lower amount of collocation with existing rights-of-way than the Valdez Alternative. In fact, only 36 percent³⁸ or approximately 290 miles³⁹ of the Nikiski Alternative is collocated with existing rights-of-way. Curiously, the Project Applicants employ a different definition of Greenfield (one mile from the centerline of existing ROWs)⁴⁰ than that adopted by FERC (500 feet from the centerline of existing ROWs). Using the Project Applicant's definition of Greenfield, 27 percent

³⁷ Second Draft Resource Report 1 at 1-134; Second Draft Resource Report 1 at 1-28 – 1-29.

³⁸ Second Draft Resource Report 10 at 10-127.

³⁹ Second Draft Resource Report 1 at 1-30.

⁴⁰ Second Draft Resource Report 10 at 10-134 (Greenfield is defined as when the "Mainline is located at least 1 mile (from the centerline) from existing ROWs. Existing infrastructure may consist of pipelines, major roads, railroads, and underground/aboveground utilities that are 2.5 miles or greater in length.").

or 218 miles of the Nikiski Alternative will require Greenfield construction⁴¹ with 196 miles or approximately 90 percent of that Greenfield construction occurring south of Livengood.⁴² Applying FERC's definition, 64 percent or approximately 510 miles of the Nikiski Alternative requires Greenfield construction. Thus, by failing to use FERC's definition of Greenfield, the amount of Greenfield construction required for the Nikiski Alternative is understated by nearly 300 miles. The fact that 90% of the Greenfield construction required for the Nikiski Alternative occurs south of Livengood, where the Nikiski Alternative deviates from the TAPS utility corridor, suggests that the Valdez Alternative's collocation with TAPS will result in substantially less Greenfield construction. Because the amount of Greenfield construction is a key factor in determining the least impactful alternative for the AKLNG Project, it is critical that the amount of Greenfield construction required for each alternative is objectively analyzed using standardized definitions and criteria.

BLM's comments to the Project Applicant's Resource Reports reflect concern regarding the amount of Greenfield construction required for the Nikiski Alternative. BLM has stated "[w]e strongly encourage that the proposed action is conducted such that, *to the full extent feasible*, activities and development are co-located with previously extant development and minimize creation of new footprints on the landscape."⁴³ Even the Project Applicants have acknowledged that "[i]nstallation of new pipelines along existing rights-of-way (such as other pipelines and roads) is often environmentally preferable to constructing in a new Greenfield right-of-way, as

⁴¹ *Id.* at 10-134, 10-127 ("'collocation' is defined as where the Mainline parallels an existing road, pipeline, powerline, or railroad within 500 feet, with no overlap of the ROWs or placing of the Mainline in existing ROWs.").

⁴² *Id.* at 10-133 – 10-134.

⁴³ BLM Alaska Comments on Resource Reports for AKLNG Project (Sept. 26, 2016).

impacts can normally be reduced by siting within and/or adjacent to previously disturbed utility rights-of-way and roads.”⁴⁴

The amount of Greenfield construction required for the Valdez Alternative has yet to be provided by the Project Applicants. However, the Project Applicants have stated that the Valdez Alternative “has a considerable amount of collocation with [TAPS] and a highway system for almost its entire length.”⁴⁵ In fact, the Valdez Alternative would allow for nearly the entire pipeline to be constructed within an existing utility corridor.⁴⁶ The Valdez Alternative’s collocation with existing rights-of-way provides advantages over the Nikiski Alternative by minimizing impacts to resources and reducing costs associated with Greenfield construction. In addition, the availability of previously gathered data regarding the Valdez Alternative and TAPS will facilitate efficient navigation of the permitting process.

By occupying the same utility corridor as TAPS, the Valdez Alternative also allows for the utilization of existing work pads, camp pads, access roads, airstrips, and the vessel traffic safety system. Unlike the Valdez Alternative, which would “use existing camp pads except at Anderson Bay,” the Nikiski Alternative would require construction of gravel camp pads at all construction camp sites.⁴⁷ By using existing gravel work pads, the Valdez Alternative “would mitigate a

⁴⁴ First Draft Resource Report 10 (Feb. 11, 2015) at 10.

⁴⁵ Second Draft Resource Report 10 at 10-72.

⁴⁶ Appendix C (Public Land Order 5150, Utility Corridor Prudhoe Bay to Valdez with General Land Status, Alaska Department of Natural Resources, dated March 2004); Appendix D at 9 (Trans-Alaska Gas System, Final Environmental Impact Statement, BLM No. AK-PT-88-003-1792-910, dated June 1988) (“The proposed TAGS project would be built primarily on federal and state land within an existing utility corridor that contains a public/private road, a major oil pipeline, and Federal lands that have been authorized to contain chilled gas ANGTS pipeline.”).

⁴⁷ Appendix D at 7.

substantial portion of the adverse impacts expected from material extraction and placement.”⁴⁸

Similarly, for the Valdez Alternative:

[A]ll of the proposed pipeline construction camps except Prudhoe Bay and Sourdough Creek would utilize former TAPS construction camp sites . . . [and] Approximately 100 miles of existing access roads, permanent or abandoned, would be repaired for reuse and approximately 34 miles of new access roads would be constructed.⁴⁹

While the Valdez Alternative is estimated to require approximately 34 miles of new access roads for the entire project, the Nikiski Alternative will require approximately 120 miles of new access roads south of Livengood alone.⁵⁰

In order to satisfy the requirements of NEPA and ensure that the least impactful alternative is selected, the cost-saving and environmental benefits associated with utilizing existing infrastructure must be taken into consideration. The Project Applicants can facilitate the objective comparison of the Valdez Alternative and the Nikiski Alternative by providing the necessary data associated with the Valdez alternative necessary to complete an objective comparison.

B. The Valdez Alternative Provides Several Socioeconomic Advantages.

The Valdez Alternative provides substantial socioeconomic benefits including reduced costs resulting in increased monetary returns to the State and natural gas access for Fairbanks and communities along the Richardson Highway, which struggle with extremely poor air quality as a result of little access to natural gas. Conversely, the Nikiski Alternative poses some substantial negative socioeconomic impacts on commercial fisheries in Cook Inlet and subsistence hunting areas in Minto Flats and other areas. In order to satisfy the requirements of NEPA, the Project

⁴⁸ *Id.* at 10.

⁴⁹ *Id.* at 4.

⁵⁰ Appendix F to Second Draft Resource Report 1 at Table 1 (120 miles calculated by totaling all new access roads south of mile 401 where Livengood is located.).

Applicants must objectively compare the socioeconomic impacts of the Nikiski Alternative to those of the Valdez Alternative.

First, the State has a constitutional duty to “provide for the utilization, development, and conservation of all natural resources belonging to the State, including land and waters, for the maximum benefit of its people.”⁵¹ Lower project costs maximize socioeconomic benefits to all Alaskans by allowing a greater return on investment for the State and lower tariffs for transportation of State-owned royalty gas. Accordingly, the cost savings associated with the Valdez Alternative’s collocation with TAPS, use of existing infrastructure, and avoidance of environmentally sensitive areas weighs heavily in favor of selecting the Valdez Alternative in order to comply with the Alaska Constitution.

Second, the Nikiski Alternative poses far greater negative socioeconomic impacts to commercial fisheries and subsistence hunting areas. The Project Applicants acknowledge that “[d]uring construction of the Marine Terminal, it is anticipated there would be temporary but significant adverse effects on some set gillnet permit holders participating in the Cook Inlet commercial salmon fishery”⁵² and “commercial set gillnet permit holders displaced by Marine Terminal construction could also face uncertainty about their ownership of shore fishery leases at the end of the construction period.”⁵³ Moreover, the Project Applicants do not account for losses that will be experienced by drift and purse seine fisheries. A vessel engaged in fishing must avoid vessels restricted in their ability to maneuver, which includes vessels engaged in dredging, surveying, or pipe laying,⁵⁴ and is prohibited from impeding the passage of any other vessel

⁵¹ Alaska Const. art. 8, § 2.

⁵² Second Draft Resource Report 5 at 5-178.

⁵³ *Id.* at 5-179.

⁵⁴ 33 C.F.R. § 83.03(g).

navigating within a narrow channel, fairway, or traffic lane.⁵⁵ Accordingly, vessel traffic associated with construction of the Nikiski Alternative and LNG shipping will negatively impact Cook Inlet commercial fisheries.⁵⁶

Similarly, the Nikiski Alternative will result in far greater impacts to subsistence hunting areas as a result of Greenfield construction therein. The Project Applicants have yet to complete subsistence studies necessary to precisely identify impacts on subsistence resources or otherwise address concerns regarding the Nikiski Alternative's impacts on subsistence hunting.⁵⁷ However, anecdotal evidence clearly supports the conclusion that the Valdez Alternative poses far fewer impacts to subsistence areas. For example, the Nikiski Alternative passes through the Minto Flats and Susitna Flats State Game Refuges while the Valdez Alternative does not affect any state game refuge. In addition, comments at scoping meetings for the AKLNG Project reveal that Alaska citizens recognize that the Nikiski Alternative is likely to have a far greater impact on subsistence hunting.⁵⁸

Second, the Valdez Alternative's proximity to Fairbanks and communities along the Richardson Highway provides superior socioeconomic benefit to the Nikiski Alternative by providing access to inexpensive natural gas for communities facing exceptionally high energy prices and poor air quality. Unlike communities along the Nikiski Alternative, communities along the Valdez Alternative do not have access to reasonably priced natural gas. Fairbanks, Alaska's second largest city, and several other communities including Glennallen, Copper Center, and

⁵⁵ 33 C.F.R. § 83.09(c); 33 C.F.R. § 83.10(i).

⁵⁶ Second Draft Resource Report 5 at 5-136 ("increased vessel traffic related to Project construction and operations could affect commercial fishing vessels by interfering with fishing and navigation, and reducing the total allowable fishing area.").

⁵⁷ *Id.* at 5-191.

⁵⁸ *See id.* at 5-xxii.

Valdez suffer from high energy costs, which negatively impact local economies and result in poor ambient air quality due to overreliance on wood and heating oil to heat homes. Fairbanks frequently experiences particulate air pollution at rates that exceed National Ambient Air Quality Standards as measured by concentration of particulate matter smaller than 2.5 microns (“PM_{2.5}”).⁵⁹ For 2015, Fairbanks was ranked the fifth most polluted city in the United States as measured by short-term PM_{2.5} pollution and the twenty-third most polluted city in the United States as measured by year-round PM_{2.5} pollution.⁶⁰

Exposure to particle pollution has substantial health impacts including death. According to the American Lung Association “particle pollution does not just make people die a few days earlier than they might otherwise—these are deaths that would not have occurred if the air were cleaner.”⁶¹ Moreover, even short-term exposure to particle pollution has been linked to:

1. death from respiratory and cardiovascular causes, including strokes;
2. increased mortality in infants and young children;
3. increased numbers of heart attacks, especially among the elderly and in people with heart conditions;
4. inflammation of lung tissue in young, healthy adults;
5. increased hospitalization for cardiovascular disease, including strokes and congestive heart failure;
6. increased emergency room visits for patients suffering from acute respiratory ailments;
7. increased hospitalization for asthma among children; and increased severity of asthma attacks in children.⁶²

From 2011 to 2014 elevated PM_{2.5} concentrations increased hospital admittance in the Fairbanks area by 22.8% for pediatric asthma, 9.3% for adult asthma, and 7.2% for COPD.⁶³

⁵⁹ Appendix E at 5 (American Lung Association, State of the Air, dated 2016).

⁶⁰ *Id.* at 3-4

⁶¹ *Id.* at 7.

⁶² *Id.*

⁶³ Appendix F at 12.

Poor air quality in the Fairbanks area, is directly linked to the unavailability of affordable natural gas for heat and power generation. For example, although the Fairbanks North Star Borough (“FNSB”) has approximately 100,000 residents, only about 1,100 commercial and residential properties currently have access to natural gas.⁶⁴ Providing the Fairbanks area with natural gas, which would allow conversion of residential and commercial heating systems, is estimated to reduce PM_{2.5} emissions from approximately 2,200 tons per year to less than 200 tons per year.⁶⁵ Accordingly, providing affordable natural gas to the Fairbanks area is vital to eliminate the deleterious particle pollution presently occurring there.

In addition to public health impacts resulting from Fairbanks areas high levels of air pollution, the EPA’s designation of large portions of Fairbanks and North Pole as nonattainment areas for particle pollution standards negatively effects economic growth in the Fairbanks area. Air quality permits for any commercial or industrial activity cannot be obtained if the activity will increase the amount of PM_{2.5} emissions over current amounts.⁶⁶ The Fairbanks area may also be subject, under federal law, to the imposition of economic sanctions such as withholding federal funds for highway construction, reducing or eliminating federal expenditures on military bases in the area, and creating additional challenges for the local power plants and refinery to install emission controls or obtain permits.⁶⁷

The Nikiski Alternative deprives the Fairbanks area from access to natural gas by circumventing the area. If the Nikiski Alternative were built, a costly spur pipeline at least 30 miles

⁶⁴ *Id.* at 13.

⁶⁵ Appendix G at 3 (Northern Economics, Fairbanks North Star Borough Gas Distribution System Analysis, dated June 29, 2012).

⁶⁶ *Id.* at 6.

⁶⁷ 42 U.S.C. § 7503, 7509.

long (minimum cost of \$50-\$60 million) is needed to serve the Fairbanks area. An additional 20 miles of spur line is needed to service North Pole, Alaska, with ten more miles required to extend service from North Pole to Eielson Air Force Base. The Valdez Alternative brings the pipeline in much closer proximity to Fairbanks, North Pole, and Eielson, which would provide the inexpensive natural gas necessary to eliminate the substantial health risks associated with particle pollution, facilitate growth in the Fairbanks economy, and provide relief from high energy prices. Providing affordable natural gas to the United States military bases near Fairbanks is also a consideration that weighs in favor of the Valdez Alternative, which would bring the AKLNG Project mainline in much greater proximity to Fort Wainwright and Eielson Air Force Base.

The Valdez Alternative provides substantial socioeconomic benefits to Alaskans not provided by the Nikiski Alternative including: (1) reduced costs that allow for Alaska's resources to be developed for the maximum benefit of the people as mandated by the Alaska Constitution and (2) improved air quality and energy prices for the Fairbanks area and Richardson-Highway communities. Conversely, the Nikiski Alternative will cause negative socioeconomic impacts including substantial losses in commercial fishing revenues and permanent impacts to subsistence hunting that are avoided by the Valdez Alternative as well as impacts caused by additional construction necessary to provide service to Fairbanks. These examples of socioeconomic impacts reveal why the Project Applicants must objectively compare the alternatives in order to determine which alternative best advances the vital interests implicated in the construction of the AKLNG Project.

C. The Valdez Alternative Avoids the Hazardous Construction, Operating, and Shipping Conditions of Cook Inlet.

The Valdez Alternative presents several advantages over the Nikiski Alternative associated with the suitability of the respective Marine Terminal sites. The Nikiski Alternative's site at

Boulder Point requires construction and operations in Cook Inlet, which is relatively shallow and routinely experiences heavy winter ice flows and extreme tidal floods. Conversely, the Valdez Alternative's site at Anderson Bay is deep, ice free, and experiences much less dramatic tidal action.

Both ice flows and extreme tides in Cook Inlet pose substantial challenges to safe construction and operation of the Marine Terminal and to tanker traffic. In fact, there are several instances of vessel casualties resulting from ice and tides in recent years.⁶⁸ As recently as 2006, “a sudden force generated by ice and current” caused a 601-foot tanker, the Seabulk Pride, to part from its mooring lines at the Kenai Pipe Line Dock in Nikiski and run aground.⁶⁹ A Coast Guard investigation into the grounding concluded that:

The only sure course of action that would have prevented this casualty was to require the ship to depart the terminal during the icing conditions experienced. The forces generated at max flood combined with ice present a substantial risk to a vessel moored at the KPL dock.⁷⁰

Although the vessel “was refloated without significant oil spillage,” the 2006 Cook Inlet Vessel Traffic Study concluded that “catastrophe was narrowly averted, given the numerous rocks and reefs in the vicinity.”⁷¹ In 2000 a freight ship, the M/V Torm Pacific, was moored at a terminal in Nikiski “when it was struck by a large pan of ice moving at approximately 5.3 knots. The vessel was sheared from the pier, parting 24 mooring lines, and struck the terminal’s northern catwalk.”⁷²

⁶⁸ Appendix H at 3-5 (Cook Inlet Vessel Traffic Study, Report to Cook Inlet Regional Citizens Advisory Council, Cape International, Inc., dated Dec. 2006).

⁶⁹ Appendix I at 2 (Coast Guard Report of Investigation: Grounding of the Tank Vessel SEABULK PRIDE in Cook Inlet, dated Feb. 2, 2006).

⁷⁰ *Id.*

⁷¹ Appendix H at 5.

⁷² *Id.*

Yet another breakaway occurred in 2000 when the T/B Energizer, moored at Nikiski, “was struck by a large pan of ice, parting mooring lines and the cargo transfer hose” and causing a 60-gallon petroleum product spill and property damage.⁷³ Finally, in 1999 a freight ship, the M/V Ocean Laurel, “was struck by a large pan of ice, estimated to be $\frac{3}{4}$ mile in length” which “sheared off the pier, parting 19 mooring lines, and struck the pier face.”⁷⁴ These instances of large vessels coming unmoored from facilities in proximity to the proposed location of the Nikiski Alternative’s Marine Terminal illustrate the reality that ice and currents in Cook Inlet pose a serious threat to safe tanker operations in Cook Inlet and will inevitably result in costly tanker delays.

In response the unmooring incidents described above, the Coast Guard has adopted special procedures for operating in Cook Inlet during winter ice conditions. The Coast Guard’s guidelines prohibit vessels from “forcing ice” and set out procedures for operating when ice is present in the inlet. Some procedures include discontinuing all transfer operations, disconnecting transfer hoses, positioning a designated vessel up current as an ice scout, and unmooring moored vessels, all of which could impede the ability of tankers to moor and receive LNG for export.⁷⁵

The State of Alaska has commissioned several studies examining the risks of operating vessels in Cook Inlet that also provide useful insight into the nature of the risks implicated by the Nikiski Alternative’s Marine Terminal site. For example, the 2015 Cook Inlet Risk Assessment goes as far as recommending the construction of a small-diameter, 8-inch pipeline across Cook Inlet from the Drift River Terminal to an existing refinery in Nikiski in order to avoid the risks

⁷³ *Id.*

⁷⁴ *Id.*

⁷⁵ United States Coast Guard, Operating Guidelines for Ice Conditions in Cook Inlet (Dec. 6, 2015).

associated with tanker traffic presently occurring in Cook Inlet.⁷⁶ The assessment makes this recommendation despite the fact that only approximately 38 one-way crude tanker transits per year would be eliminated by the pipeline.⁷⁷ The concern expressed in the Risk Assessment over 38 one-way tanker transits annually suggests that the additional 30 round-trip LNG tanker transits per month that are required for the Nikiski Alternative would raise much greater concern.⁷⁸ Another study, the 2006 Cook Inlet Vessel Traffic Study, describes Cook Inlet as “a water vexed by: sudden, severe weather; strong tides, and large ice pans aggressively moved by strong tides in the winter.”⁷⁹ That study concluded “[s]evere environmental conditions (high winds, ice, strong tide currents) coupled with human error in negotiating these conditions during vessel operations pose the most likely root cause of the next major vessel casualty and oil spill.”⁸⁰

Even FERC itself has previously determined that the Valdez Alternative’s site is more favorable than the Nikiski Alternative’s site for four out of six objective Marine Terminal Criteria (with the same favorability for the remaining two criteria).⁸¹ Specifically, the Valdez Alternative’s site was found to better (1) minimize exposure to extreme oceanographic conditions, (2) minimize distance from shore to a 60-feet [Mean Low Water Level] depth, (3) maximize suitability of tanker maneuvering and anchorage area, and (4) minimize potential hazards to navigation.⁸²

⁷⁶ Appendix J at 3 (Cook Inlet Risk Assessment Final Report, Nuka Research and Planning Group, LLC, dated Jan. 27, 2015).

⁷⁷ *Id.*

⁷⁸ Second Draft Resource Report 1 at 1-11.

⁷⁹ Appendix H at 2.

⁸⁰ *Id.* at 7.

⁸¹ Appendix A at 6.

⁸² *Id.*

BLM/COE's analysis also concluded that the Valdez Alternative's site is "favorable" for purposes of minimizing "exposure to extreme oceanographic conditions" and "potential hazards to navigation," while the Nikiski Alternative's site was "unfavorable" for both of those criteria.⁸³ Regarding ice flows in Cook Inlet, the BLM/COE determined that "floating ice and icing conditions can be severe problems"⁸⁴ and concluded that "ice in Cook Inlet would be an inherent winter hazard."⁸⁵ In addition, BLM/COE found that:

The presence of tidal extremes in excess of 30 feet vertical height and accompanying currents reaching as high as 6 to 7 knots present major problems to marine construction, facility design, and routine operations and would also increase the potential for accidents. Extreme winter icing conditions would increase the probability that operations would have to be curtailed at times and would increase the potential for accidents."⁸⁶

The advantages of the Valdez Alternative's site identified by FERC and BLM/COE directly correlate to increased safety and decreased impacts on the environment.

The excessive maritime navigational hazards present in Cook Inlet also explain why Valdez is the preferred location for the Marine Terminal based upon the expertise of marine pilots with experience in navigating these waters.⁸⁷ Marine pilots are specially licensed individuals, independent of vessel crew, who are enlisted to navigate vessels in hazardous areas in and out of port. Accordingly, marine pilots are uniquely situated to assess the comparative risks associated with navigating Cook Inlet, and their preference for the Valdez Alternative warrants thorough consideration. A survey of experienced Alaska marine pilots revealed a strong preference for

⁸³ Appendix D at 8.

⁸⁴ *Id.* at 6.

⁸⁵ *Id.*

⁸⁶ *Id.* at 12-13.

⁸⁷ Appendix E to City of Valdez Scoping Comments, dated Dec. 4, 2015, Maritime Navigational Risk Analysis of Shipping North Slope Liquefied Natural Gas (2012).

Valdez with over 60 percent of respondents stating that Cook Inlet should not even be considered, over 80 percent stating that Nikiski poses risk, and only about 10 percent stating that Valdez poses risk.⁸⁸

In addition to posing substantial safety and environmental risks, the hazardous conditions of Cook Inlet increase capital and operating costs and will inevitably result in shipping delays. Thus, in order to comply with NEPA, the Project Applicants should conduct an objective analysis of the risks associated with Cook Inlet, including analysis of the Valdez Alternative which entirely avoids these risks.

D. The Valdez Alternative Avoids Several Environmentally Sensitive Areas.

The Project Applicant's acknowledge that the Nikiski Alternative "requires crossing Cook Inlet, including through Beluga Whale ESA [Critical Habitat Area 2], active faults, extensive wetlands, and is in proximity to [Denali National Park and Preserve]."⁸⁹ However, the comparative analysis provided to date has failed to acknowledge that the Valdez Alternative avoids these and other environmentally sensitive areas including Minto Flats Game Refuge, Susitna Flats Game Refuge, Denali State Park, and several rivers and streams designated as Essential Fish Habitat ("EFH"). Failing to consider these glaring environmental impacts when comparing project alternatives is an abrogation of the duties imposed by NEPA and impedes the objective analysis necessary to determine an impactful alternative. The environmentally sensitive areas impacted by the Nikiski Alternative and the nature of those impacts are discussed below.

⁸⁸ *Id.*

⁸⁹ Second Draft Resource Report 10 at 10-73.

1. Cook Inlet Beluga Whale Critical Habitat.

The Nikiski Alternative's preferred route requires construction of a 28.4-mile subsea pipeline and Marine Terminal within Endangered Cook Inlet Beluga Whale Critical Habitat ("Beluga Critical Habitat") designated under the Endangered Species Act ("ESA"). The Marine Terminal requires a trestle extending over 3000 feet from shore and a Material Offloading Facility ("MOF"), both of which are located within Beluga Critical Habitat and require substantial dredging and pile driving. Moreover, all of the alternative routes analyzed by the Project Applicants for reaching the Nikiski Alternative's site at Boulder Point travel through Beluga Critical Habitat. The Nikiski Alternative poses obvious risks of impacts to Cook Inlet Beluga Whales, and FERC guidelines state that analysis of alternatives that avoid impacts on endangered species and critical habitat is particularly important.⁹⁰ Accordingly, the Project Applicants must thoroughly consider the scope of impacts posed by the Nikiski Alternative and alternatives such as the Valdez Alternative that avoid such impacts.

In addition to analyzing alternatives that avoid impacts to endangered species and critical habitat, NEPA also requires FERC to prepare its draft EIS concurrently with any studies required by the ESA.⁹¹ Under the ESA, federal agencies are required to ensure that agency actions do not "jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat."⁹² "Destruction or adverse modification" is defined as:

A direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the

⁹⁰ Appendix B at 10.

⁹¹ 16 U.S.C. § 1502.25.

⁹² 16 U.S.C. § 1536(a)(1).

conservation of a species or that preclude or significantly delay development of such features.⁹³

Thus, the Nikiski Alternative may be precluded from permitting under the ESA for causing “destruction or adverse modification” to Beluga Critical Habitat. Even if the Nikiski Alternative is able to comply with the requirements of the ESA, it will likely face permitting delays, legal challenges, and mitigation requirements that will increase project costs and could prevent timely completion of the project.

(a) The Scope of Construction and Nature of Operations in Cook Inlet Beluga Whale Critical Habitat Suggests Adverse Impacts Are Likely.

The scope of work required for the Nikiski Alternative’s sub-sea pipeline and Marine Terminal is alarming considering it will occur entirely within Beluga Critical Habitat. If the Nikiski Alternative were constructed, the near-shore portion of the pipeline would extend 645 feet into Cook Inlet from Boulder Point and 475 feet into Cook Inlet from Shorty Creek,⁹⁴ and will be buried from the shoreline using an open-cut method.⁹⁵ In addition to the near-shore trench, the Project Applicants also anticipate additional offshore, 6-foot-deep trenches of 3,200 feet for Boulder Point and 10,000 feet for Shorty Creek to be constructed utilizing a dredge vessel.⁹⁶ The total amount of subsea dredging for this portion of the subsea pipeline is estimated to be between 250,000 and 470,000 cubic feet.⁹⁷ After trenching, offshore installation of concrete-coated, 42-

⁹³ 50 C.F.R. § 402.02.

⁹⁴ Second Draft Resource Report 1 at 1-165.

⁹⁵ Second Draft Resource Report 2 at 2-122.

⁹⁶ Second Draft Resource Report 1 at 1-165.

⁹⁷ *Id.* at 1-166.

inch-diameter pipeline sections, weighing 33 tons each will begin.⁹⁸ The Project Applicants have described this process as follows:

During the second summer season, the pipeline would be laid across Cook Inlet using conventional laybarge methods. All pipe joints would be welded on the laybarge, which would be pulled along the ROW using anchors. The barge would normally employ 12 anchors to keep it positioned as it is pulled ahead along the ROW. It is anticipated that three anchor handling attendant tugs would be used to constantly reposition the anchors and thereby maintain a proper anchoring spread. Mid-line buoys may be used on the anchor chains when crossing other subsea infrastructure (*i.e.*, pipelines and cables).⁹⁹

The ROW required for the subsea portion of the pipeline is 13,200 feet wide to accommodate the pipelay barge and will affect over 44,343 acres during construction.¹⁰⁰ Next, after completing the pipeline shore approaches and pipe lay to the offshore tie-in point, the connection of these two free pipe ends would be performed using an above-water tie-in, the now connected pipe will be returned to the sea floor, surveys will be performed, and additional subsea free-span supports installed.

The massive construction effort required for the subsea pipeline alone is enough to warrant serious consideration of project alternatives that avoid crossing Beluga Critical Habitat. However, impacts associated with construction and operation of the Marine Terminal may result in impacts that exceed even those associated with pipeline construction. The length of the trestle and loading berths for the Marine Terminal are particularly concerning because they are permanent structures on pilings located within the Beluga Critical Habitat. The trestle required by the Nikiski Alternative would extend approximately 3,300 feet into Cook Inlet with trestle-support pilings spaced at 120 feet.¹⁰¹ The trestle and loading berths alone will require approximately 320 pilings

⁹⁸ *Id.* at 1-1xxiii.

⁹⁹ *Id.* at 1-166.

¹⁰⁰ *Id.* at 1-96, 1-99.

¹⁰¹ *Id.* at 1-12.

while additional pilings will also be required for the marine operations facility.¹⁰² During construction of the Marine Terminal, approximately 800,000 cubic yards would be dredged affecting 52 acres.¹⁰³ Additional impacts to Beluga Critical Habitat are attributable to the MOF adjacent to the trestle “that would be a dock used during Project construction to enable direct deliveries of materials, equipment, modules, and other cargo”¹⁰⁴ and to vessel traffic associated with both construction and operation of the Marine Terminal. The material offloading facility will require additional pile driving and approximately 940,000 cubic yards of dredging within Beluga Critical Habitat.¹⁰⁵ The Project Applicants have indicated that dredge material disposal will impact approximately 1,200 acres and that an “unconfined aquatic disposal site is being evaluated for disposition of the dredged material.”¹⁰⁶ Together, the subsea pipeline, marine offloading facility, and Marine Terminal are estimated to require as much as 1,410,000 cubic yards of dredging all within Beluga Critical Habitat.¹⁰⁷ Disposal of this dredge material within Cook Inlet would have additional impacts to Cook Inlet Beluga Whales as a result of additional vessel traffic and disturbances to the marine environment from disposal.

During construction, approximately 195 barge shipments are anticipated to deliver materials for the Marine Terminal in addition to the vessel traffic required for the actual construction of the pipeline, trestle, loading berths, and other facilities.¹⁰⁸ In addition, barges

¹⁰² Appendix E to Second Draft Resource Report 1 at E-15 – E-21.

¹⁰³ Second Draft Resource Report 1 at 1-99.

¹⁰⁴ *Id.* at 1-11.

¹⁰⁵ *Id.* at 1-131, 1-99.

¹⁰⁶ *Id.* at 1-99.

¹⁰⁷ *Id.* at 1-131, 1-165.

¹⁰⁸ *Id.* at 1-133.

tended by tugs will be required to transport dredge material from the MOF to the dredge disposal in approximately 4,000 cubic yard increments which would equate to approximately 235 barge trips from the MOF to the dredge disposal site.¹⁰⁹ After construction, up to 30 LNG tankers would berth and load at the Marine Terminal per month.¹¹⁰ To facilitate LNG tanker berthing, “[a] total of five assist tugs are currently planned to support LNG operations, with four of the tugs used to assist the LNG [carriers] during berthing operations.”¹¹¹ The support tugs “would be ice class and would assume the additional responsibilities of patrol/scouting, ice clearing, and ice breaking during winter months.”¹¹² Pipeline inspection and maintenance activities will also result in additional vessel traffic and subsea disturbances during normal operations.¹¹³ Thus, substantial vessel traffic associated with the Nikiski Alternative will persist as long as the AKLNG Project is operational.

Even before the designation of Beluga Critical Habitat, BLM/COE found that constructing an LNG pipeline across Cook Inlet “introduces a major construction activity into the marine environment and subjects the project to an additional potential impact from accidents and pipeline maintenance or repair.”¹¹⁴ In addition, BLM/COE noted that “[b]urial of the pipe crossing Cook Inlet deeply enough to ensure it would not be exposed by scour or endangered by ships anchors would be difficult” and that “[w]inter construction or repair would be practically impossible

¹⁰⁹ *Id.* at 1-131, 1-132.

¹¹⁰ *Id.* at 1-11.

¹¹¹ *Id.* at 1-177.

¹¹² *Id.*

¹¹³ Second Draft Resource Report 3 at 3-368 (“Pipeline surveillance overflights for routine pipeline inspections (estimated at 26 flights per year), monitoring, and maintenance, could result in disturbance of marine mammals such as belugas, harbor seals, and harbor porpoises.”).

¹¹⁴ Appendix D at 12.

because of floating ice and the extreme tidal current.”¹¹⁵ BLM/COE even suggested that as a result of these difficulties, two crossings might be necessary in order to ensure dependable operation noting that “[t]he crossings would need to be widely separated so that in the event one fails flow could be maintained by diverting gas to the other crossing.”¹¹⁶ BLM/COE concluded that “[a]ll these factors make construction of the pipeline crossing and construction and maintenance of the marine terminal more difficult and possibly make the entire systems more susceptible to accidents during operations.”¹¹⁷ With BLM/COE’s previous analysis of the Cook Inlet crossing in mind, the Project Applicants should analyze whether a single pipeline crossing adequately protects the AKLNG Project from the risk of lengthy operational disruptions. Addressing BLM/COE’s previously stated concerns regarding whether two subsea pipelines are required is necessary to determine the full scope of the Nikiski Alternative’s impact on Beluga Critical Habitat.

The substantial impacts caused by construction and vessel traffic required for the Nikiski Alternative are further exacerbated by the concentration of construction activity in the summer months, conflicts with other user groups in Cook Inlet, and the probability that additional impacts will occur as the result of the complexity of the construction and hazardous construction environment. For example, offshore construction at the pipeline and the Marine Terminal may only be conducted during “ice-free” working windows, which limits the ability of the contractors to avoid impacts on Beluga Critical Habitat.¹¹⁸ Similarly, the Project Applicants have stated that they intend to avoid conflicts with other waterway and near-shore users including commercial and

¹¹⁵ *Id.* at 13.

¹¹⁶ *Id.*

¹¹⁷ *Id.*

¹¹⁸ Second Draft Resource Report 1 at 1-112, 1-130.

recreational fishing operations,¹¹⁹ which will result in additional conflicts between minimizing impacts to belugas and Beluga Critical Habitat and to other users. It also appears that the analysis does not account for delays in the project caused by other vessel traffic, commercial fishing, beluga whale movements, accidents, regulatory delays, spills, or other potential sources of delay, which exacerbate impacts on Cook Inlet Beluga Whales by either increasing the concentration of work or requiring additional time for completion.

The combination of impacts from mainline pipe construction across 28.4 miles of Cook Inlet, Marine Terminal construction, and vessel traffic associated with construction and operation poses the greatest threat to Cook Inlet Beluga Whale critical habitat since the habitat has been designated. Even the Project Applicants acknowledge that “Beluga Critical Habitat could be impacted by Project activities”¹²⁰ and that “[o]peration of the construction and pipelay equipment would generate sound with frequencies within the beluga hearing range and at levels above threshold values . . . and may result in temporary displacement of belugas.”¹²¹

(b) The Nikiski Alternative Implicates Nearly Every Source of Adverse Impacts Identified in the National Marine Fisheries Service (“NMFS”) Recovery Plan for Cook Inlet Beluga Whales.

The NMFS Recovery Plan for the Cook Inlet Beluga Whale identifies several sources of adverse impacts to Cook Inlet Beluga Whales and their habitat and notes that “a lack of understanding of distribution, migration, and behavior patterns of prey inhibits potential mitigation measures and argues for a more precautionary approach to maximize opportunity for CI beluga recovery.”¹²² The Project Applicant’s failure to thoroughly analyze alternatives that avoid impacts

¹¹⁹ *Id.* at 1-112.

¹²⁰ Appendix H to Second Draft Resource Report 3 at 64.

¹²¹ *Id.* at 65.

¹²² *Id.* at 9.

to Cook Inlet Beluga Whales is particularly disconcerting considering construction and operation of the Nikiski Alternative implicates nearly every source of adverse impacts identified in the NMFS Recovery Plan.¹²³ Construction activities are known to disturb and modify the habitat of belugas and beluga prey impacting a beluga's ability to feed.¹²⁴ Moreover, a "construction and operation of new physical structures (*e.g.*, bridges, docks, dams, etc.) and increased numbers of vessels in CI beluga habitat can potentially affect the distribution, migration, or behavior of CI belugas and their prey."¹²⁵ Accordingly, the large-scale construction required for the offshore portion of the pipeline, the LNG Facility, and the Marine Terminal at the Nikiski Alternative's site is likely to negatively impact Cook Inlet Beluga Whales.

The construction and operation activities required for the Nikiski Alternative will cause anthropogenic noise known to impact belugas, including noise from the following sources identified by NMFS:

1. Tug boat noise: propeller cavitation (the formation of bubbles in a liquid) and engine noise including azimuth/bow thruster noise;
2. Cargo/tanker noise: propeller cavitation and engine noise including bow thruster noise;
3. Small vessel noise: outboard and inboard engine noise and propeller cavitation;
4. Dredging: suction and/or grabbing operations;
5. Pile driving noise: hammering or vibratory noise (rotatory or oscillatory to a lesser extent);
6. Shore construction noise: other than pile driving;
7. Depth sounders: from vessels;
8. Research related noise: sonars such as acoustic Doppler current profilers and dual frequency imaging sonars, scientific echo sounders and other active transducers, boat transit for photo-identification surveys, and instrument deployment/retrievals, etc.; and

¹²³ Appendix K (Recovery Plan for the Cook Inlet Beluga Whale, NMFS, dated Dec. 27, 2016).

¹²⁴ *Id.* at 8.

¹²⁵ *Id.* at 9.

9. Pipe and cable laying operations.¹²⁶

Impacts associated with these sources of anthropogenic noise are not limited to the construction period. Rather, many of these sources known to disturb Cook Inlet Beluga Whales will persist for the duration of the AKLNG Project's operation.

(c) The Valdez Alternative's Avoidance of Harmful Impacts to Cook Inlet Beluga Whales Support its Thorough Consideration.

The Nikiski Alternative poses substantial risks of impacts to Cook Inlet Beluga Whales as a result of the construction, maintenance, and operation of the 28.4-mile section of subsea pipeline and Marine Terminal within Beluga Critical Habitat. Many of the anticipated impacts associated with construction and operation of the Nikiski Alternative have been expressly identified by NMFS as posing a threat to Cook Inlet Beluga Whales. Thus, it is likely that the Nikiski Alternative will experience substantial mitigation costs, legal challenges, or the inability to obtain federal permits necessary for construction of the route. The Nikiski Alternative's high risk of substantial impacts on Cook Inlet Beluga Whales weighs heavily against deviating from the previously approved Valdez Alternative, which entirely avoids all such impacts.

2. Minto Flats State Game Refuge.

The Minto Flats State Game Refuge is located approximately 35 miles west of Fairbanks, Alaska, and encompasses 500,000 acres of wetland in Interior Alaska.¹²⁷ The refuge was established by the Alaska Legislature in 1988 "to ensure the protection and enhancement of habitat, the conservation of fish and wildlife, and to guarantee the continuation of hunting, fishing,

¹²⁶ *Id.* at 6.

¹²⁷ Appendix L at 2 (Minto Flats State Game Refuge Management Plan, ADFG, dated March 1992).

trapping, and other compatible public uses.”¹²⁸ The refuge is a vital area for harvesting fish, wildlife, and other resources for Athabascan Indians and others living in the vicinity.¹²⁹

The refuge contains some of the highest quality waterfowl habitats in Alaska and sustains the largest trumpeter swan breeding population in North America.¹³⁰ It is also an important spring and fall waterfowl staging area, particularly for geese and swans.¹³¹ More than 150,000 ducks nest in Minto Flats annually.¹³² In addition to waterfowl, the refuge also provides excellent habitat for big game and furbearers¹³³ including Wood Bison which are present in Minto Flats year-round and are listed as threatened under the ESA.¹³⁴ The Minto Flats Game Refuge Management Plan sets out goals that guide all management decisions for the refuge. These goals include:

- 1) Minimizing harmful disturbance to fish and wildlife;
- 2) Maintaining, protecting, and enhancing the quality and quantity of habitat for historically occurring resident and migratory wildlife and fish habitat; and
- 3) Maintaining, protecting and enhancing water quality, water quantity, and circulation patterns necessary for the growth and propagation of fish and wildlife.¹³⁵

¹²⁸ *Id.*

¹²⁹ *Id.*

¹³⁰ *Id.* at 6; Appendix M (Alaska Department of Fish and Game, Minto Flats State Game Refuge, Fish and Wildlife, <http://www.adfg.alaska.gov/index.cfm?adfg=mintoflats.species> (last visited Dec. 20, 2016)).

¹³¹ *Id.*

¹³² *Id.*

¹³³ First Draft Resource Report 3 at 3-154.

¹³⁴ Second Draft Resource Report 3 at 3-387.

¹³⁵ Appendix L at 4.

The Nikiski Alternative will traverse 37.7 miles¹³⁶ of the refuge and requires four new access roads totaling over 30,000 feet in length.¹³⁷ Accordingly, the Nikiski Alternative does not advance the management goals for the refuge and will negatively impact this sensitive environment during construction and also cause long-term disturbances as a result of increased access to the area by recreational users and pipeline maintenance activities.

Although pipeline construction is not entirely precluded in the refuge, the project applicant “must demonstrate that there is a significant public need for the corridor that cannot be reasonably met off-refuge.”¹³⁸ Because the Valdez Alternative entirely avoids the refuge and satisfies the underlying purpose and need of the AKLNG Project, the public need for crossing the refuge can be reasonably met off refuge. Thus, construction of the Nikiski Alternative across the Minto Flats Game Refuge may be precluded entirely. Even if the AKLNG Project obtains the necessary permits for the Nikiski Alternative to cross Minto Flats, construction therein will require substantial mitigation and will likely result in permitting delays or litigation.

3. Susitna Flats Game Refuge.

The Susitna Flats Game Refuge encompasses approximately 300,800 acres located between Beluga River and Point MacKenzie, and “was created to ensure the protection of fish and wildlife populations, particularly waterfowl nesting, feeding, and migration; moose calving areas; spring and fall bear feeding areas; and salmon spawning and rearing habitats.”¹³⁹ As the Project Applicants have acknowledged, “as many as 100,000 waterfowl use the refuge as a staging area in

¹³⁶ Second Draft Resource Report 3 at 3-280.

¹³⁷ *Id.* at 3-345; Appendix F to Second Draft Resource Report 1 at Table 1.

¹³⁸ Appendix L at 5.

¹³⁹ Appendix N at 2 (Susitna Flats State Game Refuge Management Plan, ADFG, dated March 1988).

the spring. Several thousand lesser sandhill cranes and up to 8,000 swans use the Refuge for migrating and nesting.”¹⁴⁰ The refuge also provides prime habitat for beaver, mink, otter, muskrat, coyote, and wolf populations among others.¹⁴¹ Activities that occur in the refuge must:

[B]e consistent with the following goals in accordance with the purposes for which the refuge is established. . .

1. Manage the refuge for the protection, preservation, and enhancement of fish and wildlife habitat and populations.
2. Manage the refuge to protect, maintain, and enhance public use of fish and wildlife and their habitat and general recreation in a high quality environment.¹⁴²

The Nikiski Alternative crosses 14.8 miles of Alaska Department of Fish and Game (“ADF&G”) managed Susitna Flats Game Refuge¹⁴³ and will require construction of five new or improved access roads totaling over 84,000 feet.¹⁴⁴ Any construction work in the Susitna Flats Game Refuge requires a special-use permit and new utilities are allowed to cross the refuge only “where no feasible off-refuge alternative exists, using existing corridors wherever possible, consistent with refuge goals and objectives.”¹⁴⁵ In the present case, adoption of the Valdez Alternative would entirely avoid any impacts caused by the Nikiski Alternative to the sensitive wetland area encompassed by the refuge. Even if the AKLNG Project is granted permits to traverse the refuge, mitigation measures and potential litigation will likely increase costs and delay construction.

