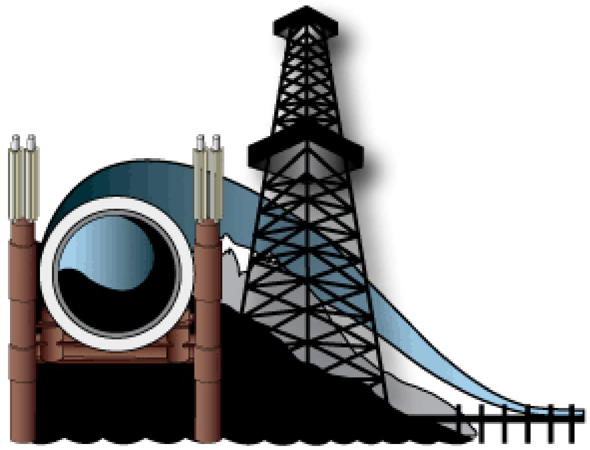

Comprehensive Evaluation and Risk Assessment of Alaska's Oil and Gas Infrastructure

Phase 1 – Interim Report

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COMPREHENSIVE EVALUATION AND RISK ASSESSMENT OF ALASKA'S OIL AND GAS INFRASTRUCTURE
PHASE 1 – INTERIM REPORT

Revision Log

Rev. No.	Date	Section	Description	Approval
Rev. 0	12/02/2008		Initial State of Alaska Draft Issue	
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INTERIM REPORT REQUIREMENTS CROSS REFERENCE

Requirement per Contract & Project Management Plan	Location in Interim Report
• A description of risk issues identified during the information/data review and stakeholder consultation process (Contract, Appendix C – Scope of Work, Pg. 3 / PMP Pg. 26)	• Section 3.0 – Stakeholder Consultation (Task 1b) • Section 6.0 – Initiating Events • Appendix C – Stakeholder Meeting Minutes
• A summary of the information and data review and its relevance to this risk assessment (Contract, Appendix C – Scope of Work, Pg. 3 / PMP Pg. 26)	• Section 4.0 – Existing Information/ Data Review (Task 1c) • Appendix D – Final Task 1c Document list and Document Review Summaries
• A listing of the oil and gas infrastructure components, processes, and systems proposed for inclusion in the risk assessment and the reasoning for their inclusion (Contract, Appendix C – Scope of Work, Pg. 3 / PMP Pg. 26)	• Section 5.0 – Infrastructure Components, Processes and Systems • Appendix E – Alaska Infrastructure Maps
• Proposed definition for unacceptable consequences (Contract, Appendix C – Scope of Work, Pg. 3 / PMP Pg. 26)	• Section 7.0 – Unacceptable Consequences
• A summary of stakeholder consultation results and discussions including priorities and issues raised by each group (Contract, Appendix C – Scope of Work, Pg. 3 / PMP Pg. 26)	• Section 3.0 – Stakeholder Consultation (Task 1b) • Appendix A – Approved Stakeholder List and Record of Stakeholder Outreach • Appendix B – Stakeholder Survey • Appendix C – Stakeholder Meeting Minutes
• Identification of methods and procedures for cooperatively working with owners and operators of Alaska's Oil and Gas Industry infrastructure to efficiently and effectively request information in support of this risk assessment in a consistent non-duplicative way (Contract, Appendix C – Scope of Work, Pg. 3 / PMP Pg. 26)	• Section 9.0 – Methods for Working with Industry
• Identification of methods and procedures to maintain confidentiality of sensitive or proprietary information that could be requested and made available to support this risk assessment (Contract, Appendix C – Scope of Work, Pg. 4 / PMP Pg. 26)	• Section 8.0 – Confidentiality Methods and Procedures

LIST OF ACRONYMS AND ABBREVIATIONS

Acronyms and Abbreviations	
AAC	Alaska Administrative Code
ABS	American Bureau of Shipping
ADEC	Alaska Department of Environmental Conservation
AKOSH	Alaska Occupational Health and Safety
AOGCC	Alaska Oil and Gas Conservation Commission
AOGA	Alaska Oil & Gas Association
API	American Petroleum Institute
APL	Alpine Pipeline
APSC	Alyeska Pipeline Service Company
ARA	Alaska Risk Assessment
AST	Above-Ground Storage Tank
ASTM	American Society for Testing of Materials
BPXA	BP Exploration Alaska
BWT	Ballast Water Treatment
CCP	Central Compression Station
CD	Central Drillsite
CFR	Code of Federal Regulations
CGF	Central Gas Facility
CIGGS	Cook Inlet Gas Gathering System
CIPL	Cook Inlet Pipeline
CIRCAC	Cook Inlet Regional Citizens' Advisory Council
CPAI	ConocoPhillips Alaska, Inc.
CPF	Central Processing Facility
CPS	Central Power Station
DOL	Department of Labor
DRA	Drag Reducing Agent
EPA	Environmental Protection Agency
EOA	Eastern Operating Area
ESA	Environmentally Sensitive Area
GC	Gathering Center
G&I	Grind and Inject
GVEA	Golden Valley Electric Association
HSE	Health, Safety and Environment
HSEMS	Health, Safety and Environmental Management System
IM	Integrity Management Standard
IPA	Initial Participating Area
JPO	Joint Pipeline Office
KKPL	Kenai-Kachemak Pipeline
KPL	Kuparuk Pipeline
KUTP	Kuparuk Unit Topping Plant
LDF	Large Diameter Flow Line

Acronyms and Abbreviations	
LNG	Liquefied Natural Gas
LPC	Lisburne Production Center
MI	Miscible Injectant
MMS	Minerals Management Service
MOC	Management of Change
MPI	Main Production Island
NAEC	Northern Alaska Environmental Center
NFPA	National Fire Protection Code
NGL	Natural Gas Liquid
NGO	Non-Governmental Organization
NSB	North Slope Borough
OCC	Operations Control Center
PA	Participating Area
PHMSA	Pipeline and Hazardous Materials Safety Administration
PMP	Project Management Plan
POC	Point of Contact
PPE	Personal Protective Equipment
PSIO	Petroleum Systems Integrity Office
PWSRCAC	Prince William Sound Regional Citizens' Advisory Council
PS	Pump Station
QA	Quality Assurance
QC	Quality Control
RCAC	Regional Citizen's Advisory Council
RFP	Request for Proposal
RGV	Remote Gate Valve
ROV	Remotely Operated Valve
SAOT	State Agency Oversight Team
SDI	Satellite Drilling Island
SIP	Seawater Injection Plant
SOW	Scope of Work
SR	Strategic Reconfiguration
STP	Seawater Treatment Plant
TAPS	Trans Alaska Pipeline System
UAA	University of Alaska Anchorage
UAF	University of Alaska Fairbanks
USAF	United States Air Force
USDOT	United States Department of Transportation
UST	Underground Storage Tanks
VMT	Valdez Marine Terminal
VSM	Vertical Support Member
WBS	Work Breakdown Structure
WOA	Western Operating Area

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1.0 EXECUTIVE SUMMARY

The Interim Report provides a summary of the initial set of tasks and activities that have been accomplished since the risk assessment kick-off in July 2008, and outlines a preliminary set of hazards and risks associated with Alaska's Oil and Gas infrastructure, based on a review of existing information and input provided by key stakeholders around the State of Alaska.

Stakeholder Consultation (Task 1b)

During the June – November 2008 timeframe, the project team solicited stakeholder input on the risk assessment, including the focus of the assessment, consequences of concern, suggested sources of information, and other specific priorities. Stakeholders from a wide variety of groups and regions were consulted during the Stakeholder Consultation process, including state agencies, federal agencies, local governments, Industry, NGOs, native organizations, and the public. Multiple key stakeholder and public stakeholder meetings were held in the five major regions listed below. Each meeting was attended by key representatives of the project team as well members of the SAOT (State Agency Oversight Team).

- Fairbanks/Interior Region
- Kenai/Cook Inlet Region
- Anchorage/Southcentral
- Valdez/Prince William Sound/Copper River Basin Region
- Barrow/North Slope Region

Concerns relating to the three major infrastructure areas of the Risk Assessment, 1) the North Slope, 2) the Trans Alaska Pipeline System (TAPS) and 3) the Cook Inlet, were identified.

Statewide Concerns. Common themes that stakeholders in all regions highlighted as important areas of focus included initiating factors such as aging/abandoned infrastructure, corrosion of pipelines or equipment, aging/inexperienced or overworked industry workforce, loss of power to facilities, and natural hazards such as earthquakes and severe weather. Consequences that were proposed included safety consequences (serious injuries or death), spills to waterways or the marine environment, spills to land, and unplanned interruptions in oil flow resulting in loss of revenue to the State and local governments. Stakeholders also mentioned concerns with regulatory oversight of infrastructure, industry culture, and operational controls and mitigation measures.

North Slope. North Slope comments included aging and maintenance of North Slope infrastructure, corrosion of pipelines, loss of critical facilities/support systems such as a power plant, and operational safety hazards. Stakeholders were also concerned with cost-cutting measures with regard to maintenance, and a perceived lack of regulatory oversight of North Slope facilities. A primary consequence of concern was a spill to a waterway (most severe) or tundra causing significant environmental damage and impacts to subsistence activities. Concern was also raised regarding an event on the North Slope with the potential to cause an unplanned shutdown of production flow to TAPS, resulting in loss of revenue to State and local governments.

TAPS. TAPS comments focused on age and integrity of the Trans Alaska Pipeline System (TAPS), as well as the TAPS Strategic Reconfiguration Plan and associated automation of pump stations. Consequences of concern that were identified included a spill from the pipeline at a river crossing causing serious environmental effects (e.g. to fisheries) and a spill to the marine environment from the Valdez

Marine Terminal. Stakeholders also expressed concern about potential unplanned shutdown of TAPS, resulting in a loss of revenue to State and local governments.

Cook Inlet. Cook Inlet stakeholders commented primarily on the age of the infrastructure, and hazards which could cause a spill to the Cook Inlet, specifically relating to offshore operations and subsea pipelines. An offshore spill would result in substantial environmental damage which could significantly impact the fisheries on the Kenai Peninsula. The Drift River Terminal was identified as a vulnerable component of the infrastructure in terms of volcanic eruptions (mudflows), based on impacts from a previous volcanic eruption.

Industry. The team was not able to consult with Industry regarding technical information and input for the methodology during this portion of the project; therefore, critical input of information for some sections of this report was not acquired. Gaining cooperation and input from the companies that own or operate the oil and gas infrastructure in Alaska is crucial for the successful completion of the Task 2 Methodology Development part of this project and implementation of that methodology during Phase 2 of the risk assessment. Two meetings were held between the SAOT, the project team, and the Alaska Oil and Gas Association (AOGA), an industry representative group, to discuss confidentiality issues. The SAOT is currently working to resolve confidentiality issues with Industry and to establish a process that will allow for future information sharing between Industry and the project team.

Existing Information/Data Review (Task 1c)

In support of developing the risk assessment methodology, the project team identified, reviewed, and summarized a comprehensive list of publicly available documents which outline risk assessment tools and approaches that can be used as a basis for customizing a fit for purpose methodology. A review of maps, data, reports, State agency statistics, and other publicly available information was also conducted to define the specific geographical and physical scope of the risk assessment.

Infrastructure Components, Processes and Systems

The project team documented the results of research gained during the Task 1c document review to refine the scope of the risk assessment by providing a narrative overview of the infrastructure and by listing physical components, processes, and systems that are both inside and outside the scope of the project. These descriptions are broken down into three separate infrastructure areas, including:

- North Slope
- TAPS
- Cook Inlet

Initiating Events

The results of the stakeholder consultation process and general risk assessment practices were used to derive a preliminary listing of event categories that will be considered during implementation of the risk assessment, including both operational and natural hazard events that have the potential to cause impacts to safety, the environment, or reliability of the producing infrastructure. This list will be expanded and refined during the Task 2 Methodology Development process, and will allow for the development of a customized, structured set of scenarios that take into account the design and operating features that are specific to the facility or infrastructure item being considered for the facilities.

Unacceptable Consequences

Consequence categories of interest for the risk assessment were identified in the scope of work as impacts of potential events that pose threats to:

- Reliability of State Revenue Due to Loss of Production
- Safety (Occupational and Public)
- The Environment

The project team developed an initial structure for defining, categorizing, and analyzing these three consequence areas. Initial definitions and categories will need to be further developed and refined as the project progresses into the Methodology Development stage. Other detailed assessment tools and approaches may be used for the in depth analysis that will be required during the Implementation Phase of the project.

Confidentiality Methods and Procedures

This section discusses the different categories of information that are likely to be requested and utilized by the project team during the course of designing and conducting the risk assessment, and the issues associated with, and the potential options for, handling each of the types of information categories. This section also describes the team's progress in resolving the confidentiality issues, and the path forward for implementing an agreement to facilitate the flow of information to the project team.

Methods for Working with Industry

During Phase 1 and 2 of the project, the project team intends to directly engage Alaska infrastructure owners/operators to be able to acquire valuable data and input for the Risk Assessment. This section identifies the methods and procedures that are proposed for cooperatively working with owners and operators of Alaska's Oil and Gas infrastructure in order to efficiently and effectively request information in support of this risk assessment in a consistent, non-duplicative way.

2.0 INTRODUCTION

EMERALD, in collaboration with subcontractor ABS Consulting, was contracted by the State of Alaska Department of Environmental Conservation (ADEC) in June 2008 to design and implement a comprehensive, engineering-oriented baseline risk assessment of the entire oil and gas infrastructure in Alaska. The State Legislature's stated purpose for the risk assessment is to:

> "…baseline the condition of Alaska's oil and gas production, storage and transportation system and evaluate the economic, environmental and safety risks associated with continued operation for another generation and recommend measures to mitigate those risks."

To achieve the legislature's desired outcome, the team will assess the current state of the infrastructure and systems in place to operate it, identify and rank areas of greatest risk, and present the results to the State in the form of a risk profile. The State will use this risk profile to manage risks and make risk based decisions for continued operations of the infrastructure well into the future.

2.1 Project Background

Alaska is dependent on oil and gas production as a primary source of State revenue, both now and for the foreseeable future. The integrity of the Alaska oil and gas network must be maintained to protect the safety of the people, the environment, and to ensure uninterrupted production, which is a primary revenue source for Alaska, contributing approximately 85% of the State's total revenue. In addition to its importance to the State, Alaska's oil and gas resources provide a critical source of energy for the nation, accounting for approximately 17% of U.S. domestic production.[1]

Parts of Alaska's complex oil and gas infrastructure have been in place since the early 1960s, and in some cases have already exceeded their original design life. As demonstrated in 2006, when part of Alaska's North Slope oil production was interrupted due to corrosion related pipeline leaks, failures in any one component of the system can directly impact the system as a whole.

Past incidents alone are not reliable predictors of future problems. Oversight of the integrity of the system requires rigorous analysis to anticipate and prevent problems before they occur. The project team will take a "system of systems" approach, which focuses on evaluating the interrelations among the system components, and identifying critical areas of the system with the highest potential for failure. The outcome of this risk assessment will be a "picture" of the current state of the infrastructure, highlighting the infrastructure components with the highest threats of failure and highest consequence of loss. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska. Research also indicates that a system-wide study of this type and magnitude has never been conducted for any of the known oil and gas infrastructure systems in the world.

The State Agency Oversight Team (SAOT) is responsible for overseeing the risk assessment project and is comprised of multiple State of Alaska agencies including the Alaska Department of Environmental Conservation (ADEC), the Alaska Department of Natural Resources (including the State Pipeline Office and Petroleum Systems Integrity Office), Alaska Department of Public Safety/State Fire Marshal's Office, Alaska Oil and Gas Conservation Commission, Alaska Department of Labor and Workforce Development, Department of Law, Department of Revenue, and the University of Alaska, College of Engineering and Mines. The role of the SAOT is to provide guidance and direction for the project. Throughout this report, references are made to the SAOT, but also to the "State", which refers either to Alaska in general or to the State as a governing body and to ADEC at times as the contracting agency for the project.

2.2 Project Scope

The project scope includes a system-wide risk assessment of Alaska's oil and gas production infrastructure. Geographic components of the project scope include:

- North Slope Infrastructure, including production facilities and pipelines up to Pump Station 1
- Trans Alaska Pipeline System (TAPS), including the Valdez Marine Terminal (VMT) up to the marine terminal loading arms
- Cook Inlet Infrastructure, including production facilities, the Cook Inlet Gas Gathering System (CIGGS) up to the Nikiski LNG Plant and the Cook Inlet Pipeline (CIPL) up to the Drift River Marine Terminal loading arms (Cook Inlet will be considered in the initial phase of this project.)

Geographic components excluded from the scope of the project include areas of future oil and gas development (i.e., areas where production operations begin after the commencement of this project – July 1, 2008.

A summary of the infrastructure scope and its boundaries is provided in the table below.

Included	Excluded
Infrastructure Components	
• Production wells • Gathering lines (flowlines from wells upstream of processing center) • Facility piping • Crude oil pipelines • Gas and water injection systems (including wells) • Gas transport pipelines integral to operating infrastructure (Cook Inlet) • Oil and gas processing and treatment • Waste management and disposal (re-injection materials) • Storage tanks • Terminals • Marine loading facilities • Support systems (e.g. utility systems, electric power, fuel systems, water supplies, control/communications systems)	• Marine transportation (e.g., tankers and other marine infrastructure) • Refineries and product distribution lines not integral to operating infrastructure • Exploration and other future development infrastructure (e.g., drilling rigs) • Reservoir maintenance • Future facilities or projects (i.e., production operations with planned start-up after the commencement of this project, July 1, 2008)

2.2.1 Recommendations for Future Study

Stakeholders expressed a number of concerns that fell outside the scope of this project. The following subsections highlight concerns that were raised most frequently and are recommended as areas of future study.

2.2.1.1 Socioeconomic Impacts to Communities

Socioeconomic impacts to Alaskan communities as a result of unplanned interruptions in oil or gas flow were of concern to many stakeholders. Potential consequences resulting from such an interruption include disruption of aviation fuel supplies for military bases and the Anchorage Airport, loss of low sulfur diesel supplies for the state, and disruption of fuel supply to power plants and subsequent loss of power and heating sources in communities, . In particular, the Cook Inlet natural gas supply is of primary importance to south-central Alaska. Stakeholders specifically pointed out that hospitals, schools, buildings, homes, and the LNG Plant in Kenai are especially vulnerable to loss of fuel. Communities in the interior of Alaska that rely on electric power from the Golden Valley Electric Association (GVEA) Power Plant were also noted as vulnerable areas. GVEA reportedly produces 75% of its power using turbine generators fueled by North Slope oil and gas streams.

An unplanned interruption in oil flow (especially through TAPS) also has the potential to cause serious economic impacts to communities, including a loss of revenue to local governments, and a potential loss of employment of residents who work in oil and gas production or in downstream processing.

2.2.1.2 Downstream Processing and Distribution Infrastructure Components

Multiple stakeholders urged the State to conduct a future study on downstream processing and distribution infrastructure, such as refineries, power plants, the LNG plant in Kenai, and downstream distribution pipelines. The focus of this risk assessment is upstream production only, including crude oil pipelines up to the metering valves on the refinery feed and outlet lines. Impacts to refineries will not be considered, however a shutdown of a refinery has the potential to act as an initiating event that may have impacts on infrastructure (TAPS) and will be considered in those terms. Power plants are generally excluded from the scope, except when they feed oil and gas infrastructure.

2.3 Interim Report Overview

This Interim Report is intended to provide a summary of the initial set of tasks and activities that have been completed since the project kick-off in July 2008, and a preliminary outline of the hazards and risks associated with Alaska's Oil and Gas infrastructure, based on a review of existing information and input provided by key stakeholders around the State. During June – November 2008, the project team solicited stakeholder input on the risk assessment, including the focus of the assessment, consequences of concern, suggested sources of information, and other specific priorities. The team also reviewed and summarized publicly available documents specific to methodology development and facilities and components that comprise the overall infrastructure. The Interim Report synthesizes this information, and provides a foundation for the draft methodology, which will be completed by the end of February 2009.

The team was not able to consult with Industry as a key stakeholder during this initial part of the project; therefore, critical input for some sections of this report was not gained. Specifically, Industry's perspective and concerns are not reflected in the Stakeholder Consultation summary. Additionally, Industry risk management processes, standards, and definitions were not available for review by the team, and were subsequently not considered as part of the Task 1c document reviews or applied to the development of the Unacceptable Consequences definition. Process overviews of the infrastructure and lists of in-scope and out-of-scope components that make up the infrastructure facilities were compiled based on publicly available information only and have not been reviewed with Industry.

The Interim Report was organized in a way that is logical to the reader and consistent with the development of a standard risk assessment. Initial sections of the report summarize the information that was gained through the stakeholder and document review processes, and highlight the application of such information to the project. Subsequent sections apply this information in terms of risk assessment basics, which involves describing the specific physical components of infrastructure that will be assessed**,** identifying potential hazard scenarios that are appropriate to apply to those components, and defining how the severity and frequency of those hazardous events could be used to establish a risk level if the event were to occur.

In this application, risk is defined by the following:

1. *What can go wrong (What adverse event can occur)?*
2. *What is the expected frequency or what is the likelihood of that event occurring?*
3. *What are the consequences if that event occurs?*

Each of the questions described above makes up a component of the risk assessment process, and will be used as the basis for developing the customized methodology for this project. The report structure is outlined in the bulleted list below.

- **Section 3.0, Task 1b Results of Stakeholder Consultation** – This section describes the process and results of the Task 1b Stakeholder Consultation effort, which was conducted from June through November 2008. During this time, the team made direct contact with over 200 interested parties, held 39 meetings around the State, and solicited written comments from stakeholders. The write-up focuses on highlighting common themes from a statewide perspective, as well as specific themes as they relate to the three main areas of the oil and gas infrastructure in Alaska: North Slope, TAPS, and Cook Inlet. The approved Stakeholder List, Record of Stakeholder Contacts, and Comprehensive Meeting Records are included as appendices to this report.

- **Section 4.0, Task 1c Existing Information/Data Review –** This section outlines the results of the document review effort conducted from July through November 2008, and is based on the final Task 1c Document Review List. Documents reviewed and summarized as part of this effort were limited to those that are publicly available and which may be pertinent to developing a customized risk assessment methodology for the assessment of Alaska's oil and gas infrastructure. The documents and data sets that were subsequently recommended by individuals or groups during the stakeholder outreach sessions, and those that contain specific information applicable to assigning frequency and consequence designations related to particular hazards, were not a part of the Existing Information /Data Review task. Recommended data sources will be reviewed as one of the next activities in the project and those pertinent sources will be used as input for the Task 2 Methodology Development and Phase 2 Implementation stages of the project. The final Task 1c Document Review List and full document summaries are included as appendices to this report.

- **Section 5.0, Infrastructure Components, Processes and Systems** – This section includes a description of the physical infrastructure that will be assessed as part of the scope of the risk assessment. The facilities and components that are considered to be outside of the scope of this review have also been described, along with the reason why they are outside of the scope of the project. The facility and component information outlined in this section was developed through project team research of publicly available documents and maps. This section of the report is segregated into the three geographic areas of infrastructure: North Slope, TAPS, and Cook Inlet. A summary of the processes and major functions within each area have been provided. These summaries are supplemented by photos of facilities and maps depicting facility locations, as appropriate.

- **Section 6.0, Initiating Events –** This section describes an initial listing of events that answer the first question of a risk assessment; "What can go wrong?" This list is intended to be a preliminary set of event categories that was derived from the stakeholder consultation process and general risk assessment practices, as they would be specifically applicable to Alaska infrastructure. During the Task 2 Methodology Development this list will be expanded, which will allow for the development of a customized, structured set of scenarios that take into account the design and operating features that are specific to the facility or infrastructure item that is being considered.

- **Section 7.0, Unacceptable Consequences** – This section addresses the second and third questions that would be asked during a risk assessment, "What is the expected frequency/likelihood of an event occurring?" and "What are the consequences if that event occurs?" The primary focus of this section is to define Unacceptable Consequence in each of the three consequence areas as defined by the State: Safety, Environment, and Reliability. The preliminary definitions were developed based on wide-ranging stakeholder input and on best available risk management practices and tools. An initial frequency scale has been presented that is based on the expected likelihood of typical event categories that will be considered. This portion of the report is intended to be the foundation of the basic risk matrix tool, which will be further refined and developed during Task 2 Methodology Development.

- **Section 8.0, Confidentiality Methods and Procedures –** This section identifies methods for maintaining confidentiality of protected information, such as trade secrets, that could be requested from Industry and made available to support the risk assessment. EMERALD procedures for handling such information are outlined in detail in this section. State level information management is currently being addressed by the SAOT in conjunction with Industry representatives.

- **Section 9.0, Methodology for Working with Industry** – This section identifies methods for working cooperatively with owners and operators of Alaska's Oil and Gas infrastructure in order to efficiently and effectively request and obtain required information in a consistent non-duplicative way. The section also outlines documents that the project team will request from Industry for each phase of the project. A snapshot of the progress accomplished in establishing this working relationship to date and expectations for future communications is also provided.

3.0 STAKEHOLDER CONSULTATION (TASK 1B)

The purpose of the stakeholder consultation task was to identify, engage, and collect input from key stakeholders that have an interest in the outcome of the project, including oil and gas infrastructure owners/operators, state and federal agencies, the University of Alaska, local governments, NGOs, native organizations, and the general public. This section of the report reflects the perspectives of these stakeholders and does not necessarily reflect the views of the project team or the State. Stakeholder buy-in to the methodology of the risk assessment is considered to be vital to the integrity and ultimate success of the project. The results of the stakeholder consultation, as well as best practices, will be used to develop the draft risk assessment methodology design that is scheduled to be completed in February 2009.

The stakeholder consultation effort was conducted from August 2008 through November 4, 2008 and was designed to seek input from key stakeholders on concerns for possible consideration in the overall evaluation of the risks associated with the continued operations of the oil and gas infrastructure in Alaska. Multiple stakeholder meetings were held to obtain input, and Stakeholders were given many other avenues and options to provide feedback and communicate their concerns to the project team, including a survey that was specifically designed and developed to be used as a communication tool (refer to **Appendix B** for an example of the survey). The survey was posted on the State's project website and was distributed to interested parties throughout the consultation period. Stakeholders had the option to bring their survey results to a consultation meeting or to submit them anonymously through the State project website, by fax, or by hard copy through the mail. Avenues for providing anonymous input were provided in order to protect the confidentiality of individuals with specific infrastructure concerns. In addition, general written comments could be conveyed via phone, fax, email, or through the custom built project website, which is available to the general public and is being maintained as the primary source for dissemination of information pertaining to the project status. . Postings to the website include outreach for upcoming events and official consultation meetings; consultation pre-read materials, surveys, schedules, agendas, presentations, and meeting minutes; status updates for the public and selected deliverables. Key stakeholder input for use in the development of the risk assessment methodology was accepted by the project team through the cutoff date of November 4, 2008. Input received after the cutoff date was forwarded to the SAOT.

The stakeholder consultation process was designed to gather input on priorities and concerns with regard to oil and gas infrastructure by asking Stakeholders to address the following topics:

- **Focus of the Risk Assessment:** Stakeholders were asked for input on the portions of existing oil and gas Industry infrastructure they felt warranted the project team's attention.

- **Initiating Events:** Stakeholders were asked for input on events that have the potential to cause catastrophes relating to the infrastructure.

- **Consequences of Concern:** Within the categories of impact to human safety, impact to the environment, or production/revenue loss, stakeholders were asked to provide input on what kinds of events they would consider to be the most significant or unacceptable.

- **Other Specific Priorities and Concerns:** Stakeholders were encouraged to provide input to the project team on other specific priorities and concerns that should be considered as part of the risk assessment.

- **Existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil and Gas Infrastructure:** Stakeholders were asked to provide recommendations for existing data and information relating to the Alaska Oil and Gas Infrastructure which could be reviewed by the project team and applied to the development of a fit for purpose risk assessment methodology to address the risks associated with the infrastructure. *Note: The data and information sources that were recommended by key stakeholders will be evaluated for applicability to the project and reviewed and utilized by the project team during the next phases of the project.*

3.1 Key Stakeholder Groups

The stakeholder interface structure for the risk assessment is displayed below in **Figure 3-1.** The final list of key stakeholders to be consulted during the Stakeholder Consultation process, including the State Agency Oversight Team (SAOT), federal agencies, local governments, Industry, NGOs, native organizations, and the public is included as **Appendix A**. The project team consulted all of the stakeholders in the Approved Stakeholder List (from all groups) that were willing to meet and also met with several groups and stakeholders not on the approved list. During the stakeholder meeting sessions, the project team reached out to over 200 people and held 39 meetings in person and via teleconference.

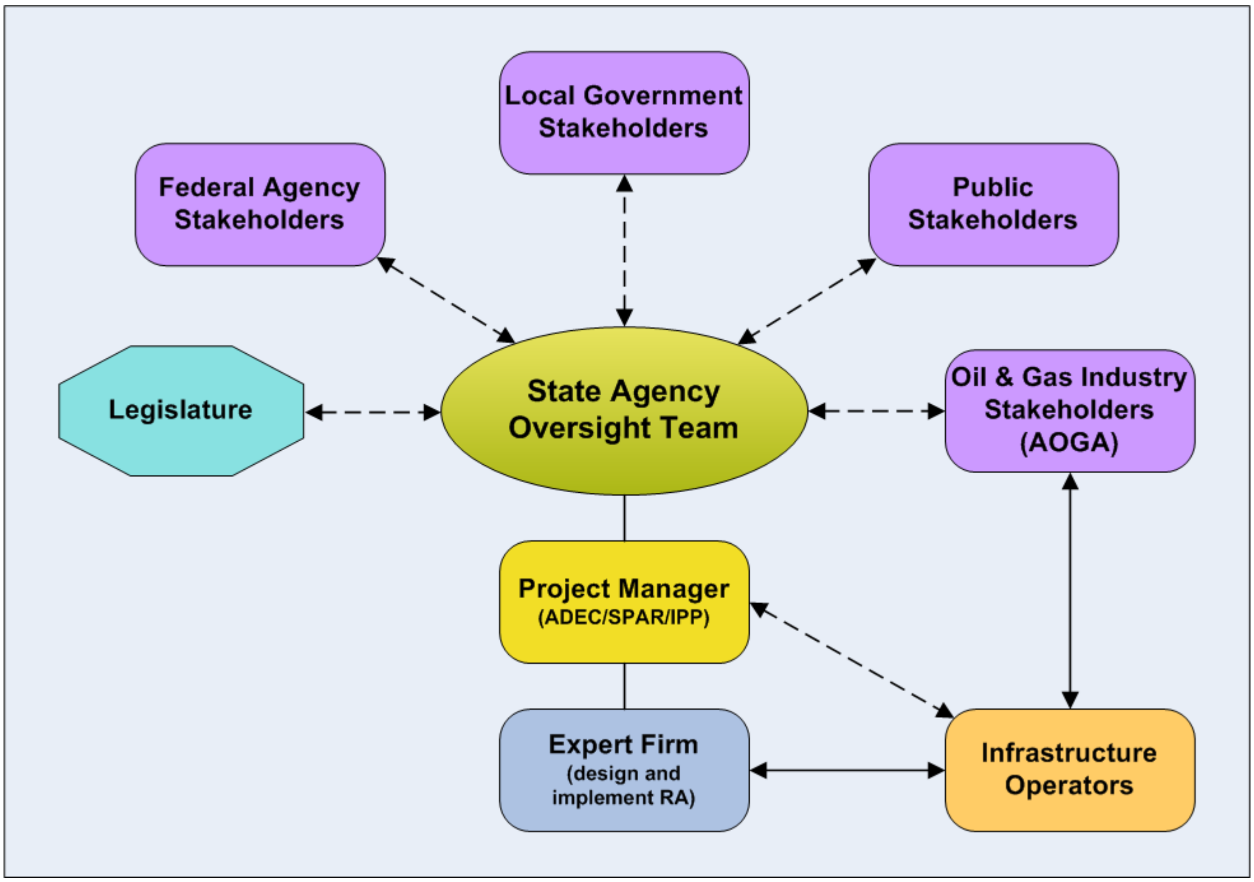

Figure 3-1 Stakeholder Communication Organization

3.1.1 State and Federal Agency Stakeholders

Federal and state agency stakeholders provided agency specific input and knowledge on critical issues related to the project from a regulatory perspective. Agencies suggested sources for guidelines, standards, procedures, and best practices for risk management, as well as existing risk assessments, studies, reports, and other data relevant to the infrastructure assessment. Agencies also discussed their proactive and reactive roles in the oversight of Alaska's oil and gas infrastructure, and in some cases pointed out gaps in regulatory oversight. Distinct portions of the infrastructure are regulated by a variety of federal, state, and local government agencies, many of which were consulted by the project team. The following regulatory oversight entities provided input. Some regulatory agencies declined to meet during the allocated Stakeholder Consultation process time period. All regulatory agency meetings were documented, and the meeting minutes which were intended to be record of the meeting discussions are included as **Appendix C** to this report.

- Alaska Oil and Gas Conservation Commission (AOGCC)
- Alaska Department of Natural Resources (ADNR), Division of Oil and Gas
- Petroleum Systems Integrity Office (PSIO)
- Department of Labor, Alaska Occupational Health and Safety (AKOSH)
- State Fire Marshal's Office (SFMO)
- Joint Pipeline Office (JPO) – multi-agency office comprised of six state and six federal agencies sharing similar regulatory or management responsibilities related to oil and gas pipelines in Alaska. ADNR and BLM co-manage the activities of the JPO. Participating agencies that were consulted during the JPO meeting included the Bureau of Land Management (BLM), ADNR, SFMO, Minerals Management Service (MMS), U.S. Army Corps of Engineers (USACE), and the Alaska Department of Labor (ADOL).
- Environmental Protection Agency (EPA)
- U.S. Department of Transportation Pipeline Hazardous Materials & Safety Administration (PHMSA)
- U.S. Coast Guard

3.1.2 Regional Stakeholders

Regional stakeholders provided input on local priorities and concerns relating to specific infrastructure in their region, as well as statewide priorities and concerns. Regional stakeholders included members of the public, city and borough representatives, university representatives, native villages and corporations, and NGOs. The Approved Stakeholder Consultation List is included as **Appendix A** to this report.

3.1.3 Industry Stakeholders

During Phase 1, the project team focused on establishing constructive relationships and communicating a clear picture of the project to the oil and gas Industry. The project team also planned to solicit input from Industry on its risk management programs and best practices, its definitions and categories for safety, environmental, and economic consequences, and a list of its existing risk assessments. However, due to legal issues surrounding protected Industry information, this information was not acquired by the project team during the key stakeholder consultation process and before the required input was needed to develop some sections of this Interim Report (Unacceptable Consequences and Scope of the Infrastructure). Gaining cooperation and input from the companies that own or operate the oil and gas infrastructure in Alaska is crucial for the successful completion of the Task 2 Methodology Development part of this project and implementation of that methodology during Phase 2 of the risk assessment. The SAOT is currently working to resolve confidentiality issues with Industry and to establish a process that will allow for future information sharing between Industry and the project team.

Introductory meetings with oil and gas Industry representatives were held collectively through the Alaska Oil and Gas Association (AOGA) during the key Stakeholder Consultation process. The Industry introductory sessions served to accomplish the following:

- Communication of an accurate and complete message to Industry on the purpose, objectives, and approach of the risk assessment. It was emphasized that this is an unbiased, engineering-oriented study to identify areas of vulnerability for the State, not a regulatory enforcement activity.

- Identification of key technical points of contact (POC) representing each owner/operator company. Industry provided a consolidated list of these POCs to the project team through AOGA. These contacts will be used to conduct initial technical meetings and to facilitate the information sharing process.

- Initiation of discussions to identify methods and procedures to maintain confidentiality of protected Industry information to support the risk assessment. The project team created a preliminary listing of information/data that may be needed by the project team during each phase of the project. A survey was also created as a tool to conduct initial interviews with Industry technical POCs to review the overview information that has been gathered from public records for each of the facilities that are considered to be in scope. Documents that are currently being requested by the project team are a combination of publicly available information, as well as potentially protected information/data. See Table 4-1, Summary of the Documents Reviewed for a summary of documentation that has been identified for review by the project team at this time.)

3.2 Regional Stakeholder Input Summary

The SAOT and project team held public and individual meetings with key stakeholders in identified target regions along the oil and gas corridor in Alaska where the communities would be most likely to be affected by a failure of the oil and gas infrastructure. The goals of the meetings were to explain the project to stakeholders and to solicit input from stakeholders in the five key regions of the State. It should be noted that Juneau was a sixth proposed location for a set of regional meetings, but it was determined that it would not be valuable for the project team to travel to Juneau during the time period of the Stakeholder Consultation process since the legislature (as a key stakeholder) was not in session. The project team may visit this region at a later time when the legislature is in session. The discussions from Stakeholder meetings and discussions conducted in each region were documented and are included as **Appendix C** to this report.

A summary of the key Stakeholder input that was solicited from each of the five regional meeting areas shown in **Figure 3-2** is described below.

- Fairbanks/Interior Region
- Kenai/Cook Inlet Region
- Anchorage/Southcentral
- Valdez/Prince William Sound/Copper River Basin Region
- Barrow/North Slope Region

Figure 3-2 Target Stakeholder Locations

Regional stakeholders had varied interests in the project and a multitude of ideas for the focus of the risk assessment. Many of the stakeholders canvassed during the consultation period identified common priorities and concerns. This section of the report summarizes the common themes expressed in each of the five regions of the State. Subsequent sections 3.3 and 3.4 organize stakeholder concerns by infrastructure area, i.e., North Slope, TAPS, and Cook Inlet. Details of all of the Stakeholder Consultation process meetings can be found in the individual Meeting Minutes that are included in **Appendix C**.

3.2.1 Fairbanks/Interior Region

The project team met with multiple key groups in the Fairbanks/Interior Region, including the City of Fairbanks, the City of North Pole, Stevens Village, the University of Alaska at Fairbanks, and the Northern Alaskan Environmental Center (NAEC). A public meeting in Fairbanks was also held for all other interested parties. Stakeholders in this region were primarily interested in events involving TAPS.

Stakeholders in the Fairbanks Region generally had concerns about the age and integrity of the pipeline, as it is now over 30 years old and has surpassed the original design lifecycle. A number of stakeholders brought up the remote locations of pump stations and the TAPS Strategic Reconfiguration Plan, which will cause the pump stations to have reduced numbers of on-site personnel. Many people were concerned that a spill from the pipeline at a river crossing could have potentially catastrophic environmental consequences. The Copper River Watershed was highlighted as an area of high environmental consequence in the event of a pipeline spill. The remoteness of the pipeline raised concerns about the ability of spill responders to reach the spill area quickly. The City officials noted that any spill from the pipeline in their region would have the potential to impact the pristine environment and the image of the area in terms of a tourism destination and the recreational activities of the area citizens. Cities in the region also noted that they were a response resource in the event of an incident involving TAPS.

Secondly, Fairbanks Region stakeholders were concerned with North Slope infrastructure events that could cause impacts to flow through the pipeline. Stakeholders discussed concerns about the aging infrastructure of the North Slope and the potential for an interruption in flow of oil to the TAPS. Although it is considered to be outside of the scope of this project, stakeholders mentioned that an interruption in oil flow to TAPS could ultimately affect the economies and revenue for both the local governments and the community due to the lack of a feed stream to the Flint Hills Refinery in North Pole. This topic may be recommended as an area for future study.

3.2.2 Kenai/Cook Inlet Region

Project team canvassing of the Kenai/Cook Inlet Region included meeting with key groups such as the Kenai Peninsula Borough, the City of Kenai, and the Cook Inlet Regional Citizens' Advisory Council (CIRCAC). The project team also conducted a public meeting in Kenai for other interested stakeholders. People in the Cook Inlet region voiced opinions that were primarily focused on the Cook Inlet area oil and gas infrastructure.

Stakeholders in the Kenai Region were concerned with operational and natural hazards which could cause a spill to the Cook Inlet, specifically from offshore operations and subsea pipelines. Stakeholders reported that an offshore spill could result in substantial environmental damage which could significantly impact the commercial and sport fisheries on the Kenai Peninsula.

The Drift River Terminal was mentioned multiple times as a vulnerable component of the infrastructure in terms of volcanic eruptions (mudflows) based on impacts from a previous volcanic eruption.

Although socioeconomic impacts are considered to be out of the scope of this risk assessment, stakeholders in the Cook Inlet Region were concerned about an unplanned interruption in natural gas supply to community power plants, which could result in the exhaustion of reserves and the potential for blackouts.

3.2.3 Anchorage/Southcentral

The project team met with several key groups in the Anchorage/Southcentral Region, including the Municipality of Anchorage, the University of Alaska at Anchorage (UAA), the US Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA), and Anchorage-based NGOs (including representatives from Cook Inlet Keeper, LNE Engineering & Policy, and the World Wildlife Fund), and Walt Parker (PWSRCAC). A public meeting was also held for other interested parties in the Anchorage Region. Anchorage stakeholders proposed suggestions for the risk assessment relating to all three infrastructure areas: North Slope, TAPS and Cook Inlet.

Anchorage stakeholder concerns were similar in nature to those raised by other regions in the State. Spills to waterways were a significant concern, including the impact on subsistence activities that could result from spills. Concerns were raised over the maintenance of infrastructure and a lack of regulatory oversight on the North Slope. Strategic Reconfiguration of TAPS was also noted as a concern. Many stakeholders noted that Cook Inlet infrastructure should be evaluated due to its age and the potential major impacts of a spill in this area, e.g., from subsea pipelines.

Although considered to be out of the scope of the risk assessment, Anchorage stakeholders were concerned with socioeconomic impacts to the Municipality of Anchorage and surrounding areas, including an interruption in oil flow from the North Slope causing loss of revenue to the municipality or an interruption in natural gas flow from the Cook Inlet causing a loss of fuel supply to power plants, resulting in a potential for blackouts and effects to communities.

3.2.4 Valdez/Prince William Sound and the Copper River Basin Region

Meetings in Valdez were held with key stakeholders including the City of Valdez, the US Coast Guard, the Ahtna Native Corporation, the Prince William Sound Regional Citizens' Advisory Council (PWSRCAC), and Cordova-based NGOs (including representatives from the Cordova District Fisherman United, Valdez Trustee Council, the PWS Science Center, the Cordova Chamber of Commerce, and the Copper River Watershed Project). A public meeting was also held for other interested parties in the Valdez region. These stakeholders were concerned primarily with events surrounding the operation of TAPS and the Valdez Marine Terminal (VMT).

Stakeholders in this region were concerned with spills from the pipeline to waterways, especially to rivers. The Copper River Watershed was highlighted as an area where a significant spill would be difficult to clean up and could have extremely serious consequences to the environment, including fisheries. Also a spill to the marine environment at the Valdez Marine Terminal was identified as a concern, specifically highlighting the crude lines to the marine facility and the marine loading arms. Stakeholders mentioned concerns with the TAPS Strategic Reconfiguration Plan and the associated automation of pump stations.

3.2.5 Barrow/North Slope Region

Meetings in the North Slope Region were held with key stakeholders including the North Slope Borough Planning Department, the North Slope Borough Mayor, the City of Barrow, the Native Village of Barrow, the Barrow Arctic Science Consortium, and LCMF LLC. Stakeholders in the North Slope Region identified common themes regarding North Slope operations and TAPS.

Subsistence effects due to spills to the environment were a major concern of North Slope stakeholders who emphasized that fishing and hunting is a way of life in their region, not just a recreational activity. Caribou, fish, and whales were specifically identified as important species. A marine spill could cause a reduction of game or changing whale migration patterns (whales moving too far offshore). A terrestrial spill could affect caribou herds, other wildlife, and/or could restrict hunting in the area.

Stakeholders also were concerned with regulatory oversight of the North Slope infrastructure and the maintenance and inspection of pipelines on the North Slope. Numerous stakeholders perceived North Slope operators as being too focused on cost-cutting measures with regard to maintenance.

North Slope stakeholders voiced a number of concerns which are outside of the risk assessment scope including loss of revenue to local governments such as cities and boroughs, high prices of fuel, strategic planning for future North Slope infrastructure development, noise and air pollution from normal operations, and transportation via the Haul Road.

3.2.6 Survey Results

Sixteen stakeholders from various groups provided input in the form of surveys and other electronic communications to the project team during the Stakeholder Consultation process. In addition, stakeholders submitted reports, articles and white papers which they felt were pertinent for review by the risk assessment team.

On the surveys, stakeholders that identified themselves as being more associated with North Slope components than other areas of the infrastructure highlighted gathering lines, crude oil pipelines, gas and water injection systems, and oil and gas processing and treatment as components for focus. Stakeholders who had associations with the TAPS corridor and Prince William Sound infrastructure area highlighted crude oil pipelines, marine loading facilities, terminals, support systems, and storage tanks as components of the infrastructure which should be a focus of the risk assessment. Survey respondents that identified themselves as being associated with the Cook Inlet area recommended terminals, marine loading facilities, storage tanks, waste management and disposal, and gas transport pipelines integral to operating infrastructure as warranting the most attention from the project. Some stakeholders identified gathering lines and crude oil pipelines as key concerns for the Cook Inlet infrastructure area.

Corrosion was identified specifically as a high risk for all infrastructure areas. In addition, the operations and maintenance of facilities was a concern of stakeholders, including Industry cost-cutting, lack of adequate maintenance and a perceived lack of regulatory oversight. Pipeline river crossings were frequently cited as an area of significance. A spill to navigable waters was considered to be of the highest level of unacceptable consequence, especially in the Copper River Watershed area and Kenai River/Cook Inlet area.

The input of surveys has been included in the discussion sections below, which summarize the overall themes and specific concerns related to each of the three infrastructure areas: North Slope, Cook Inlet and TAPS.

3.3 Common Themes for All Infrastructure Areas

A set of common themes and concerns about the oil and gas infrastructure in Alaska emerged from the key stakeholder input sessions and process. Statewide themes, which are those that were raised for more than one infrastructure area, are summarized below.

3.3.1 Focus Areas

3.3.1.1 Aging Infrastructure

In all regions visited, Stakeholders raised concerns about the aging of facilities/equipment in all three infrastructure areas: North Slope, TAPS and the Cook Inlet.

3.3.1.2 Abandoned Infrastructure

Abandoned equipment tied to existing operating infrastructure was identified as a concern for both the North Slope and the Cook Inlet. Abandoned equipment tied to existing operating infrastructure is included in the scope of the project.

3.3.1.3 Vertical Pipeline Supports

Vertical pipeline supports for pipelines on the North Slope and on TAPS were noted to be vulnerable to earthquakes, subsidence and permafrost thaw. It was also mentioned that there is a potential for unnoticed deterioration of supports in rural areas.

3.3.1.4 Operational Controls and Mitigation Measures

Stakeholders in all areas suggested numerous operational control and mitigation measures for review by the project team. Suggestions for review included consideration of the following:

- Operational Procedures
- Management and oversight of facilities
- Maintenance/Inspection/Integrity Management Programs and Procedures
- Emergency/Spill Response – Contingency plans, training, drills, procedures, local involvement
- Response Procedures
- Safety Plans
- Leak Detection/Spill Prevention – Adequacy of responses to leak detection systems/alarms, non-crude lines which are not always required to have detection systems, monitoring programs, and pigging effectiveness and accuracy

3.3.2 Initiating Events

3.3.2.1 Loss of Power

A loss of power could potentially interrupt production, resulting in a loss of royalty revenue to the State and secondary, socioeconomic impacts to communities.

3.3.2.2 Corrosion

Corrosion was a common theme among stakeholders for all three regions. Stakeholders were concerned about the aging of infrastructure and pipelines that have exceeded their original design life. Specific concerns were related to the following:

- Crude oil lines
- Gathering lines
- Non-piggable lines and the need for increased pigging
- Underground lines
- Subsea pipelines including sea water induced corrosion
- Multiphase pipelines
- Uninspected equipment
- Cracked and thinning pipe walls vs. sudden piping failures due to stress

3.3.2.3 Changes in Process Conditions

The following process condition concerns were noted by stakeholders:

- Increased levels of sand/solids in pipelines, which could lead to increased corrosion.
- Changes to composition of oil, including heavier and colder crude.

- Operational changes were identified as a potential hazard if not handled through a proper management of change process.
- As production declines over time, maintenance budgets will be cut to a point where the integrity of operations suffers. It was noted that as equipment ages, it requires more monitoring, maintenance, and upgrading.
- If a pipeline is shutdown and needs to be restarted during the winter (i.e. cold weather), there is the potential for decreased production flow through the pipeline due to the cold temperatures and energy lost from the fluid during the shutdown.

3.3.2.4 Industry Workforce

Stakeholders in all regions raised concerns relating to the Industry workforce. Stakeholders felt that consideration should be given to evaluating the scope of responsibilities of Industry workers. The following issues were raised as concerns:

- Overworked, stressed or tired infrastructure operators/employees pose an increased risk to operations.
- Inexperienced workforce. It was noted that experienced operators are gradually retiring, and being replaced by new operators with less experience, training and institutional knowledge about the systems they are operating. Additionally, potential employees graduating from technical programs are being trained on new types of equipment while many facilities use older outdated equipment. Since physical intervention is required to shut down well systems, operator knowledge is important. When knowledge is limited, personnel have less ability to proactively identify and prevent potential problems.
- The shortage of licensed engineers in Alaska.
- Lack of maintenance and monitoring due to reduced numbers of personnel.
- The use of contractors rather than owner/operator direct employees to implement infrastructure systems. A related concern regarded bridging of contractor programs with owner/operator programs, and ensuring that procedures are followed by contractors. Contractors may also have a decreased sense of ownership in operations and may not be familiar with the workplace hazards and rules.
- Strikes and illnesses.

3.3.2.5 Natural Hazards

Stakeholders mentioned many natural hazards that could potentially affect communities and towns, such as earthquakes (especially Anchorage), landslides, and tsunamis. The scope of this project considers only the consequences of natural hazards events that affect oil and gas infrastructure. Common cause failures and system criticalities will also be evaluated to determine how an event at one facility could impact the system as a whole. Direct effects of natural hazards to cities and towns are out of scope.

3.3.3 Safety Consequences

3.3.3.1 Safety – Injury or Death

Stakeholders generally mentioned concerns with infrastructure events that result in an injury or death. Multiple stakeholders commented that safety concerns should be the highest priority of the risk assessment, followed by environmental concerns, and then reliability concerns. Older facilities were noted as being at higher risk for workplace safety issues.

3.3.4 Environmental Consequences

3.3.4.1 Spills to Waterways

Spills to waterways such as rivers, streams, lakes and the Beaufort Sea or Cook Inlet were identified as a significant environmental concern. A "catastrophe" would result if a major spill of oil made its way to a waterway. The major concerns are listed below:

- Spills to rivers (e.g. pipeline river crossings). Many stakeholders viewed spills at river crossings as having high consequences (e.g., Tanana, Yukon, Delta, Chena, Copper, and other major rivers). It was reported that TAPS crosses five major rivers in the state and a spill to these rivers would take only about 30-minutes to reach the Copper River. The Copper River Watershed was of specific concern.
- Spills to the ocean (e.g., Arctic Ocean, Cook Inlet, and Prince William Sound). A particular focus was placed on impacts to fisheries, whale migration patterns, and migratory waterfowl.
- Spills during winter to water (during times of broken ice conditions).
- Spills during summer when water is flowing quickly.
- A spill causing environmental damage to fisheries in areas such as the Copper River Watershed or the Kenai River/Cook Inlet could have significant impacts to the revenue stream of the State, as well as to local communities. Damage caused by a spill to the environment affects the quality of life of the residents and affects those who participate in recreational and subsistence activities, such as hunting and fishing. Spill damage also translates into loss of revenue for the tourism industry. Spill prevention over waterways was highlighted as an area of focus for the team. It was noted that the risk assessment should evaluate piping wall thickness, maintenance programs, and monitoring of river crossings when considering the potential of a spill to a waterway.

3.3.4.2 Spills to Land

Although spills to waterways were the highest priority for most stakeholders, spills to land were also of concern. The following concerns were noted:

- Spills to Environmentally Sensitive Areas (ESAs).
- Spills to tundra, especially those affecting caribou herds, or impacting access to caribou hunting and other subsistence activities.
- Spills in areas with cultural resources – potential for damage by the spilled oil or by spill response personnel.
- Chronic/toxic effects of crude oil on the environment and wildlife.

- Undetected spills/leaks from underground storage tanks (UST) and above-ground storage tanks (AST) that may pool underground.

3.3.5 Reliability Consequences

3.3.5.1 Unplanned Interruption in Oil Flow – Loss of Revenue to the State

Unplanned events resulting in disruption of oil flow through the pipeline and loss of revenue to the State was raised as a major concern.

3.3.5.2 National and International Impacts

Interruption in flow not only affects the State of Alaska, but also has national and international repercussions.

3.3.6 Other Priorities and Concerns

3.3.6.1 Suggestions for Risk Assessment Review

Many stakeholders provided input on what they viewed as topics that should be incorporated into the risk assessment methodology. Topics included the following:

- Implementation of Process Safety Management elements by Industry operators.
- Common cause failures (e.g., an earthquake that causes damage to multiple facilities), criticalities in the system (i.e., looking at key pieces of a system to identify critical elements and points of failure), and systematic interdependencies. Multiple independent but simultaneous events will not be considered (e.g. an earthquake and an unrelated operator error simultaneously occurring and resulting in an explosion).
- Prioritization of Consequence Categories – Multiple stakeholders felt that the priority of consequences should be (1) Safety, (2) Environment, and (3) and Reliability.
- Direct, indirect and cumulative consequences.

3.3.6.2 Regulatory Oversight

Regulatory oversight was a common theme to all regions and for all areas. Many specific concerns were raised. The most common concerns include the following:

- Organizational structure of regulatory oversight in place and effectiveness of existing oversight including oversight/auditing of oil fields (North Slope and Cook Inlet) compared with TAPS.
- Lack of independent investigation of incidents (incident investigations are done by State or Industry).
- Inconsistent/poor definitions of regulatory terms.
- Lack of public involvement in oversight.
- State’s relationship with Industry, and transparency.
- State tax structure was perceived by some stakeholders as a potential indirect contributor to integrity issues. Some stakeholders felt that although the structure does not necessarily

discourage high caliber maintenance programs, it does not encourage use of best practices and efficient operations.

- Differences in definitions of acceptable risk between agencies.

3.3.7 Out of Scope Concerns

3.3.7.1 Socioeconomic Impacts to Communities Caused By an Interruption in Production

Socioeconomic impacts to communities were mentioned frequently during regional stakeholder meetings. Stakeholders in Anchorage noted that socioeconomic impacts are the highest priority consequence to the Municipality of Anchorage and its surrounding communities. The definition of reliability in terms of this project relates specifically to impacts to State revenue streams caused by a loss of production, and subsequently secondary consequences of socioeconomic impacts to individual communities are outside the scope. However, the project team recognizes that these socioeconomic impacts exist and can be very real and significant risks to citizens of the State and to those communities in which they live. The concerns and issues that are related to this topic could potentially be recommended for future study. Stakeholders specifically mentioned the following concerns:

- Exhaustion of backup fuel reserves and a lack of power/fuel sources available to communities
- Long-term production disruption that could potentially result in a loss of jobs and significant negative economic impacts to communities
- Loss of feed to refineries resulting in possible shutdown and the loss of products from refineries, such as:
  - Fuel for aircraft refueling to support the cargo industry at the Anchorage Airport
  - Supply of heating oil to communities in Alaska which are dependent on regular delivery of heating oil
  - Jobs, revenue/royalties to local communities

NOTE: The risk assessment will address effects of spills to the environment which may cause a loss of revenue to communities (e.g., impacts on fisheries, tourism and recreation), but these will be accounted for under the environmental consequence category and not under reliability.

3.3.7.2 Future Development of Infrastructure

Stakeholders mentioned some aspects of future infrastructure development that have been excluded from the scope. The project includes only producing/operating infrastructure that existed as of July 1, 2008.

- Strategic scenario planning for development of future infrastructure (e.g., evaluation of critical ecosystems to determine where infrastructure hubs and corridors should be located).
- Increased use of alternative energy (e.g., hydroelectric power to power pump stations) in operations.
- Future offshore development integrated with TAPS.
- Locations where existing facilities will tie in to new developments.

3.3.7.3 Market Conditions

Multiple stakeholders suggested market conditions as a potential concern for Alaska oil and gas infrastructure. The team will evaluate changes in composition and will consider throughput decline as part of baseline assumptions, which will be defined in the risk assessment methodology. However, market conditions which drive the economic viability of continued facility operations will generally not be considered as part of this project. This topic could potentially be recommended for future study, i.e., evaluating the cost benefits of operations versus decline in production.

3.3.7.4 Sabotage/Terrorism

Some communities identified sabotage/terrorism as a major concern. However, the scope of this project is focused on operational and natural hazard events and excludes sabotage and terrorism.

3.3.7.5 Rail and Road Transportation of Oil

Stakeholders noted that a shutdown of railroad fuel transport to the Anchorage Airport and military bases could have serious consequences. Also a spill of oil being transported by road (e.g., by tanker truck) was mentioned as a hazard (especially over a bridge which could impact a river). Marine, road and rail transportation have been specifically excluded from the scope of the risk assessment.

3.4 Area-Specific Themes

3.4.1 North Slope

Stakeholders from multiple regions had concerns with North Slope infrastructure. For information on the North Slope components, systems, and processes that are included in the scope of the assessment, and the components which are considered to be out of scope, refer to **Section 5.0**.

3.4.1.1 Infrastructure Design

The design of infrastructure varies from location to location on the North Slope, and stakeholders felt that some portions were better designed than others.

3.4.1.2 Subsea Pipelines (Northstar)

Stakeholders commented that Northstar has a single steel wall subsea pipeline that exists in a harsh corrosive environment. Loss of containment was identified as a major concern. It was suggested that extra subsea valves should be installed. Stakeholders were also concerned about the capability for spill cleanup in the Beaufort Sea during broken-ice conditions, which could prevent effective spill recovery.

3.4.1.3 Multiphase Pipelines

Multiphase pipelines, which carry crude oil, gas, water, and sediment, were identified as a concern on the North Slope. Adequate leak detection was pointed out as an issue for multiphase lines. The distance between the well pad and separation facilities was noted as a contributing factor for the inability to employ adequate leak detection technology.

3.4.1.4 Inspection and Pigging (e.g. Small Feeder Pipelines)

Smaller pipelines that are a part of the infrastructure were identified as a component warranting project team focus. Stakeholders commented that these smaller lines make up the bulk of the North Slope lines and until recently were not regulated. Concern was raised regarding lack of inspection. Pigging of these lines was suggested as a preventative measure. Stakeholders feel that it is important to analyze this risk and to ensure that effective maintenance and inspection of these lines is occurring.

3.4.1.5 Loss of Critical Facilities/Support Systems (in Prudhoe Bay)

The Central Compression Station (CCP), Central Power Station (CPS), Central Gas Facility (CGF) and other similar support systems and facilities are thought to be critical for the functioning of Greater Prudhoe Bay. Failure of any of these facilities/components could result in a field-wide shutdown or other hazardous events.

3.4.1.6 Safety – Operational Hazards in Occupied Areas

It was noted that processing/production facilities that are normally manned or have occupied areas are at high risk for fatalities/injuries. People that are housed or who work inside processing/production facilities are most at risk from potential explosions and fires within the plant boundaries.

3.4.1.7 North Slope Fire Safety Concerns

North Slope fire safety concerns included obsolete fire and gas systems at North Slope facilities (specifically at the Gathering Centers in the WOA). It was also noted that there are a number of partially finished fire and gas upgrade projects that have been in temporary construction status for some time. Enforcement of fire and building codes is more relaxed while construction is underway.

3.4.1.8 Well Concerns

A number of concerns were discussed regarding North Slope wells.

- Loss of Critical Wells – Criticality of particular wells was discussed with a focus on possibility of loss of the revenue stream long-term if certain individual wells or combinations of wells went down. Gas injection wells were considered to be critical to production in the Prudhoe Bay field, as there is no current market or sale of produced gas, and all gas must be compressed and re-injected back into the formation. The gas injection wells associated with the CGF are considered to be a critical well set. Also, gas injection wells which have access to the formation are critical to production because loss of some specific injection wells could result in loss of gas cap pressure (gas driver for production) and production could be halted.
- Loss of Waste Injection Wells – If waste injection wells at Northstar, Alpine, and Oooguruk are lost it could force shut down of operations; however, redundant wells are in place as backup. The group was not sure how many injection wells would have to go down before production would be lost. It would depend on the availability of other wells for injection.
- Shut-in Wells – The substantial number of shut-in (problem) wells is a potential concern because there are a limited number of rigs and rig personnel available to drill new wells and workover wells.

3.4.1.9 Lack of Regulatory Oversight

Regulatory oversight of the North Slope was identified as a concern, and some stated that North Slope operators were regulating themselves. Specifically, stakeholders raised the following concerns:

- Low presence of governmental regulatory personnel on the North Slope compared to other oilfields in the country, particularly for oversight on piping systems.
- Gap in regulatory oversight of platforms/offshore facilities, e.g., Northstar design. It was noted that a spill on the island would likely be a spill to the ocean environment.
- Monitoring and accountability of North Slope Infrastructure was questioned.
- Regulatory requirements and enforcement for corrosion protection was a concern.
- Regulations overseeing releases of produced water were perceived as inadequate.
- Regulations overseeing emergency shut-down valve replacement programs were perceived as unclear.

3.4.1.10 Industry Culture

Some stakeholders were concerned with aspects of Industry culture on the North Slope, such as the following:

- Workers and contractors ignoring problems such as maintenance and integrity non-conformances not in their immediate purview.

- Industry complacency and cost cutting.
- Spills not being reported.
- Not enough focus on preventative maintenance programs.
- Cultural and historical owner/operatorship differences between the Eastern and Western Operating Area production facilities of Prudhoe Bay resulting in operational and maintenance philosophy differences over time.

3.4.1.11 Coastal Erosion

Shore erosion for assets such as North Star was identified as a concern. It was specifically stated that sufficient coastal buffers should be provided to insulate facilities and transitions of offshore pipelines to land from the long-term effects of coastal erosion and environmental damage.

3.4.1.12 Spills

Spills are a primary concern of stakeholders on the North Slope. Releases to water at river/creek crossings were considered worst-case scenarios, as they would travel a long distance and impact a wide area, including damage to marine wildlife and subsistence activities. Additionally, spills in broken ice conditions were considered extremely hazardous because of the difficulty in recovering these types of spills. It was noted by stakeholders that spills to water are much worse than spills to the tundra. The tundra is damaged but is often able to recover. Some stakeholders felt that the 2006 corrosion-related spill did not cause permanent damage because it was accessible for spill response, response was fast, and the tundra was able to recover after re-sodding. Damage to cultural resources was also raised as a concern.

3.4.2 Trans Alaska Pipeline System (TAPS)

Many stakeholders had a positive view of the TAPS overall and the operator company, Alyeska Pipeline Services Company (APSC). A number of stakeholders expressed satisfaction with Alyeska's operational practices and procedures, effective communications with the communities where they operate (Valdez and Fairbanks) and generally their actions and culture which make them a good neighbor and corporate citizen. Stakeholders had a positive view of the APSC incident response program, and pointed out that Alyeska is thorough and proactive during incidents. It was noted that good communication channels are in place and Alyeska is consistent and effective at alerting all responders when an incident occurs.

Although the Stakeholder opinion of TAPS and Alyeska was very positive, specific issues and concerns were raised regarding TAPS infrastructure. TAPS was noted to be a large infrastructure component that had the potential for multiple risks. The specific TAPS issues and concerns are summarized below. Information on the TAPS components, systems, and processes that are included in the scope of the assessment, and information on the components of the overall pipeline system that are considered to be out of scope are referenced in **Section 5.3.**

3.4.2.1 Strategic Reconfiguration/ Remoteness of the Pipeline

The TAPS Strategic Reconfiguration (SR) Plan and the associated automation of pump stations, as well as the remoteness of the pipeline, were frequently identified as a concern among stakeholders. People were worried that unmanned pump stations and remote pipeline locations could result in a delay of spill recognition and spill response, making response ineffective. Stakeholders were also concerned that relying on computers rather than people can lead to problems. It was noted that following reconfiguration, the operator plans to use helicopters to ensure rapid response to spills. Commenters remarked that this strategy may fail if weather is poor or there is a forest fire.

3.4.2.2 Pipeline Concerns

Stakeholders raised a number of concerns regarding certain segments of the TAPS pipeline.

- Pipeline River Crossings (e.g., Tanana, Yukon, Delta, Copper, Chena and other major rivers) – Many stakeholders identified areas where TAPS crosses rivers as a significant concern. It was reported that the pipeline crosses five major rivers in the state and a spill to any one of these river systems would spread quickly and could have widespread impacts.
- Pipelines Under Rivers – Buried pipelines that flow under river systems were also identified as a concern, specifically with regard to inspection. It was noted that the Klutina River crossing in particular is a low spot that could have more severe corrosion issues than some other areas.
- Pipeline Segments with Significant Vertical Change – Portions of the pipeline that go steeply downhill were identified as high risk. It was noted that there is no good way to slow down the flow at these locations in the case of a spill or leak, e.g., Atigun Pass.
- Aboveground Pipeline Locations – In locations where the pipeline is aboveground and accessible to the public, it was pointed out that there is a potential for damage from events such as vehicle collisions/accidents or a hunter accidentally shooting the pipeline.

3.4.2.3 North Pole Metering Facility

The metering facility in North Pole was identified as a vulnerable point of pipeline infrastructure present in the Fairbanks Region. The metering station is not staffed, is secured only by a chain link fence, and is close to a public road and residential areas. If a major incident occurred at the metering station, the area has a high potential for public loss of life and injury.

3.4.2.4 Valve Failure

Check valves and remote gate valves (RGVs) were identified as potential weak points in the system.

3.4.2.5 Pump Station 1 Tanks

The tanks at Pump Station 1 were pointed out as a criticality in the overall system.

3.4.2.6 Refrigeration Lines

Refrigeration lines used to maintain permafrost temperatures were identified as a potential risk of toxic chemical release. Loss of the refrigeration systems was also identified as a potential cause of permafrost thawing which could ultimately affect the structural integrity of the pipeline.

3.4.2.7 Valdez Marine Terminal (VMT)

Multiple vulnerability issues were raised regarding the VMT. The main concerns are listed below:

- Marine Loading Facilities – The marine loading facility was identified as one of the highest risk areas because the potential for human error exists in operations. Additionally, the risk of human error can increase significantly because of natural hazards such as high winds and wave action during loading activities. It was reported that Alyeska has a policy of not loading at wind speeds exceeding 30 knots (when waves start crashing over the boom). Additionally, the only containment of a spill while loading is the boom surrounding the operation. It was noted that the loading arms are on a continuous maintenance schedule that results in replacement of all components of the arms every 10 years. The crude line to the loading arms was identified as a possible risk area.
- Failure of VMT support systems was identified as a concern. The VMT is self-sufficient in terms of support systems (power, waste disposal, etc).
- Storage tanks – Tanks were identified as one of the highest potential risk areas because they hold a large quantity of oil and they are located on a hill above the inlet. A concern was raised over extensions on compliance dates for required regularly occurring API tank inspections (required every 10 years). Eighteen large tanks are on-site, three of which are in cold stand-by. Concern was raised that snow is not removed from the storage tank secondary containment to maintain 110% capacity in case of a release.
- Mooring Structure – The mooring structure (about 50-feet high) was raised as a potential component for project team focus.

3.4.2.8 Loss of Power to Pump Stations/Black-start Conditions

Stakeholders indicated that if a critical electrical grid is lost, the impact could be extremely significant to the operation of the pipeline. The pump stations have back-up power, but the amount of fuel available to these backup systems and subsequent duration of the back-up power supply operation was not known by stakeholders. If a power outage occurred in winter, another consideration is the amount of time it would take for the pipeline to cool down. Loss of power and black start capabilities in the winter was a very significant concern. Pump stations receive power from multiple power sources, including Prudhoe Bay's central power grid, Golden Valley Electric Association (GVEA), and power generated onsite.

3.4.2.9 Loss of Communications

Telecommunication support systems are a potential vulnerability, loss of this support may have an impact on the operation of TAPS (e.g., impacts to fiber optic lines).

3.4.2.10 Corrosion of the Pipeline

Stakeholders were concerned with corrosion caused by a multitude of events. It was noted that Alyeska has a good corrosion protection program in place, but only a small portion of the pipeline is inspected each year so some corrosion may go undetected. Using a standard corrosion rate based on Industry standards may not provide an accurate picture within of TAPS. It was recommended that a combination of factors should be considered, such as the following:

- Effects of bacteria on corrosion.
- Rapid changes in elevation – Points of the pipeline that incur a rapid change in elevation such as the base of Atigun Pass and the base of Thompson Pass were identified as areas of increased risk for corrosion.
- Induced magnetic fields – Corrosion as a result of induced magnetic fields in the Valdez area was also identified as a concern.
- Corrosion monitoring.
- Leak detection systems.

3.4.2.11 Cold Temperature of Oil in the Pipeline

Stakeholders frequently brought up concerns with cold startup of the pipeline.

- Cold Startup after Shutdown – Stakeholders noted that a shutdown of the pipeline in winter is a significant risk as it would require restart in cold temperatures. Stakeholders reported that there is a cold startup plan that includes re-circulating oil to keep it warm. It was also noted that as throughput of the pipeline declines over time, the crude oil temperature falls more quickly with distance from the injection point.
- Flint Hills Refinery Influence on Oil Temperature in the Pipeline –A refinery shutdown can affect the temperature of oil in the pipeline. The refining process increases the temperature of the oil stream that is sent back into the pipeline. If this heating was eliminated (by a refinery shutdown or discontinued operations for some reason), it could impact the overall temperature of downstream crude oil stream that is being sent to Valdez, and there may be impacts to downstream equipment and operations from the colder crude temperatures.
- One area of concern was associated with the snow loading on the top of the Crude Storage Tanks at the VMT. If the crude temperatures in the pipeline are lower than the original design temperatures at the Valdez delivery point, snow melting on the tank roofs would not occur and snow loads could exceed maximum design tolerances.

