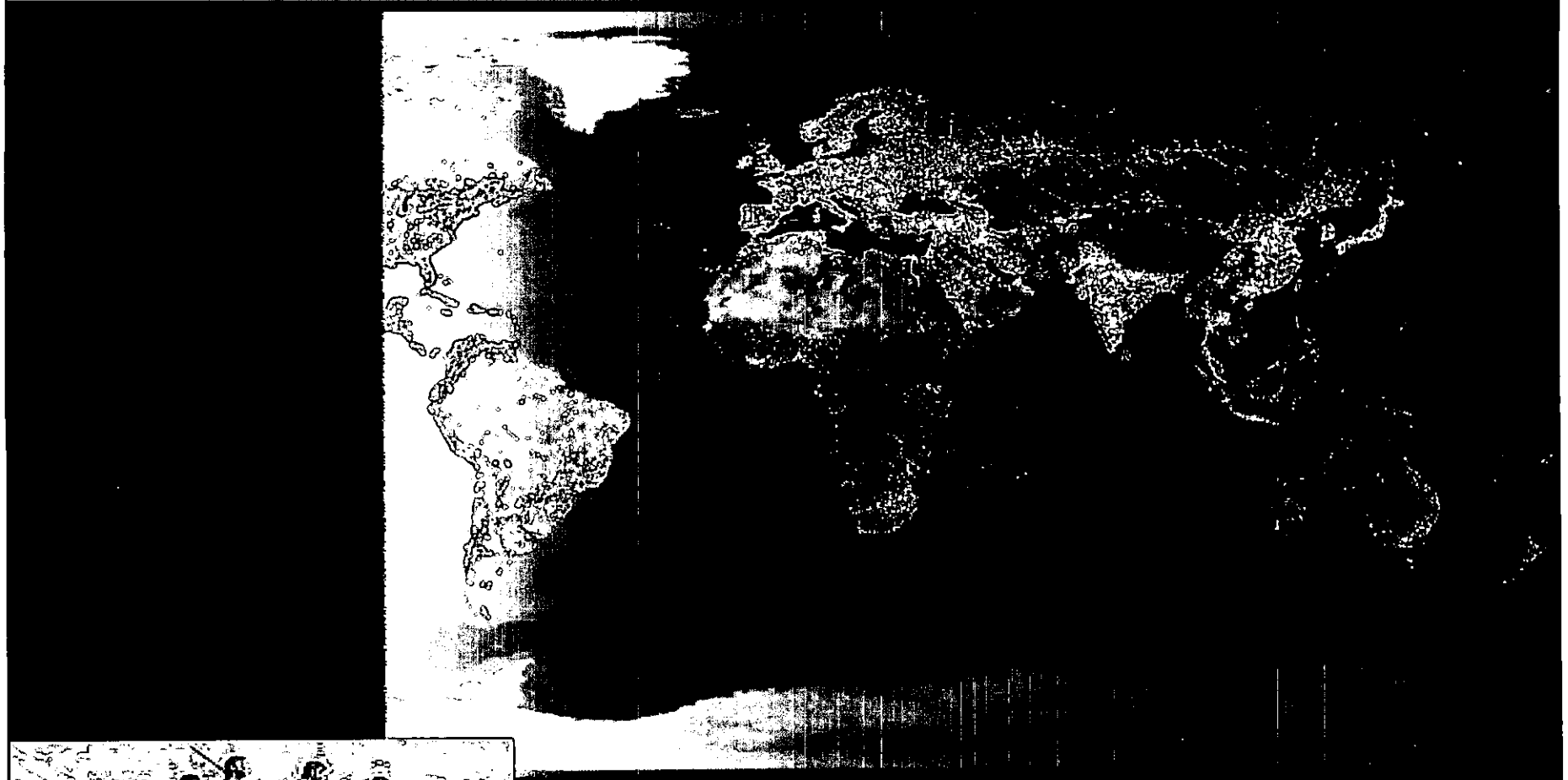
3/25/09 OVERVIEW & UPDATE FROM AGENCIES WITH PIPELINE...