¹⁴⁰ Second Draft Resource Report 3 at 3-246.

¹⁴¹ Appendix N at 4.

¹⁴² *Id.* at 3.

¹⁴³ Second Draft Resource Report 3 at 3-280.

¹⁴⁴ *Id.* at 3-344, 346-347; Appendix F to Second Draft Resource Report 1 at Table 1.

¹⁴⁵ Second Draft Resource Report 8 at 8-72.

4. Denali State Park and Denali National Park.

Denali State Park is a 325,240-acre area located near the base of Denali, the tallest mountain in North America.¹⁴⁶ Denali State Park recreation area affords tremendous views of Denali; contains three major rivers, the Susitna, Chulitna, and Tokositna; and has three glaciers adjacent to or within its boundaries, the Ruth, Eldridge and Tokositna.¹⁴⁷ Denali State Park must be managed in a manner to “protect the natural and cultural resources of the park and ensure that the park’s resources are maintained to allow for the public’s experience and understanding of the unique natural features that are found in this part of Alaska.”¹⁴⁸ In order to protect the natural resources found in Denali State Park, the management plan developed for the park states that non-recreation activities should be located outside the park,¹⁴⁹ development should be kept out of sight, facilities should be designed to blend rather than contrast with the natural landscape, and the scale of facilities should be kept small.¹⁵⁰

The Nikiski Alternative crosses approximately 38 miles of Denali State Park affecting approximately 750 acres.¹⁵¹ In addition, the Nikiski Alternative also includes plans to construct 32 new access roads totaling over 35,000 feet¹⁵² and 13 material sites within the boundaries of the park.¹⁵³ Large scale construction, such as that required for the Nikiski Alternative, is not

¹⁴⁶ *Id.* at 8-98.

¹⁴⁷ Appendix O at 5 (Denali State Park Management Plan, Alaska Department of Natural Resources, dated 2006).

¹⁴⁸ *Id.* at 6.

¹⁴⁹ *Id.* at 7.

¹⁵⁰ *Id.*

¹⁵¹ Second Draft Resource Report 8 at 8-143.

¹⁵² Appendix F to Second Draft Resource Report 1 at Table 1.

¹⁵³ Second Draft Resource Report 3 at 3-345.

compatible with the management goals and objectives for the park. Moreover, the Denali State Park Management Plan provides that pipelines may only cross park lands by permit and when no other viable alternatives are available.¹⁵⁴ In the present case, a viable alternative exists in the Valdez Alternative, which entirely avoids Denali State Park. Thus, the Nikiski Alternative may be precluded from traversing Denali State Park altogether.

The portion of Denali State Park affected by the Nikiski Alternative is also qualified as section 6(f) property under the Land and Water Conservation Fund (“LWCF”) Act.¹⁵⁵ The LWCF Act requires that “[n]o property acquired or developed with assistance under this section shall, without the approval of the Secretary, be converted to other than public outdoor recreation use.”¹⁵⁶ The Project Applicants’ analysis of Denali State Park erroneously suggests that Senate Bill 70’s removal of the “special use site” status of specific lands to allow a natural gas pipeline through Denali State Park, somehow affects the LWCF Act restrictions on the use of the land.¹⁵⁷ Nothing in Senate Bill 70 affects the status of Denali State Park’s 6(f) land status under the LCWF Act. Accordingly, approval of the lands for a pipeline right-of-way requires approval from the Secretary of the Interior.

¹⁵⁴ Appendix O at 8.

¹⁵⁵ First Draft Resource Report 8 at 8-44; 54 U.S.C.A. § 200305.

¹⁵⁶ 54 U.S.C.A. § 200305.

¹⁵⁷ Second Draft Resource Report 8 at 8-99 (“Denali State Park is considered a 6(f) property under the LWCF Act (16 USC § 4601). Section 6(f) of the LWCF Act requires that no property acquired or developed with LWCF assistance should be converted to a use other than public outdoor recreational uses without the prior approval of the Secretary of the Interior. However, Alaska Senate Bill 70 (AK SB70) (Alaska State Legislature, 2015) passed on May 15, 2015, provides exceptions from designation as a special purpose site for portions of Denali State Park to allow for ROW leasing associated with natural gas pipelines.”).

Not only would the Nikiski Alternative result in negative impacts to Denali State Park during construction, but the visual impacts and impacts caused by increased ease of access to otherwise pristine lands will remain indefinitely. Visual impacts will also affect Denali National Park despite the fact that the Nikiski Alternative, as presently proposed, does not traverse Denali National Park. A pipeline right-of-way and attendant access roads and other facilities within view of Denali National Park is detrimental to the wilderness character of the park and will negatively impact the tourism industry associated with the park.¹⁵⁸ Impacts to tourism in the Denali Borough would be highly detrimental considering “the tourism industry makes up the largest portion of total employment in the Denali Borough, at about 40 percent of all jobs.”¹⁵⁹

The impacts on Denali State Park and Denali National Park attendant to the Nikiski Alternative militate against deviating from the previously approved Valdez Alternative, which entirely avoids such impacts. Moreover, numerous agency and citizen comments expressing concern over impacts associated with the segment of the Nikiski Alternative traveling through Denali State Park support a thorough review of the Valdez Alternative.

5. Essential Fish Habitat.

The Nikiski Alternative, south of Livengood, will cross approximately 32 rivers and streams designated by the National Oceanic and Atmospheric Administration (“NOAA”) as EFH, all of which contain salmon populations.¹⁶⁰ EFH is defined in the Magnuson-Stevens Act as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.”¹⁶¹ One stated purpose of the Magnuson-Stevens Act is “to promote the protection of essential fish

¹⁵⁸ See Second Draft Resource Report 5 at 5-xxv.

¹⁵⁹ *Id.* at 5-52.

¹⁶⁰ First Draft Resource Report 3 at 3-34.

¹⁶¹ 16 U.S.C. § 1802.

habitat in the review of projects conducted under Federal permits, licenses, or other authorities that affect or have the potential to affect such habitat.”¹⁶² Accordingly, the Magnuson-Stevens Act supports selection of project alternatives that minimize impacts to EFH.

Although, the Project Applicants have not yet provided sufficient data to compare the impacts to EFH caused by the Valdez Alternative to those caused by the Nikiski Alternative, a review of EFH maps for Alaska reveals a far greater amount of EFH rivers and streams located along the Nikiski Alternative than along the Valdez Alternative.¹⁶³ Anecdotally, it is apparent that the Nikiski Alternative crosses far more well-known salmon rivers and streams including the following major crossings: Beluga, Theodor, Lewis, Ivan, Yentna, Deshka, Chulitna, Tanana, and Nenana (four crossings). Of these, one crossing of the Nenana, the Yentna crossing, and the Beluga crossing are planned to be open-cut crossings whereby the river bed is actually excavated.¹⁶⁴ In addition to these major crossings, other well-known fisheries and spawning grounds are also impacted, such as Byers Creek, Honolulu Creek, Troublesome Creek, East Fork Chulitna River, and Alexander Creek. An objective comparison of the impacts of the Valdez Alternative and the Nikiski Alternative with regard to EFH will reveal the far greater impacts associated with the Nikiski Alternative.

E. The Valdez Alternative Better Advances Concepts of Environmental Justice

Environmental justice refers to the “fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development,

¹⁶² 16 U.S.C. § 1801.

¹⁶³ See Appendix P (Fisheries Management Plan for the Salmon Fisheries in the EEZ off Alaska, NMFS, dated June 2012).

¹⁶⁴ Second Draft Resource Report 2 at 2-106.

implementation, and enforcement of environmental laws, regulations, and policies”¹⁶⁵ FERC is required to address any “disproportionately high and adverse health or environmental effects of their programs, policies, and activities on minority populations and low-income populations.”¹⁶⁶ The substantially reduced adverse impacts of the Valdez Alternative as compared with the Nikiski Alternative suggest that the Valdez Alternative will have lesser impacts on minority and low-income populations. For example, by avoiding impacts on traditional subsistence hunting and fishing areas such as Minto Flats, the Valdez Alternative will avoid any disproportionate impacts on native populations who rely on such resources for their livelihood. Moreover, the Nikiski Alternative deprives minority and low-income residents of the Fairbanks area access to low-cost natural gas, which would provide relief from health impacts caused by the extremely poor air quality there. The Project Applicants have failed to provide sufficient data related to the relative environmental justice impacts associated with the Valdez Alternative and Nikiski Alternative, thereby depriving stakeholders and FERC itself the ability to meaningfully compare the impacts of each alternative.

IV. THE PROJECT APPLICANT’S ANALYSIS OF THE VALDEZ ALTERNATIVE FAILS TO SATISFY NEPA

Despite the clear guidelines mandating objective comparison of reasonable alternatives, the Project Applicants have provided a *de minimis* analysis of the Valdez Alternative consisting of approximately five pages.¹⁶⁷ In light of FERC’s previous decisions concluding that the Valdez Alternative is superior to alternatives substantially similar to the Nikiski Alternative, the Project Applicant’s justification for deviating from the thoroughly studied and traditionally preferred

¹⁶⁵ Second Draft Resource Report 8 at 8-219.

¹⁶⁶ *Id.*

¹⁶⁷ Second Draft Resource Report 10 at 10-92 – 10-95; 10-136 – 10-137.

alternative is inadequate and inexplicable.¹⁶⁸ Rather than focus on purported disadvantages of the Valdez Alternative, the Project Applicants should be obligated to show, by objective comparison, why deviating from the Valdez Alternative is appropriate.

The primary purpose of NEPA is to “present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options.”¹⁶⁹ Presently, the dearth of data and analysis provided regarding the Valdez Alternative serves to cloud the issues rather than sharply define them. Moreover, focusing on the Valdez Alternative’s purported disadvantages to the exclusion of its advantages does not provide sufficient justification for deviating from the previously approved and historically preferred Valdez Alternative.¹⁷⁰ In light of the Valdez Alternative’s history of approval by FERC and BLM/COE and its clear environmental advantages, a detailed analysis of the Valdez Alternative is required to satisfy the requirements of NEPA. Having addressed the Valdez Alternative’s numerous comparative advantages, these comments will now address the Project Applicant’s stated reasons for eliminating the Valdez Alternative from detailed consideration.

The Project Applicants cite the following purported disadvantages of the Valdez Alternative as support for failing to provide a detailed comparative analysis:

1. the prohibitive costs to develop the site,
2. the risks of constraints during operations in the Valdez Narrows,
3. the schedule risk of permitting a pipeline through two Wild and Scenic Rivers,
4. the technical/logistical impracticalities of laying a 42-inch pipeline through the steep grade of Thompson Pass and the narrow work areas of Keystone Canyon,
5. permitting issues associated with traversing the Chugach National Forest,
6. significant challenges associated with air permitting, and

¹⁶⁸ Appendix A at 7-10.

¹⁶⁹ 40 C.F.R. § 1502.14.

¹⁷⁰ Second Draft Resource Report 10 at 10-93.

7. additional impacts to wetlands and anadromous fish streams.¹⁷¹

Each of the above-listed reasons for choosing to deviate from the Valdez Alternative and eliminate it from consideration are unconvincing when viewed in light of the greater overall negative impacts of the Nikiski Alternative. Moreover, the analysis of these purported disadvantages, contained in the draft resource reports, lacks sufficient factual support for the assertions made therein. The specific shortcomings associated with the reasons cited for eliminating the Valdez Alternative from thorough review are addressed in turn below.

A. The Cost to Develop the Valdez Alternative's Site.

According to the Project Applicants, excavation costs for 39 million cubic yards of excavation is the primary reason development of the Valdez Alternative's site at Anderson Bay is prohibitively costly.¹⁷² However, previous FERC-adopted estimates regarding the amount of excavated material at the site placed the amount at approximately 9.7 million cubic yards¹⁷³ for an LNG plant and marine terminal with the same capabilities as that proposed by AKLNG.¹⁷⁴ The Project Applicants have not provided any evidence supporting the excavation estimate used in the analysis even though it is four times larger than previous, well-supported estimates adopted by

¹⁷¹ *Id.* at 10-92.

¹⁷² Second Draft Resource Report 10 at 10-92 (“during the feasibility study for this Project, it was estimated approximately 39 million cubic yards of overburden and rock would be removed.”).

¹⁷³ Appendix A at 5.

¹⁷⁴ *Id.* at 4 (“The Yukon Pacific LNG facility would receive and liquefy 2.1 billion cubic feet per day of conditioned natural gas delivered by pipeline from Prudhoe Bay. . . . Major facilities in the plant would include four LNG process trains consisting of gas pretreatment and liquefaction, four 800,000-barrel aboveground LNG storage tanks, and a marine facility to load two tankers of 125,000 cubic meters capacity within a 12-hour period.”); Second Draft Resource Report 1 at 1-9 – 1-11 (The Project Applicant’s proposed LNG Plant includes 2 LNG storage tanks each capable of storing 240,000 cubic meters or approximately 3 million barrels total; “loading and circulating piping, from the LNG storage tanks to the loading arm would transfer approximately 12,500 cubic meters of LNG per hour;” “the Liquefaction Facility would be designed to process an average stream day rate of 2.7 billion standard cubic feet per day.”).

FERC itself. The excavation estimate presently included in the analysis far exceeds the 15 million cubic yards of actual excavation required for the TAPS terminal,¹⁷⁵ which occupies approximately 1,000 acres,¹⁷⁶ the same amount estimated to be required for the AKLNG Project,¹⁷⁷ and was constructed on terrain substantially similar to that at Anderson Bay, where the Valdez Alternative's site would be located. Moreover, as noted in previous FERC-generated EIS "the selection of Anderson Bay as the preferred terminal location was the culmination of a series of studies spanning more than 15 years."¹⁷⁸

The Project Applicants' comparative analysis does not contain any cost studies and does not acknowledge that any excess excavation costs associated with the Valdez Alternative's site would likely be offset by cost savings attributable to (1) utilizing existing infrastructure, (2) avoiding unnecessary Greenfield construction,¹⁷⁹ including the 28.4-mile subsea section of the pipeline, and (3) requiring substantially less dredging and construction for the Valdez Alternative's smaller Marine Terminal trestle. By focusing on one purported disadvantage of the Valdez Alternative, while failing to acknowledge its project-wide advantages over the Nikiski Alternative,

¹⁷⁵ *BP Pipelines (Alaska) Inc. v. Alaska*, 2011 WL 11549442 at *51 (Alaska Super.) ("Mr. Lloyd testified about the excavation work when the VMT was originally constructed. He explained that 'the amount of material excavated in the Terminal had escalated from a planned 4 million cubic yards to approximately 15 million cubic yards.' . . . Overall, this Court was persuaded that Pro Plus's estimated 10 million cubic yards of excavation is reasonable.").

¹⁷⁶ Appendix Q (Alyeska Pipeline, Valdez Marine Terminal <http://www.alyeska-pipe.com/TAPS/ValdezTerminalAndTankers> (last visited Dec. 20, 2016)).

¹⁷⁷ Second Draft Resource Report 1 at 1-6 ("The proposed Liquefaction Facility would be approximately 921 acres (901 acres onshore and 20 acres offshore).").

¹⁷⁸ Appendix A at 2-43.

¹⁷⁹ Second Draft Resource Report 10 at 10-134 (Greenfield is defined by the Project Applicants as when the "[m]ainline is located at least 1 mile (from the centerline) from existing ROWs. Existing infrastructure may consist of pipelines, major roads, railroads, and underground/aboveground utilities that are 2.5 miles or greater in length.").

the analysis presented by the Project Applicants does not reflect the type of objectivity required by NEPA. As evidenced by construction of the Valdez Marine Terminal and previous studies determining that the Valdez Alternative's site is viable and preferred, perceived challenges associated with construction at Anderson Bay are not an adequate justification for selecting the previously disavowed Nikiski Alternative.

B. Tanker Operations in Valdez Narrows.

In Second Draft Resource Report 10, risks and constraints associated with operating in the Valdez Narrows is cited as a reason for eliminating the Valdez Alternative from consideration.¹⁸⁰ By all objective measures, the Valdez Alternative's Marine Terminal site provides a far more suitable environment for tanker operations than the Nikiski Alternative's Marine Terminal site. The Valdez Alternative provides for ice-free conditions year-round and relatively minor tides. Conversely, the Nikiski Alternative's site in Cook Inlet has seasonal ice flows and extreme tidal floods that pose hazards to tanker operations. In fact, Cook Inlet has the largest tidal range in the United States at over 40 feet.¹⁸¹ FERC has previously recognized that the Valdez Alternative's site is more favorable than the Nikiski Alternative's site because it minimized exposure to extreme oceanographic conditions, such as those experienced in Cook Inlet, maximized suitability of tanker maneuvering and anchorage area, and minimized potential hazards to navigation.¹⁸²

The Project Applicant's analysis regarding the Valdez Narrows also ignores the fact that in 1995, when substantially higher oil tanker traffic was occurring in the Valdez Narrows, FERC found that anticipated oil and LNG tanker traffic in the Valdez Narrows would be "well within the

¹⁸⁰ *Id.* at 10-92.

¹⁸¹ Appendix R (National Ocean and Atmospheric Administration, Ocean Facts, Where is the highest tide? <http://oceanservice.noaa.gov/facts/highesttide.html> (last visited Dec. 20, 2016)).

¹⁸² Appendix A at 8.

limitations of the [Vessel Traffic System],” which is one of only twelve such systems operating in the United States, and would not exceed the previous peak traffic associated with oil tankers alone.¹⁸³ FERC also concluded that “the modest increased tanker traffic in Prince William Sound would not significantly increase the potential for a collision between an outbound crude oil tanker and any inbound tanker, either LNG or another crude oil tanker.”¹⁸⁴

The marine pilot study,¹⁸⁵ Cook Inlet Vessel Traffic Study,¹⁸⁶ Cook Inlet Risk Assessment,¹⁸⁷ and other sources described in section III.C of these comments also provide strong evidence regarding the comparatively high risk of operating tankers in Cook Inlet as opposed to Prince William Sound near Valdez. In light of the readily available evidence that Cook Inlet poses far greater challenges to tanker operations than does the Valdez Narrows, reliance on navigational concerns relating to the Valdez Narrows as justification for deviating from the traditionally preferred Valdez Alternative is not appropriate. Additional analysis of the difficulties Cook Inlet presents for tanker operations is included in the comparative advantages section of these comments *supra* in section III.C.

C. Proximity of the Valdez Alternative to Wild and Scenic Rivers.

The Valdez Alternative requires construction adjacent to the Delta River and across the Gulkana River within areas designated for protection under the Wild and Scenic Rivers Act

¹⁸³ *Id.* at 15.

¹⁸⁴ *Id.* at 15.

¹⁸⁵ Appendix E to City of Valdez Scoping Comments, dated Dec. 4, 2015, Maritime Navigational Risk Analysis of Shipping North Slope Liquefied Natural Gas (2012).

¹⁸⁶ Appendix H.

¹⁸⁷ Appendix J.

(“WSRA”) and administered by the Bureau of Land Management (“BLM”).¹⁸⁸ The WSRA prohibits FERC from (1) licensing “the construction of any dam, water conduit, reservoir, powerhouse, transmission line, or other project works under the Federal Power Act . . . on or directly affecting any [Wild and Scenic River]” and (2) assisting “by loan, grant, license, or otherwise in the construction of any water resources project that would have a direct and adverse effect on the values for which such river was established.”¹⁸⁹ First, as a natural gas pipeline licensed under the Natural Gas Act, the WSRA’s prohibition against granting licenses for Federal Power Act projects does not apply to the AKLNG Project. Second, the elements of the Valdez Alternative occurring within the Delta and Gulkana Wild and Scenic River corridors do not qualify as “water resources projects” because they would not impact the free-flowing characteristics of the respective rivers.¹⁹⁰ Accordingly, the assertion in Second Draft Resource Report 10 that the WSRA “is an exclusion factor with the routing of the delivery option for the Anderson Bay facility site”¹⁹¹ is erroneous.

Management of Wild and Scenic River systems is intended “to protect and enhance the values which caused it to be included in said system without . . . limiting other uses that do not

¹⁸⁸ Second Draft Resource Report 10 at 10-93 (“Two rivers, one crossed and one paralleled (the pipeline would need to be within and also cross this river), have since been designated as Wild and Scenic Rivers by the National Park Service (NPS). The Gulkana River, crossed by a Valdez delivery option, and the Delta River, paralleled by a Valdez delivery option, would have to be avoided or require NPS/Congressional/Presidential approval to cross it. For both rivers, there are no feasible options to avoiding the river (note: even a trenchless or aerial crossing still requires an easement across the National Park designation, and the NPS is not authorized by Congress to issue an easement without Congressional and Presidential approval).”

¹⁸⁹ 16 U.S.C. § 1278(a).

¹⁹⁰ *Sierra Club N. Star Chapter v. Pena*, 1 F. Supp. 2d 971, 978 (D. Minn. 1998) (“a water resource project can best be defined as any type of construction which would result in any change in the free-flowing characteristics of a particular river”).

¹⁹¹ Second Draft Resource Report 10 at 10-93.

substantially interfere with public use and enjoyment of these values.”¹⁹² In recognition of the importance of balancing development and protection of resources, the WSRA permits pipeline construction where mitigation measures allow protection of the river’s “esthetic, scenic, historic, archaeological, and scientific features.”¹⁹³ In the present case, the River Management Plans for the Gulkana and Delta Wild and Scenic Rivers provide guidance regarding the special features of each river and how construction of pipelines may affect those features. The Delta River Wild and Scenic River Management Plan acknowledges that additional pipelines may be built within the TAPS utility corridor, stating that “construction of a liquid natural gas pipeline through this utility corridor has been proposed” and “the purpose of the utility corridor is to serve as a route for pipelines, power transmission lines and other utility lines.”¹⁹⁴ Moreover, both the Gulkana River Management Plan and the Delta River Management Plan state that new pipelines and electrical lines may be permitted across the respective Wild and Scenic River corridors if the conditions of Section 1105 of the Alaska National Interest Lands Conservation Act (“ANILCA”) and Section 13 of the WSRA are met.¹⁹⁵

The Valdez Alternative would have minimal impacts on the esthetic, scenic, historic, archaeological, and scientific features of Wild and Scenic River corridors for the Delta and the Gulkana Rivers. First, the portions of the Valdez Alternative that traverse the Delta and Gulkana Wild and Scenic River corridors would be constructed within the existing TAPS utility corridor. Accordingly, additional impacts associated with construction of a buried gas line therein will be

¹⁹² 16 U.S.C. § 1281(a).

¹⁹³ 16 U.S.C. § 1281(a).

¹⁹⁴ Appendix S at 2 (River Management Plan for the Delta National Wild and Scenic River, U.S. Department of the Interior, dated Oct. 7, 1983)

¹⁹⁵ *Id.*; Appendix T at 2 (River Management Plan for the Gulkana River, U.S. Department of the Interior, dated Aug. 2006).

marginal compared to the existing TAPS mainline, which is above ground. Second, although the Valdez Alternative does run adjacent to the Delta River within the Wild and Scenic River corridor, it does not actually cross the Delta River. Because the Valdez Alternative does not require a crossing of the Delta River, the impacts to the Wild and Scenic River corridor are limited to those associated with the buried mainline. Third, the Valdez Alternative only traverses approximately one mile of the Gulkana Wild and Scenic River corridor and may be designed to cross underneath the Gulkana utilizing horizontal directional drilling. In comparison to the existing TAPS crossing of the Gulkana, which is elevated above the river, the Valdez Alternative's subterranean crossing would have a minimal impact. Thus, with sufficient mitigation, the Valdez Alternative could readily satisfy the requirements of the WSRA and ANILCA for the Delta and Gulkana Wild and Scenic River corridors.

The Valdez Alternative's additional permitting requirements associated with the WSRA are not a sufficient reason to eliminate the Valdez Alternative from thorough consideration, particularly in light of the fact that the portions of the Valdez Alternative traversing Wild and Scenic River corridors would be constructed within the TAPS utility corridor, which BLM recognizes as land with a primary purpose of energy transportation.¹⁹⁶ Routing decisions for the AKLNG Project should be based upon analysis of project-wide impacts, not upon the relatively minor challenges associated with construction in Wild and Scenic River corridors. For example, while the Valdez Alternative would cross approximately one mile of Wild and Scenic River corridor not expressly designated for energy transportation, the Nikiski Alternative crosses approximately 28.4 miles of critical habitat for the endangered Cook Inlet Beluga Whale.

¹⁹⁶ Appendix U at 2 (Utility Corridor Resource Management Plan/Environmental Impact Statement Record of Decision, BLM, dated Jan. 11, 1991) ("the primary management direction and use of BLM-administered lands in the Utility Corridor is for energy transportation.").

D. Challenges Associated with Thompson Pass and Keystone Canyon.

The Project Applicants also cite challenges associated with laying pipe over Thompson Pass and Keystone Canyon as a reason why the Valdez Alternative should be eliminated from detailed comparative analysis in the EIS. However, previously accepted EISs have identified a suitable route and construction techniques to successfully cross this stretch of terrain.¹⁹⁷ Moreover, a major highway and TAPS have already been built through the pass and provide useful baseline information regarding construction techniques and conditions in the area.

The Project Applicants should analyze the perceived difficulties associated with Thompson Pass and Keystone Canyon in the context of the project-wide impacts of each alternative. For example, while Thompson Pass and Keystone Canyon may pose some difficulty for construction of the Valdez Alternative, the Nikiski Alternative requires substantially more river crossings and a 28.4-mile section of subsea pipeline. On a project wide basis the Valdez Alternative has been repeatedly determined to be viable and less impactful than the Nikiski Alternative. Accordingly, “the technical/logistical impracticalities of laying a 42-inch pipeline through the steep grade of Thompson Pass and the narrow work areas of Keystone Canyon” is an insufficient justification for abandoning the Valdez Alternative in favor of the Nikiski Alternative.

E. Issues Associated With Traversing the Chugach National Forest.

The Project Applicants have asserted that the location of the Valdez Alternative’s site within the Chugach National Forest is another reason why a thorough analysis of the Valdez Alternative is not required. Again, absent an objective comparison on project-wide impacts to state and national park lands, which has yet to be completed, it is impossible to accurately determine which alternative minimizes such impacts. Anecdotally, it is apparent that the Valdez

¹⁹⁷ See Appendix D at 11.

Alternative's impact on Chugach National Forest land is relatively minor, consisting of only a few miles of pipeline and the LNG Facility. Moreover, the TAPS utility corridor, which the Valdez Alternative follows, already traverses Chugach National Forest thereby minimizing the impact of additional pipeline construction within that corridor. The small impact to National Forest lands adjacent to the existing TAPS marine terminal appears to be outweighed by impacts posed by the Nikiski Alternative, which requires substantially more Greenfield construction in locations such as the Minto Flats Game Refuge, Denali State Park, Susitna Flats Game Refuge, and within critical habitat for the Cook Inlet Beluga Whale.

F. Air Permitting Issues.

Potential air quality permitting issues associated with the Valdez Alternative's LNG Facility and Marine Terminal site at Anderson Bay are also cited as a reason for failing to thoroughly analyze the Valdez Alternative. However, the analysis provided to date does not contain data from any studies conducted at the actual site despite the fact that such studies have previously been completed. For example, the FERC-completed EIS for the Yukon Pacific LNG Project includes ambient air quality studies of the Valdez Alternative's site at Anderson Bay and concludes that utilizing "assumptions designed to ensure that errors in the predicted concentrations would be in the direction of over prediction," the LNG Facility and Marine Terminal could comply with all air-quality requirements.¹⁹⁸ Rather than providing conclusory statements regarding the

¹⁹⁸ Appendix A at 12-14 ("every conservative screening model analysis predicted compliance for all pollutants with the NAAQS, and compliance for all pollutants with PSD increments except for N02. Supplemental modeling for N02 using two sets of meteorological data collected near the proposed Anderson Bay facility depicts a range of potential impacts relative to the screening assessment. While these results cannot be relied upon to make conclusive determinations on the ability of the project to comply with applicable NAAQS and PSD increments, the supplemental modeling shows levels below the respective NAAQS and PSD increments for FEIS purposes.").

“predicted serious compliance problems” purported to exist at the Valdez Alternative’s site,¹⁹⁹ the project applicants should utilize existing on-site studies (or conduct new studies) to provide an objective comparison of the emission data available for each alternative site.

G. Additional Impacts to Wetlands and Anadromous Fish.

Finally, the Project Applicants have suggested that the Valdez Alternative need not be thoroughly analyzed because a salmon stream located at the Valdez Alternative’s Liquefaction Facility and Marine Terminal site must be rerouted and approximately 60 acres of wetlands will be filled.²⁰⁰ However, FERC previously approved the Valdez Alternative’s site concluding that “[o]verall, there would be minimal impacts on resident fish resources because of their limited distribution on the site.”²⁰¹

The Project Applicants have yet to compare the Valdez Alternative to the Nikiski Alternative with regard to project-wide impacts on wetlands and anadromous fish. Nevertheless, the Valdez Alternative appears to better avoid salmon streams and sensitive wetland areas as measured over the project as a whole. By focusing on minimal impacts on anadromous fish and wetlands associated with the Valdez Alternative’s site while ignoring the substantially greater impacts to such resources associated with the Nikiski Alternative, the comparative analysis does not allow for an objective comparison. Accordingly, the Project Applicants should provide all of the data necessary to compare the total impacts on anadromous fish species and wetlands. Failure to provide such data, in light of the Nikiski Alternative’s numerous anadromous salmon stream crossings in the Susitna Valley and along western Cook Inlet as well as crossing of wetland areas

¹⁹⁹ Second Draft Resource Report 10 at 10-95.

²⁰⁰ *Id.* at 10-92, 10-136.

²⁰¹ Appendix A at 11.

in Minto Flats and the Susitna Delta, reflects the need for the Project Applicant's to conduct an objective comparison of the alternatives on a project-wide basis. Unsupported assertions regarding the Valdez Alternative's impacts on wetlands and anadromous fish does not justify abandoning the historically preferred alternative.

V. CONCLUSION

The "heart" of NEPA is to "present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public."²⁰² As the United States District Court for the First Circuit stated:

It is absolutely essential to the NEPA process that the decisionmaker be provided with a detailed and careful analysis of the relative environmental merits and demerits of the proposed action and possible alternatives, a requirement that we have characterized as the linchpin of the entire impact statement.²⁰³

The Project Applicants have yet to provide an alternative analysis that satisfies the rigorous requirements of NEPA or supports deviating from the traditionally preferred Valdez Alternative. In order to comply with NEPA, FERC will require more information and more objective analysis of the impacts of the Valdez Alternative as compared to the Nikiski Alternative. Accordingly, the signatories to these comments encourage FERC to require the Project Applicants to provide data and analysis with the requisite level of detail and objectivity mandated by NEPA. Absent strong countervailing evidence provided by the Project Applicants, FERC should not allow the Project Applicants to deviate from the FERC-approved Valdez Alternative in favor of the previously disavowed Nikiski Alternative.

²⁰² 40 C.F.R. § 1502.14.

²⁰³ *Dubois v. U.S. Dep't of Agric.*, 102 F.3d 1273, 1286-87 (1st Cir. 1996) (quoting *Nat'l Res. Def. Council v. Callaway*, 524 F.2d 79, 92 (2d Cir.1975)).

Every objective analysis over the past four decades, including those conducted by FERC itself, have concluded that the Valdez Alternative is superior to the Nikiski Alternative for gas line projects substantially similar to the AKLNG Project. Accordingly, deviation from this robust historical body of analysis requires strong justification. The Project Applicants have failed to offer such justification and failed to provide the objective data that reveals no such justification exists. As detailed in these comments, the Valdez Alternative has numerous advantages over the Nikiski Alternative that are readily apparent when the two alternatives are objectively compared. These advantages strongly support a determination by FERC that the Valdez Alternative best advances the goals of NEPA and is both the preferred alternative and the environmentally preferable alternative for the AKLNG Project.²⁰³

Submitted February 9, 2017.

CITY OF VALDEZ

Dated 2-2-2017

By 
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²⁰³ Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, 46 Fed. Reg. 18026 (March 23, 1981) ("The "agency's preferred alternative" is the alternative which the agency believes would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors. . . . The environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101.").

**MAYOR OF THE FAIRBANKS NORTH STAR
BOROUGH**

Dated 2/1/17

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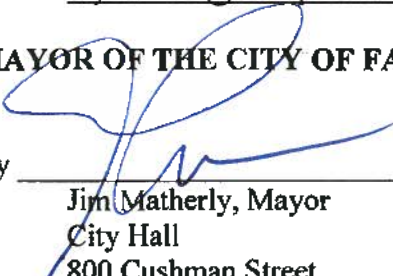
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MAYOR OF THE CITY OF FAIRBANKS

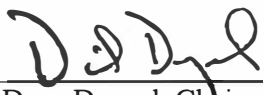
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Appendix A

Yukon Pacific EIS



Yukon Pacific LNG Project

March 1995

Final Environmental Impact Statement



FERC/EIS-0071
Yukon Pacific Company L.P.

Docket No. CP88-105-000

**Federal Energy Regulatory Commission
Office of Pipeline Regulation**

Washington, DC 20426

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D. C. 20426

TP
761
LS
Y96
1995f

In Reply Refer To:
OPR/DEER/ERC I
Yukon Pacific Company L.P.
Docket No. CP88-105-000

TO THE PARTY ADDRESSED:

The staff of the Federal Energy Regulatory Commission (FERC or Commission) has made available a final environmental impact statement (FEIS) on the construction and operation of the liquefied natural gas (LNG) liquefaction plant, LNG storage and marine loading facilities, and LNG tanker transport proposed in the above-referenced docket.

The staff prepared the FEIS to satisfy the requirements of the National Environmental Policy Act. The staff concludes that approval of the proposed action, with appropriate mitigating measures as recommended, including receipt of necessary permits and approvals, would have limited adverse environmental impact. The FEIS evaluates alternatives to various components of the proposal.

Yukon Pacific Company L.P. (Yukon Pacific) is seeking approval of a specific site at Anderson Bay, Port Valdez, Alaska to export LNG to destinations in Japan, Korea, and Taiwan. The proposed action involves construction of:

- a 2.1 billion cubic feet per day LNG liquefaction plant;
- four aboveground 800,000-barrel LNG storage tanks;
- a marine facility to load two tankers within a 12-hour period; and
- a cargo/personnel ferry docking facility.

In addition, Yukon Pacific proposes to operate a fleet of 15 LNG tankers, each having 125,000 cubic meters of cargo capacity. The fleet would make 275 trips per year. Construction of the project would take 8 years with a peak work force of nearly 4,000 workers in the fifth year.

The FEIS will be used in the regulatory decision-making process at the FERC. While the period for filing interventions in this case has expired, motions to intervene out-of-time can be filed with the FERC in accordance with the Commission's Rules of Practice and Procedures, 18 CFR 385.214(d). Further, anyone desiring to file a protest with the FERC should do so in accordance with 18 CFR 385.211.

ARLIS

Alaska Resources
Library & Information Services
Anchorage, Alaska

Appendix A
Page 2 of 15

The FEIS has been placed in the public files of the FERC and is available for public inspection in the:

Federal Energy Regulatory Commission
Division of Public Information
Room 3104
941 North Capitol Street, N.E.
Washington, DC 20426

Copies of the FEIS have been mailed to Federal, state, and local agencies, public interest groups, libraries, newspapers, individuals who have requested the FEIS, and other parties to this proceeding.

Limited copies of the FEIS are available from:

Mr. Chris Zerby, Project Manager (Room 7312)
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, DC 20426
(202) 208-0111

Mr. Jerry Brossia
State Pipeline Coordinator
411 West 4th Avenue, Suite #2
Anchorage, Alaska 99501
(907) 278-8594

Lois D. Cashell,
Secretary

EXECUTIVE SUMMARY

The Yukon Pacific LNG Project Final Environmental Impact Statement (FEIS) has been prepared by the staff of the Federal Energy Regulatory Commission (FERC or Commission) to fulfill the requirements of the National Environmental Policy Act. Among its other responsibilities, the FERC has authority under Section 3 of the Natural Gas Act to approve or disapprove the place of export and the construction and operation of facilities at this place of export. The U.S. Coast Guard, U.S. Department of Transportation, U.S. Army Corps of Engineers, the Alaska State Pipeline Coordinator's Office, Alaska Department of Fish and Game, and the City of Valdez are cooperating Federal, state, and local agencies for this FEIS.

The Draft Environmental Impact Statement (DEIS) for this project was issued in May 1993 and a 45-day public comment period followed. During that time, we received numerous comments from regulatory agencies as well as public groups, private individuals, and other concerned parties. Responses to comments received have either been incorporated into the revised text of this FEIS as new or additional information, or have been included in separate responses in appendix E. It was determined during review of the comments that there was insufficient data available from Yukon Pacific Company L.P. (Yukon Pacific) to address a number of comment areas including air quality, wetlands, and spoil disposal issues.

To obtain the information required to address these comments, we requested additional information from Yukon Pacific in September 1993. A data response was prepared and a technical conference was held in March 1994 for further clarification of the additional information. The conference was attended by Region 10 of the U.S. Environmental Protection Agency, the FERC, the Alaska Department of Environmental Conservation, and Yukon Pacific. Yukon Pacific followed up this meeting with the preparation and submittal of an Issues Resolution Document summarizing all new information. A Final Issues Resolution Document, incorporating agency comments, was filed in July 1994 and the information incorporated into the FEIS.

PROPOSED ACTION

Yukon Pacific is seeking approval of a specific export site at Anderson Bay, Port Valdez, Alaska. Yukon Pacific proposes to construct and operate facilities to liquefy natural gas delivered to Port Valdez via pipeline from the North Slope; briefly store the liquefied natural gas (LNG); and transfer the LNG at a marine terminal in Anderson Bay to LNG tankers for export to various Asian Pacific Rim countries.

The Yukon Pacific LNG facility would receive and liquefy 2.1 billion cubic feet per day of conditioned natural gas delivered by pipeline from Prudhoe Bay. The entire plant site would occupy a land area of about 390 acres. Major facilities in the plant would include four LNG process trains consisting of gas pretreatment and liquefaction, four 800,000-barrel aboveground LNG storage tanks, and a marine facility to load two tankers of 125,000 cubic meters capacity within a 12-hour period. At planned capacity, a fleet of 15 double-hulled LNG tankers would transport the LNG through U.S. territorial waters to receiving terminals in the Pacific Rim, making about 275 loaded voyages per year.

Construction of the proposed facilities would permanently affect approximately 426 acres of predominantly spruce-hemlock forest, wetland, and non-wetland subtidal marine habitats. The site, because of its steep topography, would require extensive recontouring, through excavation and filling, to create bedrock benches on which the facility structures would be constructed. This would result in about 3.3 million cubic yards of excess excavated materials requiring disposal (2.6 million cubic yards of overburden and 0.7 million cubic yards of rock).

2.1.4.3 Permanent Plant and Marine Site Development

Site development activities would begin as early as possible in the first construction year and be carried out in three consecutive summer seasons. Site excavation would involve: removal of overburden soils down to bedrock and placement of these soils in planned fill and disposal areas; the removal of rock down to design grade elevations; and the placement of compacted rock fill in low areas up to design grade elevations (figure 2.1-4). Overburden removal would be done using bulldozers, backhoes, loaders, and haul trucks. Rock excavation would be done using conventional drilling and blasting techniques. Rock would be moved and placed by bulldozers, loaders, haul trucks, and compactors. Blasting of rock would commence upon project mobilization and would be planned initially twice a day—once at lunch period, and sometime between the first and second shifts, weather permitting.

The amount of underwater blasting would be limited to what is necessary at the cargo/personnel ferry dock and the LNG tanker berthing docks, and cannot be determined exactly until detailed bathymetry of the areas is completed. In any event, blasting would be designed to meet Federal Regulations Part 1926, Safety and Health Regulations for Construction Sub Part "U". The proposed schedule restricts underwater blasting to the period October 1 through April 15 or in accordance with ADFG guidelines to avoid impacts on marine resources. The TAGS Right-of-Way Lease Stipulation Number 2.11 requires the preparation of a blasting plan and approval by the Alaska Department of Natural Resources (ADNR) for blasting in streams, rivers, or lakes.

The layout of the site shown on figure 2.1-4 reflects a need to locate all critical facilities on bedrock while at the same time optimizing cut/fill requirements to minimize spoil quantities. Site excavation quantities would be approximately 9.7 million cubic yards. Approximately 5.9 million cubic yards of this would be used for onsite fill, including earthwork for the construction wharf and off-loading area in Anderson Bay. Approximately 3.8 million cubic yards of excavated material, about 19 percent rock, would not be needed and would require disposal. This is discussed further in section 2.3.2. The site development concept uses terracing (benching) to maximize the functional area of a site which is relatively steep.

The highest bench would be occupied by the LNG process trains at an approximate elevation of 175 feet MLLW. Another major bench would be located to the west where the LNG storage tanks would be placed at a base elevation of approximately 75 feet MLLW. Secondary benches would be graded for other facilities such as the:

- power plant and operations support area and utility storage area (100 feet MLLW);
- harbormaster, helipad, and wastewater retention area (50 feet MLLW); and
- construction wharf and off-loading area (31 feet MLLW).

Once site development for the LNG tank area is well underway, the LNG tanks subcontractor would mobilize to begin construction of the ring foundations for the first LNG tank. This would be as early as possible in the second construction season; with tank installation the following year. Using a phased construction strategy it is Yukon Pacific's intention to complete one train per year for 4 years with the first train startup occurring in the fifth year. At the end of the eighth year of construction, all four trains would be completed and producing.

LNG plant and terminal. A discharge permit must be obtained by anyone who discharges or proposes to discharge pollutants into the waters of the United States including, but not limited to: sanitary wastes; domestic wastes; non-contact cooling water; LNG storage tank cleaner and hydrotest discharge; oily wastewater; surface runoff (during construction and operation) and bilge water. The EPA may not issue an NPDES permit until a certification is granted or waived by the state in which the discharge will occur. There is also a general NPDES permit for stormwater related to construction activities larger than 5 acres.

The Section 404 permitting process is administered by the COE for all discharge of fill or dredged material or mechanical land clearing and excavation in waters of the United States, including wetlands, streams, and navigable waters. Section 10 of the Rivers and Harbors Act is also administered by the COE; individual Section 10 permits would be required for all construction activities that occur in navigable waterways, including those that are tidally influenced (COE, 1992, 1995). The COE has responsibility for determining compliance with all regulatory requirements associated with Section 10 and Section 404 of the CWA.

Ambient air quality is protected by Federal regulations under the CAA. These regulations include compliance under the New Source Performance Standards (NSPS) and the new requirements for the Prevention of Significant Deterioration (PSD). The Federal permitting process for the CAA has been delegated to individual state agencies. Although applications are reviewed by both the states and the EPA, the State of Alaska would determine the need for NSPS or a PSD permit.

Some individual state or local permits would be required to construct the proposed project; however, any such permits must be consistent with the conditions of the authorization for a place of export and the construction and operation of facilities at this place of export. The Commission encourages cooperation between authorization holders and local authorities. However, this does not mean that state and local agencies, through application of state or local laws, may prohibit or unreasonably delay the construction of facilities approved by the Commission.^{1/}

At the local level, the proposed location for the LNG plant is currently zoned "Unclassified" by the City of Valdez. In order for the project to proceed, the property needs to be rezoned to "Heavy Industrial" and a Conditional Use Permit would have to be obtained from the Valdez Planning and Zoning Commission, following the submission of a formal project plan. Under the Valdez Coastal Management Program, Yukon Pacific should file the project plan 6 months before filing the permit application with the Zoning Commission.