3.4.2.12 Natural Hazards

Stakeholders outlined multiple natural hazard events. A listing of these natural hazard categories is included in **Section 6.0** of this report. The following summarizes stakeholder natural hazard concerns for the TAPS infrastructure area.

- The geology underlying VMT was identified as a potential hazard. It was noted that stress on the underlying bedrock is monitored. Piping at the VMT West Metering Facility was also identified as at-risk for impacts from falling rocks.
- Forest fires in the vicinity of the pipeline were identified to be a hazard.
- Earthquakes were mentioned as a serious threat to the pipeline and the VMT, with a potential to cause a shutdown. One commenter noted that the fault line near Yakutat is due for a big earthquake.
- Flooding from rivers and glacial lake releases were identified as potential hazards. (It was reported that 70 miles of TAPS crosses rivers.) Flooding was also identified as a risk at VMT. A past incident was related regarding the VMT losing communications for a period of time due to a flood.
- Weather events (i.e., high winds, waves and ice) in the Valdez/Prince William Sound Region were indicated as a hazard that could potentially shut down production. The Valdez Marine Terminal (VMT) has limited storage capacity. If storms prevent tankers from being loaded at the terminal, the VMT tanks could reach capacity and continuous flow from TAPS would be interrupted. A severe weather event resulting in the shutting down of operations in Valdez could eventually shut down the North Slope. It was also noted that there may also be impacts on the refineries. Although refineries and distribution lines are out of scope for this project, impacts to refineries as a result of events that occur to "in scope" infrastructure are within the scope and will be considered.
- Avalanche events were identified as a potential hazard to the VMT. It was noted that some engineering mitigation measures are in place including chutes to channel snow resulting from an avalanche.
- A tsunami was identified as a potential hazard to the VMT. Valdez has a tsunami warning system, which is reportedly tested weekly. Stakeholders were unaware of any measures in place to protect the loading arms in case of a tsunami.
- Permafrost instability and monitoring was raised as an issue of concern. The potential for a sudden failure of pipeline supports because of a sink hole in the permafrost could be a threat. Permafrost monitoring is currently occurring through infrared technology. Climate change was brought up as an initiator for permafrost melting and stakeholders were concerned that a warmer climate could cause permafrost to melt outside of the conditions for which pipelines are designed. It was mentioned that the permafrost in the Gulkana area is especially unstable.

3.4.2.13 Spills to Rivers

Stakeholders noted that a spill to a river from the pipeline could have significant impacts on the environment, fisheries and to the revenue stream of the State, as well as local communities. Concerns on spills from TAPS were the following:

- Copper River Watershed – The Copper River and its tributaries were emphasized by multiple stakeholders as an area of highest consequence. Copper River salmon fisheries could be severely impacted by a spill. It was reported that approximately 800 streams feed the Copper River. It was also noted that a significant spill could spread quickly and that it would be technically challenging to recover a spill once it reaches the watershed. Flow varies from winter to summer. Participants noted that a spill in that area could be as major as the Exxon Valdez spill.
- Spills to Silty Waters – Spills in silty waters (such as the Copper River) were identified as a concern because of how the oil and silt may interact.
- Damage to commercial and sport fisheries that could cause serious economic effects on tourism and Alaska "branding", subsistence activities, or impacts to outdoor quality of life for residents.
- Damage to the Copper River “brand".
- Damage to water wildlife and effects to land animals.
- Remote locations, land obstacles, and weather effects on spill response.
- Prevention/Mitigation – Stakeholders generally felt that prevention of a spill to a river is important. Suggested measures included shut-off valves in key locations, temporary storage, and extra layers of containment for portions of the pipeline in ultra-sensitive areas.

3.4.2.14 Spill to the Marine Environment

The potential for loss to the marine environment was reported as a significant concern for the VMT, particularly at the berths during loading/offloading. Serious environmental and economic consequences could occur, similar to the Exxon Valdez spill. The effects on fisheries and destruction of habitats impacting tourism/marketing of fish from the region were noted.

3.4.2.15 System Reliability – Shutdown of TAPS

Any event that has the potential to shut down TAPS was identified as unacceptable. A shutdown to repair or maintain the pipeline could have serious effects on revenue to the State (in scope) and local governments (out of scope).

3.4.2.16 Spill Response / Emergency Response

Concerns were raised regarding the spill response for the TAPS and VMT area. Stakeholders raised the following issues:

- *TAPS Contingency Plan* – concerns were raised on its response time estimates, river flow calculations, winter spill response and effectiveness.
- *Response Materials* – Spill response measures are in place to mitigate potential spills on TAPS, including Conexes with spill response materials, gravel, and cleared areas for helicopter landing. Reportedly, there are no dedicated spill response materials at river crossings along TAPS. Materials must be transported to the spill site.
- *Lack of Access to Rivers* – Lack of access was identified as a concern in terms of spill response. It was reported that approximately 35-40 miles of river exist with no road access.

- *Capacity and Timeliness of Response Resources in the Interior* - Limited human resources for response was identified as a potential concern. A related issue is the response time required for State regulatory agencies to make decisions so action can be taken.
- *Spill Drills* – Stakeholders felt that unannounced drills should be timed and conducted under poor weather conditions to evaluate response under worse-case scenario conditions.

3.4.2.17 Regulatory Oversight of TAPS

Stakeholders voiced concerns on the regulatory oversight of TAPS, although other stakeholders were satisfied with the oversight of TAPS. It was noted that over 32 agencies oversee this portion of the Alaska infrastructure.

- The effectiveness of regulatory oversight of the pipeline was identified as a concern. The primary concern was a potential spill to a waterway; some stakeholders felt that more oversight efforts should be placed in this area.
- New Regional Citizen's Advisory Council (RCAC) for the Corridor (out of scope) – Some stakeholders advocated creating a new RCAC for the TAPS corridor, similar to the PWSRCAC, which provides citizens oversight of State regulatory oversight of the VMT. Stakeholders felt that VMT is at reduced risk because of this oversight.

3.4.2.18 Socioeconomic Impacts to Communities (out of scope)

Stakeholders in the Fairbanks region were concerned about a loss of power event to their surrounding communities. Communities in the interior of Alaska receive their electric power from the Golden Valley Electric Association (GVEA) Power Plant, which produces 75% of its power using turbine generators fueled by North Slope oil and gas streams. Coal is a smaller source of power. The impact of loss of power on these communities has the potential to be serious (the interior can survive about two days without power). City revenue was also identified as a major concern. If TAPS production is disrupted, and flow to the refinery is consequently impacted, the City could realize significant negative economic impacts. The City currently has 150 residents whose employment is associated with the refinery operations. Stakeholders would like to see an assessment of overall downstream affects of an outage at GVEA (regarding shutdown of refinery operations, etc.). Socioeconomic impacts are outside the scope of this project, but may be recommended for future study.

3.4.2.19 Sabotage/Terrorism (out of scope)

Sabotage to the pipeline or to the VMT was identified as a top hazard, but is outside the scope of this project.

3.4.2.20 Flint Hills Refinery (out of scope)

- Wastewater Treatment Plant (North Pole) – A failure at the wastewater treatment plant in North Pole could impact the Flint Hills Refinery's ability to produce, which in turn may impact the community and product production causing downstream secondary socioeconomic consequences. The Flint Hills Refinery is outside the scope of this project, but could be considered in a future assessment including downstream oil and gas facility infrastructure components, such as refineries. If the North Pole Refinery is shut down for any reason, low temperature concerns for the pipeline could result.

3.4.3 Cook Inlet

Stakeholders identified a number of common concerns about the Cook Inlet Infrastructure. For information on the Cook Inlet components, systems, and processes that are included in the scope of the assessment, and the facilities and components that are out of scope, refer to **Section 5.2**.

3.4.3.1 Subsea Pipelines in the Cook Inlet

Subsea pipelines were identified as an area of concern because of the age of the lines (some are over 40 years old), the harsh environment in which they exist, and their location underwater which makes visual inspection difficult (Industry conducts dives periodically to inspect these lines). Stakeholders raised the following issues for focus:

- Inspection programs/pigging of lines in the Cook Inlet
- Accuracy of subsea pipeline inventories
- Ship anchors catching on subsea pipelines

3.4.3.2 Cook Inlet Power to Oil and Gas Infrastructure

Stakeholders identified the Beluga Power Plant as a critical piece of infrastructure as it supplies power to the west side of the Cook Inlet. The east side and the Tesoro Refinery depend on local public power. The platforms generate their own power and are stand-alone.

3.4.3.3 Natural Hazards

Stakeholders brought up multiple natural hazards, and a listing is included in **Section 6.0** of this report. Natural hazard events specific to Cook Inlet are outlined below.

- Strong underwater currents were identified as a concern because of their potential impact on the operations of platforms and pipelines. It was reported that the currents in the Cook Inlet can be up to 9 knots, which is similar to that of a river.

- Volcanic eruptions were noted as having the potential to negatively impact Cook Inlet infrastructure in two ways: 1) Volcanic Ash – Ash can clog equipment, leading to a production interruption or precluding timely incident response if aircraft cannot fly because it is unsafe. Ash in generators can cause a shutdown. Wind direction has the ability to significantly affect the severity of ash impacts from a volcanic event or 2) Mudflows (Lahars). The Drift River Terminal was specifically identified as a vulnerable infrastructure component at high risk to volcanic eruptions and associated mudflows. Lahars may breach secondary containment barriers. It was noted that there are millions of barrels of oil in the path of a potential volcanic eruption. Historically, an eruption occurred that impacted the Drift River Terminal.

- Earthquakes were recognized as a hazard to infrastructure in the Cook Inlet. Specifically, the Osprey Platform was reported to be susceptible to underwater landslides.

3.4.3.4 Spills to the Cook Inlet Rivers and the Marine Environment

Stakeholders frequently reported that a spill to the Cook Inlet and river systems that feed it could have serious consequences. It was indicated that a spill from a subsea pipeline could spread rapidly and cause many negative consequences to a large area of ecosystems. The following consequences were mentioned:

- Damage to commercial and sport fisheries – A spill has the potential to damage fish populations and prevent access to the river, and damage Kenai River "branding."
- Marine transportation
- Refinery Operations
- Tourism
- State and local economies
- Other industries in terms of environmental and revenue effects

Tourism is a major source of revenue for the Kenai region. It was reported that about 10,000 people are present in Kenai during summer months, and about 93% of these people are from outside the Kenai Peninsula area. If a fishery was temporarily shut-down during the summer, local government and businesses would incur significant economic damage. Additionally, a stakeholder commented that about 560 boats in the Cook Inlet drift fleet could be impacted. It was highlighted that the severity of impacts from a spill into the Cook Inlet are not just related to quantity, but are also highly dependent on the sensitivity of the specific area in which the release occurs.

3.4.3.5 Socioeconomic Consequences of Cook Inlet Natural Gas Interruption or Decline (out of scope)

The socioeconomic consequences of a Cook Inlet natural gas interruption was highlighted by stakeholders due to the importance of fuel supply from the Cook Inlet to Southcentral Alaska. An interruption in natural gas flow to community power plants and exhaustion of backup reserves could result in effects to south-central communities due to loss of electricity and natural gas for heating of hospitals, schools, buildings and homes, loss of gas to the LNG Plant, loss of power/fuel to military bases, loss of aviation gas, loss of low sulfur diesel to the State. Downstream processing facilities such as the LNG Plant and all refineries are outside of the project scope. Power plants are excluded unless they feed oil and gas infrastructure.

4.0 EXISTING INFORMATION/DATA REVIEW (TASK 1C)

During the initial part of Phase 1, the project team reviewed existing documents, information, and data that would be used to 1) help define the physical scope of the risk assessment in terms of infrastructure facilities and components, and 2) identify, gather, review and summarize documents that are applicable to the development of the risk assessment methodology. Documents that were reviewed and summarized as part of this effort were limited to those that are publicly available and pertinent to methodology development. Documents and data sets that were subsequently recommended by stakeholders and those that contain specific information applicable to assigning frequency and consequence designations related to particular hazards were not a part of this scope, but will be considered and reviewed as appropriate throughout the Task 2 Methodology Development and during Phase 2 Implementation.

4.1 Document Reviews for Development of the Risk Assessment Methodology

In support of the draft risk assessment methodology development task, the project team identified, reviewed, and summarized a comprehensive list of publicly available documents which outline risk assessment methodology tools and approaches that can be used as a basis for customizing a fit for purpose methodology that can be applied to the Alaska oil and gas infrastructure project. The document list is included as **Appendix D** of this report. The purpose of these document reviews was to identify valuable inputs to the development of the risk assessment methodology. Specifically, the team was looking for:

- Documents that describe methodologies of interest to the project
- Examples of risk applications that could provide "lessons learned" for the project activities
- Reports that provided sources of data that might be able to be accessed for purposes of the project

The documents that were reviewed and summarized as part of this effort were limited to those that are publicly available and pertinent to methodology development in the following resource categories:

- Regulations
- Industry standards, recommended practices, and guidelines
- Risk documents specific to Alaska
- Miscellaneous documents

A large number of inputs to the methodology development were identified in the document reviews, along with a number of potential data sources which identify where the data could be retrieved from. Some of the identified data may have been generated as a result of regulatory compliance activities. This data may only be available to the project team if appropriate confidentiality measures are put into place to protect the release of such information. Table 4-1 summarizes the conclusions about applicability of the documents to the project, based on the review process. The format for the document summaries, which have been included as **Appendix D** to this report, is a simple table that identifies the document title and type, describes the focus of the document, summarizes what type of information that the document contains, and makes a statement regarding the pertinence of the document and its contents to the project. The final Task 1c Document Review List and full document summaries are included as appendices to this report.

Table 4-1 Summary of the Documents Reviewed

Summary No.	Title	Methodology Source	Data Source	Other Use	Comments
1	Corrosion Control for Hazardous Liquid Pipelines (49 CFR 195 Subpart H)		X		Points to possible data, if made available by regulator or Industry.
2	Requirements for Corrosion Control for Gas Pipelines (49 CFR 192 Subpart I)		X		Points to possible data, if made available by regulator or Industry.
3	Pipeline Integrity Management for Gas Pipelines (49 CFR 192 Subpart O)	X	X		Points to possible data, if made available by regulator or Industry.
4	Pipeline Integrity Management in High Consequence Areas (for Hazardous Liquid Pipelines) (49 CFR 195.452)	X	X		Points to possible data, if made available by regulator or Industry.
5	Chemical Accidental Prevention Provisions (40 CFR 68)		X	X	If process hazards analyses or mechanical integrity information are deemed useful and made available.
6	Process Safety Management (PSM) of Highly Hazardous Chemicals (29 CFR 1910.119)		X	X	If process hazards analyses or mechanical integrity information are deemed useful and made available.
7	Pipeline Right-of-Way Leasing (11 AAC 80)		X		Points to possible data, if made available by regulator or Industry.
8	Oil & Gas Leasing (11 AAC 83.100-199)			X	None
9	Oil and Other Hazardous Substances Pollution Control (18 AAC 75)			X	None
10	Alaska Oil and Gas Conservation Commission (20 AAC 25)			X	None
11	Evaluating Process Safety in the			X	Information relevant to risk information

Summary No.	Title	Methodology Source	Data Source	Other Use	Comments
	Chemical Industry: User's Guide to Quantitative Risk Analysis				communication.
12	Managing System Integrity for Hazardous Liquid Pipelines (API 1160 and Publication 353)	X			None
13	Risk Based Inspection (API RP 580 and Publication 581)	X		X	Inspection management system evaluation.
14	Risk-Based Decision Making (API Publication 1628B)				Not pertinent.
15	Managing System Integrity of Gas Pipelines (B31.8S)	X	X		Points to possible data, if made available by regulator or Industry.
16	Standard Guide for Seismic Risk Assessment of Buildings (ASTM E2026 – 07)	X			None
17	Oil and Gas Pipeline Systems (CSA Z662-03)			X	If specific design evaluations are needed.
18	Risk Management: Guideline for Decision Makers (CSAQ850-97)			X	Risk decision-making guidance
19	Risk Management (AS/NZS 4360)			X	Potentially useful to the State during the risk management process required after the risk assessment results are available.
20	Estimating Losses from Future Earthquakes – A Panel Report	X			None
21	Disaster/Emergency Management and Business Continuity Programs (NFPA		X		Points to possible data, if Industry makes it available (i.e., NFPA 1600 compliant

Summary No.	Title	Methodology Source	Data Source	Other Use	Comments
	1600)				programs).
22	Risk Evaluations for the Classification of Marine-Related Facilities (ABS 117)	X			Limited applicability
23	Risk Assessment Applications for the Marine and Offshore Oil and Gas Industries (ABS 97)	X			Limited applicability
24	Petroleum and Natural Gas Industry — Offshore Production Installations — Guidance on Tools and Techniques for Hazard Identification and Risk Assessment (BS EN ISO 17776)	X			None
25	Guidelines for Chemical Process Quantitative Risk Assessment	X			None
26	Guidelines for Mechanical Integrity Systems			X	If inspection and maintenance program evaluation is required to support risk factors.
27	Guidelines for Hazard Evaluation Procedures, 3rd Edition	X			None
28	Guidelines for Chemical Transportation Risk Analysis	X	X		None
29	Guidelines for Risk-Based Process Safety			X	If process safety program evaluation is necessary.
30	Risk and Emergency Preparedness Analysis (NORSOK Standard Z-013)	X			None
31	Criticality Analysis for Maintenance Purposes (NORSOK Z-008)	X			None

Summary No.	Title	Methodology Source	Data Source	Other Use	Comments
32	Regularity Management and Reliability Technology (NORSOK Standard Z-016)				Not pertinent compared to other U.S. references.
33	Risk of Vessel Accidents and Spills in the Aleutian Islands: Designing a Comprehensive Risk Assessment (Special Report 293)			X	Highlights specific risk assessment process design issues.
34	Review of the Prince William Sound, Alaska, Risk Assessment Study			X	Highlights specific risk analysis issues.
35	Environmental Information for Outer Continental Shelf Oil and Gas Decisions in Alaska (NAS-2353)			X	Environmental consequence data insights.
36	Final Environmental Impact Statement - Renewal of the Federal Grant for the Trans-Alaska Pipeline System Right-of-Way	X	X		One of the best resources for the ARA team (at least for the TAPS portion of the project).
37	System Engineering Toolbox for Design-Oriented Engineers (NASA Reference Publication 1358)	X			Of limited applicability for the type of infrastructure to be evaluated in the ARA.
38	Probabilistic Risk Assessment Procedures Guide for NASA Managers and Practitioners (associated document for Programs and Procedures) (NASA NPR 8705.5)	X			Of limited applicability for the type of infrastructure to be evaluated in the ARA.
39	A Guide to the Offshore Installations (Safety Case) Regulations (2005)				Not pertinent. Limited to regulatory intent, not risk assessment approaches for safety cases.
40	Risks from Hazardous Pipelines in the	X	X		None

Summary No.	Title	Methodology Source	Data Source	Other Use	Comments
	United Kingdom				
41	The Report of the BP U.S. Refineries Independent Safety Review Panel (i.e., the Baker Report)			X	Possibly applicable if safety culture and process safety evaluations are needed, but those tasks are not within the ARA scope.

4.2 Geographical and Physical Scope of the Risk Assessment

A review of maps, data, reports, State agency statistics, and other publicly available information was conducted to define the specific geographical and physical scope of the risk assessment, including all relevant components, processes and systems that make up the existing oil and gas infrastructure. Information was identified, compiled, and synthesized based on a wide range of publicly available sources. Results of this research are presented in **Section 5.0** of this report, and include the three infrastructure areas originally defined by the State as follows.

- North Slope
- TAPS
- Cook Inlet

5.0 INFRASTRUCTURE COMPONENTS, PROCESSES AND SYSTEMS

The scope of this risk assessment includes all of Alaska's oil and gas production, storage, and transportation systems from the wells to the shipping, sales or distribution points. Geographically, this includes the North Slope infrastructure, starting at the wellbore of both production and service wells, through the production separation facilities and pipelines to Pump Station 1. This also includes the continuation of oil flow through the TAPS to the Valdez Marine Terminal, ending at the berth loading arms.

Cook Inlet is a stand-alone oil and gas production system that is located south of Anchorage. The Cook Inlet scope includes the offshore and onshore production and facilities, as well as the produced gas transfer through the Cook Inlet Gas Gathering System (CIGGS), to distribution or sale points, and up to the Nikiski LNG Plant. The scope also includes the transfer of the produced oil stream through the various sales or shipping points, through the Cook Inlet Pipeline (CIPL), up to the Drift River Marine Terminal loading arms or to the inlet of the Tesoro Refinery.

The purpose of this section is to refine the geographical and physical scope of the risk assessment and to outline those infrastructure components that are currently considered to be inside and outside of the bounds of this project, based on the scope as outlined in the State RFP, and as documented in the Project Management Plan. This geographic and physical scope is outlined in three separate infrastructure areas, each of which has a corresponding subsection within this portion of the report, including a high level process overview and a listing of major facility and system components. The three Infrastructure Area subsections include:

- North Slope
- TAPS
- Cook Inlet

The entire scope of the infrastructure is shown in the following figure and detailed maps of the North Slope, TAPS, and Cook Inlet infrastructure areas are included as **Appendix E** to this report.

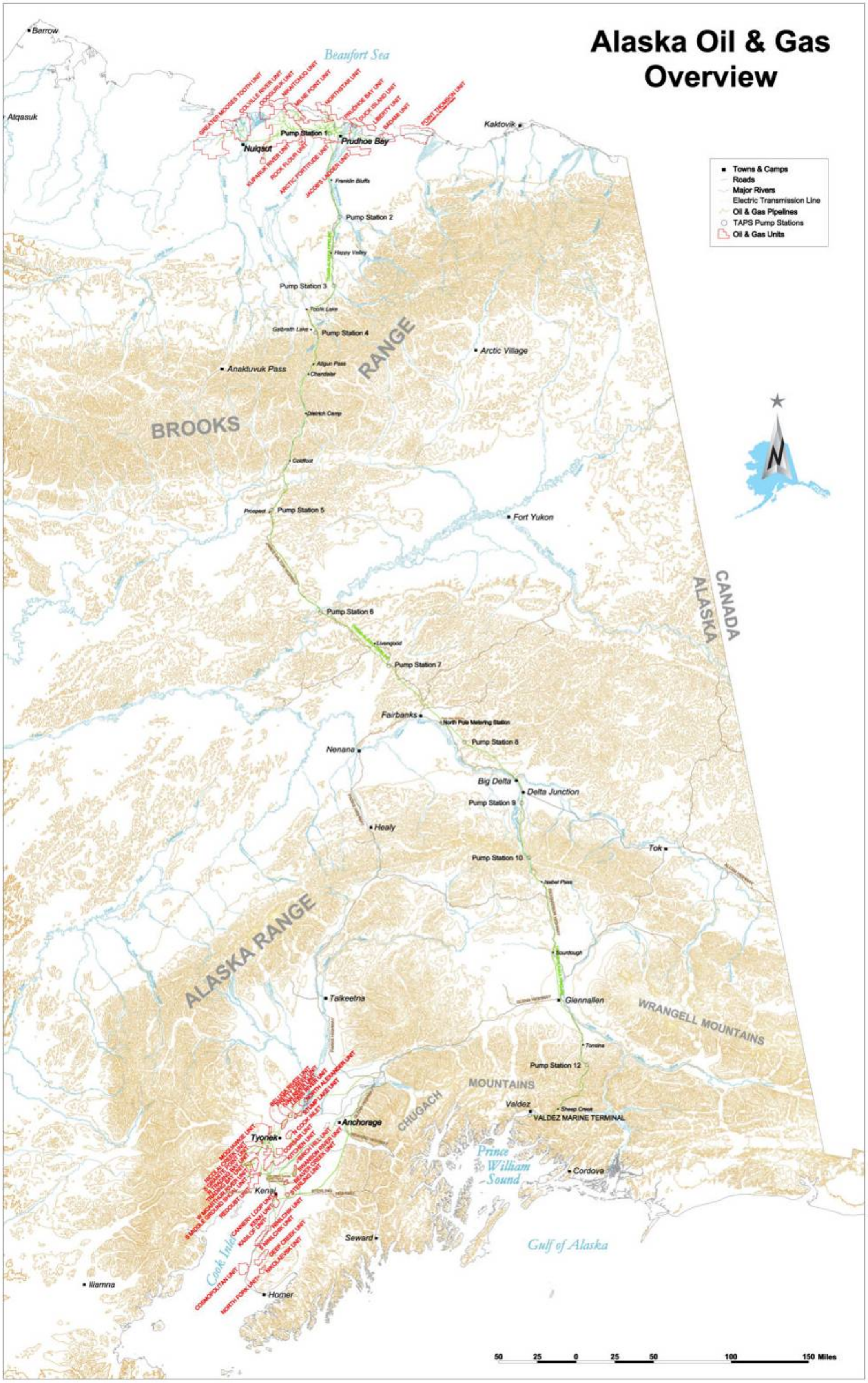

Figure 5-1 Alaska Oil and Gas Infrastructure Overview (Mapmakers)
This map is for illustration purposes only. See larger area maps in Appendix E.

5.1 North Slope

5.1.1 Overview

The North Slope is the general geographic region along the northern edge of the State of Alaska and is a flat, treeless plain of approximately 88,000 square miles. The region extends from the foothills of the Brooks Mountain Range to the south, to the Arctic Ocean to the north, to the Canadian Border to the east, and to the Chukchi Sea to the west. The developed area of the North Slope encompasses approximately 12 square miles.[2]

Atlantic Richfield Company (ARCO) made the original Prudhoe Bay discovery in March 1968. Standard Oil Company of Ohio (Sohio) drilled the confirmation well three months later. The first oil flowed from the Prudhoe Bay Field on June 20, 1977. The Prudhoe Bay development led to the discovery and development of other adjacent oil fields on the North Slope, including Endicott, Lisburne, Point McIntyre, Milne Point, Schrader Bluff, and smaller satellite developments. The original exploration companies active on the North Slope eventually evolved into the two large North Slope operators of today—ConocoPhillips Alaska, Inc. (CPAI) and BP Exploration (Alaska) Inc. (BPXA).[2]

Additional exploration discoveries on the North Slope led to the development of the Kuparuk Field located west of Prudhoe Bay. The field began producing oil in late 1981 and was followed by additional satellite field production starting in 1998. The Alpine Field, located near the mouth of the Colville River and west of the Kuparuk Field, was discovered in 1994 and began producing oil in late 2000.[2]

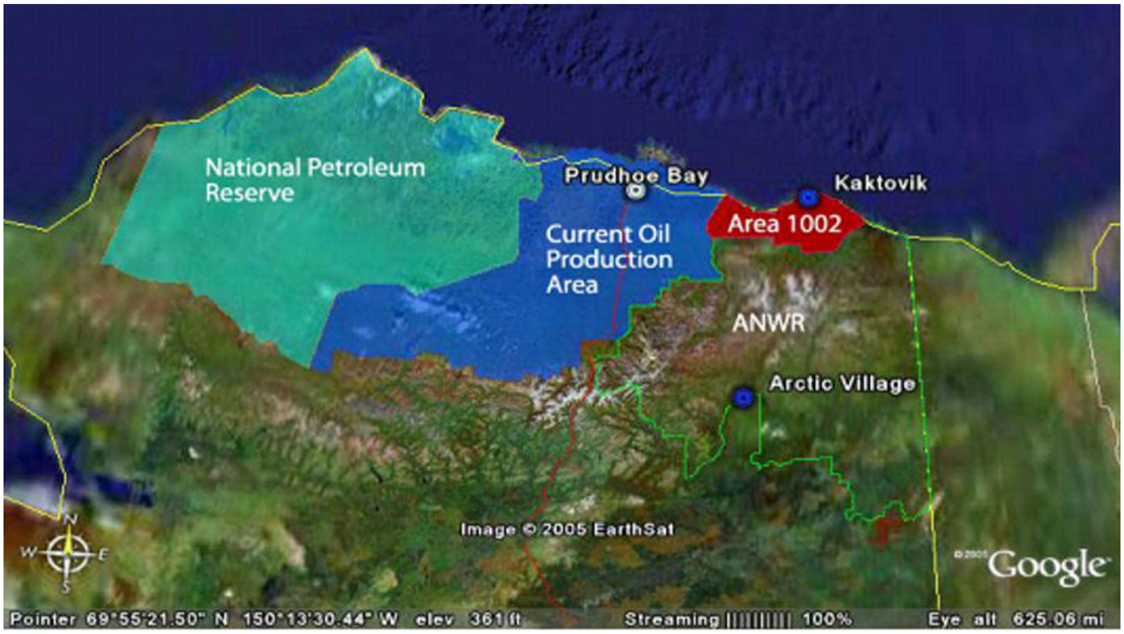

Figure 5-2 Overview of North Slope[3]

The project scope for the North Slope infrastructure includes production facilities and pipelines that deliver oil to Pump Station 1 in Prudhoe Bay. In general, the project scope begins at the wellbore of the production or service well and does not include issues associated with reservoirs, formations, and associated down-hole production. Production fluids from the well consist of three phase product (oil, gas and water) which is transported through gathering and flow lines to the oil and gas processing and treatment centers, where the produced fluids are separated. Following separation, the produced gas is transported via pipeline to various areas on the North Slope for use as fuel, reservoir injection (pressure maintenance), or for enhanced oil recovery techniques. Electrical power for most of the North Slope oil and gas infrastructure is provided by gas-fired electrical generation systems. Produced water is transported back to the well heads and injected for enhanced oil recovery. Seawater injection is used to supplement the produced water injection.

Separated crude oil is transported via pipeline to Pump Station 1 where it is transported through the Trans-Alaska Pipeline System (TAPS) main line south to Valdez. Overall oil production for the North Slope is approximately 264 million barrels per year out of the overall production for the State of Alaska of 270 million barrels per year.[4]

The major North Slope fields included in the project scope are grouped as outlined in the bulleted list below. These groupings are further categorized by facility in **Table 5-1**, and include a combination of central production and processing facilities, associated drillsites and wellpad production sites, and other production support facilities.

- Kuparuk River Unit
- Colville River Unit
- Other Western North Slope Fields (Milne Point Unit, Ooguruk Unit)
- Prudhoe Bay Initial Participating Area (IPA)
- The area commonly referred to as Greater Pt. McIntyre
- Other Eastern North Slope Fields (Badami Unit, Northstar Unit, Duck Island Unit/Endicott)

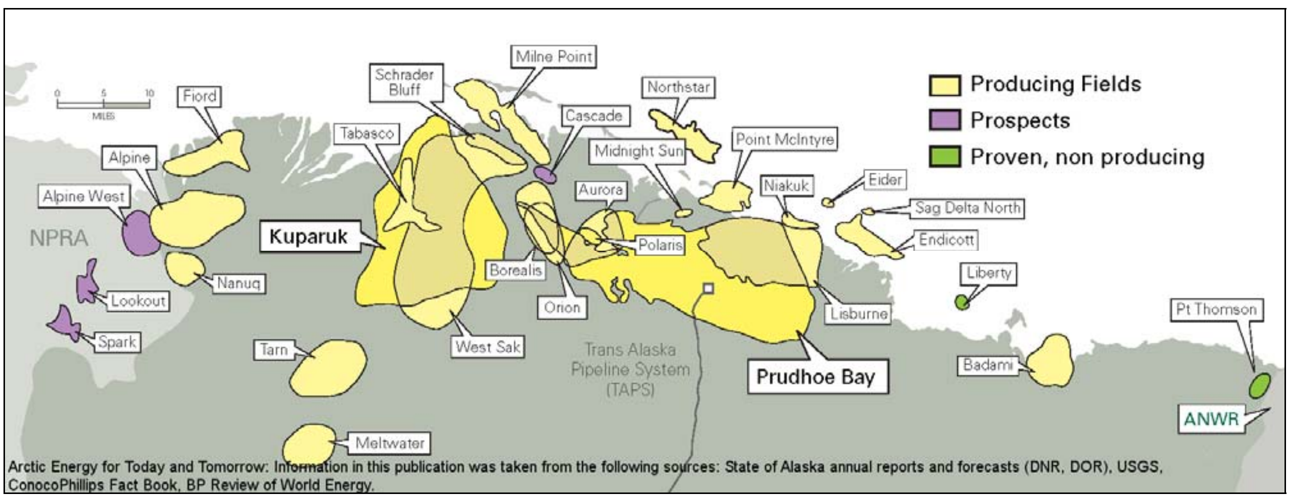

Figure 5-3 North Slope Oil Fields[5]

The following table contains a listing of facilities and components that have been determined to be in the project scope based on a review of publicly available data. *Note: This list of North Slope infrastructure components has not been reviewed by the infrastructure owner/operators to determine the accuracy of the list or the data associated with these facilities.*

Table 5-1 North Slope Facilities and Major Components

Facility	Major Components
In Scope	
Kuparuk River Unit	
Kuparuk Central Processing Facilities CPF1,CPF2, & CPF3 *(ConocoPhillips)*[6] **Fields:** Kuparuk Satellite Tarn Satellite Tabasco Satellite West Sak Satellite Meltwater	46 associated drill sites Associated piping and production/processing equipment Oliktok Pipeline (receiving end) Kuparuk Pipeline
Other Kuparuk Infrastructure: Seawater Treatment Plant Kuparuk Topping Unit	Associated piping and production/processing equipment
Colville River Unit	
Alpine Central Processing Facility *(ConocoPhillips)*[5] **Fields:** Alpine (CD1 and CD2) Satellite Fiord Satellite Nanuq	4 producing drillsites (CD1-CD4) Associated piping and production/processing equipment Alpine Pipeline Kuparuk Pipeline
Other Western North Slope Fields	
Milne Point Central Processing Facility *(BPXA)* **Field:** Milne Point	13 producing drillsites Kuparuk Pipeline (KPL) Associated piping and production/processing equipment
Oooguruk (Drill site only) *(Pioneer)* **Field:** Oooguruk	2 producing wells 1 waste disposal injection well Oooguruk Pipeline Associated piping and processing equipment *Note: 2 additional wells have also been constructed but are not operating and are out of scope.*

Facility	Major Components
Prudhoe Bay Initial Participating Area (IPA)	
Prudhoe Bay Western Operating Area (WOA)- Gathering Centers (GC) 1, 2, & 3 Prudhoe Bay Eastern Operating Area (EOA) - Flow Stations (FS) 1, 2, & 3 *(BPXA)* [5] **Fields:** Prudhoe Bay Satellite Midnight Sun Satellite Aurora Satellite Orion Satellite Polaris Satellite Borealis	Associated drillsites/wellpads Sadlerochit Pipeline Associated pipelines, facility piping and processing equipment
Other Prudhoe Bay IPA Infrastructure: Central Power Station (WOA) Central Gas Facility (EOA) Skid 50 NGL Blending Module (WOA) Central Compression Plant (EOA) 3 Injection Pads Seawater Treatment Plant Seawater Injection Plant Grind and Inject Facilities Crude Oil Topping Unit	Associated pipelines, facility piping and processing equipment
Greater Point McIntyre[5]	
Lisburne Production Center (LPC) *(BPXA)*	Associated wells Associated pipelines, facility piping and processing equipment
Point McIntyre *(BPXA)*	Wells Lisburne Pipeline Associated piping, pipelines and processing equipment
Niakuk *(BPXA)*	1 Well Lisburne Pipeline Associated piping, pipelines and processing equipment

Facility	Major Components
Raven *(BPXA)*	2 producing wells Associated piping, pipelines, and processing equipment
Other North Slope Fields[5]	
Northstar Island Facility *(BPXA)*	24 producing wells Grind and inject plant Northstar Oil Pipeline Northstar Gas Pipeline Associated facility piping and processing equipment
Endicott Production Facility (Main Production Island – MPI) Satellite Drilling Island – (SDI) satellites Eider and Sag Delta North *(BPXA)*	100 Endicott wells 2 Eider wells 2 Sag Delta wells Endicott Pipeline Associated pipelines, facility piping and processing equipment
Badami Facility *(BPXA)*	Wells Endicott Pipeline Associated pipelines, facility piping and processing equipment

Out of Scope	
Liberty *(BPXA)*	In exploration status, not currently producing
Pt. Thomson *(Exxon)*	Lease terminated; not currently producing
Alpine satellites Qannik, Lookout and Spark *(ConocoPhillips)*	In development status, not currently producing
Barrow Gas Fields and associated pipeline distribution system *(North Slope Borough)*	These fields provide natural gas distribution and sales to the City of Barrow for the generation of electric power and residential heating only, and the facilities are not tied in to the overall North Slope oil and gas production infrastructure. They are separate from the primary North Slope Infrastructure Area.

Facility	Major Components
Nikaitchuq *(Eni Petroleum)*	In exploration status, not currently producing

5.1.2 Western North Slope Facilities

5.1.2.1 Kuparuk

There are three central processing facilities (CPFs) at Kuparuk—CPF1, CPF2, and CPF3. Each CPF gathers and processes/separates the production flow from their associated drillsites. The sales quality oil flows to PS1 via the Kuparuk Pipeline (KPL). KPL also transports oil flow from Alpine (delivered to CPF2 by the Alpine Pipeline (APL) and oil flow from Milne Point (tying into KPL downstream of CPF1). Kuparuk receives natural gas liquids from Prudhoe Bay via the Oliktok Pipeline, which are used for enhanced oil recovery. Other process support facilities that are located at Kuparuk are the Seawater Treatment Plant (STP) and the Kuparuk Unit Topping Plant (KUTP).[6]

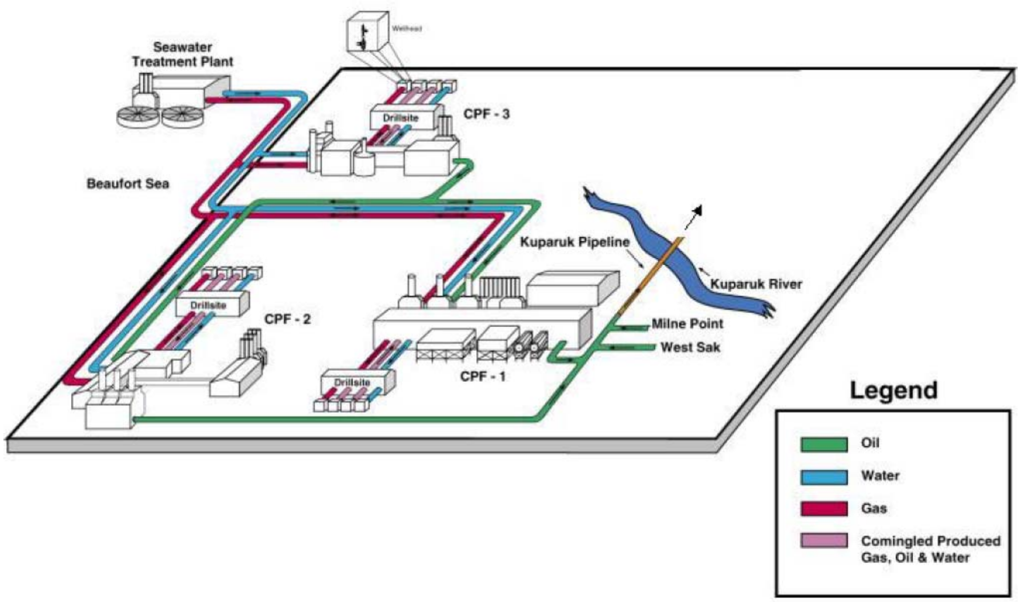

Figure 5-4 Kuparuk Facilities Schematic[6]

5.1.2.2 Colville River Unit

The Colville River Unit contains five fields that are currently being developed: Alpine (CD1 and CD2); Fiord (CD3); Nanuq-Kuparuk and Nanuq-Nuiqsut (CD4); and Qannik (CD2). There are five existing drill sites (CD1, CD2, CD3, CD4, CD5), but only CD1 through CD4 currently have wells (production and injection). Production from the drill sites is routed to the central Alpine processing facility where the produced fluids (oil, gas and water) are separated. Oil production flows from Alpine to the KPL via the Alpine Pipeline, and then is transported to TAPS PS1.

The first Colville River Unit field, Alpine, began production in 2000 and is the largest onshore oil field discovered in the United States in more than a decade. Development drilling at Alpine West (CD5) is expected during winter 2008-09. Satellite developments Lookout (CD6) and Spark (CD7), in the Greater Moose's Tooth Unit, are expected to be completed in the near future. These drill sites are not currently producing, and are outside of the scope of this project.[5]

Figure 5-5 Aerial view of Alpine Processing Center

5.1.2.3 Milne Point

The Milne Point field has 13 producing drill sites. Approximately 40% of Milne's total production is viscous oil[5], and production facilities are currently being upgraded to handle the colder, more viscous crude production. Production flow from Milne Point is separated at Milne Point's Central Processing Facility (CPF) and then ties into the KPL, downstream of CPF1, followed by transport to TAPS PS1.

Figure 5-6 Milne Point Facilities[5]

5.1.2.4 Oooguruk

Oooguruk is a relatively new producing field which was discovered in 2003 and began producing from the first well in June 2008. The field is producing from a gravel island located approximately 5 miles offshore in five feet of water. The production island has 2 producing wells and a waste disposal (grind and injection facility). No processing is done on Oooguruk Island; production fluids are transported from Oooguruk to Kuparuk for processing and ultimate delivery of oil to TAPS PS1 via the KPL.

Figure 5-7 Oooguruk Drillsite and Production Facility[7]

5.1.3 Prudhoe Bay IPA Facilities

The Prudhoe Bay IPA includes six processing facilities—three Flow Stations (FS1, FS2 and FS3) in the Eastern Operating Area (EOA) and three Gathering Centers (GC1, GC2 and GC3) in the Western Operation Area (WOA). Prudhoe Bay IPA is supported by multiple support facilities including the Central Gas Facility, Central Compression Plant, Seawater Treatment Plant, Seawater Injection Plant, Crude Oil Topping Unit, and Grind and Inject operations. Prudhoe Bay IPA facilities also service five satellites—Midnight Sun, Aurora, Orion, Polaris, and Borealis.[6] Prudhoe Bay's major facilities and operations are described in the subsections below.

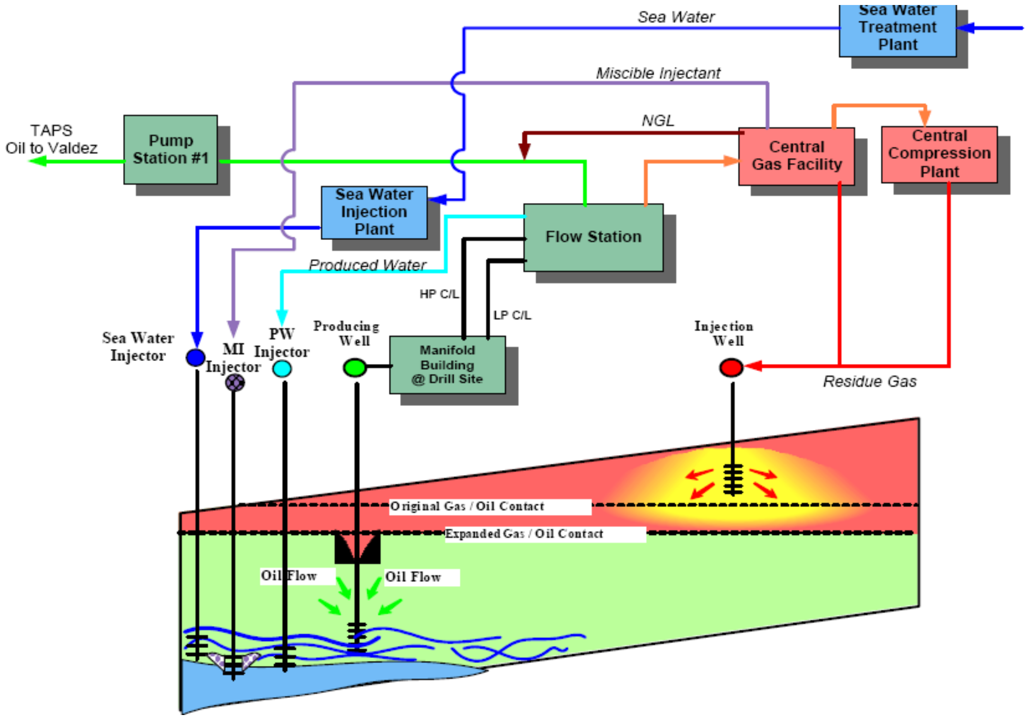

Figure 5-8 Prudhoe Bay Unit Schematic[6]

5.1.3.1 Gathering Centers and Flow Stations

The three GCs and three FSs separate the raw crude oil production from the Prudhoe Bay drill sites and well pads into oil, water, and gas components. There are 42 production drill sites and well pads in Prudhoe Bay along with three injection pads near the central gas plants. Drill sites are located in the Eastern Operating Area (EOA) and they send their associated flow to be processed in one of the Flow Stations, which are also located in the EOA. Well pads are analogous to drill sites and are located in the Western Operating Area (WOA), and their production fluids are routed to an associated Gathering Center that is also located in the WOA. Each of the production drill sites and well pads contain as many as 60 producing and injection wells. Associated manifolding for the wells gathers production into large diameter flow lines (LDFs), which deliver the production fluids for processing to one of the six central processing facilities.[6]

5.1.3.2 Seawater Treatment Plant and Seawater Injection Plant

The Seawater Treatment Plant (STP) processes seawater and sends it to the Seawater Injection Plant (SIP), which boosts the delivery pressure for injection into the Prudhoe Bay injection wells. The water is injected into the oil legs of the reservoirs as part of the secondary and tertiary recovery operation, and into the Prudhoe Bay gas cap under the Pressure Support Initiative. Water from the STP is also used in the grind and inject operations that dispose of drilling muds and cuttings into the subsurface.[6]

5.1.3.3 Crude Oil Topping Unit

The COTU processes a portion of crude oil from FS2 to produce diesel or jet fuel for support operations on the North Slope.[6]

5.1.4 Greater Pt. McIntyre Facilities

5.1.4.1 Lisburne Production Center

The Lisburne Production Center (LPC) is a standalone plant that performs nearly all of the functions described above for Prudhoe Bay IPA. The LPC processes the gas and liquid produced from the Pt. McIntyre, Lisburne, North Prudhoe Bay, West Beach, and Niakuk formations. Processed oil from the LPC is sent to TAPS PS1. LPC also produces electrical power, which can be tied into the Prudhoe power grid for two-way power.

Figure 5-9 Lisburne Production Center

5.1.5 Other Prudhoe Bay Infrastructure

5.1.5.1 Central Power Station (CPS)

The Central Power Station (CPS) is the electric power generation facility for Prudhoe Bay.[6]

5.1.5.2 Central Gas Facility (CGF) and Central Compression Plant (CCP)

The Central Gas Facility (CGF) is a gas handling plant that processes the gas that is routed from the Prudhoe Bay central processing centers. The CGF extracts natural gas liquids (NGLs) and manufactures miscible injectant (MI) from the produced gas stream. Roughly 80 mbpd of NGLs are sent to PS1 to be blended with the Prudhoe Bay crude oil or are delivered to the Oliktok Pipeline for transport to Kuparuk or Milne Point for use in enhanced oil recovery operations. The MI is distributed to the drill sites and well pads for reinjection into the reservoir for tertiary recovery. Some residue gas from the CGF is used for fuel gas needs at the Prudhoe Bay facilities, with most of the remaining residue gas compressed for injection into the gas cap at the three gas injection pads through compressors located at both the CGF/ CCP facility complex.[6]

Figure 5-10 Prudhoe Bay Central Compression Plant

5.1.6 Other North Slope Oil Fields

5.1.6.1 Northstar

The Northstar facility is located about six (6) miles northwest of Prudhoe Bay. Northstar is the first arctic offshore field connected from the production island to shore only by pipeline. A grind and inject plant is located on the island; it has some of the highest pressured gas injectors in the State of Alaska.[8] Northstar has 24 producing wells and Northstar oil and gas is transported to TAPS PS1 via two subsea pipelines. The six-mile oil pipeline has a wall thickness that is triple that of a typical onshore North Slope pipeline, and it is equipped with three separate leak detection systems.[5]

Figure 5-11 Northstar[9]

5.1.6.2 Endicott

The Endicott facility complex is located about ten (10) miles northeast of Prudhoe Bay. Endicott is the first continuously producing offshore field in the Arctic and includes 100 wells located on two production islands, the Main Production Island (MPI) and the Satellite Drilling Island (SDI). Endicott has two producing satellite fields, Sag Delta and Eider, with 2 producing wells each. A five-mile gravel causeway connects the two production islands that sit in approximately 14 feet of water. The Main Production Island includes the operations center and processing facilities. Processed oil is sent from the main processing facility through a 24-mile pipeline to TAPS PS1.[5]

Figure 5-12 Endicott

5.1.6.3 Badami

Badami is located on the shore of Mikkelsen Bay about 35 miles east of Prudhoe Bay and is the first field to be developed remotely from Prudhoe Bay infrastructure. Production began in 1998 and the field is currently in warm shutdown status.[5]

Figure 5-13 Badami

5.2 Cook Inlet Area

5.2.1 Overview

The Cook Inlet area is located north of the Gulf of Alaska and is Alaska's oldest producing oil and gas center. In 1959 Union Oil discovered the first major gas reserve in Cook Inlet. This discovery led to the development of the Swanson River Field, which began producing oil in 1960. Ninety five percent of Cook Inlet Gas was discovered before 1970 while searching for oil, and a gas pipeline was built to Anchorage in 1960.[10] Gas-focused exploration began during the late 1990's in the Cook Inlet area.

Today, oil and gas are derived from 16 offshore platforms and 21 onshore oil and gas lease units piped to onshore processing facilities on the eastern and western shores of Cook Inlet (see Figure 5-14.) Oil and gas are separated at these onshore facilities and crude oil is transferred via pipeline to the Drift River Terminal, where oil is stored for subsequent delivery to tankers berthed at the Christy Lee Platform. In 2006, the net oil production in Cook Inlet was approximately 6.14 million barrels, compared to 270 million barrels of total Alaska oil production. In 2006, the net gas production was approximately 196 billion SCF out of 3,222 billion SCF of total Alaska gas production (North Slope gas production makes up the difference, but is used for lift gas and fuel gas and is not sent to market). Cook Inlet production is projected to decrease in the future to approximately 1.8 million barrels of oil and 17 billion SCF of natural gas in 2026.[4]

Currently, gas that is produced in Cook Inlet is the source of all natural gas used in Southcentral Alaska.[10] The power that is consumed at the Cook Inlet facilities is derived from a combination of sources, including the Beluga Power Plant and on-site facility generation. Ownership of the facilities in the Cook Inlet area is diverse, with increasing investment from small and independent oil and gas companies over the past decade.

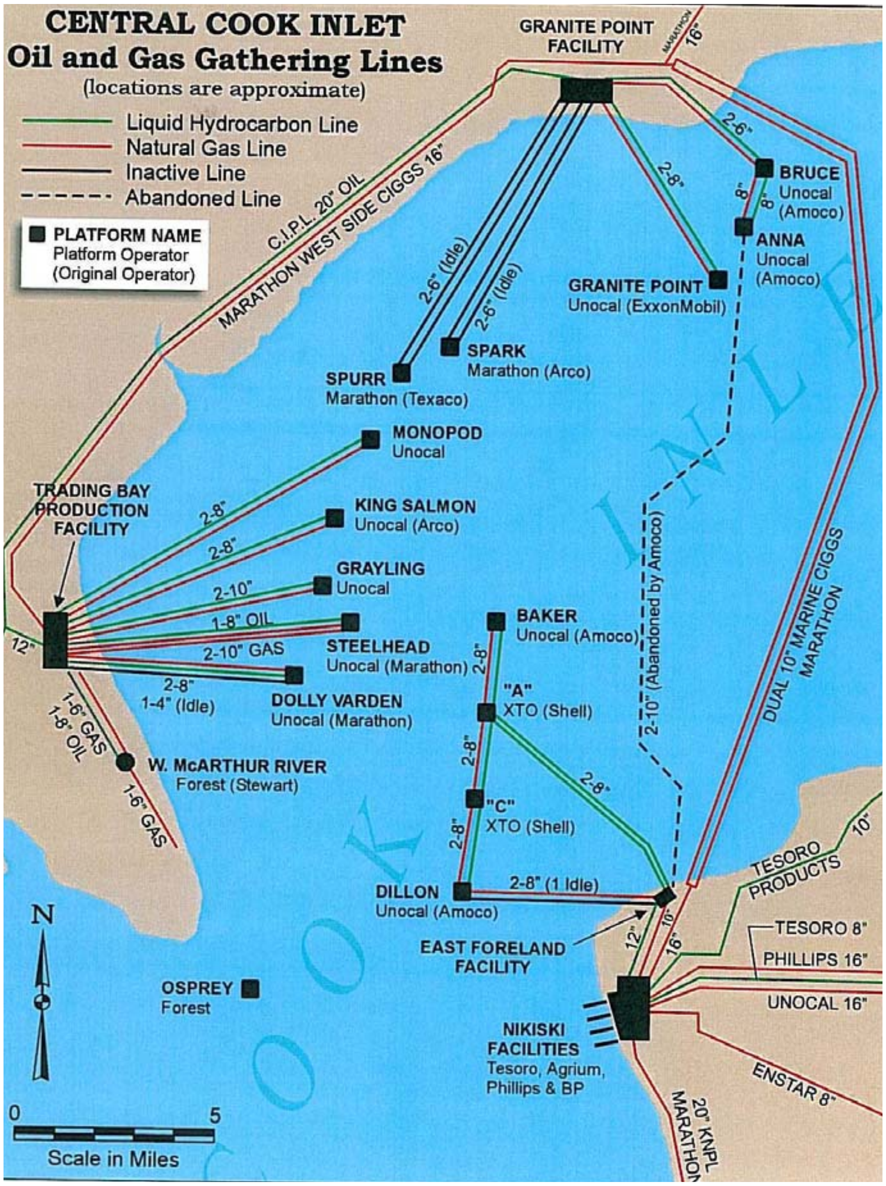

Figure 5-14 Cook Inlet Infrastructure Overview[11]

The scope of the Cook Inlet infrastructure area that is included in this risk assessment begins at the wellbore, both for offshore platforms and onshore oil and gas facilities. Oil and gas that is produced from these facilities is transferred via pipelines onshore for further processing, storage, and shipping/sales. Following separation, oil is routed to the Drift River Marine Terminal for shipping by tanker. Natural gas is transferred from production facilities to distribution in local Alaska markets and also to the ConocoPhillips/ Marathon LNG Plant via CIGGS, where gas is converted to liquefied natural gas and is exported to Japan for sale. Some gas may also be distributed to market directly from onshore gas production facilities. The scope of this project ends at the point of distribution. For the produced gas, this is the LNG Plant, other points at which the Cook Inlet Gas Gathering System transitions to distribution, and any direct distribution through pipelines that transport the gas directly from the gas fields. For the produced oil stream, the scope boundary is the Drift River Marine Terminal loading arms at Christy Lee Platform. Oil from Drift River is bound primarily for the Tesoro Refinery in Nikiski, which produces gasoline, butane, jet fuel, heating fuel, and asphalt for local Alaska markets.

The following are the major Cook Inlet Area infrastructure components included in the scope of this project:

- Sixteen offshore platforms producing oil and gas, including all process equipment, facility piping and associated pipelines. *Four platforms are currently in lighthouse mode (i.e., wells shut in, production facilities cleaned, decommissioned but not removed, and navigational aids intact*), *and are not producing, but will be considered as part of the scope.*

- Fifteen onshore gas production facilities, including all process equipment, facility piping and associated pipelines. *An additional six facility areas are not currently producing and are considered to be outside of the scope of the project.*

- Five onshore oil and gas processing facilities, including East Forelands Facility, Granite Point Tank Farm, Trading Bay Production Facility, West McArthur River Facility, and Kustatan Facility (Scope includes all process equipment, facility piping and associated pipelines).

- Drift River Marine Terminal and associated Christy Lee Platform, including all process equipment, facility piping and associated pipelines up to the berth loading arms.

- Oil and gas production pipelines/systems including the Cook Inlet Gas Gathering System (CIGGS), Cook Inlet Pipeline (CIPL), Kenai-Kachemak Pipeline (KKPL), and other associated oil and gas pipelines that are not distribution lines.

The following table contains a listing of Cook Inlet facilities and components that have been determined to be in the project scope based on a review of publicly available data. *Note: This list of Cook Inlet infrastructure components has not been reviewed by the infrastructure owner/operators to determine the accuracy of the list or the data associated with these facilities.*

Table 5-2 Cook Inlet Facilities and Components (in scope)

Facility	Major Components
In Scope	
NOTE: As of 2005, Union (Unocal) merged and is a wholly owned subsidiary of the Chevron Corporation. Platforms and natural gas producing fields in the Cook Inlet Basin are operated by Chevron, although legally Union is still listed as the owner.	
Offshore Platforms/Oil and Gas Production Facilities[12]	
Platform "A" *(XTO Energy)*	17 wells (2 shut-in) One 8" produced oil/gas/water emulsion pipeline One 8" gas pipeline Associated processing equipment and facility piping
Platform Anna *(Chevron)*	15 wells (3 shut-in) 8" oil pipeline 8" gas pipeline Associated processing equipment and facility piping
Platform Bruce *(Chevron)*	12 wells (5 shut-in) 8" oil pipeline 8" gas pipeline

Facility	Major Components
	Associated processing equipment and facility piping
Platform “C” *(XTO Energy)*	16 wells (4 shut-in) One 8” produced oil/gas/water emulsion subsea pipeline One 8” gas pipeline Associated processing equipment and facility piping
Platform Dolly Varden *(Chevron)*	37 wells (20 shut-in) 8” produced water/oil pipeline Associated processing equipment and facility piping
Platform Granite Point *(Mobil & Chevron)*	11 wells (3 shut-in) 8” produced water/oil pipeline 8” gas pipeline Associated processing equipment and facility piping
Platform Grayling *(Chevron & Marathon)*	35 wells (15 shut-in) 10” produced water/oil pipeline 10” gas pipeline Associated processing equipment and facility piping
Platform King Salmon *(Chevron & Marathon)*	25 wells (13 shut-in) 8” produced water/oil pipeline Associated processing equipment and facility piping
Platform Monopod *(Chevron & Marathon)*	2 wells (0 shut-in) 8” oil produced water/oil pipeline Associated processing equipment and facility piping
Platform Osprey (Kustatan) *(Pacific Energy Resources)*	5 wells (3 shut-in) Associated oil and gas pipeline Associated processing equipment and facility piping
Platform Steelhead *(Chevron & Marathon)*	28 wells (4 shut-in) Associated oil and gas pipeline Associated processing equipment and facility piping
Platform Tyonek (Also referred to as North Cook Inlet Platform) *(ConocoPhillips Alaska)*	7 wells (0 shut-in) Two 10” gas pipelines (pipelines are combined into one 16” line onshore) Associated processing equipment and facility piping
Platform Baker *(Chevron)* **This platform is currently shut-in and has been placed in “lighthouse” mode.*	14 wells (13 shut-in) 8” oil pipeline 8” gas pipeline Associated processing equipment and facility piping
Platform Dillon	9 wells (all shut-in) 8” oil pipeline

Facility	Major Components
(Chevron) **This platform is currently shut-in and has been placed in "lighthouse" mode.*	8" gas pipeline Associated processing equipment and facility piping
Platform Spark *(Marathon)* **This platform is currently shut-in and has been placed in "lighthouse" mode.*	6 wells (all shut-in) 6" oil pipeline 6" gas pipeline Associated processing equipment and facility piping
Platform Spurr *(Marathon & Chevron)* **This platform is currently shut-in and has been placed in "lighthouse" mode.*	8 wells (all shut-in) 6" produced water/oil pipeline Associated processing equipment and facility piping
Onshore Gas Production Facilities	
Beluga River *(ConocoPhillips)* **Includes Beluga River, Lewis River, Pretty Creek, & Ivan River Fields*	15 Beluga River wells 2 Lewis River wells 2 Pretty Creek wells 4 Ivan River wells 1 Stump Lake well (shut-in) Associated pipelines, facility piping and processing equipment
Beaver Creek *(Marathon)*	15 wells Associated pipelines, facility piping and processing equipment
Cannery Loop *(Marathon)*	10 wells Associated pipelines, facility piping and processing equipment
Deep Creek (Happy Valley) *(Chevron)*	11 wells (6 shut-in) "Kenai-Kachemak Pipeline" (KKPL) Associated facility piping
Kenai Gas Field *(Marathon)*	106 wells Grind and inject facility Gas storage injection-production cycling equipment Associated pipelines, facility piping and processing equipment
Lone Creek *(Aurora Gas)*	Wells Associated pipelines, facility piping, and processing equipment
Moquawkie *(Aurora Gas)*	1 wells (1 shut-in) Associated pipelines, facility piping and processing equipment

Facility	Major Components
Nicolai Creek *(Aurora Gas)*	1 well (3 exploratory wells) Associated pipelines, facility piping and processing equipment
Ninilchik *(Marathon)*	5 pads (Ninilchik A, Falls Creek, Grassim Oskolkoff, Paxton, and Susan Dionne) 12 wells Kenai-Kachemak Pipeline (KKPL) Associated facility piping
Sterling *(Marathon)*	4 wells Associated pipelines, facility piping and processing equipment
Swanson River *(Chevron)*	59 production wells (34 shut-in) Injection wells Gas storage injection-production cycling equipment Associated pipelines, facility piping and processing equipment
North Fork *(Gas-Pro Alaska)*	Field is shut-in
Birch Hill *(Chevron)*	Field is shut-in, production stopped in 1965
Stump Lake *(ConocoPhillips)*	Field is shut-in
Onshore Oil and Gas Processing Facilities	
East Forelands Facility *(XTO Energy)*	16” gas “North Cook Inlet Pipeline” 10” oil “North Cook Inlet Pipeline” Associated pipelines, facility piping and production/processing equipment
Granite Point Tank Farm *(Chevron)*	10” “Cook Inlet Gas Gathering System” (CIGGS) 20” oil “Cook Inlet Pipeline” (CIPL) 16” gas pipeline 10” crude oil pipeline Aboveground tanks Associated pipelines, facility piping and production/processing equipment
Kustatan Facility *(Pacific Energy Resources)*	Aboveground storage tanks Associated pipelines, facility piping and production/processing equipment
Trading Bay Production Facility *(Chevron)*	16” CIGGS gas pipeline 10” oil pipeline Associated pipelines, facility piping and

Facility	Major Components
	production/processing equipment
West McArthur River Facility *(Chevron)*	Associated pipelines, facility piping and production/processing equipment
Other Infrastructure	
Drift River Terminal *(Cook Inlet Pipeline Co.)*	10" crude oil pipeline 20" CIPL 7 aboveground crude oil storage tanks 2 aboveground diesel fuel storage tanks 2 aboveground crude fuel storage tanks Christy Lee Platform and associated loading arms Associated pipelines, facility piping and processing equipment

Out of Scope	
Onshore Gas Production (Fields or Units)	
Cosmopolitan *(Pioneer)*	Field is currently in exploration and is not producing
Corsair *(Pacific Energy Resources)*	Field is currently not producing
Kitchen *(Escopeta)*	Field is currently not producing
North Fork *(Gas-Pro Alaska)*	Field is shut-in, production stopped in 1965
Nikolaevsk *(Chevron)*	Field is currently not producing
South Ninilchik *(Chevron)*	Field is currently not producing
North Alexander *(Escopeta Oil)*	Field is currently not producing
West Foreland *(Pacific Energy Resources)*	Field is currently not producing
Onshore Oil and Gas Processing Facilities	
Swanson River Distribution Lines • 10" Oil Pipeline • 10" Gas Pipeline	These pipelines are considered to be downstream sales/ distribution lines
Other Infrastructure	

Facility	Major Components
Beluga Power Plant *(Chugach Electric Association)* **Only considered to be in scope as an infrastructure feed source (power to some facilities in scope).*	Associated operating equipment
Nikiski Industrial Complex • Tesoro Refinery *(Tesoro)* • LNG Plant *(ConocoPhillips/Marathon)* • Gas to Liquids Plant *(BP)* • Fertilizer Plant *(Agrium)*	These facilities are associated with downstream processing and distribution

5.2.2 Offshore Oil and Gas Production Facilities

Cook Inlet has 16 existing offshore platforms, 12 of which are currently producing oil and gas. Four are in lighthouse mode (wells shut in, production facilities cleaned, decommissioned but not removed and navigational aids intact). These offshore platforms typically have anywhere from 2 to 37 associated production wells. Most platforms conduct some processing on-board to separate gas from the oil and water production streams; this gas is used for fuel gas and processing functions on platform or sent to flare. Some platforms have equipment to separate produced water from oil on board, while others ship multi-phase oil and produced water to onshore processing facilities for separation. Gas and the oil and water emulsions are piped under sea to onshore processing facilities, including the Trading Bay Production Facility, East Forelands Facility, and Granite Point Production Facility.

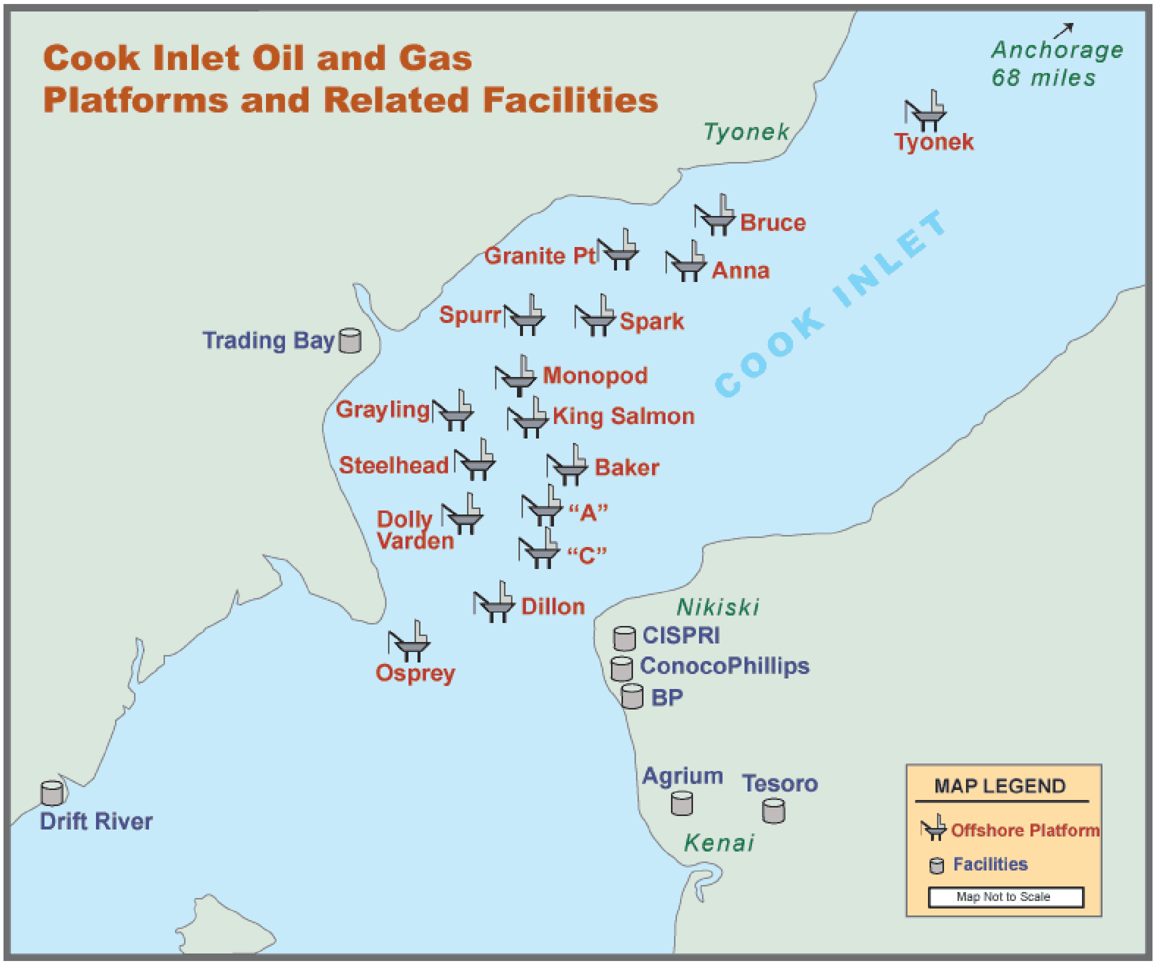

Figure 5-15 Cook Inlet Oil and Gas Platforms and Related Facilities[12]

5.2.3 Onshore Gas Production Facilities

Cook Inlet has 22 gas lease units, the majority of which reside on the East side of Cook Inlet. Twelve of these units are currently producing, 9 are in exploration status or are currently shut-in. These units represent drilling lease areas. In many cases, one lease unit may consist of more than one reservoir and several pads. For simplicity, this report will refer to the lease unit names and commonly used reservoir or pad names will also be utilized as appropriate. Within each unit, well pads are used for drilling, and the number of wells ranges from 1 to 106 wells per lease unit. Product from the producing wells is then piped to onshore Cook Inlet processing facilities for further distribution. A network of piping connects the Cook Inlet gas units and is often referred to as the Cook Inlet Gas Gathering System (CIGGS).