Alaska's Natural Gas – Needed or Not? What About Shale Gas and Carbon Regulation?

AGIA

The Alaska Gasline Inducement Act



Dr. Mark Myers

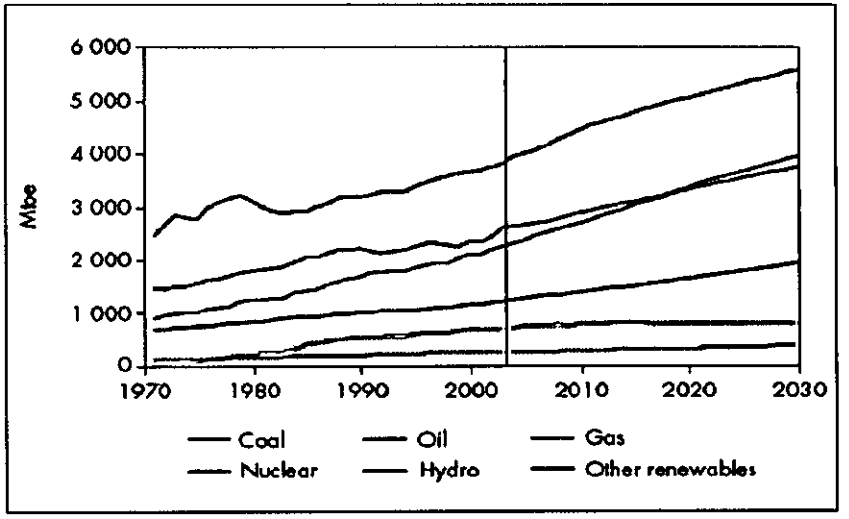
March 25, 2009

Alaska's Natural Gas is America's Resource For Enhancing Economic, Environmental and National Security

AGIA
The Alaska Gasline Inducement Act