2.2 ALTERNATIVE SITE LOCATIONS

In Order 350, the DOE concluded that the Valdez export site (Anderson Bay) is preferable to all other export sites that were considered in the TAGS FEIS issued in June 1988 and disapproved all sites other than the Anderson Bay site (DOE, 1989). Accordingly, as discussed in section 1.5, the Commission is not considering any other site. During scoping, however, several commenters asked that the process leading to selection of the Anderson Bay site be clarified in the EIS.

^{1/} See, e.g., *Schneidewind v. ANR Pipeline Co.*, 485 U.S. 293 (1988); *National Fuel Gas Supply v. Public Service Commission*, 894 F.2d 571 (2d Cir. 1989); and *Iroquois Gas Transmission System, L.P., et al.*, 52 FERC ¶ 61,091 (1990) and 59 FERC ¶ 561,094 (1992).

The selection of Anderson Bay as the preferred terminal location was the culmination of a series of studies spanning a period of more than 15 years. In 1976, the FPC issued a FEIS in FPC Docket CP75-96 on the then-proposed El Paso Alaska System (FPC, 1976). This project was to carry natural gas from Prudhoe Bay to a site at Gravina Point in Prince William Sound where it would be converted to LNG and transported from Alaska by ship to Point Conception, California. As part of studies leading up to issuance of a FEIS in 1976, 11 potential LNG sites in Prince William Sound, including Anderson Bay, were evaluated against the following 10 criteria:

- topographic conditions
- distance to deep water
- foundation suitability
- navigational suitability
- seismic considerations
- anchorage suitability
- atmospheric conditions
- ice formation
- oceanographic conditions
- land conflicts

In the El Paso Alaska System FEIS, the Anderson Bay site was then rejected as an alternative site based on more favorable topographic, seismic, and anchorage conditions at the Gravina Point site. Although not specifically discussed in the El Paso FEIS, the Coast Guard was, at the time, also concerned with the passage of LNG ships (with their relative high "sail" area) through the Valdez Narrows under high wind conditions.

The Anderson Bay site was re-examined in studies leading to the TAGS FEIS in 1988.^{2/} The TAGS LNG site selection process involved a variety of steps and considerations. Using general guidelines, the coastal regions of Alaska were screened for sites that would allow for development of a pipeline system and LNG and marine facilities capable of transporting natural gas from Prudhoe Bay for year-round export to Asian Pacific Rim markets. This screening involved review of alternatives considered in previous studies of a similar nature such as TAPS and the El Paso Alaska System. Combinations of routes and terminal sites in Norton Sound, Bristol Bay, Cook Inlet, Prince William Sound, Yakutat Bay, and Lynn Canal/Chatham Strait were examined. Following initial screening, one major regional pipeline route alternative and six alternative LNG plant and marine terminal locations were considered in detail along with the now proposed site at Anderson Bay.

Eleven pipeline criteria, 10 LNG plant site criteria, and 6 criteria related to the marine terminal were used to determine the degree of favorability for each of the alternative sites. Results of this analysis are summarized on figure 2.2-1. LNG siting criteria for the Anderson Bay site were all favorable or moderately favorable. No site was determined to have an overriding advantage over the Anderson Bay site. Unfavorable characteristics identified in the El Paso Alaska System FEIS were not found to be significant problems in the TAGS study. Table 2.2-1 compares the evaluation ratings presented in the 1988 TAGS FEIS with similar criteria unfavorably rated in the 1976 El Paso Alaska System FEIS.

Between the time of the studies presented in the El Paso Alaska System 1976 FEIS and the TAGS 1988 FEIS, two major changes occurred which influenced selection of the Anderson Bay

^{2/} The criteria and evaluations conducted by the BLM and the COE are described in detail in appendix C of the TAGS FEIS and incorporated herein by reference.

FIGURE 2.2-1 Criteria Evaluation Matrix for Proposed TAGS Project and Alternative Locations

	Prince William Sound				Cook Inlet			
	Proposed Project to:	Alternatives			Alternatives			
		Anderson Bay	Gravina	Gold Creek	Robe Lake	Boulder Point	Cape Starckhof	Harriet Point
Pipeline Criteria	- Minimize length of pipeline - Maximize use of existing infrastructure - Maximize use of proven construction techniques - Maximize opportunity for parallel construction techniques - Avoid areas of potential geohazards - Minimize potential conflicts with sensitive environments - Maximize compatibility with current and planned land use - Minimize the number of water crossings - Avoid permitting delays - Minimize potential threat to national security - Maximize availability of gas to Alaska consumers	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	 ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐ 			

☐ - Favorable - Moderately Favorable - Unfavorable - Highly Unfavorable

SOURCE: TAGS FEIS page 1-15.

TABLE 2.2-1

**Comparison of Suitability Criteria Ratings for
Anderson Bay Between El Paso Alaska System and TAGS Projects**

**El Paso Alaska System a/
FEIS Evaluation**

**TAGS b/
FEIS Evaluation**

Seismic Considerations:

Unfavorable due to possibility of seismic damage resulting from slide-induced waves.

Seismic Sea Waves:

Favorable because the LNG plant would be located at an elevation higher than the highest recorded tsunami run up wave and no major impacts on onshore structures would be anticipated.

Minimize Potential Problems Related to Soils and Geohazards:

Favorable because there is minimal probability of a major submarine slide in the area of the marine terminal. The situation is similar in most respects to the Alyeska Marine Terminal site.

Topographic Conditions:

Unfavorable due to the rugged topographic conditions at the site would require extensive site preparation and disposal of large quantities of spoil material.

Minimize Site Preparation:

Moderately favorable because approximately 10 million yards of excavated quantities (after bulking) would be utilized and 5 million yards would require disposal. The site would require a substantial amount of earthwork before construction. Soils are of good quality overlying bedrock, and site preparation would not pose major difficulties. Excess material could be used to develop the construction wharf, off-loading area, construction support, and laydown area.

Anchorage Suitability:

Unfavorable due to absence of adequate anchorage.

Maximum Suitability ... of Anchoring Areas:

Favorable because a new deep water anchorage has now been established within Prince William Sound for oil and LNG tankers.

a/ El Paso Alaska System FEIS page II and figure 79, page 505.

b/ TAGS FEIS, pages C-30 - C34.

site. First, during the preparation of the El Paso FEIS and prior to 1980, there were no rigorous Federal siting requirements similar to Part 193 of the DOT's LNG Federal Safety Standards (49 CFR Part 193). These DOT standards, established on February 11, 1980, prescribe siting requirements for thermal radiation protection, flammable vapor-gas dispersion protection, seismic investigation and design forces, flooding (including tsunamis), wind and other severe weather and natural conditions, and adjacent site activities. Yukon Pacific contends that it can meet the requirements of Part 193, as well as meet the industry's consensus standards embodied in the NFPA 59A. Thus, these new standards address and supersede some of the earlier concerns with a site at Anderson Bay.

Secondly, since 1977, the construction and operation of the Alyeska oil terminal and tanker operations have given us a great deal of knowledge and experience which simply did not exist prior to and during the preparation of the El Paso FEIS. Design and construction of the Alyeska facility required extensive site preparation similar to what would be expected at the Anderson Bay site. The location of Alyeska facilities on cut and fill terraces has demonstrated the feasibility of that design/construction concept, although the disposal of the rock and other material remains an issue (see section 2.3.2). Operation of the oil tankers to and from the Alyeska Marine Terminal, along with the use of a VTS, has reduced some of the previous navigational concerns. The Coast Guard does not anticipate VTS problems with the increased LNG tanker traffic (see section 4.15.4).^{3/} A deep water anchorage is also now available for both oil and LNG tankers in Prince William Sound; such an anchorage area was not available in 1976.

In addition to the above improvements in terms of site acceptability, a number of governmental actions have occurred which limit the scope of the FERC's review of the Anderson Bay site and issues associated with alternative sites other than Anderson Bay. These actions are discussed in section 1.1 of this FEIS. Of importance here is the fact that DOE/FE Order 350 granting Yukon Pacific authorization of the export also concluded that "With respect to the place of exportation for the LNG..., all locations other than Port Valdez, Alaska are rejected." This decision was made after evaluation of alternative sites during preparation of the TAGS EIS, taking into account the Port Valdez site and others evaluated in both the TAGS EIS and the El Paso FEIS. Accordingly, further consideration of alternative sites is outside the scope of this FEIS.

2.3 ALTERNATIVE CONSTRUCTION CAMP AND DISPOSAL PLANS

2.3.1 Alternative Construction Camp Sites

As described earlier in section 2.1.4, the construction period for the Yukon Pacific LNG Project spans 8 years reaching a peak construction workforce of 4,000 people during the fifth and sixth summers. Yukon Pacific proposes to house the majority of this workforce in a camp adjacent to the construction site (figure 2.1.4-3). Using land on both banks of Seven Mile Creek at approximately 100 to 175 feet elevation, 47 acres of forest would be cleared to establish the 30 acres of finished area required to erect the housing modules and ancillary facilities. Contouring the site would require the excavation of 0.175 million cubic yards of material; however, since rock would be imported to the camp location to supply structural fill requirements, the net impact of camp construction would be inconsequential regarding overall material disposal. This site is located far enough distant from the actual construction to afford undisturbed sleeping for offshift workers. To supply the 288,000 gpd of potable water required to support the peak workforce, a 40-foot-high dam is proposed to be constructed on Seven Mile Creek just above the waterfall, creating a 3.5-acre reservoir. With package water treatment and use of a large storage tank, all of the onsite potable water supply needs could be met from this source. The site could be developed without interfering with other construction activities, making the camp available for occupation early in the construction schedule. Our analyses described in section 4.0 determined that development of the work camp at this site would result in environmental impact.

In an effort to minimize environmental disturbance at the Anderson Bay site, four site and three access alternatives were screened to identify reasonable alternatives. These included locations other than Seven Mile Creek but still within the Anderson Bay area (onsite options) as well as one offsite location in Valdez. Factors considered in the initial screening were: the amount of land

^{3/} Coast Guard Marine Safety Office letter dated May 25, 1990 to Coast Guard Commandant.

The proposed location of the construction camp is along both banks of Seven Mile Creek. Yukon Pacific has developed a construction plan that requires considerable grading (figure 2.1.4-3) which would eliminate riparian vegetation. In addition, working the banks in this steep canyon area would likely cause rockfall into the streambed and an increased runoff of fines. Grading the banks and eliminating riparian vegetation may result in increased sedimentation in the stream and loss of downstream spawning habitat. We recommend that Yukon Pacific prepare a revised site plan that avoids grading and clearing the riparian zones within 100 feet of the streambanks along Seven Mile Creek above the proposed dam. The revised plan should also avoid grading and clearing to preserve the gorge area surrounding the water falls and the associated intertidal shoreline area located on either side of the confluence of Seven Mile Creek and Anderson Bay. The revised plan should be filed with the Secretary for review and approval by the Director of OPR.

Fuels, lubricants, and other chemicals spilled during plant construction and operation would negatively impact water quality if allowed to run off into the streams. Leachates from disturbed soils and decaying vegetation could also negatively impact water quality and affect fish utilizing the streams. To minimize impacts caused by runoff of spills or leachate, we have recommended Yukon Pacific develop a SPCC Plan using best management practices (see section 4.3.2.1).

Overall, there would be minimal impacts on resident fish resources because of their limited distribution on the site. Anadromous fish resources spawning in Nancy Creek would not be significantly impacted if disturbance to the streambed is avoided or minimized and the runoff of fine sediments is controlled. The impacts on anadromous fish spawning in Seven Mile Creek are less clear because the flow patterns are not well understood. Once an in-stream flow study has been completed, we have recommended that Yukon Pacific coordinate with the ADFG and FERC staffs to determine a flow regime to minimize impacts on spawning fish (see section 4.3.1). Grading and clearing the banks would cause some disturbance of the streambed and increased runoff of fine sediments. If the disturbance and runoff are minimized by careful construction and adequate sediment and erosion control, the impacts would not be significant.

4.4 TERRESTRIAL ECOLOGY

4.4.1 Wildlife

4.4.1.1 Raptors

The project may adversely affect raptors by disturbance or destruction of existing nest sites. (These issues as they relate to peregrine falcons are addressed in section 4.6.) Perhaps the greatest issue concerning raptors is the number of active bald eagle nests which could potentially occur within and near the project site. The Bald and Golden Eagle Protection Act (16 U.S.C. 668 (1988)) strictly prohibits the disturbance and/or destruction of bald eagle nests. In previous years, three bald eagle nests have been recorded within the project site and an additional two nests within 1 mile of the facility boundary. A nest site at Nancy Creek is known to have blown down in 1989, and no nest sites were recorded in the vicinity of Anderson Bay by FWS and ADFG personnel during surveys in June of 1991 and 1992. Bald eagles could, however, reestablish nesting territories within the project area at any time and the existence of a bald eagle nest would have an impact upon project scheduling and/or activities. Consequently, we recommend that Yukon Pacific conduct surveys for bald eagle nest sites during the year prior to the commencement of site activities and each year subsequently, to determine nesting activity at the site. If active

screening methods use very conservative assumptions (i.e., assumptions designed to ensure that errors in the predicted concentrations would be in the direction of over prediction) to provide rough estimates of the maximum pollutant concentrations that may result from a proposed source's emissions. More detailed information on the screening analysis is presented in appendix F of Yukon Pacific's DEIS Issues Resolution Document regarding FERC Docket Nos. CP88-105-000 and CP88-105-001. Copies can be obtained by contacting the FERC Project Manager or Yukon Pacific directly.

For a project with receptors either above plume height or below stack heights, the EPA guidelines for screening analyses recommend the use of the SCREEN2 and COMPLEX I models, respectively. However, SCREEN2 does not allow separate representation of multiple stacks, so this option was dismissed for the Yukon Pacific screening analysis. Instead, the ISCST2 and BEESTX models (Versions 93109) were used in screening mode to accomplish the required analysis for the proposed Anderson Bay facility. BEESTX is a model which uses the simple terrain algorithms of ISCST2 with the complex terrain algorithms of COMPLEX I. For receptors with elevations below the lowest stack top elevation, the ISCST2 algorithm is used. For receptors with elevations above the final plume rise centerline elevation, the COMPLEX I algorithm is used. For "intermediate terrain" receptors with elevations above the lowest stack top but below the final plume rise elevation, the highest results from the ISCST2 and the COMPLEX I algorithms are selected for each hour of meteorology at each receptor to calculate the maximum concentrations for each averaging time. Both models were employed because of the variable terrain that characterizes the project site and its environs and the limited meteorology used with complex terrain in screening runs.

Theoretically, the BEESTX model could have been used alone in screening mode to evaluate impacts at all terrain elevations, as it combines the ISCST2 and COMPLEX I dispersion algorithms with decision tree logic to determine whether the flat terrain or complex terrain calculations should be used to represent the impact at each receptor, and to select the higher of the concentrations predicted by the two methods for receptors in "intermediate" terrain. For practical reasons, however, Yukon Pacific used a combination of ISCST2 and BEESTX runs for efficient completion of the screening analysis. The use of both models was more convenient, primarily because different meteorological conditions needed to be addressed for different groups of receptors and because of the manner in which BEESTX prints out the modeling results. The screening analysis was therefore conducted according to the following sequence.

1. First, ISCST2 was used with a coarse receptor grid (500-meter spacing) and the full set of meteorological input parameters incorporated by the EPA SCREEN2 model to compute the maximum concentrations resulting from the algorithm for flat terrain dispersion.
2. Second, BEESTX was used with the standard EPA screening assumptions for complex terrain of F stability with 2.5 m/sec wind speed to compute the highest concentrations resulting from the elevated terrain dispersion algorithm. Other wind speed-stability combinations are not required for the elevated receptors.
3. A second set of runs was made for each pollutant using a fine receptor grid (50-meter spacing) in the vicinity of the highest values predicted by the first two sets of runs. Either the ISCST2 or BEESTX model was used for the second round of simulations, depending on which model yielded the highest coarse grid concentrations for each pollutant. The highest hourly concentrations for each pollutant from the second set of runs were used with EPA-approved factors to

estimate the maximum multiple-hour average values for comparison with applicable standards and increments. The factors used to convert the model-predicted hourly maxima to estimates of the peak 3-hour, 8-hour, 24-hour, and annual average concentrations are listed as follows:

<u>Averaging Time</u>	<u>Conversion Factor</u>
3-hour	0.9
8-hour	0.7
24-hour	0.4 (ISCST2); 0.25 (BEESTX)
Annual	0.08

Based on a methodology described in *Use of Ambient Ratios to Estimate Impacts of NO_x Sources to NO_x Concentrations* by Chu and Meyer (1991), a factor of 0.75 was used to convert modeled annual average NO_x concentrations to NO₂ concentrations.

Maximum predicted impacts from the screening analysis are shown in table 4.7.4-1. More detailed results are presented in tables D-4, D-5, and D-6 of appendix D. The screening analysis shows that the proposed Yukon Pacific LNG Project has the potential to cause significant incremental impacts on air quality in the vicinity of the Anderson Bay site. Based on this finding, the need for refined modeling analysis is indicated. The screening calculations indicate that such modeling should be performed for evaluation of compliance with the NO₂ and SO₂ PSD increments. Any increment consuming source identified in the 1992 Petro Star Valdez Refinery PSD permit application should also be included. Despite extremely conservative assumptions regarding the project's operations and emissions, as well as worst-case meteorological inputs, the results of the screening analysis indicate that compliance with PM increment can be achieved by the proposed project. Predicted carbon monoxide impacts, both total and increment consuming emissions, from the screening analysis are sufficiently low to conclude that no significant impacts on local CO concentrations will occur. In addition, the screening results indicate that all maximum pollutant concentrations are well below all NAAQS.

TABLE 4.7.4-1
Screening Modeling Results Compared with Applicable
National Ambient Air Quality Standards and PSD Increments

Pollutant	Averaging Period	Existing Ambient ($\mu\text{g}/\text{m}^3$)	Predicted Maximum Concentration ($\mu\text{g}/\text{m}^3$)	Total Concentration ($\mu\text{g}/\text{m}^3$)	Applicable NAAQS ($\mu\text{g}/\text{m}^3$)	Applicable Class II PSD Increment ($\mu\text{g}/\text{m}^3$)
SO ₂	Annual	16	15.1	31.1	80	20
	24-hour	81	75.7	156.7	365	91
	3-hour	327	170.2	497.2	1,300	512
NO ₂	Annual	27	42.06	69.06	100	25
PM ₁₀	Annual	33.5	5.04	38.54	50	19
	24-hour	100	15.75	115.75	150	37
CO	8-hour	4,524	805.1	5,329.1	10,000	N/A
	1-hour	7,680	1,150.1	8,830.1	40,000	N/A

Because of the very conservative nature of the screening model analysis discussed above, it was prudent to make use of available data to support a more realistic analysis using supplemental dispersion modeling with a full year of meteorological data. Two sets of meteorological data were used, one from a 10-meter tower at Anderson Bay and one from the Valdez Air Monitoring System (VAMS). More detailed information on the supplemental modeling is presented in appendices G and H of Yukon Pacific's DEIS Issues Resolution Document regarding FERC Docket Nos. CP88-105-000 and CP88-105-001. Copies can be obtained by contacting the FERC Project Manager or Yukon Pacific directly.

The first set of meteorological data was improved quality data from the onsite 10-meter tower at Anderson Bay for the period November 1, 1992 through October 31, 1993. The EPA acknowledged that more supplemental modeling based on the best year of the Yukon Pacific meteorological data, although not definitive as refined modeling because the EPA did not consider the tower's location to be representative of the LNG trains' stacks, would provide useful information regarding the range of air quality impacts that may occur due to operation of the proposed Anderson Bay facility. The results of that supplemental modeling using the 10-meter Anderson Bay meteorological data show levels below the respective PSD increments as shown in table 4.7.4-2 and NAAQS as shown in table 4.7.4-3.

A second set of supplemental dispersion modeling results was generated using 30-meter meteorological monitoring data for the same period collected by Alyeska at its marine terminal at Jackson Point, approximately 5 miles east of the proposed LNG process trains at the site of the Yukon Pacific plant. The EPA has stated that supplemental modeling results obtained with these data are of interest because the winds 30 meters above ground level may be more representative of transport and dispersion conditions that would govern the behavior of the Anderson Bay emission plume than the 10-meter Yukon Pacific data from Anderson Bay. Like the results using Yukon Pacific's Anderson Bay meteorological data, the results from supplemental modeling using the 30-meter Alyeska meteorological data show levels below the respective PSD increments and NAAQS. The results of this supplemental modeling analyses are presented in table 4.7.4-4 for the PSD increment consumption and table 4.7.4-5 for the comparison with NAAQS.

In summary, the very conservative screening model analysis predicted compliance for all pollutants with the NAAQS, and compliance for all pollutants with PSD increments except for NO₂. Supplemental modeling for NO₂ using two sets of meteorological data collected near the proposed Anderson Bay facility depicts a range of potential impacts relative to the screening assessment. While these results cannot be relied upon to make conclusive determinations on the ability of the project to comply with applicable NAAQS and PSD increments, the supplemental modeling shows levels below the respective NAAQS and PSD increments for FEIS purposes. The meteorological data which Yukon Pacific is capturing from its 40-meter tower at Anderson Bay will be used for modeling in support of its PSD application which must demonstrate compliance with all NAAQS and PSD increment standards.

Under the Clean Air Act, the ADEC's PSD program (which has been delegated to the State of Alaska by the EPA) is intended to ensure compliance with any operating restrictions necessary to keep air impacts from Yukon Pacific's LNG facility from adversely affecting the local population and environment. The permitting process with the ADEC will ensure that the proposed project complies with all aspects of the PSD regulations, including BACT for each source of emissions.

If unignited, the flammable vapor cloud would drift downwind until the effects of dispersion would dilute the vapors below the lower flammable limit for methane. However, if the flammable vapor cloud would encounter a source of ignition, the cloud would burn back to the spill site.

The maximum range of potentially flammable vapors—the distance to the lower flammable limit—is a function of the volume of LNG spilled, the rate of the spill, and the prevailing meteorological conditions. Yukon Pacific's study identified that an instantaneous spillage of 20,000 cubic meters of LNG with a 10 mph wind and typical atmospheric stability could travel up to 3.3 miles in 25 minutes.

The LNG tanker route through Prince William Sound to the marine terminal is far offshore for the majority of the voyage. There exist no populated areas within the maximum range of thermal radiation hazard or flammable vapor cloud hazard for an instantaneous one-tank cargo spill. As a result, the general public would not be exposed to a hazard from these events.

The instantaneous spillage of one cargo tank is considered to be a "worst case" event. Physical constraints on maximum vessel speeds and maximum depths of penetration required to rupture one LNG cargo tank render the possibility of an instantaneous release of more than one cargo tank to be implausible. This is not to imply that the loss of multiple cargo tanks could never occur, but that the extent of the hazard would not exceed that of the instantaneous spillage of one tank.

The possibility of a collision between a loaded outbound crude oil tanker and an inbound LNG tanker in ballast has been suggested as a possible event that could lead to a significant oil spill. In 1988, the number of crude oil tankers peaked at 990, for an average of 2.7 tankers per day. Presently, crude oil tankers make about 700 round trips annually—an average of 1.9 per day—through Prince William Sound. At full capacity, the proposed project would add 275 LNG tanker trips per year, or an average of 0.75 per day. This total tanker traffic of 2.7 per day is well within the limitations of the VTS system and is identical to the number of crude tankers in the peak year of 1988. By the time the TAGS project is operational, the number of crude tankers per year is expected to be under 500. The modest increase tanker traffic in Prince William Sound would not significantly increase the potential for a collision between an outbound crude oil tanker and any inbound tanker, either LNG or another crude oil tanker:

Conclusions on Marine Safety

- LNG tankers have experienced safe operation without cargo tank spillage for more than 30 years. Given the present and planned Coast Guard controls in the Prince William Sound VTS Area, LNG tankers can safely operate in these waters.
- The thermal radiation and flammable vapor cloud hazards from the maximum credible LNG tanker spill would not affect the general public.
- Although it is possible for an LNG tanker to spill cargo in a grounding type incident, the liquid would rapidly vaporize and would not have the long-term environmental consequences associated with a major oil spill.
- The addition of LNG tankers within the VTS Area would not have a significant increase on the percent potential of a collision with an outbound crude oil tanker.

Appendix B

FERC Guidance Manual



FEDERAL ENERGY REGULATORY COMMISSION

Office of Energy Projects

GUIDANCE MANUAL FOR ENVIRONMENTAL REPORT PREPARATION For Applications Filed Under the Natural Gas Act

Volume I

DRAFT

December 2015

4.10 RESOURCE REPORT 10 – ALTERNATIVES

INFORMATION RECOMMENDED OR OFTEN MISSING	
INFORMATION	DATA SOURCES ^a
☐ Ensure that project objectives that serve as the basis for evaluating alternatives are consistent with the purpose and need discussion in Resource Report 1.	D
☐ Identify and evaluate alternatives identified by stakeholders.	D
☐ Clearly identify and compare the corresponding segments of route alternatives and route variations to the segments of the proposed route that they would replace if adopted.	D
^a D Applicant	

Resource Report 10 is required for all applications. It must describe alternatives that were considered during the identification and design of the project and compare the environmental impacts of such alternatives to those of the proposed project. Resource Report 10 should describe the systematic procedure used to arrive at the proposed project, starting with the broadest feasible range of alternatives and narrowing the alternatives to a specific action on a specific site or right-of-way. The description of this procedure should include the decision criteria used, the information weighed, and an explanation of the conclusion at each decision point. The decision criteria must show how environmental benefits and costs, even if not quantifiable, were weighed against economic benefits and costs, and technological and procedural constraints. The alternatives analysis should be based on, and consistent with, the purpose and need statement provided in Resource Report 1. A clearly articulated purpose and need statement facilitates the preparation of Resource Report 10 and the applicant's ability to demonstrate why an alternative may or may not function as a suitable replacement for the proposed project.

At a minimum, Resource Report 10 should address the no-action alternative. The alternative analysis beyond the no-action alternative should be driven by the extent and type of resource impacts and by public or agency comments. Depending on the project, it may also be appropriate for the alternatives analysis to address system alternatives, route alternatives, and aboveground facility site alternatives. Further, in some cases, it may be appropriate to address alternatives to other aspects of the project, such as alternative construction technologies, dock locations or configurations for LNG facilities, power and water sources for LNG or compressor facilities, or process alternatives to specialized technologies such as natural gas liquefaction. Such additional analysis may be warranted based on agency or public input, or identified through discussions with FERC staff.

4.10.1 General Guidance

- Resource Report 10 should provide a brief summary of project modifications that were adopted prior to filing the application to minimize environmental impact or respond to a stakeholder issue, especially those

suggested during pre-filing that were incorporated into the proposed route at the time of filing. There is no need to itemize modifications that were adopted for engineering reasons.

- For each of the applicable alternative types discussed below, provide environmental comparison tables that include all of the resource data that is pertinent and useful for comparing the alternatives at the specific location. For instance, the project area may include unique features, such as karst features, prime farmland, sensitive species habitat, old growth forest, special crops, conservation easements, waterbodies, wetlands, residential developments, etc., that should be included in the comparison tables.
- Data sources used to compare the impacts of an alternative to the impacts of the corresponding portion(s) of the proposal must be consistent, based on either field data for both or desktop data (e.g., aerial interpretation, NWI maps, USGS topographic maps) for both, in order to allow for an objective comparison. In practice, this will usually mean generating desktop data for the segments of the proposed alignment that are subject to an alternatives review. However, alternatives selected for more detailed study may require field data. Staff may also request landowner address lists for alternative routes that are under more detailed study.

4.10.2 No-Action Alternative

Address the consequences of not constructing the project. In addition to avoiding the impacts directly associated with the construction of the project (e.g., disturbance of wetlands, air quality impacts, clearing of vegetation) the no-action alternative discussion should identify other potential outcomes. For example, if the proposed project were not constructed, describe the alternatives to meet the project objectives and the likely environmental effects and costs of pursuing these options.

4.10.3 System Alternatives

System alternatives are those that would meet the objectives of the project, but would use a different (and often existing) natural gas facility/pipeline system or a different configuration of facilities that would obviate the need to construct all or part of the project. If modifications or additions to the existing facilities/systems would be required to meet the project objectives, the environmental impact of these modifications should be quantified for comparison with those of the proposed project. The modifications could include construction of additional compression facilities, either at new or existing compressor stations, construction of additional pipeline loops, or construction of new segments of pipeline to interconnect existing pipeline systems.

System alternatives should include alternative configurations the applicant considered to its own system and system alternatives involving one or more other companies' facilities. Examples of the former could include alternative pipe diameters or compression scenarios that may reduce pipeline or compression requirements while meeting the requirements of the project, or alternative placement of pipeline loop or compressor stations that may avoid sensitive resource areas (e.g., upstream or downstream of the loop location). Examples of alternatives using other companies' facilities should include an examination of the current capacities of existing systems and an assessment of these systems' ability to individually or in combination meet the objectives of the proposed project. If the existing systems are inadequate, the analysis should examine the potential for any recently proposed facilities by these other companies (individually or in combination) to meet the objectives of the project, and, if these are also inadequate, the new facilities that one or more of the companies would likely need to construct to achieve the objectives of the proposed project.

The description of each system alternative should include a map identifying the location of existing pipeline systems (pipelines and compressor stations) that could be used, and any new pipeline and/or new or additional compression facilities that would be required. The map used should be of a scale that also provides coverage of the corresponding segment of the project. Figure 4.10.3-1 shows a typical map of a proposed project and two pipeline system alternatives.

The analysis of system alternatives should include a comparative table that presents the characteristics and environmental factors of the system alternative(s) and the corresponding segment of the proposed project. Table 4.10.3-1 is an example of a comparison of the characteristics and environmental factors of system alternatives.

The text should describe the environmental factors affected and should present a comparative analysis of the characteristics of the system alternative(s) and the corresponding segment of the project. It should also include a clear statement of the advantages of the project, including economic, environmental, technical, and scheduling advantages that led to the rejection of each system alternative.

TABLE 4.10.3-1				
Comparison of System Alternatives				
Characteristics or Resources	Unit	Proposed Project	Lateral System Alternative	Mainline System Alternative
Pipeline and Compression Facilities				
Total length	(mi)			
New pipeline	(mi)			
Loop pipeline				
36-inch-diameter pipe	(mi)			
30-inch-diameter pipe	(mi)			
Total compressor stations				
Upgraded	(no.)			
New	(no.)			
Total compression	(hp)			
Upgraded				
New	(hp)			
Environmental Factors				
Construction right-of-way ^a	(ac)			
Permanent right-of-way ^b	(ac)			
Length adjacent to existing right-of-way or corridor	(percent)			
Total wetlands crossed ^c	(mi)			
Forested wetlands	(mi)			
Scrub-Shrub wetlands	(mi)			
Wetland complexes crossed	(no.)			
Total perennial waterbodies crossed	(no.)			
Major river crossings (>100 feet)	(no.)			
Natural and scenic rivers	(no.)			
Endangered or threatened species habitat	(no.)			
Known cultural resources	(no. or miles)			
Federal land crossed	(mi)			
State land crossed	(mi)			
Other recreation/designated land use areas	(no.)			
Length of crossing	(mi)			
Existing residences within 50 feet of construction work area	(no.)			
^a Based on a xx-foot-wide construction right-of-way. ^b Based on a xx-foot-wide right-of-way for the proposed project; a xx-foot-wide right-of-way for the Lateral System Alternative; and a xx-foot-wide right-of-way for the Mainline System Alternative. ^c All wetland information is based on National Wetlands Inventory mapping.				

Descriptions of alternative pipe diameters and compression scenarios or alternative placement of pipeline loop should also clearly identify and compare the alternative(s) considered and the corresponding segment of the project. Maps and tables similar to those described above may be used as necessary to illustrate or summarize the comparative information. Again, include clear statements regarding the advantages of the proposed action and those of the alternative(s), providing the reader the opportunity to balance these factors.

4.10.4 Route Alternatives

Route alternatives include pipeline alignments that differ from those of the proposed project. The discussion of these alternatives should address routes that were considered, but rejected, during the selection of the applicant's proposed route because of environmental, economic, or technical reasons. The discussion should address alternative routes that were determined to be viable means of accomplishing the same objectives as the proposed route.

In general, each discussion of an alternative should begin with a statement explaining why an alternative was considered (e.g., landowner or resource agency concerns, constructability, avoidance of an impact, shortening the route) and the criteria used to evaluate it. If the alternative was not adopted, specifically state the reason it was dismissed from further consideration. If a viable alternative is identified prior to or during the environmental review process, FERC staff may request a landowner mailing list for that alternative.

Route alternatives may include "major route alternatives" or "route variations or deviations." Major route alternatives deviate from the proposed route for an extended distance (e.g., for several miles) or are several miles away from the proposed route. Major route alternatives typically are geographically different routes and are primarily considered for new pipeline projects. They may also be considered for expansion loops where substantial development has occurred and precludes constructing adjacent to an existing pipeline. Route variations or deviations often include realignments that are identified to avoid or resolve localized resource issues (e.g., cultural resource sites, wetlands, residential areas, or to accommodate landowner requests). While route variations may be a number of miles in length, they are more typically short and relatively close to the proposed route. Route variations are typically considered for both new and looping pipeline projects.

4.10.4.1 Major Route Alternatives

Major route alternatives should be addressed in sufficient detail to justify the decision to eliminate them from detailed consideration. Present the location of each major route alternative on a map of a scale that covers both the alternative route and the corresponding route segment of the proposed route (see figure 4.10.4-1 for an example).

The text should generally describe the location of the major route alternative, including the mileposts (of the proposed route) at which the major route alternative deviates from and rejoins the proposed route, and the environmental characteristics of the major route alternative and the corresponding segment of the proposed route. The environmental characteristics should include as many of the relevant factors listed on table 4.10.4-1 as can reasonably be calculated or obtained from published sources, such as USGS or NWI maps, or consultations with federal, state, or county agencies. If a factor is not relevant to the proposed route and any of the route alternatives (e.g., if none of the routes cross federal land), the level of detail in the table (e.g., specific types of federal land) can be reduced. As noted above, the data sources used to determine the potential resources along the alternative and corresponding segment of the proposed route should be the same to allow for objective comparisons.

If multiple route alternatives are being considered for a particular segment of the proposed route, the analysis should present all of the alternatives considered in this area based on a common beginning and ending point, and should compare the alternatives to the corresponding segment of the proposed route in one table. Generally, agency contacts for data collection concerning alternatives can be limited to those necessary to identify regional resources (e.g., endangered and threatened species habitat, location of historic districts or documented cultural resource sites, public lands).

Discuss the characteristics of each major route alternative relative to the characteristics of the corresponding segment of the proposed route. Also compare the technical and economic characteristics of the major route alternative with those of the proposed route.

Finally, provide clear statements regarding the relative advantages and disadvantages of the proposed route and the alternative(s), including the reasoning behind the route selection.

4.10.4.2 Route Variations or Deviations

Typically, route variations or deviations are the result of more detailed field review. Route variations may also be identified during landowner discussions (usually localized) or as a result of agency or public input. They should be identified prior to filing of the application, if at all possible, or as early as practicable. However, the need for route variations might arise at any time during the review process, from the initial filing up to construction, as localized resource issues are identified.

TABLE 4.10.4-1			
Environmental Factors That May Be Considered for Analysis of Route Alternatives/Variations			
Environmental Factor	Unit ^a	Proposed Route	Route Alternative/Variation
Total Length	(mi)		
Type of right-of-way:			
New right-of-way	(mi)		
Adjacent to existing pipeline right-of-way (e.g., loop)	(mi)		
Adjacent to other existing rights-of-way/corridors (e.g., powerline, road)	(mi)		
Right-of-way requirements:			
Construction right-of-way	(ac)		
Permanent right-of-way	(ac)		
Wetlands:			
Forested wetlands	(mi)		
Scrub-shrub wetlands	(mi)		
Total wetland impacts	(acres)		
Wetland complexes	(no.)		
Waterbodies:			
Total perennial waterbodies crossed	(no.)		
Major river crossings (>100 feet)	(no.)		
Designated natural and scenic rivers	(no.)		
Significant fisheries	(no.)		
Ponds/lakes	(no.)		
Federally listed endangered or threatened species:			
Habitat	(mi)		
Species or critical habitat	(no.)		
Cultural resources:			
National Historic Landmarks	(no.)		
National Register of Historic Places-listed properties	(no.)		
Unlisted/potentially eligible properties	(no.)		
Land use:			
Forest	(mi)		
Agricultural	(mi)		
Open (e.g., recreation, historic districts)	(mi)		
Residential	(mi)		
Commercial/Industrial	(mi)		
Other (e.g., recreation, historic districts, conservation lands)	(mi)		
Residences and other structures:			
Within 50 feet of construction work area ¹⁶	(no.)		
Federal land:			
National Forests	(mi)		
National Parks	(mi)		
Bureau of Land Management	(mi)		
Indian reservations	(mi)		
Other (e.g., wilderness areas, parks, flood storage control land)	(mi)		

¹⁶ In some cases, the distance considered should be expanded to accurately reflect the conditions. For example, an alternative may contain no residences within 50 feet, but may have a dense residential development that is 65 feet from the construction right-of-way. Under this scenario, it is more informative to expand the area considered.

TABLE 4.10.4-1 (cont'd)			
Environmental Factors That May Be Considered for Analysis of Route Alternatives/Variations			
Environmental Factor	Unit ^a	Proposed Route	Route Alternative/Variation
State land:			
State forest/parks	(mi)		
Wildlife management areas	(mi)		
Other (e.g., parks, open space)	(mi)		
Trails:			
National Trails (e.g., Appalachian Trail)	(no.)		
Other (e.g., snowmobile, hiking, biking)	(no.)		
Recreation or other designated land use areas:			
Ballfields, campgrounds, landfills, quarries, etc.	(mi)		
Paleontological resource sites	(no.)		
^a Unit of length may be miles or feet depending on the length of the alternative considered.			

For example, on a looping project, the application may be filed showing a proposed route that deviates from the existing pipeline right-of-way to avoid a residence. In this case, the application would include a comparison of the proposed route that avoids the residence and a route variation that follows the existing pipeline right-of-way. Alternatively, the application may be filed showing a proposed route that follows the existing pipeline right-of-way, but further field review identifies a new residence within the construction work area. To avoid the residence, a route variation is identified that would not significantly affect other environmental resources and is considered superior to the original proposed route. In this case, the route variation should be filed as the revised proposed route and should be compared with the original route.

Because route variations are considered to resolve localized resource issues (e.g., wetlands, residence, cultural resource sites), they are normally much shorter than major route alternatives and should be carried to a greater level of detailed analysis. This may include more contact with governmental agencies and private entities, more field review, more detailed map analysis, and a comparison of the pertinent environmental factors listed in table 4.10.4-1.

Each route variation should be presented on at least 7.5-minute-series USGS topographic maps or alignment sheets that include both the route variation and the corresponding segment of the proposed route (see figure 4.10.4-2). The text should include a description of the resource issue, a comparison of the environmental characteristics of the route variation and the proposed route, and a clear statement of the overall advantages of the proposed route. As with system and major route alternatives, the data sources used to determine the potential resources along the variation and corresponding segment of the route should be the same to allow for objective comparisons. If multiple route variations are being considered for a particular segment of the route, the analysis should present all of the variations considered in this area based on a common beginning and ending point, and should compare the variations to the corresponding segment of the proposed route in one table.

4.10.5 Alternative Sites

Alternative sites should generally be considered and discussed for all new major aboveground facilities, particularly LNG facilities and compressor stations. The consideration of alternative sites is especially necessary if specific problems or issues are identified with a new site, such as loss of over 5 acres of prime farmland soils, land use incompatibility, location within designated flood storage land, proximity to NSAs, contaminated soils, inability to reach an agreement with the landowner to acquire the property, or presence of wetlands, critical habitat, endangered or threatened species, or NRHP-eligible cultural resources.

The factors considered for evaluating aboveground facility sites are different from those considered for pipeline routes because each site is a fixed location rather than a linear corridor and because, unlike a pipeline, an aboveground facility is visible during operations and, in most cases, generates noise, air emissions, and visual impacts. The evaluation of alternative sites should consider:

- **Footprint** – The site size needs to be adequate for constructing and operating the facilities. Larger sites can provide the opportunity to set the facility back from surrounding properties.
- **Site Use** – Vacant land is preferred because pre-existing development on a site may present an unreasonable obstacle to securing control.
- **Availability** – Although section 7(h) of the NGA grants a Certificate holder the right of eminent domain, it is preferable that the site be available (such as by purchase, lease, or restrictive easement).
- **Access Road and Lateral Pipeline Length** – The location of the site relative to existing roads and the associated mainline pipeline is important because the location will determine the length of the permanent access road and whether a pipeline lateral is required.
- **Engineering Constraints** – The general location of a compressor station is determined in large part by hydraulic modeling of the natural gas flow in the pipeline. A compressor station must be sited within a milepost range determined by the gas flow modeling in order to sustain the pressure needed to deliver the gas.
- **Environmental** – Environmental impacts on resources that may include, but are not limited to, noise receptors, prime farmland, wetlands and water resources, vegetation, critical habitat, threatened and endangered species, cultural resources, visual resources, geologic hazards, and surrounding land use should be considered.