Cook Inlet is currently expanding its gas production through the development of new fields, and these lease units are considered to be outside of the scope of this project. Only those facilities that are currently producing will be considered in this project.

Figure 5-16 Beluga River Facility

5.2.4 Cook Inlet Onshore Oil and Gas Processing Facilities

Onshore oil and gas facilities are primarily located on the west coast of Cook Inlet and provide processing support for the off-shore platforms. The major facilities on the west side of the inlet include Granite Point Production Facility, West McArthur River Facility, Trading Bay Production Facility, and Kustatan Facility. These facilities all flow through Trading Bay to reach the Drift River Terminal, where oil is stored for loading on to tankers at the Christy Lee platform for distribution to the Tesoro Refinery and sale in local markets. On the East side of Cook Inlet, the East Foreland XTO facility provides processing to Offshore Platforms A and C and handles production from all Middle Ground Shoal (two XTO platforms – 'A' and 'C', and two Chevron platforms – Baker and Dillon. In addition to oil that is produced from the offshore platforms, the Swanson River Field produces oil and has processing facilities to accommodate the Swanson River Field flow. Following is a brief description and process overview of the major oil and gas processing facilities that are included in the scope of the risk assessment.

5.2.4.1 Drift River Terminal

The Drift River Terminal receives crude oil from the Cook Inlet production facilities and ballast water from tankers. The facility performs oil/water separation on the ballast water using six successive holding ponds. The cleansed water is discharged into Cook Inlet and the recovered crude oil, along with crude oil from the Trading Bay Production Facility, is piped to a loading facility, Christy Lee Platform, where it is transferred to tankers and barges. Most of the crude oil from Drift River is delivered into the local refinery market. [12]

Figure 5-17 Drift River Terminal[13]

5.2.4.2 Trading Bay Production Facility

The Trading Bay Production Facility is a crude oil treatment and separating facility. Oil and gas that is separated on the Cook Inlet offshore platforms is pumped through sub-sea pipelines to Trading Bay. Treated oil is stored at the facility and transferred by a 20" pipeline to the Drift River Terminal. Dried natural gas that is received from the offshore platforms is piped via the Cook Inlet Gas Gathering System (CIGGS) through Drift River for sale. Produced water is treated and discharged directly into Cook Inlet.

Product Routing From:

- *Oil:* Monopod, King Salmon, Dolly Varden, Grayling, Steelhead Platforms, Kustatan Facility, West McArthur Facility, Granite Point Facility
- *Gas:* Monopod, King Salmon, Dolly Varden, Grayling, Steelhead Platforms, Kustatan Facility, West McArthur Facility

Product Routing To:

- Oil: Drift River Terminal
- Gas: Granite Point Facility

5.2.4.3 Granite Point Tank Farm

The Granite Point Tank Farm is an oil and gas transfer, processing, and storage facility. The facility receives gas and oil water emulsion from offshore platforms. The gas is processed through scrubbers, compressors, and dehydrators. The emulsion is sent through a line heater and separated via a coalescer or heater treater. The oil is sent to storage tanks and later piped to the Drift River terminal for sale. Water from the facility is treated and discharged directly into Cook Inlet.

Product Routing From:

- Oil: Anna, Bruce, Granite Point, Spark (inactive), Spurr (Inactive) Platforms
- Gas: Trading Bay Production Facility, Nicolai Creek, Granite Point, Beluga River

Product Routing To:

- Oil: Trading Bay Production Facility
- Gas: Cook Inlet Gas Gathering System (CIGGS) for distribution[14]

5.2.4.4 Kustatan Production Facility

Kustatan Production Facility receives 3-phase production (emulsions and gas) exclusively from the Osprey Platform for processing and transfers oil and gas to the Trading Bay Production Facility for distribution. Unlike other platform-facility relationships in the Cook Inlet Basin, the produced water is separated at Kustatan and shipped back to the Osprey Platform for enhanced oil recovery injection and artificial lift purposes.

Figure 5-18 Kustatan Production Facility[15]

5.2.4.5 East Forelands XTO Energy Production Processing Facility

The East Forelands Production Processing Facility collects emulsions and gas from XTO Energy Platforms A and C and is also capable of collecting product from the inactive Bruce and Dillon Platforms. Production from the Tyonek Platform is piped via the North Cook Inlet Pipeline by the East Forelands facility for later distribution.

Figure 5-19 Platform A[16]

5.2.4.6 West McArthur River Production Facility

The West McArthur River Production Facility collects product from 6 offshore platforms and acts as the central collection point for Trading Bay Platforms. West McArthur River also contains a Waste Disposal Injection Facility. West McArthur River receives oil and gas from the following locations.

Product Routing From:

- Monopod
- King Salmon
- Dolly Varden
- Grayling
- Steelhead
- Osprey Platform via Kustatan Facility

Product Routing To:

- Gas: Trading Bay Production Facility
- Oil: Drift River Terminal

5.3 Trans Alaska Pipeline System

5.3.1 Overview

The Trans Alaska Pipeline System (TAPS) transports crude oil from Alaska's North Slope to the ice-free port of Valdez, Alaska, at the northeastern end of Prince William Sound. The 48-inch-diameter crude oil pipeline stretches 800 miles over tundra, three mountain ranges and more than 500 streams and rivers.[17] Approximately 579 animal crossings for caribou, moose, and other wildlife are incorporated into the TAPS corridor. Four pump stations (PSs) are currently in use to move oil through the pipeline, with four additional pump stations on standby. The Valdez Marine Terminal (VMT), at the southern end of the TAPS, is where crude oil is loaded onto tankers for transport to market. TAPS was designed, constructed, and is now operated and maintained by the Alyeska Pipeline Service Company (APSC). Continued operation of TAPS is important to ensure a secure and adequate supply of energy to the US domestic market; Alaska supplies nearly 17% of the current U.S. domestic crude oil production.[18] In addition, the TAPS is a vital component of the country's energy infrastructure and is crucial to development of North Slope oil reserves.

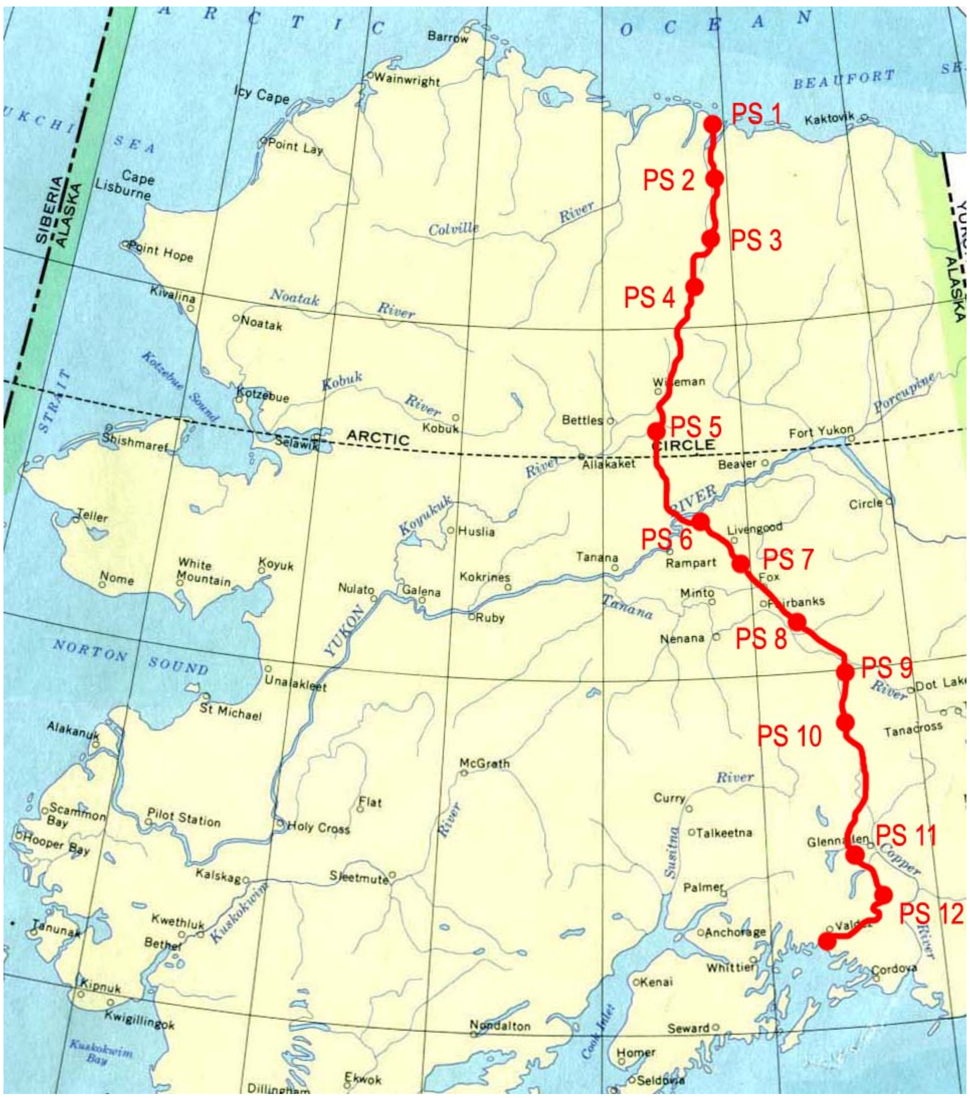

Figure 5-20 TAPS Pipeline[19]

Except for occasional maintenance and repair down time, the pipeline has operated continuously since its startup in June 1977, and has transported more than 15.5 billion barrels (bbl) of oil through the end of 2007.[17] The peak average daily crude oil TAPS throughput rate of 2.03 million bbl per day was reached in 1988; the average daily throughput rate in 2007 was approximately 740,000 bbl per day.[17] The total travel time through the pipeline at this flow rate is just under 12 days from Pump Station 1 to the VMT.

The scope of this infrastructure area that is included in the risk assessment begins at the inlet ROV valves from the North Slope supply pipelines to Pump Station 1, and continues through the pipeline and associated pump stations to the VMT, up to the marine terminal loading arms. The following five pipelines deliver oil to PS 1.[17]

- *Sadlerochit*: Started up in 1977, carries oil from the Eastern Operating Area (EOA) and the Western Operating Area (WOA) Prudhoe Bay developments.
- *Kuparuk:* Started up in December 1981, carries oil from the Kuparuk, Alpine, Milne Point, West Sak, Tabasco, and Tarn developments.
- *Lisburne:* Started up in December 1986, carries oil from the Pt. McIntyre and Niakuk developments.
- *Endicott:* Started up in October 1987, carries oil from the Endicott and Badami developments.
- *Northstar:* Started up in November 2001, carries oil from Northstar Island.

Table 5-3 contains a listing of TAPS facilities and components that have been determined to be in the project scope based on a review of publicly available data. *Note: This list of TAPS infrastructure components has not been reviewed with APSC to determine the accuracy of the list or the data associated with these facilities.*

Table 5-3 TAPS Components and Major Equipment

Component	Major Equipment[17,20,21]
In Scope	
Trans Alaska Pipeline	800-mile, 48-inch Pipeline • 420 miles aboveground, insulated and elevated pipe in thaw-unstable soils. • 376 miles conventional belowground piping in thaw-stable soils. • 4 miles of refrigerated belowground piping. Pressure: 1,180 psi Maximum Design & Operating Pressure Crude Oil Temperature:[22] • ~105°F at injection into pipeline at PS 1 • ~60°F when received at VMT (can get to 40°F during upsets) • ~50°F – 60°F offtake plant at NP Topping Plant is coldest point Valves: 177 (81 Check, 71 Gate, 24 Block, 1 Ball) Vertical Support Members (VSMs): 78,000

Component	Major Equipment[17,20,21]
Fuel Gas Line	149-mile, 10-inch Pipeline from PS 1 to MP 34, 8-inch from MP 34 to PS 4 (generally parallels mainline crude oil pipeline). Pressure: • Maximum Design: 1,335 psi • Operating: 1,090 psi Two gas turbine compressors at PS 1 boost gas pressure from ~600 psi. Gas Temperature: Maximum of 30ºF leaving PS 1. Pig Launching/Receiving Facilities at PS 1, MP 34, and PS 4.
Pump Stations 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12	Crude Oil Storage/Relief Tanks • PS 1 Crude Oil Storage Tank Capacity: 420,000 bbl • PS 5 Crude Oil Relief Tank Capacity: 150,000 bbl • All Other Pump Stations Relief Tank Capacity: 55,000 bbl Mainline Pumps • 4 turbine-driven pumps originally installed at each pump station (2 operating at PS 1 and 1 operating at PS 4). • New electrically driven pumps installed at PS 3 and PS 9 as part of Strategic Reconfiguration project. Booster Pumps • PS 1 has 3 mainline booster pumps to boost oil pressure. • All other pump stations have booster pumps to move oil from the storage tanks to the main line. • PS 5 has injection pumps. Pig Launching/Receiving Facilities at PS 1 and PS 4. Refrigerated Foundations at PS 1, PS 2, PS 3, PS 5, and PS 6. Drag Reducing Agent (DRA) injection facilities are located at PS 1, 7, and 9 and at MP 238 south of the Brooks Range.[23]

Component	Major Equipment[17,20,21]
Valdez Marine Terminal	Pigging Receiving Facility Crude Oil Storage Tanks • Capacity of 510,000 bbl ea.; 6.2 mm bbl total working volume • East Tank Farm – 14 Storage Tanks • West Tank Farm – 4 Storage Tanks (*only 1 is currently active*) Ballast Water Treatment (BWT) Facility • 3 Settling tanks; capacity of 430,000 bbl. each • 2 Biological Treatment Tanks; capacity: 5.8 million gallons each Power/Vapor (Vapor Recovery System and Power Plant) • 5 gas compressors: Two of the compressors dedicated to Berths, two compressors dedicated to tank farm service, and one operates as a swing compressor between the tank and the berths. • Tanker Vapor Collection System • 3 Waste Gas Incinerators • Flue Gas and Scrubber System • Inert Gas Cooler • Nitrogen Skid • Compressed Air System • Power Plant (3 steam boilers, 3 turbine driven generators, 2 Standby diesel generators, 4 battery-supplied UPS systems) Marine Loading Facility • 4 Berths: Berths 1, 3, 4 and 5 (Berths 4 and 5 are fixed platforms equipped with vapor recovery arms. Berth 3 is used as a lay berth for tankers. Berth 1 is out of service, but is a floating platform originally designed to handle smaller tankers (12,000-16,000 deadweight tons).[24] • Loading Arms: Four16-in arms on Berths 3, 4 and 5. Facility Piping: All facility piping is included in the scope of the review, up through the Marine Terminal loading arms on the berths.
Out of Scope	
Flint Hills Refinery (located in North Pole) Petro Star Refineries (located in North Pole and Valdez)	Downstream infrastructure, including refineries are excluded from the scope of this project but may be a focus of future study. Crude oil pipelines to these facilities will be in scope up to the metering valves on the refinery feed and outlet lines only. Although impacts to refineries will not be considered, a shutdown of a refinery has the potential to act as an initiating event and will be considered in those terms.

5.3.1.1 Strategic Reconfiguration (SR)

In 2001, APSC began a project called Strategic Reconfiguration (SR) in an effort to reduce physical infrastructure and simplify operations and maintenance on TAPS and at the VMT. The program goal is to position TAPS for more efficient operation while maintaining or enhancing safety, operational integrity, and environmental performance.[17] The new system is intended to be more cost effective and scalable for changes in pipeline throughput to position the North Slope for future exploration, development, and production.

The project involves installing electrically driven crude oil pumps at four critical pump stations (1, 3, 4 and 9) combined with increased automation and upgraded control systems, and will reduce manpower at these stations. The conversion of PS 9 has been completed, and oil began moving through the new equipment in January 2007. [25] The conversion has been completed at PS 3 with oil first moving through the upgraded equipment in December 2003. The startup date for PS 4 is projected to be March 2009. PS 1 is currently scheduled for start up in 2011, but it is not yet fully funded, so the date may change.[26]

Note: This information is based on the most current data that is available about the status of the SR Project and has not been reviewed with APSC as of the time that this Interim Report was developed.

5.3.2 The TAPS Pipeline

The Trans Alaska Pipeline is 800.3 miles (1,288 kilometers) long, with an outer diameter of 48 inches. The total area covered by the pipeline system is approximately 16.3 square miles. The pipeline crosses three major mountain passes: the Brooks Range, the Alaska Range, and the Chugach Range. Its highest elevation is at Atigun Pass (4,739 feet). It also crosses Isabel Pass (3,420 feet) and Thompson Pass (2,812 feet). The pipeline crosses 34 major rivers and nearly 500 other smaller rivers and streams.

The pipeline is elevated aboveground for 420 miles and buried for the other 380 miles. To prevent thawing of permafrost, about 420 miles of the pipeline is aboveground, mounted on approximately 78,000 vertical support members (VSMs) located about every 60 feet. Some buried sections are insulated or refrigerated and insulated.

Valves are strategically placed along the pipeline to isolate sections of the pipeline and to minimize the size of potential spills in the event of a pipe rupture. Most of the gate or ball valves can be controlled from the Operations Control Center (OCC) or from the pump stations. All valves can be operated manually for maintenance of the line or for spill isolation, if necessary.[19]

Figure 5-21 TAPS Check Valve[27]

5.3.3 Operations Control Center

Operators at the OCC monitor the TAPS 24 hours a day and maintain control of all significant aspects of the pipeline operations and pipeline leak detection using instantaneous monitoring. OCC relocated its primary control location from Valdez to Anchorage in January 2008 and the TAPS and the VMT are now controlled from the Anchorage site. APSC plans to relocate the Valdez OCC equipment to Wasilla as part of a project to construct an Alternate Operations Control Center (AOCC) as a redundant control center, which is expected to be operational during 2008.[17, 28,29]

5.3.4 Pump Stations

The original design of TAPS called for 12 pump stations equipped with 4 pumps each.[20] PS 11 was never built and exists as a security site only.[20] Currently, four operating pump stations (PS 1, 3, 4, and 9) propel oil through the pipeline.[20,30] One additional pump station (PS 5 on the southern slope of the Brooks Range) operates only to relieve pressure in the line. As a result of the decline in throughput that has been ongoing since the beginning of the 1990s, five other pump stations (2, 6, 7, 8, 10, and 12) have been placed on standby.[20,30] More recently, pumps at two pump stations (PS 2 and PS 12) have been disconnected from the pipeline entirely. The pump stations include valves, pipe, tanks, and control equipment designed to relieve excessive pressures on the pipeline when the pipeline or a pump station shuts down.

PS 1 is connected to Prudhoe Bay's central power grid and uses fuel gas from the North Slope fields. Fuel gas from the North Slope fields is also used to power and operate PS 3 and PS 4. The fuel gas is delivered to PS 3 and PS 4 through a 149-mile fuel gas line that originates at PS 1 and varies in diameter from 10 inches to 8 inches. The pump stations located farther south are powered by turbines that use liquid fuel, except for PS 9, which purchases commercial power from the nearby Golden Valley Electric Association (GVEA). PS 8 and 12 also purchase commercially generated power from local providers.[17]

Figure 5-22 TAPS Pump Station 1[19]


Figure 5-23 Pump Station 9 [31]

5.3.5 Valdez Marine Terminal

The VMT, at the southern end of the TAPS, is where crude oil is loaded onto tankers for transport to market. The VMT site encompasses over 1,000 acres on the southern shore of Port Valdez. The VMT has facilities for crude oil metering, storage, transfer, and loading. Incoming crude oil is metered and sent either to one of active fifteen 510,000 bbl storage tanks or directly to a tanker. The VMT has loading berths that can accommodate three tankers at once, although only two of the berths (Berth 4 and 5) have vapor control systems and are used for loading tankers. Berth 3 is used as a lay berth for tankers, and Berth 1 is out of service.

To reduce air emissions, vapor recovery systems collect crude oil vapors from the crude oil storage tanks and the Ballast Water Treatment (BWT) facility as well as the vapors that are vented from marine tanker vessels as they load crude oil at the berths. Before transfer to a tanker begins, crews place an oil spill containment boom around the entire berth and the tanker. The BWT facility treats the ballast water that is collected from the tankers as the oil is loaded in order to recover the oil from the ballast water.

The VMT was designed to provide the storage capacity in TAPS to allow production on the North Slope to operate without impact-related delays from the marine transportation system. The VMT currently has storage facilities with a working inventory capacity of 6.2 million bbl of crude oil and a total active volume of 7.3 million bbl.[17,20]

Figure 5-24 Valdez Marine Terminal [19]

6.0 INITIATING EVENTS

This section describes an initial listing of events to be considered as part of the risk assessment of the Alaska oil and gas infrastructure. The first step in developing an overall risk profile for a system or set of systems is to identify "What can go wrong?" An initiating event is the first thing that happens that causes or contributes to a deviation from the normal design or operational intent of a system .The hazardous events that will be postulated for this project are those events that are unplanned and undesired that have the potential to cause impacts to safety, the environment, or reliability of the producing infrastructure. The initiating events to be considered are divided into two categories, 1) operational hazard events, which are related to the operating processes that make up the infrastructure system, and 2) natural hazard events, which are caused by naturally occurring phenomenon in the environment.

The following sections, which were derived as a result of the stakeholder consultation process and from general risk assessment practices, provide a preliminary listing of event categories that will be considered for both operational and natural hazard events. These events should be considered to be a broad overview of the types of events in each category that would be specifically applicable to Alaska oil and gas infrastructure facilities, components and processes and is not intended to be an exhaustive list of all events, contributors or scenarios that will be considered during the risk assessment. This list will be expanded and refined during the Task 2 Methodology Development process, and will allow for the development of a customized, structured set of scenarios that take into account the design and operating features that are specific to the facility or infrastructure item that is being considered for the facilities and components described in **Section 5.0** of this report.

6.1 Operational Hazard Events

Operational hazard events are those events that relate specifically to the processes, systems, and equipment that make up the oil and gas infrastructure and can be events that are caused by human actions or equipment or system malfunctions associated with the operations of a system. These events can occur within the boundaries of a plant or facility and are a result of oil and gas system operations activities and tasks. The project team will evaluate the operational hazards that have the potential to cause a safety, environmental, or reliability consequence on both a facility and component level and a system-wide basis. Operational hazard scenarios will be postulated for each facility and set of components and equipment that comprise the overall Alaska oil and gas infrastructure. The following is a preliminary list of the types of operational hazards and contributing factors that are applicable to the Alaska oil and gas infrastructure and were identified through stakeholder consultation, data and information review, and best risk management practices.

- Fire
- Explosion
- Loss of Integrity (spills and leaks) (e.g., due to natural aging process– corrosion, abrasion, wear and fatigue)
- Equipment Malfunction
- Loss of Infrastructure Support Systems (e.g., power)
- Changes in Process Conditions (e.g., composition– heavy oil, increased quantities of sand, throughput decline)
- Human Error (due to fatigue, not following proper procedures, resource availability, etc.)

6.2 Natural Hazard Events

Natural hazards that have the potential to cause unacceptable safety, environmental and reliability consequences will also be evaluated by the project team. Natural hazards are atmospheric, hydrologic, geologic (especially seismic and volcanic), and wildfire phenomena that, because of their location, severity, and frequency, have the potential to affect the infrastructure adversely. The qualifier "natural" eliminates such exclusively manmade phenomena as listed in the operational hazards section above. The following is a preliminary list of operational hazards as identified through stakeholder consultation, data and information review, and best risk management practices.

- Earthquake
- Tsunami
- Volcanoes (including ash, lahars, etc.)
- Coastal Erosion
- Permafrost Thaw/Climate Change
- Ice
- Severe Storms
- Flooding
- Underwater Currents
- High Winds
- Geology (e.g. subsidence, landslides)
- Avalanches
- Forest Fire

7.0 UNACCEPTABLE CONSEQUENCES

7.1 Background

Section 4.02 of the State's scope of work for the risk assessment states:

"The State envisions the analysis will utilize an "unacceptable consequence" approach; beginning with the identification of the nature and extent of oil and gas infrastructure failures that would create unacceptable consequences or impacts to the environment, overall safety, and system reliability. The bidder must consider wide-ranging stakeholder input before identifying an unacceptable consequence."

The scope of work further identifies consequence categories of interest for the risk assessment as impacts of potential events that pose threats to:

- Reliability of State Revenue Due to Loss of Production
- Safety (Occupational and Public)
- The Environment

The risk of such events can be expressed as the combination of the magnitude of the consequences associated with the event and the frequency with which such an event is expected to occur. The term "Reliability" was defined by the State for this project as:

"Reliability: For the purpose of this project "reliability" means the continuity of production of oil and gas from which the State government receives ~85% of its revenue. Any failure, problem, or event that results in an unplanned interruption of, or reduction in the rate of oil or gas production, negatively affects reliability."

In this risk assessment, disruption of a production stream that is severe enough to have a significant impact on State revenue is considered to be a consequence of interest for reliability. The magnitude of impacts is characterized by the consequence categories defined below. These include Reliability/Revenue Consequences, Environmental Consequences, and Safety Consequences.

7.2 Approach for Consequence Categorization

The project team's initial approach to define the three consequence areas of concern for the project is provided in **Tables 7-1** to **7-3**. These initial definitions and categories will need to be further developed and refined as the project progresses into the Methodology Development stage. For example, the following initial category scales may be most useful and applicable to the preliminary risk screening activities of the risk assessment. Other detailed assessment tools and approaches may be used for the in depth analysis that will be required during the Implementation Phase of the project.

7.2.1 Reliability/Revenue Consequences

Table 7-1 presents the initial structure proposed by the project team for assessing the consequence levels related to Reliability/Revenue. Using this approach, the project team will assess the potential impact on the State's annual budget from unplanned events that interrupt or reduce oil and gas production flow, and therefore result in loss of revenue from royalties.

A three tier structure for categorizing revenue loss (i.e., Catastrophic, Challenging, and Manageable) was provided with input from the State Department of Revenue personnel, and forms the basic structure reflected in **Table 7-1.** The project team is considering the use of an expanded five category revenue loss structure (as reflected) to provide the ability to discriminate between loss events in the middle range of the scale (Challenging). The mid-level loss categories will require more definition as the risk assessment methodology is further developed.

Additionally, further discussions and data review will be used to define appropriate annual budget percentages and/or actual revenue amounts that correspond to each category range. These can then be used with estimates of the revenue loss impact from an event that results in loss of production to allow each event to be assigned to one of the Reliability/Revenue consequence categories.

During the Stakeholder Consultation process for this project, numerous economic consequence issues were raised by stakeholders that do not fall within the scope of this project, in terms of loss of reliability as defined as a loss of revenue to the State from oil or gas production royalties. There are often other large economic impacts posed by oil and gas infrastructure events that are not related to loss of State revenue. Examples of these impacts could include:

- Industrial shutdowns and loss of home heating if natural gas supply to villages and cities (such as Anchorage) is lost;

- Loss of a large portion of the Alaska electrical supply if natural gas is not available to the electrical generating network;

- Loss of jobs if the refineries supplied by the pipeline do not receive crude oil as a feed stock for continued plant operations; and

- Loss of gasoline, diesel, and aviation gas to the Alaska commercial, military and aviation fuel markets if refineries are shut down for an extended period of time due to a loss of crude stock.

These additional economic losses (and potential associated safety impacts) are clearly issues of significant consequence and concern to the stakeholders of the State, which deserve to be brought to the State's attention and addressed. However, those impacts are outside of the scope of this project as they relate to secondary, socioeconomic consequences that were not defined as consequence areas of concern for this particular project. The focus of this project is restricted to direct State revenue losses only. Therefore, a detailed analysis of the socioeconomic impacts related to loss of reliability in this context will not be performed at this time, but the State should consider addressing these stakeholder concerns in a future study.

Table 7-1 Reliability/Revenue Loss Categorization

Category	Magnitude of Revenue Loss (Compared to Annual State Budget Forecasts)
5	**Catastrophic** – Revenue losses that severely affect the State's ability to fund and provide basic or essential State services (e.g., law enforcement, fire protection, public health services, education support, welfare programs, and basic infrastructure safety programs).
4	**Extremely Challenging –** Revenue losses that have a very significant impact on the State's ability to fund non-essential but expected core State services. Note: This category will be further defined based on future detailed discussions with the State Department of Revenue and an understanding of core State services and associated funding requirements as outlined in the annual State budget forecast and the State Emergency Response Plan.
3	**Challenging** – Revenue losses that have a significant impact on the State's ability to fund non-essential but expected core State services (such as long term support to recreational/outdoor activities, plans for increased educational opportunities for State citizens, etc.). These kinds of services are expected and strongly desired by the citizens of the State, and if the State is unable to provide these services due to budget shortfalls, there is an expectation of public outcry from the citizens of the State.
2	**Moderately Challenging –** Revenue losses that have a moderate impact on the State's ability to fund non-essential but expected core State services. Note: This category will be further defined based on future detailed discussions with the State Department of Revenue and an understanding of core State services and associated funding requirements as outlined in the annual State budget forecast and the State Emergency Response Plan.
1	**Manageable** – A loss of State revenue that is of concern but does not necessarily threaten critical or core State services, but would impact optional services such as additional investment in programs to increase cultural or entertainment activities, recreational activities, etc.; or a loss in revenue that would eliminate discretionary spending and cause deferral of optional capital projects, upgrades to existing infrastructure, or services.

7.2.2 Environmental Consequences

A major aspect of stakeholder concerns expressed during the Stakeholder Consultation process were issues regarding potential environmental impacts of oil and gas infrastructure failures which lead to a loss of containment and release to the environment. **Table 7-2** presents the initial structure proposed by the project team for assessing the consequence levels related to potential events that would affect the environment.

The initial categories reflect events that would be considered to be unacceptable and significant if they:

- Affect specific valued species, resources, and/or habitat
- Involve a wide-spread area
- Have long term or persistent effects
- Restrict access to areas due to pollution effects

The assignment of potential events to the proposed five-category environmental scale will require the project team to consider a wide range of factors to determine the level of consequence of an event. The definitions for the consequence categories and scale will require further definition and research during the Methodology Development task to determine the guidelines for how each of the factors will be weighted and applied. The factors that are likely to be key contributors to the severity of an event which causes an environmental impact include:

- *Area of High Environmental Consequence* – This will be defined by the actual location characteristics (geography/topography of the area, e.g. land area or waterway) and the types of animal and plant species and activities which are dependent on the affected area.
- *Type and Amount of Material Spilled* - Crude oil, produced water, gas, etc.
- *Response to the Release* - This will consider the ability of the infrastructure operator to detect and respond to the spill, the climate conditions under which the release event occurs, and the resultant ability for mitigative and remedial activities to occur.
- *Recoverability* – This will be defined as the amount of material (based on initial release size) that can ultimately be recovered from the environment. This will need to account for both the characteristics and climate of the release location and the capability of the response organization to perform the required remedial activities. For example, it was clear from the Stakeholder Input process that there are concerns regarding the potential for accidental releases to contaminate wide portions of sensitive watersheds, and not be recoverable because of water flow and ice considerations.

The project team has examined some of the environmental classifications and definitions used in various regulations and programs to describe an area of high environmental consequence, to include aspects of both environmentally sensitive areas and high consequence areas. However, due to the unique nature of both the Alaska environment and the key stakeholder concerns, a definition of areas of high environmental consequence will be customized for use in the project and for the environmental consequence categories described below. Data that is available from applications where similar terms have already been defined may be of value to this project, but at this time, they have not been fully adopted for this customized set of definitions that is summarized in **Table 7-2** Stakeholders specifically highlighted the issues of subsistence, traditional lifestyle activities, areas of cultural significance; wildlife and human habitat which supports tourism and recreational activities, and other key issues (Refer to

Section 3.0 for a summary of stakeholder concerns). These issues have been considered as part of the initial environmental loss categorization (**Table 7-2** below) and will be defined in greater detail during the Task 2 Methodology Development.

Table 7-2 Environmental Loss Categorization

Category	Environmental Impacts
5	**Catastrophic** – A significant release to an area of extremely high environmental consequence that causes large-scale, widespread, non-recoverable, irreversible, and long-term damage that is severe. The damage would be considered to be extensive enough that the area would be "condemned" and considered unusable for the foreseeable future. The loss would prevent a return to normal life support and access for the conduct of normal activities that were once supported by the area's resources.
4	**Extremely Challenging** – A significant release to an area of very high environmental consequence that causes large-scale, widespread, long-term, severe damage to the environment. The damage would result in a long-term disruption of life support and normal use of the area, and some damage to the area may be irreversible.
3	**Challenging** – A significant release to an area of high environmental consequence that causes widespread and persistent damage to the area, which would cause a disruption in life support and would limit normal use and activities in the area for some time. Remediation would be required and some damage to the area may be irreversible.
2	**Moderately Challenging** – A release to an area of some environmental consequence that results in localized but irreversible or widespread damage to the area. Results in short-term effects on the area's environmental conditions, which causes damage to life support and a disruption in normal activities that are supported by the area. Remediation would be required and some sections of the area may or may not be restored to their original condition over time.
1	**Manageable** – A release to an area of some environmental consequence that results in localized and reversible effects on the environment. Results in some initial disruption of activities in the area, but normal usage can resume in a very short time frame once remediation/recovery activities have been completed.

7.2.3 Safety Consequences

Table 7-3 presents the initial structure proposed by the project team for assessing the consequence levels related to potential events that would affect safety. Safety impacts include both Occupational Safety (i.e., impacts to personnel that work in and on oil and gas infrastructure facilities and equipment) and Public Safety (impacts to members of the public at large who reside near or are located within the local boundaries of the operating infrastructure equipment and facilities).

The safety consequences that are being considered in this risk assessment are only those impacts that result from events involving operational failures of the oil and gas infrastructure equipment, including failures from causes such as equipment defects, degradation, improper operation, or inadequate maintenance. It does not include other accidents that are not related to infrastructure equipment operations activities such as transportation accidents, falls, construction activities or confined space accidents. Those causes for potential safety incidents are outside the scope of this project. Also not included in the scope of the project are health consequences from the normal operation of infrastructure as designed and as permitted by regulatory agencies.

The project team's approach for examining the safety consequences that could be associated with infrastructure failures will be to estimate the size of the physical area that could be affected by each event (e.g., impact radius of a plant fire and/or explosion event) and then to determine how many people may be "normally" located within the impact area or the boundaries of the event conditions. The project team will consider that any person that could potentially be located within the vicinity of the impact of a significant operational event could potentially be exposed to life threatening or fatal injuries. Available Industry data will be used to help estimate the probability of life threatening or fatal event conditions. Each event that will be considered in the project will be placed in one of the safety consequence categories that are shown in **Table 7-3**.

A side by side consequence scale has been provided to show the potential impacts to Industry workers (Occupational Safety) and to the Public. It is understood that Industry workers inherently subject themselves to higher risk activities than those of the general public, by virtue of the work that they perform and the nature of the oil and gas infrastructure work environment to which they are exposed. Therefore, the two scales depict a significantly higher risk "acceptance" criteria for workers than for members of the public, based on the same risk level categories. This is depicted in the order of magnitude increase in the number of fatalities associated with the worker scale.

Each event would be assigned to a consequence category based on the higher of the two, occupational or public safety impact. For example, an event that would be expected to cause 10 to 50 infrastructure worker fatalities, and also extend off the property far enough to cause 4 fatalities among members of the public at large, would be assigned to the Safety Consequence Category 4.

Based on an understanding of the worker populations at Alaska oil and gas infrastructure facility locations, and the lack of members of the public near most of those infrastructure locations, the project team does not expect to identify many Category 4 and 5 events. However, if there are a significant number of larger consequence events identified during the preliminary screening stage of the risk assessment, the consequence scales will be extended as necessary to enable categorization of those particular events.

Table 7-3 Safety Consequence Categorization

<table>
<tr><th>Category</th><th>Occupational Safety Impact
(Number of Potential Fatalities)</th><th>Public Safety Impact
(Number of Potential Fatalities)</th></tr>
<tr><td>5</td><td>> 100</td><td>>10</td></tr>
<tr><td>4</td><td>50 to 100</td><td>5 to 10</td></tr>
<tr><td>3</td><td>10 to 50</td><td rowspan="3">< 5</td></tr>
<tr><td>2</td><td>5 to 10</td></tr>
<tr><td>1</td><td>< 5</td></tr>
</table>

7.3 Unacceptability of Consequences

Ultimately, the “acceptability” of specific events that might occur must be judged by the State of Alaska based on their understanding of both the risk of the event and the estimate of the costs associated with reducing the risk. Overall risks can be managed by minimizing or mitigating risk levels, which can be accomplished by either reducing the magnitude of the consequences of the event (assuming that the event has occurred) or by reducing the likelihood (expected frequency) that the event will occur.

An example of this concept can be seen in the risk of fatalities on the highways of the United States due to traffic accidents. The U.S. has averaged about 38,000 fatalities per year over the last 10 years. This is about 14 fatalities per 100,000 members of our population. It would be quite easy to say that a traffic fatality is an “unacceptable consequence.” However, because we as a society have tolerated that fatality rate (or higher) for decades, the consequence of an automobile fatality is clearly not “unacceptable,” although everyone would agree that such consequences are very undesirable. Why is that? It is because to achieve that low of a level of fatalities, we already spend billions of dollars on risk reduction measures, such as highway design, vehicle safety features, driver education and licensing, and law enforcement. The consequence of a small number of fatalities per accident (generally 1 to 6 deaths) is apparently not such an “unacceptable consequence” to us that we are willing to greatly increase the amount of highway safety money we spend or to further restrict our citizens’ use of automobiles.

In the context of this risk assessment, the approach for the development of the detailed risk assessment methodology needs to be one that identifies event consequences and frequencies across a range of potential events so that the State of Alaska can use that information to help make risk management decisions such as:

- Are we as a State willing to spend any more money directly or indirectly to reduce these identified risks?
- If we are willing to spend additional money, where should those additional resources be focused to add the most value?
- If there are different types of risks, how do we feel about each of them (i.e., how do we prioritize the risks so that we can make decisions on which ones should be addressed first)?

In many risk management approaches, this type of risk information is provided in a risk profile that is structured as a set of events plotted on a risk matrix, as illustrated in the risk matrix example of **Figure 7-1**. Events would be assigned to a risk category (i.e., a block numbered from 2 to 11, based on its frequency and consequence index). Higher numbered risk categories represent higher risk levels. Assuming that consistent frequency and consequence categories are defined, events that are assigned the same risk number (i.e., lie on a diagonal) each present the same level of risk.

Figure 7-2 shows an illustration of a set of risk project results that were plotted on the example risk matrix. This illustration shows that the project examined nearly 2,000 events and placed each event in a risk category block based on its expected frequency and consequence. For example, there were 5 events identified with a Frequency Category of 4 and a Consequence Category of 4, which resulted in a Risk Level of 8, as depicted in **Figure 7-2**). Those five events represent some of the highest risk ranked events that were identified in the project.

7.4 Use of Risk Matrix Results

A risk matrix, like the one shown in **Figure 7-1,** can be used to help focus detailed risk assessment activities or can be used in the development of a risk profile to help define risk mitigation actions. For example, the project team might use the events from a preliminary risk assessment that fall in those risk levels above a certain category (e.g., Risk Level of 6) to define the classes of events that should be assessed in more detail. Or as part of the final results, the end user might determine that all of the events (or classes of events) that fall within a specific risk level or higher will need to be addressed with a specific prevention/mitigation plan that can be implemented to help reduce risk impacts.

FREQUENCY CATEGORY	1	2	3	4	5	Frequency	Years Between Events
6	*7*	*8*	*9*	*10*	*11*	> 1 every 10 years	<10
5	*6*	*7*	*8*	*9*	*10*	.1 to .033 events per year	10 to 30
4	*5*	*6*	*7*	*8*	*9*	.033 to .01 events/yr	30 to 100
3	*4*	*5*	*6*	*7*	*8*	.01 to .0033 events/yr	100 to 300
2	*3*	*4*	*5*	*6*	*7*	.0033 to .001 events/yr	300 to 1000
1	*2*	*3*	*4*	*5*	*6*	< .001 events/yr	> 1000

CONSEQUENCE CATEGORY

Figure 7-1 Example Risk Categories for Loss Events

Note 1: The large numbers shown in each cell of the table above represent risk category index numbers, with higher numbers presenting higher levels of risk. They should not be confused with the actual risk level for an event that falls within that given block.

Note 2: Events along each diagonal, from the upper left to the lower right, are shown as representing equivalent risk levels. That is only true if the frequency and consequence categories are defined consistently (i.e., the ratio of two consecutive frequency categories is the same as the ratio between two consecutive consequence categories). In this example, the magnitude associated with each consequence category has not been mathematically defined.

FREQUENCY CATEGORY	1	2	3	4	5	Frequency	Years Between Events
6	32	19				> 1 every 10 years	<10
5	120	35	12			.1 to .033 events per year	10 to 30
4	178	78	27	5		.033 to .01 events/yr	30 to 100
3	240	100	45	8	2	.01 to .0033 events/yr	100 to 300
2	260	156	76	10	3	.0033 to .001 events/yr	300 to 1000
1	320	124	88	25	8	< .001 events/yr	> 1000
	1	2	3	4	5		

CONSEQUENCE CATEGORY

Figure 7-2 Fictitious Risk Study Results - Number of Events Identified for Each Risk Level

Note 1: The numbers inside the table above represent the individual number of events that the project identified that fall into each risk level. For example, 5 events were identified at one of the four equivalent highest risk levels identified, corresponding to Frequency Category 4 and Consequence Category 4, while 320 events were identified in the lowest risk level (i.e., Frequency Category 1 and Consequence Category 1).

8.0 CONFIDENTIALITY METHODS AND PROCEDURES

As stated at the outset of this project, it is the intent of the project team to work cooperatively with the infrastructure owner/operator companies to obtain detailed information about the state of the infrastructure. It is recognized that some of the information about the infrastructure components and facilities is considered to be protected from disclosure as trade secrets or confidential information under state law, and as such, owner/operator companies have not been willing to provide information without some assurances that measures have been put in place to protect such information.

This section discusses the different categories of information that are likely to be requested and utilized by the project team during the course of designing and conducting the risk assessment, and the issues associated with, and the potential options for, handling each of the types of information categories. This section also describes the team's progress in resolving the confidentiality issues, and the path forward for implementing an agreement to facilitate the flow of information to the project team.

8.1 Categories of Information

Information required by the project team to conduct the risk assessment spans a wide range, including trade secrets and confidential information under state law, as well as non-confidential information that is available or could be made available to the public if requested. Protected Information is described below in more detail. Issues surrounding information sharing and potential tools to facilitate flow of information are also discussed.

8.1.1 Trade Secrets

Trade secrets are protected from disclosure to the public under the Alaska Uniform Trade Secrets Act, AS 45.50.910 – 45.50.945. "Trade secrets" are defined as information that (a) derives independent economic value (actual or potential) from not being generally known to, and readily ascertainable by, other persons who can obtain economic value from its disclosure or use, and (b) is the subject of reasonable efforts to maintain its secrecy. Trade secrets are designated as such by their owner, in this case, the infrastructure owner/operator companies. It is the State's role to determine whether it concurs with the designation of information as a "trade secret" per state statute.

8.1.1.1 Issues

Specific issues have been raised regarding the disclosure of trade secrets to the project team. The following provides an outline of issues associated with such information; it is not intended to be a comprehensive presentation of potential issues.

- Information defined as "trade secrets" is protected from public information requests. Some information may not meet the criteria in the statute, but may be confidential under AS 38.05.035 (a) (8).

- If a public request for information designated as trade secrets is denied, the decision could be appealed by the requestor. Concerns have been raised regarding the litigation risks faced by companies that provide information designated as trade secrets.

8.1.1.2 Tools

Confidentiality agreements are a tool used to manage trade secrets. These agreements offer protection in accordance with existing state statutes, and can outline a specific process for designating, sharing, and managing such information as agreed to by the State and infrastructure owner/operators. Additionally, such agreements can include a provision to limit access to such information to only those individuals who have been authorized to review the information.

8.1.2 Confidential Information

Confidential information in the context of this project is information, other than trade secrets as defined in Section 8.1.1, that is designated confidential under state statute.

8.1.2.1 Issues

Concerns have been voiced regarding the project team's use of confidential information. Information held by some state agencies is protected by statutory language specific to those agencies. Owners/operator companies are concerned that ADEC does not have agency-specific statutory language to protect confidential information that may be requested. If such information is provided to the project team through ADEC, it could be subject to public information requests, and the companies are concerned that it would not be protected by the State under current statutes. Given that industry is contributing information to the project on a voluntary basis, it has indicated it is not willing to provide confidential information without assurances that the information will not be publically disclosed.

8.1.2.2 Tools

One method for sharing confidential information without losing its protection is the submission of such information to the agency with the statutory provision recognizing that the information is confidential and a Memorandum of Understanding (MOU) among that agency and other agencies within the SAOT.

8.1.3 Non-Protected Information

Non-protected information is information that does not meet the definition of trade secrets or confidential information as described above. This includes information that is generally publicly available, information held by state and federal agencies that is subject to disclosure under public records requests, and information shared by infrastructure owner/operators with the project team that is not a trade secret or confidential under state law.

8.1.3.1 Issues

No significant issues have been raised regarding the sharing of non-protected information.

8.1.3.2 Tools

No special tools are expected to be needed for the sharing of non-protected information.

8.2 Progress To-Date

To date, three (3) meetings have been held with owner/operator companies, at which the issues of information sharing and confidentiality were discussed. The State has assigned an attorney from the

Alaska Attorney General's Office to help in resolving the issue. The DOL representative is facilitating discussions with owner/operator companies. Potential solutions have been suggested during these discussions and the DOL representative is currently drafting a confidentiality agreement.

8.3 Path Forward

The State will continue to facilitate resolution of the issue of confidentiality by taking the following actions:

- The DOL representative will work with the project team to develop a draft confidentiality agreement and MOU. The confidentiality agreement will outline a process for the sharing of protected information as defined by state law. This agreement will be submitted for consideration to owner/operator companies via the AOGA forum by January 31, 2009.

- It is expected that following the delivery of the draft confidentiality agreement and MOU to infrastructure owner/operators through AOGA, the owner/operators will provide comments on the drafts, and meetings will be scheduled to discuss and finalize the confidentiality agreement. The confidentiality agreement must be in place well in advance of the Risk Assessment Implementation phase which begins July 1, 2009. If confidentiality issues are not resolved by this deadline, and information sharing is not under way, the project team will have to conduct the risk assessment using the data and information that is publicly available or obtainable from state agencies and other sources. One option available to the project team would be to base the risk assessment on worst case scenarios for hazardous events and likelihood and consequence rankings. In this case, there may be limited data available on the existence or effectiveness of risk mitigation measures such as management systems, engineered safeguards or other levels of protection.

9.0 METHODS FOR WORKING WITH INDUSTRY

During Phases 1 and 2 of the project, the team intends to directly engage Alaska infrastructure owners/operators to acquire data and input for the risk assessment. This section identifies the proposed method for cooperatively working with the owners and operators of Alaska's Oil and Gas infrastructure, in order to efficiently and effectively request information in support of this risk assessment in a consistent, non-duplicative way.

9.1 Communication Channels

9.1.1 Alaska Oil & Gas Association (AOGA)

Contact with infrastructure owners/operators is expected to include a mix of formal and informal communications. To date, the project team has worked through the AOGA forum, a non-profit trade association whose 17 member companies represent the majority of oil and gas exploration, production, transportation, refining and marketing activities in Alaska. This type of formal communication channel, via AOGA, is expected to continue throughout the project, and is considered to be appropriate for project status updates and discussion of issues applicable to the owner/operator group as a whole. This forum also allows Industry the opportunity to provide consolidated and consistent input to the project team as a single voice, when appropriate. ConocoPhillips is not a member of AOGA; however they are working with AOGA for this project.

9.1.2 Industry Legal Contacts

Information that is requested in support of the project is likely to include a combination of protected and non-confidential information as described in Section 8.0, above. Communication between the State and owner/operator company legal contacts will be important in terms of identifying potential avenues for sharing protected information.

9.1.3 Industry Technical Contacts

Communication with individual owner/operator companies is necessary in order to facilitate efficient data and information sharing that is expected to be initiated during Phase 1 and will continue through Phase 2 of the project. This individual interaction will provide the team a forum for focused one-on-one discussions with technical owner/operator representatives of specific facilities and equipment and will allow the sharing of company-specific information. A single point of contact has been provided to the project team for each owner/operator company, as requested.

9.2 Information Requirements

For each phase of the project, specific sets of information will be needed by the project team. The subsections below outline information requirements, timelines for obtaining such information, and a description of how information will be used in support of the project.

9.2.1 Phase 1 Data Requirements

The goal of Phase 1 (August 2008 – August 2009) communication with infrastructure owner/operators, as initially established in the Project Management Plan, is to gain technical contacts, establish working relationships, and begin requesting data and previous study information to support the risk assessment methodology development. The following sections describe the types of information required during

Phase 1 of the project. This information may be acquired through data mining, a review of existing studies, and interviews with industry personnel, or a combination of these methods.

9.2.1.1 Facility Overview Information

Facility overview information will be used by the project team to help solidify the detailed scope of the project and to provide an understanding of the infrastructure facilities, components, systems and processes for all three infrastructure areas being considered (North Slope, TAPS and Cook Inlet). This information will be used as the basis for the systematic breakdown of the infrastructure facilities into individual components, or nodes, for execution of the analysis during implementation. The information will be input into the risk assessment database and will be used throughout the project, and may be published in various formats in reports in conjunction with this project. The project team has requested basic facility overview information to compare with what has been gathered from publicly available sources, in order to obtain an understanding of the systems, and to develop the most appropriate and efficient nodal breakdown process during methodology development. The project team will consider input on this topic until ***January 23, 2009***, during the Draft Methodology Development task. The following list of information is requested for each operating facility to be used during implementation.

- Asset inventory and associated industry mapping information for:
  - Unit and facility boundaries
  - Cook Inlet onshore and offshore production facilities, platforms, and pipelines
  - North Slope production facilities, well pads, transit lines, pipelines, support facilities (CPS, CCP, CGF, G&I, etc.), Pump Station 1 and TAPS alignment
  - TAPS pump stations, North Pole metering, Valdez (Petro Star. Inc.) refinery metering, and Valdez Marine Terminal
- Production capacity information and historical production volumes by field, facility or operating asset (e.g., gathering center)
- Production compositions and process parameters, including changes in composition over time
- Process Descriptions
- Description of Major Facility Renewal Programs or New Development Projects that are currently underway
- Listing and information of critical support facilities
- Facility Manning Description
- Facility and Equipment Data
  - Major Equipment List/System and Component Descriptions
  - Equipment age and original design life

9.2.1.2 Risk Management Information

The project team has also solicited input on industry best risk management practices and processes for use as input to the proposed risk assessment methodology, which is due for final publication on March 6, 2009. This information may be used as a reference for the Methodology Report. The team has previously asked for input on this topic.

- Risk assessment standards and guidance that the Industry believes represent best practices
- Operating company risk management policies and procedures pertinent to this risk assessment
- Example approaches for consistently ranking safety, environmental, and economic consequences

- Initial list of risk assessment studies that might be made available (e.g., asset and integrity management risk efforts)
- Other documents that would be considered to be useful in developing the project methodology and in focusing the risk assessment activities

9.2.2 Phase 2 Data Requirements

During the Phase 2 risk assessment implementation (August 2009 – February 2010), the project team will require facility-specific data that will be used to develop potential credible hazardous events and to assign frequency and consequence indexes and resultant risk rankings for each event considered, along with a description of contributing factors for the risk assessment results. Information contained in documents used to execute the risk assessment may be summarized or referenced in the final report or the risk assessment database, which will ultimately be turned over to the State as supporting documentation for the project. Information provided to the team under statutory protection must be referenced as such by industry, managed as confidential. The sharing of Phase 2-requested information must be underway by ***July 1, 2009***.

- Design data/drawings for facilities/equipment which reflect engineered systems and processes
- Incident History for events with significant production, environmental, or safety impacts, including outage duration data, spill data, etc.
- Relevant Reports and Studies (other than risk assessments). For example:
  - Overall condition assessments, inspection records, corrosion data
  - Remaining life projections
  - Life extension studies
- Management System Processes and Practices. For example:
  - Integrity Management
  - Operations Management
  - Maintenance Management
- Relevant risk assessments previously conducted for aspects of Alaska’s oil and gas infrastructure, including natural hazard studies

9.3 Method for Working with Industry

The following description outlines the method to be used in managing information acquired from infrastructure owner/operators, state agencies, and other sources. Specific protocol for managing protected information will be developed in more detail in conjunction with those owner/operator companies and/or state agencies that agree to provide information to the project team. The following paragraphs describe how information described in Section 8.1 will be designated and managed by the project team.

9.3.1 Communication of Data Needs to Industry

The project team will communicate data needs to infrastructure owner/operators and will be as specific as possible when making data requests. The preferred method for gathering information is to work cooperatively with individual infrastructure owner/operators to identify company-specific documents that meet the needs of the project team’s request. The team has communicated Phases 1 and 2 data needs via meetings and a document request list, and will continue to elaborate these data needs as required.

9.3.2 Initial Meetings to Discuss Non-Confidential Information

9.3.2.1 Facility Surveys

In order to facilitate sharing of non-confidential information, the project team has created a facility-specific survey for each infrastructure facility that is currently considered to be within the scope of the project. These surveys have been populated with information from publicly available sources. The project team is requesting that infrastructure owner/operators correct and fill in gaps in information the team has collected. Individual meetings to discuss this information are currently planned for early January 2009. Facility related input to support the methodology design will be accepted until ***January 23, 2009***.

9.3.2.2 Identification of Protected and Non-Confidential Data Types from Data Lists

This initial set of meetings is intended not only to initiate sharing of non-confidential information, but also to facilitate identification of other requested information that may be useful to the project team. Companies will be asked to identify information included on the data list that is considered to be protected. Protected information will be managed as discussed in Sections 9.3.6 through 9.3.8. In some instances, portions of documents may be considered protected, while other sections are non-protected. It is expected that information considered to be non-protected will be provided directly to the project team without delay.

9.3.3 Data Requests Following Initial Meetings

It is expected that the initial meetings described above will form the foundation for future communication with individual owner/operator companies, which will take place throughout Phase 1 and 2 of the project to facilitate the sharing of data. For each subsequent meeting, the project team will coordinate with the designated industry point of contact, clearly communicate the purpose of the meeting, and describe how information being requested will be used to support the project. The industry point of contact for each company will be expected to identify appropriate participants, communicate the intent and expected input specific to participants, and facilitate follow-up communication as required. These meetings may also include field visits to operating facilities as well as meetings with asset operators, as agreed upon.

9.3.4 Designation of Information by its Owner

The owner/operator points of contact will work with the appropriate individuals inside the company, including legal representatives, to determine for each piece of information requested, if the information or parts of the information are protected or non-confidential as described in Section 8.1.

Information determined to be "trade secret" information will be designated as such by the owner in accordance with the procedure agreed upon by the State and the infrastructure owner/operators (e.g. a confidentiality agreement). A likely method for this would be to mark each page "confidential" per AS 45.50.940 Subsection (3) with the reason the document or portion of the document meets the definition.

Information determined to be protected will be designated as such by the owner in accordance with the specific agency statutory protection adopted by the project. A likely method for this would be to mark each page "confidential" per the applicable agency-specific statute; with the reason the document or portion of the document meets the definition.

Information determined to be non-confidential is not expected to require special handling, and will be provided by the information owner or by state agencies directly to the EMERALD project team appropriate.

For information where there is some question as to whether or not it is considered to be protected, EMERALD will help to facilitate the discussions and clarify or answer questions about the use of the data requested for industry to help make the determination. In some cases, only portions of documents may be considered confidential.

9.3.5 State Concurrence with Designation

For information designated as protected, a state representative will either agree or disagree with the designation based on the State's interpretation of the statutory language, at which time the information owner will have the option to withhold the document. The EMERALD technical team will be available to work with the State and industry representatives to assist in making confidentiality determinations by answering questions about the data being requested and to explain how that data will be used in terms of the project. If the information is being requested from another state agency and has been marked confidential under specific agency statute, that agency will follow statutory language to protect the document. Confidential information shared with ADEC or to the EMERALD team will be done so only after the team agrees to the protections required by the existing statute in writing (e.g. an MOU between agencies).

9.3.6 Sharing of Information to Project Technical Team

Information which has been agreed to as protected by both the information owner and the State will be shared with the contractor under statutory protections. Multiple options for sharing such data are available, including physical transfer directly to the EMERALD technical project team, transfer to the State through ADEC, transfer through a state agency represented on the SAOT that has specific statutory ability to protect information, or through use of a data room set up either by owner/operators or the State.

9.3.7 Management of Information by Project Technical Team

EMERALD and ABS Consulting will manage confidential data in accordance with the EMERALD Information and Data Confidentiality Policy that outlines security procedures to preserve data confidentiality and integrity through a combination of administrative controls and physical limits of access. Specifically, confidential information, including both whole documents and confidential portions of documents, will be stored in a separate locked electronic file on the EMERALD server. EMERALD will modify this process as required based on procedures established in potential future confidentiality agreements or interagency agreements. Only those team members who have agreed to EMERALD's internal policy and confidentiality agreements potentially established in the future will be allowed to view these documents. The EMERALD team will not publish, permit to publish, or distribute information concerning the results or conclusions of this project, without the prior written consent of the State. Hard copy documents related to this project will be shredded prior to disposal. A complete version of EMERALD's internal policy is included as Appendix F to this report.

9.3.8 State of Alaska Management of Information

In accordance with the contract between the State of Alaska and EMERALD, EMERALD will submit source files to ADEC upon submission of each project deliverable. Reports containing information derived from designated protected information will be identified by EMERALD through report references. Although reference material is not required to be submitted to ADEC per the contract, references in the report are expected to be retrievable, which may require conveying some or all of the reference documents to ADEC.

Once deliverables and source files are conveyed to the ADEC in accordance with the contract, the ADEC will manage and store confidential documents per statutory requirements, processes agreed to in the confidentiality agreement or interagency agreements, and its internal agency procedure.

It is expected that information not classified as protected will be shared with the project team. Non-confidential information will be held secure by the EMERALD project team and will be turned over to the contracting agency, ADEC, as required by the contract. Portions of reports containing non-confidential information provided by Industry may be distributed to the public and will not be subject to protection under state statute.

9.4 Summary of Communication To-Date

AOGA Meeting- July 24, 2008. An introductory meeting between EMERALD and AOGA staff was held with the primary goal of introducing the technical team and to initiate communication with industry representatives. The issue of confidentiality, the types of data that would be needed by the team, project scope, unacceptable consequences, how recommendations from the risk assessment would be implemented by the State, and how the methodology would be executed were discussed during this meeting.

AOGA Meeting- August 21, 2008. A meeting with AOGA staff and industry members was held with the primary goal of introducing the technical team, as well as to provide an overview of the project to industry representatives, and to field questions and comments regarding infrastructure owner/operator's role in the project. Phase 1 participation included identifying technical contacts for each owner/operator company and providing input to the methodology. Examples of risk management practices, tools, and approaches, and an initial list of existing reports, studies, and assessments were requested. Phase 2 data requirements were also presented. Industry representatives raised questions and concerns primarily on the scope of the project, confidentiality, and Industry's role in the project. Outcomes of the meeting included an agreement by the State to assign a representative from the DOL to the project to address confidentiality issues. Industry agreed to provide technical contacts. Both parties agreed to continue to work to resolve the confidentiality issue.

Letter to Infrastructure Industry CEOs- September 29, 2008. A letter requesting participation by infrastructure owner/operators and designation of single points of contact was sent by the ADEC Commissioner to each owner/operator company. During the last part of October, individual owner/operators furnished single points of contact in response to the letter.

SAOT Meeting with Industry Representatives- October 15, 2008. Industry representatives, AOGA staff members, the assigned State DOL representative, and members of the SAOT discussed the issue of confidentiality at length at this meeting. Possible tools for resolution and limitations of those tools were outlined both by the State and industry representatives. Some of these suggestions included confidentiality agreements, data rooms, and statutory changes. At this meeting it was agreed that the technical project team would request meetings with individual companies to solicit input into the methodology and acquire non-confidential information. Following the meeting, a list of Phase 1 and Phase 2 data needs was provided to AOGA for distribution to owner/operator companies.

Request for Meetings with Individual Companies to Discuss Non-Confidential Information- November 3-4, 2008. During the first week in November the EMERALD Project Team contacted each designated single point of contact via email requesting individual meetings to discuss non-confidential information to be used for scoping the project. Two meetings with individual owner/operator companies were held in

November in response to this request. The remaining companies indicated that they preferred to work through the AOGA forum and declined to hold individual meetings with the technical team. Only one of the individual company meetings resulted in the sharing of non-confidential information associated with Facility Overview information to the project team.

Letter to Industry Points of Contact- November 24, 2008. A letter was sent by the ADEC Project Manager to each owner/operator designated point of contact for the project. The focus of the letter was to request that owner/operator companies meet with the EMERALD team to give input into the methodology and to review non-confidential Facility Overview information that had been obtained from public sources. The letter also indicated that a State DOL attorney had been assigned to the project, that the State would like industry owner/operator companies to identify information they consider to be confidential, and that the State would like to work a parallel path to resolve the confidentiality issues while the technical project team worked to obtain non-confidential information.

Request for Meetings with Individual Companies to Discuss Non-Confidential Information- December 12, 2008. EMERALD contacted each owner/operator single point of contact to request a meeting to discuss non-confidential information to be used for scoping the project. Most companies agreed to review information EMERALD had collected from the public domain and to meet in the first part of January.

AOGA Meeting- December 16, 2008. A meeting was held via the AOGA forum to discuss the type and format of infrastructure data that had been collected from publicly available sources and to describe the use and purpose of the data to the project and to request review of the data from Industry. In addition the discussion was focused on the development of potential solutions to the confidentiality issue. At the meeting, the State DOL representative agreed to draft an interagency MOU that could allow adoption of agency-specific protections. It was suggested that the project team be able to utilize industry facility information that the State already has in its possession at the agency level as feed data for the Facility Overview information. The owner/operator companies also agreed to hold individual meetings to discuss non-confidential information with EMERALD during January. A more specific list of data needs for Phase 1 and Phase 2 of the project was distributed at this meeting, along with a request for information pertaining to best risk management practices for Methodology Development by January 9, 2009.

9.5 Contingency Plan for Acquiring Project Data

Obtaining information directly from owner/operator companies is the preferred method of data acquisition for this project because it ensures information gained is accurate and complete. However, Industry has been asked to cooperate with the project on a voluntary basis, and as such, is not required by regulation to provide data to the project team. The team has established deadlines for Industry participation for each project phase and a contingency plan has been developed to ensure success of the project if Industry does not agree to provide data. Deadlines are described in Section 9.2, and a summary of these deadlines is reiterated below.

- Phase 1 Risk Management Practices Input will be accepted until January 9, 2009.
- Phase 1 Facility Overview Information will be accepted until January 23, 2009.
- Phase 2 Data sharing must start by July 1, 2009.

If information is not shared in accordance with the deadlines listed above, the team may move forward with execution of the project plan as scheduled, utilizing only that information which is available publicly through state agencies and other public sources through the analysis and conclusion phase of the risk assessment. The team will assume that publicly available information describing the infrastructure is accurate and complete and will focus on establishing agreements between SAOT agencies so that information held by agencies with specific statutory provisions can be shared with the project team and used in support of the project. In addition, the proposed risk assessment methodology will be written to facilitate execution of the risk assessment with or without Industry provided information. This method will assume worst-case scenario weighting factors when assigning likelihood and consequence rankings, and effectiveness of mitigation measures will not be considered.

10.0 ENDNOTES

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Appendix A – Approved Stakeholder List and Record of Stakeholder Outreach

Approved Stakeholder List

<table>
<tr><th colspan="2">State of Alaska:</th></tr>
<tr><td colspan="2">Alaska Oil and Gas Conservation Commission</td></tr>
<tr><td colspan="2">Department of Environmental Conservation</td></tr>
<tr><td colspan="2">Department of Labor and Workforce Development</td></tr>
<tr><td colspan="2">Department of Law</td></tr>
<tr><td colspan="2">Department of Natural Resources</td></tr>
<tr><td colspan="2">Department of Public Safety</td></tr>
<tr><td colspan="2">Department of Revenue</td></tr>
<tr><td colspan="2">University of Alaska, College of Engineering and Mines</td></tr>
<tr><th colspan="2">Infrastructure Owner/Operators:
*indicates companies that currently operate Oil and Gas Infrastructure in Alaska</th></tr>
<tr><td>Alaska Oil and Gas Association (AOGA)
- Agrium Kenai Nitrogen Operations
- Alyeska Pipeline Service Company*
- Anadarko Petroleum Corporation
- BP Exploration (Alaska) Inc.*
- Chevron*
- Eni Petroleum
- ExxonMobil Production Company
- Flint Hills Resources, Alaska</td><td>- Marathon Oil Company*
- Pacific Energy Resources*
- Petro-Canada (Alaska) Inc.
- Petro Star Inc.
- Pioneer Natural Resources Alaska, Inc.*
- Shell Exploration & Production Company
- StatoilHydro
- Tesoro Alaska Company
- XTO Energy, Inc.*</td></tr>
<tr><td colspan="2">Aurora Gas*</td></tr>
<tr><td colspan="2">Conoco Phillips*</td></tr>
<tr><th colspan="2">Regional Stakeholders – Local Governments, Native Organizations, Non-Governmental Organizations (NGOs), Public</th></tr>
<tr><td>Anchorage Region
- Municipality of Anchorage
- City of Wasilla
- City of Palmer
- Matanuska-Susitna Borough</td><td rowspan="6">Non-Governmental Organizations

Alaska Native Organizations

Interested Public</td></tr>
<tr><td>Fairbanks Region
- Northstar Borough
- City of Fairbanks
- City of Glennallen
- City of Copper Center</td></tr>
<tr><td>Kenai Region
- Kenai Peninsula Borough
- City of Kenai
- Cook Inlet Regional Citizens' Advisory Council (CIRCAC)</td></tr>
<tr><td>Juneau Region
- City and Borough of Juneau</td></tr>
<tr><td>North Slope Region
- North Slope Borough
- City of Barrow</td></tr>
<tr><td>Valdez Region
- City of Valdez
- City of Cordova</td></tr>
</table>

Approved Stakeholder List

- Prince William Sound Regional Citizens' Advisory Council (PWSRCAC)	
Federal Agencies:	
Alaska Occupational Health and Safety Office	Department of Homeland Security
Bureau of Land Management	Department of Transportation Office of Pipeline Safety
Department of Energy	U.S. Coast Guard
Federal Energy Regulatory Commission	U.S. Army Pacific (USARPAC)
Environmental Protection Agency	U.S. Pacific Air Force (PACAF)
Minerals Management Service	

Table A-1 below contains the stakeholders who were consulted, participated in meetings, submitted surveys or provided input in other ways such as verbal and by email. A number of private citizens also submitted input through meetings or surveys. The list of meetings is included in Table A-2.

Table A-1 Stakeholder List

Region	Organization
Anchorage/Statewide	Alaska Department of Fish & Game (ADF&G)
Anchorage/Statewide	Alaska Department of Labor and Workforce Development (DOL)
Anchorage/Statewide	Alaska Department of Natural Resources - JPO
Anchorage/Statewide	Alaska Department of Natural Resources - State Pipeline Coordinator's Office
Anchorage/Statewide	Alaska Energy Authority (AEA)
Anchorage/Statewide	Alaska Oil and Gas Association (AOGA)
Anchorage/Statewide	Alaska State Emergency Response Commission (SERC)
Anchorage/Statewide	Alaska Transportation Priorities Project
Anchorage/Statewide	Alaska's "Big Village" Network
Anchorage/Statewide	Anchorage Economic Development Committee (AEDC)
Anchorage/Statewide	Anchorage Municipal Assembly
Anchorage/Statewide	ANSCA Regional Corporation Presidents and CEOs
Anchorage/Statewide	ASRC Energy Services
Anchorage/Statewide	BP Exploration (Alaska) Inc.
Anchorage/Statewide	Bureau of Land Management (BLM) - Energy Branch
Anchorage/Statewide	Bureau of Land Management (BLM) - JPO
Anchorage/Statewide	City of Palmer
Anchorage/Statewide	City of Wasilla
Anchorage/Statewide	Cook Inlet Region, Inc.
Anchorage/Statewide	Department of Transportation OPS (USDOT) - PHMSA
Anchorage/Statewide	Division of Homeland Security and Emergency Management
Anchorage/Statewide	Marathon Oil
Anchorage/Statewide	Mat-Su Borough

Region	Organization
Anchorage/Statewide	Minerals Management Services (MMS) - JPO
Anchorage/Statewide	Municipality of Anchorage (MOA)
Anchorage/Statewide	MWH
Anchorage/Statewide	NANA/LOH Engineering
Anchorage/Statewide	North Cape Fisheries Consulting
Anchorage/Statewide	Pacific Energy
Anchorage/Statewide	Parker & Associates
Anchorage/Statewide	Rural Cap
Anchorage/Statewide	Seismic Hazards Safety Commission
Anchorage/Statewide	SFMO - JPO
Anchorage/Statewide	The Aleut Corporation
Anchorage/Statewide	Trustees for Alaska
Anchorage/Statewide	Tyonek Village Corporation
Anchorage/Statewide	U.S. Air Force
Anchorage/Statewide	U.S. Army Corps of Engineers - JPO
Anchorage/Statewide	U.S. Environmental Protection Agency (EPA)
Anchorage/Statewide	U.S. Fish & Wildlife Service (USF&WS)
Anchorage/Statewide	University of Alaska - Anchorage
Anchorage/Statewide	URS Alaska
Anchorage/Statewide	USCG
Anchorage/Statewide	World Wildlife Fund
Anchorage/Statewide Fairbanks/Interior	State of Alaska Petroleum Systems Integrity Office (PSIO)
Anchorage/Statewide Fairbanks/Interior	U.S. Army
Anchorage/Statewide Fairbanks/Interior Kenai/Cook Inlet	ConocoPhillips Alaska Inc.