- Global competition for imported energy
- Growing population, long term economic growth heighten worldwide demand
- Environmental consequences of development, extraction, and use of other resources

World Energy Consumption by Source



IEA

The Energy Mix for the United States

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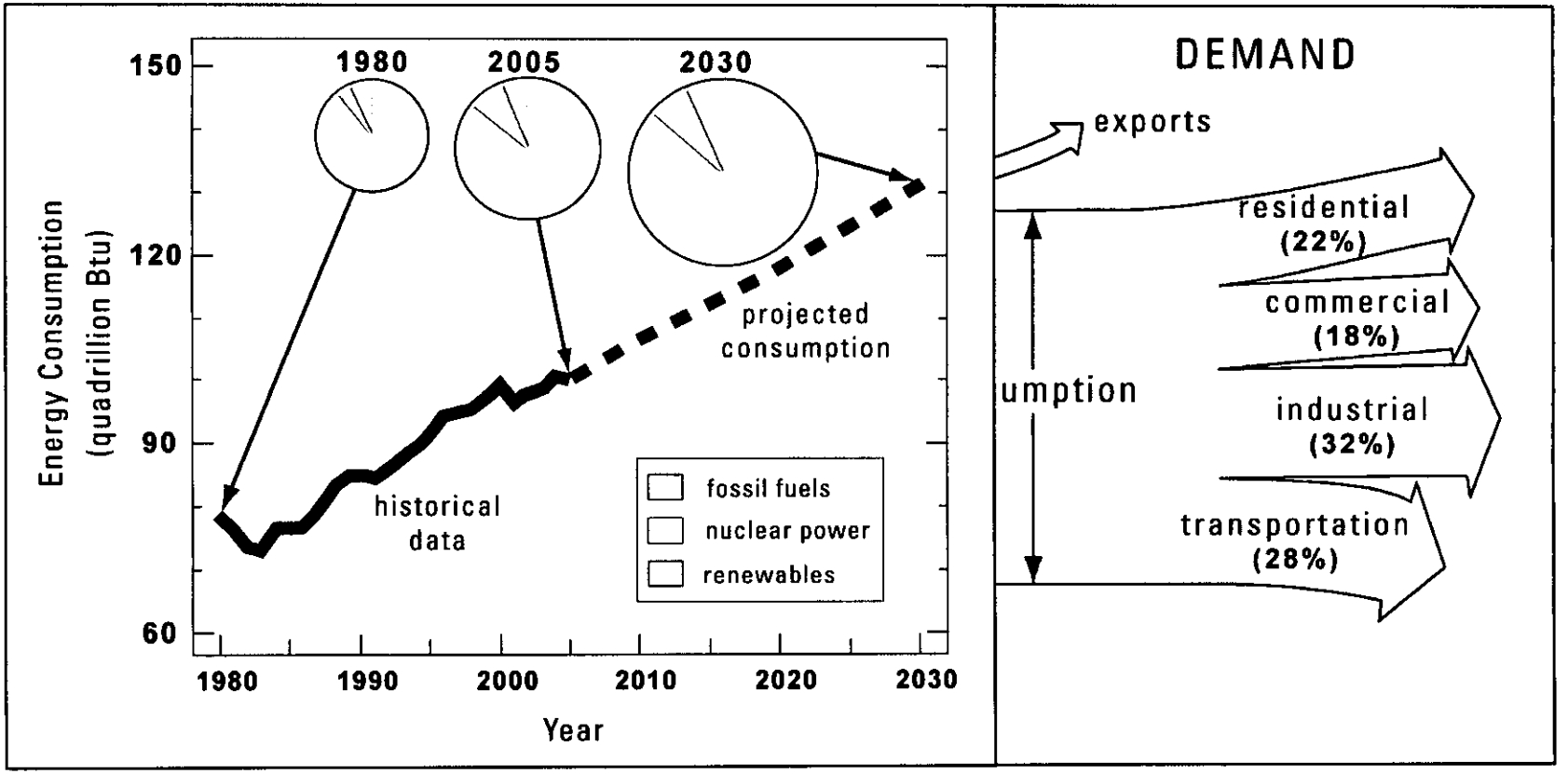