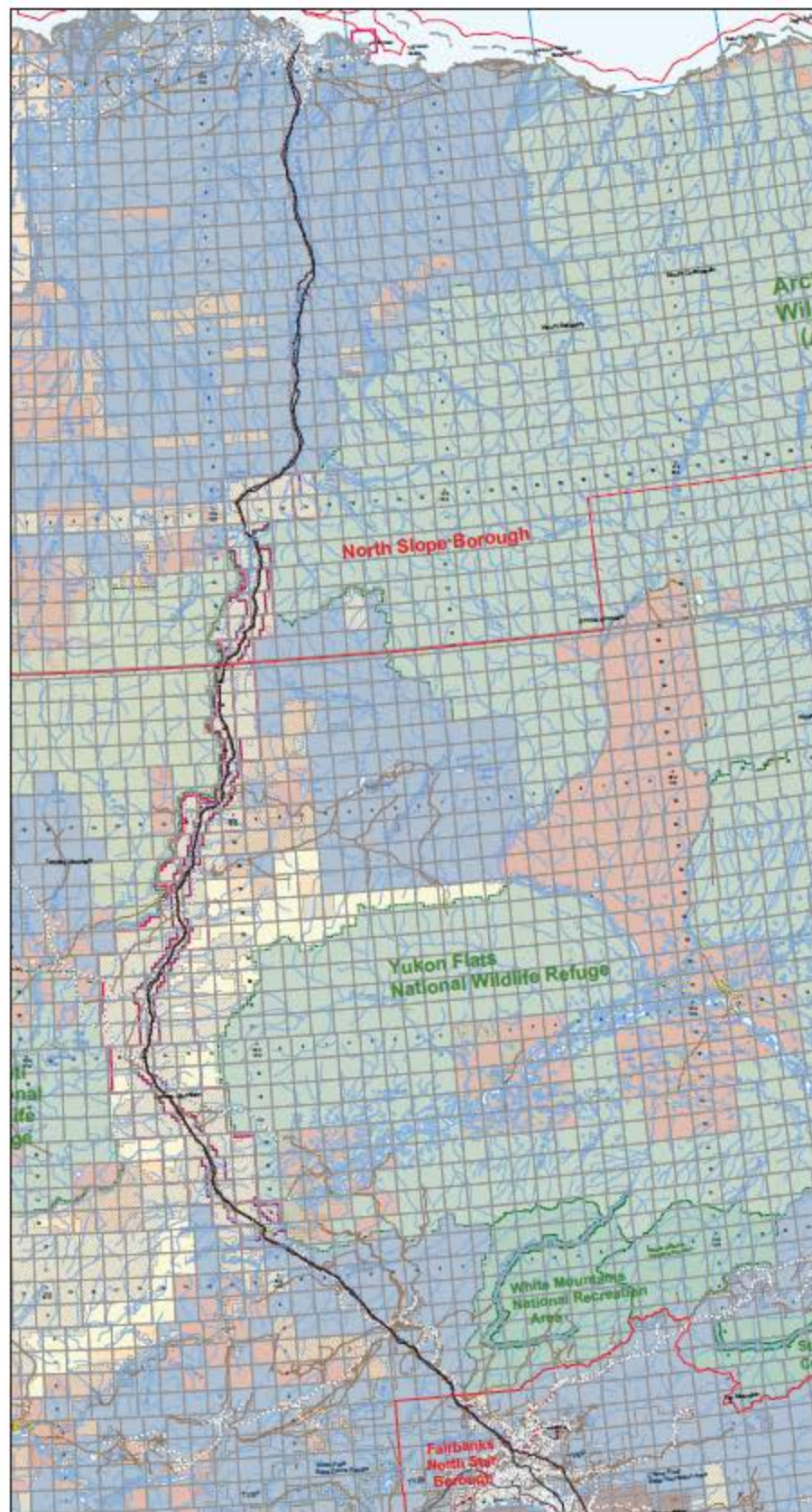
Describe the procedure used to identify the applicant's proposed site. Identify and discuss the decision criteria and weighting used at each decision point and clearly state the basis for each decision. Summarize, as appropriate, the results of hydraulic flow modeling and indicate the ideal milepost range for siting the facility. Provide maps of the locations of the proposed and most viable alternative sites. The analysis and comparison of environmental characteristics of the alternative sites should include a discussion of the following factors:

- new stations versus additional compression at existing station(s);
- area (acres) required;
- land use (e.g., agriculture, pasture, forest, industrial);
- land availability;
- visual impact (including lighting);
- designated land uses (e.g., flood storage);
- amount of prime farmland soils;
- presence of wetlands;
- presence of critical habitat or federally endangered or threatened species;
- presence of NRHP-eligible sites;
- zoning (e.g., industrial, residential, agriculture);
- miles of pipeline required to reach the site;
- length of access road required and name and type of public road from which access to the site would be obtained;
- number of NSAs within 1 mile of the site;
- location of nearby NSAs and distance from the site;
- feasibility/existence of natural screening of the site;
- air quality considerations;
- noise considerations;
- access to electric power and/or additional facilities required;
- technical considerations; and
- economic considerations.

As with alternative routes, discuss technical and economic characteristics of the alternative sites and compare them with the proposed site. Include a table of these factors based on common data sources that compares each proposed site and all of the alternatives that were considered for that site, and provide a clear statement of why each alternative site was are considered less preferable or rejected.

Appendix C

Public Land Order 5150



STATE OF ALASKA
Public Land Order 5150
Utility Corridor
Prudhoe Bay to Valdez
with
General Land Status

Public Land Order 5150

- ☐ PLD 5150 Course Boundary
- ☐ PLD 5150 Senior Boundary

Alaska Natural Gas Transportation System (Proposed)

(DNR coverage digitized from Blueline maps provided by Eastville Pipeline Company in 2011 - Revision 6)

***** Terms - Alaska Pipeline Controversy

----- Highway - - - - - Electrical Line

[illegible]

Secondary Road — Telephone Lines

—— Total ——— Organized Borough Boundaries

----- Alaska Railroad

Alaska State Lands	Federal Lands
--------------------	---------------

Alaska State Lands

- State Patented, Tentatively Approved or
Other State-Registered Lands
(last 4 months in effect, second map)
- State Mined In, Paid, Fenced, and
Other Multiple Use Areas
- State Patented
(N.E.S.A. Tractings included)
(last 4 months in effect, second map)

Federal Lands

-  National Forests, Monuments, Rangelands, and Conservation Areas
-  National Park System
-  National Wildlife Refuges
-  National Wild and Scenic Rivers
-  Outside National Park System and Outside National Wildlife Refuges
-  National Petroleum Reserve - Alaska (NPR-A)
-  Major Military
-  Bureau of Land Management

Alaska Native Claims

- Settlement Act (ANCSA)
Lands**
- ANCSA Patented or Interest Conveyed (Shaded in the map) (p. 10)
 - Both State and ANCSA Lands are Located Within a Section
 - ANCSA Section

Other Municipal and Private Lands

- ☐ **Monolingual or Other Private Parents**
(None of the following have this)
(Not a statistically significant difference)
- ☐ **Native Americans**
(None of the following have this)

Primary Data Sources

Rain Land Ownership: Alaska Department of Natural Resources (ADNR), Land Administrative System (online land resolution) March 2000.

State Legislatively Designated Areas: ACTS, Local Administration System (end-of-year evaluation, February 2000).

Oliver Monagall and Private Lands: Potential Disposal of Federal Lands Under Wilderness or Private Park

Conservation Systems Unit, Bureau of Land Management (1991) and ACDIS, *et al.* (June 1994).

Openable Place Name: Division of Alaska Place Names (1987) and US Geological Survey Quad

Foreign Born: ADBS (approximately 1.1 million male, estimated from U.S. Census Bureau data) matched, unpublished by ADBS & used ADBS, (November 2000).

Public Land Data is the Bureau of Land Management's most accurate and reliable compilation of these data for individual use or aggregate use with other data. This data should be used in

graphic display only. For official land status and boundary information, refer to Canadian Survey Data, or
Title Plans or Land Status Certificates.

The Alaska National Wildlife Refuge (ANWR) is not completely defined. Areas where the definition is a footnote they are not defined. The Alaska National Wildlife Refuge is described as follows:

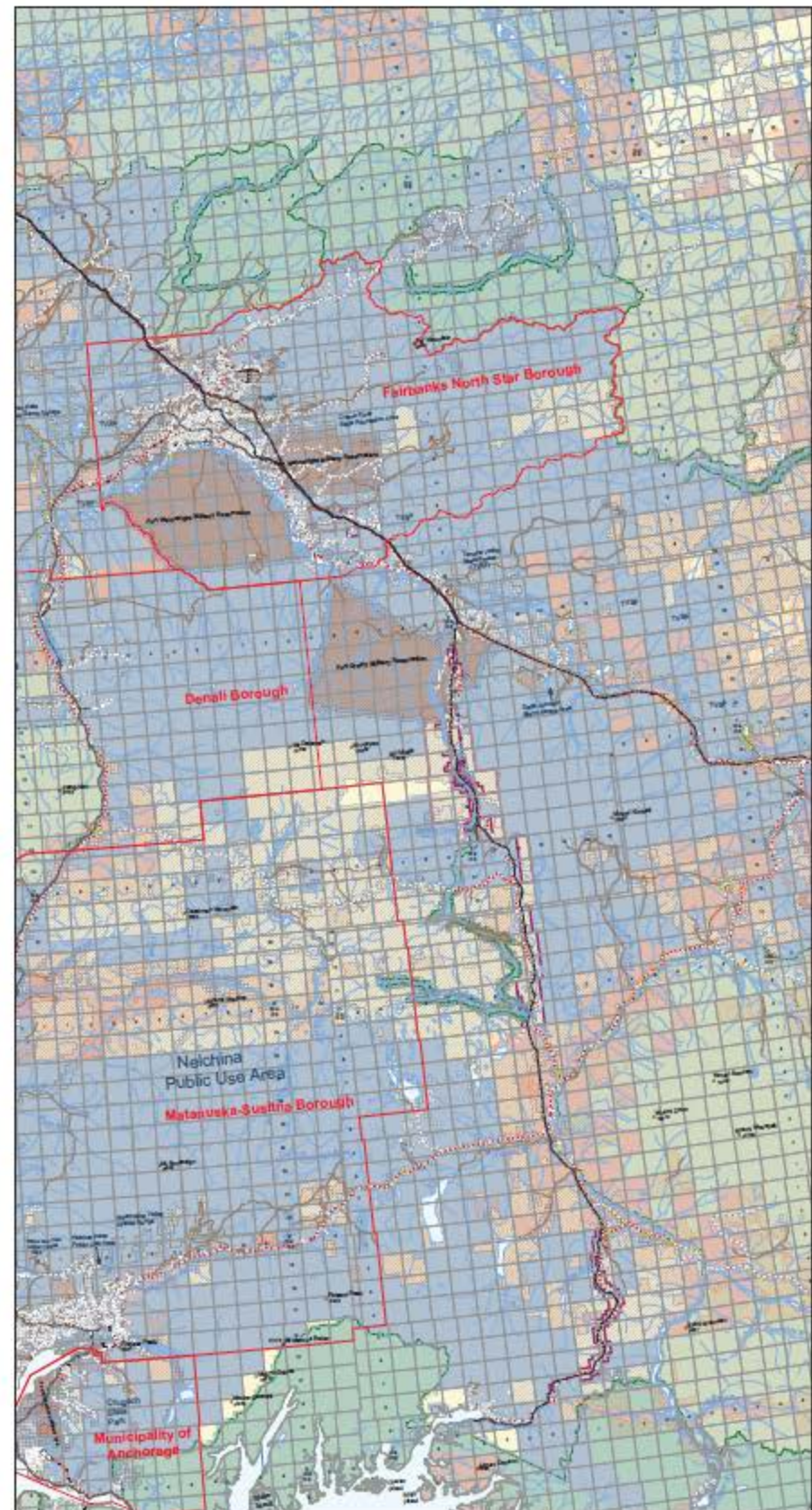
Islands, reefs, rocks, and spires, and mangrove swamps and sandbars in the coastal areas and adjacent seas of Australia within five major natural subunits: Great Australian Bight, Gulf of Carpentaria, Gulf of Tasmania, Gulf of Western Australia, and Indian Ocean. Each subunit contains a substantial quantity of submerged land. Many resources in Pacific waters are the result of substantial ground fishing and marine mammals. The subject is generally explored in the ICAO marine atlas, *Oceanic Resources* (London: Butterworths, 1976).

Note: This map shows general land ownership information. When reviewing this map, please remember that the actual maps are available through the National Wetlands Inventory (NWI).

(Federal, ANCCSA, and State land ownership is depicted, chronologically, by more recent. For example, a portion of a section (540 acre) falling within State Patented or Trustee-Approved land appears the same as to be depicted as state land, even if the State Patented or Trustee-Approved land is only a fraction of the section, and Federal land and/or ANCCSA land also occurs in the section.

The last constraint function is as follows:

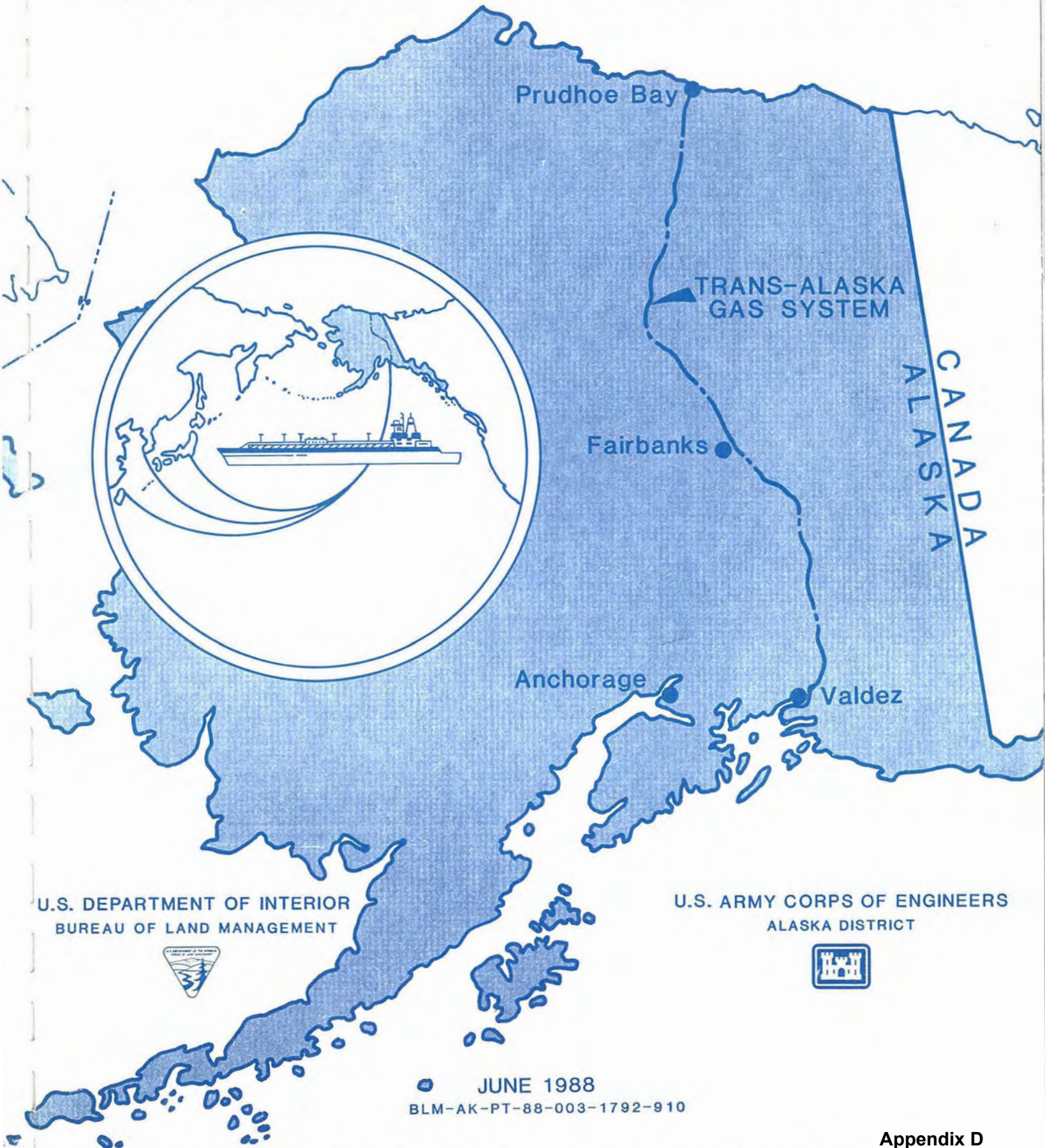
- **State Monitoring:** Instruments in Land Use Changes or Other Land Categories
- **Protected Ecological Product Land:** (Agriculture or Reserve Product)
- **Data Provided or Not:** (Agriculture or Other State-Supervised Land Includes monitoring 101-116-117, 120-125)
- **Alaska Native Claims Settlement Act (ANCSA):** (Protected or Interest Controlled)
- **Major Military:**
- **National Wildlife Refuges, National Park System Units:**
- **National Wild & Scenic Rivers outside National Park System Units and National Wildlife Refuges**
- **National Forests & Dominions, National Protected Resources, Alaska, National Scenic Area National Conservation Areas**
- **Forest of Land Management, Public Lands**

[illegible]

Appendix D

TAGS EIS

TRANS-ALASKA GAS SYSTEM FINAL ENVIRONMENTAL IMPACT STATEMENT



TN
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1988f

Bureau of Land Management
Department of the Interior
U.S. Army Corps of Engineers
Department of the Army

ARLIS
Alaska Resources
Library & Information Services
Anchorage, Alaska

**FINAL
ENVIRONMENTAL IMPACT STATEMENT
FOR THE PROPOSED
TRANS-ALASKA GAS SYSTEM**

Prepared by
Bureau of Land Management
and
U.S. Army Corps of Engineers

Cooperating Agencies

Department of Agriculture

Forest Service

Department of Commerce

National Marine Fisheries Service

Department of Energy

Economic Regulatory Administration

Department of the Interior

Bureau of Indian Affairs

Bureau of Mines

Fish and Wildlife Service

Geological Survey

Minerals Management Service

National Park Service

Department of Transportation

Coast Guard

Federal Highway Administration

Office of Pipeline Safety

Environmental Protection Agency

Federal Energy Regulatory Commission

State of Alaska

Division of Governmental Coordination

Department of Fish and Game

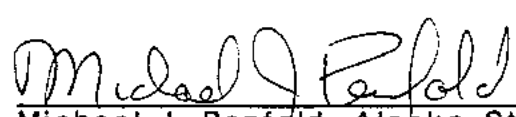
Department of Natural Resources

Department of Transportation and Public
Facilities

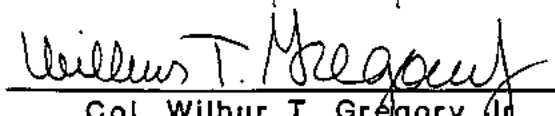
Department of Environmental Conservation

3 3755 000 40001 0

**JUNE 1988
BLM-AK-PT-88-003-1792-910**



Michael J. Penfold, Alaska State Director, Bureau of Land Management



Col. Wilbur T. Gregory Jr., District Engineer, Alaska District,
U.S. Army Corps of Engineers

Figure 1.9.4-3

	Prince William Sound				Cook Inlet			
	Proposed Project to:	Alternatives			Boulder Point	Cape Starichkof	Harrriet Point	
		Anderson Bay	Gravina	Gold Creek				Robe Lake
Pipeline Criteria	○ ○							

Favorable
Moderately Favorable
Unfavorable
Highly Unfavorable

SECTION 2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

These actions would take place from six camps north of the Yukon River and from existing facilities in communities elsewhere. Material yards would be made ready to hold construction supplies, equipment, and pipe.

Right-of-way acquisition and surveying would entail major field operations prior to construction. The location of the pipeline would be described by a surveyed centerline description of the route through Alaska.

A total of 26 construction camps would be required for the construction of the proposed TAGS project, as shown in Table 2.3.1-1. All of the *proposed* pipeline construction camps except Prudhoe Bay and Sourdough Creek would utilize former TAPS construction campsites. There would be a construction camp at each of the 10 compressor stations, as well as the LNG plant/terminal camp. Total bed space for construction camps would be 11,600.

Access roads would be built to provide necessary access from existing public or private roads to construction areas such as pipeline right-of-way, material/disposal sites, compressor stations, and material storage sites. Selection of access road locations would be based largely on the location of existing public and TAPS access roads, terrain roughness, and haulage distances. Approximately 100 miles of existing access roads, permanent or abandoned, would be repaired for reuse, and approximately 34 miles of new access roads would be constructed to a specification of 30-feet wide at the crown with thickness determined by soil and thermal conditions. Appendix E includes a list of all major access roads required for the project by milepost and length. As an option to structural fill access roads, TAGS would consider the use of snow/ice access roads in areas where all construction activities are scheduled for winter snow/ice roads, on a site-specific basis where conditions are determined to be advantageous, and *where an adequate winter supply of surface water is available for project use.*

Construction of the pipeline and ancillary facilities work pad would require natural soil or rock borrow material. This would be needed for right-of-way preparation, access roads, temporary and permanent facility foundations, and specialized ditch backfill. Borrow pit and

Table 2.3.1-1
TAGS Temporary Construction Camps

Construction Spread	Mile-Post	Location	Bed Spaces	
			Pipeline P/L	Compressor Station
1	0	Prudhoe Bay	200	---
	43*	Franklin Bluffs	400	---
	66	Compressor Station #1	100	300
	84	Happy Valley	500	---
	125	Compressor Station #2	100	300
2	140*	Galbraith Lake	500	---
			1,800	300
	170	Chandalar	500	---
	201	Dietrich	600	---
	213	Compressor Station #3	100	300
3	236*	Coldfoot	900	---
			2,100	300
	281	Compressor Station #4	100	300
	299	Oldman	700	---
	345*	Five Mile	700	---
4	358	Compressor Station #5	100	300
	384*	Livengood	700	---
	422	Compressor Station #6	100	300
			2,400	900
5	451	Fairbanks	1,000	---
	487	Compressor Station #7	100	300
	526	Delta	800	---
	563	Compressor Station #8	100	300
			2,900	600
6	600	Isabel Pass	600	---
	639	Compressor Station #9		
		Sourdough Creek	600	300
	682	Glennallen	700	---
			1,900	300
7	721	Compressor Station #10		
		Tonsina	700	300
	770	Sheep Creek	500	---
	797	LNG/Marine Terminal	200	1,500
			1,400	1,800
TOTALS			11,600	4,500

* Preconstruction camps plus one at Prospect Airport, Milepost 275.

quarry development would probably be accomplished in the first year of pipeline development. Reconnaissance investigations would be conducted during the detailed design phase to identify natural deposits suitable for use as borrow sources for the project. Initially, an inventory of existing sites within the corridor would be assessed. Then, a search for new, suitable borrow sources would be initiated.

Through the use of exploratory borings and geophysical evaluation, potential sites, new or existing, that best meet project needs, would be examined in greater detail to establish site quality and quantity. Detailed development and mining plans would be prepared for required borrow sites. Plans would be in conformance with state and federal requirements and would contain sufficient data to permit development,

SECTION 2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

Figure 2.3.3-1 presents three typical configurations for three types of buried river and stream crossings. The unweighted crossing would be used where crossings of minor streams and drainages require only minimum cover depths and where pipe buoyancy would not be a problem. Weighted river crossing designs would be utilized to allow pipeline construction in wet ditch areas or for long-term pipe buoyancy control. Selection of bolt-on weights or continuous concrete coating would be based on site-specific conditions. As previously mentioned, site-specific design would be incorporated to mitigate chilled pipe effects to rivers and streams.

Construction schedules would be developed to minimize impacts at critical water crossings to protect anadromous fish stocks and prevent downstream impacts. Temporary stream diversions could be required for pipeline installation; such diversions would require state approval. To avoid possible conflict with resident and anadromous fish, timing constraints could be required.

Following pipe-laying, trenches would be backfilled with materials equal to or better than the materials excavated. This would minimize changes in channel characteristics with respect to scour and erosive forces. Use of riprap or other bank protection techniques would be required in some locations.

2.3.3.2 Aerial River Crossing

The proposed TAGS conceptual design identified four major river crossings that would require independent aerial suspension bridges due to known environmental and difficult construction conditions. Aerial rather than buried crossings would be used for the Yukon, Tanana, Gulkana, and Tazlina rivers.

Figure 2.3.3-2 is a conceptual sketch of the single-span bridge proposed for the crossing of the Tanana, Gulkana, and Tazlina rivers. Span lengths for the three crossings are estimated to be 1,200 feet, 380 feet, and 700 feet, respectively. The Yukon River crossing would be an independent, twin-span suspension bridge.

2.3.3.3 Road Crossings

The proposed TAGS pipeline road crossings would be designed and installed with or without casings in accordance with 49 CFR 192. Access roads into material sites, camps, foreign pipelines, service facilities, and private property would be traversed uncased, as shown in Figure 2.3.3-3. The 67 major highway and road crossings would be evaluated on a site-specific basis to determine if an uncased crossing can be used. Where excessive wheel loads are anticipated or concerns for pipeline integrity are identified at road crossings, the advantages and disadvantages of cased crossing would be evaluated during the design phase.

Design and construction would be coordinated with the Alaska Department of Transportation and Public Facilities (DOT/PF) for highway crossings, proper authorizing agents for other public roads, telephone cables, and private owners for access roads as appropriate. Activities would be coordinated with Alyeska Pipeline Service Company where highway crossings are proximate to its fuel gas line or where its access roads are crossed by TAGS.

2.3.3.4 Crossing of Existing Pipelines

The design and construction of crossings of existing pipelines would require consideration of site-specific conditions and operational characteristics at each crossing. The proposed TAGS route crosses TAPS (above-ground and below-ground sections), the TAPS fuel gas line, the Kuparuk oil line (above-ground section), producer gathering lines, the Haines products pipeline, and the right-of-way for the proposed ANGTS.

Crossings of an existing above-ground pipeline would be designed for minimal impact to the existing pipeline or respective right-of-way. Although precise angles of crossing would vary based upon site-specific conditions at each crossing location, the angle between the two pipelines at the crossing point would tend toward a right angle (80° to 100°). The TAGS pipeline would be buried a minimum of 2.5 feet below the original ground surface. A crossing point at the midpoint between

SECTION 2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

Due to the extreme tidal fluctuations and currents found in Cook Inlet, a multipoint anchoring system would be required to hold the lay barge in position. The presence of the lay barge and its multipoint anchor system would result in the need for a traffic control system for vessels bound to and from the Port of Anchorage during the construction phase. Additionally, pipe burial depth for both pipelines should be sufficiently deep to provide adequate protection from anchor dragging or protection from scour.

From the Point Possession area the pipeline would parallel an existing gasoline pipeline right-of-way southwesterly for about 50 miles along the coast, terminating at Boulder Point just north of Nikiski, one of the Cook Inlet sites previously considered for location of the LNG plant and marine terminal as shown in Figure 2.9.2-2. This route avoids the Kenai National Moose Range but traverses the Susitna Flats State Wildlife Refuge and the Captain Cook State Recreation Area for about 1.5 miles.

The Boulder Point site is located on the east side of Cook Inlet on the Kenai Peninsula approximately 17 road miles north of the city of Kenai and 6 miles north of an existing petroleum, petrochemical, refining, and LNG industrial complex at Nikiski. Boulder Point is located northeast of East Forelands, a designated reserve for navigational purposes.

Commercial and residential development is not common, particularly near the site. Good infrastructure is in place for supporting construction and operations, but land availability could be a problem. Possible conflicts with nearby shipping and docking operations at Nikiski might exist (BLM 1976).

The north Kenai Road passes within 1.5 miles of the Boulder Point site, ending at Captain Cook State Recreation Area. The Nikiski airstrip is approximately 1.5 miles inland from Boulder Point; a regional airport at Kenai approximately 14 miles south.

The Boulder Point site has fair proximity to deep water, coastal bluffs of moderate height, and stable shoreline. It is the northernmost feasible industrial site with deepwater marine access on the east side of Cook Inlet and the closest site to Anchorage (ESL 1980b).

Soils are suitable for development (loess over glacial outwash), and terrain above the cliffs is gently sloping to hilly (SCS 1962). Bedrock foundation may be lacking. Faults, volcanoes, and glacial floods should not be a problem. The water table is low, and liquefaction potential is low (OIW 1975; SCS 1962).

Site terrain and topography would allow construction of the LNG plant a safe distance from the marine terminal. Distance from the 60-foot isobath to shore is approximately 4,000 feet. Earlier studies (OIW 1975) indicated acceptable anchoring at depths less than 200 feet and an adequate maneuvering area (2,000 feet minimum). Navigation aids are present and the state requires a licensed coastal pilot for vessels moving up Cook Inlet above Kachemak Bay.

A number of prominent rock outcrops occur along the shoreline of Boulder Point, particularly on the north side. The *National Oceanic and Atmospheric Administration's* (NOAA) National Ocean Survey charts warn of numerous uncharted and dangerous submerged boulders in the eastern portion of Cook Inlet, and some shoaling also exists along the east side of the inlet. Projected dangers from tsunamis are minimal due primarily to low predicted wave height, historical resistance of central Cook Inlet to earthquake-caused tsunamis, and existence of the Alaska Regional Tsunami Warning System (OIW 1975).

Floating ice and icing conditions can be severe problems in this area, and extreme tidal exchanges are generally strong in this area (BLM 1976; OIW 1975). Ice in Cook Inlet would be an inherent winter hazard, requiring ice strengthening of LNG tankers, advance scheduling, and two berths. Six out of 13 accidents recorded in Cook Inlet during a four-year study period (1971-1974) were due to ice. The ice problem is most severe in the upper inlet, particularly north of the forelands, a constriction shown in Figure 2.9.2-2. LNG shipments to/from the existing Nikiski facility have been delayed due to ice or strong winds, though only for short periods of time (OIW 1975). Increased LNG tanker traffic due to the TAGS project might, however, increase the incidence of such delays.

SECTION 2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.9.3 System Components for the Cook Inlet-Boulder Point Alternative

The Cook Inlet-Boulder Point alternative would require construction of approximately 791 miles of pipeline and 10 compressor stations.

The basic project components for the Cook Inlet-Boulder Point alternative would be similar to the proposed TAGS project. The pipeline route from Prudhoe Bay to near Livengood for the proposed project and the Cook Inlet-Boulder Point alternative would be the same. Likewise, the proposed project's approach to road crossings, elevated and below-ground river and stream crossings, fault crossings, and other basic construction techniques would be the same for the remainder of the route.

The major differences in construction would be for those conditions specific to the Cook Inlet alternative route that would require different construction techniques, such as the subsea pipeline under Cook Inlet, the approach to the pinch point near Denali National Park and Preserve, and the major access roads required for access to the compressor stations located in Minto and Susitna flats.

Table 2.9.3-1 summarizes the major facility components that would be required for the Cook Inlet alternatives compared to those for the proposed project.

In addition to the 15 construction camps which would be required from Prudhoe Bay to Livengood (see Subsection 2.3.1), 13 additional new construction campsites would be required from Livengood to Boulder Point. The locations of these sites are shown in Alignment Map 3 and the sizes identified in Table 2.9.3-2. Unlike the proposed route, which would use existing camp pads, except at Anderson Bay, all sites would require the construction of a gravel pad. Total bed space would be similar to that proposed for the proposed project.

It is assumed that the amount of mineral materials needed for the construction spreads for the Cook Inlet-Boulder Point alternative from Livengood to Boulder Point would be similar to that shown in Table 2.3.2-1 for the proposed TAGS project except that increased amounts of material would be required for permanent access roads to the Minto and Susitna Compressor Station and the new construction camp pads.

Table 2.9.3-1
Summary of Major Facility Components
for the Proposed Project and Alternatives

	Proposed Project- Anderson Bay	Cook Inlet- Boulder Point Alternative
Pipeline to LNG Site (miles)	797	791
Compressor Stations	10	10
Elevated River Crossings	4	6
Subsea Pipeline (miles)	None	15
Length of Loading Line (miles)	<i>less than 1</i>	<i>greater than 1</i>
Ferry Loading	Yes	No
Construction Camp at LNG Plant/ Terminal Site	Yes	Yes
Construction Camps at New Sites	1	13

Table 2.9.3-2
Temporary Construction Camps and Storage Pads
Livengood to Boulder Point

Location	Bed Spaces		Pipeline Storage Pad
	Pipeline P/L	Compressor Station	
Compressor Station 6A	200	300	Yes
Dunbar	800	--	Yes
Compressor Station 7A	--	300	No
Rex	600	--	Yes
Healy/Compressor Station 8A	500	300	Yes
Cantwell	600	--	Yes
Chulitna/Compressor Station 9A	500	300	Yes
Talkeetna	600	--	Yes
Kashwitna	600	--	Yes
Compressor Station 10A	100	300	Yes
Beaver Lake	600	--	Yes
Otter Creek	400	--	Yes
Boulder Point	100	1500*	No
TOTALS	5600	3000	

* LNG Plant/Marine Terminal

SECTION 2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

	Proposed Project Anderson Bay	Cook Inlet- Boulder Point Alternative
Pipeline Criteria		
- Minimize length of pipeline	○	○
- Maximize use of existing infrastructure	○	⊗
- Maximize use of proven construction techniques	○	⊗
- Maximize opportunity for parallel construction techniques	○	⊗
- Avoid areas of potential geohazards	⊗	⊗
- Minimize potential conflicts with sensitive environments	○	⊗
- Maximize compatibility with current and planned land use	○	○
- Minimize the number of water crossings	○	○
- Avoid permitting conflicts	○	●
- Minimize potential threat to national security	○	⊗
- Maximize availability of gas to Alaska consumers	⊗	○
LNG Plant Criteria		
- Adequacy of available land	○	⊗
- Avoid areas with poor foundation characteristics	○	⊗
- Avoid areas with faults	⊗	⊗
- Avoid sites potentially exposed to seismic sea waves	○	○
- Minimize length of pipeline to marine terminal	○	⊗
- Maximize use of existing community infrastructure	⊗	○
- Avoid sensitive environmental habitat	⊗	⊗
- Public safety considerations	○	⊗
- Maximize value added industrial opportunities	⊗	○
- Minimize site preparation requirements	⊗	○
Marine Terminal Criteria		
- Minimize exposure to extreme oceanographic conditions	○	⊗
- Minimize distance from shore to 60' MLLW depth	○	⊗
- Maximize suitability of tanker maneuvering and anchorage area	○	⊗
- Minimize potential hazards to navigation	○	⊗
- Minimize potential problems related to soils and geohazards	○	○
- Minimize threat to national security	⊗	⊗

NOTE: Individual criteria cannot be weighted on an equal basis.

- Favorable
- ⊗ Moderately Favorable
- ⊗ Unfavorable
- Highly Unfavorable

Figure 2.9.5-1
Criteria Evaluation Matrix for Proposed TAGS Project
and Cook Inlet-Boulder Point Alternative

SECTION 3.0 AFFECTED ENVIRONMENT OF THE PROPOSED ACTION AND ALTERNATIVES

In 1985 the total employment in Valdez was 1,850--15 federal government workers, 399 state employees, 311 local government workers, and 1,125 employees of private companies. About 200 people are employed by Alyeska.

Table 3.2.2-4 summarizes the enormous increase in the Valdez tax base which occurred due to construction of TAPS. In 1970 Valdez had an assessed valuation of only \$35 million. In 1978 the assessed valuation was \$1.7 billion and has remained fairly constant at that level. The oil and gas property within the city limits accounts for more than 90 percent of the community's assessed valuation. Depreciation in the value of TAPS is expected to seriously erode the community's tax base over the next two decades.

3.2.3 Land Use and Ownership

3.2.3.1 Introduction

The proposed pipeline with its associated compressor stations and LNG plant and terminal have the potential to alter the present land use of the existing pipeline route to a certain extent. The following subsection discusses the existing land use of the route and the nearby area in order to establish a framework for the discussion of potential TAGS project impacts to land use.

3.2.3.2 General Land Use Patterns

The proposed TAGS project would be built primarily on federal and state land within an existing utility corridor that contains a public/private road, a major oil pipeline, and Federal lands that have been authorized to contain chilled gas ANGTS pipeline. Therefore, the corridor area and its vicinity is already partially industrialized, even though it may be surrounded in many areas by undeveloped, essentially inaccessible country.

Throughout the corridor area, there are numerous existing land use plans and programs, and the TAGS project must be consistent with them or prior to construction, secure a variance. The following plans and programs are identified for the proposed TAGS corridor: the North

Slope Borough Comprehensive Land Use Plan, the North Slope Borough Coastal Management Program, Utility Corridor Draft Resource Management Plan (Federal--BLM), Fairbanks North Star Borough Comprehensive Land Use Plan, Tanana Basin Area Plan (State--DNR), Tanana Valley State Forest Management Plan, Delta-Salcha Area Plan, Copper River Basin Area Plan (State--DNR), Delta and Gulkana Wild and Scenic Rivers Plans (Federal--BLM), Draft Prince William Sound Area Plan (State--DNR), City of Valdez Comprehensive Land Use Plan, and Valdez Coastal Management Program. Other approved plans or studies include: Corridor Management Framework Land Use Plan, and Denali Scenic Highway Study (Federal--Alaska Land Use Council).

Since the utility corridor was established by the federal government in 1971, portions have been transferred to state and Native ownerships. This is especially true between the Yukon River and Fairbanks and in the Copper River drainage where in three instances federal lands within the Utility Corridor, withdrawn by PLO 5150, as amended, transferred to the State of Alaska the segment Yukon River to Washington Creek; to ATHNA Region and/or several villages scattered acreage between Sourdough and Pippin Lake areas; and to Chugach Natives small acreage in the vicinity of Tonsina south of Pippin Lake area. Appendix F shows the generalized land-ownership along the route TAGS proposes. Presently land ownership along this route is approximately 45 percent state (either patented, tentatively approved, or pending), 50 percent federal (under BLM, military, or USFS jurisdiction), 5 percent Alaska Native or in other private ownership.

In the Prudhoe Bay area the land is primarily state-owned industrial (oilfield development and production), with some sport and subsistence hunting occurring outside the lease area and pipeline corridor and fishing along the coast and the Sagavanirktok River. Subsistence and commercial fisheries for whitefish exist in the Colville River Delta.

Federal lands located north of the 68-degree parallel close to TAGS have been initially screened for wilderness opportunities. Lands determined to possess wilderness characteristics are not available for any use until such time as Congress

SECTION 4.0 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION AND ALTERNATIVES

and airstrips would result in substantial direct losses of vegetation. In this regard it is noteworthy that the area disturbed in developing material sites during the TAPS project construction (including the Dalton Highway) was significantly greater than was initially estimated (12,200 acres versus 5,760 acres) (Pamplin 1979). Approximately 29 percent of the surface area directly disturbed by TAPS material sites involved wetlands. This proportion would be lower during TAGS construction because of lower demand for gravel and greater attention to site selection to minimize destruction of wildlife habitat and wetlands in the arctic drainage area.

Construction of the TAPS material sites, Dalton Highway, and work pad accounted for the majority of damage to terrestrial habitats by that project (Pamplin 1979). The extensive use to be made of existing gravel pads for the proposed TAGS facilities would mitigate a substantial portion of the adverse impacts expected from material extraction and placement. Adherence to recommended guidelines for gravel mining (Burger and Swenson 1977; *Woodward-Clyde Consultants* 1980) would further mitigate adverse impacts. Nevertheless, the additional losses of vegetated habitats through these activities would constitute a major component of the expected impacts. Any loss of riparian willow habitat in arctic floodplains would potentially be disruptive in view of its high value as wildlife habitat and its limited occurrence (Hernandez 1974; Pamplin 1979). Impacts are expected to be moderate.

The impoundment of water caused by the disruption and alteration of surface drainage patterns due soil compression; permafrost degradation; trenching; erosion-control measures; grading; and gravel pad, access road, and pipeline mound construction would constitute major, though generally localized, impacts on vegetation and wetlands (FPC 1976b). Inhibition of cross-drainage would cause ponding and thermal erosion on the upslope side of linear gravel structures and gradual drying of habitats on the downslope side.

Both types of impact would result in changes in species composition over the long term and in direct mortality of some plants in the short term (Hernandez 1974). Gully

erosion downslope, induced by the concentration of flow through culverts onto ice-rich soils not previously subjected to such flow, would also occur in some areas (Brown and Berg 1980). Ponding problems would be exacerbated by clogging of culverts through icing and road-maintenance activities. Careful attention to terrain and drainage features in the placement of culverts and low-water crossings, coupled with proper maintenance, would mitigate some of these impacts. However, alteration of drainage patterns would constitute a principal construction-related impact on the vegetation communities and wetlands along the proposed route, particularly on the coastal plain. The overall impact is expected to be minor to moderate, depending on topography.

Dust fallout from vehicular traffic on gravel roads would occur throughout the life of the proposed project but would undoubtedly peak during the construction phase. This impact would be most noticeable along the Dalton Highway. Studies along the Dalton Highway have demonstrated that some plant species, especially certain mosses and lichens, are sensitive to road dust, and a few species appear to respond positively to it (Everett 1980; Alexander and Van Cleave 1983). Thus, some changes in species composition near gravel roads would be anticipated. In addition, the accumulation of dust on the snow within 100 to 300 feet of heavily traveled roads causes early snow melt (Everett 1980), which accelerates the chronology of growth of plants near the road by perhaps as much as two to three weeks. On the other hand, the chronology of plant growth would be delayed in areas where snowdrifts persist in spring as a result of snow accumulation along access roads and near project structures.

Accidental spills and leaks of toxic fluids such as fuels and antifreezes would occur throughout the life of the project but would be most likely during construction. The direct impact on vegetation would be considerable in localized areas and would vary according to the amount spilled, the terrain, and the season of the year (EEI 1977). Such spills would be especially serious in riparian zones and wetlands. Careful construction practices would reduce the frequency and size of spills, and

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4.2.19.20 Blueberry Lake State Recreation Site (SRS) (Milepost 765)

The Blueberry Lake SRS is a 192-acre scenic area established on state lands in 1972 by the State of Alaska as a day-use area in a scenic alpine high country setting, located on the south side of Thompson Pass adjacent to the Richardson Highway. Use is primarily during the summer tourist season.

The proposed TAGS pipeline crosses the Blueberry Lake SRS along the western part of the property. Route options to the east of the SRS boundary are precluded by a rugged terrain immediately adjacent to the east SRS boundary that leads to Heiden Canyon. An optional route along the abandoned state highway was rejected because it involved more impact directly to the SRS property and use areas. During summer construction the typical impacts related to the construction of a pipeline would occur, which would exclude use of part or all of the area during the single construction season with moderate impacts. Once construction is completed, the right-of-way would be revegetated to a manner similar to the nearby TAPS. Overall impacts are considered minor.

4.2.19.21 Keystone Canyon (Milepost 770.8 to 774.5)

The proposed TAGS route traverses Keystone Canyon for approximately 4 miles along the Richardson Highway. Both are routed near the Lowe River which is incised in a steep-walled canyon. Except where TAGS proposes to route the pipeline through the Old Richardson Highway tunnel, pipeline/highway co-use is proposed. The Keystone Canyon Railroad Tunnel has been proposed as a National Historical Landmark, see Subsection 4.2.16.2.1.

For the sections north and east of the tunnel, a temporary bypass would be constructed in the Lowe River floodplain to allow traffic to pass without significant delay during normal construction operations. The TAGS pipeline would be routed through the tunnel. Construction would be coordinated with DOT/PF to keep summer highway traffic delays to a minimum.

Traffic would be carefully controlled on a 24-hour-per-day basis by means of radio-equipped flagmen and a pilot car to reduce traffic impacts. Construction through the canyon should not impact Ruddleston Falls or the Goat Trail located on the rock cliffs above the highway.

DOT/PF is concerned about the potential impact during construction or operations should a landslide occur, closing this pinch point. This is the only land route from Valdez to other areas of the state. Completion of the new state highway through Keystone Canyon and Thompson Pass and the construction of TAPS have provided a baseline of data and experience for the proposed TAGS project. No evidence of rock failure was observed in Keystone Canyon during the 1964 earthquake, and there has been an excellent record of highway performance. There is a concern about the potential for creating localized unstable rock slopes by the undercutting or day-lighting of discontinuities in the bedrock during construction of the pipeline. The failure of a locally undercut or day-lighted bedrock section would create additional traffic delays and increased requirements for rock reinforcement. Since construction through the canyon would be limited to short 200- to 400-foot sections, the extent of a potential problem area and its potential impact would be limited to relatively short and manageable durations.

YPC would conduct detailed field investigations to accomplish geologic mapping, core and soil borings and testing, ground-water investigations, surface water hydrology, and rock slope stability evaluations. The detailed design and construction plan for TAGS would be based on the results of the field investigation and evaluation and would be coordinated with the DOT/PF during the final design phase. Coordination of blasting and excavation procedures, rock reinforcement requirements, traffic control, and safety are considered to be a necessary part of a successful design by YPC.