Region	Organization
Anchorage/Statewide Fairbanks/Interior Kenai/Cook Inlet Valdez/PWS/CRB	Alaska Department of Environmental Conservation (ADEC)
Anchorage/Statewide Kenai/Cook Inlet	Cook Inlet Keeper
Barrow/North Slope	Alaska Eskimo Whaling Commission (AEWC)
Barrow/North Slope	Arctic Slope Regional Corporation
Barrow/North Slope	Barrow Arctic Science Consortium
Barrow/North Slope	City of Anaktuvuk Pass
Barrow/North Slope	City of Barrow
Barrow/North Slope	Inupiat Traditional Government Native Village of Barrow
Barrow/North Slope	North Slope Borough (NSB)
Barrow/North Slope	Shell Oil Company
Barrow/North Slope	UIC
Barrow/North Slope	UIC Science
Fairbanks/Interior	ADNR - Division of Mining, Land, and Water
Fairbanks/Interior	Alaska Wilderness League
Fairbanks/Interior	Bureau of Land Management (BLM)
Fairbanks/Interior	City of Fairbanks
Fairbanks/Interior	City of Bettles
Fairbanks/Interior	City of North Pole
Fairbanks/Interior	Dinyee Corporation
Fairbanks/Interior	Doyon, Limited
Fairbanks/Interior	Fairbanks Daily News Miner
Fairbanks/Interior	Fairbanks Northstar Borough
Fairbanks/Interior	Golden Valley Electric Association
Fairbanks/Interior	Northern Alaska Environment Center
Fairbanks/Interior	University of Alaska - Fairbanks

Region	Organization
Fairbanks/Interior Valdez/PWS/CRB	Alyeska Pipeline Service Company
Fairbanks/Interior Kenai/Cook Inlet	Alaska Legislature
Fairbanks/Interior Valdez/PWS/CRB	Alaska Forum for Environmental Responsibility
Kenai/Cook Inlet	Baldwin and Butler
Kenai/Cook Inlet	CIRCAC
Kenai/Cook Inlet	City of Kenai
Kenai/Cook Inlet	Cook Inlet Regional Citizens Advisory Council
Kenai/Cook Inlet	Kenai Peninsula Borough
Kenai/Cook Inlet	XTO Energy
Valdez/PWS/CRB	AHTNA, Incorporated
Valdez/PWS/CRB	Cascadia Wildlands Project
Valdez/PWS/CRB	City of Valdez
Valdez/PWS/CRB	Copper Country Alliance
Valdez/PWS/CRB	Copper River Watershed Project
Valdez/PWS/CRB	Cordova District Fisherman United
Valdez/PWS/CRB	DNR - JPO
Valdez/PWS/CRB	Ecotrust Copper River Program
Valdez/PWS/CRB	Exxon Valdez Trustee Counsel
Valdez/PWS/CRB	PetroStar
Valdez/PWS/CRB	Prince William Sound Keeper
Valdez/PWS/CRB	Prince William Sound Oil Spill Recovery Institute
Valdez/PWS/CRB	Prince William Sound RCAC
Valdez/PWS/CRB	Prince William Sound Science Center
Valdez/PWS/CRB	Providence
Valdez/PWS/CRB	Stan Stephens Cruises

Region	Organization
Valdez/PWS/CRB	State of Alaska
Valdez/PWS/CRB	U.S. Coast Guard - JPO
Valdez/PWS/CRB	Valdez Behavioral Health
Valdez/PWS/CRB	Valdez LEPC
Valdez/PWS/CRB	VCSD

Table A-2 List of Stakeholder Meetings

Region/Agency	Stakeholder Meeting	Date of Meeting
State Agencies	Alaska Oil and Gas Conservation Commission	August 20, 2008
	Alaska Department of Revenue	August 18, 2008
	Joint Pipeline Office (JPO)	August 21, 2008
	Petroleum Systems Integrity Office (PSIO)	August 11, 2008
	State Fire Marshal	August 28, 2008
	Alaska Department of Labor and Workforce Development	November 7, 2008
Federal Agencies	Environmental Protection Agency	November 10, 2008
	Department of Homeland Security and Emergency Response	October 13, 2008
Anchorage/Statewide	Anchorage Public Meeting	October 15, 2008
	Municipality of Anchorage	October 14, 2008
	University of Alaska at Anchorage (UAA)	October 15, 2008
	US Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA)	October 15, 2008
	Anchorage-based NGOs (including representatives from Cook Inlet Keeper, LNE Engineering & Policy, and the World Wildlife Fund)	October 14, 2008
	Walt Parker (PWSRCAC)	October 14, 2008
Barrow/North Slope	Barrow Public Meeting	October 22, 2008
	City of Barrow	October 22, 2008

Region/Agency	Stakeholder Meeting	Date of Meeting
	Native Village of Barrow	October 21, 2008
	North Slope Borough Planning Department	October 21, 2008
	North Slope Borough Mayor	October 22, 2008
	Barrow Arctic Science Consortium	October 21, 2008
	LCMF LLC	October 21, 2008
Fairbanks/Interior	Fairbanks Public Meeting	September 25, 2008
	City of Fairbanks	September 24, 2008
	City of North Pole	September 25, 2008
	University of Alaska at Fairbanks (UAF)	September 24, 2008
	Stevens Village (Dinyee Native Corporation)	September 25, 2008
	Northern Alaska Environmental Center (NAEC)	September 25, 2008
Kenai/Cook Inlet	Kenai Public Meeting	October 1, 2008
	City of Kenai	September 30, 2008
	Kenai Peninsula Borough	October 1, 2008
	Cook Inlet Regional Citizens' Advisory Council (CIRCAC)	October 1, 2008
Valdez/PWS/CRB	Valdez Public Meeting	October 16, 2008
	City of Valdez	October 16, 2008
	US Coast Guard	October 16, 2008
	AHTNA	November 3, 2008
	Prince William Sound Regional Citizens' Advisory Council (PWSRCAC)	October 16, 2008
	Cordova-based NGOs (including representatives from the Cordova District Fisherman United, Valdez Trustee Council, the PWS Science Center, the Cordova Chamber of Commerce, and the Copper River Watershed Project)	October 30, 2008

Appendix B – Stakeholder Survey

Stakeholder Survey

Alaska Risk Assessment of Oil & Gas Infrastructure

WE NEED YOUR INPUT!

The State of Alaska is soliciting your input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Stakeholder input will be used by the State of Alaska to clarify the scope of the risk assessment and help the expert firm design the risk assessment methodology that will be implemented in the next phase of the project.

You can submit this survey through the following means:

Click here to submit survey online

E-Mail: alaskarisk@emeraldalaska.com
Fax: 907-258-8124
Mail: Stakeholder Survey, 670 West Fireweed Lane, Suite 200, Anchorage, Alaska 99503

The project is seeking stakeholder input in the following areas:

1. We are interested in understanding more about your concerns and perspective. **What is the primary reason you are interested in the Alaska Risk Assessment of Oil & Gas Infrastructure Project?** Please check the applicable category below.

- ☐ Oil & Gas Producer
- ☐ Oil & Gas Explorer
- ☐ Trade Organization
- ☐ Federal Agency
- ☐ State Agency
- ☐ Local Government
- ☐ Non-Governmental Organization
- ☐ Native Corporation
- ☐ Tribal Organization
- ☐ Education & Research
- ☐ Military
- ☐ General Public
- ☐ Other _______________
- ☐ Other _______________

2. What regional area associated with oil and gas infrastructure in Alaska do you most closely represent? Please check the nearest location.

- ☐ Cook Inlet
- ☐ North Slope
- ☐ Interior
- ☐ Prince William Sound
- ☐ Other _______________

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3. **Do you wish to be informed of future project information?**

☐ Yes ☐ No

If yes, please indicate below.

Name	**Phone Number**	**E-mail Address**

4. **What should be the focus of the risk assessment?**

The State of Alaska has identified the general scope of the risk assessment project to include existing oil and gas production facilities on the North Slope, in Cook Inlet, and the Trans-Alaska Pipeline System (TAPS). The current scope does not include areas of future oil & gas development.

What components of the existing oil and gas industry infrastructure warrant the most attention from the project team? Please indicate your risk ranking from 1 (highest) to 5 (lowest) in the applicable categories below.

<u>**Component**</u>	<u>**Rank (1 = Highest Risk; 5 = Lowest Risk)**</u>
Production Wells	☐
Gathering Lines (flowlines from wells upstream of processing center)	☐
Facility Piping	☐
Crude Oil Pipelines	☐
Gas & Water Injection Systems (including wells)	☐
Gas Transport Pipelines Integral to Operating Infrastructure (Cook Inlet)	☐
Oil & Gas Processing and Treatment	☐
Waste Management and Disposal (re-injection materials)	☐
Storage Tanks	☐
Terminals	☐
Marine Loading Facilities	☐
Support Systems (e.g. utility systems, electric power, fuel systems water supplies, control/communication systems)	☐
Other ____________________	☐
Other ____________________	☐
Other ____________________	☐

NEXT PAGE

5. The risk assessment project will identify and evaluate unplanned oil and gas infrastructure events. These events include negative outcomes that we would like to avoid or mitigate in order to prevent production/revenue loss, impact to human safety, and impact to the environment. **Within the following categories, what events would you consider to be the most significant?** Please indicate your description with units (i.e., day, barrels, persons, etc.) in the spaces below.

Category	Significant Unplanned Event Description
Production/Revenue Loss (e.g., major field or TAPS shutdown, impact to State revenue, etc.)	
Human Safety Event (e.g., injuries, death, etc.)	
Environmental Event (e.g., release of hydrocarbons impacting air, land, water, wildlife, cultural resources, etc.)	

6. **If you have any other specific concerns or priorities in the areas of production, safety, or the environment that should be considered in the risk assessment study, please indicate below:**

Specific Concern:

7. **Please indicate any data or technical information (e.g. previous studies) that you think should be made available to the project team:**

Information Source	**Reference Location**	**Key Contact (email or phone)**

NEXT PAGE

Additional Questions for State/Federal Agencies, Municipalities, or Alaska Oil and Gas Infrastructure Operators

8. **Does your organization have guidelines for risk management activities?** If so, please check the types of guidelines:

☐ Policies
☐ In-House Standards
☐ Procedures
☐ Systems

9. **Are there any standards that your organization considers best practices for risk management?** If yes, please list:

☐ Yes ☐ No

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________

10. **Has your organization performed any risk assessments of safety, environmental, natural hazards, or business interruption events that would be available to assist the project team in its effort to review risks to the overall Alaska oil and gas infrastructure?** If yes, please list:

☐ Yes ☐ No

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________

11. **Who is your organization's preferred contact point for this project if the project team has questions related to this risk assessment?**

Name	Phone Number	E-mail Address

Submit survey by one of the following means:

E-Mail: alaskarisk@emeraldalaska.com
Fax: 907-258-8124
Mail: Stakeholders Survey, 670 West Fireweed Lane, Suite 200
Anchorage, Alaska 99503

Click here to submit survey online

Appendix C – Stakeholder Meeting Minutes

C-1 Fairbanks / Interior Region Meeting Minutes

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**City of Fairbanks Stakeholder Consultation Meeting**
Date:	**September 24, 2008**
Time:	**10:00 AM – 11:30 AM**
Purpose:	The intent of this meeting was to solicit City of Fairbanks input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. Four individuals represented the City of Fairbanks (the City) including Mayor Strle, the City Chief of Staff, Assistant Fire Chief, and Deputy Police Chief. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project background, scope, and timeline.	
2.1 The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in	• None

Agenda Item	Decisions/Actions
Alaska.	
2.2 The objectives and structure of the stakeholder consultation process were explained. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Fairbanks meetings are the kick-off to this consultation period. Individual meetings with key stakeholders as well as public meetings will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.3 A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by the failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.4 The risk assessment is being managed by Alaska Department of Environmental Conservation (ADEC). Oversight is also provided by the State Agency Oversight Team (SAOT), which is comprised of representatives from multiple State agencies. The SAOT provides guidance for the project team and makes decisions relating to the project on behalf of the State of Alaska.	• None
2.5 The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures for managing risks and making risk based decisions for continued operations of the infrastructure well into the future. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment as a baseline to help prioritize gaps and make recommendations to the State with regards to regulatory oversight decisions.	• None
2.6 Guiding principles of the project were reviewed. Highlights include the high importance placed on the stakeholder consultation portion of the project and the need for cooperation with infrastructure owner/operators.	• None
2.7 A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it that an event will occur? and 3) how damaging would it be if the event did occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event that is identified.	• None
2.8 The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North	• None

Agenda Item	Decisions/Actions
Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and other downstream processing facilities and distribution systems that are not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions and man-made hazards such as sabotage will not be considered as part of this study.	
2.9 The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, stakeholder consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the draft methodology. The methodology will also be reviewed by an independent peer review entity during Phase 1. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and creating a risk profile and report that will be presented to the State.	• None
2.10 City representatives asked questions about how the project will be executed. **Q:** The City asked how owner/operators will be involved in the project and if the team would be talking to industry workers. **A:** The EMERALD Project Manager explained that the team will work cooperatively with industry. The team will ask for industry's existing studies and best risk management practices, and will work with industry to collect data in the facilities during Phase 2. The ADEC Project Manager added that the team has created avenues for anonymous input to protect workers who may have comments from a stakeholder (concerned citizen) perspective. **C:** The City commented that workers on the ground are likely to know the specifics of operations and the associated risks with operating specific pieces of equipment. **Q:** The City asked what will happen at the end of the project. **A:** The ADEC Project Manager described the use of an implementation plan involving possible collaboration with industry in combination with regulatory oversight or other appropriate measures. A variety of methods may be appropriate to mitigate risks including physical changes to infrastructure, administrative and procedural changes, and business decisions. The end result of the implementation plan should be a list of actionable items.	• None
3. Stakeholder Input on Focus of the Risk Assessment	

Agenda Item	Decisions/Actions
The EMERALD Project Manager outlined specific input to be solicited from stakeholders. The City provided input on the portions of the infrastructure they feels that warrants the project team's attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
3.1 The City posed some initial questions relating to the scope of the project in terms of infrastructure components. **Q:** The City asked if the pipeline to the refinery or railroad transportation of gas is included in the scope of the project. **A:** The EMERALD Project Manager explained that gas distribution is not included in the scope of the project so consideration will be given up to the battery limit. Transportation including railroad transportation is out of scope unless it feeds the operating infrastructure. **Q:** The City asked if the support system for Deadhorse would be considered. **A:** The EMERALD Project Manager explained that these types of systems would be considered only if they are connected to the infrastructure in some way, i.e., by line or grid, etc. Trucking and other such transportation will not be considered as part of this project.	• None
3.2 <u>North Pole Metering Facility</u>- The metering facility in North Pole was pointed out as a vulnerable point of the infrastructure present in the Fairbanks region. The metering station is not staffed, is secured only by a chain link fence, and is close to a public road and residential areas. If a major incident occurred at the metering station, the area has a high potential for public loss of life and injury.	• None
3.3 <u>Remoteness of the Pipeline</u>- A concern was raised regarding the remoteness of the pipeline and the fact that the pump stations are unmanned. Specifically, it could take a substantial amount of time to identify a problem if an operator or the public is not present to recognize it.	• None
3.4 <u>River Crossings</u>- The City identified areas where the pipeline crosses rivers as particularly high impact areas such as the Tanana River and Delta River crossings.	• None
3.5 <u>The Look-out</u>- This is a location where the pipeline is above ground and tourists are able to view the pipeline. Not only is this area exposed, it is well-known and accessible. The potential for an event such as vehicle collision is a possibility in this location. Similar risks exist at other locations where the pipeline comes above ground.	• None
3.6 <u>Aboveground Pipeline Locations</u>- The pipeline primarily runs underground in the Fairbanks area. The City identified points at which the pipeline surfaces as key risk areas. One of these locations is a popular area for hunter drop-off, which could potentially increase the risk for damage by those using the area recreationally.	• None
4. Stakeholder Input on Initiating Events	

Agenda Item	Decisions/Actions
The City identified initiating events that have the potential to cause catastrophes relating to the infrastructure in the Fairbanks region.	
4.1 Aging Infrastructure- The age of the pipeline was identified as an item of concern. The pipeline has surpassed its life expectancy as it has been operating for over 25-years.	• None
4.2 Forest fires- close to the pipeline were identified as a potential concern.	• None
4.3 Other- Additional examples of potential initiating events were postulated by the City representatives and included explosion and earthquake.	• None
5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the external environment or natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. The discussion on this topic was framed in terms of impacts to the City of Fairbanks.	
5.1 Revenue Loss- The Mayor pointed out that loss of revenue is a big concern to the City of Fairbanks in terms of impacts.	• None
5.2 Spills Impacting Public Safety & Environmental- Rupture of the pipeline from any initiating event that leads to a spill is of concern because it has the potential to impact public safety and the environment which subsequently translates into loss of revenue from tourism and has the potential to impact quality of life (outdoor life for Fairbanks residents)	• None
5.3 City of Fairbanks Response Resources- The City indicated that it has a role in response to incidents on the pipeline. Although Alyeska provides the bulk of emergency response resources, the City of Fairbanks is part of a mutual aid agreement to supplement response in the region. This response includes fire, life/safety, hazmat, and security. Response to pipeline incidents has the potential to drain the City's resources and reduce response effectiveness to other City emergencies, which could subsequently impact public safety. City representatives gave a summary of situations that have required their response in the past including a bomb in 1978, the pump station shut-down in 2007, and the bullet hole in the pipeline from a local hunter/resident. Examples of incidents that could pose a hardship on City of Fairbanks response resources include fire, explosion, and response to coordinate shut-down. A shut-in would not necessarily require the City's response, but a rupture or leak could. For example, the incident at the pump station in 2007 required City response. In general, impacts to the Fairbanks region are secondary rather than direct. Fire Chief Lane from North Pole and Fire Chief Tucker from North Slope Borough are directly responsible for response support for North Pole metering.	• None
5.4 Environmental damage- particularly waterways, is a concern because Fairbanks is highly reliant on the tourism industry and residents of Fairbanks want to preserve	• None

Agenda Item	Decisions/Actions
the natural resources of the State. It is home to city residents who have recreational activities such as fishing and hunting as well as subsistence activities.	
5.5 From the City of Fairbanks perspective, a catastrophe is defined as having "separation" of the pipe.	• None
6. Stakeholder Input on Other Specific Concerns or Priorities City representatives identified other concerns and priorities to the project team.	
6.1 Sabotage**-** Although sabotage is out of the scope of this project, it was identified as a major concern from the City of Fairbanks perspective.	• None
6.2 Alyeska/TAPS**-** City representatives feel that Alyeska is doing an effective job providing response through their incident response systems. Alyeska includes the community in planning and response efforts and good communication channels are in place to keep the community aware when an incident occurs. On a day-to-day basis, the City does not worry about incidents with the pipeline.	• None
7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure No suggestions for best risk management practices were recommended by City of Fairbanks representatives. Recommended data sources were as follows.	
7.1 The City indicated that DNR holds maps identifying geographic areas of high forest fire risk.	• None

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Stevens Village (Dinyee Native Corporation) Stakeholder Consultation Meeting**
Date:	**September 25, 2008**
Time:	**9:00 AM – 10:00 AM**
Purpose:	The intent of this meeting was to solicit Stevens Village input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. Howard Taylor, General Manager of Dinyee Corporation represented Stevens Village. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project background, scope, and timeline.	
2.1 The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None

Agenda Item	Decisions/Actions
2.2 The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Fairbanks meetings are the kick-off to this consultation period. Individual meetings with key stakeholders as well as public meetings will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.3 A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by the failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.4 The risk assessment is being managed by Alaska Department of Environmental Conservation (ADEC). Oversight is also provided by the State Agency Oversight Team (SAOT), which is comprised of representatives from multiple State agencies. The SAOT provides guidance for the project team and makes decisions relating to the project on behalf of the State of Alaska. EMERALD, an independently run subsidiary of Doyon Limited, Inc., is the lead contractor for the State. EMERALD is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and management of the project. ABS Consulting, subcontractor to EMERALD, will supplement the technical effort and contributes large-scale technical risk assessment experience and an international perspective.	• None
2.5 The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures for managing risks and making risk based decisions for continued operations of the infrastructure well into the future. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment as a baseline to help prioritize gaps and make recommendations to the State with regards to regulatory oversight decisions.	• None
2.6 Guiding principles of the project were reviewed. Highlights include the high importance placed on the stakeholder consultation portion of the project and the need for cooperation with infrastructure owner/operators.	• None
2.7 A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it that an event will occur? and 3) how damaging would it be if the event did occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential	• None

Agenda Item	Decisions/Actions
event that is identified.	
2.8 The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and other downstream processing facilities and distribution systems that are not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions and man-made hazards such as sabotage will not be considered as part of this study.	• None
2.9 The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, stakeholder consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the draft methodology. The methodology will also be reviewed by an independent peer review entity during Phase 1. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and creating a risk profile and report that will be presented to the State.	• None
3. Stakeholder Input on Focus of the Risk Assessment The EMERALD Project Manager outlined specific input to be solicited from stakeholders. Dinyee Corporation provided input on the portions of the infrastructure it feels that warrants the project team's attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
3.1 Dinyee indicated that it generally does not have significant concerns with specific components of the infrastructure or operations of TAPS or North Slope infrastructure. Dinyee feels that the owner/operators are managing infrastructure to the best extent possible. Dinyee people work closely with infrastructure operators and they are aware of the maintenance programs employed along the Pipeline.	• None
4. Stakeholder Input on Initiating Events Dinyee Corporation identified initiating events that have the potential to cause catastrophes relating to the	

Agenda Item	Decisions/Actions
infrastructure in the Fairbanks region.	
4.1 Aging Infrastructure- This was identified as the number one concern of Dinyee because it has the potential to impact all three consequence areas and because regardless of the quality of maintenance programs, it seems to have the highest potential for the cause of an accident.	• None
5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the external environment or natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. Significant concerns from the Dinyee perspective were identified and are summarized below.	
5.1 Spill to Waterways- A substantial spill close to a waterway was identified as a cause for significant concern. Additionally, it was noted that a worst case scenario or "catastrophe" would be if oil resulting from such a spill made its way to the Tanana or Yukon River. Impacts would be seen in all three categories: financial, environmental, and safety.	• None
5.2 Spills during Summer- Dinyee pointed out that a spill occurring in the summertime would be of significant consequence because it has the potential to cause increased damage to the environment compared to a winter-time spill (clean up and remediation efforts are easier in the winter when frozen conditions exist).	• None
5.3 Toxicity of Spills- Dinyee indicated that it also has some concern over the toxicity of crude oil and its potential to harm both people and wildlife.	• None
6. Stakeholder Input on Other Specific Concerns or Priorities Dinyee Corporation provided a summary of its interest in oil and gas infrastructure and the project and identified other concerns and priorities to the project team for consideration.	
6.1 Dinyee Corporation Interest in the Project- Dinyee is a local village corporation and land owner in the interior. As a land owner, Dinyee has a long-term vision, especially regarding use of its lands and potential revenue from oil and gas development on those lands. Dinyee has three subsidiaries: Alaska Reclamation that focuses on erosion control and reseeding, River Villages which conducts aboveground pipeline maintenance for Alyeska; such as painting, and a management LLC that conducts grant writing and other administrative work.. Dinyee Corporation's interest in infrastructure is two-fold, as a landowner and as an incident response organization that participates in response drills for Pump Stations 4, 5, and 6 and contributes manpower in the event of an incident. Dinyee has been involved in spill response for all events north of Fairbanks and is on standby to assist in managing ice flows that have the potential to wash out bridges during breakup. Stevens Village is approximately 26-miles from Pump Station 6. Dinyee personnel have a response time of about 90-minutes from Stevens Village and 120-	• None

Agenda Item	Decisions/Actions
minutes from Fairbanks.	
6.2 Alyeska Response Measures- Dinyee indicated that connexes with spill response materials, gravel, and cleared areas for helicopter landing are operational controls in place to mitigate potential spills on TAPS.	• None
6.3 Perspective on Alyeska- The Dinyee representative indicated that as a whole they feel Alyeska is thorough and responsive with regard to spill response on TAPS as reflected by its record. Dinyee commented that Alyeska is a good civic neighbor.	• None
6.4 Tax Structure- The State tax structure was identified as a potential indirect contributor to integrity issues. The Dinyee representative indicated that the tax structure does not necessarily discourage high caliber maintenance programs, but it also does not encourage use of best practices and efficient operations.	• None
7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure No suggestions for best risk management practices or data sources were recommended by Dinyee Corporation.	

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.

Topic:	**City of North Pole Stakeholder Consultation Meeting**
Date:	**September 25, 2008**
Time:	**11:30 AM – 1:00 PM**
Purpose:	The intent of this meeting was to solicit City of North Pole input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. Three individuals represented the City of North Pole (the City) including the Economic Development Director, City Clerk, and Director of City Services. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project background, scope, and timeline. The City posed some initial questions relating to the scope and considerations of the risk assessment.	
2.1 The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed	• None

Agenda Item	Decisions/Actions
in the past, this type of system-wide assessment has never been conducted in Alaska.	
2.2 The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Fairbanks meetings are the kick-off to this consultation period. Individual meetings with key stakeholders as well as public meetings will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.3 A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by the failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.4 The risk assessment is being managed by Alaska Department of Environmental Conservation (ADEC). Oversight is also provided by the State Agency Oversight Team (SAOT), which is comprised of representatives from multiple State agencies. The SAOT provides guidance for the project team and makes decisions relating to the project on behalf of the State of Alaska.	• None
2.5 The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures for managing risks and making risk based decisions for continued operations of the infrastructure well into the future. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment as a baseline to help prioritize gaps and make recommendations to the State with regards to regulatory oversight decisions.	• None
2.6 Guiding principles of the project were reviewed. Highlights include the high importance placed on the stakeholder consultation portion of the project and the need for cooperation with infrastructure owner/operators.	• None
2.7 A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it that an event will occur? and 3) how damaging would it be if the event did occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event that is identified.	• None
2.8 The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North	• None

Agenda Item	Decisions/Actions
Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All “inside the fence” components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and other downstream processing facilities and distribution systems that are not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions and man-made hazards such as sabotage will not be considered as part of this study.	
2.9 The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, stakeholder consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the draft methodology. The methodology will also be reviewed by an independent peer review entity during Phase 1. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and creating a risk profile and report that will be presented to the State.	• None
2.10 The City posed some initial questions relating to the scope of the assessment and considerations to be made by the project team. Questions and answers are summarized as follows. **Q:** The City asked if the project team would consider throughput decline as part of the assessment, specifically, at what point will industry decide revenue is not worth the cost of operating. **A:** The project team stated that throughput decline will be considered as part of baseline assumptions, which will be defined in the risk assessment methodology, however, market conditions which drive the economic viability of continued operations will generally not be considered as part of this study. **C:** The City recommended that a future study evaluating the cost benefits of operations versus decline in production would be beneficial. **C:** The ADEC Project Manager commented that this particular study is focused on engineering considerations and the physical infrastructure. **Q:** The City asked how the project scope boundary of transportation that feeds infrastructure, versus distribution, will be interpreted. **A:** The EMERALD Project Manager stated that the team is currently in the scoping process. Individual lines will be evaluated in terms of the overall project scope boundaries and determined to be in or out of scope on an individual basis.	• None

Agenda Item	Decisions/Actions
3. Stakeholder Input on Focus of the Risk Assessment The EMERALD Project Manager outlined specific input to be solicited from stakeholders. The City provided input on the portions of the infrastructure it feels that warrants the project team's attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
3.1 Wastewater Treatment Plant- The City noted that it provides wastewater treatment for the Flint Hills Refinery (FHR). If a critical component in this system failed, it could impact the FHR's ability to produce, which in turn may impact production. The PetroStar Refinery can go an extended period of time without disposing of waste through the City of North Pole (an estimated few years); however, Flint Hills needs the City's wastewater system for continued operation on a regular basis.	• None
3.2 Refinery Influence on Oil Temparature- The group discussed the potential impact of a refinery shut down as it relates to temperature of oil in the pipeline. The refining process increases the temperature of the oil stream that is sent back into the pipeline. If this heating was eliminated (by a refinery shutdown or discontinued operations for some reason), it could impact the overall temperature of downstream crude oil stream that is being sent to Valdez and there may be impacts to downstream equipment and operations from the colder crude temperatures.	• None
3.3 Golden Valley Electric Association (GVEA) Power Plant- The City noted that the interior receives its electric power from GVEA, which produces power using primarily turbine generators fueled by oil. Coal is another smaller source of power. The City recommends that the project team look at overall downstream affects of an outage at GVEA (with regards to shutdown of refinery operations, etc).	• None
3.3 Fiber Optic Lines- Telecommunication support systems were identified as a potential vulnerability in infrastructure support. The City recommended the project team examine the impact that loss of this support might have on operation of TAPS.	• None
4. Stakeholder Input on Initiating Events The City identified initiating events that have the potential to cause catastrophes relating to the infrastructure in the Fairbanks region.	
4.1 Throughput Decline- The City commented that as throughput declines so does the temperature of crude in the pipeline.	• None
4.2 Change in Oil Composition- Increased levels of arsenic in refinery waste was identified as a potential problem for processing at the City wastewater plant. If these levels exceed EPA thresholds for hazardous waste, the treatment plant may not be able to accept the waste.	• None
5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers	

Agenda Item	Decisions/Actions
to both public safety and safety of industry workers. Environment refers to any consequences to the external environment or natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. Significant concerns from the City of North Pole perspective were identified and are summarized below.	
5.1 Oil Spills to Waterways- Spills or leaks at river crossings such as the Tanana and Chena Rivers were identified as a significant concern. Potential considerations relating to river crossings were identified as piping wall thickness, maintenance programs, and effectiveness of program implementation.	• None
5.2 Impacts to Ground Water- City representatives noted that the water table in North Pole is high so spills have a high potential to impact ground water, which is used as a drinking water source for North Pole residents.	• None
5.3 Impacts to City of North Pole Revenue- City revenue was identified as a major concern. If TAPS production is disrupted, and flow to the refinery is consequently impacted, the City could realize significant negative economic impacts. The City currently has 150 residents whose employment is associated with the refinery operations. Additionally, loss of production at the overall State level could mean less distribution of revenue to cities such as North Pole.	• None
5.4 Cost of Soil & Water Contamination- Cost to clean-up soil and/or water contamination resulting from an oil spill was identified as a concern for the City.	• None
6. Stakeholder Input on Other Specific Concerns or Priorities The City provided a summary of its interest in oil and gas infrastructure and the project and identified other concerns and priorities to the project team for consideration.	
6.1 City of North Pole Interest in Infrastructure- The primary source of industry in North Pole is associated with the North Pole Flint Hills Refinery. The refinery provides 60% of the fuel for the Anchorage airport as well as fuel for Eielson Airforce Base and the Alaska Railroad. North Pole also has infrastructure support systems such as power production, wastewater treatment, a spur line, and railroad that transports oil. Additionally, the City is identified as a response resource in Alyeska's Emergency Response Plan.	• None
6.2 Significance of Rail Transportation- The City noted that although transportation is out of scope, a shut down of railroad fuel transport to the Anchorage Airport and military bases, could have a significant impact on Alaska. The railroad makes two trips per day to Anchorage.	• None
6.3 Capacity & Timeliness of Response Resources in the Interior- The issue of limited human resources for response was identified as a potential concern. A related issue is the response time required for State regulatory agencies to make decisions so action can be taken.	• None
7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure No suggestions for best risk management practices were suggested by the City of North Pole. Recommended	

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data sources are summarized below.	
7.1 The City recommended contacting Jeff Cook of Flint Hills and Mark Breshley of PetroStar, who could both be potentially good resources for data.	• EMERALD to contact Flint Hills and PetroStar for potential data/information
7.2 The City recommended conferring with GVEA regarding impacts of electric grid loss to the infrastructure, and ACS regarding impacts of fiber optic line loss.	• EMERALD to contact GVEA and ACS

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Northern Alaska Environmental Center (NAEC) Stakeholder Consultation Meeting**
Date:	**September 25, 2008**
Time:	**1:30 PM – 3:00 PM**
Purpose:	The intent of this meeting was to solicit NAEC input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

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1. Introductions The meeting began with introductions of those in attendance. Pamela Miller, Arctic Program Director, represented NAEC. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project background, scope, and timeline. NAEC posed some initial questions relating to the scope and considerations of the risk assessment.	
2.1 The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in	• None

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Alaska.	
2.2 The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Fairbanks meetings are the kick-off to this consultation period. Individual meetings with key stakeholders as well as public meetings will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.3 A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by the failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.4 The risk assessment is being managed by Alaska Department of Environmental Conservation (ADEC). Oversight is also provided by the State Agency Oversight Team (SAOT), which is comprised of representatives from multiple State agencies. The SAOT provides guidance for the project team and makes decisions relating to the project on behalf of the State of Alaska. EMERALD, an independently run subsidiary of Doyon Limited, Inc., is the lead contractor for the State. EMERALD is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and management of the project. ABS Consulting, subcontractor to EMERALD, will supplement the technical effort and contributes large-scale technical risk assessment experience and an international perspective.	• None
2.5 The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures for managing risks and making risk based decisions for continued operations of the infrastructure well into the future. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment as a baseline to help prioritize gaps and make recommendations to the State with regards to regulatory oversight decisions.	• None
2.6 Guiding principles of the project were reviewed. Highlights include the high importance placed on the stakeholder consultation portion of the project and the need for cooperation with infrastructure owner/operators.	• None
2.7 A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it that an event will occur? and 3) how damaging would the consequences be if the event were to have occurred? Rankings are assigned for	• None

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both probability and consequence and are combined to form an overall risk ranking for each potential event that is identified.	
2.8 The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and other downstream processing facilities and distribution systems that are not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions and man-made hazards such as sabotage will not be considered as part of this study.	• None
2.9 The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, stakeholder consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the draft methodology. The methodology will also be reviewed by an independent peer review entity during Phase 1. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and creating a risk profile and report that will be presented to the State.	• None
2.10 NAEC posed some initial questions relating to the scope and implementation of the project. Questions and answers are summarized as follows. **Q:** NAEC noted that existing studies evaluating oversight of TAPS have been conducted, but asked how the project team will obtain this type of information from industry. **A:** The project team indicated that the intent is to cooperate with industry. The team held an introductory meeting with industry through AOGA a few months ago to initiate this communication. **Q:** NAEC commented that in addition to infrastructure operators, AOGA also represents owners with a purely financial interest. The NAEC representative asked how the team would obtain access to layers of personnel beyond the senior manager level. These are the individuals that have information on the quality of infrastructure operations. **A:** The project team stated that although the team has worked through AOGA to	• None

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date, we recognize the need to work with individual owner/operator companies. The EMERALD Project Manager reiterated that this project is not an enforcement action and it is intended to be beneficial to both the State and industry. **C:** The NAEC representative urged the project team to build public confidence in the methodology by demonstrating to the public that the methodology is being developed in a transparent and forthright manner. **C:** The ADEC Project Manager stated that this issue will be addressed through a review of the methodology by the public as well as an evaluation by an independent peer review entity. The EMERALD Project Manager added that this is intended to be a qualitative review with a goal of ranking risks so the State and industry have the information needed to best to focus their resources. The goal is to develop a fit for purpose, sound methodology. Different groups have varying perspectives, and will likely have different definitions for what is considered to be an "unacceptable consequence".	
3. Stakeholder Input on Focus of the Risk Assessment The EMERALD Project Manager outlined specific input to be solicited from stakeholders. NAEC did not identify any specific components of the infrastructure as warranting special attention from the project team. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
4. Stakeholder Input on Initiating Events NAEC identified initiating events that have the potential to cause catastrophes relating to the infrastructure in the Fairbanks region.	
4.1 <u>Overworked Industry Employees</u>- Additional workload and stresses on infrastructure operators were identified as a concern. As resources are cut and workers are expected to take on more responsibility, effectiveness of maintenance and monitoring may decrease. Additionally, NAEC indicated that workers may not have the appropriate physical resources to provide effective maintenance. NAEC was also concerned that many experienced workers are now retiring, and incoming operators have little institutional knowledge. NAEC recommended evaluating the scope of responsibilities of industry workers.	• None
5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the external environment or natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. Significant concerns from the NAEC perspective were identified and are summarized below.	
5.1 <u>Subsistence</u>- NAEC commented that some of the smaller villages including Coldfoot, Anaktuvuk Pass, Nuiqsut, and Bettles are highly affected by the oil and gas infrastructure in their area Nuiqsut is located only 4-miles from an oil field.	• None

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Resident's livelihoods are dependent on subsistence from the Colville River, Arctic Ocean, and land animals in the area. NAEC commented that these villages are impacted more substantially than Barrow because they realize actual impacts of oil field risks in their backyard. NAEC recommended that the project team consult with these villages.	
5.2 Chronic Impacts- NAEC brought up the issue of chronic environmental impacts as a concern. Many small spills over time have the potential to significantly impact the environment. Currently, 75 contaminated sites exist on the North Slope. The EMERALD Project Manager commented that likelihood is considered in combination with consequence as part of a standard risk management process. These types of chronic impacts will be captured in this process. For example, a small spill may have a low consequence level, but if the frequency that the spill occurs is high, the overall risk ranking will be a combination of those two factors.	• None
5.3 Catastrophes with Extremely Low Probability- NAEC indicated that the public would like to see analysis of potentially major catastrophes even if the impact is very unlikely.	• None
6. Stakeholder Input on Other Specific Concerns or Priorities NAEC provided a summary of its interest in oil and gas infrastructure and identified other concerns and priorities to the project team for consideration.	
6.1 NAEC's Interest in Infrastructure- NAEC has been operating for over 35-years. Historically, the organization originally centered on protection of waterways. Today, NAEC focuses on new developments, contingency plans, oil spills, and gaps in regulatory oversight.	• None
6.2 Differences in How Acceptable Risk is Defined- Potential disparity between how industry and groups like NAEC define acceptable risk was identified as a concern. Specifically, NAEC feels that definitions used for evaluating risk on the North Slope are not appropriate.	• None
6.3 Lack of Regulatory Oversight- NAEC identified low presence of State regulatory personnel on the North Slope, particularly for oversight on piping systems, as a concern. NAEC asked if the State would be willing to provide additional personnel if needed. NAEC added that as new oil and gas development continues, and infrastructure grows, State regulators will be spread thinly over a large area of responsibility. NAEC recommended that the project team take this into consideration by evaluating the number of State regulators present on the North Slope over the past several years.	• None
7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure No suggestions for best risk management practices were suggested by NAEC. Recommended data sources are summarized below.	
7.1 The Joint Pipeline Office (JPO) maintains information on pigging activities.	• EMERALD to follow

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	up with JPO on data/information
7.2 The Office of Pipeline Safety was recommended as a potential source of information.	• EMERALD to contact Office of Pipeline Safety
7.3 Unions were suggested as a potential source of information on worker safety and other labor issues.	• EMERALD to consider unions as a potential source of information
7.4 A recommendation was made for the team to evaluate the number of spill drills for industry, both tabletop and field deployment.	• EMERALD to consider use of spill drill information as part of the project
7.5 The congressional hearing record was recommended as a source of information.	• EMERALD to consider use of congressional hearing record as a source of information
7.6 The Exxon Valdez Commission recommendations by Walt Parker were recommended as a source of information.	• EMERALD to consider use of Exxon Valdez Commission records as a source of information

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Fairbanks Public Stakeholder Consultation Meeting**
Date:	**September 25, 2008**
Time:	**6:30 PM – 8:30 PM**
Purpose:	The intent of this meeting was to solicit Fairbanks area public input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

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1. Introductions The meeting began with introductions of those in attendance. A total of 22 individuals were present including members of the public, the State Agency Oversight Team (SAOT), industry, State Legislators, the Fairbanks Daily News-Miner, and local Fairbanks Alaska Department of Environmental Conservation (ADEC) employees. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz. Ira Rosen, the ADEC Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project background, scope, and timeline. Attendees posed some initial questions and comments relating to the scope and considerations of the risk assessment.	
2.1 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.2 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Fairbanks meetings are the kick-off to this consultation period. Individual meetings with key stakeholders as well as public meetings will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.3 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline leak due to corrosion). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.4 Project Oversight- The risk assessment is being managed by Alaska Department of Environmental Conservation. Oversight is also provided by the State Agency Oversight Team (SAOT), which is comprised of multiple State agencies. The SAOT provides guidance for the project team and makes decisions relating to the project on behalf of the State of Alaska.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the	• None

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State with regard to regulatory oversight decisions.	
2.6 Project Guiding Principles- Guiding principles of the project were reviewed. Highlights include the high importance placed on the stakeholder consultation portion of the project and the need for cooperation with infrastructure owner/operators.	• None
2.7 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is the event? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None
2.8 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions that drive the economics of continued operations and man-made hazards such as sabotage will not be considered as part of the study.	• None
2.9 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile that will be summarized in a final report that will be presented to the State.	• None
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the presentation and following the presentation. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and	

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management of the project.	
Q: Is abandoned infrastructure included in the scope of the assessment? **A:** The possibility of considering abandoned infrastructure will be discussed by the team. The category will have to be evaluated and discussed internally, but it is likely that abandoned equipment tied to existing operating infrastructure will be included.	• EMERALD to evaluate abandoned infrastructure as a component of the project scope
Q: Who will conduct the risk assessment? Will ADEC be executing it in-house or will it be contracted out? Does the State have the expertise to conduct a risk assessment such as this? **A:** EMERALD has been hired to conduct the risk assessment. ABS Consulting is also part of the EMERALD team. These companies are risk management experts. **Q:** Doyon (EMERALD is a Doyon subsidiary) does not seem qualified to do this work. Are personnel resumes available for review? **A:** EMERALD is an independently operated Doyon subsidiary that has been in business since 1996 providing process safety and risk management consulting services. The EMERALD Project Manager, Bettina Chastain, has about 20-yrs of experience, and has been involved in this field since the Occupational Safety and Health Administration (OSHA) PSM regulation was initially published. Industry is required to comply with this OSHA PSM regulation. Process safety and risk management is EMERALD's core business. EMERALD does risk assessment work for the oil and gas industry and also exports its services internationally. EMERALD brings knowledge of Alaska and the Alaska oil and gas infrastructure to the project and will provide project management and technical oversight of the project. For this project, EMERALD has teamed with ABS Consulting, a large international firm with experience conducting large scale assessments. ABS Consulting has world-wide experience and brings a global perspective to the project. ABS works for industry and also exports these types of services. The team developed a competitive proposal in response to the State RFP. The team can make resumes available upon request.	• EMERALD to provide personnel resumes upon request
C: The State is working to retain the National Academy of Sciences (NAS) to conduct the peer review, which will be executed during the same period of time the methodology is available for public review. The State hopes that it can get agreement on the methodology through that process. **Q:** When will the public have the opportunity to see the draft methodology? What type of public involvement will there be after the deadline of Nov 4? **A:** The risk assessment methodology will be developed by February 2009. The methodology will be made available for public review and public workshops will be held during the March-April 2009 timeframe. This effort will run concurrently with the independent Peer Review.	• None

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Q: The team says it will work with industry. What if industry does not comply with this request? It seems some of the information required will be proprietary. Will industry be willing to share proprietary information? **A:** The team hopes to cooperate with industry and has already met with industry through AOGA. We believe it is in everyone's best interest to cooperate. If there are significant risks to industry, it will be important both to the State and to industry to have that knowledge. Risk assessments have been conducted on portions of the infrastructure and the team would like to have the opportunity to review these assessments from a system-wide perspective. Some of this information needed is certainly confidential, but the team is working with industry to put tools in place to address this concern and to provide industry a comfort level that will allow them to provide information to the project. We also hope that industry will work with us to develop the methodology. Industry already utilizes risk management processes. We hope to consider these as part of methodology development. We also hope that industry works with the team during the implementation phase so the results can be used to make risk management decisions that will benefit both the State and industry. **C:** The dialogue between industry and the project team is open. The State is working with Department of Law to identify the best path forward, possibly through confidentiality agreements. The project's success depends on an open dialogue with industry because industry holds the majority of existing data on the infrastructure.	• None
Q: Access to industry information is very important for this project. It is naïve to assume that industry will give the State access to this information, especially because they have not shared this type of information in the past. It is disconcerting to hear that the team is "hoping" for industry cooperation. Hopefully, the State has the legal authority to force industry cooperation if necessary. Industry may have fears about how the State will re-tool its regulatory oversight as a result of the project. Oil and gas is a public resource so industry should have to share its information on the infrastructure with the public. **A:** The ACES project allowed State agencies to share information. Department of Revenue (DOR) now has the authority to require information from industry on changes in production and unplanned disruptions. This has allowed DOR to create a base of information that can be used. This project is in the beginning phases of gathering information. If industry does not cooperate, the State may have to go back to the legislature and request additional authority to gain that information. The State hopes that industry will go about this the easy way through cooperation rather than the hard way.	• None
Q: How will the team gain access to the oilfield workers that have operational information? Whistleblowers have been an enormous asset to non-governmental organizations (NGOs). Also, if the contract for the risk assessment is with ADEC, how will the team acquire information from other State agencies? **A:** The State is working with Department of Law to work out information-sharing	• Discuss options for outreach to industry employees

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between State agencies. **Q:** How will the project team gain access to the infrastructure operators in the field? **A:** We will need cooperation from industry to go to the facilities and talk with operators. **Q:** Are protections being offered to whistleblowers so they have the opportunity to provide input freely and not put their jobs at risk? **A:** Anyone can submit a survey on the website anonymously. An important focus of the project is outreach. The team wants to give people as many routes as possible to provide input. The survey is a tool that gives people that opportunity if they are not comfortable speaking publicly about their concerns. **Q:** How will oilfield workers be notified? **A:** The team will have to notify these workers through public outreach. They will have to be reached as citizens. **C:** It seems that the team thinks it will be easy to solicit input from whistle-blowers. Input from these individuals will be essential to the project, but will be difficult to obtain. **C:** The State should send the survey to industry workers.	
Q: With regard to natural hazards, will the team consider climate change as part of the project? **A:** The team will evaluate natural hazards as part of the project. In terms of climate change specifically, the team has not determined how it will be incorporated into the methodology. The team will look to the State academic institutions for assistance with this. The team recognizes that this issue needs to be addressed.	• Determine how to address climate change as part of the project
C: I tried to submit the survey online, but it did not work. **A:** The submit button on the survey did not work for about half a day, but is up and running now. Also, the survey can be mailed or faxed back to the project team. The team wants to ensure that we have work-arounds so anyone who wants to provide input can do so.	• None
C: In terms of State agency groups, Alaska Fish and Game should be on the SAOT.	• Consider inclusion of Alaska Department of Fish and Game
C: The process being utilized for the project is good, but success hinges upon how ADEC defines unacceptable consequences. This is extremely important.	• None

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C: An inherent conflict of interest is present in terms of this project because it requires the State to oversee its own monitoring program. Additionally, Doyon works for industry. The project needs a formal public component, similar to a Regional Citizen Advisory Council, for people to have confidence in the results. This would mean a lot from a stakeholder perspective.	• Consider a more formal and ongoing channel for public input into the project
C: The project team should consult with smaller communities in the vicinity of oil and gas infrastructure. Specific recommendations include Nuiqsut, Glennallen, AHTNA, and the Native Village of Eyak. The team should go to them rather than expecting them to travel to attend a meeting.	• Consider options for consultation with smaller communities with an interest in infrastructure
C: It is important to point out that all the comments made by various representatives of the public today have been consistent in their message.	• None
Q: How often does the SAOT meet? **A:** At this point in the project, the SAOT meets monthly. During the RFP development the team met more frequently.	• None
Q: Is the State working on defining unacceptable consequences? **A:** Yes, DOR is working on how to define unacceptable consequences from a revenue perspective. Each State agency will likely have its own perspective on this topic. It will be up to the technical team to make a recommendation and the SAOT to make a final decision on this definition. **C:** The end product will be a risk profile that will likely be on a continuum. "Unacceptable" is probably not an ideal term because we are really looking at different levels of consequences, e.g. high, medium, low. Additionally, each consequence category, i.e., safety, environment, and reliability, will have its own metric.	• None
C: Mapping is an important tool for reviewing spill information. When information is displayed geographically, certain issues become clearer.	• None
C: Fluctuation in market conditions has been excluded from the scope of the project, but the system does not operate statically. Some of the greatest risks to operations are linked to change in flow, e.g., cold start-up. The team should find a way to consider these conditions. **A:** The team will evaluate changes in composition and will consider throughput. Market conditions refer to economics that drive business decisions that could halt production. Economics will not be considered.	• None
Q: What is Alyeska's perspective on the project (directed to industry representatives at the meeting)? **A:** Alyeska is interested to see how the work lays out and how the methodology is	• None

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developed from a technical perspective. Confidentiality is a legitimate business concern. Alyeska is also interested to hear what the public thinks about the project.	
4. Stakeholder Input on Focus of the Risk Assessment The EMERALD Project Manager outlined specific input to be solicited from stakeholders. Attendees provided input on the portions of the infrastructure they feel warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
4.1 Small Feeder Lines- Feeder lines that are a part of the infrastructure were identified as a component warranting project team focus. These smaller lines make up the bulk of the lines and until recently they were not regulated. This means that integrity of these lines was solely up to the operators. There is no pigging of these lines. It is important to analyze this risk and to ensure that effective maintenance of these lines is occurring. It is not enough to look at the past track record of the companies because the companies have changed over time. For example, Arco and BP are now combined. We hear from workers who express concern that operations are not occurring in a safe manner. This issue extends beyond OSHA.	• None
4.2 Tie-ins Between New and Existing Facilities- Although new developments are out of scope, it was recommended that locations where existing facilities will tie-in to new developments should be considered. The team should take a dynamic view of the infrastructure rather than a static view.	• None
5. Stakeholder Input on Initiating Events Attendees identified initiating events that have the potential to cause catastrophes relating to the infrastructure.	
5.1 Reduced Workforce- Over time, the number of industry operators at the facilities has been reduced. This means that less people are present in the field to recognize spills quickly when they occur. This human recognition is industry's biggest asset when it comes to effective spill response. It was pointed out that there is obviously something wrong that needs to be fixed, otherwise there would be no need for this project.	• None
5.2 Low Throughput- Decline in production was noted as a significant concern because when the owner/operators start cutting costs, integrity of operations may suffer.	• None
5.3 Management of Change- Changes to operations is a risk in itself.	• None
6. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. Significant concerns from attendees	

Agenda Item	Decisions/Actions
in these specific areas were identified and are summarized below.	
6.1 Chronic Impacts- Chronic environmental impacts were identified as a concern. Many small spills over time have the potential to significantly impact the environment. 500 spills occur per year on the North Slope. This could have health implications to the public that will eventually have to be addressed.	• None
6.2 Subsistence- Some of the smaller villages including Coldfoot, Anaktuvuk Pass, Nuiqsut, and Bettles were identified as highly affected by the oil and gas infrastructure in their area. Nuiqsut is located only 4-miles from an oil field. Resident's livelihoods are dependent on subsistence from the Colville River, Arctic Ocean, and land animals in the area. It was recommended that the project team consult with these villages.	• None
6.3 Impacts to Waterways- Catastrophic impacts to waterways such as rivers and the Beaufort Sea were identified as a significant concern. Pipelines cross these rivers and some are in close proximity to the sea. It was noted that these risks are often underplayed, but should be analyzed.	• None
6.4 Any Spill to a Waterway Unacceptable- In terms of the Copper River Watershed, an unacceptable consequence is any spill into a river system. Spills in these waterways are difficult to clean up and should be prevented by engineered means. It was pointed out that this opinion is a consensus of the NGO groups.	• None
6.5 Toxicity of Oil- The toxicity of oil was identified as a concern. It was noted that even small amounts of oil are toxic and last longer than previously thought. The team should look at the best available scientific research on this topic to fully address the impacts of spills.	• None
6.6 Health Impacts- Health impacts to response workers was identified as a consequence of concern. When incidents occur, if response workers are not properly trained and protected, health impacts can result. This occurred in relation to the Exxon Valdez spill. This is a very high impact because this type of damage can never be repaired.	• None
6.7 Revenue Impacts to Copper River Basin Fisheries- A spill causing environmental damage to the Copper River watershed could have significant impacts to the revenue stream of the State as well as local communities. More oversight efforts should be placed in this area.	• None
7. Stakeholder Input on Other Specific Concerns or Priorities Attendees provided a summary of their interest in oil and gas infrastructure and the project and identified other concerns and priorities to the project team for consideration.	
7.1 Process Safety Management- An attendee raised the issue of process safety management (PSM) and recommended that the team consider it in terms of the risk assessment methodology. The attendee stated that PSM was not specifically addressed in the Project Management Plan (PMP) and that the Plan does not define safety. The Baker Report blamed process safety for the Texas City explosion that killed and injured multiple people. It is important to have a work environment that allows employees to provide input and that management listens to that input and	• None

Agenda Item	Decisions/Actions
takes action on it rather than ignoring or punishing employees that speak up about problems. The attendee noted that the PMP says that maintenance procedures will be checked. It is important that implementation of procedures is also considered because procedures are useless without proper implementation. The infrastructure could be designed perfectly, but if the operators are not effective, problems will occur. The attendee stated that the assessment needs to go to this level of detail to provide useful results. The ADEC Project Manager asked how process safety management is defined. The attendee stated that it is about how managers work with the employees. It is about having engineers look at all aspects of the operation to see if any flaws in the system exist. PSM addresses safety of the process as a whole.	
7.2 <u>Public Involvement in Oversight</u>- The need for citizen involvement in oversight of the oil and gas industry was identified as a priority. It was noted that the public has asked for this type of public oversight for a long period of time.	• None
7.3 <u>Insufficient Contingency Plans</u>- Contingency Plans were identified as a concern. The commenter noted that holes are present in existing plans.	•
7.4 <u>Lack of Regulatory Oversight</u>- Low presence of governmental regulatory personnel on the North Slope was identified as a concern. It was recommended that the project team take this into consideration by evaluating the number of State regulators present on the North Slope over the past several years compared to other oilfields in the country. The team should look at the organizational structure that is in place, how robust that structure is, as well as evaluate the operating and maintenance schedule of industry. A rigorous audit program is key for the oilfields. This has been done on TAPS, but should be implemented elsewhere (along the infrastructure) as well.	• None
7.5 <u>New RCAC for the Corridor</u>- It was noted that the PWSRCAC has been a good oversight mechanism. Industry has resisted establishing new RCAC's in other regions of the State, but they could be needed. A citizen's group such as this has the ability to oversee State regulatory oversight of the infrastructure. This should be considered as a potential mitigation measure in response to risks. The citizens along the oil and gas corridor have been asking for their own RCAC for a long time.	• None
7.6 <u>Mitigation Measures</u>- It was pointed out that if the goal is to fix problems, the project needs to address potential mitigation measures to minimize risks. Low level chronic risks need to be captured in this effort.	• None
8. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Recommended data sources and best risk management practices suggested by attendees are summarized below.	
8.1 The Baker Report was recommended as a source of information on process safety management and its application in industry.	• Project team to consider review of the

Agenda Item	Decisions/Actions
	Baker Report
8.2 A recommendation was made to review major maintenance projects conducted by industry including why the maintenance work was initiated, what was found, and what the recommendations were at the time. This could be compared to the record of work actually completed.	• Project team to consider reviewing major maintenance projects by industry
8.3 A recommendation was made that the team should consider gaps in regulatory jurisdiction. The team indicated that the Petroleum Systems Integrity Office (PSIO) has been tasked with completing a gap analysis to meet this need. PSIO has been meeting with State and federal agencies to identify these gaps. This project and the PSIO gap analysis are linked The Risk Assessment Project will use results of the PSIO work as considerations for the assessment. The PSIO will use the results of the risk assessment to ensure that critical gaps in high risk areas are addressed. PSIO will use risk assessment ranking to set priorities for gaps.	• Project team to consider regulatory gaps in oversight
8.4 A recommendation was made that the team should evaluate effectiveness of spill response as part of the project.	• Project team to consider use of spill response information as part of review
8.5 It was recommended that the team evaluate Contingency Plans as part of the assessment.	• Project team to consider review of Contingency Plans

Attachments:	Presentation Stakeholder Information Packet

C-2 Kenai / Cook Inlet Region Meeting Minutes

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**City of Kenai Stakeholder Consultation Meeting**
Date:	**September 30, 2008**
Time:	**1:00 PM -2:30 PM**
Purpose:	The intent of this meeting was to solicit City of Kenai input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. Kenai City Manager Rich Koch and Police Chief Gus Sandahl represented the City of Kenai. The meeting was facilitated by Brad Chastain, EMERALD Stakeholder Facilitator and scribed by Gretchen Grekowicz, EMERALD Project Coordinator.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Stakeholder Facilitator outlining project team organization, objectives, scope, and timeline.	

Agenda Item	Decisions/Actions
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	• None
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Stakeholder Facilitator. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None

Agenda Item	Decisions/Actions
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	• None
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the presentation and following the presentation. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
C: The jurisdiction of the City of Kenai (the City) Police Department is limited the city limits. State troopers are responsible for response outside the city limits to communities such as Kasilof and Nikiski. In terms of any type of emergency, the City of Kenai police would be the first law enforcement on the scene. The City participates in spill drills. The City has a fully staffed fire department. Industry provides its own security for Cook Inlet facilities.	• None
C: The major industries in the Kenai area are tourism, commercial fishing, and oil and gas.	• None
3. Stakeholder Input on Focus of the Risk Assessment	

Agenda Item	Decisions/Actions
The EMERALD Stakeholder Facilitator outlined specific input to be solicited from stakeholders including portions of the infrastructure the City feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
3.1 Road Transportation- Road transportation of oil with tankers was identified as a potential concern. The City noted that as part of future development, about 40 truckloads of oil per day will be transported across the Kenai River bridge. An accident involving one of these tanker trucks could result in a significant spill to the river. The City feels that bridges are a vulnerable point in general.	• None
3.2 Aging Infrastructure- Aging facilities were identified as a potential concern. The City recommended that the project team consider maintenance records for such facilities.	• None
3.3 Cook Inlet and the Swanson River Field- Cook Inlet, specifically Swanson River Field, was identified as an area warranting team focus because of its importance to the whole south central region of Alaska in terms of fuel supply.	• None
4. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure in the Kenai region.	
4.1 No input was provided relating to initiating events.	• None
5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. The City was asked for their concerns of significance within the scope of the project.	
5.1 Local Revenue Streams- A shutdown of the infrastructure is a concern to the City, which receives revenue from oil wells to which it has royalty rights comprising $150,000 of the budget. Also, about 5% of the City's budget comes from revenue sharing with the State of Alaska. Depending on the significance of revenue impacts to the State, the City of Kenai may or may not realize an impact from an event.	• None
5.2 Socioeconomic Impacts- The City identified socioeconomic affects from a shutdown as a significant concern both for Kenai and for Anchorage. The City noted that the Tesoro Refinery supplies fuel to the Anchorage Airport. Specific to the City of Kenai, many local jobs rely on the presence of the oil and gas industry.	• None

Agenda Item	Decisions/Actions
5.3 Impacts to Fisheries - A catastrophic spill to the Kenai River or Cook Inlet that impacts commercial and sport fisheries is an unacceptable consequence from the City's perspective. The City noted that about 10,000 people are present in Kenai during summer months. A majority of these people are from outside the Kenai Peninsula area. If a fishery was temporarily shut-down during the summer, the City and local businesses would incur significant economic damage. A portion of the City's income is derived from sales tax, fees, and commercial fishing tax. Additionally, about 560 boats in the Cook Inlet drift fleet could be impacted.	• None
5.4 Drinking Water Sources - The City expressed concern over potential contamination of ground water from which it derives its drinking water.	• None
6. Stakeholder Input on Other Specific Concerns or Priorities Stakeholders were asked to identify other concerns and priorities to the project team for consideration.	
6.1 No other concerns or priorities were provided in the meeting.	• None
7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Participants were asked for suggestions for best risk management practices and data sources.	
7.1 No suggestions for best practices or data sources were provided.	• None

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Cook Inlet Regional Citizens Advisory Council (CIRCAC) Stakeholder Consultation Meeting**
Date:	**October 1, 2008**
Time:	**9:00 AM – 10:30 PM**
Purpose:	The intent of this meeting was to solicit input from the CIRCAC as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. The CIRCAC was represented by Executive Director, Mike Munger, Director of Public Outreach, Trent Dodson, and three board members via teleconference. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz. Myron Casada represented ABS Consulting via teleconference. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project team organization, objectives, scope, and timeline.	

Agenda Item	Decisions/Actions
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	• None
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None

Agenda Item	Decisions/Actions
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	• None
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
2.9 CIRCAC Interest-CIRCAC is focused on citizens oversight of oil and gas operations affecting Cook Inlet. CIRCAC works with industry and reviews and comments on State Contingency Plans. CIRCAC's main objective at this point in the project is to advocate for keeping Cook Inlet from being screened out of the project.	• None
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the overview and following the overview. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
Q: Will the project team rely solely on information provided by infrastructure owner/operators? Will the project be like an independent audit? **A:** This will not be an independent audit, but if audits have been completed, the project team is interested in utilizing them as a source of information. This project will not be a condition assessment, but will instead be a high-level evaluation of the systems in place to operate the infrastructure. The team will consider what systems are in place and the quality of those systems. Phase 1 of the project is focused on identifying existing information both in the public sector and from industry. Phase 2 will focus on filling in gaps in information in the field.	• None

Agenda Item	Decisions/Actions
C: Not many 3rd party audits of the infrastructure exist.	
4. Stakeholder Input on Focus of the Risk Assessment The EMERALD Project Manager outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
4.1 Sub-Sea Pipelines in Cook Inlet- CIRCAC identified sub-sea pipelines as an area of concern because of the age of the lines and the harsh environment in which they exist.	• None
4.2 Inspection Programs a Low Concern- CIRCAC stated that a series of spills occurred in CI in the 1990's, which led to improvements to industry's inspection programs. As part of this effort, many of these lines were retro-fitted to accommodate pigging.	• None
4.3 Decommissioned Infrastructure Components a Low Concern- CIRCAC indicated that from a spill perspective, lines that are shut-down are not very risky.	• None
4.4 Flowlines- Multiphase flowlines were identified as an area warranting focus because they have little regulatory oversight an they contain a higher cut of oil making them susceptible to internal corrosion.	• None
5. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.	
5.1 Erosion- CIRCAC identified erosion as a potential hazard.	• None
5.2 Infrastructure Age- CIRCAC identified aging infrastructure and original design life expectations as a concern, however, CIRCAC also feels that many of the pipelines in Cook Inlet were over-engineered because the owners/operators were not sure how harsh the conditions really were in CI.	• None
5.3 Currents- CIRCAC identified strong underwater currents as a concern because of their potential impact on the infrastructure. The currents in CI can be up to 9 knots, which is similar to that of a river. This makes it a difficult environment in which to operate pipelines.	• None
5.4 High Paraffin Content in Oil- CIRCAC identified paraffin content as a potential concern.	• None
5.5 Anchors- The potential for ship anchors catching on sub-sea pipelines was raised as a concern. This has not occurred historically, but is considered a	• None

Agenda Item	Decisions/Actions
hazard. Industry conducts dives every three years to inspect these lines and uses sandbags to stabilize pipelines.	
5.6 Volcanoes- Volcanic eruptions were identified as a concern and the past eruption impacting Drift River Terminal was referenced.	• None
5.7 Cook Inlet Power Supply- Power sources for Cook Inlet infrastructure were discussed. CIRCAC indicated that the West ide of CI depends on power from Beluga while the East side and the Tesoro Refinery depend on local public power. The platforms generate their own power and are stand alone.	• None
6. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. Participants were asked for concerns of significance within the scope of the project.	
6.1 Release to the CI Marine Environment- The CIRCAC defined unacceptable as any spill to Cook Inlet, which could have significant impacts to fisheries, marine transportation, and other industries. The CIRCAC recognizes that production from CI is small, but environmental and socioeconomic consequences could be huge.	• None
6.2 Written CIRCAC Summary of Unacceptable Consequences- The CIRCAC both read and provided the project team a written copy of a statement outlining its definition of unacceptable consequences.	• None
6.3 Spills to Water- Spills to water were identified as unacceptable in part because recovery of spills to water is difficult especially in broken ice conditions. CIRCAC noted that if a spill is not recovered within about 12-hours, it reaches convergence zones making it almost impossible to recover.	• None
6.4 Location-Specific Consequence Severity- CIRCAC highlighted that severity of impacts from a spill into CI are not just related to quantity, but are also highly dependent on the sensitivity of the specific area in which the release occurs.	• None
7. Stakeholder Input on Other Specific Concerns or Priorities Participants were asked to identify other concerns and priorities to the project team for consideration.	
7.1 Regulatory Oversight in CI- The group discussed regulatory jurisdiction in Cook Inlet. CIRCAC stated that ADEC is the regulatory authority until a spill to water occurs at which time both the Coast Guard and ADEC have jurisdiction. A MOU between the ADEC and MMS exists; giving the State primacy over MMS regulated areas in Cook Inlet.	• None
8. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Suggestions for best risk management practices and data sources were suggested by participants and are	

Agenda Item	Decisions/Actions
summarized below.	
8.1 The CIRCAC stated that it has received a voluntary pipeline report on an annual basis from industry since 2002. The report includes a summary of howpipelines in Cook Inlet are being operated. CIRCAC can provide this document.	• EMERALD to consider use of Annual CI Pipeline Report from CIRCAC
8.2 CIRCAC provided a written statement of its perspective on unacceptable consequences.	• EMERALD to review written statement from CIRCAC and consider as an input to methodology development
8.3 CIRCAC indicated that it completes a summary of reported spills in CI annually.	• EMERALD to consider use of CIRCAC Annual Spill Summary

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Kenai Peninsula Borough Stakeholder Consultation Meeting**
Date:	**October 1, 2008**
Time:	**2:00 PM – 3:30 PM**
Purpose:	The intent of this meeting was to solicit input from the Kenai Peninsula Borough as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. The Kenai Peninsula Borough (the Borough) was represented by Mayor John Williams and two Borough officials. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project team organization, objectives, scope, and timeline.	
2.1 <u>Project Team</u>**-** The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of	• None

Agenda Item	Decisions/Actions
Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives**-** The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are	• None

Agenda Item	Decisions/Actions
included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
3. Stakeholder Input on Focus of the Risk Assessment The EMERALD Project Manager outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
3.1 NS Valve Maintenance- North Slope valve maintenance programs were recommended as an area of focus for the project.	• None
3.2 Sub-sea Pipelines- Sub-sea pipelines were identified as the highest risk in Cook Inlet. Some of these lines have been operating for 40 years.	• None
3.3 Onshore CI Production- Onshore production in Cook Inlet was identified as a secondary area of concern due to its age.	• None
3.4 Abandoned Lines & Platforms- Decommissioned lines are considered a low risk if they have been properly drained, cleaned, and closed out. Lines that have been abandoned in place without proper shut-down are of concern. The risk associated with out-of-commission platforms is unknown. The potential for support legs to corrode may be a risk. To date, no platforms in Cook Inlet have been officially decommissioned.	• None

Agenda Item	Decisions/Actions
3.5 Drift River Terminal- Drift River was identified as high risk for impacts from volcanic activity and associated mudflows.	• None
4. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.	
4.1 Corrosion on the North Slope- Corrosion was identified as the biggest threat on the North Slope. The Borough felt that recent events could have been prevented, but the owner/operators chose to push operating capacity without the best possible maintenance programs.	• None
4.2 Volcanoes- Volcanic eruptions and resulting mudflows were identified as a hazard in Cook Inlet. Wind direction has the ability to significantly affect the severity of ash impacts from a volcanic event, which could lead to an interruption in production due to equipment clogging.	• None
5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. Participants were asked for concerns of significance within the scope of the project.	
5.1 Shutdown of Fisheries- Impacts to Kenai River fisheries including both commercial and sport fishing was identified as an unacceptable consequence in terms of both environment and revenue. Tourism is a major source of funding for the Kenai region and a spill has the potential to prevent access to the river, damage Kenai River "branding", and damage fish populations.	• None
5.2 Loss of Production Impacting the Tesoro Refinery- Significant local socioeconomic impacts could be realized if production is interrupted and flow to the refinery is stopped.	• None
5.3 Loss of Power/Fuel to Anchorage & Military Bases- A power interruption due to production shutdown at the LNG Plant or the Tesoro Refinery was identified as a concern. The project team pointed out that the LNG Plan and all refineries are outside of the project scope.	• None
5.4 Interruption in Natural Gas Supply- A shutdown in gas production that supplies the power plant in Kenai could have significant impacts on the local community. The LNG Plant also relies on power from the electric grid. It was pointed out that platforms in CI generate their own power. Additionally, the hospital, schools (43), borough buildings (108) are all heated by natural gas.	• None
6. Stakeholder Input on Other Specific Concerns or Priorities	

Agenda Item	Decisions/Actions
Participants were asked to identify other concerns and priorities to the project team for consideration.	
6.1 Cook Inlet Ownership- The Borough noted that infrastructure in Cook Inlet is fractured by multiple historical owners. This may be difficult to sort through.	• None
6.2 Future Decommissioning of Platforms in CI- The Borough brought up concerns regarding decommissioning and removal of platforms in Cook Inlet and the potential for a blowout. Although removal of platforms is outside of the project scope, it was identified as a risk.	• None
6.3 Loss of International Crude Supply- The fact that Alaska imports crude from Russia for processing at the Tesoro Refinery was identified as a concern. Loss of this spot market could impact revenue to the Cook Inlet region and to the State.	• None
7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Suggestions for best risk management practices and data sources were suggested by participants and are summarized below.	
7.1 The Borough thought that an incident write-up had been completed summarizing impacts of the volcanic eruption on Drift River.	• EMERALD to consider review of referenced document

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Kenai Public Stakeholder Consultation Meeting**
Date:	**October 1, 2008**
Time:	**6:30 PM – 8:30 PM**
Purpose:	The intent of this meeting was to solicit Kenai area public input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with an introduction by Ira Rosen, ADEC Project Manager and introductions of those in attendance. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project team organization, objectives, scope, and timeline.	