EIA

Large Changes Have Occurred In Fuel Sources

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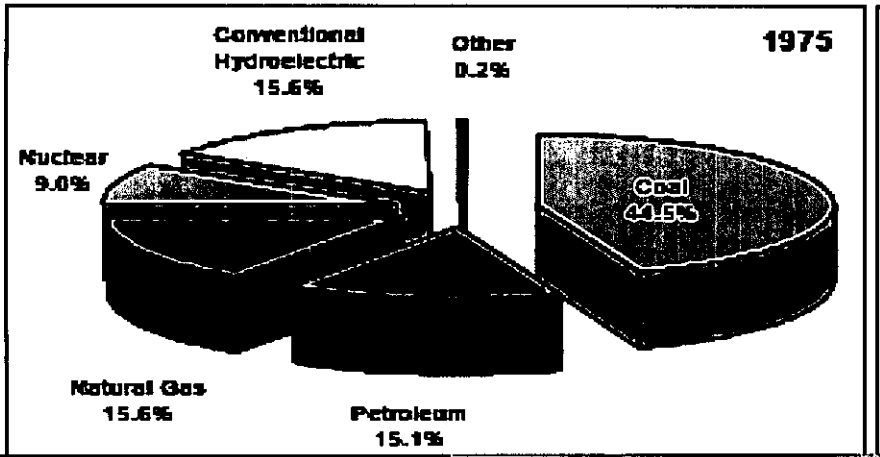
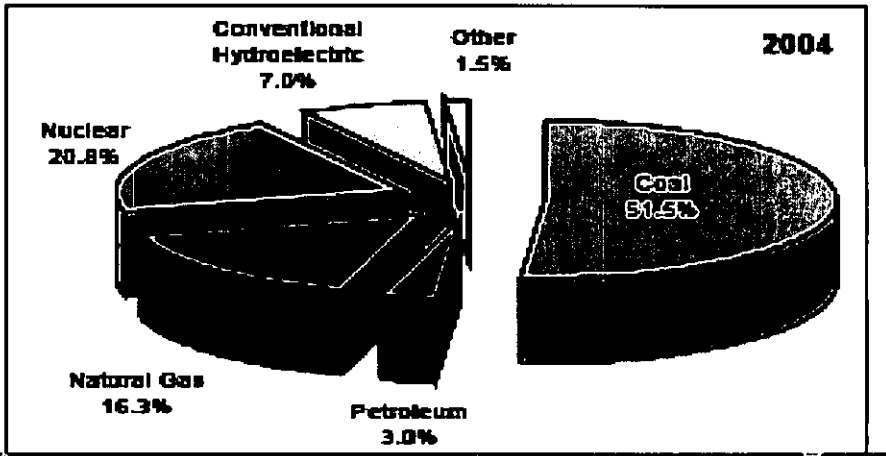
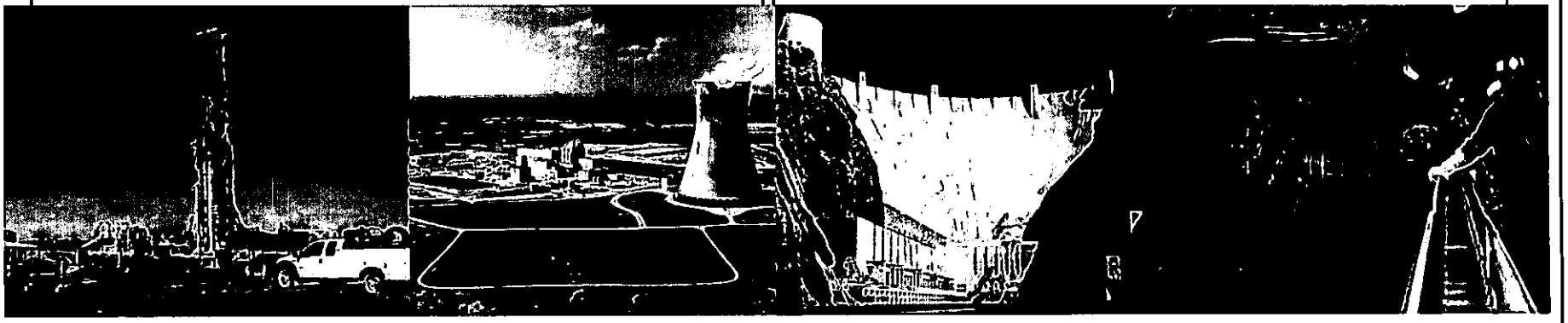
U.S. Electric Power Generation by Fuel Type - Years 1975 and 2004







USGS/EIA

Change in Fuel Type for Electrical Generation Over Three Decades

No Free Lunch: All New Sources of Energy Have There Own Unique Environmental Challenges: Biomass/Water