4.2.19.22 Canyon Slough Area (Milepost 780)

Canyon Slough is located within a portion of a highly productive salmon habitat area along the south side of the

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4.3.9 Surface and Ground Water

General types of hydrologic impacts that may arise along the Cook Inlet-Boulder Point alternative route are the same as those for the primary route described in Subsection 4.2.9. The following paragraphs identify specific impacts most applicable to various segments of this alternative route.

4.3.9.1 Livengood to the Nenana River

Permanent effects would accrue from the need to provide permanent access along the 50-mile portion of this route that is not connected to the existing road or railroad system. To ensure year-round access, the TAGS access road would have permanent bridges and culverts. The route would also require development of material sites to supply gravel for both the work pad and access road. This would possibly cause major and long-lasting disturbances to an undisturbed area. Hydrologic impacts would result from the introduction of sediment and pollutants into Minto Flats. Erosion control would be particularly difficult due to the instability of the ice-rich silts on the hill slopes and because of the tendency of the streams to ice. A compensating effect would be improved access for TAGS oil spill control and cleanup activities should they be necessary. Overall, impacts would be expected to be moderate for this area.

The Tanana and Nenana river crossings are in a very unstable area. As a result of pipeline construction, or due to natural activities which constrict the river, ice jams could divert the Nenana River through any one of the existing distributaries forming its junction with the Tanana. This could breach the alternative route between the crossings, endanger the pipeline, and alter the existing geometry of both the Tanana and Nenana rivers. These changes in geometry could affect navigation on the Tanana and conceivably increase risks of flooding. Impacts would be expected to be moderate.

4.3.9.2 Nenana River to Summit

Through this area the primary challenge would be to coordinate the drainage design with that existing for the railroad and the

highway so as to not accelerate erosion for either of the existing systems. Impacts would be major should such acceleration occur.

4.3.9.3 Summit to Cook Inlet

Through both the Chulitna and Susitna portions of section, the prime hydrologic impacts of the pipeline would be the potential for affecting the water quality of the existing streams or altering hydraulics of the adjoining highway or railroad drainage structures.

Primary hydrologic impacts in the Willow to Cook Inlet section would be construction-related pollution and erosion. Additional long-term impacts to water quality might arise because of improved access to an otherwise inaccessible area. Impacts would probably be minor in this section.

4.3.9.4 Cook Inlet to Boulder Point

Impacts are primarily from construction-related erosion and would most likely be minor.

4.3.10 Marine Environment

The marine environment could affect or be affected by project construction or operation in ways similar to those described for the proposed project (Subsection 4.2.10.1). The Cook Inlet-Boulder Point alternative is notably different from the proposed project in its additional requirement for a 15-mile subsea pipeline. This introduces a major construction activity into the marine environment and subjects the project to an additional potential impact from accidents and pipeline maintenance or repair. There are several major differences in the characteristics of the marine environment for the Cook Inlet-Boulder Point alternative that influence potential environmental impacts. The presence of tidal extremes in excess of 30 feet vertical height and accompanying currents reaching as high as 6 to 7 knots present major problems to marine construction, facility design, and routine operations and would also increase the potential for accidents. Extreme winter icing conditions would increase the

SECTION 4.0 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION AND ALTERNATIVES

probability that operations would have to be curtailed at times and would also increase the potential for accidents. Extensive shoaling areas off the East Forelands just south of Boulder Point would require some dredging and pose potential navigational hazards, while sedimentation, scour, and the presence of mobile submarine bedforms would affect engineering design suitability for marine terminal facility offshore components.

Burial of the pipe crossing Cook Inlet deeply enough to ensure it would not be exposed by scour or endangered by ships anchors would be difficult. Winter construction or repair would be practically impossible because of floating ice and the extreme tidal current. To ensure dependable service, two crossings might be necessary. The crossings would need to be widely separated so that in the event one fails, flow could be maintained by diverting gas to the other crossing. Impacts in this area would likely be minor related mainly to potential to increased silt loading and interference with ship traffic. All these factors make construction of the pipeline crossing and construction and maintenance of the marine terminal more difficult and possibly make the entire systems more susceptible to accidents during operations.

There is less deepwater turning room for tanker maneuvering and anchoring in Cook Inlet, which has a narrow channel and major potential problems with ice in the winter season. There is the additional possibility that a vessel could anchor in the vicinity of the pipeline crossing and perhaps drag its anchor across the pipe. The subsea transmission line from the west side of Cook Inlet has been broken in this manner, causing electrical outages in Anchorage. Even though the pipeline would be jetted into the bottom, much of the jetted silt would not settle back over the line due to the currents. Eventually, the pipeline trench would be filled in with silt.

The marine terminal pilings could cause sediment to accumulate or erode due to changes in current patterns, resulting in sills being created or producing a deeper channel which could impact marine operation.

The potential effect of the facility or resultant tanker traffic on marine birds, fish, or mammals would be negligible. There is an increased possibility of an oil spill

due to increased ship traffic in the area; and such a spill could cause damage to the local clam beds or affect bald eagle populations which gather each summer at the mouths of most Cook Inlet rivers. Spills would be difficult to control or clean up in the area during high winds and/or broken ice conditions.

The possibility also exists for collision of a beluga whale with a ship.

Once out of Cook Inlet and on the high seas, LNG tanker traffic would follow the general route of LNG tankers that have been successfully delivering Cook Inlet LNG to Tokyo for the past 17 years. No new impacts are expected to the high seas marine environment.

4.3.11 Fish Impacts

Since construction techniques, mitigation procedures, and types of streams involved are similar, impacts to fish along the Cook Inlet-Boulder Point alternative route would be similar to those described for the proposed route in Subsection 4.2.11. Those areas where impacts would be different are discussed below.

More fishing pressure, resulting from fishing by construction workers, and, possibly, from improved access for recreational fishermen would result in increased stress to fish populations during TAGS construction and possibly operation along the Cook Inlet-Boulder Point alternative route. There is also a chance that some existing, heavily used areas would have restricted access after construction due to creation of an exclusion or security zone around some TAGS-related facilities, resulting in a shift of existing fishing pressure to other Cook Inlet fish resources. Much of this can be regulated. A number of access roads, work pads, and culverts crossing many streams could result in temporary blockage or erosion with resultant turbidity of small streams and cross drainages along the Cook Inlet-Boulder Point alternative route. Excavation of a greater number of new materials sites would have the potential for similar impacts. Impacts would probably be moderate during construction and minor during operation.

There would be minor impacts from the compressor stations, LNG plant, or marine

Appendix E

American Lung Association
State of the Air 2016



STATE OF THE **AIR** 2016



Acknowledgments

The American Lung Association “State of the Air® 2016” is the result of the hard work of many people:

In the American Lung Association National Office: Paul G. Billings, who supervised the work; Janice E. Nolen, MA, who directed the project, analyzed data, wrote the text, and coordinated print and web presentations; Thu Anh Vu Tran, who assisted with the data analysis and report preparation; Lyndsay Moseley Alexander and Laura Kate Bender, who integrated the Healthy Air Campaign with this report; Zach Jump, MA, who converted the raw data into meaningful tables and comparisons and calculated all the population data; Susan Rappaport, MPH, who supervised the data analysis; Norman Edelman, MD, and Al Rizzo, MD, who reviewed the science and health discussions; Neil Ballentine, who directed the online presentation; Todd Nimirowski, who designed and created the user experiences online; Lauren Innocenzi and MacKenzie Olsberg, who managed content production online; Laura Lavelle, who developed social sharing and digital engagement strategy; Kim Lacina, Allison MacMunn, and Gregg Tubbs, who coordinated internal and external communications and media outreach; Michael Albiero, who designed the logo and report cover; and Craig Finstad, who coordinated sharing the data with direct mail donors.

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The American Lung Association assumes sole responsibility for the content of the American Lung Association “State of the Air® 2016”.

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Fighting for Air

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People at Risk In 25 U.S. Cities Most Polluted by Short-Term Particle Pollution (24-hour PM_{2.5})

2016 Rank ¹	Metropolitan Statistical Areas	Total Population ²	Under 18 ³	65 and Over ³	Pediatric Asthma ^{4,6}	Adult Asthma ^{5,6}	COPD ⁷	CV Disease ⁸	Diabetes ⁹	Poverty ¹⁰
1	Bakersfield, CA	874,589	257,512	86,198	22,811	47,274	27,545	39,611	58,509	206,604
2	Fresno-Madera, CA	1,120,522	321,538	127,627	28,482	61,434	37,066	54,190	78,465	293,929
3	Visalia-Porterville-Hanford, CA	608,467	186,159	61,302	16,490	32,302	18,893	27,286	39,992	160,479
4	Modesto-Merced, CA	798,350	225,241	92,260	19,952	44,214	26,914	39,399	57,132	160,041
5	Fairbanks, AK	99,357	23,924	7,913	2,205	5,999	2,938	3,875	4,764	9,011
6	Salt Lake City-Provo-Orem, UT	2,423,912	749,941	222,480	50,564	145,851	59,401	93,542	115,627	267,966
7	Logan, UT-ID	131,364	41,232	11,968	2,889	7,834	3,153	4,831	5,817	17,696
8	San Jose-San Francisco-Oakland, CA	8,607,423	1,876,296	1,168,168	166,204	523,893	330,069	488,003	703,447	968,270
9	Los Angeles-Long Beach, CA	18,550,288	4,419,138	2,287,192	391,452	1,093,121	670,009	981,745	1,425,473	3,174,300
10	Missoula, MT	112,684	21,839	15,363	1,555	8,935	5,475	5,801	6,945	17,216
11	Reno-Carson City-Fernley, NV	597,837	130,592	97,747	8,848	38,360	34,676	45,621	47,522	89,277
11	Lancaster, PA	533,320	128,671	87,385	13,929	39,794	27,486	39,175	44,979	54,499
13	El Centro, CA	179,091	51,111	21,523	4,527	9,863	6,046	8,897	12,791	40,162
14	Pittsburgh-New Castle-Weirton, PA-OH-WV	2,653,781	512,313	489,155	55,262	210,546	154,349	218,588	249,655	331,578
15	Yakima, WA	247,687	73,891	31,719	4,826	16,075	10,398	12,998	14,992	50,044
16	Anchorage, AK	398,892	101,730	36,091	9,374	23,752	12,587	16,994	20,760	39,450
17	Sacramento-Roseville, CA	2,513,103	592,935	358,196	52,523	149,894	96,523	144,007	205,390	397,024
18	Philadelphia-Reading-Camden, PA-NJ-DE-MD	7,164,790	1,601,349	1,058,447	164,662	520,226	350,165	491,940	577,817	950,284
18	Harrisburg-York-Lebanon, PA	1,239,677	271,569	204,056	29,398	95,249	66,506	94,211	108,812	129,647
20	El Paso-Las Cruces, TX-NM	1,050,374	290,708	124,863	20,269	55,486	39,945	58,111	81,066	250,142
21	Eugene, OR	358,337	68,413	62,334	4,963	29,455	16,575	24,260	26,412	64,722
21	South Bend-Elkhart-Mishawaka, IN-MI	723,537	178,540	110,538	15,281	58,635	48,571	53,112	58,902	111,135
21	Phoenix-Mesa-Scottsdale, AZ	4,489,109	1,121,933	638,383	122,364	325,041	226,682	264,470	327,660	753,716
24	New York-Newark, NY-NJ-CT-PA	23,632,722	5,198,379	3,383,979	473,026	1,812,756	1,039,620	1,392,285	1,785,585	3,281,939
25	Medford-Grants Pass, OR	293,886	60,420	63,154	4,383	23,312	14,641	22,447	24,063	54,487

Notes:

1. Cities are ranked using the highest weighted average for any county within that Combined or Metropolitan Statistical Area.
2. **Total Population** represents the at-risk populations for all counties within the respective Combined or Metropolitan Statistical Area.
3. Those **under 18** and **65 and over** are vulnerable to PM_{2.5} and are, therefore, included. They should not be used as population denominators for disease estimates.
4. **Pediatric asthma** estimates are for those under 18 years of age and represent the **estimated** number of people who had asthma in 2014 based on state rates (BRFSS) applied to population estimates (U.S. Census).
5. **Adult asthma** estimates are for those 18 years and older and represent the **estimated** number of people who had asthma in 2014 based on state rates (BRFSS) applied to population estimates (U.S. Census).
6. Adding across rows does not produce valid estimates. Adding the disease categories (asthma, COPD, etc.) will double-count people who have been diagnosed with more than one disease.
7. **COPD** estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
8. **CV disease** is cardiovascular disease and estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
9. **Diabetes** estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
10. **Poverty** estimates come from the U.S. Census Bureau and are for all ages.

People at Risk In 25 U.S. Cities Most Polluted by Year-Round Particle Pollution (Annual PM_{2.5})

2016 Rank ¹	Metropolitan Statistical Areas	Total Population ²	Under 18 ³	65 and Over ³	Pediatric Asthma ^{4,6}	Adult Asthma ^{5,6}	COPD ⁷	CV Disease ⁸	Diabetes ⁹	Poverty ¹⁰
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9	Harrisburg–York–Lebanon, PA	1,239,677	271,569	204,056	29,398	95,249	66,506	94,211	108,812	129,647
10	Louisville/Jefferson County–Elizabethtown–Madison, KY–IN	1,498,593	348,103	213,057	35,700	134,900	132,472	132,990	138,376	213,396
11	Cleveland–Akron–Canton, OH	3,497,851	763,909	583,516	79,634	296,253	229,278	285,478	327,871	527,700
12	Philadelphia–Reading–Camden, PA–NJ–DE–MD	7,164,790	1,601,349	1,058,447	164,662	520,226	350,165	491,940	577,817	950,284
13	Indianapolis–Carmel–Muncie, IN	2,353,935	581,717	304,412	46,418	190,921	152,034	157,184	183,577	342,625
14	Cincinnati–Wilmington–Maysville, OH–KY–IN	2,208,450	532,957	302,529	55,681	186,179	148,558	168,576	191,278	304,362
14	Altoona, PA	125,955	25,897	24,360	2,803	9,732	7,144	10,387	11,828	18,367
16	Houston–The Woodlands, TX	6,686,318	1,793,010	668,355	126,257	322,667	251,119	362,663	515,515	1,014,700
16	San Luis Obispo–Paso Robles–Arroyo Grande, CA	279,083	50,639	48,977	4,486	17,852	11,905	18,081	25,139	38,048
16	Lancaster, PA	533,320	128,671	87,385	13,929	39,794	27,486	39,175	44,979	54,499
16	Johnstown–Somerset, PA	213,950	40,609	43,588	4,396	16,796	12,637	18,455	20,999	29,818
20	Detroit–Warren–Ann Arbor, MI	5,315,251	1,206,783	779,744	123,521	448,280	362,499	401,894	414,592	854,741
21	Erie–Meadville, PA	365,618	79,430	59,913	8,598	28,186	19,491	27,596	31,850	55,897
22	Birmingham–Hoover–Talladega, AL	1,317,269	305,150	195,649	40,271	96,700	102,850	119,939	129,794	227,444
23	Little Rock–North Little Rock, AR	902,443	215,116	126,381	19,823	60,518	60,538	83,498	83,957	138,677
23	Fairbanks, AK	99,357	23,924	7,913	2,205	5,999	2,938	3,875	4,764	9,011
23	Wheeling, WV–OH	145,205	28,098	27,933	2,779	12,814	13,249	15,016	15,880	22,863

Notes:

1. Cities are ranked using the highest Design Value for any county within that Combined or Metropolitan Statistical Area.
2. **Total Population** represents the at-risk populations for all counties within the respective Combined or Metropolitan Statistical Area.
3. Those under 18 and 65 and over are vulnerable to PM_{2.5} and are, therefore, included. They should not be used as population denominators for disease estimates.
4. **Pediatric asthma** estimates are for those under 18 years of age and represent the **estimated** number of people who had asthma in 2014 based on state rates (BRFSS) applied to population estimates (U.S. Census).
5. **Adult asthma** estimates are for those 18 years and older and represent the **estimated** number of people who had asthma in 2014 based on state rates (BRFSS) applied to population estimates (U.S. Census).
6. Adding across rows does not produce valid estimates. Adding the disease categories (asthma, COPD, etc.) will double-count people who have been diagnosed with more than one disease.
7. **COPD** estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
8. **CV disease** is cardiovascular disease and estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
9. **Diabetes** estimates are for adults 18 and over who have been diagnosed within their lifetime, based on state rates (BRFSS) applied to population estimates (U.S. Census).
10. **Poverty** estimates come from the U.S. Census Bureau and are for all ages.

EPA Concludes Ozone Pollution Poses Serious Health Threats

- Causes respiratory harm (e.g., worsened asthma, worsened COPD, inflammation)
- Likely to cause early death (both short-term and long-term exposure)
- Likely to cause cardiovascular harm (e.g., heart attacks, strokes, heart disease, congestive heart failure)
- May cause harm to the central nervous system
- May cause reproductive and developmental harm

—U.S. Environmental Protection Agency, *Integrated Science Assessment for Ozone and Related Photochemical Oxidants*, 2013. EPA/600/R-10/076F.

Based on that review, the EPA set more protective limits, called national ambient air quality standards, on ozone pollution in October 2015. These official limits drive the cleanup of ozone pollution nationwide. The Clean Air Act requires EPA to review the standards every five years to make sure that they protect the health of the public.

Particle Pollution

Particle pollution refers to a mix of very tiny solid and liquid particles that are in the air we breathe. But nothing about particle pollution is simple. And it is so dangerous, it can shorten your life.

Ever look at dirty truck exhaust?

The dirty, smoky part of that stream of exhaust is made of particle pollution. Overwhelming evidence shows that particle pollution—like that coming from that exhaust smoke—can kill. Particle pollution can increase the risk of heart disease, lung cancer and asthma attacks and can interfere with the growth and work of the lungs.

What Is Particle Pollution?

Particle pollution refers to a mix of very tiny solid and liquid particles that are in the air we breathe. But nothing about particle pollution is simple. And it is so dangerous, it can shorten your life.

Size matters. Particles themselves are different sizes. Some are one-tenth the diameter of a strand of hair. Many are even tinier; some are so small they can only be seen with an electron microscope. Because of their size, you can't see the individual particles. You can only see the haze that forms when millions of particles blur the spread of sunlight.

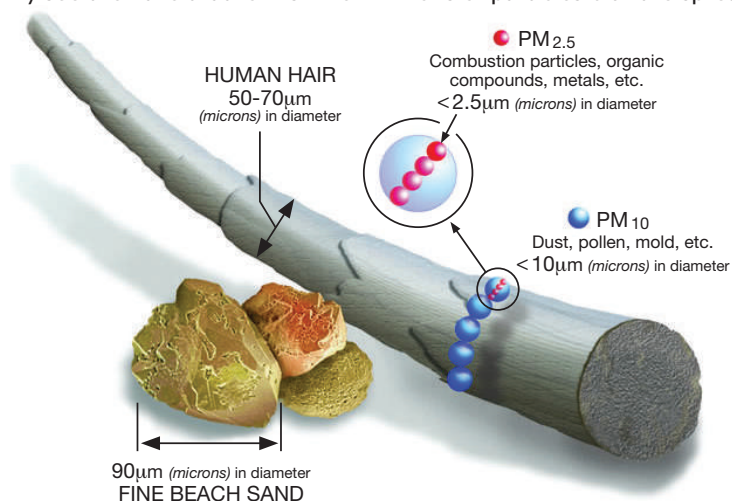


Image courtesy of the U.S. EPA

The differences in size make a big difference in how they affect us. Our natural defenses help us to cough or sneeze larger particles out of our bodies. But those defenses don't keep out smaller particles, those that are smaller than 10 microns (or micrometers) in diameter, or about one-seventh the diameter of a single human hair. These particles get trapped in the lungs, while the smallest are so minute that they can pass through the

lungs into the bloodstream, just like the essential oxygen molecules we need to survive.

Researchers categorize particles according to size, grouping them as coarse, fine and ultrafine. Coarse particles fall between 2.5 microns and 10 microns in diameter and are called PM_{10-2.5}. Fine particles are 2.5 microns in diameter or smaller and are called PM_{2.5}. Ultrafine particles are smaller than 0.1 micron in diameter²² and are small enough to pass through the lung tissue into the blood stream, circulating like the oxygen molecules themselves. No matter what the size, particles can harm your health.

“A mixture of mixtures.” Because particles are formed in so many different ways, they can be composed of many different compounds. Although we often think of particles as solids, not all are. Some are completely liquid; others are solids suspended in liquids. As the EPA puts it, particles are really “a mixture of mixtures.”²³

The mixtures differ between the eastern and western United States and in different times of the year. For example, the Midwest, Southeast and Northeast states have more sulfate particles than the West on average, largely due to the high levels of sulfur dioxide emitted by large, coal-fired power plants. By contrast, nitrate particles from motor vehicle exhaust form a larger proportion of the unhealthy mix in the winter in the Northeast, Southern California, the Northwest, and North Central U.S.²⁴

Who Is at Risk?

Anyone who lives where particle pollution levels are high is at risk. Some people face higher risk, however. People at the greatest risk from particle pollution exposure include:

- Infants, children and teens;²⁵
- People over 65 years of age;²⁶
- People with lung disease such as asthma and chronic obstructive pulmonary disease (COPD), which includes chronic bronchitis and emphysema;
- People with heart disease²⁷ or diabetes;²⁸
- People with low incomes;²⁹ and
- People who work or are active outdoors.³⁰

Diabetics face increased risk at least in part because of their higher risk for cardiovascular disease.³¹

What Can Particles Do to Your Health?

Particle pollution can be very dangerous to breathe. Breathing particle pollution may trigger illness, hospitalization and premature death, risks that are showing up in new studies that validate earlier research.

Thanks to steps taken to reduce particle pollution, good news is growing from researchers who study the drop in year-round levels of particle pollution.

Looking at air quality in 545 counties in the U.S. between 2000 and 2007, researchers found that people had approximately four months added to their life expectancy on average due to cleaner air. Women and people who lived in urban and densely populated counties benefited the most.³²

Another long-term study of six U.S. cities tracked from 1974 to 2009 added more evidence of the benefits. Their findings suggest that cleaning up particle pollution had almost immediate health benefits. They estimated that the U.S. could prevent approximately 34,000 premature deaths a year if the nation could lower annual levels of particle pollution by 1 µg/m³.³³

Other researchers estimated that reductions in air pollution can be expected to produce rapid improvements in public health, with fewer deaths occurring within the first two years after reductions.³⁴

These studies add to the growing research that cleaning up air pollution improves life and health.

Breathing particle pollution may trigger illness, hospitalization and premature death.

Short-Term Exposure Can Be Deadly

First and foremost, short-term exposure to particle pollution can kill. Peaks or spikes in particle pollution can last for hours to days. Deaths can occur on the very day that particle levels are high, or within one to two months afterward. Particle pollution does not just make people die a few days earlier than they might otherwise—these are deaths that would not have occurred if the air were cleaner.³⁵

Even low levels of particles can be deadly. A 2016 study found that people age 65 and older in New England faced a higher risk of premature death from particle pollution, even in places that met current standards for short-term particle pollution.³⁶

Particle pollution also diminishes lung function, causes greater use of asthma medications and increased rates of school absenteeism, emergency room visits and hospital admissions. Other adverse effects include coughing, wheezing, cardiac arrhythmias and heart attacks. According to extensive research, short-term increases in particle pollution have been linked to:

- death from respiratory and cardiovascular causes, including strokes;^{37,38,39,40}
- increased mortality in infants and young children;⁴¹
- increased numbers of heart attacks, especially among the elderly and in people with heart conditions;⁴²
- inflammation of lung tissue in young, healthy adults;⁴³
- increased hospitalization for cardiovascular disease, including strokes and congestive heart failure;^{44,45,46}
- increased emergency room visits for patients suffering from acute respiratory ailments;⁴⁷
- increased hospitalization for asthma among children;^{48,49,50} and
- increased severity of asthma attacks in children.⁵¹

Again, the impact of even short-term exposure to particle pollution on healthy adults was demonstrated in the Galveston lifeguard study. In addition to the harmful effects of ozone pollution, lifeguards had reduced lung volume at the end of the day when fine particle levels were high.⁵²

Year-Round Exposure

Breathing high levels of particle pollution day in and day out also can be deadly, as landmark studies in the 1990s conclusively showed⁵³ and as other studies confirmed.⁵⁴ Chronic exposure to particle pollution can shorten life by one to three years.⁵⁵ Recent research has confirmed that long-term exposure to particle pollution still kills, even with the declining levels in the U.S. since 2000⁵⁶ and even in areas, such as New England, that currently meet the official limit, or standard, for year-round particle pollution.⁵⁷

In late 2013, the International Agency for Research on Cancer, part of the World Health Organization concluded that particle pollution could cause lung cancer. The IARC reviewed the most recent research and reported that the risk of lung cancer increases as the particle levels rise.⁵⁸

Year-round exposure to particle pollution has also been linked to:

- increased hospitalization for asthma attacks for children living near roads with heavy truck or trailer traffic;^{59,60}
- slowed lung function growth in children and teenagers;^{61,62}
- development of asthma in children up to age 14;⁶³
- significant damage to the small airways of the lungs;⁶⁴
- increased risk of death from cardiovascular disease;⁶⁵ and
- increased risk of lower birth weight and infant mortality.⁶⁶

Research into the health risks of 65,000 women over age 50 found that those who

In late 2013, the World Health Organization concluded that particle pollution could cause lung cancer.

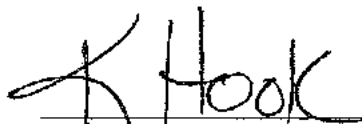
Appendix F

FNSB Air Quality Comprehensive Plan

Fairbanks North Star Borough Air Pollution Control Commission

Air Quality Comprehensive Plan *Framework for Healthy Air, People, and Economy*

*Prepared and Approved by the
Fairbanks North Star Borough Air Pollution Control Commission*



Kathleen Hook
Chair

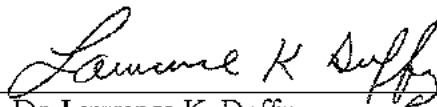
5/4/16

Date

N/A

Mark Sherman
Vice-Chair

Date



Dr. Lawrence K. Duffy

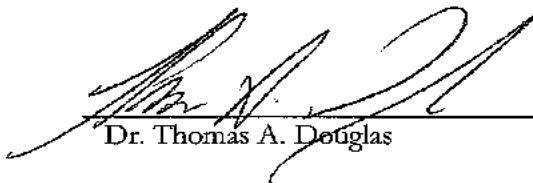
May 4, 2016

Date

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Gwen Holdmann

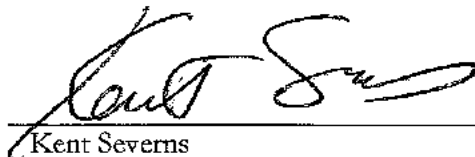
Date



Dr. Thomas A. Douglas

5/4/16

Date



Kent Severns

5/6/16

Date



Michael R. Pollen

5/6/16

Date

Recommendations to the Mayor of the Fairbanks North Star Borough

The purpose of this Air Quality Comprehensive Plan, Framework for Healthy Air, People, and Economy (AQ Framework) is to provide a list of actionable items to the Fairbanks North Star Borough (FNSB) Mayor, staff, and policy makers to achieve compliance with the Clean Air Act as expediently and economically as possible.

Executive Summary The combustion of solid and liquid fuels creates very fine particulate matter, known as PM_{2.5}. These particles are two and a half millionths of a meter and smaller and cannot be seen with the naked eye. High levels of PM_{2.5} in the air can lead to mild to severe human health problems and even premature death. Federal law provides for the protection of human health and safety, and PM_{2.5} levels in the air are regulated under the federal Clean Air Act.

Due to geography, climate, types of emission sources, and population density within the FNSB, the concentrations of PM_{2.5} often exceed the maximum levels set by the Clean Air Act. If PM_{2.5} levels exceed the maximum allowable levels on a regular basis, federal law mandates the development and implementation of a plan to reduce and maintain PM_{2.5} below the regulatory maximums. In the event that a plan is not developed that meets EPA approval and PM_{2.5} levels are not reduced, the federal government can and will impose economic sanctions, including withholding federal funds for highway construction, reducing or eliminating federal expenditures on military bases in the area, and creating additional challenges for the local power plants and refinery to install emission controls or obtain permits.

Balancing an individual's right to economic self-determination against others' life, liberty, and pursuit of happiness may create conflict. The AQ Framework was developed as a tool for the FNSB, recommending methods to reduce PM_{2.5} in the most effective way that protects both the individual's freedom of choice and economic rights and the community's right to a healthy environment. This AQ Framework presents 1) the health needs to reduce PM_{2.5}; 2) the policy, economic, social, and technological challenges faced in doing so; 3) consequences of failure in addressing the problem; 4) a desired future scenario; and 5) limiting factors which includes lack of awareness, affordable clean energy, high emitting equipment, and building energy efficiency. This AQ Framework does not provide a specific plan, and instead provides a suite of ideas, from abstract to specific, focused on moving our community toward solving these challenges. The recommendations include changes to policy, subsidies to reduce emissions, increased communications, and the use of technologies to protect people

from air pollution.¹ The Air Pollution Control Commission (APCC) intends to revisit and revise this AQ Framework every 3 years.

Introduction If we are to protect our health and our economy, it is vitally important that we reduce air pollution in our community. The APCC was established “to develop comprehensive plans for the prevention, abatement, and control of air pollution in the borough.”² Members of the APCC, Alaska Department of Environmental Conservation (ADEC), FNSB residents, and state and locally-elected officials supported the development of this AQ Framework.

Background According to the Environmental Protection Agency (EPA), Congress designed the Clean Air Act to protect public health and welfare from different types of air pollution caused by a diverse array of pollution sources. The Act contains key provisions to control common pollutants, with the intention to protect public health and welfare nationwide. The law requires the EPA to establish national ambient air quality standards (NAAQS) based on the latest science. The EPA also requires states to adopt enforceable plans to achieve these standards.³

The EPA must identify and issue “air quality criteria” for pollutants that “cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare” and “the presence of which in the ambient air results from numerous or diverse mobile or stationary sources.”⁴ After issuing air quality criteria for a pollutant the EPA must establish primary and secondary NAAQS for the pollutant.⁵ Primary NAAQS are standards “requisite to protect the public health” and secondary NAAQS are standards “requisite to protect the public welfare.”⁶

Under the Clean Air Act, states are divided into air quality control regions.⁷ If the EPA issues NAAQS for a pollutant then states must, within three years, adopt and submit

¹ The APCC would like to acknowledge the efforts of the Fairbanks economic Development Corporation, through the Interior Issues Council, who hosted during the months of May and June 2015 nine meetings of interested parties known as the Air Quality Task Force (AQTF). The initial draft of this document is a result of the efforts of these participants.

² Fairbanks North Star Borough Code Chapter 2.48.120

³ Information accessed on June 11, 2015 at http://www.epa.gov/air/caa/pdfs/CAA_Nutshell.pdf.

⁴ 42 U.S.C. § 7408(a)(1) (2012).

⁵ *Id.* § 7409(a)(1)(A).

⁶ *Id.* § 7409(b)(1)-(2).

⁷ *Id.* § 7407.

state implementation plans (SIPs), specifying the manner in which the state will achieve and maintain the NAAQS for each of the state's air quality control regions.⁸

If the air quality in a control region falls short of NAAQS for a criteria pollutant then the region is designated in nonattainment for that pollutant.⁹ States with nonattainment areas are required to devise and carry out additional SIP measures in order to improve air quality.¹⁰ Generally, SIPs must provide for attainment of the NAAQS within five years of a nonattainment designation.¹¹ But the EPA may, after taking into account the severity of the nonattainment and the availability of pollution control measures, conclude that additional time is warranted and extend the period for attainment up to an additional five years.¹²

The Clean Air Act includes provisions to ensure states and local communities submit and implement adequate SIPs. Sanctions are applied if the agency finds a state has failed to submit or carry out an adequate SIP, or if the EPA disapproves a submitted plan.¹³ If the state has not cured the deficiency within 18 months of the EPA's finding or disapproval then the EPA may restrict the state's use of federal highway funds in the nonattainment area or require offsetting emissions reductions, at a two-to-one ratio, for new or modified major stationary sources in the nonattainment area.¹⁴

If the deficiency is not remedied within two years of the EPA's finding or disapproval then the EPA must impose both sanctions.¹⁵ And if the EPA finds a state has not submitted an approvable SIP demonstrating attainment within two years, or if the EPA disapproves a SIP after two-years nonattainment, then the EPA is required to develop a federal implementation plan to ensure air quality improvement.¹⁶

State of Alaska Mandate Article 7, Section 4 of the Alaska Constitution states: "The legislature shall provide for the promotion and protection of public health." The legislature has declared that "[i]t is the policy of the state to conserve, improve, and protect its natural resources and environment and control water, land, and air pollution, in order to enhance the health, safety, and welfare of the people of the state and their overall economic and social well-being." Pursuant to this policy the legislature established the Alaska Department of Environmental Conservation

⁸ *Id.* § 7407, 7410.

⁹ *Id.* § 7407(d).

¹⁰ *Id.* § 7502.

¹¹ *Id.* § 7502(a)(2)(A).

¹² *Id.*

¹³ *Id.* § 7509.

¹⁴ *Id.* §§ 7503, 7509.

¹⁵ *Id.* § 7509(a)-(b).

¹⁶ *Id.* § 7410.

(ADEC). Within the ADEC is the Division of Air Quality, which “prevents, abates and controls air pollution in a cost-effective, accountable manner.” The Division oversees three programs:

- The Air Non-point and Mobile Sources Program is responsible for managing mobile and area air pollution sources. Its mission is to protect public health and the environment by working to achieve ambient clean air standards throughout Alaska.
- The Air Permit Program controls significant, stationary sources of air pollution to protect and enhance air quality, abate air pollution impacts, and ensure protection of public health and the environment.
- The Air Quality Monitoring Program undertakes air quality assessments to provide measurement of air quality conditions to support decision making related to improving or preserving clean air.

FNSB Setting The FNSB is a second-class, general law Borough. “The Borough has the following general powers, subject to other provisions of law . . . To establish and prescribe the functions of a borough department, office, or agency . . . To enforce an ordinance and to prescribe a penalty for violation of an ordinance.”¹⁷

The FNSB is located in the interior region of Alaska and covers 7,444 square miles. The population is approximately 100,000 people living predominantly in and around the cities of Fairbanks and North Pole. There are approximately 41,607 housing units,¹⁸ 153,333 total vehicles,¹⁹ and eight stationary sources which includes power plants or refineries.²⁰ The physiographic setting and climate are described as “sub-arctic interior river valley.” The FNSB is located at the edge of an area where air masses remain in place for long periods of time due to low wind speed and cold temperatures. This stagnating air, combined with wintertime radiative cooling leads to strong lower atmospheric inversions. This is exacerbated in and around the cities of Fairbanks and North Pole because they are surrounded by hills on three sides.

EPA adopted a NAAQS for particulate matter (PM) pollution 2.5 microns or less in diameter (PM_{2.5}). The following table provides the current PM_{2.5} NAAQS.

¹⁷ Information accessed on June 11, 2015 at <http://www.codepublishing.com/AK/FairbanksNorthStarBorough/?FairbanksNSB15/FairbanksNSB1504.html>.

¹⁸ Information accessed on June 9, 2015 at <http://quickfacts.census.gov/qfd/states/02/02090.html>.

¹⁹ Information accessed on June 9, 2015 at <http://doa.alaska.gov/dmv/research/curreg14.htm>.

²⁰ ADEC SIP Appendix III.D.5.6-6.

National Ambient Air Quality Standards Particulate Matter PM _{2.5}		
Averaging Time	Level	Form
24-hr	35 µg/m ³	Not to exceed more than once per year on average over 3 years
3 years	35 µg/m ³	98 percentile, average over 3 years
Annual	12 µg/m ³	Annual mean, averaged over 3 years

In 1997, the EPA established the first annual and 24-hour NAAQS for PM_{2.5}. In 2006, the EPA strengthened the 24-hour ambient PM_{2.5} standard from 65 micrograms per cubic meter (µg/m³) to 35 µg/m³. States were required to examine monitoring data collected within their communities and to make designation recommendations based on the new standard by December 2007. Compliance with ambient air quality standards is based on the calculation of a “design value” for individual monitors consistent with the calculation of the applicable standard. For the 24-hour ambient PM_{2.5} standard, the design value is calculated from the 3-year average of annual 98th percentile values.

In 2009, the EPA designated Fairbanks as nonattainment for the 24-hour PM_{2.5} standard using measurements collected at the State Office Building over the previous 3-year period, 2006 – 2008. The 98th percentile value for each of those years was 42.2 µg/m³, 33.1 µg/m³ and 46.7 µg/m³; collectively they produced a PM_{2.5} design value of 41 µg/m³ for the 3-year period ending in 2008. Design values are updated each year, based on the previous 3-years of data.²¹

Source of FNSB PM_{2.5} Emissions PM_{2.5} within the nonattainment area consists mainly of organic carbon, sulfate, nitrate, and ammonia. And in the summer, wildfires can contribute to PM_{2.5} exceedance days. To determine the exact local PM_{2.5} sources, the FNSB examined air pollution from three permanent air quality monitoring stations in downtown Fairbanks: a multi-pollutant station at the FNSB Administrative Center; a micro-scale station at the Old Post Office building; and a neighborhood-scale station at the State Office Building. In 2012 the North Pole Fire Station on Hurst Road (also known as North Star Fire Station), a micro-scale station, also began collecting air pollution measurements.

According to Ward et al²²

²¹ State of Alaska Fairbanks PM_{2.5} Moderate State Implementation Plan December 24, 2014

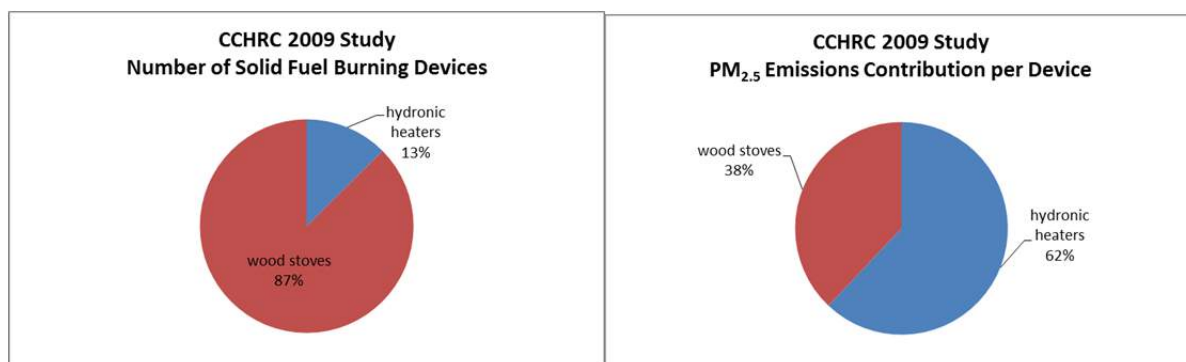
²² Source Apportionment of PM_{2.5} in a Subarctic Airshed - Fairbanks, Alaska, Aerosol and Air Quality Research, 12: 536–543, 2012 .

In an effort to understand the sources of PM_{2.5} in the Fairbanks airshed, source apportionment using Chemical Mass Balance (CMB) modeling was conducted at four locations in Fairbanks over a three-winter period (2008/2009, 2009/2010, and 2010/2011). At each of the four sites, PM_{2.5} concentrations averaged between 22.5 ± 12.0 µg/m³ and 26.5 ± 18.9 µg/m³, with frequent exceedances of the 24-hour NAAQS on the scheduled sample days. The results of the CMB modeling revealed that wood smoke (likely residential wood combustion) was the major source of PM_{2.5} throughout the winter months in Fairbanks, contributing between 60% and nearly 80% of the measured PM_{2.5} at the four sites. The other sources of PM_{2.5} identified by the CMB model were secondary sulfate (8–20%), ammonium nitrate (3–11%), diesel exhaust (not detected-10%), and automobiles (not detected-7%). Approximately 1% of the PM_{2.5} was unexplained by the CMB model. Additional research is needed to confirm the wood smoke results of the CMB model, as well as determine which sources (fuel oil residential heating, coal combustion, etc.) contribute to the measured secondary sulfate.

In 2009, the Cold Climate Housing Research Center (CCHRC) completed a study which calculated the contribution of PM_{2.5} emissions from various wood burning devices. CCHRC referenced a 2005/2006 Sierra Research survey²³ which inventoried FNSB wood burning devices and how they were used (such as all day, only night/weekends, not at all) and then used that data along with PM_{2.5} emission rates (grams/hour) from wood burning devices to calculate the resulting PM_{2.5} emissions. The survey estimated there were 10,420 wood stoves in the nonattainment area, and they emitted approximately 214 tons of PM_{2.5} per year. The study also indicated there were approximately 1,500 wood fired hydronic heaters in the nonattainment area and they emitted approximately 350 tons of PM_{2.5} per year, more than any other residential source. Thus solid fuel hydronic heaters representing 13% of the Solid Fuel Burning Appliances (SFBA) (1500/11,920) in the non-attainment area contributed approximately 62% of the total tons of PM_{2.5} per year resulting from SFBA's (350 tons/564 tons).²⁴

²³ Dulla, Bob, Frank Di Genova. March 18th, 2008. Subject: Fairbanks Home Heating Survey, Winter 2007-2008

²⁴ Cold Climate Housing Research Center, Reducing PM_{2.5} Emissions from Residential Heating Sources in the Fairbanks North Star Borough, February 23, 2009 (p. 14) as cited in ADEC's Final 2014 SIP.



FNSB PM_{2.5} Monitoring Data Because FNSB is one nonattainment area with potentially multiple airsheds, meeting the Clean Air Act standard is difficult but achievable. The city of Fairbanks three-year air quality average has recently decreased and is close to meeting the Clean Air Act 24-hour standard of 35 micrograms of PM_{2.5} per cubic meter known as an exceedance day. The number of exceedance days at the North Pole monitoring site is well above the Clean Air Act Standard.²⁵

According to the ADEC in its draft monitoring plan for 2014/2015, the Alaska Monitoring NAAQS Summary for PM_{2.5} for 2011, 2012, and 2013 at the NCore site located at 809 Pioneer Road (installed in December 2010) and at the North Pole Fire Station on Hurst Road (installed in March 2012) were as follows:

TARGET: NAAQS 35 µg/m³ (24-Hr, 98th percentile)

Site	2011	2012	2013	2014	2015
NCore Site	33.1	50.0	36.2	31.6	36.7*
North Pole Fire #3	NA	NA	NA	139	111.6*

* Preliminary data

24-Hr, 98th percentile, average over 6 month winter sampling season

Site	2011	2012	2013	2014
North Pole Fire #3	No Data	158.4	121.6	139

TARGET: NAAQS 12 µg/m³ (Annual mean)

²⁵ ADEC Annual Air Quality Monitoring Network Plan 2014-2015 (Public Notice Draft)

Site	2011	2012	2013	2014	2015
NCore Site	10.4	11.3	10.5	10.4	10.0*
North Pole Fire #3**	No Data	16.8	29.1	No Data	No Data

* Preliminary Data

* **Not an actual annual mean, data collected over 6 month period during winter season

In summary, significant investment in monitoring and research has been expended to define the nature and magnitude of air quality issues in the Fairbanks area. This information has provided a basis upon which mitigation measures have been discussed and continue to be debated. What is clear is that action needs to be taken by all stakeholders in the FNSB to improve air quality, protect public health, and reduce the direct and indirect costs associated with poor air quality. Ultimately, these actions need to work toward achieving Clean Air Act standards.