Agenda Item	Decisions/Actions
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contributes large-scale technical risk assessment experience and an international perspective.	• None
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None

Agenda Item	Decisions/Actions
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	• None
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the presentation and following the presentation. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
Q: Is the funding for this study the result of budgeting through the State of Alaska legislature? **A:** Yes, this study was initiated by the Governor's office and the project budget was appropriated by the legislature. **Q:** Why is the project being managed by ADEC rather than the PSIO? **A:** The PSIO had just been formed at the time this project was initiated and had minimal staffing. ADEC was in the best position to manage the project on behalf of the State. **Q:** What amount was appropriated by the legislature for the project? **A:** $5 million.	• None

Agenda Item	Decisions/Actions
Q: A risk assessment of this scale has not been conducted anywhere in the world? **A:** Not that the project team is aware of. **Q:** Is it because Alaska is so big? **A:** The team is not sure why no other risk assessments of this scale have been conducted.	• None
Q: Weren't the corrosion issues that occurred a unique situation because those pipelines were not under any regulatory jurisdiction? That is not the case for TAPS or Cook Inlet, so is the project studying a topic about which the State already has information? **A:** Distinct portions of the infrastructure are regulated by a variety of agencies including the Alaska Oil and Gas Conservation Commission (AOGCC), Division of Oil and Gas, Department of Transportation (DOT), and ADEC. **Q:** Are you saying that some areas of the infrastructure do not have regulatory oversight? **A:** Some portions only have minimal oversight. **A:** The project team's charter is to look at the system as a whole and to take the information that already exists, including previous studies, as well as existing regulatory oversight into account. The team will narrow its focus for Phase 2 of the project to areas that have not been heavily regulated. PSIO's work lines up with the project in terms of regulatory oversight because it will use results of the risk assessment to recommend priorities for filling gaps and eliminating overlaps in regulatory oversight of the infrastructure.	• None
Q: What will happen when this project ends? **A:** An implementation plan has not been developed yet, but the ADEC will work hand in hand with the PSIO to implement actions and mitigation measures as a result of the risk assessment. This may be done through meetings with industry or through additional regulatory oversight.	• None
Q: Industry is a prime source of information. What confidentiality issues will exist regarding their information? Is public information available on TAPS, Cook Inlet Platforms, and CIGGS? **A:** Some information is available publicly. The team is gathering this information. Confidentiality is an important issue that the State is working through with industry to ensure that industry is comfortable enough to share information and has confidence that information will be protected. The results of this project will be much more valuable if the project team can work with industry. **Q:** Why is the project under ADEC management when Department of Natural Resources (DNR) and Department of Revenue (DOR) have specific statutory	• None

Agenda Item	Decisions/Actions
ability to protect information? **A:** ADEC is attempting to adopt some of these protections through interagency agreements. **C:** It is important that the project has the best information possible to achieve its objectives. For industry, the threat of passing on incriminating evidence may be a concern. It will be important to offer industry operators protection against incrimination if they cooperate with the team by providing information/data. It is recommended that it would be good to offer incentives such as this to those who cooperate, and disincentives to those members of industry who do not cooperate. State and federal protections for this type of situation exist. **C:** AOGA represents 17 oil and gas owner/operators across the State of Alaska. The AOGA members are well aware that some competition exists regarding companies that give more information than others. The group of industry representatives needs to come to the table as a whole and work collaboratively. Industry understands that it will succeed only if the project succeeds so it wants to work with the project team, however; confidentiality issues must be worked out before this can happen.	
Q: How is the project team viewing industry? As a stakeholder? **A:** Industry is definitely a key stakeholder. Meeting with AOGA was one of the first steps the project team took in initiating work on the project. The project team would like industry to share its best risk management practices and provide studies that have already been conducted. The project team sees industry as an integral part of the team and would like to start meeting with them as soon as possible. It is important to also point out that industry is participating in these public meetings. **C:** A stakeholder is someone who is not directly involved in managing the risk. Industry is different than a typical stakeholder because it is actually taking action to deal with risk. **A:** Any person with the potential to be effected is a stakeholder. The team understands that industry is a crucial part of the project. Upon completion of the project, industry will be a beneficiary of the report. Hopefully it will gain information from this report. If information reveals that actions have not been taken when they should have, there could be repercussions for industry.	• None
Q: How was advertising done for this meeting? People were not aware of the meeting. More people would have attended with better advertising. **A:** The team formed a list of key stakeholders that was run through the SAOT for approval. The team has contacted key individuals and groups and held meetings with those stakeholders. When one-on-one meetings are held, the attendees do not always feel compelled to additionally attend the public meeting. An ad was placed in the newspaper and public service announcements were run. Additionally, anyone who completes a survey and includes their contact information is added to the mailing list for future project notifications. The team wants to provide every avenue possible to stakeholders for providing input to the process. Do you have additional suggestions on how the project team should have advertised to reach out	• None

Agenda Item	Decisions/Actions
to others? **C:** An email tree would have been a useful tool. Notification for this meeting left a lot to be desired. The legislative representatives indicated that they would be willing to review the project team's list to see if any key stakeholders were missed.	
Q: The project is focused on existing infrastructure and it is a snapshot in time. How is the team balancing the risk profile with the original design of the infrastructure? For example, the entire infrastructure could have been built in stainless steel, but if that was the case the pipeline would have never been built due to cost. In other words, some risks are not economically worth mitigating. How will the team handle this? **A:** The team will evaluate the current state of the infrastructure in comparison to the original design condition. The team hopes to receive industry data that shows corrosion control programs are in place, that lines are being pigged, and data supporting that industry has confidence that it can continue operating safely past the design life of the infrastructure. **Q:** How will you make the value judgment regarding what constitutes a reasonable level of maintenance and reasonable dollars to invest in the infrastructure? How will you determine how long systems are expected to operate into the future? **A:** The team will have to make some judgments regarding scale of consequences. The team will evaluate a variety of factors and will assess the management systems industry has in place. This is part of the methodology and has not been developed yet. **C:** There are likely to be differences in values. To someone who is not responsible for paying to maintain the infrastructure like the State, it may seem worth fixing items even at a very high price, but industry may have a different point of view since it has to pay for repairs and improvements. **C:** This discussion is a mix of project scope and implementation of results that will occur after project completion. Following the project, the State would like to present the results to industry to identify how best to handle the highlighted risks. The mission of this project is to identify the risks, not take action to mitigate them. **C:** The EMERALD project team will create a risk profile and identify risk contributors. EMERALD will then present this profile to the State and the State will determine how best to implement the results.	• None
4. Stakeholder Input on Focus of the Risk Assessment The EMERALD Project Manager outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	

Agenda Item	Decisions/Actions
4.1 No input was provided on specific components of the infrastructure that warrant the attention of the project team.	• None
5. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure in the Kenai region.	
5.1 No input was provided relating to initiating events.	• None
6. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. The public was asked for their concerns of significance within the scope of the project.	
6.1 No input was provided in terms of consequences to reliability, safety, or the environment as a result of an unplanned event.	• None
7. Stakeholder Input on Other Specific Concerns or Priorities Stakeholders were asked to identify other concerns and priorities to the project team for consideration.	
7.1 <u>Prioritization of Consequence Categories</u>- The project team should consider re-ordering the three categories. Safety should be the top priority, then environment, then reliability.	• None
7.2 <u>Consideration of Industry's Perspective</u>- A commenter recommended that the project team consider industry's interests in addition to the State's interests. The assessment cannot be solely focused on how much money the State can make. If the team does not consider industry's perspective, it runs the risk of ending up with bad information. The team should consider the parties that spend the money to mitigate the risk. From a practical standpoint, the State oversees management of the infrastructure, but does not incur actual risk. The State does not suffer the consequences if a risk happens. State employees do not go to jail. The State does not have to make capital investments in the infrastructure. The State and the public are exposed to the risk, but are not responsible for it. This difference in perspective needs to be reconciled. The project results should be beneficial to industry as well as the State. I am an Alaska resident, and I do not want to see $5 million spent on this study without any benefit to the risk takers. If industry is not included, the team runs the risk of creating the model in a vacuum. The ADEC Project Manager commented that everyone is a stakeholder in some sense. The team's goal is to work cooperatively with industry to develop the methodology. The team would like to develop an equivalency matrix comparing consequence definitions for each of the three categories. Consequence levels considered significant will vary between different people. The team needs to work with industry as a stakeholder to find out what it considers significant. It all comes	• None

Agenda Item	Decisions/Actions
back to loss of integrity and consequences.	
7.3 Evaluation of Oil Company Contractors-A commenter noted that contractors that work for oil companies should be recognized as part of the project since they provide certain critical services to the companies.	• None
8. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure No suggestions for best risk management practices were suggested by the public. Recommended data sources are summarized below.	
8.1 Industry Information & Data- Multiple commenters pointed out that industry holds a large amount of the information including past studies that are pertinent to the project. No other specific recommendations were made regarding existing studies or data.	• None

Attachments:	Presentation Stakeholder Information Packet

C-3 Anchorage / Southcentral Region Meeting Minutes

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Anchorage-based NGO's Consultation Meeting**
Date:	**October 14, 2008**
Time:	**10:30 AM – 12:00 PM**
Purpose:	The intent of this meeting was to solicit input from Lois Epstein and other Anchorage-based NGO's as stakeholders with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. Representatives from multiple NGO's including Cook Inlet Keeper, LNE Engineering & Policy, and World Wildlife Fund participated. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz. Myron Casada and Steve Harris represented ABS Consulting. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project team organization, objectives, scope, and timeline.	

Agenda Item	Decisions/Actions
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	• None
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None

Agenda Item	Decisions/Actions
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	• None
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
2.9 Lois Epstein's Background- Ms. Epstein provided a brief description of her experience with the oil and gas industry. Ms. Epstein is an engineer and has been involved in oil and gas for over 20-years. She was a consultant to the EPA and served on the Federal Advisory Committee for Liquid Pipelines in Washington D.C. Ms. Epstein was previously employed by the Environmental Defense Fund and has spent a considerable amount of time working with pipeline regulations in Alaska. Ms. Epstein currently provides consulting services to environmental organizations and is employed by the Alaska Transportation Priorities Project.	• None
2.10 Dennis Gann's Background- Mr. Gann works for Cook Inlet Keeper and is involved primarily with coal and other energy issues in Alaska.	• None
2.11 Verner Wilson's Background- Mr. Wilson recently graduated from Brown University and works for the World Wildlife Fund. Mr. Wilson is from Dillingham, Alaska, and is focused on oil and gas issues impacting Bristol Bay.	• None
3. Questions and Comments from Attendees on the Project Overview	

Agenda Item	Decisions/Actions
Questions and comments were taken both throughout the overview and following the overview. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
Q: Will the project make recommendations or only identify risks? **A:** The project team will provide a risk profile and will list contributing factors as part of this profile. Potential mitigation measures and recommendations are out of scope. **C:** The project team should include mitigation measures in the report. The public is interested in having access to that knowledge as a resource. **A:** Mitigation measures will be determined by the State of Alaska following completion of the project as part of the risk management process. PSIO is also focused on using the results of the risk assessment to make decisions relating to regulatory oversight.	• None
Q: Why are downstream pipelines excluded from the scope? **A:** The team understands that downstream issues are important, but this project has limited funding and time so boundaries had to be drawn. **C:** The title of the project is misleading. The focus is really oil and gas “production” infrastructure rather than all infrastructure. **A:** The scope has been progressively defined as the project is executed. This was the original title tagged to the project by the State. **C:** It is unfortunate that spills such as those at Captain Cook Park are out of scope. Many risks will be missed. I would like to see the scope accomplish as much as possible.	• None
Q: You mentioned that the project originated from a loss of State revenue viewpoint. Does this mean that environmental impacts will not be considered equally? **A:** Environmental, safety, and reliability impacts will all be considered. Reliability of State revenue was just the origin of the project.	• None
Q: Will National Academy of Sciences (NAS) conduct the peer review? **A:** The State is currently working with NAS to put a contract in place for the independent third party peer review of the methodology.	• None
Q: How much data analysis of spill reports will be done? **A:** As much as required to develop an overall picture. The team hopes to use existing studies and summaries of information as much as possible.	• None
Q: Is offshore infrastructure included in the scope? **A:** Yes, Northstar, Endicott, and Cook Inlet could all be considered offshore and are within the scope of the project.	• None

Agenda Item	Decisions/Actions
Q: Is Minerals Management Services (MMS) involved in the project? **A:** The team has outreached to MMS, but is unsure how much involvement they will have. **C:** MMS has jurisdiction over federal waters including some of the future developments and ongoing exploration.	• None
Q: Are refinery tanks included in the scope of the project? **A:** No, refineries are outside the scope of the project.	• None
4. Stakeholder Input on Focus of the Risk Assessment The EMERALD Project Manager outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
4.1 Multiphase Pipelines- Concerns were raised regarding difficulty in implementing adequate leak detection on multiphase pipelines. Ms. Epstein would like to see the impact of related spills minimized; potentially by placing separation processes as close to the well pad as possible. A recommendation was made for the project team to compare distances from separation for various well pads, and give a read on the relationship between spills and distance between well pad and separation facility.	• None
4.2 Leak Detection Systems- Concerns were raised over the adequacy of leak detection in general. When the BP incidents occurred in 2006, the leak alarm sounded for an extended amount of time, but the spill was not found until someone discovered the spill in person. Only crude lines are regulated for leak detection, so many lines in existence are not required to have detection systems. Additionally, federal regulations do not specify frequency of leak monitoring, they only require the operator to have a system in place.	• None
4.3 Shut-off Valves- Concerns were raised regarding shut-off valve replacement programs. Federal regulations are vague in this area and are non-existent at the State level.	• None
4.4 VMT Tanks- A recommendation was made to look at potential ongoing leakage from storage tanks at the VMT.	• None
4.5 Drift River Terminal- A recommendation was made to evaluate potential releases into Cook Inlet at the Drift River Terminal.	• None
4.6 TAPS- The strategic reconfiguration and associated automation of TAPS was identified as a concern. Reductions in numbers of on-site personnel has the potential to delay or make spill response ineffective.	• None

Agenda Item	Decisions/Actions
5. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.	
5.1 Combination of Simultaneous Events- Ms. Epstein identified combination of multiple events as a concern. Incidents are often the result of human error in concert with natural hazards such as permafrost movement or freezing events.	• None
5.2 Corrosion Caused By Material Incompatibility- An incompatible interaction between lines in Cook Inlet at Captain Cook Park was raised as a potential concern. The incompatibility has reportedly led to external corrosion.	• None
6. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. Participants were asked for concerns of significance within the scope of the project.	
6.1 Types of Releases- Ms. Epstein recommended the team consider the impacts of multiple types of spills including large releases, smaller chronic releases, and releases to environmentally sensitive areas.	• None
6.2 Produced Water Spills- Regulations overseeing releases of produced water were identified as inadequate. Ms. Epstein feels that spills of produced water are minimized when they could have serious impacts. It was recommended that this type of spill be differentiated from spills of oil.	• None
6.3 Discharge of Drilling Waste to Cook Inlet- Concern was expressed regarding permitted discharges of drilling wastes directly into Cook Inlet. The project team stated that if an action is permitted and legal it will be out of the project scope. This project will evaluate hazards of unplanned events, not planned and allowed events.	• None
6.4 Subsurface Spills from Storage Tanks- Concern was expressed regarding the potential for spills/leaks from underground storage tanks (UST) or above-ground storage tanks (AST) that may pool underground and go unrecognized for a period of time.	• None
7. Stakeholder Input on Other Specific Concerns or Priorities Participants were asked to identify other concerns and priorities to the project team for consideration.	
7.1 Independent Investigation of Incidents- Ms. Epstein noted that the State has no independent third party analysis when incidents occur and stated that investigations by the State or industry are not entirely effective because it is a conflict of interest for these groups to review their own problems. Independent investigative groups such as the National Transportation Safety Board exist at the federal level, but do not regularly conduct investigations in Alaska.	• None

Agenda Item	Decisions/Actions
7.2 Regulatory Oversight- A recommendation was made to consider certain regulatory programs and their effectiveness. Ms. Epstein noted that infrastructure regulated under the federal Integrity Management regulation receives a higher level of scrutiny than other components of the infrastructure. Additionally, the State does not have strict regulatory requirements for corrosion protection. The team should consider the fact that having regulations on its own is not enough. Enforcement of regulations must also be effective. The team should evaluate enforcement issues as well.	• None
7.3 Inconsistent/Poor Regulatory Definitions- Ms. Epstein identified poor definitions as a problem contributing to ineffective regulatory oversight. For example, the definition of gathering lines is not well written and subsequently makes it easy for operators to argue about the oversight of their particular lines.	• None
8. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Suggestions for best risk management practices and data sources were suggested by participants and are summarized below.	
8.1 Ms. Epstein recommended that the team consult with unions to obtain concerns that workers may not feel comfortable sharing in public. The project team stated that the team will outreach to industry employees as private citizens rather than in their role as employees.	• None
8.2 A recommendation was made to review trend reports that exist for the Cook Inlet infrastructure. Ms. Epstein will email the link to this document.	• EMERALD to consider use of CI Trend Reports
8.3 A recommendation was made to review a document on State regulatory enforcement from Cook Inlet Keeper. Ms. Epstein will email the link to this document.	• EMERALD to consider use of CI Keeper Recommendations Document
8.4 A recommendation was made to review the ADEC spills database.	• EMERALD to consider use of ADEC Spills Database
8.5 A recommendation was made to review a report to congress on internal corrosion conducted by the Office of Pipeline Safety.	• EMERALD to consider review of report to congress on internal corrosion
8.6 A recommendation was made to contact Rick Kupewicz, a pipeline contractor that works for Acufacts, as a technical resource.	• EMERALD to consider contacting Rick Kupewicz

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Walt Parker Consultation Meeting**
Date:	**October 14, 2008**
Time:	**1:00 PM – 2:30 PM**
Purpose:	The intent of this meeting was to solicit Walt Parker's input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	Walt Parker, Prince William Sound Regional Citizens Advisory Council (PWSRCAC) Steve Harris, ABS Consulting Ira Rosen, ADEC Myron Casada, ABS Consulting (Teleconference) Bettina Chastain, EMERALD Gretchen Grekowicz, EMERALD

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz. Myron Casada and Steve Harris represented ABS Consulting. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project team organization, objectives, scope, and timeline.	
2.1 <u>Project Team</u>- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of	• None

Agenda Item	Decisions/Actions
Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives**-** The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are	• None

Agenda Item	Decisions/Actions
included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
2.9 Walt Parker's Background- Mr. Parker provided a background on his history with the oil and gas industry. Mr. Parker has been involved with the oil and gas industry in Alaska since the 1940's. He was the chairman of the Exxon Valdez Commission and has worked with the PWS RCAC since its inception. Mr. Parker has also worked with the State Pipeline Office.	• None
3. Stakeholder Input on Focus of the Risk Assessment The EMERALD Project Manager outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
3.1 Vertical Supports- Pipeline supports (on TAPS) were identified as a point of vulnerability, especially in areas of permafrost thaw.	• None
3.2 TAPS Pump Stations- Strategic reconfiguration and the associated automation of pump stations was identified as a concern. Manning at pump stations has also been decreased as a result of SR and automation. Mr. Parker stated that these stations are now undermanned and feels that relying on computers rather than people can lead to problems. Additionally, ADEC has not received adequate funding to provide regulatory oversight of the pipeline and does not have political pressure to increase effectiveness in oversight.	• None

<table>
<tr><th>Agenda Item</th><th>Decisions/Actions</th></tr>
<tr><td>3.3 <u>Oil Fields</u>- Mr. Parker identified the oil fields on the North Slope as being at the greatest risk because of lack of regulatory oversight. TAPS is overseen by the JPO.</td><td>• None</td></tr>
<tr><td>3.4 <u>Pipeline Segments with Significant Vertical Change</u>- Portions of the pipeline that go steeply downhill were identified as high risk. There is no good way to slow down the flow at these locations, e.g., Atigan Pass</td><td>• None</td></tr>
<tr><td colspan="2">4. Stakeholder Input on Initiating Events
Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.</td></tr>
<tr><td>4.1 <u>Corrosion</u>- Corrosion was raised as a general concern.</td><td>• None</td></tr>
<tr><td>4.2 <u>Worker Fatigue</u>- Overworking of employees was identified as a concern. 12-hour shifts are long, especially when worked two weeks straight for those on the typical two week on, two week off work schedule. Human factors are usually greater than physical infrastructure risk.</td><td>• None</td></tr>
<tr><td>4.3 <u>Quality of Workers</u>- Experience levels of workers could be an issue.</td><td>• None</td></tr>
<tr><td colspan="2">5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment
The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. Walt Parker was asked for his concerns of significance within the scope of the project.</td></tr>
<tr><td>5.1 <u>Spills to Rivers</u>- Mr. Parker noted that spills to rivers would likely get the same level of attention as the Exxon Valdez spill.</td><td>• None</td></tr>
<tr><td colspan="2">6. Stakeholder Input on Other Specific Concerns or Priorities
Walt Parker was asked to identify other concerns and priorities to the project team for consideration.</td></tr>
<tr><td>6.1 <u>Maintenance Budgets</u>- Mr. Parker recommended evaluating the owner/operator maintenance budgets to see how they have fluctuated over time. As the infrastructure ages it could be assumed that maintenance budgets would increase.</td><td>• None</td></tr>
<tr><td colspan="2">7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure
No suggestions for best risk management practices or data sources were suggested by Mr. Parker.</td></tr>
</table>

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Municipality of Anchorage (MOA) Stakeholder Consultation Meeting**
Date:	**October 14, 2008**
Time:	**3:00 PM – 4:30 PM**
Purpose:	The intent of this meeting was to solicit MOA input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. Two representatives from the MOA participated. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz. Myron Casada and Steve Harris represented ABS Consulting. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project team organization, objectives, scope, and timeline.	
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting,	• None

Agenda Item	Decisions/Actions
EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives**-** The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the	• None

Agenda Item	Decisions/Actions
scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the overview and following the overview. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
Q: Will shared infrastructure systems such as main transmission lines be included in the scope of the project? **A:** To the extent that they feed the infrastructure. **C:** There are Enstar gas lines that run across the Kenai Wildlife Refuge, which have been used to fuel the infrastructure in certain situations.	• None
C: Is the reliability consequence category focused entirely on revenue to the State? The team should consider other types of reliability impacts such as loss of power in Anchorage and other socioeconomic impacts. **A:** Reliability is focused on State revenue for the purposes of this project. The team recognizes that socioeconomic impacts are important and this issue may be recommended for future study.	• None
Q: Will overhead power be considered? **A:** To the extent that it feeds infrastructure.	• None
4. Stakeholder Input on Focus of the Risk Assessment	

Agenda Item	Decisions/Actions
The EMERALD Project Manager outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
4.1 TAPS- The MOA identified TAPS as a high priority because it supplies aviation gas to the Anchorage Airport through refinement at the North Pole Refinery. Anchorage is a hub for refueling flights between North America and the Pacific Rim, and Anchorage is the fourth largest consumer of jet fuel in the country. An interruption in production could impact the image of the Anchorage Airport as a reliable place for cargo fueling and cargo companies could take their business to other airports as a result. The Anchorage Airport supplies every 1 out of 8 jobs in the State.	• None
4.2 Cook Inlet Facilities- The MOA noted that Cook Inlet has some of the oldest infrastructure in the State. Swanson River Field was identified as the oldest of these fields. Additionally, there are 16 platforms that are 20-30 years old. 12 out of the 16 platforms in place are currently operating. The team should evaluate how well cathodic protection has held up over time for the platform infrastructure. Ownership/operatorship of facilities in Cook Inlet is varied and it could be difficult to sort out the history.	• None
4.3 Subsea Pipelines- The MOA identified inventories of subsea pipelines as a potential concern, and recommended that the project team confirm that all lines are accounted for, and that integrity management programs have been implemented. There was a problem relating to inaccurate inventories of sub-sea pipelines in the 1990's.	• None
4.4 Drift River Terminal- The Drift River Terminal was identified as a vulnerable component of the infrastructure because of its susceptibility to damage from a volcanic eruption.	• None
4.5 Osprey Platform- The Osprey Platform has shelf issues and may be susceptible to underwater landslides.	• None
5. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.	
5.1 Lack of Qualified Operators- The MOA identified lack of institutional knowledge as a potential concern. Potential employees graduating from today's technical programs are being trained on new types of equipment while many facilities use older outdated equipment. For example, many Cook Inlet facilities still use analog control systems (pneumatic systems) circa 1960's.	• None
5.2 Volcanic Activity- Volcanic activity including ash clogging equipment was	• None

Agenda Item	Decisions/Actions
identified as a hazard. Ash in generators could cause a shut-down. Ash could also preclude timely incident response if aircraft cannot fly because it is unsafe.	
5.3 Currents in Cook Inlet- Strong currents were identified as a potential hazard in Cook Inlet; relating to subsea pipelines and aged platform infrastructure.	• None
6. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. The MOA was asked for its concerns of significance within the scope of the project.	
6.1 Impacts to the City of Anchorage- The MOA pointed out that Anchorage is the service center for the State of Alaska. Employees for the North Slope are often based out of Anchorage. Anchorage also provides much of the response resources as well as the transportation infrastructure for the State.	• None
6.2 Secondary Impacts of Production Interruption Affecting Refineries- The MOA identified multiple secondary impacts due to production interruption that have the potential for downstream consequences. The PetroStar refinery in North Pole provides fuel to the military bases so loss of production impacting that refinery could have serious implications to military bases. Additionally, loss of refined product from the Flint Hills Refinery also in North Pole could create a serious safety risk because it provides the majority of the number 2 diesel fuel in the State. Many communities in Alaska such as those in the Cook Inlet are entirely dependent on regular delivery of heating oil.	• None
6.3 Socioeconomic Impacts of Natural Gas Interruption- The MOA identified gas decline or a potential production interruption on the CIGGS system as a factor with significant socioeconomic repercussions. The natural gas distribution system relies on consistent flow in order to maintain adequate pressure of the system as a whole. If flow of natural gas is interrupted and the system starts to lose pressure, portions of that system will start to automatically shut-in order to maintain a specified PSI. Once this occurs, only a certified Enstar technician (about 12 exist in the State) can perform a re-start. Even a 1-day interruption in flow could be catastrophic. An even more severe situation is the potential for loss of gas pressure to the turbines that supply electrical power. Electricity is required to re-start these turbines. If no electricity is available, restart could be significantly delayed, which could have important impacts on a cold winter day. Municipal Light and Power and Chugach Electric are most at risk. The MOA indicated that they are starting to receive more and more anecdotal information indicating near misses. Cook Inlet has only a day or two supply of backup gas storage. The project team asked if a black start has ever occurred in Anchorage. The MOA responded that this has never occurred, but is a big worry of the utility owners. An additional concern is that if the Kenai LNG Plant and therefore the wells supplying the LNG Plant were shut-in, structural damage may occur to these wells impacting future gas production.	• None
7. Stakeholder Input on Other Specific Concerns or Priorities	

Agenda Item	Decisions/Actions
The MOA was asked to identify other concerns and priorities to the project team for consideration.	
7.1 Natural Gas Distribution from Nikiski to Anchorage- The distribution of natural gas from Nikiski to Anchorage is critical because it supplies fuel for power generation/distribution. In addition, Cook Inlet refining is also the only source of low sulfur diesel in the State.	• None
7.2 Previous Shut-downs- When a hole was shot in TAPS and it was consequently shutdown, the producers diverted the supply of crude bound for lower-48 locations. This was a voluntary diversion of crude by the operators, but assisted in maintaining supply in Alaska.	• None
7.3 Bradley Hydroelectric Power- The MOA indicated that Bradley Hydro powers Homer primarily and provides only about 10% of the overall power supply to Anchorage.	• None
8. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure No suggestions for best risk management practices or data sources were suggested by the MOA.	
8.1 A recommendation was made for the project team to consider meeting with the Regulatory Commission of Alaska.	• EMERALD to consider meeting with the Regulatory Commission of Alaska
8.2 A rationalization study commissioned by the Alaska Energy Authority (AEA) was recommended as a source of information on power supply in Alaska.	• EMERALD to consider requesting rationalization study from AEA

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Anchorage Public Stakeholder Consultation Meeting**
Date:	**October 15, 2008**
Time:	**6:30 PM – 8:30 PM**
Purpose:	The intent of this meeting was to solicit Anchorage area public input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

[redacted]

Agenda Item	Decisions/Actions
1. Introductions A total of 39 individuals were in attendance including the project team, members of the State Agency Oversight Team (SAOT), industry representatives, local businesses, NGOs, and the public at large. The meeting began with an introduction by Ira Rosen, ADEC Project Manager, and introductions of those in attendance. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project team organization, objectives, scope, and timeline.	
2.1 <u>Project Team</u>- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	• None
2.2 <u>Project Goal</u>- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 <u>Stakeholder Consultation Objectives</u>- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on	• None

Agenda Item	Decisions/Actions
significant concerns relating to existing oil and gas infrastructure in Alaska.	
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	• None
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to	• None

Agenda Item	Decisions/Actions
visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the presentation and following the presentation. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
Q: Where is the scope boundary on the east side of CI? **A:** The Tesoro refinery. The scope ends at distributions points. All refineries and the LNG Plant are out of scope.	• None
Q: Is loss of revenue the only reliability concern being considered? **A:** Yes, loss of revenue to the State is currently in the scope. **Q:** You stated that the scope of the project is set and that it only relates to State revenue, but safety and environment were also mentioned. Is revenue a higher priority? Safety and environment seem to be secondary priorities. **A:** The team will evaluate and rank incidents in all three of these categories (safety, environment, and reliability).	• None
Q: When the team assesses impacts, will it evaluate regulatory oversight and effectiveness of that oversight? **A:** This project is linked with the charter of the PSIO, which is to evaluate regulatory oversight of the infrastructure by conducting an analysis identifying gaps and overlaps in oversight. The PSIO will use the results of this risk assessment project to identify combined areas of high risk and gaps in regulatory oversight, and to recommend a path forward in terms of State regulations. **Q:** Will the PSIO gap analysis be made public? **A:** Yes, it will be made public.	• None
C: It appears that tribal governments are not being consulted as part of this project. These issues go far beyond impacts to the State. The team should consult tribal governments.	• None
C: Industry does not understand its own problems. The project team will not have the data needed to make an accurate assessment of the infrastructure. The Prince William Sound Risk Assessment and the new study to assess shipping risks in the Aleutian Islands were referenced. **A:** The team is hoping to work cooperatively with industry so the project can incorporate data that already exists on the infrastructure.	• None

Agenda Item	Decisions/Actions
C: The executives from industry that are profiting from the pipeline should be questioned under sworn testimony. Owner/operator companies manage huge amounts of resources and should have to be held accountable.	• None
C: The work that this project is undertaking should have been done by industry a long time ago. It was not done and the result was the 2006 spills on the North Slope. Now the State is being forced to step in and do the work that should have already been done. It is frustrating that industry is not willing to provide their risk management practices as an input for the methodology development. The State may not have the legal authority to compel industry to provide these types of documents. Industry should not be in a position to argue over providing this information. In order to have effective oversight of the oil and gas industry the State must have adequate legal authority, independence, and funding. This project has the authority and funding, but does not appear to be independent because the State is really evaluating the effectiveness of its own oversight. As a result, the results of the assessment may not be trusted by the public. The solution to this problem is funded citizen oversight of the project and involving citizens with the time and expertise to dedicate to the project. It is important to have a seat for citizens at the table in an organized way, not just through the public meeting process. This project should be seen as positive for everyone involved because it will allow industry to operate well into the future and will also help to protect those who rely on the environment for their livelihood and subsistence; those that stand to lose everything in the event of a spill.	• None
C: The team should provide additional avenues for stakeholder input such as a video cam allowing people to give their input. Stakeholders should not be required to write down their comments if they are not comfortable expressing their views in a public setting.	• None
C: When the results of the risk assessment are presented to the public, will the document include the back-up information used to rank risks? It is important that the methodology outline how risks will be ranked so the results have credibility with the public.	• None
C: The name of the project is misleading because the focus is really on “production infrastructure” not all infrastructure. It is disappointing that the project does not include downstream pipelines.	• None
C: The team should consult with union officials to gather concerns of industry workers that may be afraid to speak out in public.	• None
Q: Will deferral in revenue resulting from a shut-down in production be handled the same as a loss of oil that cannot be recovered such as a spill or fire? **A:** The project team will have to evaluate how to handle deferral. All interruptions in production are not equal. The definition being used for this project is “unplanned interruptions”.	• None

Agenda Item	Decisions/Actions
C: Even unplanned events have the potential to cause a shut-in. Owner/operators should not be penalized for shutting in wells for safety reasons. The market also plays into the equation because if oil is deferred and the price goes up, the State could actually realize increased revenue as a result of the shut-in. **A:** The team is working with Department of Revenue (DOR) to find a metric that best captures impacts to the State revenue stream. It needs to be somewhat simple to be effective because it needs to apply to the system as a whole.	
Q: Does the team have a good rapport with the oil companies? **A:** The team has been working with industry cooperatively since the start of the project. The State has been keeping industry informed and is working to continue fostering that relationship. **C:** This is not the kind of relationship I had in mind. The number one priority of the project team should be to only meet with industry under sworn testimony on camera so that the team is not tempted to be corrupted. I would expect the team to state that it has testimony scheduled on particular dates. This testimony should be captured live on video for citizens to view. **A:** The State has hired experts to conduct this risk assessment. It is the State's job to oversee the project. The State would like to work cooperatively with industry in support of the project objectives. Industry has shareholders that hold them accountable. Industry also suffers if the infrastructure is not run effectively. Individual companies within industry do not necessarily share information with each other so it is not accurate to view industry as one big happy group. The job of the State and the project team is to ask industry for its existing information and studies so the project budget is used efficiently. The challenge of this effort is that statutory language does not exist allowing the State to adequately protect industry's information. Industry is not sandbagging the project team. They want to work with the team, but have a right to protect their trade secrets. The State is trying to work through this issue. The project team does not have statutory authority to hold hearings. **C:** This is the attitude that concerns me. To expect that just because industry has shareholders, they are held accountable is not correct. If industry cannot handle talking frankly with the public, they should not operate in Alaska. If the team does not have the legal authority to compel industry to speak, it should obtain this authority immediately. The process should be public. Energy is unlike anything else because it is a fundamental necessity that is owned by the public. The State is cutting industry slack, which is a mistake. To portray the individual industry companies as competitive and not willing to collaborate with each other is false because they work together on many large projects and could not possibly do this without having a good understanding of each others' business. **C:** The tribes also have proprietary issues, but the reason they provide information that has been developed over thousands of years is because they are good citizens. Industry should be willing to do the same thing. It is a matter of	• None

Agenda Item	Decisions/Actions
citizenship without exercising every right to confidentiality you can. How high can the risk really be to sit in a locked room with the State's contractors and provide information?	
4. Stakeholder Input on Focus of the Risk Assessment The EMERALD Project Manager outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
4.1 Valdez Marine Terminal- Multiple vulnerability issues were raised regarding the VMT. One commenter noted that the potential for loss to the marine environment is significant at VMT, particularly at the berths during loading/offloading. A loss of this type could have consequences similar to the Exxon Valdez spill. Another commenter noted that the fire systems at VMT are old and that snow is not removed from the storage tank secondary containment to maintain 110% capacity in case of a release.	• None
4.2 Drift River Terminal- The vulnerability of the Drift River Terminal due to volcanic activity was raised as a concern, especially regarding the potential for lahars to breach secondary containment barriers. The commenter noted that there are millions of barrels of oil in the path of a potential volcanic eruption.	• None
4.3 Cook Inlet Infrastructure- Concern was expressed that there is no visual oversight of the Cook Inlet infrastructure. The commenter noted that new laser scanning technology is not being studied for potential use in this area and there is no ability to pig smaller lines relating to this infrastructure	• None
4.4 Multiphase Pipelines- Concern over the difficulty in implementing adequate leak detection on multiphase pipelines was raised.	• None
4.5 Shut-off Valves- One commenter noted that shut-off valve replacement programs are not specific in federal regulations and are non-existent at the State level.	• None
5. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.	
5.1 Natural Hazards- Volcanoes/lahars and earthquakes were pointed out as potential natural hazard events that should be considered.	• None
5.2 Change in Composition- The increasing thickness of crude oil as a contributing factor to degradation of pipelines was discussed.	• None
6. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure	

Agenda Item	Decisions/Actions
in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. The public was asked for their concerns of significance within the scope of the project.	
6.1 River Crossings- Concerns relating to spills at river crossings were raised. One commenter stated that spill prevention at river crossings should be the number one priority. The commenter indicated that there is lack of video oversight of river crossings or shallow water ice. He expressed concern over the fact that oil flowing under the ice during winter may not be recognized for an extended period of time and the response time in this situation is not fast enough to prevent significant issues.	• None
6.2 Subsistence- Multiple commenters raised the issue of subsistence. One attendee pointed out that the Yukon River is an extremely important source of food for Alaskans. The Yukon River supports salmon, birds, and other wildlife. He also expressed concern that industry focus only on the bottom line while local communities must live with results such as impacts to subsistence.	• None
7. Stakeholder Input on Other Specific Concerns or Priorities Stakeholders were asked to identify other concerns and priorities to the project team for consideration.	
7.1 ADEC Approval of Industry Documents- One commenter expressed concern that ADEC rubber-stamps approval for industry documents such as Contingency Plans.	• None
7.2 Lack of Effective Response in Moving Water- The issue of ineffective response of oil from the river systems was raised as a concern.	• None
7.3 Alternative Energy- Multiple commenters stated that they would like to encourage use of alternative energy. One commenter recommended powering the pump stations along TAPS using hydroelectric power derived from rivers under the ice flows at river crossings along TAPS. This attendee recommended incorporating ideas for alternative power generation such as wave energy into the final report as a way of outlining how industry should operate into the future. The commenter pointed out that oil prices can change rapidly, which makes it important for Alaska to have a good understanding of its relationship with industry and for the State to have alternative sources of revenue. Another commenter stated that instead of using diesel fueled generators on the North Slope, alternative power sources could be used to reduce emissions. Another attendee pointed out that only response equipment is run by diesel fueled generators. The Emerald Project Manager pointed out that the scope of this project is existing infrastructure operations.	• None
7.4 Video Monitoring Programs- One commenter recommended use of video-cam monitoring programs as an alternative form of identifying at-risk portions	• None

Agenda Item	Decisions/Actions
of the pipeline.	
7.5 Regulatory Oversight- A recommendation was made to consider particular regulatory programs and their effectiveness. The commenter noted that infrastructure regulated under the federal Integrity Management regulation receives a higher level of scrutiny than other components of the infrastructure. Additionally, the State does not have strict regulatory requirements for corrosion protection. The team should consider the fact that having regulations on its own is not enough. Enforcement of regulations must also be effective. The team should evaluate enforcement issues as well.	• None
7.6 Independent Investigation of Incidents**-** One commenter noted that the State has no independent third party analysis when incidents occur and stated that having the State or industry examine accidents is not entirely effective because it is a conflict of interest for these groups to review their own problems. Independent investigative groups such as the National Transportation Safety Board exist at the federal level, but do not regularly conduct investigations in Alaska.	• None
8. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure No suggestions for best risk management practices or data sources were suggested by the public.	

Attachments:	Presentation Stakeholder Information Packet

C-4 Valdez / Prince William Sound and Copper River Basin Region Meeting Minutes

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Prince William Sound Regional Citizens Advisory Council (PWSRCAC) Stakeholder Consultation Meeting**
Date:	**October 16, 2008**
Time:	**9:30 AM – 11:00 AM**
Purpose:	The intent of this meeting was to solicit input from the PWSRCAC as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	Donna Schantz, PWSRCAC Sharry Miller, ADEC Stan Stephens, SSC Dan Rice, PSIO John Devens, PWSRCAC Thane Miller, PWSRCAC Tom Kuckertz, PWSRCAC Patrick Duffy, PWSRCAC Nancy Bird, PWSRCAC (teleconference) Myron Casada, ABS Consulting Ira Rosen, ADEC Bettina Chastain, EMERALD Gretchen Grekowicz, EMERALD

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. PWSRCAC was represented by Executive Director John Devens, PWSRCAC staff, and PWSRCAC board members. PSIO and ADEC staff members also attended. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz. Myron Casada and Steve Harris represented ABS Consulting. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope	

Agenda Item	Decisions/Actions
The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project team organization, objectives, scope, and timeline.	
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	• None
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives**-** The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging	• None

Agenda Item	Decisions/Actions
would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	• None
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
2.8 PWSRCAC Background- PWSRCAC is a citizens advisory group concerned with VMT. PWSRCAC is funded by Alyeska and was formed after the Exxon Valdez spill. The RCAC maintains a 5-year plan supported by committees that identify priority projects and issues. Currently, one of PWSRCAC's priorities is to keep the tug escort program in place, which would no longer be legally required once all ships are double-hulled.	• None
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the overview and following the overview. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
Q: Can PWSRCAC get studies on change in composition from the project team? **A:** The project team does not have that information right now. The team is currently just starting the methodology development. **C:** We have been told from industry that information on change in composition is	• None

Agenda Item	Decisions/Actions
proprietary and cannot be provided, but it has impacts on the infrastructure and is important knowledge to have in terms of spill response.	
C: The scope of the project is too large. Adequate time and money have not been allotted.	• None
C: The team will have to obtain permission from industry to get access to facilities.	• None
C: I hope that EMERALD is separate from Doyon. Doyon works with industry on the North Slope. It is important to ensure that EMERALD is separate from industry.	• None
Q: Does the scope of the project include natural hazards? **A:** Yes, the scope includes natural hazards.	• None
Q: Is the team talking with industry employees that might have concerns? Are there protections in place so they can speak freely? **A:** Anonymous avenues for input have been established. These avenues were not constructed specifically for industry employees, but for any stakeholder that may want to remain anonymous.	• None
Q: Will the team make recommendations in addition to identifying risks? **A:** The team will submit a risk profile including contributing factors for each risk. It will be the State's responsibility to make risk management decisions based on the profile.	• None
C: The team should travel to Cordova for the second round of public meetings. Cordova may have more to lose from a spill than Valdez.	• None
4. Stakeholder Input on Focus of the Risk Assessment The EMERALD Project Manager outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
4.1 North Slope- The North Slope was recommended as an area of focus for the team. PWSRCAC noted that regulatory oversight on the North Slope is lacking, which creates a situation in which industry is policing itself. Operations are not easily observed by citizens. PWSRCAC is concerned that wrong-doing is occurring on the North Slope because of minimal oversight.	• None
4.2 Pipeline Near Salcha- One commenter noted that the pipeline near Salcha currently has a 17% bend in the line. The commenter expressed concern that if the line continues to bend it could leak without detection. The commenter feels that these types of problems should be corrected regardless of expense.	• None

Agenda Item	Decisions/Actions
4.3 VMT West Metering Facility- One commenter identified piping at the west metering facility as at-risk for impacts from falling rocks.	• None
4.4 VMT Tanks- A concern was raised over extensions on compliance dates for required regularly occurring API tank inspections (every 10-years). 18 large tanks are on-site, 3 of which are in cold stand-by.	• None
5. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.	
5.1 Operational Hazards- One commenter mentioned multiple potential operational hazards including leaks, explosions, overworked employees, corrosion, and turbine issues along the corridor.	• None
5.2 Permafrost- Permafrost was mentioned as a potential natural hazard in terms of pipeline supports and potential failures. One commenter stated that the permafrost in the Gulkana area is especially unstable. It was recommended that the team evaluate the entire pipeline rather than focusing on the pump stations.	• None
5.3 Earthquakes- Earthquakes were identified as a potential natural hazard. PWSRCAC would like to see potential impacts of an earthquake outlined and ranked.	• None
5.4 Corrosion- PWSRCAC identified corrosion as the biggest concern. It was noted that Alyeska has a good corrosion protection program in place, but only a small portion of the pipeline is inspected each year so some corrosion may go undetected. The commenter also pointed out that it is not physically possible to inspect all major equipment. One commenter stated that corrosion is not easily observed. For piggable lines, the team could review maintenance and leak detection records, but many lines are not piggable. Furthermore, for underground lines that cannot be pigged, the only way to inspect is by excavating and testing them. A problem with this approach is that it is possible to dig up a portion of line for inspection and assume that it is representative of other portions of the line, but 100% verification cannot be obtained.	• None
5.5 Cyber-Terrorism- A concern was raised over the risk of breach into operator computer systems by hackers, and the potential for remote control of the infrastructure.	• None
5.6 Flooding- Flooding was identified as a risk at VMT. PWSRCAC indicated that there was a close call a few years ago and the VMT actually lost communications for a period of time.	• None
5.7 Vertical Supports- Supports were identified as a potential concern. The commenter pointed out that supports are deteriorating, but because they are located in rural areas, degradation is not noticed. The commenter also noted	• None

Agenda Item	Decisions/Actions
that supports did note fail during the Denali earthquake.	
5.8 Industry Culture- A culture of ignoring problems was raised as a concern. The commenter noted that often industry workers and contractors ignore problems such as maintenance and integrity nonconformances that are not in their immediate purview.	• None
5.9 Cold Start-up- PWSRCAC identified a shut-down of the pipeline in winter, requiring restart in cold temperatures, as a concern. Alyeska does have a cold startup plan that includes re-circulating oil to keep it warm.	• None
6. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. Participants were asked for concerns of significance within the scope of the project.	
6.1 Copper River Impacts- PWSRCAC is most concerned about potential impacts to the Copper River system and stated that it is the most important salmon fishery in the world. Approximately 800 streams feed the Copper River. Another commenter indicated that it is extremely technically challenging to recover a spill once it reaches the watershed. The change in flow from low in winter to high in summer makes responses even more complicated. PWSRCAC feels that because of the potential for such significant impact, prevention is extremely important. Once a spill occurs, damage is inevitable.	• None
7. Stakeholder Input on Other Specific Concerns or Priorities Participants were asked to identify other concerns and priorities to the project team for consideration.	
7.1 RCAC for TAPS & NS- PWSRCAC stated that creation of an RCAC for TAPS and for the North Slope could be a valuable risk mitigation measure and would give the public confidence in operations in those areas. PWSRCAC feels that it has contributed significantly in identifying risks for the VMT and stated that Alyeska has been cooperative in responding to these risks. PWSRCAC indicated that industry is strictly profit driven, and an RCAC helps to balance this out.	• None
7.2 Air Pollution- PWSRCAC noted that concerns regarding air pollution are minimal since venting from ballast water treatment is now contained in a closed vapor recovery system.	• None
7.3 Loopholes in Regulations- One commenter felt that industry took part in writing regulations and wrote in exemptions for themselves. Additionally, the commenter noted that the number of ADEC regulators on site at the facilities is too low. ADEC salaries are too low to attract or keep high quality people.	• None
8. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies,	

Agenda Item	Decisions/Actions
Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Suggestions for best risk management practices and data sources were suggested by participants and are summarized below.	
8.1 PWSRCAC recommended Richard Fineberg as a point of contact.	• EMERALD to consider consulting with Richard Fineberg
8.2 A recommendation was made for the project team to initiate contact with Glennallen. The commenter stated that valuable local knowledge could be provided from this region	• EMERALD to consider consultation with Glennallen region
8.3 A recommendation was made for the project team to review a 2006 Rock Slope Stability study that was done at the VMT. PWSRCAC will provide this study to the project team.	• EMERALD to consider use of Rock Slope Study
8.4 PWSRCAC indicated that it conducted a study on redundancy of communications systems. RCAC can provide this study.	• EMERALD to consider use of RCAC Communications Study
8.5 PWSRCAC indicated that a report on strategic reconfiguration was completed, but would have to be obtained from Alyeska.	• EMERALD to consider requesting Strategic Reconfiguration Study from Alyeska
8.6 PWSRCAC indicated that various studies and reports exist on the topic of the Copper River.	• EMERALD to consider researching Copper River reports
8.7 A recommendation was made to review the record of TAPS Contingency Plan hearings by James Brady	• EMERALD to consider review of TAPS C Plan Hearing Record
8.8 Multiple sources for watershed maps were identified including Ecotrust maps showing spill transport and environmental sensitivity indexes.	• EMERALD to consider use of referenced maps.
8.9 It was noted that Alyeska has a GIS database identifying environmentally and culturally sensitive areas.	• EMERALD to consider requesting Alyeska mapping data
8.10 A report summarizing the performance of the pipeline during the Denali earthquake was completed by Doug Nainen	• EMERALD to consider review of Denali Earthquake Report

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.

Topic:	**U.S. Coast Guard (USCG) Stakeholder Consultation Meeting**
Date:	**October 16, 2008**
Time:	**1:30 PM – 3:00 PM**
Purpose:	The intent of this meeting was to solicit input from the U.S. Coast Guard as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. The USCG was represented by two staff members. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz. Myron Casada and Steve Harris represented ABS Consulting. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project team organization, objectives, scope, and timeline.	
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance	• None

Agenda Item	Decisions/Actions
for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet	• None

Agenda Item	Decisions/Actions
infrastructure. Future developments such as exploration are excluded from the scope of the project. All “inside the fence” components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
2.9 USCG Interest- The structure of the USCG in Alaska was outlined for the team. Alaska is District 17 of the USCG and is based in Juneau, headquarters for the USCG in Alaska. The District is broken down into multiple district units including the Marine Safety Unit (MSU) in Valdez and other facilities throughout Alaska. The Valdez MSU focuses primarily on inspection and is responsible for all of Prince William Sound. Sector Anchorage has responsibility for the North Slope. The USCG has jurisdiction over navigable waterways, thirteen of which are crossed by pipelines. USCG has jurisdiction over a portion of the VMT storage tanks. USCG conducts annual inspections, Contingency Plan reviews, and oversees oil transfers.	• None
3. Stakeholder Input on Focus of the Risk Assessment The EMERALD Project Manager outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
3.1 VMT Overall Low Concern- The USCG indicated that generally VMT operations do not appear to be high risk. USCG feels that Alyeska operates safely and is very responsive when incidents occur. They are more concerned with private owners of small fishing vessels and other individual situations.	• None

Agenda Item	Decisions/Actions
Most of the discharges in their region do not originate from VMT.	
3.2 VMT Facility Piping- Facility piping was identified as an area for potential project team focus, particularly the crude line to the loading arms. This may be at higher risk because the downhill portion of the line, from containment to the pier, does not have a shut-off valve or any other means to stop flow.	• None
3.3 Loading Arm Maintenance- The USCG indicated that the loading arms are on a continuous maintenance schedule that results in replacement of all components of the arms every 10-years.	• None
3.4 Storage Tanks- Tanks were identified as one of the highest potential risk areas because they hold a large quantity of oil and they are located on a hill above the inlet.	• None
3.5 Marine Loading Facility- Marine loading facilities were identified as one of the highest potential risk areas because a high potential for human error exists in operating this facility. Additionally, the risk of human error can increase significantly because of natural hazards like high winds and wave action. USCG noted that Alyeska has a policy of not loading at wind speeds exceeding 30 knots (when waves start crashing over the boom). Additionally, the only containment of a spill while loading is the boom surrounding the operation.	• None
3.6 Mooring Structure- USCG identified the mooring structure, which is about 50-feet high as a potential component for project team focus. Due to the height, a significant amount of freeboard exists between it and the berths. USCG noted that this is the reason the floating berth is not utilized.	• None
4. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.	
4.1 VMT Support Systems- USCG noted that VMT is self-sufficient in terms of support systems.	• None
4.2 High Winds- Winds and associated wave action was identified as a hazard that could lead to incidents while loading as well as potential shut-down of production at the VMT if ships cannot be loaded and the tanks are filled to capacity.	• None
4.3 Geology- The geology underlying VMT was identified as a potential hazard. USCG indicated that stress on the underlying bedrock is monitored.	• None
4.4 Avalanches- Avalanche was identified as a potential hazard. USCG indicated that some engineering mitigation measures are in place including chutes to channel snow resulting from an avalanche.	• None
4.5 Tsunami- Tsunami was identified as a hazard. USCG indicated that Valdez	• None

Agenda Item	Decisions/Actions
has a tsunami warning system, which is tested weekly. USCG was unaware of any measures in place to protect the loading arms in case of a tsunami.	
5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. Participants were asked for concerns of significance within the scope of the project.	
5.1 Any Spill to Water- From a USCG perspective, any spill to water is a problem and a spill that significantly impacts a waterway would cause a shutdown if the USCG determines that safety zones must be created precluding tanker traffic to and from the VMT.	• None
6. Stakeholder Input on Other Specific Concerns or Priorities Participants were asked to identify other concerns and priorities to the project team for consideration.	
6.1 Regulatory Oversight at VMT- USCG representatives indicated that about 32 regulatory agencies have some level of oversight at VMT.	• None
6.2 Alyeska's Communication- USCG indicated that Alyeska is very consistent and effective at communicating incidents to them.	• None
7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Suggestions for best risk management practices and data sources were suggested by participants and are summarized below.	
7.1 A recommendation was made for the team to consider consulting with USCG Sector Anchorage, POC Lieutenant Commander Deleauri, Mark Hamilton, Port of Anchorage Captain, and Admiral Brooks from the District 17 Headquarters in Juneau.	• EMERALD to consider contacting recommended USCG POCs
7.2 A recommendation was made for the team to review a pipeline river crossing study focused on terrorism risks that was completed by the USCG.	• EMERALD to consider use of USCG River Crossing Study
7.3 USCG noted that a wind study of Port Valdez was completed by the RCAC.	• EMERALD to consider use of Port Valdez Wind Study
8.4 USCG recommended that the team consider reviewing the VMT Contingency Plan, Tanker Contingency Plan, and TAPS Contingency Plan.	• EMERALD to consider review of referenced contingency plans

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**City of Valdez Stakeholder Consultation Meeting**
Date:	**October 16, 2008**
Time:	**5:30 PM – 6:30 PM**
Purpose:	The intent of this meeting was to solicit input from the City of Valdez as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. The City of Valdez was represented by Mayor Bert Cottle and multiple members of the City Council. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz. Myron Casada and Steve Harris represented ABS Consulting. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project team organization, objectives, scope, and	

Agenda Item	Decisions/Actions
timeline.	
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	• None
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives**-** The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each	• None

Agenda Item	Decisions/Actions
potential event.	
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All “inside the fence” components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	• None
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the overview and following the overview. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
Q: Is terrorism included in the scope of the project? **A:** No, terrorism is outside the scope of this project. **C:** Terrorism should be the topic of a future assessment. **Q:** If terrorism is out of scope, what types of hazards will the team consider? **A:** Operational and natural hazard events will be considered.	• None
Q: Will the team consider inspection program schedules? **A:** Yes, inspection programs will be considered.	• None
Q: Will the team have access to previous studies?	• None

Agenda Item	Decisions/Actions
A: Yes, the team would like to use existing information and studies as much as possible.	
Q: Is there a deadline for submitting a report to the State? **A:** Yes, the Interim Report is due in December 2008. The proposed methodology will be submitted in February 2009, followed by the peer and public review in March-May 2009. The final methodology will be delivered in July of 2009, after which the implementation will occur from August 2009 to February 2010. The analysis and final report will be submitted by the end of May 2010. **Q:** There are two public comment periods? **A:** Yes, the team is soliciting public input into the methodology now, and the team will solicit comments on the proposed methodology in early spring.	• None
Q: Will the team consider multiple failure modes? **A:** It depends. In general, single failure modes will be the focus, but it may be appropriate to evaluate some areas in more detail. Fault tree analysis may be used as a tool.	• None
Q: What other groups will you meet with in Valdez? **A:** Meetings have either been held or are scheduled with the PWSRCAC, the US Coast Guard, and the City of Valdez.	• None
Q: Will the team evaluate back-up generation at facilities? **A:** Yes, power and fuel sources as well as back-up sources will be considered.	• None
Q: Will the team meet with native organizations? **A:** Yes, the team is holding individual meetings with key stakeholders including native organizations.	• None
Q: Will Cook Inlet receive the same level of scrutiny as other components of the system? **A:** The team will develop one set of tools that will be applied to all three consequence categories. It is likely that a screening tool will also be developed to assist in focusing the assessment.	• None
Q: Will private facilities be evaluated? **A:** Yes, both state and federally regulated facilities will be evaluated.	• None
Q: Is Alyeska agreeable to providing its documents? **A:** The team is asking industry to provide information/data. Industry has indicated that it will cooperate, but before this can occur, confidentiality issues must be resolved.	• None
4. Stakeholder Input on Focus of the Risk Assessment	

Agenda Item	Decisions/Actions
The EMERALD Project Manager outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
4.1 No input on the focus of the risk assessment was received at this meeting.	• None
5. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.	
5.1 Floods- Flooding, including floods resulting from glacier lake releases were identified as a potential hazard.	• None
5.2 Corrosion- Points of the pipeline that incur a rapid change in elevation, such as the base of Atigan Pass and the base of Thompson Pass, were identified as at-risk for corrosion. Corrosion as a result of induced magnetic fields in the Valdez area was also identified as a concern.	• None
5.3 Severe Storms- Weather was identified as a hazard that could potentially shut down production. If storms prevent tankers from being loaded at the terminal, the VMT tanks could reach capacity and interrupt flow from TAPS.	• None
5.4 Earthquakes- One commenter noted that the fault line near Yakutat is due for a big earthquake.	• None
6. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. Participants were asked for concerns of significance within the scope of the project.	
6.1 No input on priorities for unplanned events was received at this meeting.	• None
7. Stakeholder Input on Other Specific Concerns or Priorities Participants were asked to identify other concerns and priorities to the project team for consideration.	
7.1 Emergency and Spill Response- One commenter stated that spill drills conducted at VMT may not be realistic enough, and was concerned that response may be delayed due to bad weather conditions. It was recommended that unannounced drills be timed, and conducted under poor weather conditions. Another commenter pointed out that the citizens would like to know that assistance is coming in emergency situations when weather is bad. Citizens have no where to go in case of an emergency. During 9/11 there were reports of a threat to VMT and	• None

Agenda Item	Decisions/Actions
Alyeska began transporting people across the bay.	
7.2 Alyeska Strategic Reconfiguration- One commenter noted that Alyeska recently reconfigured its operation of TAPS. Following reconfiguration, Alyeska plans to use helicopters to ensure rapid response to spills. This strategy may fail if weather is poor or there is a forest fire.	• None
8. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Suggestions for best risk management practices and data sources were suggested by participants and are summarized below.	
8.1 A recommendation was made to obtain a study of 2006 flooding along TAPS reportedly completed by Alyeska	• EMERALD to consider use of 2006 Alyeska Flood Study

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Valdez Public Stakeholder Consultation Meeting**
Date:	**October 16, 2008**
Time:	**6:30 PM – 8:30 PM**
Purpose:	The intent of this meeting was to solicit Valdez area public input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions

1. Introductions

A total of 14 individuals were in attendance including the project team, members of the State Agency Oversight Team (SAOT), several APSC representatives, one PWSRCAC representative, and one member of the public at large. The meeting began with an introduction by Ira Rosen, ADEC Project Manager, and introductions of those in attendance. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz.

Agenda Item	Decisions/Actions
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project team organization, objectives, scope, and timeline.	
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	• None
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None

Agenda Item	Decisions/Actions
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	• None
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the presentation and following the presentation. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
Q: Will information be provided to the public at the end of Phase 1 of the project? **A:** The draft methodology will be submitted to the State in February 2009 followed by a public comment period on that methodology in early spring. Public review will occur concurrently with the peer review process.	• None
Q: Will tank farms such as those in the village be considered as part of the project?	• None

<table>
<tr><th>Agenda Item</th><th>Decisions/Actions</th></tr>
<tr><td> A: No, only tanks integral to operating the infrastructure will be considered. Distribution is out of the scope of the project.
C: It would be interesting to know the capacity of the largest tank farm in the State.
C: One of the consequence categories outlined in your presentation focuses on impacts to State revenue. It is important to note that significant impacts may be realized by local communities as a result of interruption in production without any impact to the revenue of the State as a whole, e.g., a line rupture in a tank farm.
A: Multiple comments such as this have been raised by stakeholders.
Q: If the supply of heating oil to Valdez or other communities was interrupted, the impact could be huge. Are these impacts included in the scope of the project?
A: The definition of reliability in terms of this project relates specifically to impacts to State revenue streams. The team recognizes that other economic and socioeconomic impacts are important, and some very real risks exist in these areas, but that is not part of this project scope. This topic could potentially be recommended for future study. </td><td></td></tr>
<tr><td> Q: Phase 2 of the project is about 5-months long. Is that enough time to implement the risk assessment?
A: 5-months is a limited period of time, so the team must focus on implementing the methodology efficiently. As the team works to develop the methodology during Phase 1, existing data/information on the infrastructure will be gathered. Phase 2 will focus on filling in gaps where that information is lacking. </td><td>• None</td></tr>
<tr><td> Q: How does the team plan on obtaining data from industry?
A: To date, the project team has met with industry through the Alaska Oil and Gas Association (AOGA) forum. The ARA project has the potential to benefit both industry and the State because it is proactive in nature, and industry has indicated that it intends to cooperate with the State. Currently, the State is working to establish protections for proprietary data that industry provides to the project. This project is not intended to be an enforcement action and to ensure success; a working relationship must be established with industry. </td><td>• None</td></tr>
<tr><td colspan="2"> 3. Stakeholder Input on Focus of the Risk Assessment
The EMERALD Project Manager outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems. </td></tr>
<tr><td>3.1 <u>Focus on North Slope Facilities</u>- A commenter recommended making North Slope facilities an area of focus. The independent citizen oversight provided by the</td><td>• None</td></tr>
</table>

Agenda Item	Decisions/Actions
PWSRCAC has already highlighted most of the concerns associated with the VMT, which have been resolved. There seems to be a lack of regulatory oversight on the North Slope. For example, some of the lines that ruptured had not been pigged in 14 years, which was not addressed by the State as a preventative measure. The project team commented that low stress lines were not required to be pigged at that time.	
4. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure in the Valdez region.	
4.1 No input was provided relating to initiating events.	• None
5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. The public was asked for their concerns of significance within the scope of the project.	
5.1 No input was provided in terms of consequences to reliability, safety, or the environment as a result of an unplanned event.	• None
6. Stakeholder Input on Other Specific Concerns or Priorities Stakeholders were asked to identify other concerns and priorities to the project team for consideration.	
6.1 Maintenance & Inspection Programs- It was recommended that the team analyze how maintenance and inspection programs are developed and monitored. The commenter noted that although the infrastructure is aging, it could potentially last for many more years if maintained properly. The project team added that the way facilities are maintained including reinvestments and inspections will be considered as part of assigning overall risk levels.	• None
6.2 Transparency of State-issued Reports- A commenter referenced a corrosion study performed for the State by Coffman Engineering in response to the 2006 incidents. The commenter pointed out that certain portions of that report were sanitized by the State or BP. The commenter also noted that she felt that the previous head of the ADEC Industry Preparedness Program (IPP) was demoted after she pointed out these problems. A representative from the PSIO office responded by noting that the PSIO will evaluate regulatory oversight and will use the risk assessment to help identify priorities for filling gaps in oversight.	• None
7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure	

Agenda Item	Decisions/Actions
No suggestions for best risk management practices or data sources were suggested by the public.	

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Cordova-based NGO's Stakeholder Consultation Meeting**
Date:	**October 30, 2008**
Time:	**9:00 AM – 10:30 AM**
Purpose:	The intent of this meeting was to solicit Cordova-based NGO input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The teleconference meeting began with introductions of those in attendance. Cordova was represented by Rochelle Van Den Broek, Cordova District Fisherman United; and Jennifer Gibbins, Cordova Chamber of Commerce. Nancy Bird represented the PWS Science Center. Ken Adams represented the Valdez Trustee Council. Kate Alexander attended on behalf of the Copper River Watershed Project. The meeting was facilitated by Brad Chastain, EMERALD Stakeholder Facilitator and scribed by Gretchen Grekowicz, EMERALD Project Coordinator.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Stakeholder Facilitator outlining project team organization, objectives, scope, and timeline.	
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance	• None

Agenda Item	Decisions/Actions
for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives**-** The objectives and structure of the stakeholder consultation process were explained by the EMERALD Stakeholder Facilitator. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet	• None

Agenda Item	Decisions/Actions
infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	•
2.9 Cordova NGO Interest- The common interest of this group of organizations is a focus on impacts from historical oil and gas operations and releases, primarily the Exxon Valdez oil spill. The Copper River Watershed Project's mission is to promote sustainable development, restore fish habitats, and establish avenues for the public to provide its ideas on these issues.	• None
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the presentation and following the presentation. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
Q: What is the status of National Academy of Sciences (NAS) involvement in the project? **A:** The State is working to finalize a contract with NAS to provide a peer review of the methodology.	• None
Q: Implementation of the methodology starts in late August 2009 and has a duration of 6- months. What is the reasoning for this timing? Is it seasonal? **A:** The team will have to collect a significant amount of data. This process will start well before Phase 2. Initial data collection efforts have already begun. The schedule was developed based on an overall timeline set out by the State and is not driven by seasons.	• None

Agenda Item	Decisions/Actions
Q: Does the team expect to have access to industry's facilities? Will industry be pre-notified of the visits or will they be unannounced? Will the visits be set up like an inspection? **A:** It is important for the team to have cooperation from industry and access to industry data, but confidentiality issues with this type of sensitive industry information exist. The State is currently working to address these issues and industry has expressed interest in working with the project team. This project is not intended to be an enforcement action and will not include inspections. The team may work on-site at industry facilities, but any site visits will be planned ahead of time coordinated with individual operators.	• None
Q: How much time is allotted for this meeting? **A:** The meeting is scheduled for 1 ½ hours, but the team is flexible in order to capture all input from the participants.	• None
Q: Why are human acts outside the scope of the project? **A:** Terrorism and sabotage risks have already been studied considerably by other agencies and the State removed this area from the scope of the study. Intentional human acts will not be considered as part of the project, but human-caused accidents will be evaluated.	• None
Q: Will the team be conducting assessments in the field? **A:** The team will break down the infrastructure system into components, then identify high risk areas and points of vulnerability. The team will consider multiple factors during this process, but will not be conducting inspections in the field. The team would like to collect as much information as possible from existing studies and anticipates the best data may be available at the facility levels in some cases.	• None
Q: Will the team take environmental hazards such as high winds, river crossings, etc. into consideration? **A:** Yes, the team will evaluate natural hazards as part of the risk assessment. ABS Consulting has world-renowned experts in natural hazard analysis. Additionally, the team is soliciting input from the Alaska Seismic Hazards Safety Commission.	• None
Q: How will the team measure how damaging an event will be? Economic impacts relating to damage of the Copper River are difficult to define. **A:** The team is currently asking for input on economic impacts and thresholds that would be considered unacceptable in this category. Ms. Van den Brook offered to email the team a list of economic impacts.	• Ms. Van den Brook to email EMERALD list of economic impacts.
Q: How effective is JPO as a regulatory agency and how will this project interact with JPO? Does anyone on the project team represent the environmental and cultural resource perspectives? There should be public representation on the project team. **A:** JPO agencies are on the SAOT and are being consulted for Stakeholder input. The SAOT originally considered including a public advisory group as part of the	• None

Agenda Item	Decisions/Actions
project, but Emerald can't speak for the SAOT's decision on this topic. The entire first year of the project is dedicated to soliciting Stakeholder input and developing the methodology. **C:** This is very unfortunate and is a huge omission from the project. Many citizens can provide greater knowledge of the issues than those on the project team.	
Q: When is the next opportunity for the public to have input into the project? **A:** The Interim Report will be delivered to the State in December 2008. Then the proposed risk assessment methodology will be submitted to the State in February 2009. The public will have an opportunity to provide comment on the risk assessment methodology at that time.	• None
3. Stakeholder Input on Focus of the Risk Assessment The EMERALD Stakeholder Facilitator outlined specific input to be solicited from stakeholders including portions of the infrastructure the participants feel warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
3.1 <u>Aging North Slope Infrastructure</u>- Concerns were raised over the age of North Slope infrastructure and the status of the current technology in place at facilities.	• None
3.2 <u>TAPS River Crossings</u>- Commenters identified areas where TAPS crosses rivers, particularly tributaries of the Copper River, as a significant concern.	• None
4. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.	
4.1 <u>Corrosion</u>- Corrosion of pipelines was identified as a concern.	• None
4.2 <u>Human Error</u>- Accidents caused by overworked, tired, or inexperienced workers were noted as a concern.	• None
4.3 <u>High Winds</u>- Damage from wind was identified as a concern.	• None
4.4 <u>Industry Budget Reductions</u>- Industry cost-cutting measures were identified as a concern. The commenter noted that oil companies are realizing record profits while maintenance and operations budgets are being cut. One commenter pointed out that industry budgets do not appear to recognize the need for increased monitoring and upgrades of aging equipment. Another commenter stated that industry does not live up to its commitments.	• None
4.5 <u>Automation of Facilities</u>- Strategic reconfiguration of TAPS resulting in automation of pump stations was pointed out as a concern.	• None
4.6 <u>Reduced Workforce</u>- One commenter pointed out that the industry workforce	• None

Agenda Item	Decisions/Actions
has been reduced resulting in decreased attention to operations and less monitoring activity.	
5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. Participants were asked for their concerns of significance within the scope of the project.	
5.1 Impacts to Copper River Fisheries- Any spill that impacts the Copper River watershed including fisheries and damage to the Copper River "brand" was identified as unacceptable. This was defined as the Copper River and its tributaries.	• None
5.2 Damage to the Intrinsic Value of the Copper River- One commenter noted that there is value in the existence of the Copper River as an environment. Damage to this intrinsic value is difficult to measure.	• None
5.3 Subsistence- Subsistence and traditional culture were noted as significant concerns.	• None
5.4 Spills to Silty Waters- Spills in silty waters were identified as a concern because of how the oil and silt may interact during attempts to recover the oil.	• None
5.5 An Event Comparable to the Exxon Valdez- One commenter pointed out that it took a major catastrophe like the Exxon Valdez oil spill to spur action on the part of industry and the government to create a Regional Citizens Advisory Council. Participants were concerned that it would take another similar catastrophe to get this type of attention focused on Prince William Sound. Participants stated that another major event like Exxon Valdez cannot be tolerated. It was also mentioned that some sort of failure is inevitable. The commenter noted that Alaska should set the standard for prevention for the rest of the world.	• None
6. Stakeholder Input on Other Specific Concerns or Priorities Stakeholders were asked to identify other concerns and priorities to the project team for consideration.	
6.1 Response Effectiveness- Multiple aspects of incident response were pointed out as potentially flawed. One commenter indicated that the hierarchical structure of the chain of command system could prevent timely response. This commenter would like to see local people get in and respond right away To spills. A comment was also made regarding the lack of priority industry has on spill response efforts. Lack of public oversight, mechanical failures, response capabilities, and response training were also raised as concerns. Ineffective monitoring programs were also pointed out as a contributing factor to poor response to spills.	• None
6.2 Prevention vs. Response- One commenter stated that the focus should be on prevention of incidents rather than response.	• None

Agenda Item	Decisions/Actions
6.3 State's Relationship with Industry- The relationship between the State and the oil and gas industry was identified as too close. The commenter specifically referenced the previous manager of the IPP Program who was reportedly forced to resign because of highlighting industry deficiencies. Another commenter stated that industry has the perception that the State exists to facilitate industry's needs, but in reality it is a privilege for industry to operate in Alaska. Additionally, the commenter feels that it is part of the State's culture to allow industry too much influence in matters. It was noted that there is usually no public voice in the State's process.	• None
7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Participants were asked for suggestions for best risk management practices and recommended data sources.	
7.1 A recommendation to review a study on silt was provided. Kate Alexander can provide this study.	• EMERALD to consider use of Silt Report.

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Ahtna, Incorporated Stakeholder Consultation Meeting**
Date:	**November 3, 2008**
Time:	**2:00 PM – 3:30 PM**
Purpose:	The intent of this meeting was to solicit Ahtna input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. Ahtna was represented by 12 board members. The meeting was facilitated by Brad Chastain (EMERALD Stakeholder Facilitator) and scribed by Gretchen Grekowicz, EMERALD Project Coordinator.	
2. Project Objectives, Background, and Scope The EMERALD Stakeholder Facilitator provided a detailed overview outlining project team organization, objectives, scope, and timeline.	
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the	• None

Agenda Item	Decisions/Actions
project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Stakeholder Facilitator. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None
2.7 Project Scope- The scope of the project was described in terms of geography,	• None

Agenda Item	Decisions/Actions
infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	•
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the presentation and following the presentation. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
Q: Are refrigeration units along TAPS included in the scope of the project? **A:** Yes, because they are integral to the integrity of the infrastructure.	• None
Q: Is industry feeling threatened about this project? **A:** Industry has indicated that it will cooperate with the project team, but is concerned about confidentiality of proprietary data. The State is currently working with industry to resolve this issue.	• None
Q: Is the PSIO a part of the State? **A:** Yes, PSIO is part of the Alaska Department of Natural Resources.	• None
Q: What will the State do with the final report provided by EMERALD? **A:** That will be up to the State. Options may include working cooperatively with industry, making regulatory changes, focusing State oversight, etc.	• None

Agenda Item	Decisions/Actions
C: Ahtna is concerned with how the final report is handled.	
Q: Will the team review the TAPS Contingency Plan? **A:** The TAPS Contingency Plan will be considered as an operational control and could impact the severity or likelihood of a potential event. This project will not involve analysis of individual plans or procedures, but will consider controls in place.	• None
3. Stakeholder Input on Focus of the Risk Assessment The EMERALD Stakeholder Facilitator outlined specific input to be solicited from stakeholders including portions of the infrastructure the participants feel warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
3.1 <u>Refrigeration Units</u>- Refrigeration units used to maintain permafrost temperatures were identified as a potential risk of toxic chemical release.	• None
3.2 <u>Valves</u>- Ahtna identified check valves and RGVs as potential weak points in the TAPS system.	• None
3.3 <u>Pipelines Under Rivers</u>- Buried pipelines that flow under river systems were identified as a concern. Ahtna feels these pipelines should be inspected because they are not visible. In particular, the Klutina river crossing is a low spot that could have more severe corrosion issues.	• None
4. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.	
4.1 <u>Earthquakes</u>- Earthquakes were identified as a key concern.	• None
4.2 <u>Corrosion of Aging Lines</u>- Corrosion of aging lines was identified as a concern. Commenters noted that the infrastructure has exceeded its life expectancy, and although pigging is conducted, it may not keep up with the corrosion issue.	• None
4.3 <u>Reduced Manning of TAPS</u>- Ahtna pointed out that the automation and reduced workforce specific to TAPS is a concern, specifically in terms of spill detection and response time.	• None
4.4 <u>Pigging Effectiveness</u>- The accuracy of the smart pig program and alternatives to pigging were identified as a priority for the team's focus.	• None
5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers	

Agenda Item	Decisions/Actions
to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. Participants were asked for their concerns of significance within the scope of the project.	
5.1 Ahtna Summary of Unacceptable Consequences- Ahtna indicated that it has reviewed potential risks of oil and gas industry operations as a group, and has created a matrix. Ahtna provided the project team with a comprehensive worksheet of these concerns, which will be incorporated as stakeholder input and will be considered during methodology development.	• Consider Ahtna summary of concerns as an input to methodology development.
5.2 Impacts to TAPS River Crossings- TAPS crossings over major rivers was identified as a concern. Ahtna stated that the potential exists for thousands of gallons to spill at these points, which could quickly impact the Copper River. Ahtna recommended adding additional shut-off valves in key locations to minimize the potential impact of such a spill. Ahtna also suggested installing temporary storage that would allow for a spill to be quickly pumped into a tank. It was also suggested that an extra layer of containment be added to portions of the pipeline in ultra-sensitive areas.	• None
5.3 Subsistence- Subsistence, particularly fishing, was identified as the top concern of Ahtna. Ahtna indicated that TAPS crosses five major rivers in the region and a spill to these rivers would take only about 30 minutes to reach the Copper River..	• None
5.4 Impacts to Permafrost- Ahtna identified melting and other damage to the permafrost as a concern.	• None
6. Stakeholder Input on Other Specific Concerns or Priorities Stakeholders were asked to identify other concerns and priorities to the project team for consideration.	
6.1 TAPS Contingency Plan- Ahtna indicated that it does not agree with the TAPS Contingency Plan. Ahtna feels that the plan is unrealistic in terms of its response time estimates, that river flow calculations are inaccurate and were not verified in the field, and generally that the plan will not provide effective response. Ahtna indicated that it expressed these concerns to Alyeska, but they were not addressed in the Contingency Plan.	• None
6.2 Lack of Ahtna People Employed by TAPS- Ahtna indicated that the only economic benefit it receives from the oil and gas industry is based on employment of its people. Ahtna does not receive any direct revenue from the ROW over its lands. Ahtna indicated that it agreed to grant access to its lands in exchange for employment of its people. Ahtna stated that it would like to see a response training program for its people and a six-person team that could respond to spills between Valdez and Pump Station 10.	• None
6.3 Response Materials- Ahtna indicated that there are no dedicated spill response materials at river crossings along TAPS. Materials must be transported to the spill site.	• None

Agenda Item	Decisions/Actions
6.4 Response in Winter- Concern was raised over winter spill response. Ahtna indicated that Alyeska's plan only addresses summer response.	• None
6.5 Unreported Leaks- Ahtna stated that a long term leak releasing oil into the Klutina River did not get reported or fixed until a whistle-blower reported it.	• None
6.6 Lack of Access to Rivers- Lack of access was identified as a concern in terms of spill response. Ahtna indicated that approximately 35-40 miles of critical river shoreline exist with no road access.	• None
6.7 Alaskan Residents Incur Results of Events- Ahtna pointed out that the people of Alaska incur the actual results of a risk, not the oil and gas companies.	• None
6.8 Copper River not an ESA- The fact that Copper River is not considered an Environmentally Sensitive Area by the State was raised as a concern.	• None
7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Participants were asked for suggestions for best risk management practices and recommended data sources.	
7.1 The Copper River watershed flow model was recommended as a source of information.	• Consider using Copper River Watershed Model during implementation phase.

Attachments:	Presentation Stakeholder Information Packet

C-5 Barrow / North Slope Region Meeting Minutes

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Barrow Arctic Science Consortium (BASC) Stakeholder Consultation Meeting**
Date:	**October 21, 2008**
Time:	**10:00 AM – 11:30 AM**
Purpose:	The intent of this meeting was to solicit BASC input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. BASC was represented by Glenn Sheehan, Executive Director. The meeting was facilitated by Brad Chastain, EMERALD Stakeholder Facilitator, and scribed by Gretchen Grekowicz., EMERALD. JoAnn Grady represented Grady and Associates, and Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Stakeholder Facilitator outlining project team organization, objectives, scope, and timeline.	
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on	• None

Agenda Item	Decisions/Actions
process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Stakeholder Facilitator. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine),	• None

Agenda Item	Decisions/Actions
reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the presentation and following the presentation. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
Q: Does the Risk Assessment allow for suggestions regarding paths to the future? **A:** The State will determine how to take action on the results of the risk assessment, but that will occur after the assessment is complete.	• None
C: BASC has worked with the oil and gas industry on the North Slope to a limited extent by conducting research funded by ConocoPhillips. Also, many of the local residents have worked on the North Slope in a spill response function.	• None
C: Gas distribution at Naval Arctic Research Laboratory (NARL) is maintained by UIC. Bethel Utilities Corporation, Inc. (BUCI) does not maintain gas distribution at NARL.	• None
4. Stakeholder Input on Focus of the Risk Assessment The EMERALD Stakeholder Facilitator outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	

Agenda Item	Decisions/Actions
4.1 No input was received on the focus of the risk assessment in this meeting.	• None
5. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.	
5.1 Methane Hydrates- The risk of explosion relating to methane hydrates was raised as a concern. As the temperature of the ocean rises, methane hydrate explosions become more common, which is a condition only found in the Arctic. An explosion near shore could affect drilling rigs and piping. The BASC representative also noted that methane hydrates are a source of fuel power that could supply communities and help build infrastructure.	• None
5.2 Outdated Equipment- BASC identified outdated equipment at the older facilities as a higher risk than new facilities such as Alpine. The representative pointed out that the risk at specific facilities is highly dependent on location and age. It was suggested that a "best practices list" be generated for upgrading and retrofitting older facilities. It was also pointed out that reliable instrumentation is even more important at unmanned facilities. When personnel are on-site, rapid recognition and response to releases is more likely.	• None
6. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. BASC was asked for its concerns of significance within the scope of the project.	
6.1 Impacts to Subsistence- A marine spill resulting in harm to fish and wildlife would significantly impact the subsistence lifestyle. North Slope communities are sensitive to disasters in the marine environment, especially following the incident in which the Navy dumped 20,000 gallons of fuel into the ocean near Barrow. It was reported that as a result of this spill, the area was devoid of game for at least 4 years. Marine spills have the potential to permanently change whale migration precluding hunters from catching them if they are too far offshore. The BASC representative also noted that even a 1-year alteration in whale migration has the potential to become a permanent shift.	• None
6.2 Any Injury or Death- It was noted that any infrastructure event that results in an injury or death is unacceptable. Some events, such as driving accidents, are expected and should be considered separately from infrastructure events.	• None
6.3 A Shut-Down of TAPS- An event that shuts down TAPS was identified as unacceptable. The BASC representatives noted that guidelines should be established to determine a realistic length of time (e.g., two weeks) for a shutdown to repair or maintain the pipeline. Remoteness of the location should be considered when defining these guidelines.	• None

Agenda Item	Decisions/Actions
6.4 Destruction of Cultural Resources- A terrestrial spill has the potential to damage or destroy cultural resources. Currently available cultural resource maps are not complete and were conducted with only minimal on-the-ground verification of sites. In general, most cultural resources are located in shallow ground, so spill response personnel could easily remove soil without noticing that artifacts are being removed with it. It was noted that no thorough cultural survey of oil fields has been conducted, and a lack of awareness exists regarding the quality of existing maps. It was recommended that the project team consider cultural resources as part of the assessment.	• None
7. Stakeholder Input on Other Specific Concerns or Priorities BASC was asked to identify other concerns and priorities to the project team for consideration.	
7.1 Incentives for Onshore Development- BASC stated that shutting down TAPS would be disastrous for the North Slope; therefore, it is critical to fully utilize the pipeline. The long-term goal of the North Slope is to get a congressional delegation to incentivize the industry to bring offshore development onshore, and to integrate it with TAPS. Onshore development would generate revenue to the NSB through taxation of physical infrastructure.	• None
8. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Suggestions for best risk management practices and data sources suggested by BASC are summarized below.	
8.1 Craig George, NSB Department of Wildlife Management, was recommended as a resource. It was noted that several attempts had been made prior to the meeting to reach this department for input.	• EMERALD to consider contacting Craig George
8.2 Charlie Hopson and Adeline, both of which work for LCMF and conduct spill response for Alyeska, were recommended as points of contact for spill response issues (907-852-8212).	• EMERALD to consider contacting LCMF
8.3 Anne Jensen (907-852-3050) of UIC Sciences was recommended as a resource for cultural resource information.	• EMERALD to consider contacting Anne Jensen

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**North Slope Borough (NSB) Planning Department Stakeholder Consultation Meeting**
Date:	**October 21, 2008**
Time:	**1:30 PM – 3:00 PM**
Purpose:	The intent of this meeting was to solicit North Slope Borough Planning Department input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. Gordon Brower represented the North Slope Borough (NSB). The meeting was facilitated by Brad Chastain, EMERALD Stakeholder Facilitator, and scribed by Gretchen Grekowicz, EMERALD Project Coordinator. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Stakeholder Facilitator outlining project team organization, objectives, scope, and timeline.	

Agenda Item	Decisions/Actions
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	• None
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Stakeholder Facilitator. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None

Agenda Item	Decisions/Actions
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	• None
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the presentation and following the presentation. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
C: The NSB Planning Department is primarily interested in: 1) oversight of permitting requirements, 2) review of North Slope Development, 3) public hearings, and 4) zoning.	• None
C: State Bill 191 removed the NSB's capability to comment on offshore drilling operations	• None
C: The NSB has considered establishing its own ordinances and codes to compensate for deficiencies in the State system.	• None
Q: Will projects that are currently scheduled for construction be included in the scope of the project? **A:** No, the scope of the project is limited to infrastructure in production as of July 1, 2008.	• None

Agenda Item	Decisions/Actions
C: When equipment is replaced, it should have to meet new standards.	• None
4. Stakeholder Input on Focus of the Risk Assessment The EMERALD Stakeholder Facilitator outlined specific input to be solicited from stakeholders including portions of the infrastructure stakeholder feel warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
4.1 Offshore Pipelines- Northstar has a single steel wall subsea pipeline that exists in a harsh corrosive environment. The potential for disaster is huge. Extra subsea valves should be installed. Capability for spill cleanup has not been tested or proven in ice conditions. Ice could prevent response vessels from reaching a spill. Claiming this type of spill can be cleaned up sufficiently is different than actually being able to demonstrate the capability.	• None
5. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure in the Barrow region.	
5.1 <u>Accidental Shooting</u>- Hunters could accidentally shoot a hole in the pipeline.	• None
5.2 <u>Aging Infrastructure</u>- The NSB indicated that it has been raising the issue of integrity of aging infrastructure for years. The NSB wants to work with the State, but feels the State does not take them seriously.	• None
6. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. The NSB was asked for their concerns of significance within the scope of the project.	
6.1 <u>Respiratory Illness</u>- Nuiqsut residents think the Arctic haze is related to Prudhoe Bay activities rather than from global industrial pollution in general. The NSB feels that any chronic impact to human health is unacceptable.	• None
6.2 <u>Revenue-</u> The NSB wants the existing infrastructure replaced to prevent decline in tax value/revenue. New developments such as Oooguruk and Nakaitchuq help increase NSB revenue.	• None
6.3 <u>Subsistence-</u> Terrestrial spills have the potential to impact caribou herds. Caribou calving is shifting south because of the Meltwater Field. Also, the caribou split to either side of TAPS. The NSB proposed a caribou crossing, but the industry threatened no new development, which could impact NSB revenue. If the resources move, they are no longer available to villagers for subsistence. A spill to water	• None

Agenda Item	Decisions/Actions
could impact bowhead whale migration and the fish population (fish require a certain percentage of ice cover). Harm to marine resources could permanently affect the indigenous subsistence way of life in area communities.	
7. Stakeholder Input on Other Specific Concerns or Priorities Stakeholders were asked to identify other concerns and priorities to the project team for consideration.	
7.1 Working relationships- The NSB indicated that it prefers to work with Pioneer, Eni and other independent companies rather than the large oil companies. NSB has encountered difficulty working with BP. Interactions with ConocoPhillips are improving. The NSB has a good working relationship with Shell.	• None
7.2 Certification Programs- The NSB indicated that it would like to see a program requiring certification of infrastructure components instituted. This would encourage more proactive preventative maintenance rather than reaction to problems.	• None
7.3 Low Quantity of Regulators- The NSB pointed out that there are a low number of regulators present on the North Slope, which leads to industry conducting its own oversight of the infrastructure. The NSB referenced comparative data on Louisiana's oversight resources that indicates Alaska numbers are low.	• None
7.4 Traffic on the Haul Road- The NSB stated it is concerned about heavy traffic on the Haul Road.	• None
7.5 Rezoning- For major rezoning, plans should be submitted to outline how shutdown and cleanup of facilities will be accomplished.	• None
8. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Participants were asked for suggestions for best risk management practices were and data sources.	
8.1 No suggestions for best practices or data sources were received during the meeting.	• None

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Native Village of Barrow Meeting**
Date:	**October 21, 2008**
Time:	**2:45 PM – 4:00 PM**
Purpose:	The intent of this meeting was to solicit Native Village of Barrow input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. Tommy Olemaun and Vera Williams represented the Native Village of Barrow. The meeting was facilitated by Brad Chastain, EMERALD Stakeholder Facilitator, and scribed by Gretchen Grekowicz, EMERALD Project Coordinator. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Stakeholder Facilitator outlining project team organization, objectives, scope, and timeline.	

Agenda Item	Decisions/Actions
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	• None
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Stakeholder Facilitator. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None

Agenda Item	Decisions/Actions
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	• None
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the presentation and following the presentation. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
C: The Native Village of Barrow (the Village) is generally opposed to offshore drilling and development because the ocean is their heritage and hunting area. We prefer onshore development, but are concerned that industry waits to take action until problems occur rather than being proactive about maintenance.	• None
C: The Village would like to receive part of the revenue from the oil and gas industry to provide services to our 1,700 enrolled members.	• None
Q: Does the scope include both onshore and offshore infrastructure? **A:** The scope of the project includes existing onshore and offshore infrastructure, including Northstar and Endicott.	• None
4. Stakeholder Input on Focus of the Risk Assessment	

Agenda Item	Decisions/Actions
The EMERALD Stakeholder Facilitator outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
4.1 No input on the focus of the risk assessment was received in this meeting.	• None
5. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure in the Barrow region.	
5.1 <u>Infrastructure Age</u>**-** The Village commented that the pipeline is old and pointed out that there is new technology so the infrastructure should be replaced to relieve anxiety about the safety of the pipeline.	• None
5.2 <u>Need for Increased Pigging</u> – The Village expressed surprise about the break at Greater Prudhoe Bay in 2006 and did not understand why the pigging did not work. The Village commented that there may be a need for more pigging to prevent spills in the future.	• None
6. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. The Native Village of Barrow was asked for their concerns of significance within the scope of the project.	
6.1 <u>Safety During Subsistence Activities</u> – The Village expressed concern regarding safety of those hunting if they must navigate around the infrastructure to hunt animals.	• None
6.2 <u>Spills Impacting Hunting</u>**-** The Village identified spills that damage wildlife or limit access to hunting grounds as unacceptable.	• None
7. Stakeholder Input on Other Specific Concerns or Priorities Stakeholders were asked to identify other concerns and priorities to the project team for consideration.	
7.1 <u>Spill Response</u> – The Village commented that spill response drills should be conducted in the Arctic instead of the Gulf of Mexico to make them more realistic in terms of response to Alaska incidents.	• None

Agenda Item	Decisions/Actions
7.2 Best Practices- The Village feels that industry should evaluate operations in other Arctic regions and develop best practices as a result of the research.	• None
7.3 Vegetation and Soil- Determining how best to restore arctic soil and plants was identified as an important topic. The grasses currently being used in restoration efforts grow faster than native plants. Additionally, vegetation grows differently in areas where driving on the ice road has compacted the tundra. The Village noted that lichens, in particular, take a long time to recover. It was highlighted that damaged grazing areas have an impact on wildlife availability.	• None
7.4 Monitoring & Accountability – The Village identified better monitoring of the infrastructure and accountability as a potential solution. The commenter also stated that the people need more than a piece of paper to believe a solution will really work.	• None
7.5 Energy Crisis- The Village commented that pipeline spurs and refineries should be made accessible to Alaskan villages to alleviate the energy crisis and reduce fuel prices.	• None
7.6 Consultation with Land Owners- The Village noted that oil companies should consult with Native Village of Barrow about native allotments before moving forward with new developments. Seventy-five percent of the National Petroleum Reserve, Alaska (NPRA) is a Village of Barrow allotment. The commenter added that industry should hire local natives with knowledge of the area to accompany them during development to ensure natural resources are not damaged.	• None
7.7 Seismic Studies- The people are concerned about the affect of seismic studies on marine resources because they have impacted the ringed seal population.	• None
8. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Participants were asked for best risk management practices and data sources.	
8.1 No suggestions for best practices or data sources was received in this meeting.	• None

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**LCMF Stakeholder Consultation Meeting**
Date:	**October 21, 2008**
Time:	**4:00 PM – 5:00 PM**
Purpose:	The intent of this meeting was to solicit LCMF input from Charlie Hopson as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology. Mr. Hopson has a background as a consultant for oil industry, and as a tax assessor.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. Charles Hopson represented LCMF and JoAnn Grady represented Grady and Associates. The meeting was facilitated by Brad Chastain, EMERALD Stakeholder Facilitator, and scribed by Gretchen Grekowicz., EMERALD Project Coordinator. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Stakeholder Facilitator outlining project team organization, objectives, scope, and timeline.	

Agenda Item	Decisions/Actions
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	• None
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Stakeholder Facilitator. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None

Agenda Item	Decisions/Actions
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	• None
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
3. Stakeholder Input on Focus of the Risk Assessment The EMERALD Stakeholder Facilitator outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
3.1 Modules- LCMF noted that areas containing multiple workers are at high risk for fatalities/injuries. The representative stated that people working inside modules are most at risk.	• None
3.2 NS Facilities- The LCMF representative indicated that overall he does not worry about North Slope facilities. The facilities appear new from his perspective.	• None
4. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.	

Agenda Item	Decisions/Actions
4.1 Industry Culture- LCMF feels that BP designed and built its portion of the infrastructure more responsibly than ARCO. The representative stated that ARCO cut a lot of corners in building its facilities, including rushing into permitting. When BP bought-out ARCO, it inherited these problems. New North Slope facilities do not appear to have significant issues.	• None
4.2 Natural Hazards- A concern was raised regarding deterioration of infrastructure due to harsh weather conditions and subsidence leading to sinking supports. The representative noted that the tundra can shift substantially over fairly short periods of time making predictability of spill paths unreliable (e.g. a tundra lake that reportedly changed in depth from 2-3 feet to 8-9 feet over the course of a few weeks).	• None
4.3 Seawater-Induced Corrosion- A concern that seawater injection can increase corrosion in pipes was raised.	• None
5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. LCMF was asked for its concerns of significance within the scope of the project.	
5.1 Widespread Spills to Water- LCMF's primary concern is a spill to water at river/creek crossings that would travel a long distance and impact a wide area including the marine environment. No spill is really considered acceptable, but there is greater concern over spills to water versus the tundra. Available spill response equipment is not adequate for responding to a spill to water in broken ice conditions. Response is more achievable on land. The tundra is damaged but is able to recover. For example, the 2006 corrosion-related spill did not cause permanent damage because it was accessible, response was fast, and the tundra was able to recovered after restoration with sod.	• None
5.2 Revenue from Infrastructure Low Priority- The representative stated that the most important potential consequence is safety. He feels that revenue should is not as high a priority.	• None
6. Stakeholder Input on Other Specific Concerns or Priorities LCMF was asked to identify other concerns and priorities to the project team for consideration.	
6.1 Life Expectancy of TAPS- The representative noted that the assessed value of the pipeline was based on a life span of 30-years, and that time has elapsed. He commented that from a taxation standpoint, the pipeline is worth almost nothing.	• None
7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure	

Agenda Item	Decisions/Actions
No suggestions for best risk management practices or data sources were suggested by LCMF.	

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**North Slope Borough Meeting**
Date:	**October 22, 2008**
Time:	**10:30 AM – 12:00 PM**
Purpose:	The intent of this meeting was to solicit North Slope Borough (NSB) input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. Harold Curran, Randy Hoffbeck, and Ben Greene represented the North Slope Borough (NSB). The meeting was facilitated by Brad Chastain, EMERALD Stakeholder Facilitator, and scribed by Gretchen Grekowicz, EMERALD Project Coordinator. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Stakeholder Facilitator outlining project team organization, objectives, scope, and timeline.	

Agenda Item	Decisions/Actions
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	• None
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Stakeholder Facilitator. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None

Agenda Item	Decisions/Actions
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	• None
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the presentation and following the presentation. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
C: The NSB's primary interest in the project relates to tax assessment income from the physical infrastructures and a desire to reduce the risks of events occurring on the pipeline.	• None
Q: Will the team consider environmental conditions that could lead to an event? **A:** Yes, the risk assessment will consider natural hazards (e.g., volcanoes, earthquakes, tsunamis, etc.) and operational hazards.	• None
Q: Will tankers be in scope when they are loading and attached to arms? **A:** No, marine areas are excluded from this study even when tankers are connected to loading arms.	• None

Agenda Item	Decisions/Actions
Q: Will seismic issues or exploratory drilling be addressed in the risk assessment? **A:** No, seismic work and exploratory drilling are considered exploration and are not a part of this study.	• None
Q: Was the National Academy of Sciences book on oil and gas risk assessment cumulative effects a starting point for this project? **A:** No, it is the State's understanding that there is no existing and generally accepted methodology to use for this type of project.	• None
C: In June, the NSB sent a letter to the Commissioner of ADEC supporting the intent of the project. We have also been involved with the PSIO. The NSB is concerned that the budget for the project is insufficient. We are also concerned with the exclusion of future development from the scope. The risk assessment should include this component.	• None
Q: To what extent will the risk assessment focus on climate change as part of environmental consequences? **A:** Climate change will be considered as a natural hazard and is included in the scope of the project.	• None
Q: Will the project team be able to obtain information from industry? **A:** Industry has indicated they are supportive of the project, but confidentiality and data protection issues are a concern. The State assigned an Assistant Attorney General to work on crafting agreements to resolve these issues. **C:** The industry looks for ways to get reductions in tax values of the physical infrastructure, and could use the results of this assessment to reduce taxes paid to the NSB on capital infrastructure assets.	• None
Q: Is this a point-in-time assessment? **A:** Yes.	• None
Q: Will the risk assessment include recommendations? **A:** Actions to reduce risks will be determined by the State after the project is complete. EMERALD's current scope is to produce a final report that includes a risk profile of oil and gas infrastructure.	• None
Q: Will the risk assessment include an analysis of cause? **A:** Yes, it will be an analysis based primarily on conditions. Risk assessments consider operational controls and will provide a profile of factors that can be referenced.	• None

Agenda Item	Decisions/Actions
Q: Do you have authority to require the industry to provide information? **A:** No. The intent of this project is not a regulatory action or investigation. The project is intended to be executed with the cooperation of industry.	• None
Q: What will be the outcome of this project? **A:** EMERALD will submit a report to the State that ranks risks and outlines contributing factors. The State will then use this ranking to develop a final implementation plan. The State may choose to work with industry to implement changes, or may opt for other options including regulatory enforcement. The implementation plan has not yet been developed by the State.	• None
Q: Will the risk assessment include a systems analysis? Industry decision-making is driven by profit/quarterly reporting. Systems last as long as they are adequately maintained, but that costs money. **A:** Yes and No. The study will evaluate the adequacy of systems in their current state but will not consider the economic factors related to decisions to fund maintenance programs or address how systems improve or worsen over time.	• None
Q. Will the risk assessment include an analysis of facilities that are not adding value but have not been shut down because the industry does not want dismantlement, removal, and restoration (DR&R) responsibility? **A:** The risk assessment is constrained to evaluating unplanned events, not planned shutdowns such as DR&R. **C:** Deferred abandonment results in high risk with no benefit.	• None
Q: Will the study include an assessment of the reasonable life of the infrastructure? **A:** The intent of the project is to view the infrastructure as operating indefinitely into the future; therefore, an estimate for the life-span of the infrastructure will not be included. However, the original design of the infrastructure will be evaluated.	• None
4. Stakeholder Input on Focus of the Risk Assessment The EMERALD Stakeholder Facilitator outlined specific input to be solicited from stakeholders including portions of the infrastructure stakeholders feel warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
4.1 No input was received on focus of the risk assessment during this meeting.	• None
5. Stakeholder Input on Initiating Events	

Agenda Item	Decisions/Actions
Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure in the Barrow region.	
5.1 No input was provided relating to initiating events.	• None
6. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. The NSB was asked for its concerns of significance within the scope of the project.	
6.1 Subsistence- The NSB is concerned about the direct and indirect impacts of infrastructure to wildlife/subsistence resources. Tainting of resources and animal displacement are priority issues. Nuiqsut was cited as an example of a community that is close to infrastructure and is likely to experience impacts to subsistence lifestyle. People want a way to measure and account for cumulative impacts of chemical contamination, air pollution, noise pollution, spills, and construction. Noises from transportation (e.g., barging) and from onshore operation can impact marine mammals and the marine environment in general. Spills to rivers, lakes, streams, and the ocean are a bigger concern than spills to the tundra. It was noted that the Colville River is an environmentally sensitive and irreplaceable area because 75% of fish over-winter in the Colville River Delta. It is a critical habitat for migratory waterfowl, ducks, and geese that inhabit the area because the ice melts earlier than in other areas. The people want offshore construction and drilling to occur only in winter (November – April) to prevent a spill from occurring in a broken ice environment. Industry has not shown that effective response is possible in broken ice conditions.	• None
6.2 NSB Revenue- NSB is concerned with potential impacts to its revenue stream. NSB taxes the capital value of the infrastructure (limited to 3-miles offshore) so revenue and depreciation are tied to production and the expected life of the pipeline. A long-term reduction in production or deterioration of assets may shorten the estimated life span of the pipeline, resulting in a decline in revenue to NSB. Industry looks for ways to diminish the assessed value to reduce taxes. The NSB looks for assets not captured in the existing assessment. In terms of revenue, destruction of a major facility would be considered unacceptable.	• None
7. Stakeholder Input on Other Specific Concerns or Priorities Stakeholders were asked to identify other concerns and priorities to the project team for consideration.	
7.1 No other input or priorities were discussed.	• None
8. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Participants were asked for suggestions for best risk management practices and data sources.	

Agenda Item	Decisions/Actions
8.1 No input on best practices or existing data sources was received during this meeting.	• None

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**City of Barrow Stakeholder Consultation Meeting**
Date:	**October 22, 2008**
Time:	**1:30 PM – 3:00 PM**
Purpose:	The intent of this meeting was to solicit City of Barrow input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. Mayor Michael Stotts and April Burnett represented the City of Barrow, and JoAnn Grady represented Grady and Associates. The meeting was facilitated by Brad Chastain, EMERALD Stakeholder Facilitator and scribed by Gretchen Grekowicz, EMERALD Project Coordinator.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Stakeholder Facilitator outlining project team organization, objectives, scope, and timeline.	

Agenda Item	Decisions/Actions
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	• None
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Stakeholder Facilitator. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None

Agenda Item	Decisions/Actions
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	• None
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
2.9 City of Barrow Interest- The Mayor indicated that the city's revenue is based on income sharing from the NSB and grants. The City is also attempting to gain additional income from NPRA development.	• None
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the presentation and following the presentation. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
C: The City of Barrow agrees with the stance of the NSB on most issues, and typically follows its lead. The village of Nuiqsut will probably have more significant concerns on this topic than Barrow.	• None
C: Factors that attract interest to Barrow include polar bears, climate change, and its location at the top of the world.	• None
C: People in the community have expressed surprise that oil is still flowing after so many years of operations.	• None

Agenda Item	Decisions/Actions
C: A monorail on TAPS could be a beneficial form of transportation for people.	• None
3. Stakeholder Input on Focus of the Risk Assessment The EMERALD Stakeholder Facilitator outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
3.1 <u>Offshore Operations</u>**-** Offshore infrastructure including future developments was identified as the most significant concern because spill response in broken ice conditions has not been proven. The Mayor indicated that the community understands the need for resource development in terms of revenue, but they want to highlight that Alaska is a unique environment with spill response challenges. The Mayor indicated that a spill to open water is not as big of a concern as a spill in broken ice conditions in terms of response.	• None
4. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure in the Barrow region.	
4.1 <u>Corrosion & Aging Infrastructure</u>**-** Concerns regarding corrosion and the age of the equipment on the North Slope were raised.	• None
5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. The City of Barrow was asked for their concerns of significance within the scope of the project.	
5.1 <u>Impacts to Subsistence Lifestyle-</u> The City identified impacts to subsistence as the number one concern. Fishing and hunting is a way of life, not just a recreational activity. Caribou, fish, and whales were specifically identified as important species. Other out of scope factors were mentioned with regard to subsistence impacts including cruise ships, climate change (e.g., there is currently open water where there is normally ice), and offshore platforms that have not been tested by a spill response in ice conditions.	• None
6. Stakeholder Input on Other Specific Concerns or Priorities Stakeholders were asked to identify other concerns and priorities to the project team for consideration.	
6.1 <u>Industry Communication with Communities</u>**-** The Mayor indicated that the community appreciates that the oil companies have included Barrow in communications.	• None

Agenda Item	Decisions/Actions
7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Participants were asked for suggestions for best risk management practices and data sources.	
7.1 No suggestions on best practices or existing data sources were provided.	• None

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Barrow Public Stakeholder Consultation Meeting**
Date:	**October 22, 2008**
Time:	**6:30 PM – 8:30 PM**
Purpose:	The intent of this meeting was to solicit Barrow area public input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. A total of 11 individuals were present including members of the public and representatives from the North Slope Borough (NSB), UIC Sciences, Grady and Associates, Petroleum Systems Integrity Office (PSIO), and the Alaska Department of Environmental Conservation (ADEC). The meeting was facilitated by Brad Chastain (EMERALD Stakeholder Facilitator), and scribed by Gretchen Grekowicz of EMERALD. Ira Rosen, the ADEC Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Stakeholder Facilitator outlining project team organization, objectives, scope, and	

Agenda Item	Decisions/Actions
timeline.	
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	• None
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives**-** The objectives and structure of the stakeholder consultation process were explained by the EMERALD Stakeholder Facilitator. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each	• None

Agenda Item	Decisions/Actions
potential event.	
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	• None
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the presentation and following the presentation. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
Q: What is the difference between this type of risk assessment and an environmental assessment? **A:** This project is an engineering-based risk assessment and will focus on evaluating events that could affect the existing infrastructure. An Environmental Impact Statement (EIS) generally focuses on evaluating potential outcomes of certain actions and outlines alternatives to those actions. Both assessments consider environmental impacts, but are different in intent and scope.	• None
Q: Will the public have an opportunity to comment on the draft methodology and the final report?	• None

Agenda Item	Decisions/Actions
A: Input at this meeting is focused on gathering input to be used for methodology development. In early spring the proposed methodology will be available for public review and comment. The final report, including the risk profile, will not undergo public review and comment. The project approach is to develop the methodology soundly and with input from stakeholders, and then implement the methodology resulting in analysis and creation of the risk profile. **Q:** If the process is limited to quantitative analysis, the concerns of the public may not be captured. What if the results are not accepted by the public? People are comfortable with the NEPA process and appreciate the opportunity to comment on the draft results. If they don't see a similar track, they may not accept it. **A:** This risk assessment is a objective and qualitative analysis of existing infrastructure. The project plan is not designed to mirror the NEPA process for public input. **C:** The public will be interested in the outcome of the project and how the results are handled by the State. The public will want to have input into the risk management decision-making process. Also, it is important that the public be a part of some sort of review. This may raise issues of proprietary information and burden of proof.	
Q: Have there been questions or concerns about the methodology? It seems very technical for the general public. **A:** The methodology may not be easily understood for people who do not have a background in risk assessment, but the questions on which we are seeking Stakeholder input are designed to be understandable by the general public. **Q:** Do you have a predetermined process for conducting this risk assessment? **A:** A standard risk assessment approach will be used, but the methodology will be customized and will consider a wide array of stakeholder concerns from around the State, as well as best available practices. The methodology has not been developed yet.	• None
Q: You stated that the scope of the project includes Cook Inlet infrastructure, but that marine transportation is excluded. Some of the facilities in Cook Inlet are offshore. If those facilities are considered in scope, why are offshore facilities on the North Scope out? **A:** Some offshore North Slope developments are out of scope because they are not currently in production and are considered future developments. **C:** The risk profile of offshore facilities in Cook Inlet could possibly be used as a knowledge base for application to North Slope offshore operations in the future.	• None

Agenda Item	Decisions/Actions
Q: Will nonpublic entities like the North Slope Borough be able to review the draft report? **A:** EMERALD's scope of work is limited to completing the draft report for submittal to the State. The State will determine who reviews the report.	• None
Q: Will this study be a baseline for future studies and work? **A:** Yes, this assessment will be a baseline risk profile for existing oil and gas infrastructure. The State may choose to execute this type of assessment on an ongoing process.	• None
C: It would be beneficial to identify portions of the infrastructure that are problematic and put the focus on the operator that is responsible. **Q:** Is the team able to evaluate risks resulting from operations that are planned and within regulations, or are you legally constrained to only look at unplanned and noncompliant risks (e.g., flaring near a community may be a risk)? **A:** This project assumes that the goal is for industry to operate as designed and permitted. This does not necessarily mean that all individuals agree with the approved designs or regulation of industry. The team will not examine the adequacy of existing regulations, or consider risks from planned operations. **C:** I am concerned that the pipeline was not designed with sufficient safety measures to prevent a blow-up. What checks and balances are in place to prevent impacts to the environment? What are the high volume areas that need to be monitored? **A**. The design, operation, and existing safeguards present within the infrastructure will be considered. **Q:** Much of the pipeline is buried in Nuiqsut. I do not understand why the same was not done elsewhere on the North Slope. This would make it easier for the Porcupine caribou herd to migrate and would make the area accessible to harvesting for subsistence. **A:** The intent of the project is to assess the current infrastructure, not to evaluate the risks presented by approved and permitted design.	• None
C: The majority of NSB concerns are related to how the results of the assessment are implemented, whether the State takes the findings seriously, and the potential need for additional legislation, regulations, or lease language/stipulations. **A:** PSIO was created to evaluate quality management systems within the oil and gas industry and conduct a gap analysis of regulatory oversight. PSIO will use results of this assessment to match up areas of high risk with gaps in regulatory oversight, and will also look at low risk areas with extensive oversight to reduce duplicative efforts. To date, PSIO has discovered that gaps exist primarily in the enforcement of existing regulations rather than jurisdiction. Additional legislation does not necessarily mean reduction of risk or enforcement of regulations in the field. There will be a significant amount of	• None

Agenda Item	Decisions/Actions
public input, including local government input, into PSIO projects.	
3. Stakeholder Input on Focus of the Risk Assessment The EMERALD Stakeholder Facilitator outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
3.1 No input was provided on specific components of the infrastructure that warrant the attention of the project team.	• None
4. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure in the Barrow region.	
4.1 No input was provided relating to initiating events.	• None
5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. The public was asked for their concerns of significance within the scope of the project.	
5.1 <u>Safety of Spill Response Personnel</u>-The impact of spills on the safety of response personnel was raised as a concern. Historically, some release sites had conditions that posed potential health risks to humans even though they had been classified as safe to work in. The commenter also noted that they had doubts that response personnel are always provided with adequate personal protective equipment (PPE).	• None
5.2 <u>Preservation and Protection of Cultural Resources -</u> Concerns were expressed regarding the preservation and protection of cultural resource sites. It was noted that environmental standards for identification of cultural resources have improved since the 1970's. Areas once considered inconsequential now may be classified as strong candidates for having cultural resources that must be protected and preserved. It is possible that undiscovered cultural resource sites are located in close proximity to the infrastructure, and could be inadvertently damaged by response personnel. Additionally, oil can damage or destroy cultural artifacts and prevent them from being carbon dated. Advance identification of probable failure points could mitigate the potential for damage. Cultural resources are an important part of a people's history and are now legally protected.	• None

Agenda Item	Decisions/Actions
5.3 Health/Socioeconomic Factors- One commenter expressed concern that the oil and gas infrastructure is a contributor to chronic health issues. It was stated that a health risk baseline could be useful into the future for identifying high-risk communities and indicators for early monitoring. The project team noted that the methodology will include an evaluation of safety consequences based on proximity; however, this study is not a human health impact assessment, and long-term chronic health impacts are not within the scope of the project. The study will examine specific events and impacts that could occur.	•
5.4 Environmental Impact on Subsistence Lifestyle **–** Commenters were concerned about the impact of the infrastructure on subsistence lifestyles. Potential conditions that could negatively impact a subsistence lifestyle were stated to include habitat fragmentation, restriction of hunting around the pipeline, and impacts to calving caribou that will not cross pipelines or roads. It was noted that subsistence and offshore issues should be included as part of the study for the North Slope because it is an integral part of the culture. Results of these studies could benefit the community and help mitigate or prevent future mistakes.	• None
5.5 Safety**–** A concern was expressed that infrastructure near communities increases the risk of accidents (e.g., a hunter could inadvertently shoot the pipeline and create damage to the pipeline and environment).	• None
6. Stakeholder Input on Other Specific Concerns or Priorities Stakeholders were asked to identify other concerns and priorities to the project team for consideration.	
6.1 Strategic Planning for Future Development- One commenter felt the scope of the project should be broadened to include strategic scenario planning of future infrastructure. Currently, much of the "spider web" expansion of the oil field occurs without planning. Critical ecosystems should be evaluated to determine where infrastructure hubs and corridors should be located and identify the areas that should remain intact.	• None
7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Participants were asked for suggestions for best risk management practices or data sources.	
7.1 No suggestions for best risk management practices or data sources were suggested by the public.	• None

Attachments:	Presentation Stakeholder Information Packet

C-6 State and Federal Agency Meeting Minutes

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**PSIO Stakeholder Consultation Meeting**
Date:	**August 11, 2008**
Time:	**9:00 a.m. – 11:00 a.m.**
Purpose:	The intent of this meeting was to solicit SOA PSIO input as a stakeholder with interests in Alaska's existing oil & gas infrastructure to be considered during development of the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of attendees. PSIO was represented by three members; two of which are tasked with conducting a gap analysis of State of Alaska regulatory authority and a third focused on quality management systems. EMERALD Project Manager, Bettina Chastain, facilitated the meeting supported by Gretchen Grekowicz scribing and ABS Consulting via teleconference.	
1.1 PSIO was created in response to the March 2006 oil spills and is tasked with 1) identifying gaps and overlaps in the oil and gas industry, and 2) evaluating quality management. PSIO currently has three full time employees and four new full time positions pending authorization. To date the group has focused its resources on the gap analysis portion of its scope.	• None
2. Stakeholder Input Objectives and Process Reviewed PSIO's role in relation to the project, which will focus on identifying gaps and overlaps in regulatory	

oversight of the infrastructure. PSIO will be both a contributor to the Risk Assessment and a customer of its results.

3. Organization Input on Focus of the Risk Assessment, Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, and Environment, & Other Specific Concerns or Priorities

No discussion specific to this agenda item occurred. This item may be addressed in a future meeting as appropriate.

4. Guidelines, standards, procedures, and best practices for risk management

Discussion specific to this agenda item was limited to discussion about B31.8 as a baseline tool.

4.1 PSIO recommended that ABS Consulting review B31.8 in terms of existing baseline standards.	• ABS Consulting to review B31.8 and follow-up with Mike of PSIO

5. Existing risk assessments, studies, reports, or other data/information relevant to Alaska Oil and Gas Infrastructure

Discussed the work PSIO is currently doing to analyze and document perceived and actual gaps in regulatory oversight of the oil and gas infrastructure and how this work relates to the ARA Project.

5.1 The ARA Project and PSIO project have been linked since inception and have some common threads including contact with State and federal agencies and a need to identify infrastructure components for mapping industry-wide. The group agreed to collaborate in the following areas 1) use of consistent terminology including definitions 2) coordination of data requests to industry as appropriate, and 3) mapping information. PSIO's goal for mapping is to have GIS quality data from infrastructure while EMERALD/ABS Consulting's goal is to gain data for visual portrayal of the infrastructure.	• PSIO and EMERALD/ABS Consulting to collaborate regarding data requests to industry, terminology development, and mapping information
5.2 PSIO's gap analysis may contain information pertinent to the risk assessment in terms of regulatory oversight gap considerations. PSIO will use the results of the risk assessment to prioritize gaps and make recommendations to policy-makers so they can determine which gaps should be filled and which overlaps eliminated. The timing of the ARA project versus the PSIO work is a bit off meaning that PSIO may have to wait for ARA results some period of time following completion of the PSIO gap analysis.	• None
5.3 To date PSIO has completed a full regulatory analysis documenting statutory and regulatory authority and jurisdiction of each agency and has identified the tools each agency has to implement its authority including inspection, permitting, and investigation. This initial portion of work did not evaluate actual enforcement and inspection occurring in the field. That will be step two of the gap analysis. PSIO pointed out that not all gaps will necessarily be filled	• PSIO to provide results of initial gap analysis

and not all overlaps will be eliminated. PSIO stated that this initial assessment can be made available to the ARA Project soon.	
5.4 PSIO indicated that as part of the gap analysis it will also be reviewing perceived overlaps in regulatory oversight, i.e., situations in which federal agencies and State agencies both inspect a particular aspect of the infrastructure, but for different reasons.	• None
5.5 PSIO has established liaisons at pertinent State agencies and also has a memorandum of agreement with DOT who acts as the federal liaison.	• None
5.6 In general, PSIO is finding that agencies have broad statutory authority, but are not always able to implement that authority. This occurs for a variety of reasons including lack of resources. In these cases, agencies may focus in on a certain aspect of their statutory authority and not address others. The final results will be documented in PSIO's gap analysis.	• None
5.7 PSIO is putting out an RFP to contract analysis of the implementation of regulatory authority in the field. A contractor should be on board by about mid-October and PSIO expects that the analysis will be complete approximately 6-months from then (Feb-April of 2009). EMERALD indicated that it may be helpful to review this scope of work so that the ARA Project can plan to utilize the results appropriately.	• PSIO to provide scope of work from the RFP being contracted out
5.8 The quality assurance aspect of PSIO's work involves viewing from a management system perspective and educating the State on quality management systems. Quality management systems may also be a consideration as part of the gap analysis. PSIO is willing to share the information they gather on quality systems if it is pertinent for consideration as part of the risk assessment.	• None

Attachments:	None

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**SOA Department of Revenue Stakeholder Meeting**
Date:	**August 18, 2008**
Time:	**11:00 a.m. – 12:30 p.m.**
Purpose:	The intent of this meeting was to solicit SOA Dept. of Revenue's input as a stakeholder with interests in Alaska's existing oil & gas infrastructure to be considered during development of the risk assessment methodology.
Attendees:	[redacted]

Discussion Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. Marcia Davis, Dept. of Revenue Deputy Director and SAOT member, three Dept of Revenue financial analysts and key EMERALD/ABS Consulting project team members were in attendance.	
1.1 Jennifer Duvall monitors oil production volumes and is the keeper of this data. Specifically, Jennifer analyzes peaks and dips in production numbers to evaluate what events trigger a dip in revenue outside acceptable parameters. Jennifer works closely with PSIO.	• None
1.2 Nels Tomlinson statistically analyzes departures from average oil production and is currently working to set up a system for conducting this analysis through the use of control charts. Nels works with PSIO to understand departures from average production.	• None
2. Stakeholder Consultation Objectives & Process	

Reviewed Dept. of Revenue's role in relation to the project, which is centered on State revenue from oil and gas production. Dept. of Revenue's input will be from this perspective and will largely focus on the reliability/production aspect of the risk assessment.

3. Organization Input (on Focus of the Risk assessment, Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment, & Other Specific Concerns or Priorities)

Discussed the work Dept. of Revenue is currently conducting with the legislature to define "unplanned events" for purposes of tax implications, to establish a quantitative definition of "unacceptable" in terms of unplanned events resulting in loss in production and subsequent impacts in revenue to the State. This is being accomplished by tracking production data over time and tying that data back to triggering events.

3.1 The legislature is currently in the process of defining "unplanned events" in terms of oil production relating to State taxes. Regulations are currently being written to establish a threshold. The State only offers tax exemptions for "planned events".	• None
3.2 Dept of Revenue holds production data from 1997- present, and is working on creating a history of unplanned events associated with deviations (have data on this from about 2006-present). Currently the limiting factor for production is gas and water handling capacity at the North Slope facilities, it is not production availability itself.	• None
3.3 EMERALD/ABS Consulting asked about regulatory requirements for industry to report production upsets to Dept. of Revenue. Dept. of Revenue indicated there was no such requirement, but one may exist for reporting to AOGCC or DNR.	• None
3.4 Dept of Revenue is currently working on methods for tracking production and unplanned increases/decreases through statistical methods. To date, two approaches have been tested; control charts and time series. The control chart method is preferred and will be used as a tool to identify events that appear to be out of the "normal" range (defined by 1 standard deviation) so Revenue can trace discrepancies back to triggering events. The median represents a moving 20-day average of oil production and the upper and lower control limits are set at 1 standard deviation from the median (or 3.14 times the median daily production change).	• None
3.5 Control charts are produced on a field by field basis because tax structures and "normal" production varies based on history, size, and federal versus state oil. Dept. of Revenue is working on a statistical model to take the decline in oil production (about 4-6% per year) into account as part of this evaluation. The data included in the control charts includes both "planned" and "unplanned events". It is a complete picture of production revenue. This approach is being used for 30 fields/production facilities and focuses primarily on North Slope oil production with a lesser focus on gas production and Cook Inlet oil production.	• None
3.6 The control charts and associated data may be useful in defining "unacceptable consequences" in terms of revenue to the State of Alaska, to	• Dept of Revenue to provide EMERALD production data

identify historical unplanned events and their impact on State revenue. Dept. of Revenue will provide EMERALD this data with recommendations on appropriate standard deviation. Dept. of Revenue recommended use of an average per barrel rate for the ARA project rather than using varying rates on a by field basis.	• Cheryl will send EMERALD the tax calculation overview given to legislators
3.7 The group discussed utilizing a discount rate to account for time value of money. A 5% discount rate was used for AGIA. Dept of Revenue recommends using a 7.5% discount rate, which is consistent with rates currently being in other applications.	• None
4. Guidelines, Standards, Procedures, and Best Practices for Risk Management No discussion occurred on this agenda item.	
5. Existing risk assessments, studies, reports, or other data/information relevant to Alaska oil & gas infrastructure The group discussed potential information/data available and pertinent to methodology development and recommended points of contact that may be helpful.	
5.1 DNR may hold historical unplanned event data going back farther than 2006 that could potentially be utilized by the ARA project.	• None
5.2 Alan Dennis, a DNR oil and gas auditor, may be a valuable point of contact. He has an Arco background and was involved in the Strategic Oil Revenue Royalty Study.	• None
5.3 Dept. of Revenue recommends that EMERALD/ABS Consulting contact Donna Kempers prior to meeting with Alyeska. She has experience at the North Pole refinery and Valdez Marine Terminal and is very knowledgeable regarding Alyeska and TAPS.	• Dept of Revenue to provide Donna Kempers' contact information
5.4 Dept. of Revenue commented that Pipeline and Hazardous Materials Safety Association (PHMSA) or the Joint Pipeline Office (JPO) may have applicable natural hazard assessments.	• None

Attachments:	Meeting Agenda

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Alaska Oil & Gas Conservation Commission (AOGCC) Stakeholder Meeting**
Date:	**August 20, 2008**
Time:	**1:30 p.m. – 4:30 p.m.**
Purpose:	The intent of this meeting was to solicit AOGCC's input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	Tom Maunder, AOGCC Jane Williamson, AOGCC Myron Casada, ABS Consulting Dave Roby, AOGCC Ira Rosen, ADEC Bettina Chastain, EMERALD Gretchen Grekowicz, EMERALD Jim Regg, AOGCC Chuck Scheve, AOGCC Lou Grimaldi, AOGCC Cathy Foerster, AOGCC

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. AOGCC was represented by its Commissioner Cathy Foerster, SAOT representative Jim Regg, petroleum inspectors, and other members. The meeting was facilitated by EMERALD Project Manager Bettina Chastain and scribed by Gretchen Grekowicz. Myron Casada from ABS Consulting Group provided technical insight and the State Project Manager Ira Rosen represented ADEC.	
2. Stakeholder Consultation Objectives & Process The EMERALD Project Manager provided an overview of the project with a focus on outlining the stakeholder consultation process.	

2.1 ADEC Project Manager elaborated on the importance of the stakeholder consultation portion of the project and the need to get buy-in prior to methodology development.	• None
2.2 EMERALD/ABS Consulting indicated that during methodology development the project team will identify risk factors and consequences of concern. The scope of the project was also clarified by describing the geographic and infrastructure component boundaries of the project. The project will include North Slope, Cook Inlet, and TAPS. Future developments and refineries are out of scope.	• None
2.3 ABS Consulting pointed out that to allow for evaluation of the entire system, the focus and level of detail must be tightly managed during methodology development. In addition, as consequences of significance are identified, the team will focus the assessment so those consequences can be targeted for more in-depth evaluation.	• None
2.4 AOGCC explained that it focuses primarily on preventing waste of oil and gas resources to the State of Alaska. AOGCC also has a mandate to protect freshwater. AOGCC is responsible for the reservoir development and management, wellbore, wellhead/production tree, well safety systems. AOGCC's regulatory jurisdiction generally stops with the surface safety system; inspection responsibilities include petroleum measurement at custody transfer points. AOGCC does not consider deferral of production "waste" because there is no actual loss in production, only delay.	• None
2.5 AOGCC fills both a reactive and proactive role in oversight. The role is reactive because oil and gas releases trigger investigations by AOGCC, and proactive because the agency provides some oversight in field development, reviews permits, and reviews and inspects well equipment on a regular schedule.	• None
3. Organization Input on: Focus of the Risk Assessment, Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment, and Other Specific Concerns or Priorities The EMERALD Project Manager described input the project team is seeking in terms of consequences of significance in the categories of production/reliability, environment, and safety. AOGCC representatives contributed this input as it relates to AOGCC's purview to regulate and prevent waste of oil and gas resources.	
3.1 AOGCC does not currently use a scale to determine what is "unacceptable" waste, but it does use historical flaring in conjunction with the context of the flaring event and AOGCC regulations to determine if there is potential waste on a case-by-case basis. The potential for penalties exists, but are not triggered at a specific volume of waste. Specific to flaring, AOGCC does not decide what is "normal" flaring. AOGCC data provides trends in flaring, lease use, pilot-purge gas that are used in reviews to determine if waste has occurred.	• None
3.2 Criticality of particular wells was discussed with a focus on possibility of loss of the revenue stream long-term if certain individual wells or combinations of wells went down. It was stated that the loss of critical wells has the potential to stop production long-term while loss of facilities would just defer production. AOGCC indicated that wells with access to the formation gas drivers are critical because loss of a well that would result in loss of gas cap pressure could negatively impact	• None

reserve recovery.	
3.3 It was pointed out that large volume gas injectors at PBU (AGI, NGI, WGI pads) and similar wells have the potential to be a large source of gas releases.	• None
3.4 The group discussed whether or not there are wells that cannot be replaced. Seasonal drilling restrictions could temporarily delay replacement of a well.	• None
3.5 The power plant (CCP) and other support systems like it are thought to be key points of failure at Greater Prudhoe Bay because it cannot function without these systems.	• None
3.6 AOGCC pointed out that if waste injection wells at Northstar, Alpine, and Oooguruk are lost it could force shut down of operations, however, redundant wells are in place at Alpine as backup. Oooguruk and Northstar do not currently have back-up wells. The group was not sure how many injection wells would have to go down before production would be lost. It would be dependent on the availability of other wells for injection.	• None
3.7 AOGCC identified changing workforce as a potential concern. Experienced operators are being replaced by new operators with less experience and institutional knowledge about the systems they are operating. Since physical intervention is required to shut well systems down as well as restart and continue operating wells, particularly problem wells (e.g., wells with mechanical integrity issues), operator knowledge is important. When knowledge is limited, personnel have less ability to proactively identify potential problems and prevent those problems from occurring or becoming serious in nature. A related concern raised by the group was the reduction of personnel numbers, which were cut in the 1980-90's. It is not apparent if these numbers were increased back up to normal operating workforces in recent years. In addition, much of the work is now done by contractors rather than employees, which could potentially decrease the sense of ownership in operations.	• None
3.8 AOGCC identified the substantial number of problem wells, both shut-in and operating, as a potential concern because there are a limited number of rigs and rig personnel available to drill new wells and workover wells. AOGCC collects information on these wells and their "problem" when it involves annular pressure communication (both producers and injectors); it is unknown what production impact has resulted from these problem wells. AOGCC also noted that not all shut-in wells are problem wells; some are shut-in for other reasons including economics, excessive water, or gas handling.	• None
3.9 AOGCC identified the gap in regulatory oversight of platforms/offshore facilities, e.g., no oversight of Northstar design. It is AOGCC's understanding that no agency looks at platform re-assessment (Cook Inlet). Platforms may be a critical point in the infrastructure because they cannot be easily replaced and spills on platforms would likely be spills to the ocean environment.	• None
3.10 AOGCC identified CO_2, H_2S and sand production as potential concerns of significance in long term facility/production impacts.	• None

4. Guidelines, Standards, Procedures, and Best Practices for Risk Management

No discussion on this topic occurred.

5. Existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure

AOGCC representatives identified sources of data for potential use as part of the ARA project. These sources include detailed inspection and testing data/records, investigative reports, troubled well reports, as well as other pieces of information.

5.1 The topic of root cause analysis of historical infrastructure events was raised for discussion. AOGCC is not aware of any State agency commissioned root cause analyses being performed on events.	• None
5.2 AOGCC has a database with all the wells in the State of Alaska including locations, measurements, and inspection and testing data (e.g. safety valve tests, blowout prevention tests) from 2000 to present. Some gaps in the data exist for components of infrastructure that have no requirements for safety valves. AOGCC suggested that this set of data could potentially be used to judge how frequently individual systems are looked at. This information is held in an MS Access database.	• None
5.3 AOGCC has investigative reports of waste incidents as well as failure rates on surface safety valves, subsurface safety valves, and blowout prevention equipment. AOGCC has a regulatory requirement for operators to report a release exceeding 10 bbls oil or 1MMcf gas, and any release that results in a facility shut down.	• None
5.4 AOGCC has total production and injection data, but suggested it may be difficult to evaluate reliability based on this data.	• None
5.5 AOGCC receives annual reports from North Slope operators of any well that is shut in more than 365 consecutive days. This report includes the reason wells are shut-in, but may not capture multiple reasons leading to a shut-in. All well records except for those that are confidential are also available to the public online.	• None
5.6 AOGCC receives monthly flaring reports from facilities including information on reason for the flare event. AOGCC tracks and trends this data to look at spikes and dips in flaring and to identify potential problems.	• None
5.7 AOGCC recommended that the ARA project team consult with Minerals Management Service (MMS), Bureau of Land Management Petroleum and Hazard Management Safety Administration (PHMSA).	• None
5.7 CIRCAC has a gap analysis of regulatory oversight of flow lines.	• None

Attachments:	Agenda

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Joint Pipeline Office (JPO) Stakeholder Consultation Meeting**
Date:	**August 21, 2008**
Time:	**1:00 p.m. – 3:00 p.m.**
Purpose:	The intent of this meeting was to solicit JPO's input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. JPO representation consisted of a variety of state and federal agencies including Dept of Natural Resources, Dept of Labor, Bureau of Land Management, U.S. Army Corps of Engineers, Mineral Management Services, and the State Fire Marshal's Office. The meeting was facilitated by EMERALD Project Manager Bettina Chastain and scribed by Gretchen Grekowicz. ABS Consulting representative Myron Casada provided technical expertise, and ADEC Project Manager Ira Rosen represented the State.	

Agenda Item	Decisions/Actions
2. Stakeholder Consultation Objectives & Process The EMERALD Project Manager provided an overview of the project with a focus on outlining the stakeholder consultation process.	
2.1 The goal of the project is to provide a snapshot of the oil and gas infrastructure in Alaska for use both by industry and the State. A system-wide risk assessment of this scope and scale is unprecedented to date.	• None
2.2 The project was kicked off in the beginning of July 2008. Phase 1 will continue through August 2009 and includes stakeholder consultation, collection of existing data/information pertinent to methodology development, design of a proposed risk assessment methodology, and public/peer review of that methodology. Phase 2 will run from August 2009 – February 2010 and will involve implementation of the finalized risk assessment methodology. Phase 3 will include analysis of results and development of a final report documenting results of the risk assessment.	• None
2.3 The objective of the stakeholder consultation meetings, including this meeting, is to solicit input that will be considered during methodology development. The methodology will utilize best practices for risk assessments and will incorporate both frequency and consequences of potential events. The results of the risk assessment will consist of a risk profile of Alaska's oil and gas infrastructure and will be documented in the form of a report.	• None
2.4 JPO recommended that the project team engage Dept. of Homeland Security (DHS) to work out confidentiality issues that may be pertinent from a DHS perspective. John Madden is the DHS-DMVA contact for the State of Alaska. Tom Burgess, with TSA, is an additional contact. Jack Fox is the Pipeline Security contact for DHS and is located in Washington D.C.	• ADEC Project Manager to work with DHS regarding confidentiality
3. Organization Input on: Focus of the Risk Assessment, Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment, and Other Specific Concerns or Priorities The group discussed potential oil and gas infrastructure concerns from the JPO perspective.	
3.1 JPO identified TAPS as an infrastructure component with the potential for multiple risks. Previous risk studies have shown that the highest risk areas for the pipeline are sabotage, followed by operator error, natural hazards (such as seismic events, flooding (70-miles of TAPS crosses rivers), 3rd party damage, and vehicle strike. TAPS was shut down for approximately 60-hrs. after the 7.9 earthquake in 2002.	• None
3.2 JPO asked if the project team would consider the occurrence of multiple events concurrently, or events that have a domino effect (e.g. an event on the North Slope that affects TAPS). The ABS Consulting Technical Lead indicated that the team may look at dependent events and will consider interactions within the system as a whole, but detailed modeling of failure logic is not possible for the scope of the study required by the State.	• None

Agenda Item	Decisions/Actions
3.3 JPO identified weather events (i.e., waves and ice) as a significant concern in Valdez. The Valdez Marine Terminal (VMT) has limited storage capacity. A severe weather event shutting down operations in Valdez could eventually shut down the North Slope. The JPO staff felt that significant risk is associated with cold start-up of the pipeline. There may also be impacts on the refineries. The EMERALD Project Manager clarified that although refineries and distribution lines are out of scope for this project, impacts to refineries as a result of events that occur to "in scope" infrastructure are within the scope and will be considered.	• None
3.4 JPO identified well freeze-up and limited availability of glycol for antifreeze as a potential concern for the North Slope.	• None
3.5 JPO identified use of contractors rather than owner/operator direct employees to implement infrastructure systems as a potential concern. A related concern is the bridging of contractor programs with owner/operator programs. Many unplanned events occur because personnel fail to follow procedures.	• None
3.6 JPO asked if the project team would be evaluating the effectiveness of operational controls. EMERALD/ABS Consulting stated that regulating operational controls is really in the State's purview. This project will generally only look to determine whether procedures and programs are in place. The level of evaluation required to determine the effectiveness of operating controls is beyond the scope of this project.	• None
3.7 JPO commented that each agency has base criteria against which industry is regulated. This defines how these agencies measure "unacceptable". EMERALD/ABS Consulting explained that these standards may or may not be appropriate for a system-wide assessment because the measurements are very focused on specific risks. Also, the level of actual consequence for regulatory concern may be very low compared to the level a consequence of interest for the potential events to be examined in the risk assessment.	• None
4. Guidelines, Standards, Procedures, and Best Practices for Risk Management The group briefly discussed potential guidelines and examples that may be useful for methodology development.	
4.1 Criticality evaluation (i.e., looking at key pieces of a system to identify critical elements and points of failure) was discussed by the group. JPO indicated that this type of evaluation exists for TAPS as part of Alyeska's reliability centered maintenance (RCM) program and may be a good source of information for methodology development of system level criticality analysis.	• None
5. Existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure JPO indicated that it is aware of a multitude of existing studies, risk assessments, reports and other data. JPO has a substantial portion of this information in its records system, however, much of the information is designated as confidential.	
5.1 JPO commented that Dept of Energy (DOE) and Dept. of Defense (DOD) are	• None

Agenda Item	Decisions/Actions
potential stakeholders on the federal side. These departments have existing risk assessments on TAPS.	
5.2 JPO indicated that a multitude of risk assessments have already been performed on TAPS so that particular component may not need as much focus by the project team from an on-site facility visit perspective. JPO has many of these risk assessments in its records system, which can be shared if confidentiality issues are worked out. EMERALD/ABS Consulting requested a list with titles and dates of previous studies/assessments. JPO indicated that they have an enormous amount of information so it makes more sense for the project team to send its own resource to the JPO records office to collect information.	• None
5.3 An MMS risk assessment by Baker was identified as potentially useful for review by the project team.	• None
5.4 The following documents are all publicly available on the JPO website and may be pertinent to the project: • TAPS Right-of-Way Renewal Environmental Impact Statement • TAPS Reconfiguration Environmental Assessment (EA) • Valdez Terminal Reconfiguration EA	• None
5.5 A structural integrity review of the platforms in Cook Inlet exists and may be pertinent to the project.	• None

Attachments:	Agenda

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**State Fire Marshal Stakeholder Consultation**
Date:	**August 28, 2008**
Time:	**9:00 a.m. – 11:00 a.m.**
Purpose:	The intent of this meeting was to solicit State Fire Marshal input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of attendees. The Fire Marshal's (FM) office was represented by the Assistant State Fire Marshal, Kelly Nicolello. The meeting was facilitated by EMERALD Project Manager, Bettina Chastain, and scribed by Gretchen Grekowicz.	
2. Stakeholder Consultation Objectives & Process The EMERALD Project Manager outlined the purpose of the stakeholder consultation process. The group discussed input to the methodology development in terms of the FM's purview, to prevent loss of life and property from fire and explosion.	
2.1 The State FM focuses on three aspects of oil and gas infrastructure specific to facilities: • Plan review- of all oil and gas facilities undergoing construction or remodeling. This is a non-structural review for fire, safety, and life issues. If construction/remodeling occurs without a plan submittal, a retro-active review is conducted. This means that plan reviews exist for most oil and gas facilities including rigs. • Construction reviews- to assess if actual construction work is in	• Assistant FM to provide EMERALD list of the 17 regulated pipelines that are being added to the FM's facility inspection program

compliance with approved plans. Currently, construction reviews are conducted for projects exceeding $5M at 60% and 90% completion. The FM conducts site visits to BP quarterly. • Inspections- Historically, the FM has focused its inspection program on facilities with the highest potential for loss of life such as bars, hotels, etc. In 2000, when the FM's Office became part of JPO, they began focusing on the North Slope including both occupied and unoccupied facilities. This year 17 regulated pipelines are being added to their inspection program. The scope of the inspections relates specifically to fire and life hazards in physical buildings rather than process safety, training, etc. The FM must use a statewide approach to inspection and are not allowed to cherry pick facilities for inspection. The FM does not inspect Cook Inlet facilities frequently or consistently.	
2.2 The FM Office indicated that they would like to centralize inspection of oil and gas facilities by collocating with JPO. This will be beneficial because from the time a project starts, the FM will have the ability to work with other state and federal agencies, each providing its own expertise.	• None
2.3 From a fire response standpoint, the FM has no authority over the North Slope or Cook Inlet. Industry manages this internally with their own quality management systems and fire response crews. Industry is required to report fire incidents, but on a monthly basis.	• None
3. Organization Input on: Focus of the Risk Assessment, Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment, and Other Specific Concerns or Priorities Oil and gas infrastructure concerns specific to North Slope, Cook Inlet, TAPS, and Valdez Marine Terminal were discussed as related to fire prevention and life safety.	
3.1 From the FM's perspective any loss of life or injuries is an "unacceptable consequence".	• None
3.2 General to the industry, one FM concern is the use of more contractors and fewer owner/operator direct employees.	• None
3.3 The primary concern at North Slope facilities is obsolete fire and gas systems, which have led to halon dumps, switch communication problems, and lack of spares. Industry has recognized that the fire and gas systems need to be updated and are in the process of completing these upgrades. As upgrades occur, industry refurbishes old equipment for use as spares. The FM's Office is unsure how much progress has been made in the upgrade process, but generally, the FM Office feels good about the progress that has been made in this area. Concern would start to increase again if progress slowed. The FM only has the authority to have industry fix non-functioning systems.	• None
3.4 The FM Office raised the concern of cultural differences between East and West-side production facilities on the North Slope regarding the way that each operates.	• None

<table>
<tr><td>3.5 The FM Office indicated that another concern for the North Slope is the number of partially finished projects, e.g., operating panels switching to PCC (mostly at the GCs). Enforcement of fire and building code is more relaxed while construction is underway, but many of these projects go on for extended periods of time with fire codes not fully enforced due to their “construction” status.</td><td>• None</td></tr>
<tr><td>3.6 The FM recommended Gathering Centers (West Side of North Slope – Prudhoe Field) as a focus of the ARA project.</td><td>• None</td></tr>
<tr><td>3.7 Cook Inlet facility concerns include:
• Aging infrastructure
• Isolation of the infrastructure from an emergency response standpoint. The closest outside response is Nikiski. Fundamentally, fire response is difficult for rigs.
• Cook Inlet has already suffered a number of fires (enough to put the Granite Point Facility out of service) and a few injuries, although no fatalities.
• Ongoing construction and remodeling that have the potential to affect the integrity of portions of the facility, such as fire walls.</td><td>• None</td></tr>
<tr><td>3.8 Concerns related to TAPS are reducing because they have been replacing outdated fire and gas systems. The new systems are passive, i.e., use equipment separation through fire resistant walls, floors and doors. Historically, primarily active systems utilizing halon, foam, etc. have been used. TAPS has also transitioned to remote activated fire suppression systems. This has reduced the manning of facilities tremendously and subsequently reduced the life-safety hazard. Historically, fire teams were stationed at every location. The negative aspect of this is that when an emergency occurs, there are not as many personnel available to respond. The response time for Pump Stations 3, 4, and 9 is particularly long. The decision to make this transition is up to industry and is not under authority of the FM.</td><td>• None</td></tr>
<tr><td>3.9 There are very few concerns regarding the Valdez Marine Terminal (VMT) with regard to fire and life/safety. The FM is very involved with VMT’s fire response personnel, testing of their systems, and day-to-day operations.</td><td>• None</td></tr>
<tr><td colspan="2">4. Guidelines, Standards, Procedures, and Best Practices for Risk Management
This agenda item was not discussed.</td></tr>
<tr><td colspan="2">5. Existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure
The Assistant FM identified risk assessment that may be useful to the ARA project team.</td></tr>
<tr><td>5.1 The Assistant FM identified a few risk assessments he is aware of:
• Valdez Marine Terminal Tank Risk Assessment (assessment of transition to Internal Floating Roof (IFR) tanks)
• BP 2003 assessment of the need for emergency responders</td><td>• None</td></tr>
</table>

• RCAC has a number of risk assessments	

Attachments:	Agenda Project Overview Handout

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**University of Alaska Fairbanks Stakeholder Consultation Meeting**
Date:	**September 24, 2008**
Time:	**3:00 PM – 4:30 PM**
Purpose:	The intent of this meeting was to solicit University of Alaska Fairbanks (UAF) input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. Six individuals represented UAF, primarily from the College of Engineering and Mines, including Ron Johnson, UAF College of Engineering and Mines Mechanical Engineering Professor, and SAOT member. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz. Myron Casada and Steve Harris represented ABS Consulting. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project background, scope, and timeline.	