Health Effects of PM_{2.5} Wood smoke is especially harmful to children, pregnant women, the elderly, and people with lung and heart disease.²⁶ Wood smoke is a mixture of solids, gases, and liquids. Much like cigarette smoke, wood smoke contains hundreds of air pollutants that can cause cancer and other health problems. The particles in smoke are tiny bits of solids and liquids produced by incomplete combustion. Breathing air with wood smoke in it causes inhalation of fine particles deeply into the lungs. The particles contain toxic substances that can remain in the lungs for months, causing changes that lead to diseases and structural damage. These 2.5 micron diameter particles are so small they get past the respiratory tract's defenses and reach the deepest areas of the lungs (the alveoli, tiny air sacs where oxygen enters the blood stream).

Many other harmful substances, such as toxic organic chemicals, can be carried into the lungs by fine particles. An organic chemical is any chemical containing carbon and hydrogen. Many organic chemicals in wood smoke contribute to health problems in the respiratory tract. Examples of harmful organic chemicals of concern in wood smoke include: benzene, formaldehyde, acetaldehyde, acrolein, and polycyclic aromatic hydrocarbons (PAHs).²⁷

²⁶ Affidavit of Dr. Ali Hamade in Case No. 4FA-13-01205CI, State of Alaska v. Straughn, January 22, 2013.

²⁷ Naeher, Luke P. et al. Woodsmoke Health Effects: A Review. Inhalation Toxicology, 19:67-106, 2007.

Breathing wood smoke can have short- and long-term effects. Some of the short-term effects include: irritated eyes, throat, sinuses, and lungs; headaches; reduced lung function, especially in children; lung inflammation or swelling; increased risk of lower respiratory diseases; more severe or frequent symptoms from existing lung diseases (such as asthma, emphysema, pneumonia, and bronchitis), and risk of heart attack and stroke. Other long-term effects include: chronic lung disease including chronic bronchitis and emphysema (COPD), chemical and structural changes in lungs, and cancer.²⁸

Adults with normal health generally have better resistance to most effects of wood smoke. However, they may feel shortness of breath and notice it is more difficult to exercise. They may also notice irritated eyes, sore throats, phlegm, chest tightness, headaches, and allergy symptoms. Although anyone can have health effects from wood smoke, those most likely to be affected even at low levels are: infants and children, the elderly, pregnant women, and adults with existing heart or lung conditions.²⁹

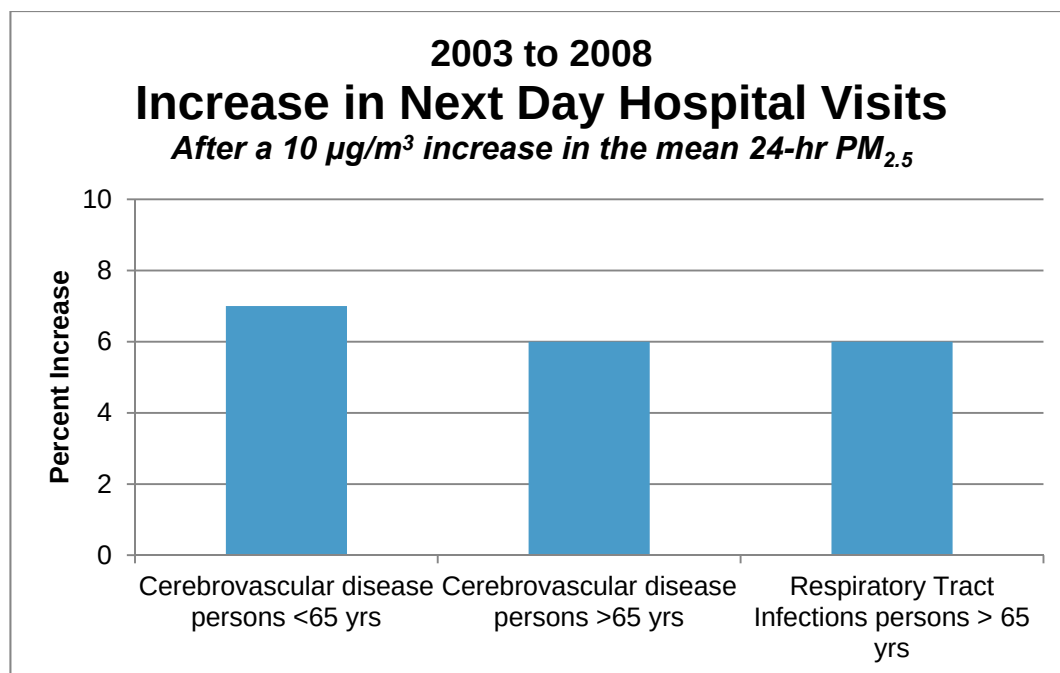
PM_{2.5} is a particle small enough to enter the bloodstream and cause immediate or consequential human health impacts. Sources that emit PM_{2.5} can also emit even smaller particles that can enter a human cell causing other health impacts.

For the period 2003-2008, the State of Alaska Department of Health and Social Services (ADHSS) reviewed Fairbanks Memorial Hospital data and FNSB PM_{2.5} air monitoring data to determine if increases in PM_{2.5} concentrations were associated with increases in hospital visits for selected cardiac and respiratory conditions.³⁰ A total of 5,718 hospital visits consisting of 1,596 emergency room visits and 4,122 hospitalizations were analyzed; the mean 24-hr PM_{2.5} level was 20.1 µg/m³. According to the report, hospitalizations for the following health conditions were statistically significantly associated with increased mean 24-hr PM_{2.5} levels:

²⁸ Affidavit of Dr. Ali Hamade in Case No. 4FA-13-01205CI, State of Alaska v. Straughn, January 22, 2013.

²⁹ Ibid.

³⁰ ADHSS Association between Air Quality and Hospital Visits — Fairbanks, 2003–2008, Bulletin 26, August 2010.



In summary, these results indicate that increased concentrations of ambient PM_{2.5} levels in FNSB were associated with increased risk of hospitalizations due to cerebrovascular disease in all persons and respiratory tract infections all persons aged >65 years during the study period.

According to the American Lung Association³¹, lung disease diagnoses amongst the FNSB population have increased between 2011 to 2014 at representative rates of pediatric asthma by 22.8% (n= 1,775 to 2,180), adult asthma by 9.3% (n=6482 to 7,074), and COPD by 7.2% (n=2900 to 3810). Cardiovascular disease diagnoses have been made for 5.8% of the population.

On January 29, 2015, a representative of the Fairbanks Memorial Hospital testified to the FNSB Assembly that, between 2009 and 2014, there was a positive correlation between elevated PM_{2.5} concentrations and hospital admittance for respiratory complaints such as wheezing, shortness of breath, and a cough.³²

While research links air pollution with increased illnesses in children, including documented increased rates of school absenteeism,³³ a similar correlation cannot be

³¹ American Lung Association, State of the Air Report 2012 and 2015, accessed on June 1, 2015 at <http://www.stateoftheair.org/2015/states/Alaska/>

³² Testimony of Shawn X. Zhan to FNSB Assembly, January 29, 2015.

³³ Noonan CW, Ward TJ, Navidi W, Sheppard L, Bergauff M, Palmer C. 2011. Assessing the Impact of a Wood Stove Replacement Program on Air Quality and Children's Health. Research Report 162. Health Effects Institute, Boston, MA.

made with an FNSB school district reference because the FNSB school district does not report data in this manner.

State of Alaska's Response to the Problem Based upon historical measurements of FNSB PM_{2.5} levels, in 2006 the EPA notified the State of Alaska and the FNSB that average daily amounts of air-borne particulate matter in parts of the FNSB exceed the level deemed healthy by the Clean Air Act. The EPA designated FNSB as noncompliant on December 18, 2009. Noncompliance triggered a requirement to provide a SIP that demonstrated a path to attainment by December 2012. Due to lawsuits the EPA pushed that date back to December 31, 2014.

Pursuant to section 107(d) of the Clean Air Act, EPA must designate as “nonattainment” those areas that violate the NAAQS and those areas that contribute to violations. The Clean Air Act prescribes the methodology to consider “pollutant emissions, air quality data, population density and degree of urbanization, traffic and commuting patterns, growth, meteorology, geography and topography, jurisdictional boundaries, and level of control of emissions sources.” In 2007, ADEC worked with the FNSB and the EPA to describe and designate the area not meeting the established standards.

Initial evaluation of possible control measures and model development with those various measures began and continued from 2011 through 2013. In September 2013 ADEC released proposed regulation changes for the non-attainment area pertaining to open burning, wood-fired heating device visible emission standards, solid fuel-fired heating device fuels, wood-fired heating device standards, and PM_{2.5} air episode and advisories. ADEC announced a plan to take comments through the Fall of 2013, incorporate comments into a draft Moderate SIP in early 2014, conduct a final 30-day public comment period, and submit the SIP to EPA by May 2014. However, after the closure of the public comment period the draft SIP was not released for public comment until November 17, 2014. The final SIP was submitted to the EPA on December 31, 2014 and the proposed regulations became effective on February 28, 2015.

Access to affordable and abundant natural gas is paramount to substantially reducing PM_{2.5} emissions in the FNSB. In a borough with over 100,000 residents, currently only about 1,100 commercial and residential properties have access to natural gas. To deliver natural gas to the most people possible and minimize air pollution as soon as possible, the State of Alaska, along with the FNSB community, has taken several steps in the past few years through the creation of the Interior Energy Project (IEP).

The IEP has three main goals:

- 1) Boost the economy of the Interior by lowering heating costs.

- 2) Improve public health concerns by significantly reducing air quality PM 2.5 levels.
- 3) Help avoid federal funding sanctions if the air quality does not improve.

Interior utilities, Interior Gas Utility (IGU) and Fairbanks Natural Gas (FNG) are both project entities within the IEP.

Funding for the IEP was provided in sponsored legislation – namely SB 23 in 2013 totaling over \$332.5 million for the delivery, transportation and distribution of LNG to Interior Alaska communities.

The IEP funding package includes a collaboration of legislation including SB 23 and others equaling \$150 million in bonding authority, \$125 million in low-interest loan availability, \$30 million in tax credits for construction of natural gas storage facilities and \$57.5 million in zero percent interest grants to assist the community in achieving its goals of providing \$15/mcf gas (roughly \$2.00/gal fuel oil) to as many FNSB residents as businesses possible, as quickly as possible.

To date, IGU has received about \$38 million and FNG has received about \$15 million through low cost, tax-free loans and grants from the State of Alaska, administered by the Alaska Industrial Development and Exploration Authority (AIDEA). Additionally, the FNSB has authorized a \$7.5 million line of credit for the IGU, as well as a \$3 million capital grant from the State administered by the FNSB. The IGU distribution system is estimated to cost about \$300 million. This price does not include storage or transportation costs.³⁴

In 2015, the Interior Gas Utility installed about 72 miles of pipe in the City of North Pole and the surrounding area south to Dyke Road and north to Hurst Road. The 2 inch to 8 inch high density polyethylene (HDPE) pipe runs in front of 2,200 homes available to hook up to the system, with project costs equaling \$20 million. Phase 1 included partnerships with over a dozen contracting, permitting and construction agencies, crossing the Alaska Railroad in five areas and the Trans-Alaska Pipeline (TAPS) for the first time in their history by a pipeline not owned or controlled by Alyeska Pipeline Service Company.

Fairbanks Natural Gas (FNG), the current supplier to 1,100 residents and businesses in the FNSB community, expanded their distribution system by an additional 60 miles from 2014 to 2015. The FNG system is currently capable of serving an additional 3,500 residents with a natural gas supply if there were additional LNG storage.

³⁴“FAQ” Interior Gas Utility. 2013. Web. Accessed April 14, 2016.

AIDEA purchased Fairbanks Natural Gas in 2015, with plans to combine the two utilities for better efficiency and lower costs in serving the community with an affordable natural gas option. Initially, this acquisition has reduced rates to current FNG customers while negotiations are underway for transitional ownership and the planned sale to IGU, expected in 2016.

Due to the various efforts and delays of the IEP since its inception in 2013 and a significant drop in oil prices, GVEA, who was considered a possible tenant anchor, secured a 12-year contract to buy a new naphtha fuel blend instead of waiting for a natural gas project to come to fruition.³⁵ GVEA, however, has expressed interest in taking 2.5 million gallons of LNG should the price be competitive. GVEA has committed to take 0.6 bcf of gas to help the project by taking gas in the summer when other users would not need gas for heating. Storage capacities for residents are mandated to have a 5-day reserve and LNG processing plants are anticipated to begin construction in fall of 2016.

In March 2016, AIDEA announced that Salix, a subsidiary of Avista Corporation, was chosen as a finalist to produce LNG from southcentral Alaska (Cook Inlet) for Interior use with an anticipated delivery date of 2018. Delivery to the burner tip is targeted at a price of \$14-17 per thousand cubic feet or the equivalent of \$2 per gallon of home heating oil.³⁶ The reduction in energy costs and air pollution are considered large motivators for conversions from heating oil to natural gas at these prices.

ADEC Response to the Problem In response to the failure to meet the Clean Air Act standards, ADEC has implemented a suite of control measures and made information available to the public. Enforcement of ADEC regulations can only be accomplished through cease and desist orders and ultimately court procedures. The most well-known instance in Fairbanks, *Alaska v. Straughn*, was focused on outdoor wood boiler emissions and led to multiple court events and dozens of dockets over a seven-month period.³⁷

³⁵ Buxton, Matt. "New GVEA Fuel Contract Worries Backers of Natural Gas for Fairbanks." Fairbanks News Miner. N.p., 15 Dec. 2015. Web. 14 Apr. 2016.

³⁶ IEP Natural Gas Conversion Analysis. 2014. Prepared for AIDEA by Cardno Entrix. Ch. 39 SLA 2015.

³⁷ Case number 4FA-13-01205CI, information accessed on July 8, 2015 at http://www.courtrecords.alaska.gov/eservices/?x=EH*tNFLDzxby5R7WlCJWSz6qgx5MITn6Cw74Z6ydUT31fTGNP0C4fZau5wzqCHdEYT*MtdZfePDi5h*3f19n8A.

ADEC submitted a Moderate SIP to EPA in December 2014 and EPA found the Moderate SIP officially “complete” on February 18, 2015. Now EPA has up to June 2016 to review the SIP and make a finding of adequacy. They can approve, partially approve, or disapprove all or parts of the SIP. If any part of the SIP is disapproved, ADEC will be required to address the deficiencies with a SIP amendment.

ADEC anticipates the EPA will designate Fairbanks as a Serious Area for non-attainment in June 2016 triggering a requirement to submit a Serious SIP by December 2017. Thus, ADEC began Serious SIP development in January 2015 in order to meet the December 2017 deadline for submission to EPA.

Anticipating mandatory Best Available Control Technology (BACT) for stationary sources upon Serious non-attainment designation by EPA in 2019, ADEC has requested that owners and operators of eight stationary sources voluntarily conduct and submit a preliminary BACT analysis by December 2015 and a final by March 2016. ADEC begins Serious SIP modeling in March 2016. ADEC anticipates having a draft Serious SIP for public review by December 2016, public notice and hearings in February 2017, and submission to EPA by December 2017.

City of Fairbanks Response to the Problem Responding to the problem of non-attainment and pending federal sanctions, on May 18, 2009 the Fairbanks City Council adopted Ordinance No. 5775 whereby “no hydronic heater may be installed inside the City of Fairbanks after June 8, 2009 without a permit issued by the City of Fairbanks Building Department. No permit shall be issued until standards are adopted by the Fairbanks City Council.” On October 22, 2012 Ordinance No 5903 amended Fairbanks General Code Chapter 34, Article VI Section 34-201 to include the stipulation that permits for the upgrade or replacement of existing hydronic heaters may be issued if the upgraded or replacement heater is qualified by the EPA.

During the period from 2009 through 2014, Aurora Energy expanded the system distributing steam building heat in the Fairbanks city core. It is estimated that the equivalent displacement of heating oil is 326,400 gal/yr.³⁸

FNSB Response to the Problem Since 2009 there have been several Borough Assembly and Voter Initiatives to resolve the PM_{2.5} issue. Key actions are represented in Figure 1, FNSB Assembly Activity & Voter Initiative Timeline. Actions moving the Borough forward to resolve this problem is designated by green boxes. Actions creating barriers to resolve this problem is designated by red boxes.

³⁸ Per David Fish, Aurora Energy, August 16, 2015 email correspondence

Appendix G

NEI Air Quality Report

Fairbanks North Star Borough Gas Distribution System Analysis



June 29, 2012

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price differential between propane and heating fuel is less than the price difference between natural gas and heating fuel.

The present value of costs of an alternative using natural gas and propane to meet the heating and industrial demand is estimated at approximately \$5.25 billion in 2012 dollars. This amount includes the cost of the fuels, conversion costs for replacing the existing furnaces or boilers, and the capital and operating costs for the piped distribution system. This estimate also includes the cost of new propane trucks and tanks to serve the low-density area of the borough; similar to the status quo, estimated costs for the high, medium, and low-density areas of the borough are presented in the table. The \$5.25 billion also assumes that the distribution system is operated by a private company, which results in a more conservative comparison since government or cooperatives would be expected to have lower costs, as discussed later in the report (see Sections 4.1 and 7).

The net present value expressed in 2012 dollars of the potential cost savings from converting to lower cost natural gas and propane is estimated at approximately \$5.36 billion over the 50-year study period.

Air Quality

Project air quality engineers prepared an analysis of the potential effects on air emissions from conversion to natural gas-fired space heating systems in the residential and commercial sectors of the three zones noted earlier. This analysis estimates the annual amount of criteria pollutant emissions in each demand zone for each year of the conversion effort.

Criteria pollutants are regulated pollutants under the Clean Air Act, and include:

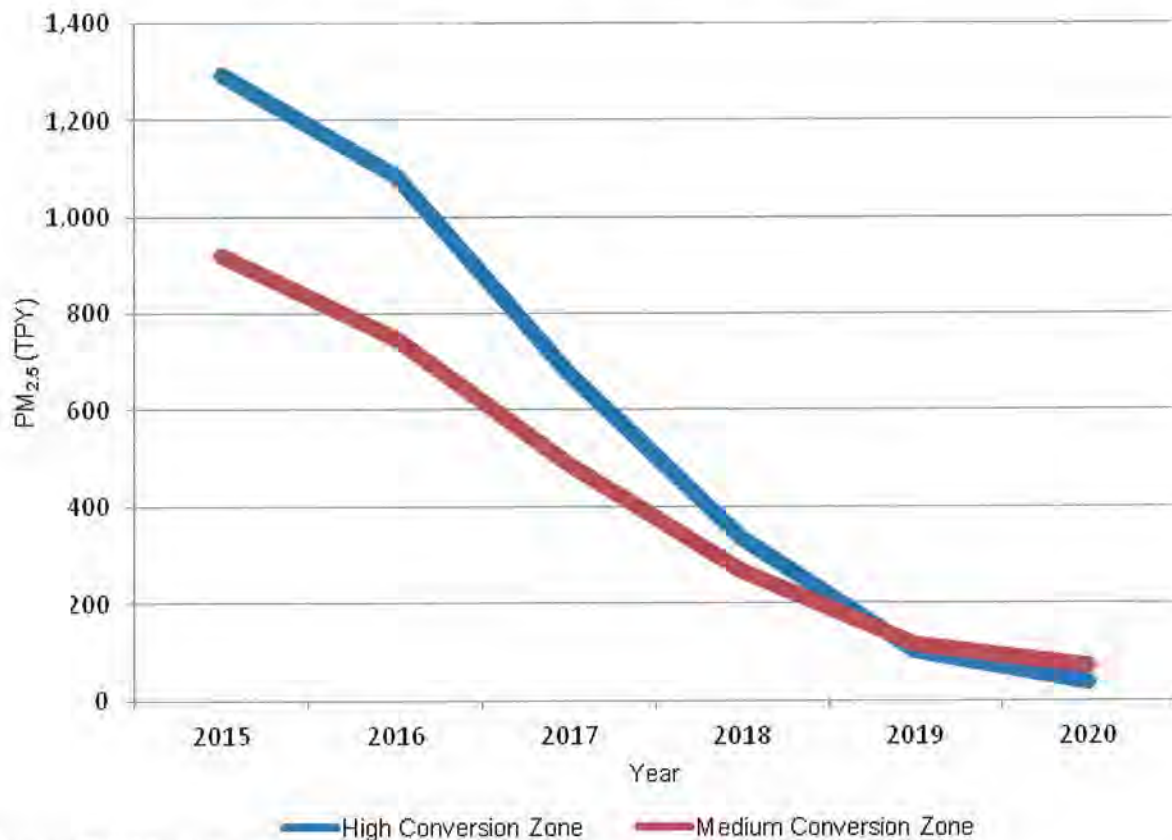
- Oxides of nitrogen (NO_x),
- Carbon monoxide (CO),
- Particles with an aerodynamic diameter less than or equal to 10 micrometers (PM₁₀),
- Particles with an aerodynamic diameter less than or equal to 2.5 micrometers (PM_{2.5}),
- Sulfur dioxide (SO₂), and
- Volatile organic compounds (VOC).

Emissions of each criteria pollutant are expected to decrease substantially based on the conversion scenarios presented in this report.

Of particular concern to the FNSB is the criteria pollutant PM_{2.5}, also known as fine particulate matter. The United States Environmental Protection Agency (EPA) has designated portions of the Fairbanks and North Pole areas as a nonattainment area for PM_{2.5}, as shown in Figure ES-1. The EPA regulates PM_{2.5} because it can cause or aggravate serious health problems, including asthma, bronchitis, and heart attacks. Further, the nonattainment designation negatively affects economic growth due to air quality permitting constraints that apply in nonattainment areas.

The analysis demonstrates that converting to natural gas use for heating will reduce the overall emissions of PM_{2.5} in the Fairbanks area. Figure ES-3 illustrates the estimated change in PM_{2.5} emissions from residential and commercial sources in the high and medium-demand zones. Total PM_{2.5} emissions decrease from approximately 2,200 tons per year to less than 200 tons per year. The analysis makes clear that conversion of residential heating systems from wood-fired and coal-fired to natural gas-fired is essential to achieving reductions in PM_{2.5} emissions.

Figure ES-3. PM_{2.5} Emissions Estimates, High and Medium Demand Areas, 2015 to 2020, in Tons of Pollutant per year.



Source: SLR International

The conversion to natural gas will also reduce NO_x and SO₂ emissions, which are precursors to the formation of secondary PM_{2.5} in the atmosphere. These emission reductions will help bring the Fairbanks area into attainment with the ambient PM_{2.5} air quality standard.

The emissions reductions presented here reflect the changes associated with the piped natural gas systems in the high and medium-demand areas or propane systems in the low-demand area. Emissions from facilities in the industrial sector, as described in Section 2, are not included in this analysis.

If the Fairbanks area converts many of the existing space heating emission units to natural gas combustion, water vapor emissions will likely increase. These additional water vapor emissions do not necessarily mean that ice fog events will become more common because the frequency of the meteorological conditions that trigger ice fog events will not increase. However, the ice fog events that do occur may have slightly longer duration and may cover a slightly larger geographic area.

Decision Points

The purpose of this report section is to identify if there were zones or areas where the costs of converting to natural gas and propane were greater than the costs of using distillates and wood. As noted in the BCA discussion (Section 8), the benefit-cost ratio for each of the three density areas (high, medium, and low) is very positive, so there is no need to phase the project or to not undertake development of the distribution system in any area.

10 Air Quality

Conversion of heating system fuels such as wood, oil, and coal to natural gas will reduce the emissions of criteria air pollutants in the Fairbanks area. Criteria pollutants are regulated pollutants under the Clean Air Act, and include oxides of nitrogen (NO_x), carbon monoxide (CO), particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (PM₁₀), particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers (PM_{2.5}), sulfur dioxide (SO₂), and volatile organic compounds (VOC).

An analysis has been prepared to estimate the annual amount of criteria pollutants emitted from the heating systems for existing residential and commercial buildings in the FNSB. Emissions from facilities in the industrial sector, as described in Section 2, are not included in this analysis. Table 21 provides a summary of the estimated current emissions from these sources, distributed between the high, medium, and low-demand areas as described in Section 2.4. Note that the high and medium-demand zones together approximate the area designated as the PM_{2.5} nonattainment area.

Table 21. Summary of Existing Emission Estimates in the FNSB, by Zone

Zone	Category	NO _x (tpy)	CO (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)	SO ₂ (tpy)	VOC (tpy)
High	Residential	399	12,672	1,505	1,294	452	9,592
	Commercial	347	203	59	54	534	10
	Total	746	12,875	1,564	1,348	986	9,602
Medium	Residential	278	8,815	1,047	900	315	6,672
	Commercial	61	36	10	10	94	2
	Total	339	8,851	1,057	909	409	6,674
Low	Residential	83	2,679	318	274	96	2,028
	Commercial	24	114	6	5	36	4
	Total	108	2,793	324	279	131	2,033
Overall	Residential	760	24,166	2,871	2,467	863	18,292
	Commercial	433	353	75	68	664	16
	Total	1,193	24,519	2,946	2,536	1,526	18,308

Source: SLR International Corp 2012

Note: All emissions are in terms of tons of pollutant emitted per year (tpy).

The residential emissions estimates were calculated using data from the 2010 Fairbanks Home Heating Survey report, prepared by Sierra Research for the Alaska Department of Environmental Conservation. This survey estimated the number of residential heating devices, types of fuel used, and amount of fuel used in the PM_{2.5} nonattainment area. Four categories of fuel are used for space heating in residential buildings: wood, oil, coal, and natural gas. The oil category includes fuel oil, diesel, and kerosene. The same fuels are used for space heating in commercial buildings. Fuel combustion efficiency varies depending on the type of heating device used and the fuel being combusted. Existing emissions were calculated by applying the fuel use ratios to the demand estimates discussed in Section 6.2.1 (in terms of Btu of natural gas input), adding the existing natural gas consumption to the fuel use tally, adjusting the demand for each fuel based on the average combustion efficiency of that fuel compared to natural gas, and converting the heat input demand into fuel consumption for each of the fuel categories. Demand in the low zone is discussed in Section 6.2.1 in terms of propane. The heat demand in this zone was originally calculated in terms of Btu of

natural gas input; therefore, the low zone demand numbers did not require additional adjustment prior to the emission calculations.

Annual emission estimates were calculated using an EPA reference document, AP-42, Compilation of Air Pollutant Emission Factors, Section 1 (EPA 2010). Emission estimates for PM₁₀ and PM_{2.5} may differ from the PM emissions in the analyses being prepared as part of the PM_{2.5} State Implementation Plan (SIP). The FNSB and the contractor preparing the SIP analyses, Sierra Research, are currently in the final stages of development of Alaska-specific PM emission factors. These emission factors are based on source testing of commonly used heating devices and locally available fuels in the FNSB. Preliminary discussions indicate that the Alaska-specific PM emission factors may be substantially lower than the PM emission factors provided in AP-42.

The same method described above was used to calculate the emission estimates for the commercial sources, except the fuel type use data were provided by Sierra Research (Sierra Research 2010). Wood was not included in the fuel type use data for commercial sources. The calculation method assumes that the fuel use ratio is the same in the high, medium, and low-demand zones.

10.1 Non-attainment Area

Particulate matter is a pollutant of special concern in the Fairbanks area. Exceedances of the ambient air quality standard for PM_{2.5} have been measured in Fairbanks. As a result, EPA has designated portions of the Fairbanks and North Pole areas as a nonattainment area for PM_{2.5}. This nonattainment area is portrayed in Figure 2. Because of the very small size of the particle, PM_{2.5} can reach deeply into human respiratory systems and cause or aggravate serious health problems, including asthma, bronchitis, and heart attacks. PM_{2.5} can be emitted directly from sources of combustion and can also form when gases emitted by combustion react in the air (EPA 2012).

The nonattainment designation for the Fairbanks area is a cause for concern for several reasons. First, the local population is at increased risk for respiratory and circulatory health problems. Secondly, the designation negatively affects economic growth in the area. Air quality permits for any commercial or industrial activity cannot be obtained if the activity will increase the amount of PM_{2.5} emissions over current amounts. Because of this restriction, growth of existing commercial and industrial activity will likely not occur, and new commercial and industrial activities will likely not take root in the Fairbanks area, until EPA is satisfied that compliance with the ambient PM_{2.5} standard is attained and a plan is in place to maintain compliance with the ambient standard.

Natural gas conversion in Fairbanks will reduce the emissions of PM_{2.5} from residential and commercial facilities. The conversion to natural gas will also reduce NO_x and SO₂ emissions, which are precursors to the formation of secondary PM_{2.5} in the atmosphere. The reduction will help bring the Fairbanks area into attainment with the ambient PM_{2.5} air quality standard. The reduction in emissions is discussed further in Section 10.2.

10.2 Potential Impacts, Conversion to Natural Gas

SLR International Corp's analysis estimates the change in emissions resulting from conversion of the three demand zones to natural gas over a period of six years. The emissions calculations assume that the rate of conversion for each original fuel type is the same except in the low-demand zone, where demand modeling indicates that residential wood burners will likely not begin converting to propane prior to 2021. In the low-demand zone, the emissions calculations assume that residential conversions from coal and oil occur at the same rate, while residential conversion from wood combustion does not occur during the six years of the scenario. The emission calculations also assume that the existing use

of natural gas supplied by FNG remains constant during the years of the analysis. Results of the analysis are shown in Table 22 through Table 24.

Table 22. Estimated Annual Emissions (tpy) After Conversion in the High-Demand Zone, 6-Year Conversion

Pollutant	Category	Existing	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
NO _x	Residential	399	391	355	279	216	172	160
	Commercial	347	330	281	227	199	198	199
	Total	746	721	636	506	415	369	360
CO	Residential	12,672	12,166	10,268	6,389	3,093	795	152
	Commercial	203	199	187	172	165	166	168
	Total	12,875	12,366	10,454	6,562	3,258	961	319
PM ₁₀	Residential	1,505	1,445	1,221	761	371	99	23
	Commercial	59	54	40	24	16	15	15
	Total	1,564	1,499	1,260	785	387	114	38
PM _{2.5}	Residential	1,294	1,242	1,049	655	320	86	21
	Commercial	54	49	37	23	15	14	15
	Total	1,348	1,292	1,086	678	335	101	36
SO ₂	Residential	452	434	366	227	109	27	4
	Commercial	534	471	301	112	14	1	1
	Total	986	905	668	340	123	28	5
VOC	Residential	9,592	9,207	7,763	4,816	2,309	563	73
	Commercial	10	10	10	11	11	11	11
	Total	9,602	9,217	7,774	4,826	2,320	574	84

Source: SLR International Corp 2012

Note: All emissions are in terms of tons of pollutant emitted per year (tpy).

Table 23. Estimated Annual Emissions (tpy) After Conversion in the Medium-Demand Zone, 6-Year Conversion

Pollutant	Category	Existing	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
NO _x	Residential	278	280	249	200	158	129	122
	Commercial	61	62	50	40	35	35	35
	Total	339	343	299	240	193	164	157
CO	Residential	8,815	8,904	7,250	4,714	2,560	1,060	644
	Commercial	36	36	33	30	29	29	30
	Total	8,851	8,940	7,283	4,745	2,589	1,089	673
PM ₁₀	Residential	1,047	1,058	862	562	306	129	80
	Commercial	10	11	7	4	3	3	3
	Total	1,057	1,068	869	566	309	132	82
PM _{2.5}	Residential	900	909	741	483	264	112	69
	Commercial	10	10	6	4	3	3	3
	Total	909	919	747	487	267	114	72
SO ₂	Residential	315	318	259	168	91	37	22
	Commercial	94	95	53	20	2	0	0
	Total	409	413	312	188	93	37	22
VOC	Residential	6,672	6,740	5,482	3,555	1,917	777	460
	Commercial	1.8	1.8	1.8	1.9	1.9	1.9	1.9
	Total	6,674	6,741	5,484	3,557	1,919	779	462

Source: SLR International Corp 2012

Note: All emissions are in terms of tons of pollutant emitted per year (tpy).

Appendix H

2006 Cook Inlet Vessel Traffic Study

Cook Inlet Vessel Traffic Study

Report to Cook Inlet Regional Citizens Advisory Council



December 2006

*Cape International, Inc.
Nuka Research & Planning, LLC.*

states, “During colder winters the cold may extend into the lower Inlet as far south as Anchor Point on the east side and Cape Douglas on the west side. The thickness of the ice varies between 0.5 and 2.0 meters.”

As we conducted the research for this traffic study, reviewed the casualty records, and talked to marine pilots, agents and operators, a succinct description of the water body became quite clear:

“Cook Inlet is a wide, long inlet with moderate to low levels of vessel traffic when compared to other large North America ports, but is a water body vexed by:

- Sudden, severe weather,
- Strong tides, and
- Large ice pans aggressively moved by strong tides in the winter.”

Vessels Trading in Cook Inlet

Cook Inlet supports a wide variety of vessel traffic ranging from the smallest fishing vessel to crude oil tankers. Refined products and crude oil are routinely shipped in and out of the Inlet. In addition, Liquefied Natural Gas (LNG) and ammonia carriers call at the Nikiski Industrial complex. Many crude oil development and production platforms operate in the area. Crude oil and natural gas pipeline crossings exist in Cook Inlet and Turnagain Arm in several locations.

There is only moderate fuel barge traffic through out the inlet since much of the refined oil needed for regional consumption is provided to Anchorage via a pipeline from the Tesoro refinery in Nikiski.

The Port of Anchorage (POA) is a ‘classic’ port in that it imports and exports a variety of goods and raw material in bulk and containers.

Overview of Coastwise and International Traffic

Based on US Coast Guard advance notice of arrival³ records and other local sources of information⁴, 704 large vessels⁵, other than fuel barges on domestic trade, called at Cook Inlet ports from January 1, 2005 through July 15, 2006. As can be seen in Figure 1, almost two-thirds (65%) of the calls were made by container vessels operated by Horizon Lines, roll-on,

3 Required by 33 CFR 160, Subpart C for all vessels carrying certain dangerous cargoes and all vessels at 300 gross tons or greater traveling not carrying certain dangerous cargoes.

4 Horizon Lines, TOTE, and Alaska Marine Highway Systems sailing schedules: www.horizonlines.com, www.totemocean.com, and <http://www.dot.state.ak.us/amhs/>

5 300 gross tons or more in size. This is the Coast Guard’s break point for advance notice of arrival. Gross Tonnage refers to the volume of all ship’s enclosed spaces measured to the outside of the hull framing. It was a measurement of the enclosed spaces within a ship expressed in “tons” – a unit which was actually equivalent to 100 cubic feet. The calculation of gross tonnage is complex but important given that fees, registration requirements and, as seen here, regulatory standards are based on gross tonnage.

two other radars are still functional. In other words, there are degrees of 'loss of maneuverability' that are not obvious within the summary of Coast Guard records displayed in Table 7. These notes also apply to the full list of casualties in Appendix E.

Table 7: Cook Inlet Summary of Vessel Casualties Reported to US Coast Guard June 22, 1990 through August 1, 2006.

Accident or Event	Total	Comments
Allision	27	Includes one allision with oil production platform and one barge damaged by ice.
Capsize	2	
Collision	20	Includes two barge/tug collisions.
Explosion	2	One explosion resulted in subsequent fire, sinking and pollution.
Fire	18	Included cargo hold fire on container ship moored at Port of Anchorage.
Flooding, sinking	40	Includes four abandonments
Grounding	26	
Material Failure	17	
Set Adrift/Breakaway	4	Includes breakaway of Seabulk Pride in February 2006.
Loss of Vessel Maneuverability	69	Includes loss of electric power.
Total	225	
Total, Alaska waters	5,922	

During the period of study, there were 59 casualties resulting in damage to a vessel in excess of \$20,000. In eleven of the incidences, vessel damage exceeded \$250,000. The most significant casualties were M/V Glacier Bay spill in 1987 (which is earlier than the records studied in this report), the capsizing of the barge Oregon in 1997, the Container Ship Greatland cargo hold fire in 2003, and the breakaway of the tankship Seabulk Pride in 2006.

Casualties of Interest¹⁶

1. Explosion and subsequent fire (on board the 113-ft supply vessel Alaska Constructor on November 2, 1988). The explosion ignited a tank truck containing 3,000 gallons of gasoline, thus multiplying the consequences of the casualty. Three lives were lost and the vessel was destroyed. Water pollution was minor.
2. Potential for ammonia release (M/V EEKLO at Agrium Wharf on February 11, 2005): During loading ammonia, an able bodied seaman (AB) inadvertently slacked instead of tightened one of the bow mooring

¹⁶ Sources: (1) Conversation and follow-up e-mail with Lt Ken Phillips, Marine Safety Detachment supervisor Kenai. 1 Nov 2006, (2) Whitney, John. 2002. Cook Inlet, Alaska Oceanographic and Ice Conditions and NOAA's 18-Year Oil Spill Response History 1984-2001, and (3) ADEC records.

wires in heavy (5.7 kt) current and ice coverage. This caused the gas ship M/V EEKLO to move 3-12 feet aft, shifting the loading arm, and subsequently shutting down the loading process. The Coast Guard issued a requirement to secure loading when currents exceed 4kt on the flood.

3. Tow-Tug collision (SCT Barge 282 and tugboat Pacific Challenger near Homer March 22, 2006): The SCT Barge 282 was departing from Pioneer Dock in Homer under the Tugboat PACIFIC CHALLENGER. The tug and barge were about to round the spit in Kachemak Bay when the PACIFIC CHALLENGER rolled in a swell pushing the PACIFIC CHALLENGER into the starboard bow of the SCT Barge 282. At that time no damages were identified. The barge continued onto Port Graham where they discovered damage to the bow. This collision resulted in a fracture in the #1 starboard cargo tank in way of the deck edge. No spill observed. The product in tank #1 was offloaded at Port Graham.
4. Tow-Tug collision (towing vessel Paragon and Barge 344, underway in Cook Inlet, January 21, 2006): The Paragon was struck by the barge it was towing when an ice pan slowed the progress of the Paragon and allowed the barge to overtake it. Barge 344 struck the Paragon's stern causing a 4" wide by 18" long hole in the port forward void space of Barge 344.
5. Ship allision with dock (M/V PEONY at Agrium dock, October 18, 2005): Unexpected heavy weather set the ship into the pier causing structural damage to the pier initially estimated at less than \$100,000. A pilot was requested and arrived on board but was unable to move the ship due to low tide levels. Damage to the vessel is minimal on the port bow and does not affect seaworthiness. Allision was caused by unexpected extreme weather conditions and was ruled unavoidable by Coast Guard investigators.
6. Dragging anchor and near miss in Kachemak Bay (Informal report by the Coast Guard). Two Coast Guard marine safety personnel were on board the M/V STEWART ISLAND conducting an ice rules boarding when it began to drag anchor. The wind was 'blowing pretty hard'. The STEWART ISLAND came within 30-40 yards of colliding with the SEABULK PRIDE, which was anchored as well. Anchoring guidelines for Kachemak Bay were written as a result. See Appendix D.
7. Container ship fire (M/V Greatland at the Port of Anchorage, May 19, 2002): Shortly after mooring at the Port of Anchorage, personnel on the container ship M/V Greatland discovered a fire in one of the cargo holds. Trained marine firefighters from the Anchorage Fire Department entered the compartment and found several school buses smoldering.

They extinguished the fire and there was no serious damage to the vessel. The fire was believed to have originated from a small fuel oil leak on one of the buses. This was the first serious marine fire at Port of Anchorage since the 1960's.

8. Freight Barge capsized (Crowley Barge OREGON, south Cook Inlet, January 25, 1997) . This barge suffered a breach (hole) amidships, took on water, and overturned. The entire load of 12,500 tons solid urea was lost.
9. Vessel collision with a moorage (M/V Chesapeake Trader and Christy Lee Dock, January 1, 1998). While coming along side, the Chesapeake Trader hit and damaged the catwalk of the moorage. Damage to the vessel was superficial, but the moorage catwalk needed to be replaced, costing \$425,000.
10. Freight ship breakaway (M/V OCEAN LAUREL, Nikiski, January 31, 1999). While moored at the pier during periods of heavy icing the vessel was struck by a large pan of ice, estimated to be $\frac{3}{4}$ mile in length. The vessel was sheared off the pier, parting 19 mooring lines, and struck the pier face, resulting in approximately \$40,000 in damage to the mooring structure and \$20,000 in damage to the vessel. The hull was indented in two locations above the waterline along the portside.
11. Tank barge breakaway (T/B ENERGIZER, Nikiski, January 19, 2000). The barge was moored to the Kenai Pipeline (KPL) dock when it was struck by a large pan of ice, parting mooring lines and the cargo transfer hose. Approximately 60 gallons of isomerate (an oil distillate used in blending gasoline) spilled into the water. The barge cargo pipe header and deck crane were damaged.
12. Freight ship breakaway (M/V TORM PACIFIC, Nikiski, January 20, 2000). The ship was moored portside to the Alaska Nitrogen Products Terminal (Agrium) when it was struck by a large pan of ice moving at approximately 5.3 knots. The vessel was sheared from the pier, parting 24 mooring lines, and struck the terminal's northern catwalk. The catwalk was destroyed and the ship sustained some damage above the waterline.
13. Tank ship breakaway (Seabulk Pride, Nikiski, February 2, 2006). This 601-foot double-hull oil cargo tanker, broke free of its moorings at Kenai Pipeline Dock, Nikiski. It drifted north until grounding about a half mile away along the bluff at the East Forelands. Initial investigations indicate that heavy ice and strong tidal currents were main factors in causing the breakaway. The vessel was re-floated without significant oil spillage. However, catastrophe was narrowly averted, given the numerous rocks and reefs in the vicinity.

Pollution from Vessels

Between January 1, 1992 and August 30, 2006 there were 295 oil spills reported to the Coast Guard from vessels operating in Cook Inlet. Of that total, 286 were spills not connected to a vessel casualty (grounding, collision, fire, or sinking). One hundred and twenty eight (128) spills (43% of the total) were small diesel or gasoline spills from fishing vessels and pleasure craft. All the spills were reported as “not serious”. This means that the Coast Guard classified the spills as minor.¹⁷

During the same period there were 333 spills reported from the 15 Cook Inlet oil production platforms.

Between 1996 and 2002 ADEC reported 126 spills in Cook Inlet from vessels.¹⁸ All were minor. All spills combined only contributed 7415 gallons of the 500,359 gallons of oil spilled in the Cook Inlet sub-area during that period.

Most significant spills of the past 20 years have come from oil platforms or on-shore facilities. Vessel spills¹⁹ of interest include:

- On July 2, 1987 at 0334, the tank ship Glacier Bay grounded south of the mouth of the Kenai River while enroute Nikiski to offload North Slope crude oil. Hull damage resulted in a 130,000 gallon spill. The vessel reportedly ran aground on an uncharted rock. (Note: This incident is a pre-spills database era report.)
- Spill response vessel M/V Sun Tide collision with the jack-up drilling rig, Gilbert Rowe, on August 23, 1993. The collision ruptured a fuel oil tank on the Sun Tide, releasing 6000 gallons of diesel fuel.
- Five hundred gallon light oil spill during loading operations on the tank barge Annahootz at the Port of Anchorage on September 1, 1994.