Agenda Item	Decisions/Actions
2.1 The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.2 The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Fairbanks meetings are the kick-off to this consultation period. Individual meetings with key stakeholders as well as public meetings will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.3 A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by the failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.4 The risk assessment is being managed by Alaska Department of Environmental Conservation (ADEC). Oversight is also provided by the State Agency Oversight Team (SAOT), which is comprised of representatives from multiple State agencies. The SAOT provides guidance for the project team and makes decisions relating to the project on behalf of the State of Alaska. Ron Johnson represents UAF on the SAOT.	• None
2.5 The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures for managing risks and making risk based decisions for continued operations of the infrastructure well into the future. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment as a baseline to help prioritize gaps and make recommendations to the State with regards to regulatory oversight decisions.	• None
2.6 Guiding principles of the project were reviewed. Highlights include the high importance placed on the stakeholder consultation portion of the project and the need for cooperation with infrastructure owner/operators.	• None
2.7 A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it that an event will occur? and 3) how damaging would it be if the event did occur? Rankings are assigned for both probability and	• None

Agenda Item	Decisions/Actions
consequence and are combined to form an overall risk ranking for each potential event that is identified.	
2.8 The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and other downstream processing facilities and distribution systems that are not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions and man-made hazards such as sabotage will not be considered as part of this study.	• None
2.9 The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, stakeholder consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the draft methodology. The methodology will also be reviewed by an independent peer review entity during Phase 1. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and creating a risk profile and report that will be presented to the State.	• None
2.10 UAF posed the following initial questions to the project team relating to the project overview. **Q:** UAF asked if any other projects of this scale have been conducted historically. **A:** The project team indicated that they are not aware of any projects to this scale. The closest match ABS Consulting is aware of is the BC Hydro project they executed, but even this project was quite different than the Alaska Risk Assessment Scope.	• None
3. Stakeholder Input on Focus of the Risk Assessment The EMERALD Project Manager outlined specific input to be solicited from stakeholders. UAF provided input on the portions of the infrastructure they feel warrant the project team's attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	

Agenda Item	Decisions/Actions
3.1 Electric Grid- UAF commented that if a critical electrical grid is lost, the impact could be huge both to the community and operation of the pipeline. The pump stations have back-up power, but the amount of fuel available to these backup systems and subsequent duration that the back-up will provide is unknown. If a power outage occurred in winter, another consideration is the amount of time it would take for the pipeline to cool down. Conversely, the infrastructure also feeds electricity to Alaska communities, and the impact of loss of power on these communities has the potential to be serious (the interior can survive about 2-days without power), which is supplied by Golden Valley Electric Association (GVEA). Approximately ¾ of GVEA electricity is generated by gas turbines.	• None
4. Stakeholder Input on Initiating Events UAF identified initiating events that have the potential to cause catastrophes relating to the infrastructure in the Fairbanks region.	
4.1 Permafrost/Climate Change- UAF stated that the pipeline design did consider permafrost conditions and incorporated these considerations appropriately into the design. UAF does not anticipate any major catastrophes relating to permafrost. However, a potentially warmer climate could lead to loss of permafrost and UAF is unsure how the pipeline design would accommodate this change. The potential for a sudden failure of pipeline supports because of a sink hole in the permafrost could be a threat. Prevention requires monitoring of the permafrost. This type of monitoring is currently occurring through infrared technology.	• None
4.2 Natural Hazards- UAF identified the issue of shore erosion as a potential concern. Melting of the polar ice cap has the potential to increase erosion. The topic of volcanoes and earthquakes was also raised. The project team indicated that for assets such as Northstar, erosion will likely be considered.	• None
4.3 Construction Activities- UAF identified construction activities as a potential impact to the infrastructure. The construction of a gas pipeline was used as an example. The project team indicated that construction activities inside the fence and around existing operating infrastructure would be considered.	• None
4.4 Industry Workforce- UAF identified threats to the industry workforce as a potential threat to production. Examples provided were strikes, illness due to confined quarters, and reduced expertise of operators in connection to training and experience.	• None
4.5 Decline in Through-Put & Changes in Composition- UAF pointed out that as throughput declines, less time will be required for the temperature of the pipeline and the fuel within it to cool. If a shut-down occurs in winter, this could be an important issue. UAF commented that oil composition is also changing. More sand is present, which could present increased erosion/corrosion threats.	• None
4.6 Corrosion- UAF pointed out that corrosion caused by a combination of events is of concern and should be considered by the project team. UAF indicated that Alyeska has evaluated the effect of bacteria on corrosion. UAF emphasized that if the team uses a standard corrosion rate based on industry standards, the results may	• None

Agenda Item	Decisions/Actions
not provide an accurate picture. Instead, UAF recommends considering the combination of factors.	
5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the external environment and natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. UAF did not identify any consequences of concern related to safety, environment, and reliability. UAF did ask questions relating to evaluation of the consequence categories. Questions and answers are summarized as follows.	
5.1 UAF posed some initial questions regarding the level of detail that consequence categories will be considered. **Q:** UAF asked how much analysis will go into evaluating environmental consequences. **A:** The project team indicated that it will consider the triggering event and will evaluate the environment directly impacted by that event, e.g., river, tundra, etc. The sensitivity of the environment will be considered. The team will not evaluate secondary and tertiary impacts.	• None
6. Stakeholder Input on Other Specific Concerns or Priorities UAF representatives identified other concerns and priorities to the project team.	
6.1 UAF commented that assumptions on rate of decline and market conditions will have to be made even though market is out of scope of the project. UAF pointed out that the EIA rate could be used.	• None
7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure No suggestions for best risk management practices were recommended by UAF representatives. Recommended data sources were as follows.	
7.1 UAF indicated that the university has existing data/information on natural hazards.	• EMERALD/ABS Consulting to work with UAF regarding natural hazard data
7.2 UAF indicated that Alaska Energy Authority has information/data on reliability of the power infrastructure in the interior. The project team stated that they also plan to consult with the State Emergency Response Commission to understand the response plan for loss of power events in the interior.	• EMERALD to gather information from GVEA, AK Energy Authority, and SERC
7.3 State Department of Revenue evaluates how revenue equates to jobs in the State. They also may have studies that show the effect of reduced production on	• None

Agenda Item	Decisions/Actions
number of jobs.	

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Department of Homeland Security & Emergency Response (DHS) Stakeholder Consultation Meeting**
Date:	**October 13, 2008**
Time:	**2:00 PM – 3:30 PM**
Purpose:	The intent of this meeting was to solicit DHS input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. DHS was represented by Director, John Madden, and Deputy Director, Mike O'Hare. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz. Myron Casada and Steve Harris represented ABS Consulting. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project team organization, objectives, scope, and timeline.	
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses	• None

Agenda Item	Decisions/Actions
representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project	• None

Agenda Item	Decisions/Actions
includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
2.9 DHS Interest- DHS is interested in how weaknesses in the infrastructure might be exploited by the public. Level of detail portrayed in reports such as that produced by this project may be a security issue, especially if the risk assessment points out criticalities in the system. Alaska statutes exist that provide the authority for the State to withhold information from public review for security reasons. This project has the potential to point out these weaknesses and DHS is concerned about the public nature of this project. DHS co-chairs the State Emergency Response Commission (SERC) and organizes SERC meetings.	• DHS and SAOT to discuss public involvement and review of project deliverables
3. Stakeholder Input on Focus of the Risk Assessment The EMERALD Project Manager outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
3.1 No input on the focus of the risk assessment was received at this meeting.	• None
4. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.	

Agenda Item	Decisions/Actions
4.1 Seasonal Hazards- DHS identified seasonal hazards such as fire, flooding, and storms as important hazards to consider. These hazards have been well analyzed and are predictable in terms of season, but the locations and frequency of the events are highly variable and difficult to anticipate. On average, about 1 million acres per year are lost to wildland fires. Alaska experiences about five hurricane force storms per year.	• None
4.2 Unpredictable Natural Hazards- DHS pointed out that although hazards such as volcanoes, earthquakes, and tsunamis are monitored by academic institutions and other agencies, they are difficult to predict and impossible to prevent. Additionally, DHS noted that the hazards these types of events present are well documented, but the downstream risks are not. DHS is concerned with downstream impacts to food, energy, water and sanitation.	• None
4.2 Katrina and Berlin Airlift as Benchmarks- DHS uses catastrophes such as Katrina, 9-11, and the Berlin Airlift to define unacceptable consequences.	• None
5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. DHS was asked for concerns of significance within the scope of the project.	
5.1 Exhaust of Backup Fuel Reserves- DHS indicated that it sees interruption in flow as a disruption in energy availability to communities. DHS is concerned with loss of power/fuel sources for an extended period of time leading to exhaustion of backup reserves. DHS representatives indicated that loss of energy for 8-10 days could pose a serious problem to Alaska while a short-term interruption in flow is not significant from a DHS standpoint. The situation becomes serious when energy must be brought in from outside the State. Tolerances for delays in delivery of fuel vary by community. For example, many rural villages are accustomed to receiving fuel only once per year while Anchorage and Fairbanks are highly dependent on consistent delivery. DHS's responsibility is to plan emergency response efforts. DHS coordinates the defense plan for protection against all types of threats to the State including loss of electricity, natural gas, and terrorist attacks. The project team commented that socioeconomic impacts are not within the scope of the project.	• None
6. Stakeholder Input on Other Specific Concerns or Priorities DHS was asked to identify other concerns and priorities to the project team for consideration.	
6.1 No input on other concerns or priorities were received at this meeting.	• None
7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure	

Agenda Item	Decisions/Actions
Suggestions for best risk management practices and data sources were provided by DHS and are summarized below.	
7.1 DHS has information on the length of time energy could be disrupted before serious impacts to the State would occur. This information pertains primarily to distribution downstream of refineries.	• None
7.2 DHS recommended contacting the following State agencies: • Department of Community and Economic Development (DCED), Deputy Commissioner Mike Black (269-4578) • Department of Natural Resources • Alaska Energy Authority	• EMERALD to consider contacting recommended POCs

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

***This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.**

Topic:	**U.S. Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) Stakeholder Consultation Meeting**
Date:	**October 15, 2008**
Time:	**1:00 PM – 2:30 PM**
Purpose:	The intent of this meeting was to solicit USDOT PHMSA input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. PHMSA was represented by Dennis Hinnah, Deputy Director Western Region. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz. Myron Casada and Steve Harris represented ABS Consulting. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project team organization, objectives, scope, and timeline.	
2.1 Project Team**-** The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance	• None

Agenda Item	Decisions/Actions
for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet	• None

Agenda Item	Decisions/Actions
infrastructure. Future developments such as exploration are excluded from the scope of the project. All “inside the fence” components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
3. Stakeholder Input on Focus of the Risk Assessment The EMERALD Project Manager outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
3.1 Pump Station 1 Tanks- The PHMSA representative pointed out that the tanks at Pump Station 1 are a criticality in the overall system.	• None
3.2 Cook Inlet- Cook Inlet infrastructure was identified as an area for focus because of its age. The State does not receive much revenue from Cook Inlet, which may mean it does not get a high level of regulatory attention.	• None
4. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.	
4.1 Decline in Production- Low flow was identified as a concern in terms of the potential for a black start in winter.	• None
5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment	

Agenda Item	Decisions/Actions
The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. PHMSA was asked for its concerns of significance within the scope of the project.	
5.1 Environmental Consequences- The PHMSA representative recommended considering impacts to Environmentally Sensitive Areas, drinking water sources, and vicinity to navigable waterways. PHMSA has an official definition of high consequence areas.	• None
5.2 Safety Consequences- The PHMSA representative recommended focusing primarily on gas line vicinity to residences or worker populations in terms of safety.	• None
5.3 National and International Impacts- The PHMSA representative pointed out that interruption in flow through TAPS not only affects the State of Alaska, but also has national and international repercussions.	• None
5.4 Socioeconomic Impacts to Anchorage- The PHMSA representative indicated that the highest priority consequence area is socioeconomic impacts to the City of Anchorage in terms of fuel and power supply.	• None
6. Stakeholder Input on Other Specific Concerns or Priorities PHMSA was asked to identify other concerns and priorities to the project team for consideration.	
6.1 PHMSA Regulatory Jurisdiction- PHMSA regulates oil and gas pipelines at the federal level including lines in Cook Inlet including the LNG Plant, TAPS, and common carrier lines on the North Slope downstream from separation facilities (i.e. from gathering centers to Pump Station 1). PHMSA also regulates gas distribution (e.g. Enstar/BEUCI) to individual residences. PHMSA regulates both intrastate and interstate pipelines in Alaska because the State does not have a program with primacy in this area. PHMSA regulates some fuel tanks including VMT breakout tanks and Pump Station 1 tanks. PHMSA does not regulate produced water lines.	• None
6.2 Low Stress Rule- The PHMSA representative pointed out that an exemption previously existed for low stress lines, but PHMSA now regulates these lines as a result of the Low Stress Rule. The regulation change occurred in July 2008 and compliance by industry is not required for a few years still.	• None
6.3 PHMSA Enforcement- PHMSA evaluates operator qualifications, safety systems to prevent operator error, and Integrity Management Programs as part of its overall regulatory oversight.	• None
6.4 MMS Regulatory Oversight- MMS regulatory oversight of existing operating infrastructure in Alaska is limited, but does include the BP Northstar wells.	• None

Agenda Item	Decisions/Actions
7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Suggestions for best risk management practices and data sources suggested by PHMSA are summarized below.	
7.1 PHMSA will provide the project team a list of pipelines/equipmemt it regulates.	• Mr. Hinnah to email the project team list of regulated pipelines.
7.2 TSA employee, Jack Fox, was recommended as a point of contact In DC. Mr. Fox understands the limits on making information available to the public in terms of mapping of Alaska energy.	• None
7.3 The Department of Energy conducted a study of the Cook Inlet gas supply that may have good historical information. DOE has also conducted other studies on the infrastructure.	• EMERALD to consider use of DOE studies
7.4 Large scale natural hazard studies may have been conducted by USGS or the Tsunami Warning Center.	• EMERALD to consider contacting USGS and the Tsunami Warning Center
7.5 MMS outlines some physical risks through its lease sale program.	• EMERALD to consider utilizing MMS lease sale documentation as an information source.
7.6 A study was commissioned by MMS (POC Karen Smith) for the Liberty project. Part of the study included a summary of spill data for the North Slope from multiple sources. Michael Baker executed the study.	• EMERALD to consider contacting MMS for existing studies

Attachments:	Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**University of Alaska Anchorage (UAA) School of Engineering Stakeholder Consultation Meeting**
Date:	**October 15, 2008**
Time:	**2:30 PM – 4:00 PM**
Purpose:	The intent of this meeting was to solicit UAA input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. UAA was represented by Orson Smith, Chair of the Department of Engineering. The meeting was facilitated by Bettina Chastain, EMERALD Project Manager, and scribed by Gretchen Grekowicz. Myron Casada and Steve Harris represented ABS Consulting. Ira Rosen, the Alaska Department of Environmental Conservation (ADEC) Project Manager, represented the State of Alaska.	
2. Project Objectives, Background, and Scope The ADEC Project Manager provided a brief introduction of the project, which was followed by a detailed overview by the EMERALD Project Manager outlining project team organization, objectives, scope, and timeline.	
2.1 Project Team**-** The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance	• None

Agenda Item	Decisions/Actions
for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Project Manager. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet	• None

Agenda Item	Decisions/Actions
infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
3. Stakeholder Input on Focus of the Risk Assessment The EMERALD Project Manager outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
3.1 Supports- Supports on aging infrastructure were identified as a potential weakness in the system.	• None
3.2 Piping Integrity- Cracks and thinning pipe walls were identified as areas of concern. UAA noted that the way piping reacts to stress is an important concern because it can mean the difference between a crack that slowly leaks versus a crack that splits and results in total failure of the line. Original design basis may or may not have taken this into account.	• None
4. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.	

Agenda Item	Decisions/Actions
4.1 Qualified Engineers- The shortage of licensed engineers in Alaska was raised as a concern. UAA noted that only about 30% of people enrolled in arctic engineering courses are Alaska residents. The demand for engineers in Alaska is about 500 individuals per year while UAA only graduates about 100 engineers per year. This means that Alaska is highly dependent on engineers from outside the state. This could result in a lack of competent people to design, modify and operate the infrastructure. The State does not have a strategy to remedy this situation.	• None
4.2 Permafrost Thaw- Permafrost instability and monitoring as a result of climate change was raised as an issue of concern. Permafrost has been melting for decades and current strategies for keeping it frozen will not work if it is melting as a whole.	• None
4.3 Erosion- Climate change can also result in sea level rise and increased shore erosion. The coast on the North Slope is highly susceptible to erosion because of the geology in that region. An additional factor is retreating sea ice. Sea ice prevents open water storms from reaching the shoreline leading to an increased rate of erosion.	• None
4.4 Earthquakes- Anchorage is at high risk for loss of life and property damage due to earthquakes. Resonation frequencies in the Anchorage area are significant. Normally occurring resonation combines with an earthquake and dictates the specific level of damage to structures such as buildings. Codes do not address these location-specific issues. Earthquakes are a concern along the oil and gas infrastructure corridor.	• None
4.5 Tsunami- Many underwater landslide areas exist in the fjords region of the state, which includes all of South East and South Central Alaska. These areas are primarily alluvial fan deposits. The fjords have very steep underwater drop-offs close to the shore. This puts communities in the area at high risk for tsunami.	• None
5. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. UAA was asked for its concerns of significance within the scope of the project.	
5.1 No input was received from UAA on this topic.	• None
6. Stakeholder Input on Other Specific Concerns or Priorities UAA was asked to identify other concerns and priorities to the project team for consideration.	

Agenda Item	Decisions/Actions
6.1 No other concerns or priorities were identified by UAA.	• None
7. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Suggestions for best risk management practices and data sources suggested by UAA are summarized below.	
7.1 A study on North Slope infrastructure erosion was conducted by Tom Ravens at UAF. The study was sponsored jointly by BP and MMS.	• EMERALD to consider NS erosion study as a source of information
7.2 USGS has earthquake maps. NOAA has sponsored studies on tsunami hazards for Homer, Seward, and Whittier. Maps associated with these studies may be available.	• EMERALD to consider use of USGS and NOAA as a source of information

Attachments:	Presentation Stakeholder Information Packet

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**Alaska Department of Labor Occupational Safety and Health Stakeholder Consultation Meeting**
Date:	**November 7, 2008**
Time:	**11:00 AM – 12:30 AM**
Purpose:	The intent of this meeting was to solicit Alaska Department of Labor (DOL) Occupational Safety and Health (AKOSH) input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. DOL Alaska Occupational Safety and Health was represented by Chief of Enforcement, Steve Standley, and four staff members. The meeting was facilitated by Brad Chastain, EMERALD Stakeholder Facilitator, and scribed by Gretchen Grekowicz., EMERALD Project Coordinator.	
2. Project Objectives, Background, and Scope The EMERALD Stakeholder Facilitator provided a brief introduction of the project, which was followed by a detailed overview outlining project team organization, objectives, scope, and timeline.	

Agenda Item	Decisions/Actions
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	• None
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Stakeholder Facilitator. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None

Agenda Item	Decisions/Actions
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	• None
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
2.9 AKOSH Interest- AKOSH is the State equivalent of the Occupational Health and Safety Administration (OSHA). AKOSH described its jurisdiction over oil and gas facilities as limited to onshore facilities. This jurisdiction is granted under a plan that is approved by the federal government and gives AKOSH primacy for onshore infrastructure. Offshore facilities such as Northstar, Endicott, and Cook Inlet platforms are regulated by federal OSHA. TAPS operations are also outside AKOSH jurisdiction. AKOSH indicated that it conducts two types of inspections, programmed and unprogrammed. Programmed inspections are mapped out ahead of time, and focus on specific industries. These focus areas are based on injury statistics, and are designated by federal OSHA. Unprogrammed inspections are in response to accidents, incidents, and referrals.	• None
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the presentation and following the presentation. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
Q: Who is the SAOT? **A:** The SAOT is made up of multiple state agencies including Department of Revenue, Petroleum Systems Integrity Office, Department of Law, Department of	• None

Agenda Item	Decisions/Actions
Natural Resources, Alaska Oil and Gas Conservation Commission, Department of Environmental Conservation, University of Alaska, and Joint Pipeline Office. **Q:** Will the PSIO gap analysis be a part of this risk assessment project? **A:** The risk assessment project team is working hand-in-hand with PSIO. The PSIO will use the results of the assessment as a roadmap to identify high risk areas that may also have gaps in regulatory oversight. PSIO will also identify low risk areas where duplicative oversight may be eliminated.	
Q: Will the team involve equipment manufacturers? **A:** The team will evaluate infrastructure systems as they stand today and will consider original design criteria, but actual manufacturers will not likely be consulted.	• None
Q: Will the team consider illnesses? For example, response personnel that become ill because of asbestos exposure. **A:** This assessment is focused on immediate affects of incidents, so long-term illnesses and risks to response personnel would be secondary impacts, and not necessarily considered as part of this assessment. **C:** I would strongly recommend that the team consider potential safety impacts to responders as a primary risk.	• None
4. Stakeholder Input on Focus of the Risk Assessment The EMERALD Stakeholder Facilitator outlined specific input to be solicited from stakeholders including portions of the infrastructure the public feels warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
4.1 <u>Old Facilities</u>- AKOSH indicated older facilities are at higher risk for workplace safety issues.	• None
4.2 <u>Voluntary Protection Program (VPP) Facilities</u>- Facilities that are not part of AKOSH or federal OSHA's Voluntary Protection Program were noted as higher risk facilities.	• None
5. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.	
5.1 <u>Preventive Maintenance Programs</u>- AKOSH representatives stated that industry does not appear to focus on preventive maintenance programs. Instead it addresses only issues that have already become problematic.	• None
5.2 <u>Explosion</u>- Explosions were identified as the biggest safety concern of AKOSH.	• None

Agenda Item	Decisions/Actions
5.3 Aging Workforce- The concern of an aging oil and gas industry workforce was raised. AKOSH stated that it is difficult to maintain a consistent presence of qualified workers.	• None
5.4 Influx of Contractors during Turn-Arounds- AKOSH pointed out that during turn-arounds, facilities often have large numbers of contractors on-site that are not necessarily familiar with the workplace hazards and rules. This could increase the chance of a safety incident occurring.	• None
6. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. AKOSH was asked for its concerns of significance within the scope of the project.	
6.1 Safety Incidents Due to Repair Work- AKOSH representatives indicated that repairs to equipment requiring opening of systems are at highest risk for accidents.	• None
6.2 Safety Consequence Ranges- AKOSH defines consequences in its Federal Inspection Reference Manual (FIRM). Essentially, any exposure to a hazard is considered unacceptable. AKOSH representatives indicated that frequency of incidents is also taken into account when assigning violation penalties. Events fall into three categories: • imminent danger, • serious outcomes (an employee fatality, serious illness, or injury that could impact the individual's lifestyle), and • other than serious outcomes	• None
7. Stakeholder Input on Other Specific Concerns or Priorities AKOSH was asked to identify other concerns and priorities to the project team for consideration.	
7.1 PSM as an Operational Control- Representatives indicated that the assumption of AKOSH is that if Process Safety Management (PSM) regulations are complied with, no injuries should occur.	• None
7.2 Seasonal Considerations- AKOSH noted that seasons and weather can strongly influence the safety hazards. For example, during the winter it is often dark and icy.	• None
8. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Participants were asked for suggestions for best risk management practices or data sources.	
8.1 AKOSH recommendeds the Federal Inspection Reference Manual (FIRM) as a	• EMERALD to consider

Agenda Item	Decisions/Actions
source of information for the project team.	use of the FIRM.
8.2 AKOSH recommended multiple workplace safety databases that could provide the project team with workplace injury and violation statistics. These included the BLS database that shows typical injuries by industry and by state. The OSHA website also includes a database that contains records citations and can be searched by most cited standard, SAIC code, region, or state.	• EMERALD to consider use of recommended databases.
8.3 AKOSH indicated that is could provide the project team with the list of infrastructure facilities that are part of its Voluntary Protection Program. AKOSH feels these facilities are at lower risk for safety incidents.	• EMERALD to consider use of VPP Listing.

Attachments:	Presentation Stakeholder Information Packet

Meeting Minutes
State of Alaska Oil & Gas Infrastructure Risk Assessment

*****This document is intended to be a summary of the meeting discussion for use by the project team in developing the risk assessment methodology and is not intended to be an official transcript.***

Topic:	**U.S. Environmental Protection Agency Stakeholder Consultation Meeting**
Date:	**November 10, 2008**
Time:	**9:00 AM – 10:30 AM**
Purpose:	The intent of this meeting was to solicit U.S. Environmental Protection Agency (EPA) input as a stakeholder with interests in existing Alaska oil and gas industry infrastructure. Input provided at this meeting will help the expert firm design the risk assessment methodology.
Attendees:	[redacted]

Agenda Item	Decisions/Actions
1. Introductions The meeting began with introductions of those in attendance. The EPA was represented by three staff members. The meeting was facilitated by Brad Chastain, EMERALD Stakeholder Facilitator, and scribed by Gretchen Grekowicz., EMERALD Project Coordinator.	
2. Project Objectives, Background, and Scope The EMERALD Stakeholder Facilitator provided a brief introduction of the project, which was followed by a detailed overview outlining project team organization, objectives, scope, and timeline.	

Agenda Item	Decisions/Actions
2.1 Project Team- The project team is comprised of the ADEC, lead agency for the project; the State Agency Oversight Team (SAOT) which encompasses representatives from multiple State agencies and provides oversight and guidance for the project; EMERALD, the lead contractor for the State; and ABS Consulting, EMERALD's subcontractor. EMERALD, an independently run subsidiary of Doyon Limited, Inc. is a professional services consulting firm with a core focus on process safety and risk management. EMERALD will provide local Alaska infrastructure expertise and will manage the project. ABS Consulting, will supplement the technical effort and contribute large-scale technical risk assessment experience and an international perspective.	• None
2.2 Project Goal- The goal of the project is to conduct a system-wide risk assessment of oil and gas infrastructure in Alaska. This will involve taking a system of systems approach and evaluating the interrelations among components of the infrastructure. Although many risk assessments of individual infrastructure components have been executed in the past, this type of system-wide assessment has never been conducted in Alaska.	• None
2.3 Stakeholder Consultation Objectives- The objectives and structure of the stakeholder consultation process were explained by the EMERALD Stakeholder Facilitator. Six regional meeting areas along the infrastructure corridor are planned including Fairbanks, Kenai, Anchorage, Valdez, Barrow, and possibly Juneau. Individual meetings with key stakeholders, as well as public meetings, will be held in each location. The goal of the meetings is to solicit stakeholder input on significant concerns relating to existing oil and gas infrastructure in Alaska.	• None
2.4 Project Background- A background of the project was provided. Alaska's infrastructure is aging and many of its components have exceeded their original design life. In 2006, North Slope oil production was halted by failure of one component of the system (pipeline corrosion leak). The governor announced this risk assessment project in May 2007 in response to that incident.	• None
2.5 Expected Outcome- The outcome of the project will be a "snapshot" of the current state of the infrastructure and will highlight components with the highest relative risk. Results of the Risk Assessment will be summarized in the form of a risk profile. The SAOT will use this risk profile to develop appropriate mitigation measures. This project has been integrally linked with the Petroleum Systems Integrity Office (PSIO) since its inception. The mission of PSIO is to evaluate gaps and overlaps in regulatory oversight of the oil and gas infrastructure. PSIO will use results of the risk assessment to prioritize gaps and make recommendations to the State with regard to regulatory oversight decisions.	• None
2.6 Risk Assessment Standards- A brief explanation of standard risk assessment methodology was provided. The risk assessment process is an organized and systematic effort to identify and analyze hazardous scenarios. Risk assessment asks three questions: 1) what can go wrong? 2) how likely is it? and 3) how damaging would the event be if it were to occur? Rankings are assigned for both probability and consequence and are combined to form an overall risk ranking for each potential event.	• None

Agenda Item	Decisions/Actions
2.7 Project Scope- The scope of the project was described in terms of geography, infrastructure components, and other factors and considerations. The project includes the North Slope, Trans-Alaska Pipeline System (TAPS), and Cook Inlet infrastructure. Future developments such as exploration are excluded from the scope of the project. All "inside the fence" components of the infrastructure are included in the scope. Excluded components are transportation (including marine), reservoir maintenance and impacts to the reservoir, and refineries and distribution facilities not integral to operating the infrastructure. The team will consider design/operating life, the natural aging process, operating procedures and standards, maintenance and management, regulatory oversight, changes in oil composition, and natural hazards when conducting the study. Market conditions, such as commodity pricing which would make operations non-economical, and man-made hazards such as sabotage will not be considered in the study.	• None
2.8 Project Timeline- The project is broken into three phases. Phase 1 started in July 2008 and will run approximately thirteen months. The first task of Phase 1, development of the Project Plan, was completed and approved by the SAOT. The next step, Stakeholder Consultation, is currently underway. The team will use input from this consultation as well as best practices to develop a draft risk assessment methodology, which will be complete in February 2009. At that time the project team will come back out to the regions to solicit stakeholder input on the methodology. The methodology will also be reviewed by an independent peer review entity. Phase 2 will take about 6-months and will begin in August 2009. Phase 2 involves implementation of the methodology by working with industry to visit facilities and collect infrastructure information and data. Phase 3 is the last phase of the project and will be complete by the end of May 2010. It involves analyzing the data collected during implementation and developing a risk profile which will be summarized in the final report that will be presented to the State.	• None
3. Questions and Comments from Attendees on the Project Overview Questions and comments were taken both throughout the presentation and following the presentation. This section includes questions, answers, and general comments and suggestions relating to the scope, timeline, and management of the project.	
Q: Will abandoned wells in the National Petroleum Reserve Alaska (NPRA) be considered? **A:** No, only producing infrastructure will considered as part of the project. Exploration activities are out of scope. **Q:** Only facilities producing today? **A:** Yes, facilities producing as of the start of the project, July 1, 2008.	• None
Q: Are bulk fuel tanks in the scope of the project? **A:** Yes, bulk fuel storage is within the scope.	• None
Q: Are topping units within the scope of the project? **A:** Yes, topping units are within scope because they provide fuel to the	• None

Agenda Item	Decisions/Actions
infrastructure.	
Q: Are injection systems within the scope of the project? **A:** Yes, injection systems are within the scope.	• None
Q: Are water flood lines within the scope of the project? **A:** Yes, water flood lines are within scope, but their ability to maintain reservoir pressure will not be considered.	• None
Q: Will Class I underground injection wells be considered? **A:** Class I underground injection wells will be considered as they pertain to support of production. **Q:** What about trucking of grind and inject materials? **A:** Yes, as it pertains to support of production.	• None
Q: Is trucking of critical materials, such as transportation on the Haul Road, within the scope of the project? **A:** This may need to be further defined by the project team.	• None
Q: How will the team get cooperation from industry? **A:** The success of this project is dependent upon cooperation from industry. Currently the team is meeting with industry through AOGA, but confidentiality issues are an issue, and are being addressed by the State.	• None
Q: How is the team interacting with the "gas pipeline team" that is producing the Environmental Impact Statement (EIS)? An infrastructure assessment will be conducted as part of that process. Are the two teams dovetailing? **A:** The team reached out to the Federal Energy Regulatory Commission (FERC), Department of Natural Resources and other agencies, but did not receive input on other risk assessments that are being conducted. The team does not presently have a connection with the "gas pipeline team." **C:** The risk assessment team should maintain an awareness of the gas line activities. That team may execute a parallel effort.	• None
Q: Will the assessment be based only on a review of existing data and information or will it also include facility site visits? **A:** The assessment will probably include a combination of both information/data review and facility visits. On-site work will not be inspection-oriented, but the team is likely to interview facility operators and gather technical information. **Q:** Will you compare what you hear in the field with the documentation? **A:** Yes, this is part of the due diligence effort.	• None
Q: Will tribes be consulted? Is the consultation process documented?	• None

Agenda Item	Decisions/Actions
A: Yes, the work plan outlines the stakeholder consultation process for the project. A list of stakeholders to be consulted was approved by the State and includes native organizations. The team traveled to five regions along the oil and gas corridor and held individual meetings as well as public meetings. Stakeholders were also provided the opportunity to provide input via the project website, a survey, or by teleconference. **C:** EPA is currently creating a consultation protocol that covers all the North Slope Alaska villages. North Slope villages are inundated with meetings so the Foraker Group facilitated an inter-village agreement that outlines which village will cover certain meetings.	
C: The team should consider combinations of multiple events.	• None
Q: What is the interface between federal agencies and the State for this project? **A:** The Project Manager for ADEC is Ira Rosen. He is being supported by Nuka Research who is facilitating the communication of the project from the State's perspective.	• None
4. Stakeholder Input on Focus of the Risk Assessment The EMERALD Stakeholder Facilitator outlined specific input to be solicited from stakeholders including portions of the infrastructure the participants feel warrants project team attention. Components of the infrastructure in the scope of the project include production wells, gathering lines, facility piping, crude oil pipelines, gas and water injection systems, gas transport pipelines integral to the operating infrastructure, oil and gas processing and treatment, waste management and disposal (re-injection), storage tanks, terminals, marine loading facilities, and support systems.	
4.1 <u>Reserve Pits</u>- EPA identified abandonment on producing pads as a potential concern.	• None
5. Stakeholder Input on Initiating Events Input was solicited on initiating events that have the potential to cause catastrophes relating to the infrastructure.	
5.1 <u>Corrosion</u>- Corrosion of flow lines, gathering lines, and bulk storage tanks was identified as a concern.	• None
5.2 <u>Noise</u>- Noise that could impact waterfowl or other wildlife was identified as a concern.	• None
6. Stakeholder Input on Priorities for Preventing Unplanned Events Related to Oil & Gas Infrastructure in Terms of Reliability, Safety, & Environment The three consequence categories that will be used to evaluate risks for the project were described. Safety refers to both public safety and safety of industry workers. Environment refers to any consequences to the natural resources of the State including waterways, wildlife, and other resources. Reliability refers to events that disrupt the flow of oil and subsequently have the potential to impact State revenue. EPA was asked for its concerns of significance within the scope of the project.	

Agenda Item	Decisions/Actions
6.1 Spill to a Navigable Waterway- EPA indicated that its definition of unacceptable consequence is automatically defined by regulations, and is any spill to navigable water.	• None
6.2 Migrating Fish- Spill impact to migrating fish was identified as a concern.	• None
6.3 Cumulative Impacts- Cumulative impacts were identified as a concern.	• None
7. Stakeholder Input on Other Specific Concerns or Priorities EPA was asked to identify other concerns and priorities to the project team for consideration.	
7.1 Effectiveness of Spill Response- EPA indicated that it is concerned with both timeliness and effectiveness of spill response efforts following an incident.	• None
7.2 Future Studies- EPA recommended an evaluation of risks associated with legal operations be a topic of future study.	• None
8. Best Risk Management Practices, Guidelines, and Standards; existing Risk Assessments, Studies, Reports, or Other Data/Information Relevant to Alaska Oil & Gas Infrastructure Participants were asked for suggestions for best risk management practices or data sources.	
8.1 EPA indicated that the standards it uses are posted on the EPA website and include the regulations as well as SPCC guidance for regional inspectors.	• EMERALD to consider review of EPA standards.
8.2 Economic analysis on the national level relating to SPCC Plan regulations was noted as a possible source of information.	• EMERALD to consider use of economic analysis relating to SPCC Regulations.
8.3 The EPA Office of Research and Development (ORD) web site was recommended as a source of information. EPA encouraged the team to review the contents of each program's webpage.	• EMERALD to consider use of information on the ORD web site.
8.4 It was noted that a substantial amount of risk assessment work was conducted following 9/11 and Hurricane Katrina focusing on human health and safety.	• EMERALD to consider research of post 9/11 & Katrina RAs.

Attachments:	Presentation Stakeholder Information Packet

Appendix D – Final Task 1c Document Review List and Document Summaries

Table 1 provides the initial list of documents that the project team will review as part of task 1c. However, not all of the reviews will be documented to the same degree (i.e., depending on the value of the document to the project). Also, additional documents may be identified during the stakeholder input solicitation process and during the review of the initial documents listed here. Finally, relevant document identification is expected to continue during the on-going risk assessment methodology development.

Table 1. Documents to Be Reviewed

Publishing Entity	Title
Regulations:	
Department of Transportation	*Corrosion Control* (including pipeline integrity management for hazardous liquid pipelines) (49 CFR Subpart H)
	Gas Pipeline Integrity Management (49 CFR 192 Subpart O)
Environmental Protection Agency	*Risk Management Planning (RMP) for Chemical Accidental Release Prevention* (40 CFR 68)
Occupational Safety and Health Administration	*Process Safety Management (PSM) of Highly Hazardous Chemicals* (29 CFR 1910.119)
State of Alaska	Pipeline Right-of-Way Leasing (11 AAC 80)
	Oil & Gas Leasing (11 AAC 83)
	Oil And Other Hazardous Substances Pollution Control (18 AAC 75)
	Alaska Oil and Gas Conservation Commission (20 AAC 25)
Standards:	
American Petroleum Institute (API)	*Managing System Integrity for Hazardous Liquid Pipelines* (API 1160)
American Society of Mechanical Engineers (ASME)	*Managing System Integrity of Gas Pipelines* (ASME B31.8S,)
Canadian Standards Association	*Oil and Gas Pipeline Systems* (CSA Z662-03)
Canadian Standards Association	*Risk Management: Guideline for Decision Makers* (CSAQ850-97)
Councils of Standards of Australia and New Zealand	*Risk Management* (AS/NZS 4360)
Canadian Standards Association	*Oil and Gas Pipeline Systems* (CSA Z662-03)

Publishing Entity	Title
Federal Emergency Management Agency	*Standard Guide for Seismic Risk Assessment of Buildings* (ASTM E2026-07)
National Fire Protection Association (NFPA)	*Disaster/Emergency Management and Business Continuity Programs* (NFPA 1600)
Recommended Practices and Industry Guidelines:	
American Petroleum Institute	*Managing Systems Integrity of Terminal and Tank Facilities* (API Publication 353)
	Risk Based Inspection (API RP 580)
American Bureau of Shipping	*Guide For Risk Evaluations For The Classification Of Marine-Related Facilities* (ABS 117)
	Guidance Notes on Risk Assessment Application for the Marine and Offshore Oil and Gas Industries (ABS 97)
British Standards Institute and International Standards Organization	*Guidelines on Tools and Techniques for Hazard Identification and Risk Assessment - Offshore Production Installations* (BSI BS EN ISO 17776)
Center for Chemical Process Safety (CCPS)	*Chemical Process Quantitative Risk Assessment Guidelines*
	Evaluating Process Safety in the Chemical Industry: A User's Guide to Quantitative Risk Analysis
	Guidelines for Mechanical Integrity Systems
	Guidelines for Hazard Evaluation Procedures, 3rd Edition
	Guidelines for Chemical Transportation Risk Analysis
	Guidelines for Risk Based Process Safety *Center for Chemical Process Safety*
American Petroleum Institute	*Base Resource Document on Risk-Based Inspection* (API Publication 581)
	Environmental Event Combination Criteria Phase I, Risk Analysis (API Report 87-20)
	Risk-Based Decision Making (API PUBL 1628B)
National Space and Aeronautics Administration (NASA)	*System Engineering Toolbox for Design-Oriented Engineers* (NASA Reference Publication 1358)
	Probabilistic Risk Assessment Procedures Guide for NASA Managers and Practitioners

Publishing Entity	Title
	Probabilistic Risk Assessment (PRA) Procedures for NASA Programs and Projects (NASA NPR 8705.5)
Norwegian Technology Centre	*Risk and Emergency Preparedness Analysis* (NORSOK Standard Z-013)
	Criticality Classification Method (Z-CR-008)
	Regularity Management and Reliability Technology (Z-016)
United Kingdom Health and Safety Executive	*A Guide to the Offshore Installations (Safety Case) Regulations* (SI 1992/2885)
Alaska-Related Risk Documents:	
National Academy of Science	*Risk of Vessel Accidents and Spills in the Aleutian Islands: Designing a Comprehensive Risk Assessment* (Special Report 293)
National Academy of Science	*Review of the Prince William Sound Risk Assessment*
Miscellaneous Documents:	
Alyeska Pipeline Services Company	*Environmental Report for Trans-Alaska Pipeline System Right-of-Way*
Argonne National Laboratory	*TAPS Renewal Final Environmental Impact Statement*
Federal Emergency Management Agency	*Estimating Losses From Future Earthquakes, Panel Report* (FEMA 176)
United Kingdom Offshore Operators Association	*HSE Management Guidelines*
United Kingdom Health and Safety Executive	*Risks from Hazardous Pipelines in the United Kingdom*

Summary No. 1
Document Title: *Corrosion Control for Hazardous Liquid Pipelines* (49 CFR 195 Subpart H)
Date: June 30, 1971, including Amendments through December, 2001
Publisher/Source: Department of Transportation
Document Type: Regulation
Information Restrictions (if any): None
Focus: 49 CFR 195 Subpart H prescribes minimum requirements for protection steel pipelines against corrosion. Although not explicitly stated in this subpart, the regulation applies to transportation of hazardous liquids by pipeline.
Summary: 49 CFR Subpart H defines corrosion control requirements for both buried/submerged pipelines and atmospherically exposed pipelines. Corrosion controls for breakout tanks are also addressed. The regulation provides information on the following: (1) which pipelines must have coatings for corrosion control, (2) requirements on coating material properties, (3) inspection requirements for pipe coatings, (4) cathodic protection requirements – when and where applicable, (5) cathodic protection for breakout tanks, (6) examination requirements for exposed portions of buried pipelines, (7) criteria for determining the adequacy of cathodic protection, (8) external corrosion control monitoring requirements for protected and unprotected pipelines, rectifiers, and other devices used in cathodic protection, and breakout tanks, (9) which facilities to electrically isolate and what inspections/tests/safeguards are required, (10) actions you must take to alleviate interference currents, and (11) steps you must take to mitigate internal corrosion. The regulation also specifies which pipelines must be protected against atmospheric corrosion, appropriate coating materials, corrosion monitoring requirements, methods for determining the strength of corroded pipe, and corrective actions to take upon discovering corroded pipe. The requirements for performing external corrosion direct assessment to evaluate the effects of external corrosion are specified. A list of required corrosion control records is provided. Information to be maintained includes records or maps showing the location of cathodically protected pipelines, cathodic protection facilities (installed after Jan. 28, 2002), and neighboring structures bonded to cathodic protection systems. Records of each analysis, check, demonstration, examination, inspection, investigation, review, survey, and test required by this regulation to demonstrate adequacy of corrosion control must be maintain for 5 years (or in some cases, for the life of the pipeline). Appendix A discusses delineation between federal and state jurisdiction relative to this regulation. Appendix B discusses risk-based alternatives to pressure testing older hazardous liquid and carbon dioxide pipelines. This appendix contains qualitative data for assigning a pipeline segment into a low, medium, or high risk category based on factors such as hazard location, product and volume indicators, and probability of failure. Appendix C contains guidance on implementation of an integrity management program. It suggests: (1) identifying high consequence areas (referring to the National Pipeline Mapping System and other government databases to find these areas) and potential impacts of a release on an area (considering factors such as terrain, drainage systems, farm tile fields, roadway crossings with ditches, type of product in the pipeline, etc.) and (2) considering risk factors for establishing the frequency of integrity assessment using a variety of risk indicator tables (e.g., impacted area population, previous test results, leak history, pipeline condition, cathodic protection history, pipe coating history), and safety indicators for leak history, volume or line size, age of pipeline, and product transported. Appendix C provides a simple quantitative method for combining these factors to estimate the *relative* risk of pipeline segments.

Summary No. 1
Pertinence to ARA: **__ Not Pertinent: _ Illustrates Methodology: _X Provides a Data Source: __ Other Use** **Explanation:** Appendices B and C in 49 CFR Subpart H provide factors and tables to consider in estimating the relative risk of pipeline accidents. The tables provide very broad scales that are not always well defined (e.g., what qualifies as a rural vs. non-rural area as listed in one of the tables). However, these appendices do provide a good framework and list of factors to consider in developing a risk methodology. Also, for Alaskan pipelines to which this subpart applies, application of this standard should have resulted in significant data that could be of use to this project.

Summary No. 2
Document Title: *Requirements for Corrosion Control for Gas Pipelines* (49 CFR 192 Subpart I*)*
Date: Current as of Oct. 8, 2008
Publisher/Source: Department of Transportation
Document Type: Regulations
Information Restrictions (if any): None
Focus: Subpart I describes minimum requirements for the protection of metallic pipelines used for natural gas and other gas transportation from external, internal, and atmospheric corrosion.
Summary: *49 CFR 192 Subpart I* defines a set of corrosion controls for external, internal, and atmospheric corrosion. It also defines remedial measures, direct assessment requirements, and corrosion control recordkeeping requirements. 1. External Corrosion Control – Defined for buried or submerged pipelines installed after July 31, 1971. Also defined separately for buried or submerged pipelines installed before August 1, 1971. External corrosion controls defined for the following: examination of buried pipeline when exposed, protective coating, cathodic protection, monitoring, electrical isolation, test stations, test leads, and interference currents. 2. Internal Corrosion Control – General rules for identifying/controlling internal corrosion are defined. Internal corrosion controls defined for the following: design and construction of transmission lines and monitoring. 3. Atmospheric Corrosion Control – General rules for protecting against atmospheric corrosion and monitoring are defined. 4. Remedial Measures – General remedial measures applicable to replacing segments of metallic pipe due to external corrosion are defined. Remedial measures for when to replace a transmission line due to general corrosion or localized pitting are defined. Remedial measures for when to replace distribution lines (other than cast or ductile iron) and when to replace cast or ductile iron pipelines are defined. 5. Direct assessment rules for onshore steel or iron transmission lines are referenced to other sections of 49 CFR 192. 6. Corrosion control recordkeeping requirements are defined.
Pertinence to ARA: **__ Not Pertinent: __ Illustrates Methodology: _X_ Provides a Data Source: __ Other Use** **Explanation:** Defines minimum corrosion protection requirements for gas pipelines. Oil and gas equipment operators should currently meet these standards (for federally regulated pipelines). However, regulatory information will be needed to determine if that is the case (e.g., what oversight has been exercised and to what level has compliance been achieved). Also, if operators have provided high quality corrosion protection (i.e., beyond the minimum regulatory requirements) that information should be considered in evaluating leak/rupture failure rates for equipment of interest to the ARA project.

Summary No. 3
Document Title: *Pipeline Integrity Management for Gas Pipelines* (49 CFR 192 Subpart O)
Date: December 15, 2002
Publisher/Source: Department of Transportation, *Federal Register*, Vol. 68, No. 240
Document Type: Regulations
Information Restrictions (if any): None
Focus: Subpart O prescribes minimum requirements for an integrity management program for any gas transmission pipeline covered by the regulation.
Summary: *49 CFR 192 Subpart O* requires the development of a gas pipeline integrity management program for all segments of the pipeline in high consequence areas. The regulation provides methods for determining high consequence areas. The regulation also defines the elements that must be included in an integrity management plan. These elements include: (1) identification of all high consequence areas, (2) baseline assessment plan, (3) identification of threats to covered pipeline segments, (4) a direct assessment plan, (5) provisions for meeting requirements if remediation conditions are found, (6) a process for continual evaluation/ assessment, (7) plans for confirmatory direct assessments as may be required, (8) provisions for adding preventive and mitigative measures to protect high consequence areas, (9) performance plans and performance measures, (10) recordkeeping provisions, (11) a management of change process, (12) a quality assurance process, (13) a communication plan for addressing safety concerns, (14) procedures for providing an electronic copy of the operator's risk assessment or integrity plan to appropriate government agencies, (15) procedures for ensuring each integrity assessment is conducted in a manner that minimizes environmental and safety risks, and (16) a process for identifying and assessing newly identified high consequence areas. For many of the integrity management program elements, the regulation discusses how a gas pipeline operator should address the element (e.g., what is contained in an element, actions to take). The regulation also describes actions to take to address integrity issues, discusses preventive and mitigative measures to protect high consequence areas, defines reassessment intervals and allowable deviations, and discusses methods for measuring program effectiveness.
Pertinence to ARA: **__ Not Pertinent: _X_ Illustrates Methodology: _X_ Provides a Data Source: _ Other Use** **Explanation:** *49 CFR 192 Subpart O* defines a method for determining high consequence areas near a gas transmission pipeline. These concepts may be useful in developing high consequence (for safety) criteria for the ARA project. However, the consequence criteria are only related to public safety implications (not occupational, environmental, or reliability considerations). Data submitted as part of the IM regulatory submission will be of interest if available.

Summary No. 4
Document Title: *Pipeline Integrity Management in High Consequence Areas (for Hazardous Liquid Pipelines)* - (49 CFR195.452)
Date: Including Amendments through June 2008
Publisher/Source: Department of Transportation
Document Type: Regulation
Information Restrictions (if any): None
Focus: This regulation applies to any federally regulated hazardous liquid pipeline and carbon dioxide pipeline that could affect a high consequence area (HCA), unless the operator effectively demonstrates by risk assessment that the pipeline could not affect the area. HCAs are defined in 49CFR450, to include: (1) A commercially navigable waterway, which means a waterway where a substantial likelihood of commercial navigation exists; (2) A high population area, which means an urbanized area, as defined and delineated by the Census Bureau, that contains 50,000 or more people and has a population density of at least 1,000 people per square mile; (3 An other populated area, which means a place, as defined and delineated by the Census Bureau, that contains a concentrated population, such as an incorporated or unincorporated city, town, village, or other designated residential or commercial area; (4) An unusually sensitive area, as defined in §195.6.
Summary: The pipeline integrity management (IM) regulation requires pipeline operators to define what sections of their pipelines could potentially affect an HCA and to implement an IM program for those sections. An operator must include, at minimum, each of the following elements in its written IM program: (1) A process for identifying which pipeline segments could affect a HCA (2) A baseline assessment plan (3) An analysis that integrates all available information about the integrity of the entire pipeline and the consequences of a failure (4) Criteria for remedial actions to address integrity issues raised by the assessment methods and information analysis (5) A continual process of assessment and evaluation to maintain a pipeline's integrity (6) Identification of preventive/mitigative measures to protect the HCA (7) Methods to measure the program's effectiveness (8) A process for review of integrity assessment results and information analysis by a person qualified to evaluate the results and information Specific inspection methods and requirements for risk assessment of potential pipeline leaks are outlined in the regulation.
Pertinence to ARA: **__ Not pertinent _X_ Illustrates Methodology _X_ Provides a Data Source __ Other** **Explanation:** The Trans-Alaska Pipeline System (TAPS) is covered by the IM regulation and other federally-regulated pipelines in Alaska may be covered as well. The ARA project team has requested a listing from DOT of pipelines that are federally regulated and which of them are subject to the IM regulation. In addition to providing some useful definitions with regard to the significance of potential leaks, application of the IM regulation requires the pipeline operator to (1) collect a vast amount of data, 92) analyze it, and (3) make decisions on those analysis results. Access by the ARA project team to any of these three types of information could be an important contributor to the project.

Summary No. 5
Document Title: *Chemical Accident Prevention Provisions*, EPA Risk Management Program Rule (40 CFR 68)
Date: June 20, 1996 (updated through April 9, 2004)
Publisher/Source: Environmental Protection Agency
Document Type: Regulation
Information Restrictions (if any): None
Focus: EPA risk management is the application of management principles, methods, and practices to prevent and control accidental releases of hazardous chemicals or energy that affect members of the public around facilities that handle the substances specifically listed in the rule. It does not address hazards from naturally occurring hydrocarbon mixtures (e.g., condensate, crude oil, field gas, and produced water). After processing in a refinery or other processing unit, flammable materials that are NFPA 4 materials are covered by EPA's RMP rule.
Summary: The EPA RMP rule is very similar to OSHA's PSM regulation; however, the RMP rule only addresses threats to the public. It contains management system requirements for almost all of the same elements included in OSHA PSM: Operating Procedures, Mechanical Integrity, Training, Employee Participation, Contractors, Process Safety Information, Management of Change, Process Hazard Analysis, Incident Investigation, Emergency Planning and Response, Hot Work Permit, Pre-Startup Safety Review, and Compliance Audits. Facilities covered by the RMP rule must develop and maintain accident prevention programs and periodically file a risk management plan (RMPlan). The RMPlan lists worst-case and alternative-case release scenarios and estimates their impact t to the public.
Pertinence to ARA: **__ Not Pertinent: __ Illustrates Methodology: _X_ Provides a Data Source: X__Other Use** **Explanation:** Where the EPA RMP rule applies, it focuses on public safety only. It does not address employee safety, reliability, or environmental issues. Therefore, analyses performed in response to RMP coverage would only address one of the three consequences of interest for the ARA risk assessment. If any of the facilities within the scope of the ARA are covered by RMP (e.g., possibly portions of the Valdez Marine Terminal [VMT]), the RMP rule might be of interest to identify what the facility considered as its worst-case and alternative-case release scenarios; however, with the limited population around the VMT, those scenarios are likely not to be of interest to the ARA. Also, the accident prevention portions of the RMP rule requirements are so similar to those in OSHA's PSM regulation that the discussion of the applicable PSM requirements of interest would apply (e.g., potential value of existing process hazard analyses and mechanical integrity program information). See the document summary for the OSHA PSM regulation (29 CFR 1910.119).

Summary No. 6
Document Title: *Process Safety Management of Highly Hazardous Chemicals* (29 CFR 1910.119)
Date: February 24, 1992
Publisher/Source: Occupational Safety and Health Administration, *Federal Register, Vol. 57, No. 36, pp. 6356 64.*
Document Type: Regulation
Information Restrictions (if any): None
Focus: Process safety management is defined as the application of management principles, methods, and practices to prevent and control accidental releases of hazardous chemicals or energy. Having appropriate management systems in place for assuring the integrity of process safety in facilities is an essential element of an overall chemical accident prevention strategy.
Summary: The Occupational Safety and Health Administration (OSHA) promulgated its performance-based standard on *Process Safety Management of Highly Hazardous Chemicals* (29 CFR 1910.119) on February 24, 1992. This regulation is a 14-element "design specification" of a management system for preventing catastrophic events in the workplace. The following is a breakdown of the PSM elements: Operating Procedures, Mechanical Integrity, Training, Employee Participation, Contractors, Process Safety Information, Management of Change, Process Hazard Analysis, Incident Investigation, Emergency Planning and Response, Hot Work Permit, Pre-startup Safety Review, Compliance Audits, and Trade Secrets.
Pertinence to ARA: **__ Not Pertinent: __ Illustrates Methodology: _X_ Provides a Data Source: X Other Use** **Explanation:** The PSM regulation applies to processes involving handling of flammable materials, including petroleum and natural gas; however, it does not apply if such a process is regulated for fire and explosion hazards by the Department of Transportation (DOT). This means that although parts of the North Slope, Cook Inlet, Valdez, and other terminal facilities are covered by PSM, the pipeline equipment and activities covered by DOT are exempted from PSM. Where PSM applies, it focuses on occupational safety only, it does not address public safety, reliability, or environmental issues, so analyses performed in response to PSM coverage would only address one of the three consequences of interest for the Alaska Oil and Gas Infrastructure Risk Assessment. For facilities where PSM applies, there are two elements of particular interest: Process Hazards Analysis (PHA) and Mechanical Integrity (MI). **PHA**: Employers operating PSM-covered facilities must perform PHAs to identify occupational safety issues, using at least one of six specified methodologies (what-if, checklist, what-if/checklist, HAZOP, FMEA, fault tree analysis), or an appropriate, equivalent methodology. These analyses may be useful to this project, if the facility operators will make them available. **MI**: Employers must establish and implement written procedures to maintain the MI of process equipment and must train employees responsible for maintaining the integrity of process equipment. Inspections and tests must be performed on process equipment at a frequency consistent with applicable manufacturer's recommendations and good engineering practices or more frequently if determined necessary by experience. If available, MI program documentation (e.g., equipment inspection and testing schedules) might provide this project with insight into the diligence of facility integrity efforts.

Summary No. 7

Document Title: *Pipeline Right-of-Way Leasing* (11 AAC 80)

Date: May 10, 2002

Publisher/Source: State of Alaska

Document Type: Regulation

Information Restrictions (if any): None

Focus: 11 AAC 80 defines the information required for a right-of-way lease of state land for pipeline purposes under AS 38.35; state authority for administering this requirement; and rules for administrative determination of temporary or emergency service or temporary or emergency abandonment, reduction, or impairment of service.

Summary: 11 AAC 80 defines the information required for a right-of-way lease of state land for a pipeline. The information required for a lease application includes the following: (1) name and address of applicant, (2) map showing proposed pipeline, including point of origin and termination, total length, and length on uplands, (3) map showing the locations of the proposed pipeline right-of-way crossing of streams or beds of other bodies of water, and (4) width of the proposed temporary right-of-way for construction and the proposed right-of-way required for operation.

Also required in the application are general proposed pipeline characteristics, including the nature of substance transported, diameter of pipe, size/number/location of pumping, compressor, heating or refrigeration stations, and estimated life of the pipeline. Engineering and design characteristics of the pipeline, planned temperature of the transported material, location of pipe above or below surface (if known), and proposed methods for crossing bodies of water are required.

Information on spill/leak prevention, detection and containment are part of the application. A listing of operation and maintenance support facilities, human support facilities, and planned staffing for operation and maintenance of the pipeline is required in the application.

The application also requires plans to reasonably prevent, detect, and abate conditions from construction, *maintenance and operation*, or termination of the pipeline that might cause a safety or health hazard to workers or the public or irreparable harm/damage to public or private property.

Additional information is required on quality control, financing, the general contractor, and the proposed pipeline operator. This regulation also describes the information requirements for requests for authorization to provide temporary or emergency service or for temporary or emergency abandonment, reduction or impairment of service and the state's consideration for addressing such requests.

Pertinence to ARA:
__ Not Pertinent: __ Illustrates Methodology: _X Provides a Data Source: __ Other Use

Explanation: 11 AAC 80 does not provide specific information or methodology useful to the ARA project. However, the actual lease applications filed in compliance to this requirement will contain useful physical and operating characteristics of the pipeline (size, material properties, length, etc.) and geographical information (location, stream crossing, etc.). Also, contingency plans for preventing/mitigating releases should appear in the application – that would be potentially useful for consequence assessment.

Summary No. 8
Document Title: *Oil & Gas Leasing* (11 AAC 83.100-199)
Date: 2006
Publisher/Source: State of Alaska
Document Type: Regulation
Information Restrictions (if any): None
Focus: 11 AAC 83.100-199 describes the general terms and conditions applicable to all oil and gas leases in the state of Alaska.
Summary: Topics covered in 11 AAC 83.100-199 of the Alaska Administrative Code include: leasing methods, paying quantities, rental payments, lease extension by drilling/extension after production/shut-in production, elimination from a unit, and directional drilling. Other subjects covered in the code are: reserved rights of the state, confidential reports, damages, plan of operations, oil and gas lease bond, conditional leases, failure to pay rental, reinstatement, default, royalty bidding, sliding royalty scale, royalty reduction, and extension by commitment to an approved unit.
Pertinence to ARA: **__ Not Pertinent: __ Illustrates Methodology: __ Provides a Data Source: _X_ Other Use** **Explanation:** 11 AAC 83.100-199 provides little or no information to support the ARA project. Section 11 AAC 83.158, Plan of Operations, requires lease holders to provide a description of operating procedures designed to prevent or minimize adverse effects on other natural resources and other land uses of the leased or licensed area and adjacent areas, including fish and wildlife habitats, historic and archeological sites, and public use areas. This information, contained in the lease agreement, may be useful in assessing adverse consequences to an area following an accidental release.

Summary No. 9
Document Title: *Oil and Other Hazardous Substances Pollution Control* (18 AAC 75)
Date: June 9, 2008
Publisher/Source: State of Alaska
Document Type: Regulation
Information Restrictions (if any): None
Focus: 18 AAC 75 describes general oil pollution prevention requirements for facilities and operations for which an approved oil discharge prevention and contingency plan is required under AS 46.04.030 or AS 46.04.055 (j).
Summary: 18 AAC 75 defines the oil pollution prevention requirements that covered vessels, barges, pipelines, railroad tank cars, and other facilities must meet to be prepared for and to help prevent an oil discharge. Topics covered in this administrative code include: 1. Oil Pollution Prevention Requirements 2. Financial Responsibility for Oil Discharges 3. Discharge Reporting, Cleanup, and Disposal of Oil and Other Hazardous Substances 4. Oil Discharge Prevention and Contingency Plans and Nontank Vessel Plans 5. Oil Spill Primary Response Action Contractors and Nontank Vessel Cleanup Contractors, Incident Management Teams, and Response Planning Facilitators 6. Civil Penalties for Discharge of Petroleum Products and By-products 7. Surface Oiling 8. Oil Discharge for Scientific Purposes 9. General Provisions Section 1 of this code (75.045 and 75.065) provides requirements on equipment and procedures for preventing/mitigating oil spills. Section 4 discusses in more detail contingency planning and response actions to a possible oil spill.
Pertinence to ARA: **__ Not Pertinent: __ Illustrates Methodology: __ Provides a Data Source: _X Other Uses** **Explanation:** 18 AAC 75 has very limited value for the ARA project. Sections 1 and 4 provide some information that may prove helpful in estimating consequences associated with potential oil releases (via estimating response capability and response time).

Summary No. 10

Document Title: *Alaska Oil and Gas Conservation Commission* (20 AAC 25)

Date: 2008

Publisher/Source: State of Alaska

Document Type: Regulation

Information Restrictions (if any): None

Focus: 20 AAC 25 focuses on requirements and safe practices for well drilling operations.

Summary: 20 AAC 25 covers the following major topics:

1. **Drilling** – permit requirements, re-entry of a suspended well, changes to a program in a permit to drill, designation of operator, notice of ownership, bonding, claims, casing and cementing, primary well control for drilling, secondary well control for primary drilling and completion, secondary well control for through-tubing and completion, well control requirements, well identification, reserve pits and tankage, wellbore surveys, drilling units and well spacing, hydrogen sulfide, gas detection, records and reports, geologic data and logs, temporary shutdown of drilling or completion operations, other wells in designated areas, and annular disposal of drilling waste. The sections on permits, well control, hydrogen sulfide, and gas detection contain some design information/requirements that may be useful to quantifying risk.

2. **Abandonment and Plugging** – abandonment of wells, plugging of wells and well plugging requirements, suspended wells, shut-in wells, water wells, and well location clearances.

3. **Production Practices** – production equipment, notification of uncontrolled release of oil and gas, multiple completion of wells, commingling of production, potential of gas wells, production measurement, measurement/allocation/reporting of well production, gas disposition, gas-oil ratio limitations, common production facilities, underground disposal of oil field wastes and underground storage of hydrocarbons, illegal production, automatic shut-in equipment, initial reservoir properties, workover operations, secondary well control for tubing workover, well control requirements for workstring service operations, well control requirements for wireline operations, well control requirements for other service operations, and operations producing hydrogen sulfide. The sections on automatic shut-in equipment, well control requirements, and hydrogen sulfide contain some design information/requirements that may be useful to quantifying risk.

4. **Reports** – request for additional information, books and records, and filing of forms.

5. **Enhanced Recovery** – enhanced recovery operations, casing/cementing/tubing of injection wells, notice of commencement and discontinuance of injection operations, enhanced recovery records, report of underground injection, freshwater aquifers exemption, and underground injection control variances orders.

6. **General Provisions** – covers a variety of administrative requirements and actions. Contains a section on general well control requirements, which adopt by reference several API recommended practices related to drilling, completion, operations, safe practices, and equipment.

Pertinence to ARA:
__ Not Pertinent: __ Illustrates Methodology: __ Provides a Data Source: _X_ Other Uses
Explanation: Much of the information required by this administrative code is not useful in performing a risk assessment. As noted in the Summary section, some of the information filed

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with the state on control equipment used in drilling and gas detection may be useful to support modeling accidental releases and potential consequences. However, more specific design information from the well operator should be used if available.

Summary No. 11
Document Title: *Evaluating Process Safety in the Chemical Industry: User's Guide to Quantitative Risk Analysis*
Date: June 2000
Publisher/Source: American Chemistry Council (ACC)
Document Type: Industry guidance
Information Restrictions (if any): None
Focus: This booklet is designed to help managers and executives understand quantitative risk analysis (QRA) terminology, QRA applications, and appropriate use of QRA results.
Summary: The *Guide* covers four basic topics: 1. QRA terminology 2. Considerations for when to apply QRA and the types of results available from these studies 3. An overview of the QRA process, with emphasis on proper problem scoping and selection of the right analysis techniques 4. Interpretation and use of QRA results The booklet does not provide any detailed methods for estimating risk.
Pertinence to ARA: **__ Not Pertinent: _ Illustrates Methodology: _ Provides a Data Source: _X Other Use** **Explanation:** The *Guide* discusses many factors that should be considered in both evaluating risk and displaying risk results. (Section 4 of the booklet.) These factors should be considered in developing risk tolerance criteria for the ARA project.

Summary No. 12
Document Title: *Managing System Integrity for Hazardous Liquid Pipelines* (API 1160 and Publication 353)
Date: November 2006
Publisher/Source: American Petroleum Institute
Document Type: Standards
Information Restrictions (if any): None
Focus: API 1160 provides recommendations for operators in developing and implementing a written integrity management program for terminals and tank facilities.
Summary: Although the risk management principles and concepts in this standard are universally applicable, this publication is specifically targeted at integrity management of aboveground liquid petroleum storage facilities. The applicable petroleum terminal and tank facilities covered in this document are associated with distribution, transportation, and refining facilities as described in API Standard 2610 and API Publication 340.
Pertinence to ARA: **__ Not Pertinent: _X_ Illustrates Methodology: __ Provides a Data Source: __Other Use** **Explanation:** This document covers the issues of overall risk management, risk assessment, risk ranking, risk mitigation, and the performance measures applicable to an overall integrity management program. The appendices include two possible methodologies for conducting a risk assessment. Typically, a risk assessment is performed if changes are being made to a facility. If a facility chooses to perform a risk assessment, it may elect to use one of the two methods described in the appendices or a method obtained from a different source. The facility also may elect to develop its own risk assessment methodology. In terms of applicability to Alaskan oil and gas infrastructure, this industry standard would apply to the Valdez marine terminal and might also apply to other facilities such as the Drift River Terminal and some facilities on the North Slope and along the pipeline. If so, the management systems for those facilities should reflect these recommendations and some data from prior risk assessments may be held by infrastructure operators. It is unlikely that any of that information will have been submitted to state or federal agencies unless required under a specific regulatory requirement.

Summary No. 13
Document Title*:* *Risk-Based Inspection (API RP 580)* and *Base Resource Document on Risk-Based Inspection for API Committee on Refinery Equipment* (API Publication 581)
Date: First Edition, 2001
Publisher/Source: American Petroleum Institute
Document Type: Industry standard
Information Restrictions (if any): None
Focus: API RP 580 applies to development of a risk-based inspection (RBI) program for fixed equipment and piping for hydrocarbon and chemical process facilities. It is intended to supplement API 510, *Pressure Vessel Inspection Cod;* API 570, *Piping Inspection Code*; and API 653, *Tank Inspection, Repair, Alteration and Reconstruction.*
Summary: API RP 580 is intended to provide guidance on developing an RBI program for fixed equipment and piping in the hydrocarbon and chemical process industries. It includes answers to basic questions such as: • What is RBI? • What are the key elements of RBI? • How do I implement an RBI program? API RP 580 provides users with the basic elements for developing and implementing an RBI program. It is based on the knowledge and experience of engineers, inspectors, risk analysts, and other personnel in the hydrocarbon and chemical process industries. The purpose of API RP 580 is to provide users with the basic elements for developing and implementing an RBI program. The methodology is presented in a step-by-step manner to the maximum extent practicable. Items covered are: • An introduction to the concepts and principles of RBI for risk management • Individual sections that describe the steps in applying these principles within the framework of the RBI process: 1. Planning the RBI Assessment 2. Data and Information Collection 3. Identifying Deterioration Mechanisms and Failure Modes 4. Assessing Probability of Failure 5. Assessing Consequence of Failure 6. Risk Determination, Assessment and Management 7. Risk Management with Inspection Activities 8. Other Risk Mitigation Activities 9. Reassessment and Updating 10. Roles, Responsibilities, Training and Qualifications 11. Documentation and Recordkeeping The expected outcome from the application of the RBI process should be the linkage of risks with appropriate inspection or other risk mitigation activities to manage the risks.

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Note: API 581, *Base Resource Document on Risk-Based Inspection for API Committee on Refinery Equipment,"* provides more detail and resources regarding the implementation of an RBI program that meets the recommended practice measures defined in API RP 580.
Pertinence to ARA: **__ Not Pertinent: _X_ Illustrates Methodology: __ Provides a Data Source: _X_ Other Use** **Explanation:** Two aspects of an RBI process as defined in API RP 580 are of interest to the ARA team as the team develops its approach for risk assessment of operational events. Also, the implementation by infrastructure operators of effective RBI programs should be an indication of a strong management system approach to preventing process leaks. However, it is not clear whether adequate information will be available to the ARA team to allow evaluation of RBI implementation efforts in order to assess the effectiveness of management system practices for the infrastructure systems/equipment of interest..

Summary No. 14
Document Title: *Risk-Based Decision Making* (API Publication 1628B)
Date: July 1996
Publisher/Source: American Petroleum Institute
Document Type: Industry guidance
Information Restrictions (if any): None
Focus: This risk-based decision making (RBDM) publication focuses on risk-based techniques used to examine the need for remediation at sites where hydrocarbons have been released. It does not apply to emergency response or immediate spill containment, but does help define a process for deciding if long-term mitigation is needed.
Summary: The RBDM publication describes how RBDM methods apply to decisions regarding environmental mitigation of hydrocarbon-contaminated sites. It outlines appropriate uses of risk assessment, the components of risk assessment, and how to determine a "termination point" for any proposed or ongoing remediation effort. The guidance provided by the RBDM publication is consistent with EPA guidance on risk assessment and the American Society for Testing and Materials (ASTM) standard guide for risk-based corrective action.
Pertinence to ARA: **_X_ Not Pertinent: __ Illustrates Methodology: __ Provides a Data Source: __ Other Use** **Explanation:** This document is not pertinent to the ARA effort. It is limited to use of risk for defining long-term remediation plans of previously contaminated sites. This type of assessment is not within the scope of the ARA project.

Summary No. 15
Document Title: *Managing System Integrity of Gas Pipelines* (B31.8S)
Date: 2005
Publisher/Source: The American Society of Mechanical Engineers
Document Type: Standards
Information Restrictions (if any): None
Focus: B31.8S provides a systematic, comprehensive, and integrated approach to managing the safety and integrity of gas pipelines systems. The standard describes a process that can be used to develop an integrity management program.
Summary: B31.8S provides two approaches for developing an integrity management program: a prescriptive approach and a performance or risk-based approach. B31/8S applies to onshore pipeline systems that are constructed with ferrous materials and that transport gas. This includes all parts of physical facilities through which gas is transported, including pipe, valves, appurtenances attached to pipe, compressor units, metering stations, regulator stations, delivery stations, holders, and fabricated assemblies. The principles and processes embodied in integrity management are applicable to ARA. This standard is specifically designed to provide the information necessary to develop and implement an effective integrity management program, using proven industry practices and processes. The processes and approaches in this standard are applicable to the entire pipeline system.
Pertinence to ARA: **__ Not Pertinent: _X_ Illustrates Methodology: _X_ Provides a Data Source: __Other Use** **Explanation:** B31.8S provides the industry guidelines for what is now required for selected gas pipelines under the DOT gas pipeline integrity rule. To the extent that infrastructure operators have implemented this standard (if they are not regulated under the system integrity rule for gas pipelines), the infrastructure operators may have data and models used in meeting this industry standard.

Summary No. 16
Document Title: *Standard Guide for Seismic Risk Assessment of Buildings* (ASTM E2026 – 07*)*
Date: 1999
Publisher/Source: American Society for Testing of Materials
Document Type: Industry standard
Information Restrictions (if any): None
Focus: The *Guide* provides guidance on conducting seismic risk assessments for buildings and assists a user in assessing a property's potential for losses from earthquake occurrences. Hazards addressed include (1) earthquake ground shaking, (2) earthquake-caused site instability, including fault rupture, landslides, and soil liquefaction, (3) lateral spreading and settlement, and (4) earthquake-caused offsite response impacting the property, including flooding from dam or dike failure, tsunamis, and seiches. It does not address (1) earthquake-caused fires and toxic materials releases, (2) federal, state, or local laws and regulations of building construction or maintenance, (3) preservation of life safety, or (4) prevention of building damage.
Summary: The *Guide* provides guidance on conducting seismic risk assessments for buildings. It is intended to reflect a commercially prudent and reasonable investigation for performance of seismic risk assessments. Seismic risk assessments may be performed for an individual building or a group of buildings. The *Guide* provides suggested approaches for the performance of five different types of seismic risk assessments. Each is intended to serve different financial and management needs of the user. The *Guide* is intended to: • Encourage standardized seismic risk assessment • Establish guidelines for field observations of the site and physical conditions, and the document review and research considered appropriate, practical, sufficient, and reasonable for seismic risk assessment • Establish guidelines on what reasonably can be expected of and delivered by a provider in conducting the seismic risk assessment of buildings • Establish guidelines on appropriate field observations and analysis for conducting a seismic risk assessment • Establish guidelines by which a provider can communicate to the user of this guide, observations, opinions, and conclusions in a manner that is meaningful and not misleading either by content or by omission
Pertinence to ARA: **__ Not Pertinent: _X_ Illustrates Methodology: __ Provides a Data Source: __ Other Use** **Explanation:** Within the areas considered of concern due to seismic potential, the *Guide* may be useful to the ARA team in developing an approach for evaluating buildings and structures to determine if significant seismic risks are associated with failure of those structures. See also the document summary for FEMA-176.

Summary No. 17
Document Title: *Oil and Gas Pipeline Systems* (CSA Z662-03)
Date: June 2003
Publisher/Source: Canadian Standards Association
Document Type: Standards
Information Restrictions (if any): None
Focus: CSA Z662-03 covers the design, construction, operation, and maintenance of oil and gas industry pipeline systems.
Summary: This standard establishes essential requirements and minimum standards for the design, construction, and operation of oil and gas industry pipeline systems.
CSA Z662-03 covers numerous issues. For example: • Design • Materials • Installation • Joining • Pressure testing • Corrosion control • Operating, maintenance, and upgrading • Offshore steel pipeline • Gas distribution • Plastic pipelines • Oilfield steam distribution pipelines • Aluminum piping Appendix B briefly covers a risk assessment process that could be used in oil and gas pipeline systems. The level of detail is minimal compared to that in other references reviewed as part of this project. **Pertinence to ARA:** **__ Not Pertinent: __ Illustrates Methodology: __ Provides a Data Source: _X__Other Use** **Explanation:** The standard is not useful to ARA as guidance for risk assessment. However, it is useful in identifying important aspects of design, maintenance, and upgrading of pipelines. Because this is a Canadian standard, it is unlikely to have been used by any of the Alaskan oil and gas infrastructure operators; therefore, the processes and practices are not likely to be reflected in data available from Alaskan operators or regulators.

Summary No. 18
Document Title: *Risk Management Guideline for Decision Makers* (CSAQ850-97)
Date: 2002
Publisher/Source: Canadian Standards Association
Document Type: Standards
Information Restrictions (if any): None
Focus: This guideline focuses on incorporating risk perception and risk communication into the decision-making process.
Summary: This guideline provides (1) a systematic method for analyzing complex risk issues and (2) the decision maker with the information necessary to make decisions with confidence. It does not tell an individual organization what it should value.
Pertinence to ARA: **__ Not Pertinent: __ Illustrates Methodology: __ Provides a Data Source: _X_ Other Use** **Explanation:** The guideline is intended to assist decision makers in effectively managing all types of risk issues, including injury or damage to health, property, the environment, or any parameter the organization values. The guideline describes a process for acquiring, analyzing, evaluating, and communicating information necessary for decision making. It could assist the ARA project team in identifying the major components in the risk management decision process and ensuring that the risk assessment helps support good risk-based decision-making. The guideline does not provide specific technical tools for risk analysis, evaluation, and control.

Summary No. 19

Document Title: *Risk Management* (AS/NZS 4360:2004)

Date: August 31, 2004

Publisher/Source: Council of Standards of Australia and New Zealand

Document Type: Recommended Practice and Industry Guideline

Information Restrictions (if any): None

Focus:
The AS/NZS 4360 standard provides generic guidance for all the activities required to manage risk for activities, decisions and/or operations of any public, private, or community enterprise.

Summary:

The AS/NZS 4360 standard is organized in three parts:

1. Chapter 1 - A scope and general introduction. The Standard discusses the elements of the risk management process in a broad, generic way. Specific objectives of the Standard are listed; again broad generic goals like providing a better basis to understand opportunities, threats, uncertainties, etc., for decision making; improved incident management and loss reduction; improved stakeholder confidence; effective allocation of resources; and improved compliance with relevant legislation. Risk terminology is defined.
2. Chapters 2 and 3 present an overview of the risk management process and a more detailed description of each element of the process. The main elements of the process, per the Standard, are as follows: (1) communicate and consult with stakeholders, (2) establish the context for risk management, (3) identify risks, (4) analyze risks, (5) evaluate risks, (6) treat risks, and (7) monitor and review effectiveness of the risk management process. These seven elements are discussed in detail in Chapter 3.
3. Chapter 4 discusses establishing effective risk management: how to develop, establish, and sustain systematic risk management in an organization. Topics covered include evaluating existing practices and needs and risk management planning.

Pertinence to ARA:
__ Not Pertinent: __ Illustrates Methodology: __ Provides a Data Source: _X Other Use

Explanation: The Standard presents standard risk management concepts that are well understood in industry and government. Detailed approaches for analyzing and managing risk are not discussed. However, a good overview of risk management practices and elements that should be considered in these practices is provided.

Of particular value to this project are Section 3.6 (discussion on the treatment of risk) and Chapter 4 (establishing effective risk management). Concepts discussed in these portions of the Standard should be considered as the state, develops recommendations based on the risk assessment results.

Summary No. 20
Document Title: *Estimating Losses from Future Earthquakes – A Panel Report (A Non-Technical Summary),"FEMA-176, Earthquake Hazards Reduction Series 50, pp. 82*
Date: June 1989
Publisher/Source: Federal Emergency Management Agency
Document Type: Industry guidelines
Information Restrictions (if any): None
Focus: The document presents nontechnical, general guidelines and considerations in performing large-scale loss estimates from earthquakes, including collateral hazards (fault rupture, landslide, liquefaction, tsunamis, and seiches) and indirect losses. It is an introduction to fundamental loss concepts, methods, and models with brief discussions of issues for a lay audience. The loss-estimation material presented and discussed is quite dated.
Summary: The document provides a discussion and presentation of early earthquake loss estimate studies (circa 1972-87) funded by FEMA and intended for local and state government use in disaster response planning to aid long-term strategies of earthquake hazard reduction. Methods discussed emphasize large-scale losses and rely on averaging damage and loss over a large group of facilities. It is not intended for individual buildings. There are descriptions of the basic inputs of hazard and vulnerability and illustrates examples of collateral losses and indirect losses.
Pertinence to ARA: **__ Not Pertinent: X Illustrates Methodology: __ Provides a Data Source: __ Other Use** **Explanation:** General recommendations regarding early and thorough user-needs assessment prior to performing such a study, detailed inventory development, and facility classification/vulnerability relationships appear to be already well addressed in the ARA project plan. Early loss-estimation methods that are discussed apply to urban settings and disaster response planning. Other than the generalities of a broad-scoped framework for earthquake loss-assessment, there is no direct impact or regard to Alaska oil business or infrastructure presented in this document. Submitted documents to which this work refers are older government (USGS, FEMA) earthquake-loss research reports for certain urban areas of the lower 48 states. The report has no regulatory impact or requirements. The early work on FEMA-type earthquake loss assessments (circa 1970s – 80s) has been subsumed nationally by the more modern FEMA "HAZUS" for systematic loss estimates from earthquake, wind, and flood.

Summary No. 21
Document Title: *Standard on Disaster/Emergency Management and Business Continuity Programs* (NFPA 1600)
Date: 2007
Publisher/Source: National Fire Protection Association (NFPA)
Document Type: Industry standard
Information Restrictions (if any): None
Focus: NFPA 1600 establishes a common set of criteria for disaster/emergency management and business continuity programs. It provides (1) requirements for disaster and emergency management and business continuity programs and (2) the criteria to assess current programs or to develop, implement, and maintain aspects for prevention, mitigation, preparation, response, and recovery from emergencies. The standard applies to public, not-for-profit, and private entities.
Summary: The standard outlines requirements and approaches for disaster/emergency management programs, which are defined as an ongoing process to prevent, mitigate, prepare for, respond to, and recover from an incident that threatens life, property, operations, or the environment. It also addresses Incident Management Systems (IMS), which are the combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure, designed to aid in the management of resources during incidents. Each of these programs and systems are defined, in part, to contribute to "Business Continuity," an ongoing process supported by senior management and funded to ensure that the necessary steps are taken to identify the impact of potential losses and maintain viable recovery strategies, recovery plans, and continuity of services.
Pertinence to ARA: **__ Not Pertinent: __ Illustrates Methodology: _X_ Provides a Data Source: __ Other Use** **Explanation**: The standard itself does not provide data but is widely implemented among commercial and government organizations. If specific disaster/emergency plans and business continuity activities (like those required under NFPA 1600) have been documented and made available to the ARA team, they can be used to (1) help the ARA team assess events already considered of interest, (2) ensure the completeness of scenarios developed in the ARA, and (3) help ensure that the ARA team appropriately credits planning by industry and government organizations that may help mitigate events considered in the risk assessment.

Summary No. 22
Document Title: *Risk Evaluations for the Classification of Marine-related Facilities (ABS 117)*
Date: June 2003
Publisher/Source: American Bureau of Shipping
Document Type: Industry guidance
Information Restrictions (if any): None
Focus: ABS 117 provides guidance to ABS clients (i.e., ship and offshore production structure designers and constructors) on how to prepare a risk evaluation to demonstrate that a design proposed for classification meets the overall criteria for safety and strength standards of the *ABS Rules and Guides*. It defines a process that the client can implement to prepare and submit documentation for consideration by ABS. It also outlines the approach that ABS will take in reviewing the submittal to determine if the proposed design is acceptable for classification.
Summary: ABS 117 applies to any situation where a design is being proposed on the premise that it provides equivalent protection against the risks addressed by the ABS Class Rules, rather than by strict compliance with existing prescriptive classification Rules. Evaluations of hardware and survey issues are included in the scope of this *Guide*. This *Guide* is applicable to both ships and offshore facilities. Specifically, it is applicable when ABS clients propose: i) Alternative Arrangements. Marine-related facilities with design characteristics that include alternative means of compliance to applicable prescriptive classification Rules. ii) Novel Features. Marine-related facilities that contain novel features of design in respect to the hull, machinery, or equipment to which provisions of the Rules are not directly applicable. If proposed designs include alternative arrangements or novel features that conflict with existing applicable statutory requirements or regulations from any other regulatory body outside ABS, the decision for approval lies with those external bodies. While many regulatory bodies are evolving to accept the use of risk evaluations to demonstrate safety equivalency to prescriptive requirements, there may always be a number of regulatory bodies that will not accept such flexibility.
Pertinence to ARA: **__ Not Pertinent: _X_ Illustrates Methodology: __ Provides a Data Source: _X_ Other Use** **Explanation:** While risk-based approaches to classification of ships and marine structures are not pertinent to the ARA project, this *Guide* provides two types of information that are potentially useful to development of the ARA methodology. Chapters 5 and 6 introduce an approach that uses basic risk applications (Chapter 5) that can then be followed by detailed risk assessment activities (Chapter 6). The differences in basic and detailed risk assessment can simply be the change from qualitative to quantitative techniques; however, it can also be a change in scope or level of detail for the follow-on risk assessment study. This might be an approach used in the ARA if a screening analysis is followed by a more detailed risk assessment application. Also, Appendix 5 of the *Guide* describes some of the risk acceptance criteria used by various agencies. Studying other risk assessment criteria applications may assist the ARA team in developing the risk methodology required for the ARA project.

Summary No. 23
Document Title: *Risk Assessment Applications for the Marine and Offshore Oil and Gas Industries (*ABS 97)
Date: 2000
Publisher/Source: American Bureau of Shipping
Document Type: Industry guidance
Information Restrictions (if any): None
Focus: ABS 97 provides an overview of the risk assessment field for managers and technical professionals in the maritime and offshore oil and gas industries. The risks addressed are primarily those affecting the safety of a vessel, facility, or operation, but the methods discussed can also be applied to other types of risk.
Summary: The concept of risk is defined, and the methods available to assess the risks associated with an operation are described. Guidelines for setting up and conducting successful risk studies are provided. Regulatory requirements that have prompted the development of modern risk assessment practices are described, and future regulatory trends are discussed. ABS 97 includes chapters on risk assessment methods, conducting a risk assessment, safety regulations pertinent to marine system hazards, and regulations pertinent to the hazards of offshore oil and gas operations. It also provides examples of the benefits of risk assessment applications and in a final chapter introduces risk-based inspection as a technique pertinent to the marine and offshore production industries.
Pertinence to ARA: **__ Not Pertinent: _X_ Illustrates Methodology: __ Provides a Data Source: __ Other Use** **Explanation:** ABS 97 provides basic information on risk assessment methodologies pertinent to marine and offshore industries. Although those industries are not within the scope of the ARA risk assessment (other than limited offshore production assets in Cook Inlet and those currently in operation in the sea north of Alaska), the examples of methodologies are useful. However, it is not new information to the ARA team members who will be involved in developing the methodology.

Summary No. 24
Document Title: *Petroleum and Natural Gas Industry — Offshore Production Installations — Guidance on Tools and Techniques for Hazard Identification and Risk Assessment* (BS EN ISO 17776)
Date: 2000
Publisher/Source: British Standards Institute and International Standards Organization
Document Type: International Standard
Information Restrictions (if any): None
Focus: BS EN ISO 17776 describes some of the principal tools and techniques that are commonly used for the identification and assessment of hazards associated with offshore oil and gas exploration and production activities, including seismic and topographical surveys, drilling and well operations, field development, operations, decommissioning and disposal, together with the necessary logistical support of each of these activities.
Summary: .BS EN ISO 17776 provides guidance on how these tools and techniques can be used to assist in developing strategies, both to prevent hazardous events and to control and mitigate any events that may arise. The standard addresses (1) hazards and risk assessment concepts, (2) methods for hazard identification and risk assessment (including the role of experience/judgment, (3) checklists, (4) codes and standards, and (5) selection of structured review techniques. It also addresses risk management, including hazard identification, risk assessment, and risk reduction. The standard closes with guidelines for use in specific activities.
Pertinence to ARA: **__ Not Pertinent: _X_ Illustrates Methodology: __ Provides a Data Source: __ Other Use** **Explanation:** Like several other references, BS EN ISO 17776 provides advice about general tools for, and application of, risk assessment methodologies. It is oriented to offshore oil and gas applications, which although not totally applicable, are related to the risk assessment application faced by the ARA project team.

Summary No. 25
Document Title: *Guidelines for Chemical Process Quantitative Risk Assessment*
Date: October 1989
Publisher/Source: Center for Chemical Process Safety (CCPS)
Document Type: Industry guideline
Information Restrictions (if any): None
Focus: The CCPS *CPQRA Guidelines* provides risk assessment methodology for use in the chemical process industry.
Summary: The *CPQRA Guidelines* provides a comprehensive description of commonly used methods for estimating the risk associated with a chemical process. Subjects covered in the guidelines are as follows: 1. Chapter. 1 Chemical Process Quantitative Risk Analysis – This chapter discusses the basic elements of a CPQRA; the steps in performing a risk assessment; scoping issues; and general, typical limitations of such studies. 2. Chapter. 2 Consequence Analysis – This chapter provides an overview of typical mathematical models used to calculate the source (release rate) and dispersion of accidental releases of hazardous materials. It also provides models for fires, explosions, and release effects (toxic, thermal, explosive). 3. Chapters. 3, 5, and 6 Event Probability and Failure Frequency Analysis and Data – Techniques for estimating incident frequencies from historical records and using modeling methods (fault tree and event tree) are discussed. This chapter also describes other modeling methods for common cause failures, human errors, and external events. Chapter 5 discusses creation of a CPQRA database (information needed and sources of data) but does not provide any specific data. Chapter 6 discusses other specialized techniques (e.g., MORT, Markov, Monte Carlo) that are used in risk assessments. 4. Chapter. 4 Measurement, Calculation, and Presentation of Risk Estimates – This chapter discusses risk measures, presentation formats for risk, and calculation of risk (individual, societal). Factors that influence risk uncertainty, sensitivity, and importance are also discussed qualitatively. 5. Chapters .7 and 8 CPQRA Applications and Case Studies – These chapters provide illustrative examples of risk assessment applications. 6. Chapter 9 Future Developments – This chapter discusses future needs for developing better models (in particular, consequence models) and better data to support chemical process risk assessments.
Pertinence to ARA:

Summary No. 25

__ Not Pertinent: _X Illustrates Methodology: __ Provides a Data Source: __ Other Use

Explanation: The *CPQRA Guidelines* provide standard methodologies used in quantitative risk assessments and a foundation for developing the ARA risk assessment methodology. It also provides references to many industrial failure data sources; however it does not provide equipment failure data. The *CPQRA Guidelines* discuss typical limitations associated with performing risk assessments. These limitations should be considered when developing the ARA project methodology.

Summary No. 26
Document Title: *Guidelines for Mechanical Integrity Systems (MI Guide)*
Date: August 2006
Publisher/Source: Center for Chemical Process Safety
Document Type: Industry guideline
Information Restrictions (if any): None
Focus: The *MI Guide* addresses the development, implementation, management, and continuous improvement of mechanical integrity (MI) programs for companies in the chemical processing industries (CPI). The *MI Guide* recommends efficient approaches for establishing a successful MI program, while taking into consideration that facilities with small staffs and fewer resources must also develop MI programs. The practices described in the book are intended to help facilities create or improve MI programs.
Summary: For the purposes of the *MI Guide*, MI is the programmatic implementation of activities necessary to ensure that important equipment will be suitable for its intended application throughout the life of an operation. Chapter 1 in the *MI Guide* helps set the groundwork for the MI program. Chapter 2 discusses roles and responsibilities for company personnel and examines the ongoing activities that management undertakes to help ensure the success of the MI program. Chapter 3 reviews considerations a facility may have when defining the equipment to include in its program. Chapter 4 discusses inspection, testing, and preventive maintenance (ITPM). Many traditional PM programs were established to address routine nonintegrity-related tasks. However, in this book "preventive maintenance" refers to those activities performed that are not inspections or tests [e.g., lubrication of rotating equipment]) to prevent the failure of equipment within the MI program Chapter 5 covers personnel training, and Chapter 6 addresses the procedures needed for MI. A life-cycle approach to QA is presented in Chapter 7. Chapter 8 covers equipment deficiency recognition and resolution. Chapter 9 is dedicated to the equipment-specific aspects for the management systems covered in Chapters 4 through 8. Chapter 10 reviews common issues encountered with MI program implementation. Chapter 11 provides overviews of risk-based tools that can be used to help make decisions related to MI activities. Chapter 12 offers advice for continual assessment and improvement of an MI program.
Pertinence to ARA: **__ Not Pertinent: __ Illustrates Methodology: __ Provides a Data Source: _X_ Other Use** **Explanation:** The *MI Guide* goes beyond the regulatory requirements of the process safety and risk management regulations to define industry-leading practices for MI efforts. Not very many facilities or organizations would look to this guide as a minimum standard. It is used by companies that want to exceed the minimums. If the ARA project needs recommendations from the industry to use to judge the quality of ITPM activities, this reference would be useful in defining such a program quality evaluation.

Summary No. 27
Document Title: *Guidelines for Hazard Evaluation Procedures, (HEP Guidelines) 3rd Edition*
Date: 2008
Publisher/Source: American Institute of Chemical Engineers
Document Type: Industry guideline
Information Restrictions (if any): None
Focus: The third edition of *HEP Guidelines* provides guidance to companies and individuals needing to perform qualitative hazard reviews. It describes how to develop a hazard review program and how to effectively plan, execute, and respond to specific hazard reviews.
Summary: The *HEP Guidelines* provides information on how to prepare for and execute hazard reviews for both safety and environmental compliance and process improvement purposes. It includes sections on preparation for hazard evaluations, use of specific hazard identification methods, scenario and nonscenario based approaches, technique selection, risk-based determination of safeguard adequacy (including use of layer of protection analyses), analysis follow-up, and special applications. The appendices to the *HEP Guidelines* present worked examples for each of the techniques described in the document.
Pertinence to ARA: **__ Not Pertinent: _X_ Illustrates Methodology: __ Provides a Data Source: __ Other Use** **Explanation:** The *HEP Guidelines* describe qualitative analysis methodologies for risk assessment purposes. The ARA team members are expert in those methods and are very familiar with this guideline (the second edition of the guideline was prepared for AIChE by members of the ARA team). One use the ARA team might make of the *HEP Guidelines* is to support the selection of any qualitative techniques the team might choose to use. Also, if the ARA team needs to assess qualitative work products from infrastructure operators, the *HEP Guidelines* could be used to help support a basis for such an assessment.

Summary No. 28
Document Title: *Guidelines for Chemical Transportation Risk Analysis*
Date: 1995
Publisher/Source: Center for Chemical Process Safety (CCPS)
Document Type: Recommended Practices and Guidelines
Information Restrictions (if any): None
Focus: The CCPS *Guidelines for Chemical Transportation Risk Analysis (TRA)* provides methods for estimating the risk associated with transporting hazardous materials via pipelines, rail, roads, barges, ocean-going vessels, and intermodal containers.
Summary: The TRA guidelines provide methods, limited data, and data references to use in estimating the risk of transporting hazardous materials. The text provides an overview of the TRA process and discusses scoping issues and limitations associated with such studies. **Chapter 2** provides a more detailed description of the TRA frequency analysis process for various modes of transportation (e.g., pipelines, rail, road) covering the following topics: failure modes, parameters influencing accident rates, parameters influencing release probabilities, containment systems, accident trends with time, confidence in data, mode-specific issues, releases associated with supporting equipment, and a general calculation procedure. This chapter also contains limited data for calculating accident frequencies and estimating release consequences. Chapter 4 also discusses TRA data issues and provides references to other failure data sources. **Chapter 3** covers special topics, including some data and methods applicable to estimating accident consequences. Chapter 5 discusses risk measures and risk calculations; the material is very similar to the text in the CCPS *CPQRA Guidelines* book. **Chapters 6** and **7** provide TRA application examples and case studies. Chapter 8 discusses future TRA developments and needs. The five appendices in this text provide some limited information on shipping containers, information needs for TRA, and a qualitative evaluation checklist for collecting TRA-related risk information.
Pertinence to ARA: **__ Not Pertinent: _X Illustrates Methodology: _X Provides a Data Source: __ Other Use** **Explanation:** The CCPS *Guidelines for Chemical TRA* provides a methodology and limited data for estimating the frequency of pipeline releases. Methods and data for estimating ignition probabilities are provided. This information could support the development of the risk methodology for the ARA project.

Summary No. 29
Document Title: *Guidelines for Risk-Based Process Safety*
Date: 2007
Publisher/Source: Center for Chemical Process Safety (CCPS)
Document Type: Recommended Practices and Guidelines
Information Restrictions (if any): None
Focus: The *Guidelines for Risk-Based Process Safety* (*RBPS Guidelines*) provides tools and guidance to help process safety professionals build and operate more effective process safety management (PSM) systems.
Summary: The *RBPS Guidelines* provides guidance on how to (1) design a PSM system, (2) correct a deficient system, and (3) improve PSM practices. The *RBPS Guidelines* focuses on four areas needed for effective process safety and discusses several management programs/practices to achieve success: 1. Commitment to Process Safety – process safety culture, compliance with standards, process safety competency, workforce involvement, and stakeholder outreach. 2. Understanding Hazards and Risk – process knowledge management, asset integrity and reliability, contractor management, training and performance assurance, management of change, operational readiness, conduct of operations, emergency management, and hazard identification and risk analysis. 3. Managing Risk – operating procedures and safe work practices. 4. Learning from Experience – incident investigation, measurement and metrics, auditing, and management review and continuous improvement. For each of the programs/practices suggested for these four areas, the *RBPS Guidelines* provides key principles, work activities, improvement examples, possible metrics, and management review topics. The *RBPS Guidelines* stresses that not all programs/practices are required at every facility in order for that facility to have an effective PSM program. It also stresses that for PSM programs to be most effective, they should be integrated with other ongoing management systems (quality, reliability, environmental, etc.).
Pertinence to ARA: **__ Not Pertinent: _ Illustrates Methodology: _ Provides a Data Source: _X Other Use** **Explanation:** The *RBPS Guidelines* focus on improving safety management systems. The influence of many of the programs/practices and associated work activities described in the guidelines might be useful considerations in determining any adjustment factors to apply to equipment failure data.

Summary No. 30
Document Title: *Risk and Emergency Preparedness Analysis* (NORSOK Z-013)
Date: Rev. 2, 2001-09-01
Publisher/Source: Norwegian Technology Centre
Document Type: Industry Standard
Information Restrictions (if any): None
Focus: NORSOK Z-013 focuses on risk and emergency preparedness analyses (EPAs) for offshore production facilities (it does not address onshore facilities). It uses analysis of occupational fatality risks as the measure of interest and does not address public safety in any form, or the risk of occupational injuries.
Summary: The most valuable section of this standard for purposes of the ARA project is Chapter 4 on establishment of risk acceptance criteria (RAC). This information is supplemented in Annex A. The standard provides a series of steps for performing a quantitative risk analysis. However, the focus is entirely on risks to personnel on offshore platforms, where risk analysis is used to support plans for escape, evacuation, and rescue . Comparable studies are not developed for onshore facilities The standard does address some of the issues that are pertinent to the occupational safety portion of the ARA project. It also outlines an approach for quantitative assessment of cost-benefit analysis (CBA). Although CBA is not within the scope of the ARA project, it may be useful for further considerations by the state and infrastructure operators as they consider risk management alternatives for dealing with any significant risks identified in the ARA project results. (Note: The CBA discussion addresses, at least theoretically, three dimensions of consequence [i.e., risks to personnel, environment, and assets]).
Pertinence to ARA: **__ Not Pertinent: _X_ Illustrates Methodology: __ Provides a Data Source: __ Other Use** **Explanation:** Because of its scope (i.e., offshore production platforms), the only places in Alaska where analyses like this standard described may have been applied are the Cook Inlet and any facilities off the North Slope that may have been treated as offshore facilities (e.g., Endicott, North Star). However, it is unlikely that such risk assessments (if they were done during development) are available. The risk methodology and the information on risk acceptance criteria may be useful to the project and should be considered in the development of consequences of interest, unacceptable consequences, and screening methodologies, as well as the ultimate risk assessment methodology.

Summary No. 31
Document Title: *Criticality Analysis for Maintenance Purposes* (NORSOK Z-008)
Date: November 2001
Publisher/Source: Norwegian Technology Centre
Document Type: Industry standard
Information Restrictions (if any): None
Focus: The standard applies to offshore topside systems, sub-sea production systems, and oil and gas terminals. However, its application is restricted to mechanical equipment (static and rotating) instrumentation, and electrical equipment. It does not include load bearing structures, floating structures, risers, and pipelines.
Summary: This standard outlines a prioritization process for identifying equipment criticality for the purpose of planning maintenance actions. Criticality in terms of the standard is based on a quantitative ranking of the seriousness of the consequence of events and faults involving that equipment. Table 1 “General Consequence Classification” and Table 2 “Consequence Classification for Containment (External Leakage)” in the standard provide generic examples of consequence categories. The standard provides a structure that has to be completed and adopted as part of the criticality process. Another aspect the standard requires to be examined is the level of redundancy against loss of “main function” for equipment of interest. The standard outlines a process where the criticality assessment is provided as part of a failure modes and effects analysis or other reliability-centered maintenance (RCM) analysis approach. The criticality plays a role in defining the appropriate maintenance strategy for each class of specific item of equipment that supports the main functions of interest.
Pertinence to ARA: **__ Not Pertinent: _X_ Illustrates Methodology __ Provides a Data Source: __ Other Use** **Explanation:** This type of criticality approach (which is also present in many other forms of RCM processes) or asset integrity management process is similar to what the ARA project may perform, either in a screening analysis or as part of the more detailed risk assessment. It is expected that similar processes may have been implemented as part of oil and gas infrastructure operators’ maintenance planning processes. If so, the classification schemes and results of those studies would likely be very valuable to the ARA project team.

Summary No. 32
Document Title: *Regularity Management and Reliability Technology* (NORSOK Z-016)
Date: Rev. 1, December 1998
Publisher/Source: Norwegian Technology Center
Document Type: Industry Standard
Information Restrictions (if any): None
Focus: The standard covers analysis of reliability and maintenance of the components, systems, and operations associated with exploration, drilling, exploitation, processing, and transporting petroleum resources.
Summary: This standard outlines an approach for “regularity management” for process equipment. Part of that management approach is the application of reliability technology. This “regularity” nomenclature is not consistent with that applied in U.S. businesses, with the overall program more likely to be called “reliability management” or “asset integrity management”; however, the concepts could be applicable to infrastructure to be considered in the ARA project. The standard does draw some distinctions between regularity analyses and risk analyses. Rare events (like some of the natural hazards that may be of interest in the ARA) are typically excluded from the type of analysis described in this standard. The standard contains definitions of reliability management terms that are likely to be used in the ARA project, including measures such as reliability, availability, mean time between failure, etc. However, there are numerous other references that also define these concepts and provide approaches for their application.
Pertinence to ARA: **_X_ Not Pertinent: __ Illustrates Methodology: __ Provides a Data Source: __ Other Use** **Explanation:** Given the differences in terminology, it is recommended that the ARA project use other reliability references that are more consistent with the approaches used by Alaskan industry. Also, the recommendation to exclude rare events is not consistent with the ARA project’s mandate to address natural hazard events.

Summary No. 33
Document Title: *Risk of Vessel Accidents and Spills in the Aleutian Islands: Designing a Comprehensive Risk Assessment - Special Report 293*
Date: 2008
Publisher/Source: Transportation Research Board, National Academy of Science
Document Type: Specific risk assessment study
Information Restrictions (if any): None
Focus: *Special Report 293* provides a risk assessment plan for examining the risk of vessel accidents and spills in the Aleutian Islands. The report recommends following the steps of the IMO Formal Safety Assessment (FSA) process in performing a risk assessment and focuses on how to perform a risk assessment of shipping operations with emphasis on oil spills and environmental impacts.
Summary: *Special Report 293* provides a general guidance for conducting a risk assessment of shipping operations in the Aleutian Islands. The report is not a risk assessment and is organized as follows: 1. Chapters 1, 3, and 4 discuss the safety concerns and history of accidents related to shipping operations around the Aleutian Islands. These chapters also provide background information on island history, economy, and shipping operations. 2. Chapter 2 provides a qualitative description of risk assessment fundamentals and the risk assessment process. 3. Chapters 5 and 6 describe how an Aleutian Island shipping risk assessment should be defined, organized, and performed. Chapter 6 provides more detail descriptions of what should be done in each element of the risk assessment. 4. Chapter 7 summarizes areas of concern, conclusions, and recommendations for performing a risk assessment of shipping operations in the Aleutian Islands.
Pertinence to ARA: **__ Not Pertinent: __ Illustrates Methodology: __ Provides a Data Source: _X Other Use** **Explanation:** *Special Report 293* is very general regarding the overall plan for performing a risk assessment. It does suggest a two-step risk assessment approach – first qualitatively (or semi-quantitatively) identify those events that are high risk and second quantitatively analyze only the high risk events and risk mitigation options to determine the appropriate recommendations to consider. This idea may be of value to the ARA project. The report also provides useful comments on portraying risk assessment results. Appendix C on Expert Judgment provides some useful suggestions the ARA project team should consider when incorporating expert judgment into the risk assessment. The report outlines a risk assessment process, but it is shipping-operations-oriented and focuses primarily on oil spill accidents, which is probably of limited use to this project. It also stresses that a reasonable time horizon should be established (i.e., risks over the next 10 years, 25 years, etc.) in order to properly evaluate the cost-benefit of risk-reduction recommendations.

Summary No. 34
Document Title: *Review of the Prince William Sound, Alaska, Risk Assessment Study*
Date: 1998
Publisher/Source: National Research Council
Document Type: Specific risk assessment study – Critical Review
Information Restrictions (if any): None
Focus: The National Research Council (NRC) committee performed an examination and evaluation of the methods used in the Prince William Sound (PWS) risk assessment and their appropriateness for supporting the study's conclusions and recommendations.
Summary: The NRC critical review of the PWS risk assessment highlights a variety of issues of concern with the study and conclusions. The report summarizes its findings in three areas: models used to assess risk, data collection and use, and report conclusions and recommendations. As noted by the authors, the study findings and recommendations are not applicable to other areas. Appendices B and C discuss the framework of probabilistic risk analysis and the consideration of human factors. Some discussion on modeling human errors is provided in these appendices.
Pertinence to ARA: **__ Not Pertinent: __ Illustrates Methodology: __ Provides a Data Source: _X Other Use** **Explanation:** The report is very specific to the shortcomings of the PWS risk assessment. In particular, the authors highlight concerns with justifying assumptions (providing a rationale basis for the assumption), data collection methods, modeling human errors, modeling transparency, and tying study results to recommendations. The ARA project team should take note of the types of the issues raised concerning performing a risk analysis; these issues should be considered as the team (1) develops the oil and gas infrastructure risk methodology, (2) gathers data, and (3) develops recommendations based on analysis results. Recommendations made by the PWS risk assessment include the following: provide an overarching study framework, expand the consideration of human factors, disclose underlying data (used in the study), and analyze sensitivities and uncertainties. Appendix B provides some discussion on the SAM model and the treatment of human errors and other human factors that may be useful in risk model development.

Summary No. 35
Document Title: *Environmental Information for Outer Continental Shelf Oil and Gas Decisions in Alaska* (NAS-2353)
Date: 1994
Publisher/Source: National Research Council
Document Type: Miscellaneous Documents
Information Restrictions (if any): None
Focus: The National Research Council investigated the adequacy of scientific and technical information relevant to the potential environmental consequences of three planned Alaskan leases sales: Sale 126 (Chukchi Sea), Sale 1234 (Beaufort Sea), and Sale 107 (Navarin Basin in the Bearing Sea).
Summary: The National Research Council concluded that the environmental information available for the Chukchi Sea, Beaufort Sea, and Navarin Basin is generally adequate for leasing and exploration decisions, except regarding effects on human environment (i.e., socioeconomic effects) as defined in the Outer Continental Shelf (OCS) Act. The committee concluded that the environmental information is not sufficient to support decisions about development, production, transportation, and siting of onshore facilities.
Pertinence to ARA: **__ Not Pertinent: __ Illustrates Methodology: __ Provides a Data Source: _X_ Other Use** **Explanation:** The document presents an assessment of the environmental information for the potential environmental consequences of three planned Alaskan leases sales. The document is somewhat useful for the ARA project because it identifies information that can be used in estimating the consequences of loss of containment events. The environmental information identified in the document is at least 14 years old. Therefore, more current sources of information will need to be identified for use in estimating consequences of loss of containment events.

Summary No. 36

Document Title: *Final Environmental Impact Statement - Renewal of the Federal Grant for the Trans-Alaska Pipeline System (TAPS) Right-of-Way*

Date: November 2002

Publisher/Source: U.S. Department of the Interior, Bureau of Land Management

Document Type: Public document

Information Restrictions (if any): None

Focus: This EIS focuses on expected impacts of the TAPS operation for a second lease of 30 years (i.e., from 2004 to 2034). It estimates the potential environmental impacts of pipeline operations, including unintended oil spill consequences.

Summary: The EIS describes it purpose, how it was conducted, including scoping studies and public input processes, and what the results and recommendations of the EIS were. It examines the action requested by the TAPS owners (i.e., a 30-year renewal of the lease), along with a number of alternatives to that option. The EIS describes the options analyzed and those suggested by stakeholders during the scoping effort, but that were not selected for analysis.

The study used historical data for the prior 30 years and projected impacts for the next 30 years if the renewal was granted, considering known changes to the pipeline that would affect the environmental impacts if another 30-year lease was granted. It also projected the impact of the alternatives that were selected for evaluation.

Appendix A to the EIS describes the methodologies used in the study.

Pertinence to ARA:
__ Not Pertinent: _X_ Illustrates Methodology: _X_ Provides a Data Source:__ Other Use

Explanation: For the TAPS portion of the ARA project, the EIS provides some of the best data the project identified (at least for the period up to 2002). Also, the projected environmental impacts are of interest as one vision of the future impacts (or risks) of the pipeline. In addition to the data, the methodologies described in Appendix A of the EIS are potentially relevant to the environmental assessment portion of the ARA project.

Summary No. 37
Document Title: *System Engineering 'Toolbox' for Design-oriented Engineers* (NASA Reference Publication 1358)
Date: December 1994
Publisher/Source: NASA
Document Type: Recommended Practices and Industry Guidelines
Information Restrictions (if any): None
Focus: The *Toolbox* provides tools and methodologies in system engineering applications available to the design-oriented systems engineer.
Summary: The *Toolbox* is organized into the following sections: 1. Concept Development Tools 2. System Safety and Reliability Tools 3. Design-related Analytical Tools 4. Graphical Interpretation Tools 5. Statistical Tools and Methodologies 6. Total Quality Management (TQM) Tools 7. Trend Analysis Tools The *Toolbox* emphasizes tools and methodologies in system engineering applications available to the design-oriented systems engineer to find design and operation weaknesses in complex systems. These tools and methodologies can help managers and engineers systematically identify and prioritize system improvements. The *Toolbox* is a textbook or sourcebook for tools and methodologies in system engineering applications and focuses on applications in complex systems As such, the *Toolbox* is only useful as an introduction to a limited set of methods.
Pertinence to ARA: **__ Not Pertinent: _X_ Illustrates Methodology: __ Provides a Data Source: __Other Use** **Explanation:** Although the *Toolbox* presents system engineering methodologies, the approaches are most applicable to estimating the reliability of highly redundant mechanical and electrical systems. It is not particularly useful for the ARA project, which will require the estimation of the frequency of loss of containment events for largely nonredundant (i.e., single train) systems. If specific, detailed evaluations of complex control systems are required during the project, this document might be a useful reference. However, that type of analysis is not anticipated.

Summary No. 38

Document Title: *Probabilistic Risk Assessment Procedures Guide for NASA Managers and Practitioners (Version 1.1)* (NASA NPR 8705.5)

Date: August 2002

Publisher/Source: NASA Headquarters – Office of Safety and Mission Assurance

Document Type: Recommended Practices

Information Restrictions (if any): None

Focus: The *Guide* provides a recommended approach and procedures for how probabilistic risk assessment (PRA) should be performed for aerospace applications.

Summary:
The *Guide* is organized into three parts:

1. A management introduction to PRA is presented in Chapters 1 through 3. The *Guide* presents an introduction on the historic use of PRA at NASA, a discussion of the relationship between PRA and risk management, and an overview of PRA with simple examples.

2. Chapters 4 through 14 present probabilistic methods for PRA, methods for scenario development, uncertainty analysis, data collection and parameter estimation, human reliability analysis, software reliability analysis, dependent failure analysis, and modeling of physical processes for PRA.

3. Chapter 15 provides a detailed discussion of the “scenario-based” PRA process using two aerospace examples.

The *Guide* emphasizes that PRA is a decision support tool, helping managers and engineers find design and operation weaknesses in complex systems. PRA can help managers and engineers systematically identify and prioritize system improvements.

The *Guide* is not a textbook or sourcebook for PRA methods and techniques and focuses on aerospace application. As such, the *Guide* is only useful as an introduction to a limited set of methods.

Pertinence to ARA:
__ Not Pertinent: _X_ Illustrates Methodology: __ Provides a Data Source: __Other Use

Explanation: Although the *Guide* presents a reliability methodology, the approach is most applicable to estimating the reliability of highly redundant mechanical and electrical systems.

The *Guide* is not particularly useful for the ARA project , which will require the estimation of the frequency of loss of containment events for largely nonredundant (i.e., single train) systems.

If specific, detailed evaluations of complex control systems are required during the project this document might be a useful reference. However, that type of analysis is not anticipated.

Summary No. 39
Document Title: *A Guide to the Offshore Installations (Safety Case) Regulations (2005)*
Date: January 2006 (Draft)
Publisher/Source: United Kingdom Health and Safety Executive
Document Type: Regulatory guidance
Information Restrictions (if any): None
Focus: This document is a guide to the *Offshore Installations (Safety Case) Regulations 2005*. It is intended to help people who may be affected by the Regulations to understand what the Regulations require.
Summary: This guide provides a simple explanation of the main provisions of the Regulations to assist those who have duties under the Regulations (including licensees, installation operators, installation owners, well operators) and others involved with offshore activities. Safety cases are detailed evaluations of the risks of the development, operation, and decommissioning of offshore facilities. They are used by regulatory agencies in the North Sea, Australia, and some other locations that have followed the North Sea approach. Safety cases examine the risks posed by the facility and the environmental, health, and safety management systems that control those risks. This document explains the United Kingdom offshore safety case regulations, line by line. However, it does not provide any detail on the methodology for performing the required risk assessments. That information is provided by other documents referenced in this description of regulatory guidance.
Pertinence to ARA: **_X_ Not Pertinent: __ Illustrates Methodology: __ Provides a Data Source: __ Other Use** **Explanation:** Although safety cases, as applied in the North Sea, are some of the most extensive risk assessment developed in the hydrocarbon industry, this document does not provide the detail on those risk assessments that might be useful to the ARA project. However, some of the references in this document may be worthwhile in further methodology investigation by the ARA team.

Summary No. 40
Document Title: *Risks from Hazardous Pipelines in the United Kingdom* (No. 82/1994)
Date: 1995
Publisher/Source: UK Health and Safety Executive
Document Type: Pipeline Risk Study
Information Restrictions (if any): None
Focus: The report estimates the risks posed by typical pipelines in the U.K. that transport hazardous material.
Summary: No. 82/1994 is a study sponsored by the UK Health and Safety Executive, examining the risks (individual and societal) posed by pipelines transporting hazardous material across the country. Fifteen different pipelines transporting toxic material, flammable material, or oxygen were analyzed. The report contains the following: 1. A description of pipelines examined and physical properties of the pipeline 2. Methodology for calculating pipeline risk - likelihood and consequence 3. Pipeline failure frequency data for leaks, small holes, and ruptures. Data tables showing the frequency of failure by failure cause (e.g., corrosion, construction defect, ground movement) are included 4. Charts showing the relationship between pipeline failure frequency due to (1) external interference and wall thickness and (2) corrosion and wall thickness 5. Individual risk results (fatality risk) and societal risk results (shown as FN curves) Consequence modeling was done using consultant software employing standard gas release rate and dispersion models.
Pertinence to ARA: **__ Not Pertinent: _X Illustrates Methodology: _X Provides a Data Source: _ Other Use** **Explanation:** The methodology described in No. 82/1994 is standard risk assessment method (event, likelihood, consequence). Only material release events are examined and health effect risks are estimated. Failure data on pipeline leaks/holes/ruptures may be useful in the ARA project

Summary No. 41
Document Title: *The Report of the BP U.S. Refineries Independent Safety Review Panel* (i.e., the Baker Report)
Date: January 2007
Publisher/Source: Independent Safety Review Panel for the BP U.S. Refineries
Document Type: Industry recommendations
Information Restrictions (if any): None
Focus: The "Baker Report" focuses on process safety deficiencies and corporate safety culture issues that contributed to the accident at the BP Texas City refinery (which resulted in 15 fatalities) and that were present to varying degrees at the other four BP refineries considered in the review.

Summary: The Baker Report provides a number of findings and recommendations that have value for other operators of hazardous materials facilities. The Independent Review Panel (the Panel) developed and followed a multifaceted plan to accomplish the mandate of its charter and the Chemical Safety Board's recommendation. The plan included:

- Visits by the Panel and its staff to BP's U.S. refineries
- Public meetings that the Panel conducted in the local communities where the refineries are located
- Interviews of refinery-level personnel and corporate-level managers
- Process safety reviews that technical consultants conducted at BP's U.S. refineries
- A process safety culture survey conducted among the workforce at BP's U.S. refineries
- Frequent interaction with BP representatives, including periodic briefings by representatives of BP
- A targeted document review
- Meetings with other companies relating to their management of process safety

The Panel's findings were organized into two primary areas: (1) corporate safety culture and (2) process safety management system, each with the following areas of specific findings:

- Corporate Safety Culture
    - Process safety leadership
    - Employee empowerment
    - Resources and positioning of process safety capabilities
    - Incorporation of process safety into management decision-making

- Process Safety Management Systems
    - Process risk assessment and analysis
    - Compliance with internal process safety standards
    - Implementation of external good engineering practices
    - Process safety knowledge and competence
    - Effectiveness of BP's corporate process safety management system
    - Process safety audits
    - Timely correction of identified process safety deficiencies
    - Corporate oversight

Summary No. 41

The Panel's recommendations included recommendations on:

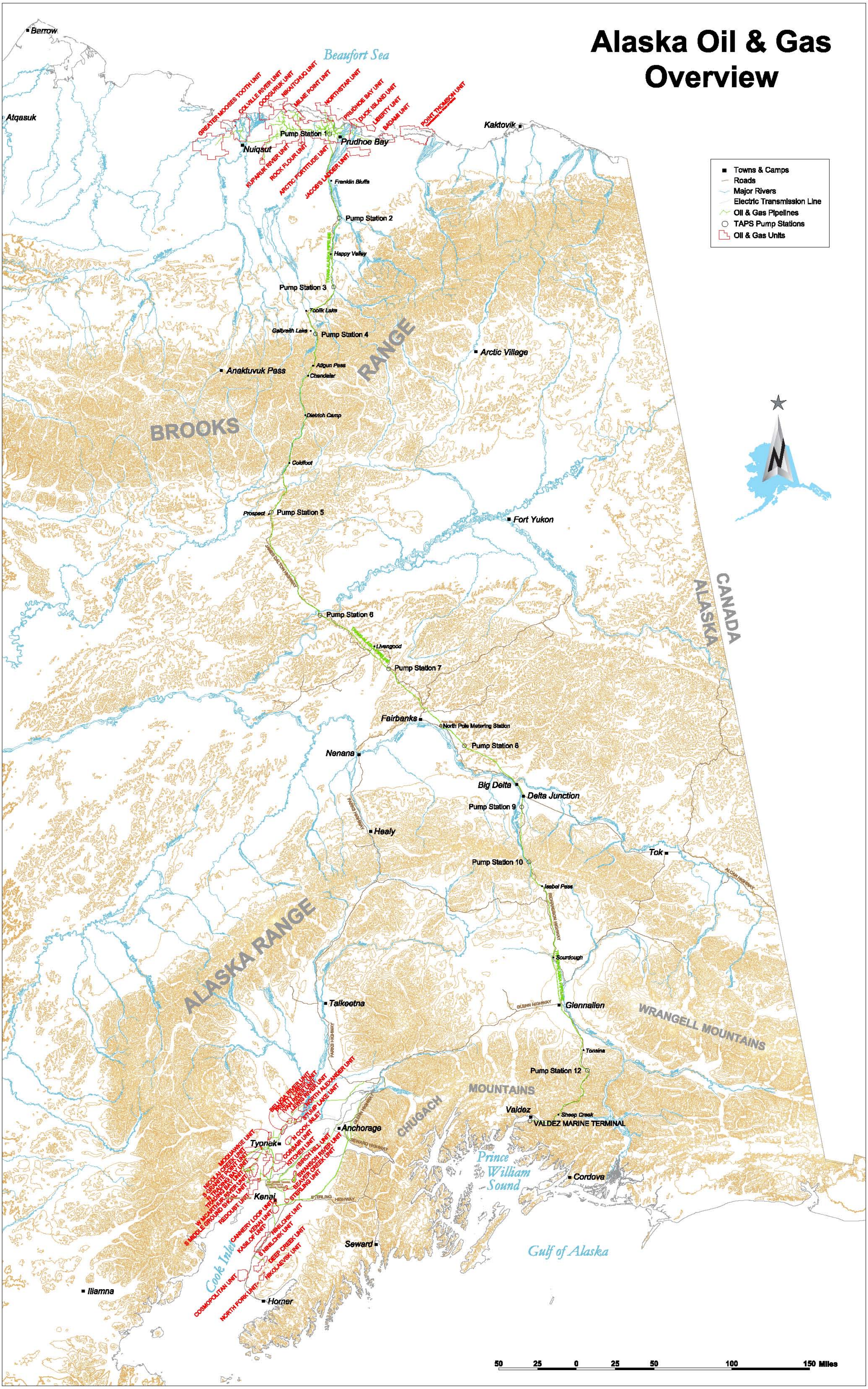
- Process safety Leadership
- Integrated and comprehensive process safety management system
- Process safety knowledge and expertise
- Process safety culture
- Clearly defined expectations and accountability for process safety
- Support for line management
- Leading and lagging performance indicators for process safety
- Process safety auditing
- Board monitoring
- Industry leadership

Many of these findings and recommendations are considered potentially applicable in many other organizations and facilities.

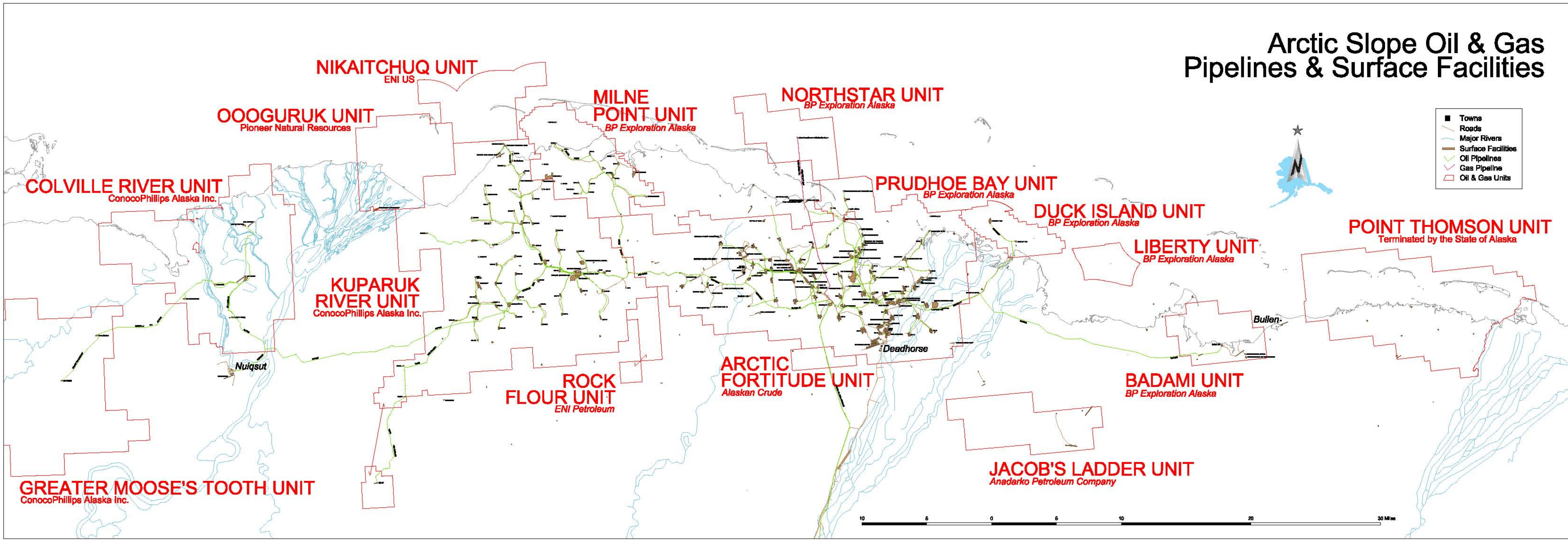
Pertinence to ARA:
__ Not Pertinent: __ Illustrates Methodology: __ Provides a Data Source: _X_ Other Use

Explanation: The corporate safety cultures and the process safety management systems implemented by the Alaskan oil and gas infrastructure operators clearly play a role in the likelihood of accidents that have the potential to pose reliability, safety, and environmental impacts. The Baker Report and other recent management systems evaluation efforts might play a role in evaluations the ARA team will make in assessing the likelihood of specific kinds of failures. However, a broad process safety and safety culture evaluation is not within the scope of the ARA project.

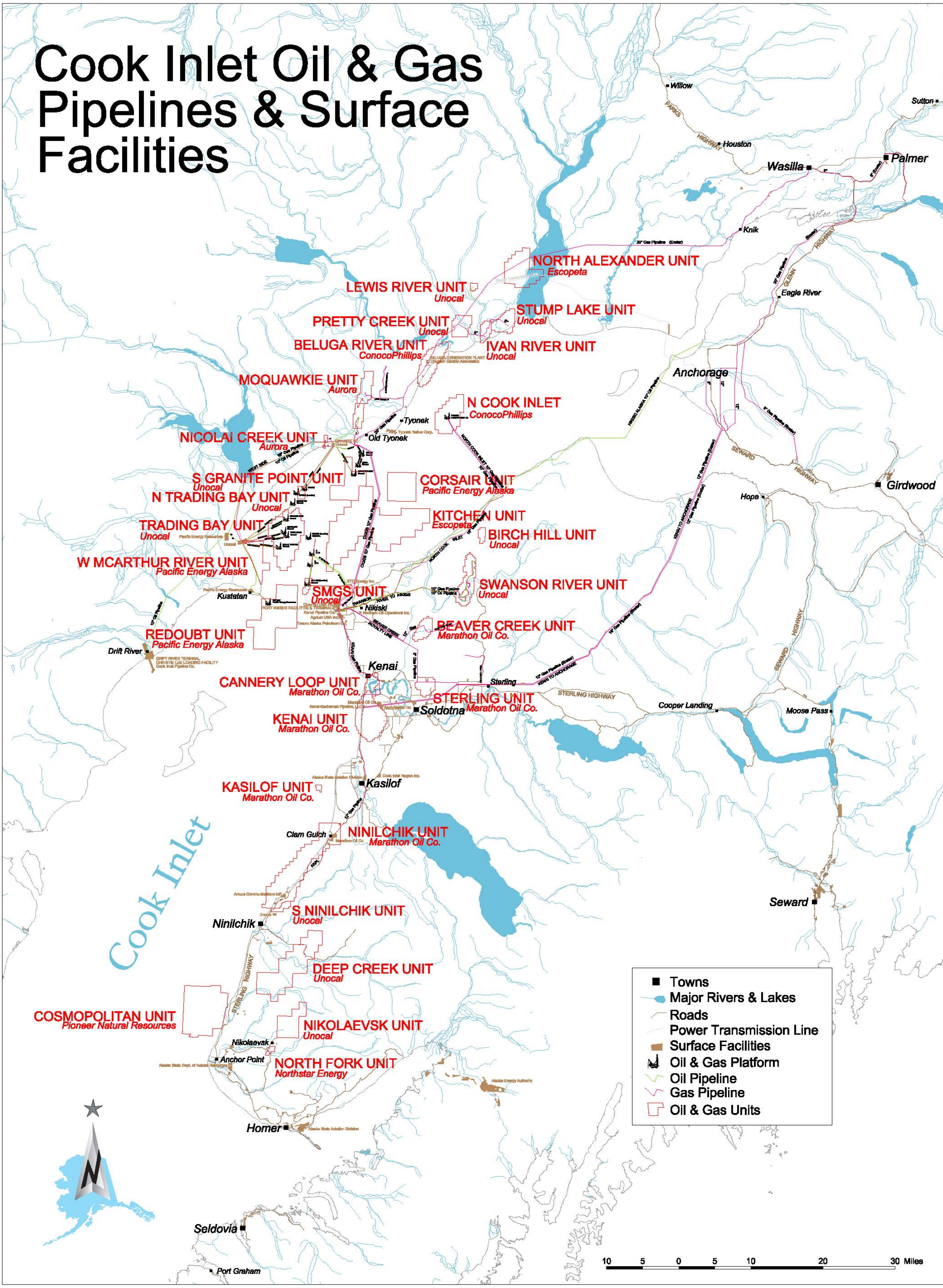
Appendix E – Alaska Infrastructure Maps



Alaska Oil & Gas Overview
Towns & Camps
Roads
Major Rivers
Electric Transmission Line
Oil & Gas Pipelines
TAPS Pump Stations
Oil & Gas Units
Beaufort Sea
Barrow
Atqasuk
Nuiqsut
Prudhoe Bay
Kaktovik
Pump Station 1
Franklin Bluffs
Pump Station 2
Happy Valley
Pump Station 3
Toolik Lake
Galbraith Lake
Pump Station 4
Atigun Pass
Chandalar
Dietrich Camp
Coldfoot
Prospect
Pump Station 5
Anaktuvuk Pass
Arctic Village
BROOKS
RANGE
Fort Yukon
Pump Station 6
Livengood
Pump Station 7
Fairbanks
North Pole Metering Station
Pump Station 8
Nenana
Big Delta
Delta Junction
Pump Station 9
Healy
Pump Station 10
Tok
Isabel Pass
Sourdough
Glennallen
Talkeetna
ALASKA RANGE
WRANGELL MOUNTAINS
Tonsina
Pump Station 12
CHUGACH
MOUNTAINS
Valdez
Sheep Creek
VALDEZ MARINE TERMINAL
Anchorage
Tyonek
Kenai
Prince William Sound
Cordova
Seward
Gulf of Alaska
Cook Inlet
Iliamna
Homer
CANADA
ALASKA
50 25 0 25 50 100 150 Miles


Arctic Slope Oil & Gas
Pipelines & Surface Facilities
NIKAITCHUQ UNIT
ENI US
OOOGURUK UNIT
Pioneer Natural Resources
MILNE
POINT UNIT
BP Exploration Alaska
NORTHSTAR UNIT
BP Exploration Alaska
COLVILLE RIVER UNIT
ConocoPhillips Alaska Inc.
PRUDHOE BAY UNIT
BP Exploration Alaska
DUCK ISLAND UNIT
BP Exploration Alaska
POINT THOMSON UNIT
Terminated by the State of Alaska
LIBERTY UNIT
BP Exploration Alaska
KUPARUK
RIVER UNIT
ConocoPhillips Alaska Inc.
Nuiqsut
Deadhorse
Bullen
ARCTIC
FORTITUDE UNIT
Alaskan Crude
ROCK
FLOUR UNIT
ENI Petroleum
BADAMI UNIT
BP Exploration Alaska
JACOB'S LADDER UNIT
Anadarko Petroleum Company
GREATER MOOSE'S TOOTH UNIT
ConocoPhillips Alaska Inc.
Towns
Roads
Major Rivers
Surface Facilities
Oil Pipelines
Gas Pipeline
Oil & Gas Units
10
5
0
5
10
20
30 Miles

Cook Inlet Oil & Gas Pipelines & Surface Facilities



Appendix F – Project Information and Data Confidentiality Policy

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GENERAL PROJECT INFORMATION AND DATA CONFIDENTIALITY POLICY

Purpose

This Project Information and Data Confidentiality Policy (Policy) is intended to provide guidance to Emerald Consulting Group LLC (Emerald) employees and subcontractors on general confidentiality and data security procedures. This Policy augments existing client contract confidentiality requirements, and is intended to preserve data integrity and confidentiality through a combination of administrative controls and physical limits of access.

All Emerald clients require their information and data be maintained confidential and protected at all times. In general, no information or data will be accessed, shared, combined, transmitted between clients or projects, removed from company premises, or destroyed without specific authorization by an authorized Emerald Manager.

When required, all employees assigned and authorized on a project are required to familiarize themselves with this policy and sign an acknowledgement of such for the specific project. Questions about this policy, or the guidelines for specific information or data, should be addressed to the designated Emerald Project Manager.

An employee or subcontractor found to have violated this policy may be subject to disciplinary action, up to and including termination of employment or termination of contract.

The information and data covered in this policy includes, but is not limited to, information or data that is accessed, reviewed, stored, or shared via any means. This includes electronic information, information on paper, information shared orally, or information shared visually.

Emerald classifies information and data into two main categories:

- Public
- Confidential

Procedure for PUBLIC Information and Data

Public information and data is information generally available to the public through open sources such as web sites, periodicals, published papers, and databases, or has generally been declared public knowledge by the Emerald Project Manager. Public information and data can generally be used and shared between projects and clients. Care should be taken to ensure copyrights are observed and approvals are obtained for copyrighted material prior to use, regardless of where the information or data is accessed.

Procedure for CONFIDENTIAL Information and Data

Confidential information and data is all information other than the above defined Public information. This includes data, drawings, figures, specifications, reports, correspondence, memos, notes, minutes, procedures, policies, databases, templates, pictures, videos, trade secrets, programs, methodologies, personnel information, financial information, and all other information and data generally not regarded as Public. Confidential information and data is required to be protected and secured at all times and not commingled between projects or clients. Confidential information and data shall not be transmitted outside of the company unless specifically authorized by the Project Manager.

Project personnel are expected to use professional judgment in securing and managing Confidential information and data. Any employee who is uncertain of the category of a particular piece of information should contact the Project Manager immediately and assume it is Confidential until instructed otherwise.

Confidential information and data is retained, transferred to the client, or destroyed depending on contract provisions. The Emerald Project Manager should be contacted regarding final disposition of information and data.

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ACKNOWLEDGMENT FORM

Project:	State of Alaska Oil & Gas Risk Assessment
Project Number:	150-001
Effective Date:	June 24, 2008
Reference:	General Project Information and Data Confidentiality Policy

Project Specific Requirements

1. Information and data used for the project will be from Public sources or will be obtained through requests as part of this project. No project information or data from other clients will be accessed or used by project team members.
2. The official project record will consist of hard copy files and electronic files maintained by Emerald.
3. Project hard copy files will be maintained as the official project information and data, and files will be secured under the Project Manager's control. Only employees assigned and authorized on the project are allowed access to the files.
4. Electronic files will be maintained as the official project information and data, and data will be secured on the Emerald network in a project specific folder. Only employees assigned and authorized on the project are allowed access to the folder.
5. Electronic project information and data transferred through the Emerald FTP site will be contained in a project specific folder or contained on a project-specific Sharepoint site. Only employees assigned and authorized on the project are allowed access to the FTP folder or Sharepoint site.
6. All external inquiries regarding this project will be referred to the Emerald Project Manager.

I have familiarized myself with the contents of this Policy and the Project Specific Requirements. By signing below, I acknowledge, understand, accept and agree to comply with the procedures and requirements. I understand that information contained in the Policy and Project Specific Requirements is not intended to cover every situation which may arise, but is simply a general guideline to address expectations of Emerald and our clients.

Employee Signature ____________________ Date ____________________