As can be seen, significant oil spills from vessels are rare. Furthermore, ADEC and Coast Guard records of the minor spills over the last 14 years do not provide any particular insights that would assist prevention and response planning for major or high consequence vessel spills.

¹⁷ The US Coast Guard categorizes oil spills into these sizes: minor - less than 10,000 gallons; medium - 10,000 to 99,999 gallons; and major - 100,000 gallons or more.

¹⁸ ADEC. Statewide Summary of Oil and Hazardous Material Spill Data July 1, 1995 - June 30, 2002 (provisional report) See <http://www.dec.state.ak.us/spar/perp/data.htm>

¹⁹ Sources: (1) Whitney, John. 2002. Cook Inlet, Alaska Oceanographic and Ice Conditions and NOAA's 18-year Oil Spill Response History 1984-2001, and (2) ADEC spills database. See <http://www.dec.state.ak.us/spar/perp/data.htm>.

Summary and Recommendations

1. Risk is traditionally defined as:

$$\text{Risk} = \text{Probability} \times \text{Consequence}$$

Twelve vessels make 80% of the large vessel port calls in Cook Inlet. These vessels have the greatest potential (probability) for a Cook Inlet marine casualty due simply to their time in the inlet. Of the twelve, five are gas or oil carriers where the consequence of environmental damage from a casualty is high. On the non-tank vessels, six vessels carry a 0.5 to 1.2 million gallons of persistent fuel oil. The remaining common carrier – AMHS ferry Tustumena – carries a much smaller quantity of diesel fuel oil but its cargo (passengers) is of the highest value. Thus, continued or enhanced partnerships with and monitoring of the operators of these vessels will address the majority of the risk of significant or major vessel casualties and oil spills in Cook Inlet.

2. Risk analysis could be improved by requiring that near-miss incidents be reported.
3. Severe environmental conditions (high winds, ice, strong tide currents) coupled with human error in negotiating these conditions during vessel operations pose the most likely root cause of the next major vessel casualty and oil spill.
4. Cook Inlet is unique in that potentially the most serious casualties can occur while a vessel is moored. Ice and strong tides broke the tankship Seabulk Pride from its moorings in 2006. A serious ammonia spill was narrowly averted when a gas ship shifted at the Agrium dock while loading in 2005. A study of best mooring practices and monitoring of their effectiveness will be an important contribution to vessel traffic risk management in Cook Inlet.

Appendix I

Coast Guard Investigation of Seabulk Pride Grounding

Coast Guard Report of Investigation:
Grounding of the Tank Vessel SEABULK PRIDE in Cook Inlet
February 2nd, 2006

Summary

On February 2, 2006 at approximately 0523 (all times are Alaska Standard Time) the tank vessel SEABULK PRIDE's mooring lines parted at the Kenai Pipe Line (KPL) Dock in Nikiski, Alaska. The ship went adrift and grounded approximately one-half mile north of the pier near the East Forelands.

The vessel was pushed parallel to the dock by a sudden force generated by ice and current, this was the initiating event. At 0523 the two after spring wires parted within seconds of each other and the order was given to shutdown the loading operation. The mooring lines continued to part, come free from hooks, and spool off their winch reels setting the ship adrift in the flood tide. The cargo hoses parted as the ship drifted away from the pier, discharging as much as 5 BBLS of product into Cook Inlet. At 0530 the port anchor was let go, with four shots of chain, to check the motion of the vessel.

The vessel grounded near the East Forelands and remained relatively static until it was re-floated following the initial damage surveys. The vessel transited to Homer and anchored in Kachemak Bay pending a more thorough inspection of the damage and completion of the Coast Guard on scene investigation.

At the time of the incident the vessel was not in full compliance with the ice guidelines issued by the Captain of the Port, Western Alaska. The vessel did not meet the recommendation to be in immediate standby, was not moored in preparation for a worst case scenario, and the bridge was not manned with an underway watch. A combination of tidal conditions, poor line handling, and ice flows all contributed to the break away and subsequent grounding. The ice flows and current were the clear initiating factor in this casualty.

The on scene risk assessment conducted was inadequate for the situation faced. The only sure course of action that would have prevented this casualty was to require the ship to depart the terminal during the icing conditions experienced. The forces generated at max flood combined with ice present a substantial risk to a vessel moored at the KPL dock.

Jurisdiction & Authority

The SEABULK PRIDE is a U.S. Flagged vessel, and the casualty occurred on a navigable waterway of the U.S.

33 USC 1227 authorizes the investigation of any incident, accident, or act involving damage to a waterfront facility, or which affects or may affect the safety or environmental quality of the ports, harbors, or navigable waters of the United States.

Appendix J

2015 Cook Inlet Risk Assessment



Cook Inlet Risk Assessment FINAL REPORT

January 27, 2015

Revision 1



Prepared by: Nuka Research and Planning Group, LLC
Appendix J and Pearson Consulting, LLC
Page 1 of 3

Cook Inlet Risk Assessment Final Report

January 27, 2015 (Revision 1)

Developed by:

**Nuka Research and Planning Group, LLC
and
Pearson Consulting, LLC**

4.1 Construct Subsea Pipeline Across Cook Inlet

Currently, oil produced on the west side of Cook Inlet, either on land or from platforms in the Inlet, is transported via pipeline to the Drift River Terminal where it is loaded on to tank vessels and shipped across the Inlet to the Tesoro Refinery in Nikiski. There is a pending proposal submitted to state and federal regulators by Cook Inlet Energy to replace this tanker traffic with a subsea pipeline that would move oil produced from both onshore and offshore drilling sites on the western side of the Inlet to the Nikiski Industrial Facilities. This change would result in the removal of tank vessels from the system, thereby reducing the risk of vessel spill.

4.1.1 Overview of Proposed Project

In 2012, Cook Inlet Energy proposed the Trans-Foreland Pipeline Project that would consist of a 29-mile, subsea pipeline built to transport up to 90,000 barrels of crude oil per day along the bottom of Cook Inlet from Kustatan to Nikiski. At the federal level, the project qualifies for a nationwide permit from the U.S. Army Corps of Engineers, pending a review by other agencies. Permitting by the Alaska Department of Natural Resources is also required for the right-of-way. Figure 4 shows the proposed pipeline route, which was modified in 2012 after consultation with the Southwest Alaska Pilots Association to avoid the strong currents and deep areas in the immediate vicinity of the Forelands (Baker, 2013). The project is estimated to cost \$50 million (Loy, 2012).

4.1.2 Potential for Subsea Pipeline to Reduce Overall Spill Risks

The construction of a subsea pipeline across Cook Inlet would reduce the number of tanker transits, and therefore would also reduce the potential for a tanker spill because the exposure, or total volume of oil transported by tanker, would be reduced. However, oil would still be transported across the Inlet by pipeline, so spill risk is not entirely eliminated. The probability of a spill and potential spill volume were compared for tankers and subsea pipelines.

The Glosten Associates estimated the extent to which the potential number and size of tanker spills would be reduced if tankers were no longer transporting oil across Cook Inlet (The Glosten Associates, 2013a). This estimate was developed based on the *Cook Inlet Vessel Traffic Study* (Cape International, 2012) and *Spill Baseline and Accident Causality Study* (The Glosten Associates and ERC, 2012). Assuming the pipeline displaced all cross-Inlet tanker traffic, 38 one-way crude tanker transits would be eliminated each year.⁷ This translates to removing 35.1 traffic-days per year from the system, and would reduce spills by an estimated 0.105 per year (The Glosten Associates, 2013a).⁸ The potential size of these spills does not change from the sizes estimated in the *Spill*

⁷ The vessel traffic study was conducted using 2010 data. At that time, activity at the Drift River Terminal had changed significantly due to the 2009 eruption of Mt. Redoubt. Because the Drift River oil storage tanks were not in service in 2010, actual numbers of tank vessels transits from the West to the East side of Cook Inlet are now lower though not quantified for the study. (Information provided by Jack Jensen, Tesoro Alaska and Advisory Panel member.)

⁸ In addition to displacing tanker traffic, the pipeline would presumably eliminate the need to store oil at the Drift River Terminal prior to vessel loading. This would reduce the potential for spills from the storage terminal which is currently at a capacity of 1,080,000 bbl capacity per the operating company's state-approved oil spill contingency plan (CIPL, 2013). This risk reduction was not quantified as the terminal and associated storage are outside the scope of the CIRA.

Appendix K

Draft Recovery Plan for the Cook Inlet Beluga Whale

***Recovery Plan
for the
Cook Inlet Beluga Whale
(Delphinapterus leucas)***



National Marine Fisheries Service
National Oceanic and Atmospheric Administration

December 2016



NOAA FISHERIES

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Research permit # 14210

Recovery Plan
for the
Cook Inlet Beluga Whale
(Delphinapterus leucas)

Prepared by:
National Marine Fisheries Service
Alaska Region
Protected Resources Division

Approved: _____



Eileen Sobeck
Assistant Administrator for Fisheries,
National Oceanic and Atmospheric Administration

Date: 12/27/16

contaminant toxicity may change as the climate changes. There is no evidence to suggest that this pesticide, with low toxicity for mammals, short half-life in water (2–18 days), and low level of use in Alaska, is a threat to CI belugas.

b. Relative Concern

Predicting cumulative effects is extraordinarily difficult, as it requires knowledge of a myriad of contextual factors for each exposure (e.g., acoustic exposure; contaminant exposure; predatory exposure), and synergistic effects can be very unpredictable (Wright et al. 2007). Because susceptibility varies among individuals in a population and because mortalities may be dispersed over time, factors contributing to cumulative effects are difficult to detect, making mitigation of these effects challenging. Stressors related to the current small population size of CI belugas, when combined with anticipated trends of increased anthropogenic impacts, can increase the likelihood of co-occurring and interacting multiple stressors that may combine effects to the detriment of the CI belugas' recovery.

Moreover, stress resulting from anthropogenic noise, a threat of high relative concern, needs to be evaluated in combination with other stressors because noise has been demonstrated as a component of harmful synergistic effects in several animals and humans (Steyger 2009).

Given the increase of human activities in Cook Inlet and the presence of contaminants in Cook Inlet and CI belugas, the trend for and likelihood of cumulative effects is increasing over time. Cumulative effects are categorized as a threat of high relative concern for CI belugas due to the following: 1) multiple stressors occur year-round and throughout range of CI belugas; 2) uncertainty regarding the magnitude of future cumulative effects; 3) uncertainty over the mechanisms of existing and future cumulative effects (including synergistic effects, if any); 4) difficulty in detecting impacts attributable to cumulative mechanisms; and 5) difficulty in effectively mitigating cumulative effects due to the occurrence of multiple stressors.

3. Threat Type: Noise

Anthropogenic noise effects to CI beluga prey are discussed in the “Threat Type: Reduction in Prey” section (III.A.6); and cumulative effects involving noise are considered in the “Threat Type: Cumulative Effects of Multiple Stressors” section (III.A.2).

a. Sources of Noise in Cook Inlet

The acoustic environment of Cook Inlet is naturally noisy, complex, and dynamic. Natural sources of noise are particularly abundant in the CI beluga hearing range and include: bottom substrate being transported by high currents; sand and mud bars generating breaking waves during low tide/high current periods; river mouths becoming rapids at low tide periods; and fast and pancake ice being formed during winter months and under continuous mechanical stress by high tide oscillations and currents. Furthermore, the inflow of cold freshwater of glacial origin can vary considerably near major river mouths and arms in the upper Inlet, creating a complex sound propagation environment due to changes in both salinity and temperature as a result of sharp water mass fronts. These differences in water density and temperature act as sound barriers, reflecting and refracting sound energy. In addition, the large volume of fresh water from glacial areas surrounding Cook Inlet introduces suspended glacial silt and sediments into beluga habitat. Silt and other fine sediments suspended in the water column create acoustic clutter (a volume of scattered sound reflection) that can further impede echolocation performance. The

presence of all of these natural sources of noise varies over time and space, as does their contribution to the overall ambient noise of Cook Inlet. Their contribution is important as a wide range of frequencies overlap with beluga signals, including both lower frequency ranges used for social communication and higher frequency ranges used for echolocation. The effects of these natural conditions, while difficult to quantify, may compromise CI beluga acoustic communication and echolocation, particularly as the sound transmission distance increases. Consequently, the natural acoustic space for CI belugas may be more limited than for belugas found elsewhere. This particular condition enhances the potential for negative effects when anthropogenic sources of noise are introduced into CI beluga habitat.

Due to the co-occurrence of Alaska's urban center and the current range of CI belugas, a wide variety of anthropogenic noises that could affect recovery exists, especially in the upper Inlet. Most sources of anthropogenic noise in Cook Inlet are seasonal and occur during the ice-free months, although some sources are present year-round. Sources of anthropogenic noise in Cook Inlet include: propeller cavitation, engines, and depth sounders associated with vessels; dredging activities; pile driving activities; military detonations; aircraft; airguns used for seismic surveys; drilling associated with oil and gas exploration; hydraulic/mechanical noise; and sounds associated with other noise-producing activities. Although there are several technical reports documenting specific Cook Inlet noise sources and their signal characteristics,¹⁹ a comprehensive survey of anthropogenic noise sources in Cook Inlet and beluga exposure to these sources has not been conducted. Most of the identified sources in the Inlet are not well documented, and many are not controlled, monitored, or regulated.

Due to industrial activity and development in the current range of CI beluga, a wide variety of anthropogenic noise sources that could potentially interfere with recovery are present in CI beluga habitat. Sources are listed below by order of importance, based on signal characteristics and the spatio-temporal (space and time) acoustic footprint. The order was determined by considering the following factors: intensity (loudness), frequency (range of tones), and duration of acoustic signal; area affected by the sound source; and duration of sounds in both seasonal terms (e.g., happening all summer) and frequency of occurrence (e.g., happening once per week throughout the summer; M. Castellote, NMFS, unpub. data).

- Tug boat noise: propeller cavitation (the formation of bubbles in a liquid) and engine noise including azimuth/bow thruster noise;
- Cargo/tanker noise: propeller cavitation and engine noise including bow thruster noise;
- Small vessel noise: outboard and inboard engine noise and propeller cavitation;
- Dredging: suction and/or grabbing operations;
- Pile driving noise: hammering or vibratory noise (rotatory or oscillatory to a lesser extent);

¹⁹ See a sample listing of acoustic reports pertaining to Cook Inlet and Cook Inlet belugas available on the NMFS AKR Research on Cook Inlet Belugas webpage: <http://alaskafisheries.noaa.gov/pr/beluga-research-cook-inlet>.

- Military detonations of high explosives:²⁰ demolition and projectile explosions in military firing ranges;
- Oil/gas exploration: airgun sources for seismic survey and high power active transducers (multibeam echosounders, sub-bottom profilers, etc.);
- Shore construction noise: other than pile driving;
- Oil/gas exploitation: platform noise (in-air noise radiated into the water), drilling noise (in water and/or bottom substrate), air/water vessels during operations;
- Commercial jet aircraft: overflights, take offs, and landing approaches;
- Military jet aircraft: overflights, take offs, and landing approaches;
- Propeller aircraft: overflights, take offs, and landing approaches;
- Depth sounders: from vessels;
- Fishing related noise (other than engine noise): hydraulic/mechanical operations;
- Research related noise: sonars such as acoustic Doppler current profilers and dual-frequency imaging sonars; scientific echo sounders and other active transducers, boat transit for photo-identification surveys, and instrument deployment/retrievals, etc.; and
- Pipe and cable laying operations.

Climate change is having an indirect effect on ocean noise pollution (Reeder and Chiu 2010). As levels of carbon dioxide rise in the atmosphere, ocean waters are becoming more acidic. Ocean acidification reduces concentrations of seawater salts that absorb sound, particularly low-frequency sound. This ocean pH change is predicted to be greatest in higher latitudes, allowing lower frequency sound to carry farther and to be stronger at a given distance. Shallow sound channeling exists in Cook Inlet, which allows potential noise impacts to be concentrated in shallow waters and become more spatially extensive (i.e., sound channels can trap noise and allow it to travel farther). At the same time, climate change may directly result in either an increase or decrease of in-water noise. For example, warming temperatures may reduce the prevalence of ice cover, and thus reduce ice-associated noise, but warmer temperatures may also result in higher wind speeds resulting in higher noise levels at the waters' surface.

b. Potential Effects of Noise on CI Belugas

There is an extensive body of literature regarding the effect of anthropogenic noise on marine mammal behavior. Most of the studies addressing this problem have used behavioral attributes such as changes in site fidelity, dive patterns, swimming speed, orientation of travel, herd cohesiveness, and dive synchrony to indicate possible disturbance or stress caused by noise (Richardson et al. 1995). A review and summary of available information regarding effects from anthropogenic noise to beluga hearing and behavior is presented in Appendix IX.E – CI Beluga Hearing, Vocalization, and Noise Supplement.

²⁰ Demolition activities and mortar/artillery firing on military ranges.

Factors, whether anthropogenic or natural, that affect the available prey species may have a greater impact on one prey species or species subcomponent (e.g., age or size-related). Resultant changes in relative abundance of prey will affect the prey composition available (Pyke et al. 1977).

a. Competition for Prey Resources

CI belugas compete with humans and other animals for prey resources, particularly salmon and eulachon. Quantitative data on the spatial and temporal distribution of beluga prey in upper Cook Inlet are limited (see Appendix IX.F – CI Beluga Prey Supplement). Although management of fisheries targeting anadromous species in Alaska attempts to constrain harvests to be no greater than the level of surplus production, it is unlikely that escapement goals will be met in all tributaries across all years. Effects of fishing by humans on beluga foraging success are not well known, yet may include spatial and temporal components for any specific prey resource. Effects on belugas will depend on the extent to which a reduction occurs to the abundance, quality, or availability of prey (localized or Inlet-wide), and if the belugas can compensate for losses of preferred prey by shifting to other feeding sites or less-preferred prey. If a non-preferred prey species is reduced, the relative or absolute abundance of preferred prey may increase over time, depending on the ecological linkages and response times. The temporal distribution of these prey resources may be as important as their magnitude, particularly for growing juveniles and pregnant and/or lactating female belugas. Changes in seasonality of prey may occur due to seasonality and species preference of fisheries, changes in seasonal fish habitat, or seasonal environmental changes affecting Cook Inlet. The extent to which shifts in the seasonality of prey species or temporal gaps in prey availability impact reproductive success and survival of belugas, particularly during critical life stages, is unknown. However, these impacts are likely to be most important if affecting temporal availability of energy-rich high-lipid prey. Alternatively, events that result in decreases of specific runs or changes in the availability of prey (e.g., by changing schooling patterns or altering nearshore terrain) may leave temporal gaps in the availability of prey at sufficient densities resulting in the reduction in total days when beluga blubber fat storage can occur. For more information see Appendix IX.F – CI Beluga Prey Supplement.

CI belugas may also compete against other predators (harbor porpoise, harbor seals, killer whales, sea lions, large whales, sea otters, sea birds, etc.) for available prey resources, particularly in upper Cook Inlet where the available prey resources may be more limited in abundance or diversity. Although there may be some foraging specialization upon available prey species, there is also likely to be a high degree of dietary overlap due to the limited prey diversity available. In upper Cook Inlet, belugas are most likely to compete for prey resources with harbor seals and harbor porpoises, which have been documented also to be present in Cook Inlet year round and co-occur in the same general locations as CI belugas (Small et al. 2011; AEA 2013; T. McGuire, LGL, unpub. data).

b. Disturbance or Modification of Prey Habitat

The amount or types of prey available to CI belugas may also be reduced as a result of disturbances or modifications to prey habitat. Anthropogenic activities that may detrimentally affect prey habitat and possibly reduce the availability of prey to belugas are present both seasonally and continuously in Cook Inlet. Anthropogenic activities in Cook Inlet that may

disturb or modify the habitat of beluga prey include dredging; oil or gas activities; hard rock quarrying; laying of electrical, communication, or fluid lines; construction of docks, bridges, breakwaters or other structures; and other activities. These activities may cause avoidance or destruction of an area used by beluga prey as a result of anthropogenic disturbance. Permanent structures, such as docks, platforms, or bridges, alter the Cook Inlet habitat by altering local tidal flow, among other potential effects. However, the net effect of anthropogenic structures on beluga prey remains unknown.

In addition to loss of habitat available to beluga prey species by displacement or avoidance, anthropogenic activities may reduce the quality of the prey as a result of contamination of the habitat. For example, mechanical disturbance of the seafloor (e.g., dredging) re-suspends silt, and potentially buried chemicals, into the water column. A sewer outfall plume alters both the abiotic and biotic environment, releasing various hormones, pharmaceuticals, and other chemicals into Cook Inlet. Catastrophic events such as oil or chemical spills are infrequent, but may have significant effects on beluga prey, whether through changes to spawning or migration patterns, direct mortality, or potential long-term sub-lethal impacts (Moles et al. 1994; Marty et al. 1997; Murphy et al. 1999). While some of these contaminants are known to bioaccumulate and be passed up the food chain, they also may impact the survival, quality, and reproduction of the prey species itself. For example, elevated copper concentrations can harm salmon and other CI beluga prey.

The habitat upon which beluga prey depend may also be affected by natural events, including: Pacific decadal oscillation, an El Niño-like pattern of Pacific climate variability (potentially affecting rainfall, freshwater runoff, water temperature, and water column stability); climate change (potentially affecting glacial output and siltation and salinity in downstream estuarine environments); volcanic ash outfall (affecting siltation and water chemistry); and earthquakes and associated landslides, elevation changes, and tsunami waves. Some of these natural threats are infrequent, but may have instantaneous and substantial impacts upon abundance, quality, or seasonality of CI beluga prey. However, other threats, such as Pacific decadal oscillations, may occur more regularly, may or may not be readily detectable, may develop over an extended time period, and may have long-lasting ecological effects.

Ecological regime shifts, in which species composition is restructured in association with abrupt changes in climate, have been identified in the North Pacific (Hollowed and Wooster 1992; Anderson and Piatt 1999; Hare and Mantua 2000; Spies 2007) and are believed to have affected prey species availability in Cook Inlet. For example, in the 1970s, dominance in the Gulf of Alaska ecosystem transitioned from crustaceans to groundfish, particularly gadid (e.g., cods) species. In another analysis, Hare and Mantua (2000) reaffirmed the 1976 to 1977 ecosystem change in the Gulf of Alaska and identified a less dramatic shift in 1989. Analyses of multi-decadal data from small-mesh trawl surveys conducted by NMFS and ADF&G showed ecosystem reorganization in the 1970s at Kachemak Bay in southern Cook Inlet and around Kodiak Island and in Shelikof Strait located in the northern Gulf of Alaska south and west of Cook Inlet Gulf waters (Bechtol 1997; Anderson and Piatt 1999). Of particular note was a decline in forage species, particularly pandalid shrimp and capelin, and increases in cod, pollock, and flatfish.

Changes to the marine, coastal, and freshwater ecosystems are known to be occurring as a result of global climate change and the associated occurrence of shifts in temperature, oxygen content, ocean acidification, and other physical and chemical changes (Doney et al. 2012), and

Surveys, Cook Inletkeeper, the Alaska Ocean Observing System, and the CI beluga photo-identification project's "Seen Belugas?" sighting program). The monitoring program could be organized and supported by the NMFS Cook Inlet Beluga Recovery Coordinator (see Action 2).

39. Evaluate impacts on CI belugas from anthropogenic activities with potential to result in degradation or loss of CI beluga habitat, with emphasis in known and historic feeding areas.

Construction and operation of new physical structures (e.g., bridges, docks, dams, etc.) and increased numbers of vessels in CI beluga habitat can potentially affect the distribution, migration, or behavior of CI belugas and their prey. However, a lack of understanding of distribution, migration, and behavior patterns of prey inhibits potential mitigation measures and argues for a more precautionary approach to maximize opportunity for CI beluga recovery. Additional information is needed on the impacts to CI belugas from construction and operation of physical structures, including structures located both within Cook Inlet proper and upstream of CI beluga habitat (which could affect beluga prey). Particular emphasis should be given to areas of known and historic feeding importance (e.g., Susitna River and Delta; Kenai River; Knik Arm).

40. Assess the biological benefits, costs, and implementation feasibility of potential protection or restoration measures for particular habitats important to CI beluga recovery and implement such measures if determined warranted.

Considering the ecological value, stability, and resiliency of habitats important for CI beluga recovery, including habitats that support foraging or reproduction, an analysis will be needed to determine if protection or restoration measures are warranted and whether previous mitigation measures may no longer be needed. Throughout the long term, a variety of potential mitigation measures may be applied, representing a range of likely outcomes for CI beluga habitat and future CI beluga recovery. An analysis must first be conducted to evaluate the costs, biological benefits, and implementation feasibility, of potential protection or restoration measures. For some potential measures, realistic benefits may be achieved at little cost, whereas other measures may be expensive to implement and are likely to offer questionable or limited positive results. Implementation of any protection or restoration measures must be accompanied by long-term monitoring to determine the effects on CI beluga recovery. Because CI beluga recovery is likely to be an ongoing process, the array of potential protection or restoration measures should be periodically examined and the implemented measures revised as needed.

41. Work with local, state, and federal agencies and stakeholders to develop a comprehensive Cook Inlet habitat database, and methods and plans for reducing or mitigating the levels of habitat loss or degradation in areas of known importance to CI belugas for foraging and reproduction, including restoration of habitats if necessary.

Ongoing and future coastal development projects that are deemed likely to degrade CI beluga habitat should be mitigated. Potential effects of individual development projects should be evaluated on the basis of the aggregate and comprehensive impacts on beluga habitat, taking into account existing projects and disturbance, and not simply as the incremental impact of an additional individual project. Such mitigation efforts will be most effective if they are developed collaboratively between government and non-government entities. For instance, collaborative work with municipalities or other entities could be undertaken to help minimize runoff and stormwater pollution and to reduce the incidence of toxic spills into Cook Inlet.

Appendix L

Minto Flats State Game Refuge Management Plan

MINTO FLATS STATE GAME REFUGE MANAGEMENT PLAN

March 1992

**Prepared by the Divisions of
Habitat and Restoration
and
Wildlife Conservation**

**Alaska Department of Fish and Game
1300 College Road
Fairbanks, AK 99701-1599**

Carl L. Rosier, Commissioner



INTRODUCTION

The Minto Flats State Game Refuge, located about 35 miles west of Fairbanks between the communities of Minto and Nenana, was established by the Alaska Legislature in 1988 to ensure the protection and enhancement of habitat, the conservation of fish and wildlife, and to guarantee the continuation of hunting, fishing, trapping and other compatible public uses within the Minto Flats area. The Minto Flats State Game Refuge, encompassing approximately 500,000 acres, traditionally has been and remains an important area for harvesting fish, wildlife, and other resources for Athabaskan Indians and others living in Minto and Nenana and also serves as an important fish and wildlife use area for Fairbanks North Star Borough residents.

The purpose of the Minto Flats State Game Refuge Management Plan is to provide consistent long-range guidance to the Alaska Department of Fish and Game, the Alaska Department of Natural Resources, and other agencies involved in managing the refuge.

The plan presents management goals for the refuge and its resources and identifies policies to be used in determining whether proposed activities within the refuge are compatible with the protection of fish and wildlife, their habitats, and public use of the refuge. The plan will be reviewed every five years and, if appropriate, updated every ten years, as funding permits. Public participation will be solicited during the update process. The plan affects state lands only, and has no force on private lands. The plan does not address hunting or fishing regulations which are the authority of the Boards of Fisheries and Game.

This document is the result of a public planning process led by the Alaska Department of Fish and Game. The plan has been developed by a planning team representing state, federal, and municipal agencies, including: the Alaska Departments of Environmental Conservation, Fish and Game, Natural Resources, and Transportation and Public Facilities; the United States Fish and Wildlife Service; the Fairbanks North Star Borough and the villages of Minto (Seth-de-ya-ah Corporation) and Nenana (Toghottele Corporation).

At the outset of the public planning process, public meetings were held in Fairbanks, Nenana and Minto to explain the planning process and solicit citizens' opinions regarding the issues, interests, and concerns pertinent to refuge management. The meeting results were used by the planning team to identify a list of issues to be addressed in the plan. At the same time, resource information on refuge fish and wildlife populations and their habitats, other natural resources, existing land use, and land ownership was being collected and synthesized. This information, presented in both map and narrative form, comprises the plan's resource inventory.

Management goals and policies for the refuge were developed by the planning team to address the identified issues. All policies were developed with consideration of their ability to meet the management goals. The draft plan was distributed for public review, and comments received during the public review process were used to develop final policies. The goals and policies were then adopted by the Commissioner of Fish and Game.

The plan is implemented by the Alaska Department of Fish and Game in several ways. A Special Area Permit is required for any habitat altering activity, including any construction work, in a designated State Game Refuge (5 AAC 95). A Special Area Permit application form can be obtained from any Alaska Department of Fish and Game office and should be submitted to the Habitat Division Regional Office in Fairbanks. The Habitat Division will review all proposed activities for consistency with the goals and policies outlined in this plan. Activities will be approved, conditioned, or denied based on the direction provided in this plan as well as other state laws and regulations.

Future refuge management activities of the Alaska Department of Fish and Game will also be directed by this plan. Research programs, public use facilities, and other department projects will be consistent with the goals and policies presented in this plan.

Other state, federal, and local agencies have management responsibilities on refuge lands as well. Any use, lease, or disposal of land or resources on state land in the refuge requires Alaska Department of Natural Resources authorization. Activities affecting air or water quality require authorization from the Alaska Department of Environmental Conservation. The U. S. Army Corps of Engineers (COE) evaluates applications of the Department of the Army permits for discharging dredged and fill material in waters of the United States including wetlands. Federal and state agencies, including the United States Fish and Wildlife Service and National Marine Fisheries Service, along with local governments, review proposals for COE permits, pursuant to the Fish and Wildlife Coordination Act (16 USC 661-666 et.seq.). U. S. Coast Guard approval is required for certain kinds of work in navigable waters.

GOALS

Activities which occur within the Minto Flats State Game Refuge will reflect the following goals in accordance with the purposes for which the refuge was established (AS 16.20.037(b)). All management decisions in the Minto Flats State Game Refuge, whether affecting activities undertaken by the department, other agencies, or the public, will be in accordance with these goals.

I. FISH AND WILDLIFE POPULATIONS AND THEIR HABITAT

Manage the refuge to protect and enhance fish and wildlife habitat and conserve fish and wildlife populations and diversity.

- A. Minimize harmful disturbance to fish and wildlife.
- B. Maintain, protect, and where appropriate enhance or restore the quality and quantity of habitat for historically occurring resident and migrant wildlife, particularly nesting, rearing, and staging habitat for waterfowl; important moose winter and calving habitat; important black bear spring and fall feeding habitat; and important furbearer habitat.
- C. Maintain, protect, and where appropriate enhance or restore:
 - 1) the uninterrupted movements and migrations of historically occurring resident and migrant fish; and
 - 2) important fish habitat including spawning, rearing, and overwintering areas.
- D. Maintain water quality, water quantity, and circulation patterns necessary for the growth and propagation of fish and wildlife.

II. PUBLIC USE

Guarantee continued public use of the refuge in a manner consistent with protection and enhancement of fish and wildlife habitat and the conservation of fish and wildlife populations.

- A. Maintain and where appropriate enhance opportunities for fishing, hunting, and trapping as allowed by statute and the Boards of Fisheries and Game; education and study of fish and wildlife; and other outdoor uses consistent with the goals of this management plan.

TRANSPORTATION / UTILITY CORRIDORS THROUGH THE REFUGE

Transportation and utility corridors, including railroads, roads, powerlines, and pipelines may be sited on refuge lands if they are determined to be compatible with the purposes for which the refuge was established. Proposals will be evaluated for compatibility with the refuge purposes listed in legislation and reflected in the goals of this plan: 1) protection and enhancement of habitat resources; 2) conservation of fish and wildlife populations; and 3) the continuation of fishing, hunting, trapping and other public uses compatible with habitat protection and enhancement and fish and wildlife conservation. Additionally, corridor proposals must demonstrate that there is a significant public need for the corridor that cannot be reasonably met off-refuge, that the use of refuge lands and impacts to refuge resources are avoided or minimized to the maximum extent feasible, that public access to the refuge is maintained, and that all impacts to refuge resources are fully mitigated.

Given the distribution of habitats and public uses within the refuge, the potential for incompatibility between corridor development and resource values appears to be greater within the portion of the refuge north of the Tanana River. Therefore, the highest priority should be given to avoiding the future siting of transportation and utility corridors in the most valuable refuge habitats north of the Tanana River.

FIRE MANAGEMENT

Encourage study of fire effects within the refuge to clarify the benefits, impacts, and tradeoffs which result from wildland fire and to resolve disagreement over a return to a more natural fire regime within the refuge. Fire protection needs for the refuge will be identified, with public review, in the Alaska Interagency Fire Management Plan.

OTHER USES

To protect refuge habitat and fish and wildlife populations, the department may allow by permit only those activities compatible with the purposes for which the refuge was established, terms and standards of 5 AAC 95, and the goals and policies of the plan. Any activity which is not compatible with the purposes for which the refuge was established, terms and standards of 5 AAC 95, and the goals and policies of this plan will not be allowed.

this reason, vegetation classes that seemed to have similar ecological functions were combined. After reducing 94 categories (not all of which occurred within the refuge) to 16, a new vegetation map of the MFSGR was produced by the Division of Forestry, ADNR at the request of Habitat Division. This map, drawn at a scale of 1:63,360 and color coded by type, is on file at the ADF&G regional office in Fairbanks and is the basis for the vegetation maps associated with this resource report.

Fish and Wildlife Resources

Minto Flats' productive habitats support a diverse array of fish and wildlife populations. The MFSGR contains an area that is good habitat for big game species such as moose and black bear, furbearers such as beaver, muskrat, marten, and mink, fish such as northern pike and whitefish, and birds, including waterfowl, game birds, raptors, and passerines. A partial list of fish and wildlife species that use Minto Flats is presented in Table 1.

Waterfowl

Minto Flats constitutes one of the highest quality waterfowl nesting and staging habitats in Alaska, and possibly in North America (Conant 1985). Waterfowl arrive in the area during April or May prior to spring breakup and remain through freezeup (BLM 1989). Breeding population surveys have shown Minto to support duck densities equal to or greater than other important production areas such as the Yukon Flats or the North American prairies. During the eight year period from 1978-1985 the U.S. Fish and Wildlife Service estimated average nesting densities on Minto Flats of 213.2 ducks per square mile (Conant and Hodges 1985). Many species of ducks use Minto Flats, including gadwall, green-winged teal, blue-winged teal, redhead, ring-necked duck, goldeneye, bufflehead, oldsquaw, scoter, ruddy duck, and mergansers (BLM 1989), but the area is especially important for mallards, pintails, and canvasbacks--all species of international concern. Other ducks exhibiting high densities within the MFSGR include wigeon, shoveler, and scaup.

The area is also used by other waterfowl species, including Canada geese, sandhill cranes, and loons. According to Conant and Hodges (1985) Minto Flats seems to be especially important for white-fronted geese.

Minto Flats is one of the best habitats in Alaska for the trumpeter swan (*Cygnus buccinator*). During the last two decades the population of these birds in Alaska has steadily increased. For example, swans in the "Lower Tanana" unit surveyed by the U.S. Fish and Wildlife Service have increased from 476 in 1968 to 3,880 in 1990 (USF&WS 1990). Of these, approximately 2,500 birds were counted on Minto Flats (King pers. comm. 1990). Minto Flats will continue to be an essential component of the trumpeter swan's nesting, rearing, and staging habitat nationwide, although numbers will probably not continue to increase much higher than current densities.

Appendix M

Minto Flats State Game Refuge
Wildlife Website



Alaska Department of Fish and Game

[ADF&G Home](#) » [Lands and Waters](#) » [Conservation Areas](#) » [Minto Flats](#)

Minto Flats — State Game Refuge

Fish and Wildlife

Switch to area:

Minto Flats ▼

Go

[Overview](#) [Fish and Wildlife](#) [Visitor Information](#) [Permits](#) [Contacts](#)

Birds



Minto Flats is one of the highest quality waterfowl habitats in Alaska. It supports high density duck nesting, producing 150,000 or more ducks annually, with breeding populations averaging 213 ducks per square mile. The refuge sustains one of the largest trumpeter swan breeding populations in North America. Minto Flats is also an important spring and fall waterfowl staging area, particularly for geese and swans. Sandhill cranes and loons nest in the area in relatively large numbers. Bald eagles are known to nest in the flats, and peregrine falcons have historically nested

adjacent to the refuge. During winter, grouse and ptarmigan are present in large numbers, and overwintering passerines and small owls are common.

Mammals

Minto Flats has historically supported large numbers of moose and provides excellent habitat for black bear. Healthy populations of furbearers inhabit the flats, including beaver, muskrat, river otter, lynx, wolverine, red fox and mink. Marten, normally a dry land dweller, is uncommonly abundant on the flats.

Fish

The rivers and shallow lakes on the flats combine to make an excellent home for northern pike, burbot and grayling. Several species of whitefish (including sheefish) reside there also. Chinook, chum and coho salmon migrate through the area. Many of the lakes that are not connected to rivers support blackfish.

Appendix N

Susitna Flats State Game Refuge Management Plan

**SUSITNA FLATS
STATE GAME REFUGE
MANAGEMENT PLAN**

MARCH 1988

**Prepared by the
Divisions of Habitat and Game**

**Alaska Department of Fish and Game
333 Raspberry Road
Anchorage, Alaska 99518**

Don W. Collinsworth, Commissioner



INTRODUCTION

Susitna Flats State Game Refuge, located between Beluga River and Point MacKenzie on the west side of Cook Inlet was established by the Alaska Legislature in 1976. It was created to ensure the protection of fish and wildlife populations, particularly waterfowl nesting, feeding, and migration; moose calving areas; spring and fall bear feeding areas; and salmon spawning and rearing habitats. It was also established for public use of fish and wildlife and their habitat, particularly waterfowl, moose, and bear hunting; viewing; photography; and general public recreation in a high quality environment.

The purpose of the Susitna Flats State Game Refuge Management Plan is to provide consistent long-range guidance to the Department of Fish and Game in managing the refuge.

The Susitna Flats State Game Refuge encompasses approximately 300,800 acres and supports spectacular spring and fall concentrations of migrating waterfowl and shorebirds. The refuge also supports several major salmon streams and productive moose and bear habitat. Susitna Refuge attracts large numbers of waterfowl hunters and sport fishermen and is the site of a commercial set net fishery for salmon.

Since creation of the refuge in 1976, the Anchorage and Matanuska-Susitna Valley populations have increased dramatically and the Point MacKenzie agricultural development has occurred adjacent to the refuge. Susitna Flats State Game Refuge has grown to be one of the most popular recreational hunting and fishing areas in the state. Many multiple use activities have been proposed for and have occurred on the refuge since its creation. In order to evaluate the compatibility of these uses with the protection of fish and wildlife, their habitats, and public use of the refuge, the Department of Fish and Game has undertaken this comprehensive refuge management planning process.

The plan presents management goals and objectives for the refuge and its resources and identifies policies to be used in determining whether proposed activities are compatible with the protection of fish and wildlife, their habitats, and public use of the refuge. The plan will guide management of the refuge for the next ten years and will be reviewed after 5 years for necessary updates or amendments. The plan affects state lands only, not private or municipal lands. The plan does not address harvest regulations.

This document is the result of a public planning process led by the Department of Fish and Game. The plan has been developed by a planning team representing state, federal, and municipal agencies including: The Alaska Departments of Fish and Game, Natural

GOALS

Activities that occur on the Susitna Flats State Game Refuge will be consistent with the following goals in accordance with the purposes for which the refuge is established (AS 16.20.020 and 16.20.036(b)):

1. Manage the refuge for the protection, preservation, and enhancement of fish and wildlife habitat and populations.
2. Manage the refuge to protect, maintain, and enhance public use of fish and wildlife and their habitat and general recreation in a high quality environment.
3. Manage multiple use activities to ensure compatibility with goals #1 and #2 of this plan.

Mammals

The presence of a wide variety of habitats provides niches for a wide variety of mammals. The accompanying Resource Inventory Mammal Map depicts distribution and seasonal use patterns.

Moose (*Alces alces*) are found throughout the refuge. In fact some of Alaska's highest density moose populations occur in the Susitna River valley. Suitable moose habitat includes birch, aspen, cottonwood and white spruce woodlands and forests, riparian alder-willow shrublands, and sphagnum-shrub bogs. Moose winter concentrations occur along river and stream valleys, including the Susitna River floodplain and the lower, timbered portions of the Theodore and Lewis rivers. In excess of 100 moose winter along the Susitna River. Within the refuge an estimated several hundred moose winter along the Theodore and Lewis rivers where mature forest stands with dense canopies provide cover for escape, relief from deep snow conditions, and perhaps protection from wind. Moose calving takes place in lowland bogs beginning in late May and extending through June. Wet marshy lowlands consisting of open areas interspersed with dense stands of shrubs and trees are preferred calving grounds. The Little Susitna River flats and areas along the Little Susitna River are important moose calving areas on the refuge.

The refuge also provides important cover for moose. In summer moose feed in open areas and utilize the bordering shrub and forest areas for cover. Moose usually bed down near cover.

Both black bears (*Ursus americanus*) and brown bears (*Ursus horribilis arctos*) are common on the refuge. The grass flats and sedge meadows west of Susitna River are important spring feeding areas for brown bear. Known brown bear concentration areas occur along the Lewis and Theodore rivers in the summer during salmon spawning season. Black bears are usually limited to forested areas. Black bears prefer open forests and mixed habitat types composed of fruit-bearing shrubs and herbs, lush grasses, and succulent forbes. Salmon are often utilized heavily during salmon spawning season, and berries are the most important food item in late summer and fall.

Furbearers are also abundant on the refuge. Muskrats (*Ondatra zibethicus*), beaver (*Castor canadensis*), river otter (*Lutra canadensis*), mink (*Mustela vison*), least weasel (*Mustela nivalis*), ermine (*Mustela erminea*), wolverine (*Gulo gulo*), coyote (*Canus latrans*), wolf (*Canus lupus*), lynx (*Lynx canadensis*), red fox (*Vulpes vulpes*), snowshoe hare (*Lepus americanus*), marten (*Martes americana*), red squirrel (*Tamiasciurus hudsonicus*), and northern flying squirrel (*Glaucomys sabrinus*) are all resident on the refuge.

Muskrat, beaver, and river otter are closely associated with freshwater aquatic habitats. The most productive beaver habitat is characterized by a dependable water supply with little fluctuation in stream flow and by willow, aspen, cottonwood, or birch vegetation. Muskrat favor shallow ponds interspersed with wetland vegetation. River otter often can be found

Appendix O

Denali State Park Management Plan

Denali State Park Management Plan



2006

Division of Parks and Outdoor Recreation
Alaska Department of Natural Resources



Denali State Park Management Plan

Adopted 2006



Division of Parks and Outdoor Recreation
Alaska Department of Natural Resources



STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF THE COMMISSIONER

FRANK H. MURKOWSKI, GOVERNOR

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ADOPTION OF THE DENALI STATE PARK MANAGEMENT PLAN

The Commissioner of the Department of Natural Resources finds that the Denali State Park Management Plan meets the requirements of AS 41.21.150-152 and 41.21.022(4) and hereby adopts this plan as policy for the Department of Natural Resources, Division of Parks and Outdoor Recreation which prescribes management of state lands within the boundaries of Denali State Park and Blair Lake, Indian River, and Tokositna State Recreation Areas including permitting and other department programs and activities. This plan supersedes the 1989 Denali State Park Master Plan.



Mike Menge
Commissioner
Alaska Department of Natural Resources

June 30, 2006

Date

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF PARKS AND OUTDOOR RECREATION

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June 30, 2006

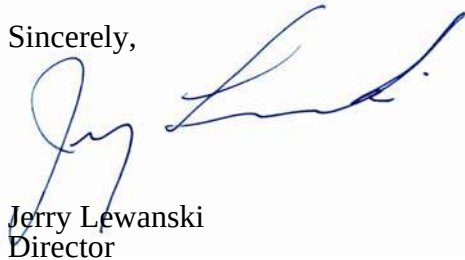
Dear Alaskan,

The creation of Denali State Park in 1970 and expansion in 1976 was the realization of decades of local, state, and national interest and involvement. Renowned for its wealth of natural resources and recreational opportunities, Denali State Park is one of the jewels of the Alaska State Park System. Sharing a common boundary with Denali National Park and Preserve to the north and the Matanuska-Susitna Borough and state lands to the south, the state park and its surrounding public lands offer limitless outdoor opportunities, spectacular mountain scenery, and an abundance of fish and wildlife.

For the last several years, it has been widely recognized that the northern Susitna Valley is experiencing increasing pressures from private and commercial development as well as by increasing recreational use and tourism. To address these concerns, the State of Alaska along with its partners, the Matanuska Susitna Borough and the National Park Service, embarked on a planning effort to ensure that the increasing development and uses in this area occur in an orderly manner. It was important to the partners to provide for a diversity of uses while being sensitive to the concerns of local residents. Over the course of the planning process, planners made every effort to address and accommodate concerns and desires while fulfilling the mandate of the park's enabling legislation. This plan represents these efforts and we are proud of the results.

This plan is designed to be used over the next twenty years. As resources become available to State Parks, the recommendations in the plan will be implemented in phases. In addition, State Parks will continue to participate in planning efforts for lands along the park's boundaries. We look forward to working together with the public, the State Parks Advisory Board, and the South Denali Steering Committee to address the pressing issues in the region, to help achieve the plan's goals, and to better serve the public.

Sincerely,



Jerry Lewanski
Director

Chapter 1

INTRODUCTION

Plan Purpose

This plan provides guidance for management of park lands and development of recreational facilities, consistent with the park’s Mission Statement. In addition, the plan discusses trends in recreation and tourism, and provides natural resource information that will simplify the task of maintaining a current resource database as new information becomes available.

Establishment of the Park

The Alaska State Legislature created Denali State Park (AS 41.21.150-152) in 1970, and in 1976 amended the boundary to add the upper reaches of the Tokositna basin, west of the old park boundary (see Figure 1). In both actions, the legislature had a strong interest in tourism related development, as well as providing recreational opportunities for Alaskans and preserving the area's natural resources. In 1994 the Blair Lake and Tokositna State Recreation Areas were established. The Indian River State Recreation area was added in 2002. All three were created through management agreements within DNR.

Overview of the Park

Denali State Park is approximately 324,240 acres in size. The State Recreation Areas include an additional 1,470 acres. Although much smaller than Denali National Park and Preserve to the north (6,028,203 acres), Denali State Park and its associated State Recreation Areas are very diverse area. They afford tremendous views of Denali; contains three major rivers, the Susitna, Chulitna, and Tokositna; and have three glaciers adjacent to or within its boundaries, the Ruth, Eldridge and Tokositna. Vegetation ranges from lowland spruce and hardwood forests to alpine tundra. The George Parks Highway transects the park and opens its scenery, wildlife and other natural resources to the public.

Primary uses of the park are camping, hiking, fishing, viewing Denali, canoeing, rafting, river boating, hunting and trapping.

Historical Background

The Mount McKinley National Park was created in 1917, when the federal government “reserved” a 2 million acre tract around Mt. McKinley as a national park. The national park quickly became one of Alaska’s primary tourist attractions.

Chapter 2

GOALS & OBJECTIVES

Park Mission Statement

The park’s enabling legislation does not include a formal statement of purpose for Denali State Park. The Division of Parks and Outdoor Recreation, as part of the planning process and in conjunction with the Susitna Valley State Park Citizen’s Advisory Board, developed the following “Mission Statement” to serve in the absence of an explicit legislative statement of purpose.

Denali State Park shall be managed and developed in a manner compatible with the following goals:

- I. Protect the natural and cultural resources of the park and ensure that the park’s resources are maintained to allow for the public’s experience and understanding of the unique natural features that are found in this part of Alaska.
- II. In a manner that is compatible with Goal I, provide for a variety of opportunities for visitors to the park to experience and understand the park’s natural and cultural resources, including viewing Denali.

Park facilities shall be designed and developed to support the public use and understanding of the park and its resources and not serve as attractions in and of themselves.

- III. In a manner that is compatible with Goals I and II, recognize and accommodate, in so far as reasonable, the diverse needs of different types of visitors to the park. Avoid conflicts between different groups of visitors or between visitors and park resources.

Denali State Park Goals and Objectives

There are a number of goals and objectives to be achieved in the management and development of Denali State Park. This section presents a list of goals, organized into four groups: environmental, cultural, recreational, and tourism. Each goal statement is followed by specific objectives. The objectives are not ranked in terms of priority.

1. Protect Natural Resources within the Park. The park’s natural resource base consists of two parts: 1) the natural ecosystem with its processes and wildlife, and 2) the visible landscape composed of natural and man-made features.

- Protect naturally significant areas, such as:
 - specific habitat areas (such as bear denning and swan nesting areas),

- sensitive wetlands,
 - sensitive alpine and sub-alpine tundra,
 - wildlife concentration areas, such as along rivers and creeks during salmon spawning season.
- Minimize impact to the park landscape, in general, by:
 - locating non-recreational activities outside the park,
 - locating facilities and activities where carrying capacity is adequate,
 - concentrating development in nodes to minimize the area disturbed,
 - locating recreation facilities relatively close to the highway to reduce impact to the backcountry,
 - rehabilitating disturbed areas, such as existing gravel borrow sites, to natural conditions or using them to meet recreation facility objectives,
 - designing and locating recreation facilities to minimize the need for management controls, and
 - limiting opportunities for misuse of the park.
- Minimize conflict with natural processes by:
 - locating facilities and activities on soils that are well-drained, permafrost-free, and not subject to erosion,
 - locating intensive development on sites that have gentle slopes that will not be subject to erosion,
 - locating facilities and activities outside floodplains (including glacier outburst floods),
 - locating recreation facilities where there is adequate water for proposed uses, and
 - locating facilities where the soil is suitable for waste disposal (Note: a package treatment plant is recommended for intense development sites, such as a lodge).
- Protect the natural character of the landscape by:
 - protecting the view from the road and the railroad, and keeping major development out of sight,
 - designing facilities to blend, rather than contrast with, the natural landscape, and
 - keeping the scale of facilities (including roads, parking, buildings, and other structures) relatively small.

2. Protect Historic Sites and Current Land Uses, and contribute to a new sense of community in the Denali Region.

- Protect historic and cultural sites, such as:
 - the Curry Lookout, and
 - any archaeological sites discovered (none are known to exist in the park).

Activity/Facility	Natural	Wilderness	Cultural	Recreation Development
<u>Guiding and Outfitting.</u> Licensed big game hunting, fishing, mountaineering, and backcountry guiding, outfitting, and all other commercial operations providing services to park users for compensation.	Compatible only by permit or concession contract issued by DPOR.	Same	Same	Same
<u>Grazing.</u> Grazing or loose herding of domestic or wild animals for personal or commercial purposes. ²³	Not compatible	Same	Same	Same
<u>Resource Extraction.</u> Extraction for commercial or personal use. Removal of timber, gravel, rock, sand, minerals, plants, or other park resources.	Not compatible	Same	Same	Same
<u>Resource Extraction by State Parks.</u> Removal of timber, gravel, rock, sand, plants, or other park resources for use by State Parks in the park.	Compatible	Not Compatible	Compatible	Compatible
<u>Utilities, Transmission Lines, Pipelines.</u> Includes telephone and electrical power lines, oil and gas pipelines, communication and wind generation towers and other associated facilities.	Allowed by permit only when no viable alternative exists. Tower heights limited to 85 feet. Use best practices to minimize impacts to viewshed, especially areas within viewsheds of areas with high public use.	Not compatible	Not compatible	Same as Natural

²³ From 11 AAC 20.430.

Appendix P

Alaska Fisheries Management Plan

FISHERY MANAGEMENT PLAN For The SALMON FISHERIES In The EEZ Off Alaska

**North Pacific Fishery Management Council
National Marine Fisheries Service, Alaska Region
State of Alaska Department of Fish and Game**

June 2012

**North Pacific Fishery Management Council
605 W. 4th Avenue, #306
Anchorage, AK 99501-2252**

Figure 19 EFH Distribution for Sockeye Salmon – South-Central Region

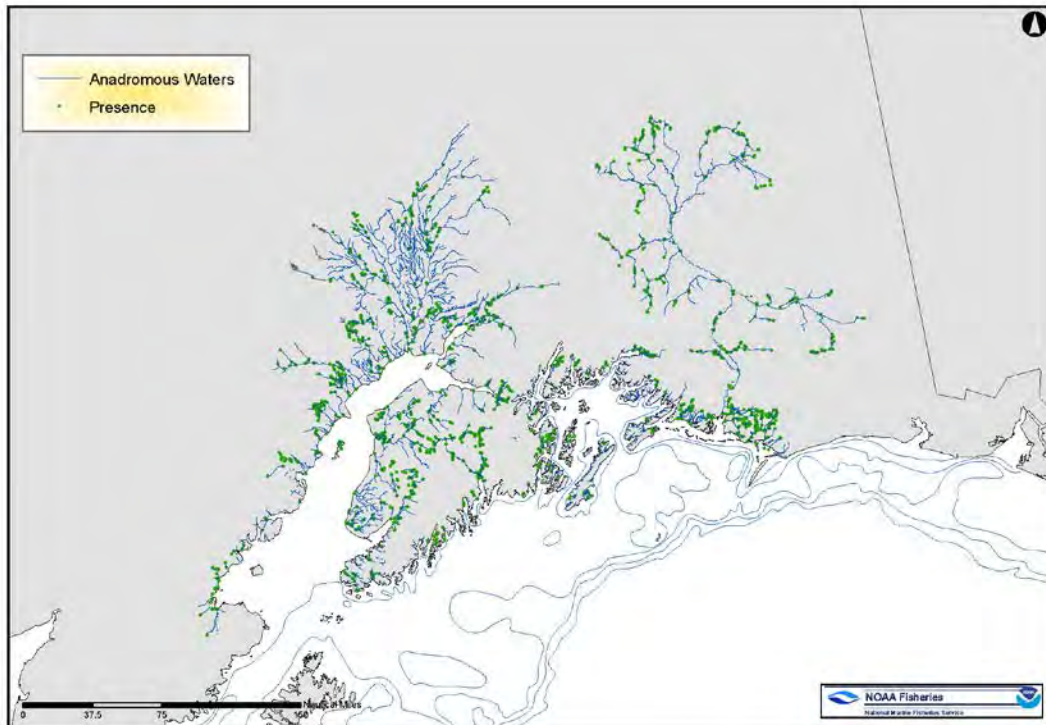


Figure 20 EFH Distribution for Sockeye Salmon – Southwestern Region

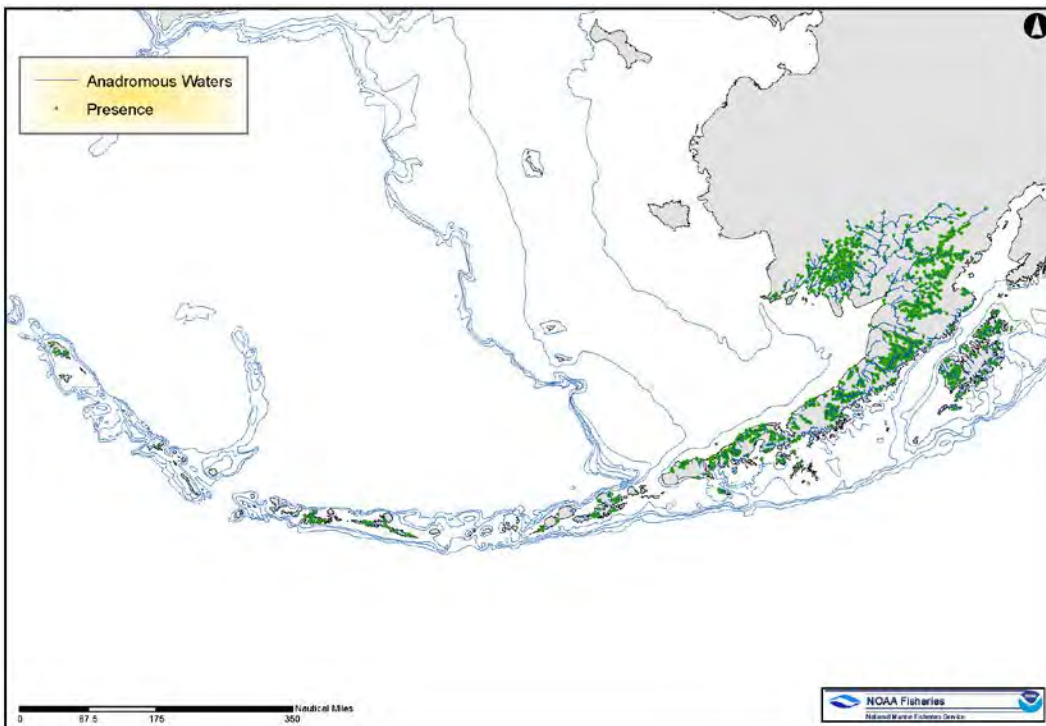


Figure 25 EFH Distribution for Chinook Salmon – Southeastern Region

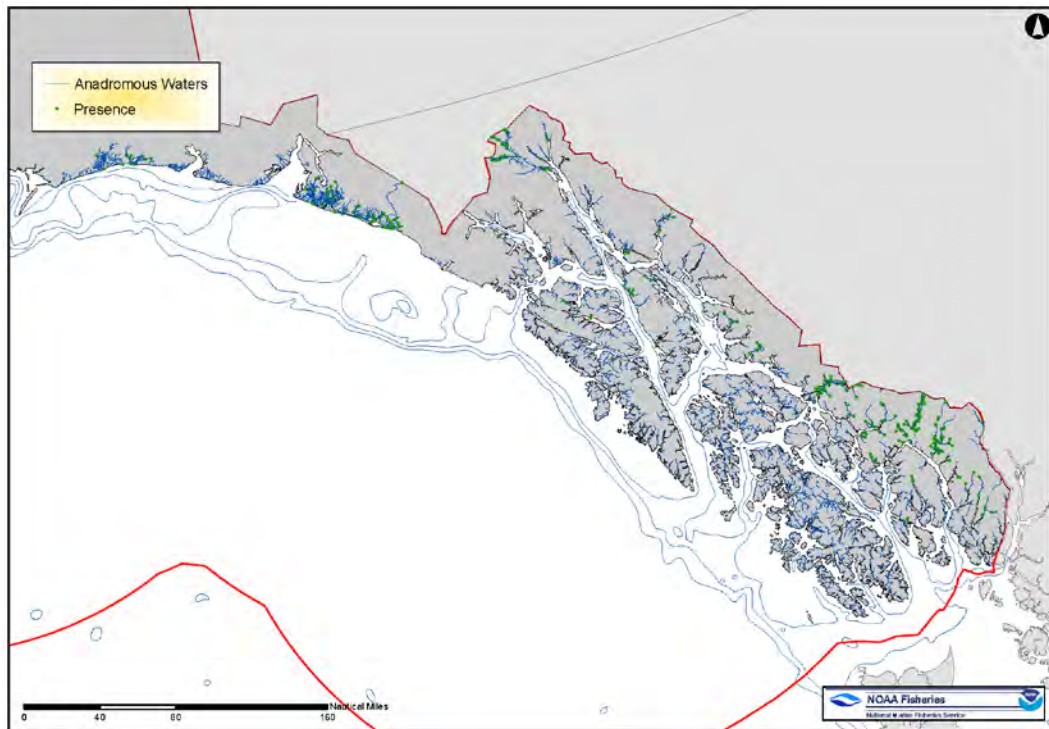


Figure 26 EFH Distribution for Chinook Salmon – South-Central Region

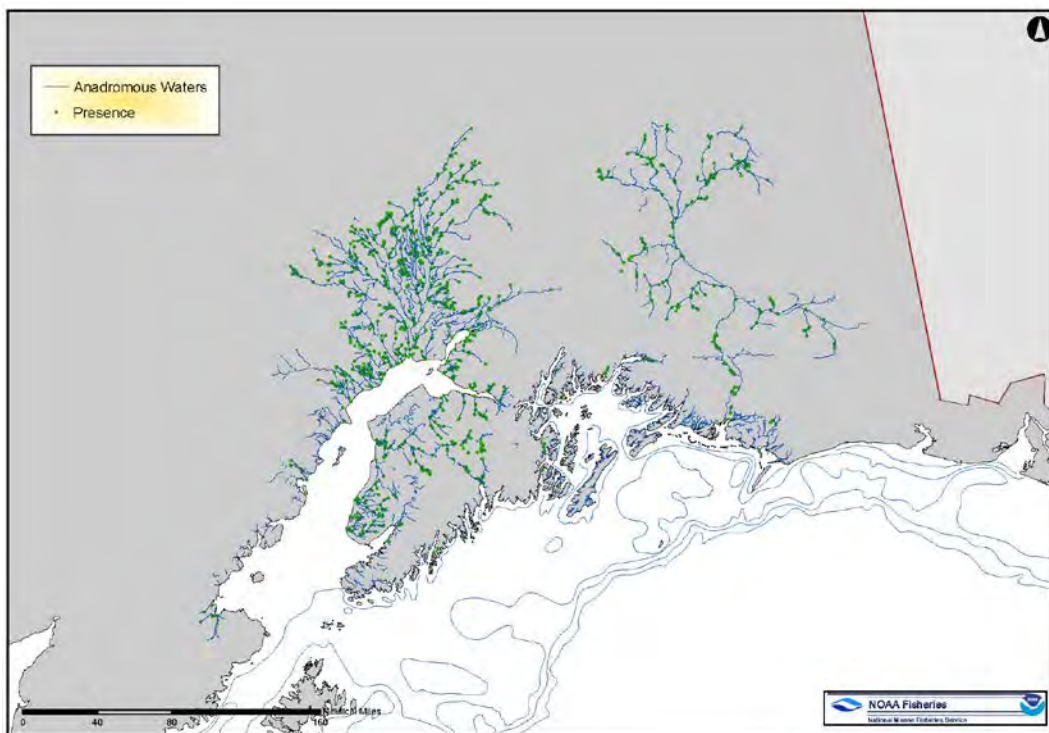


Figure 33 EFH Distribution for Coho Salmon – South-Central Region

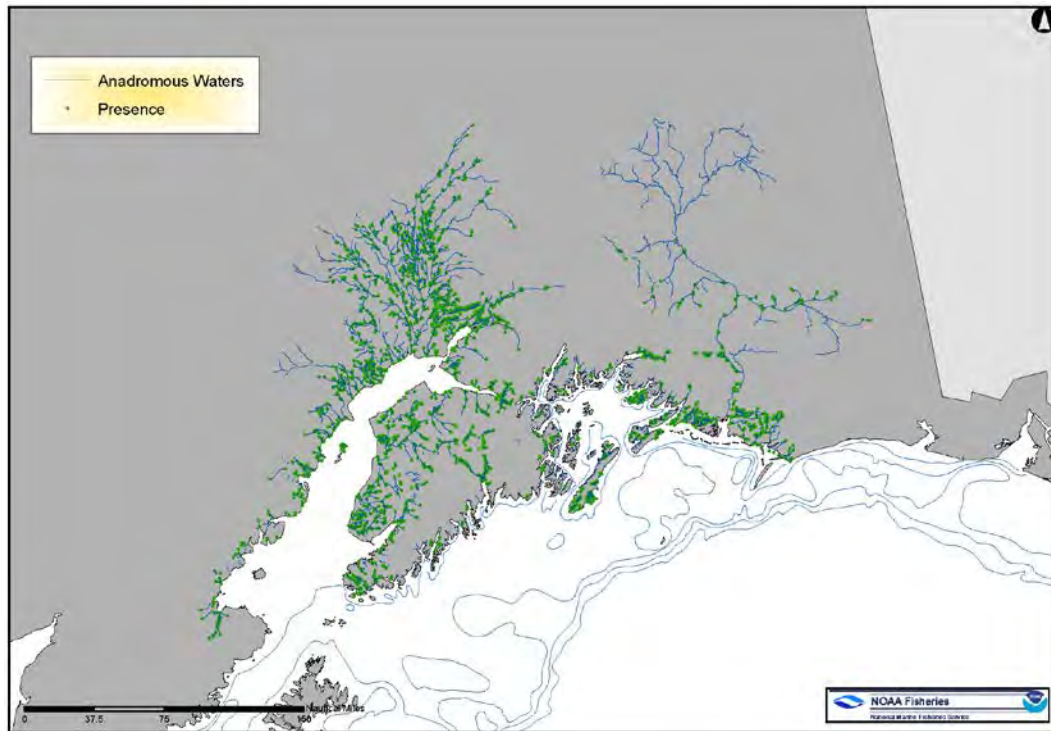
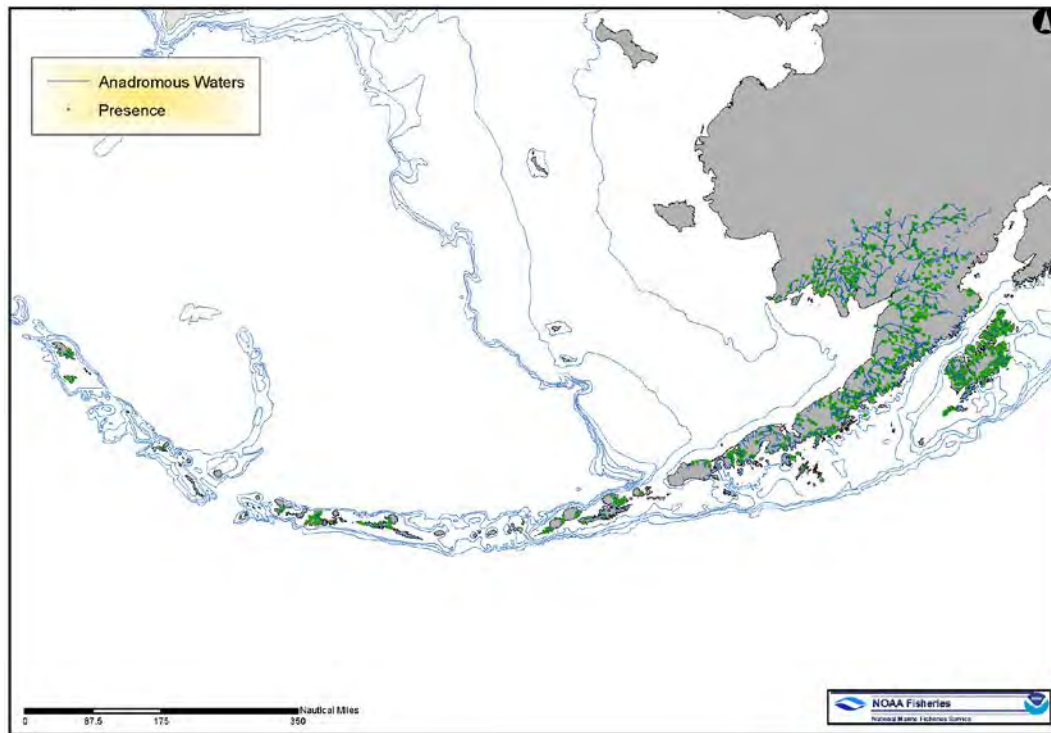
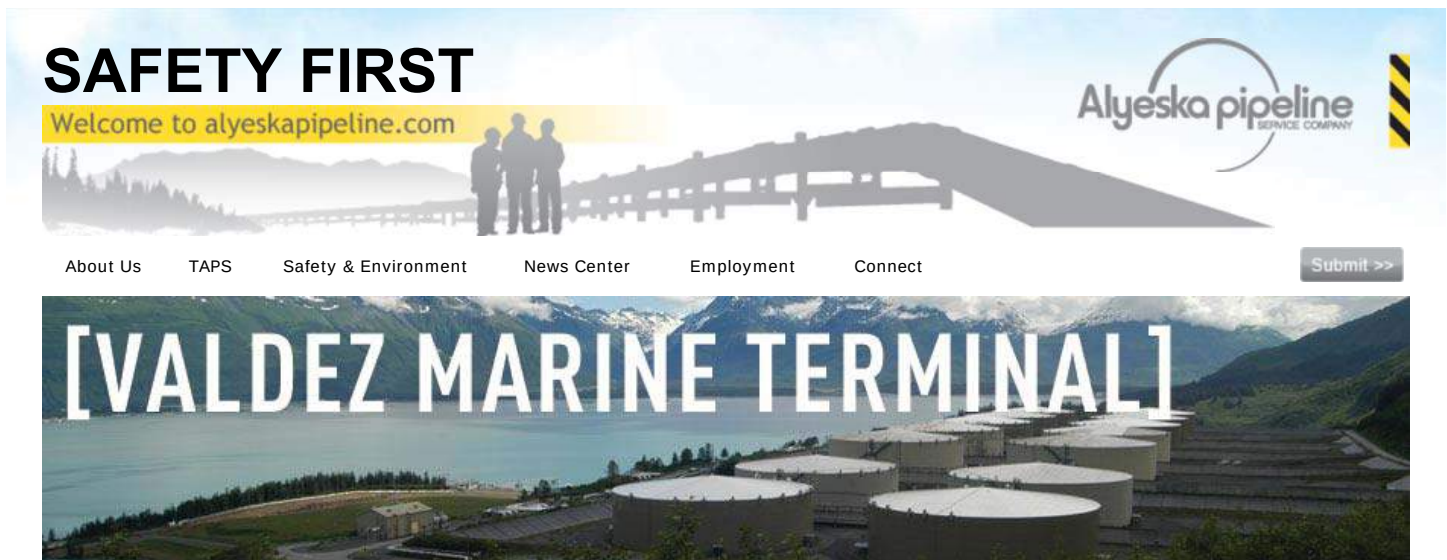


Figure 34 EFH Distribution for Coho Salmon – Southwestern Region



Appendix Q

Alyeska TAPS -Valdez Marine
Terminals and Tankers



Overview of TAPS

Pipeline Facts

Glossary

Pipeline History/Design
/Construction

Permafrost

Pipeline Bridges

Earthquake

Protection

Pipeline Operations

Declining Throughput

Low Flow Impact

Study

Crude Oil

Pump Stations

Throughput

Valdez Marine Terminal
& Tankers

Tankers

SERVS

Assets & Capabilities

Oil Spill Exercise

Program

Vessel of

Opportunity

Electrification &
Automation

The Valdez Marine Terminal

The Valdez Marine Terminal marks the end of the Trans Alaskan Pipeline System. Located in the northeast corner of Prince William Sound, the Terminal lies on more than 1,000 acres of land. The facility was designed for loading crude oil onto tankers and holding crude oil so that North Slope production can continue without impact from the marine transportation system. There are 14 storage tanks in service, facilities to measure the incoming oil, two functional loading berths, and a power plant.

At the Terminal, crude oil is measured and stored, then loaded onto tankers and sent to market. Tankers tie into a berth, where they hook into loading arms to take on crude oil. Before loading begins, crews protect the surrounding waters by placing an oil spill containment boom around the berth and tanker.

The Valdez Marine Terminal also has a facility to purify storm water, other Terminal drainage water, and primarily ballast water -- the water that fills tankers' hulls to stabilize them before they take on crude cargo. The Ballast Water Treatment system sends oily water through multiple processes to strip it of any hydrocarbons.

Basic information

- Located in Port Valdez, the northern most ice-free port in the U.S
- Total area — 1,000 acres
- Cost to build — \$1.4 billion
- Elevation — sea level to 660 ft. All facilities except berths 15 ft. or higher
- 18 storage tanks constructed, 14 in service as of January 1, 2012
- Current holding capacity in crude oil with 14 tanks — 7.13 million bbl.
- Two functional loading berths with vapor recovery capacity

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[Site Map](#) | [Contact](#)

Appendix R

NOAA Tide Facts



Where is the highest tide?

The highest tide in the world is in **Canada**.



The highest tides in the world can be found in Canada's Bay of Fundy. Shown here: Hopewell Rocks, New Brunswick, located in the Bay. Image credit: New Brunswick Department of Tourism and Parks (Canada).

The highest tides in the world can be found in Canada at the Bay of Fundy, which separates New Brunswick from Nova Scotia. At some times of the year the difference between high and low tide in this Bay is 16.3 meters (53.5 feet), taller than a three-story building.

The highest tides in the United States can be found near Anchorage, Alaska, with tidal ranges up to 12.2 meters (40 feet).

Tidal highs and lows depend on a lot of different factors. The shape and geometry of a coastline play a major role, as do the locations of the Sun and Moon. Storm systems at sea and on land also shift large quantities of water around and affect the tides. Detailed forecasts are available for high and low tides in all sea ports, but are specific to local conditions.

That many of the areas of the world with high ranges of tides are in the areas of Alaska, Canada, and northern Europe has created a misconception that the range of tide increases with increasing latitude (as one moves farther from the equator and closer to the poles). This is incorrect.

Increased tidal ranges in these areas are created by the positions and configurations of the continents in the northern hemisphere. In the higher latitudes of the northern hemisphere, the continents of North America, Europe, and Asia are pressed closer together. This "constriction" of the oceans creates the effect of a higher range of tides.

In the higher latitudes of the southern hemisphere, in the southern tips of South America, southern Africa, Australia, and Antarctica, tidal ranges are not increased. In these areas the continents are not pressed closely together, there is not a "constriction" of the oceans, and the tidal ranges are not increased.

Get **Social**



More **Information**

- Tides and Water Levels Education (<http://oceanservice.noaa.gov/education/kits/tides/>)
- Tides Online (<http://tidesonline.noaa.gov/>)
- Center for Operational Oceanographic Products and Services (<http://tidesandcurrents.noaa.gov/>)

Contact Us (<mailto:nos.info@noaa.gov>)

- [Ocean Facts \(/facts/\)](#)
- [What We Do \(/topics/\)](#)
- [Press Releases \(/newsroom/\)](#)
- [Video \(/video/\)](#)
- [Podcasts \(/podcast/\)](#)
- [Images \(/gallery/\)](#)
- [Every Kid in a Park \(/ekip/\)](#)
- [About Us \(/about.html\)](#)
- [Privacy Policy \(/privacy.html\)](#)

- [\(<http://oceanservice.noaa.gov/exit.php?url=https%3A%2F%2Finstagram.com%2Fnoaaoccean>\)](http://oceanservice.noaa.gov/exit.php?url=https%3A%2F%2Finstagram.com%2Fnoaaoccean)
- [\(<http://oceanservice.noaa.gov/exit.php?url=https%3A%2F%2Ftwitter.com%2Fnoaaoccean>\)](http://oceanservice.noaa.gov/exit.php?url=https%3A%2F%2Ftwitter.com%2Fnoaaoccean)
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- [\(<http://oceanservice.noaa.gov/exit.php?url=https%3A%2F%2Fwww.pinterest.com%2Fnoaaoccean%2F>\)](http://oceanservice.noaa.gov/exit.php?url=https%3A%2F%2Fwww.pinterest.com%2Fnoaaoccean%2F)
- [\(<http://oceanservice.noaa.gov/exit.php?url=https%3A%2F%2Fwww.youtube.com%2Fusoceangov>\)](http://oceanservice.noaa.gov/exit.php?url=https%3A%2F%2Fwww.youtube.com%2Fusoceangov)
- [\(<http://oceanservice.noaa.gov/exit.php?url=https%3A%2F%2Fwww.flickr.com%2Fphotos%2Fusoceangov>\)](http://oceanservice.noaa.gov/exit.php?url=https%3A%2F%2Fwww.flickr.com%2Fphotos%2Fusoceangov)

- [Take Our Survey \(/survey.html\)](#)
- [Site Map \(/sitemap.html\)](#)
- [Contact Us \(/contact.html\)](#)
- [Report an Error \(/contact.html#contact\)](#)
- [Disclaimer \(/disclaimer.html\)](#)
- [For NOS Employees \(<http://oceanservice.noaa.gov/exit.php?url=https%3A%2F%2Fsites.google.com%2Fa%2Fnoaa.gov%2Fnos-for-employees%2F>\)](http://oceanservice.noaa.gov/exit.php?url=https%3A%2F%2Fsites.google.com%2Fa%2Fnoaa.gov%2Fnos-for-employees%2F)
- [NOS Program Offices \(/programs/\)](#)
- [Website directory \(/websites/welcome.html\)](#)
- [Information Quality \(\[http://www.cio.noaa.gov/services_programs/info_quality.html\]\(http://www.cio.noaa.gov/services_programs/info_quality.html\)\)](http://www.cio.noaa.gov/services_programs/info_quality.html)
- [Acknowledgements \(/about/acknowledgements.html\)](#)
- [Freedom of Information Act \(<http://www.rdc.noaa.gov/~foia/>\)](http://www.rdc.noaa.gov/~foia/)

National Ocean Service (<http://oceanservice.noaa.gov>) | NOAA (<http://www.noaa.gov>) | Department of Commerce (<http://www.commerce.gov>)

Revised: November 24, 2014 | You are here: <http://oceanservice.noaa.gov/facts/highesttide.html>

Appendix S

Delta River Management Plan

RIVER MANAGEMENT PLAN

FOR THE

DELTA NATIONAL WILD AND SCENIC RIVER

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
ANCHORAGE DISTRICT, ALASKA

Recommended by: Wayne A. Boden Oct. 6, 1983
ANCHORAGE DISTRICT MANAGER DATE

Approved by: Curtis McVee Oct 7, 1983
ALASKA STATE DIRECTOR DATE

- WSRA requires that each component of the national wild and scenic rivers system be administered to protect and enhance the values which caused it to be included in the system.
- The Delta River Habitat Management Plan outlines actions for protecting and enhancing fish and wildlife habitat.

ITEM 13 - SCENIC QUALITY

Issue

How will the existing natural scenic qualities within the river corridor be protected?

Situation

Most of the scenery around Tangle Lakes and the wild stretch of the Delta River is outstanding and is in a natural primitive condition. The area east of the recreational stretch has been modified by highway and pipeline construction.

Considerations

- The outstanding quality of the existing scenery was a major reason for including the Tangle Lakes and Delta River in the wild and scenic rivers system.
- The WSRA (Section 10) allows for changes in the existing landscape if those changes do not substantially interfere with public enjoyment of the scenery.

ITEM 14 - PIPELINES AND ELECTRICAL TRANSMISSIONS

Issue

Will additional pipelines and other utility lines be allowed within the river corridor?

Situation

A portion of the wild stretch of river and all of the recreational stretch is within the utility corridor originally established as a route for the Trans-Alaska Pipeline System. Construction of a liquid natural gas pipeline through this utility corridor has been proposed.

Considerations

- The purpose of the utility corridor is to serve as a route for pipelines, power transmission lines and other utility lines.
- ANILCA allows for transportation and utility corridors across wild and scenic rivers (Section 1105).
- WSRA allows for easements and rights-of-way upon, over, under, across, or through any component of the national wild and scenic rivers system (Section 13).
- The scenery and other values along a wild and scenic river must be protected.

ITEM 15 - OIL AND GAS DEVELOPMENT

Issue

How will oil and gas exploration and development be affected by the river corridor?

Situation

The Denali/Tiekel amendment to BLM's Southcentral Management Framework Plan resulted in a Public Land Order (PLO 6329) which opened most of the land adjacent to but not within the river corridor for mineral location and oil and gas exploration under the United States mining and mineral leasing laws. However, the potential for commercial deposits of oil and gas in the area around the river corridor is considered to be low.

Considerations

- Utility corridor.
- ANILCA (Section 606) amended WSRA (Section 9) to withdraw minerals in Federal lands within one-half mile of a wild river in Alaska from all forms of appropriation under the mining laws and mineral leasing laws.
- The WSRA does not prohibit mining and mineral leasing within the boundaries of scenic or recreational rivers but does provide for regulating activities associated with this industry (Section 9).

ITEM 16 - NAVIGABILITY

Issue

How will a navigability determination for the Delta River and Tangle Lakes affect this management plan?

Situation

Preliminary findings of the BLM are that the Delta River is non-navigable. The navigability situation has been discussed under BLM policy for boundary determination.

Considerations

- The State owns the bed of navigable waters up to the ordinary high water mark.
- The wild and scenic river boundaries will not include land owned by the State.
- The WSRA (Section 10) provides for a cooperative agreement with the Governor of a State to participate in the administration of a wild and scenic river.

ITEM 17 - CLASSIFICATION OF THE TANGLE LAKES AND TANGLE RIVER

Issue

What WSRA classification (wild, scenic, or recreational) will be applied to the 24-mile Tangle Lakes and Tangle River segment of the river corridor?

Appendix T

Gulkana River Management Plan

RIVER MANAGEMENT PLAN REVISION for the GULKANA RIVER

A Component of the National Wild and Scenic Rivers System

U.S. Department of the Interior
Bureau of Land Management
Glennallen Field Office
August, 2006

access via the road mentioned under Item 1, helicopter, and occasionally powerboat and airboat. Alyeska, the company responsible for pipeline maintenance, periodically conducts spill response drills, staging activity out of Sourdough campground and boat launch.

Considerations:

- In accordance with the provisions of the Wild and Scenic Rivers Act (WSRA) and Title XI of ANILCA, new utility systems may be permitted within NWSR corridors. This includes items such as electric transmission lines and other systems of general transportation and utility transmission. ANILCA sections 1104 and 1105 provide applicable standards for granting such authorizations
- New pipeline/utility corridors would detract from the primitive and scenic qualities of the river corridor.

Action 14.1: New pipelines and electrical transmission lines will not be permitted within or across the wild river corridor unless conditions of ANILCA Section 1105 and the WSRA are met.

Discussion: Before any such utility line will be authorized, a determination must first be made that it would be compatible with the purposes for which the national wild river was established, and that there is no economically feasible and prudent alternate route or location (ANILCA 1105, WSRA).

ITEM 15: NAVIGABILITY

Situation: Navigability has been determined on the Gulkana. Consequently, this issue has been addressed in Item 11, State and Private lands, under Action Item 11.1 which provides for cooperative management with the State.

ITEM 16: HEADWATERS OF THE SOUTH BRANCH OF THE WEST FORK

Issue: How should the 15 miles of floatable water upstream of the designated portion of the south branch of the West Fork Gulkana River be managed?

Situation: It has been established through field investigation that the start of the designated river corridor on the south branch of the West Fork Gulkana River is not the actual start of the floatable section of this river. The south branch of the West Fork can actually be floated from two separate lakes 15 miles upstream from the lake identified as the start of the river corridor. This 15-mile segment upstream of the start of the designated wild river corridor contains the wildest stretch of river on the entire Gulkana River system. There are no roads, trails, or privately owned lands along this stretch of the river. This segment shares the same outstandingly remarkable values as identified for the designated corridor.

Appendix U

BLM Utility Corridor Resource Management Plan

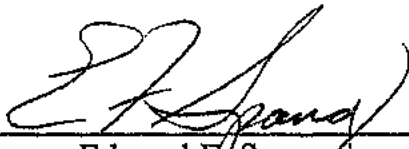
UTILITY CORRIDOR

Resource Management Plan/
Environmental Impact Statement

RECORD OF DECISION

prepared by
United States Department of the Interior
Bureau of Land Management
Arctic District Office

January 11, 1991



Edward F. Spang
State Director, Alaska

Introduction

This document is the Bureau of Land Management's (BLM) Record of Decision prepared for the Utility Corridor Resource Management Plan/Environmental Impact Statement (RMP/EIS). The Utility Corridor RMP is a long-term comprehensive land use plan developed to direct the BLM's management of a portion of the lands and minerals it administers in northern Alaska. The lands are shown on map 1.1, of the Proposed RMP (reproduced in this document for your convenience) and amount to approximately 6.1 million acres of BLM-administered surface, of which 5.8 million acres is BLM-administered mineral estate. The Utility Corridor RMP supersedes all previous land use planning decisions for this area, many of which are contained in a Management Framework Plan completed in 1979.

The Utility Corridor, established by Public Land Order (PLO) 5150, as amended, on December 30, 1971, is an essential component of the national domestic oil and gas transportation system. It provides a route to transport a significant portion of the nation's petroleum; the present and future importance of access to these resources cannot be overstated. In recognition of this fact, the Proposed RMP provides that the primary management direction and use of BLM-administered lands in the Utility Corridor is for energy transportation. Therefore, both the "Inner" and "Outer" Corridor, as shown on map 1.1 of the Proposed RMP, are designated as a Federal Land Policy and Management Act of 1976 (FLPMA) section 503 right-of-way corridor under 43 C.F.R. 2806.2.

The signing of this Record of Decision completes the initial phases of our land use planning process. However, the signing of this Record of Decision does not represent the end of the planning process. Planning is an on-going process of data collection, analysis and evaluation related to the prescribed uses of public lands that continues during plan implementation, and may eventually lead to amendment or revision of the plan.

The planning process began with the determination of the scope of the issues to be addressed in the

RMP in 1986. The Draft RMP/EIS was distributed for public review on August 28, 1987, for a 90-day review period, which ended on November 30, 1987. The Proposed RMP/Final EIS was signed on September 27, 1989, and made available to the public on November 24, 1989, for a 30-day protest period. The BLM Director received 14 timely protests, of which 12 were accepted for administrative review.

The Proposed RMP was prepared in accordance with the FLPMA, the Alaska National Interest Lands Conservation Act of 1980 (ANILCA), and the Department of the Interior, BLM planning regulations (43 C.F.R. 1600). The draft and final EISs were prepared in accordance with the Council on Environmental Quality's (CEQ) regulations for implementing the National Environmental Policy Act of 1969 (NEPA) (40 C.F.R. 1500.) These regulations require the consideration of cumulative impacts--the total level of impacts that would arise from the implementation of management actions described in the Utility Corridor RMP.

An important cross-reference to our analysis is contained in the final EIS prepared for the Proposed RMP. The reader is directed to the *Final Environmental Impact Statement for the Proposed Trans-Alaska Gas System*, published in June, 1988, document number BLM-AK-PT-88-003-1792-910, chapter 4.7 for a detailed cumulative impact analysis, which was utilized in the analysis performed for the Proposed RMP.

Specific attention was given to analysis of and impacts to existing subsistence uses and resources. In the "Affected Environment" chapter, pages 3-28 through 3-31 describe the use occurring both inside and outside the planning area (for example, Anaktuvuk Pass, Nuiqsut, and Kaktovik, all areas that are outside of the planning area.) While not specifically stated in the text, based on the body of data on pages 3-28 through 3-31, the impact analysis that is contained in the "Environmental Consequences" chapter, extended outside the planning area and the reader of the RMP should bear this fact in mind.