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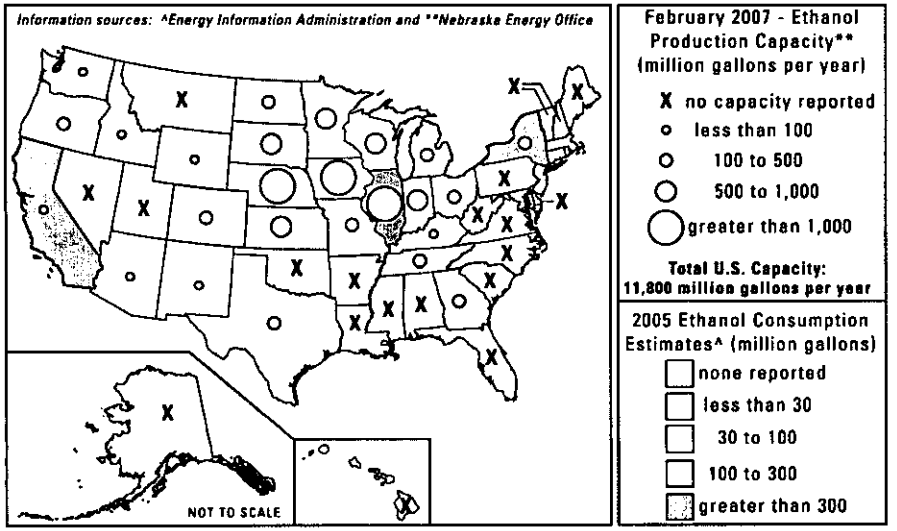
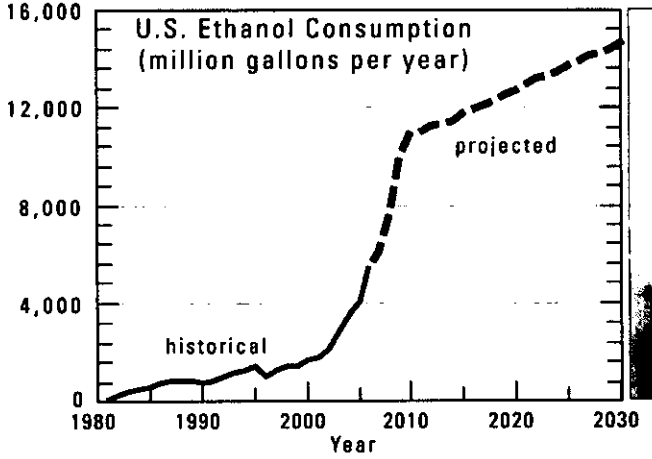
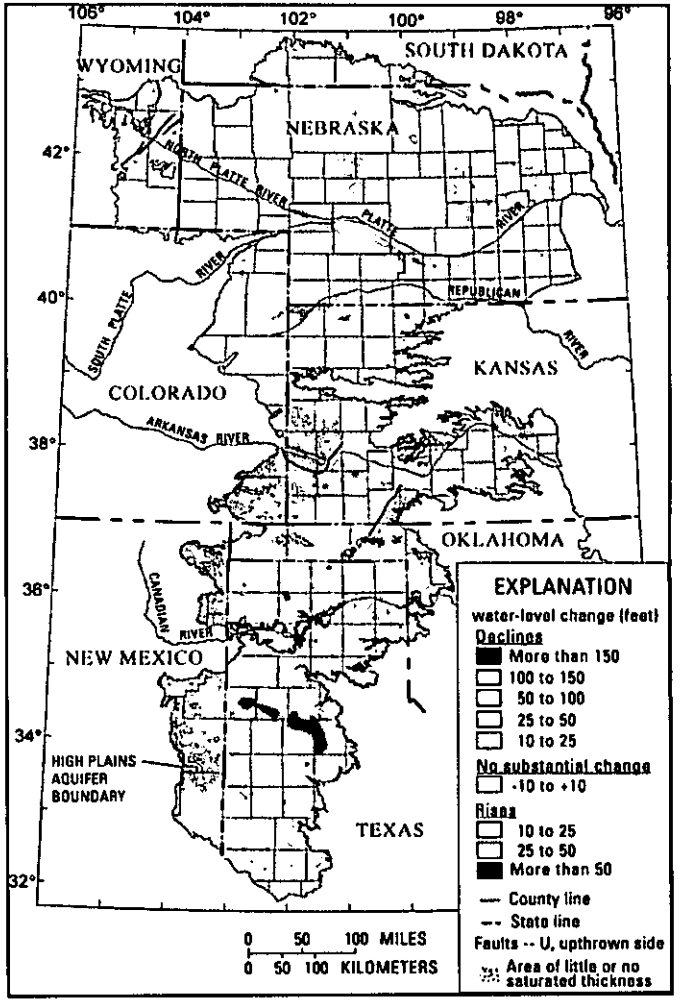
The Alaska Gasline Inducement Act

USGS/EIA







The USA Today

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- How have things changed since the legislature approved the AGIA license?
  - Global economic downturn with associated rapid decline in oil and gas prices
  - Rapid expansion of unconventional (shale) gas supplies in USA
  - Policy shift limiting access to lower 48 federal lands for non-renewable energy production?
  - First authoritative Arctic oil and gas assessment
  - Increased likelihood of carbon regulation

Economic 'Recession' AGIA

The Alaska Gasline Inducement Act

Jim Mulva, Chairman and CEO ConocoPhillips,
March 13, 2009 - *Petroleumworld.com*

"Costs are coming down pretty dramatically," (Mulva) said. "When we say defer, we're not talking years, we're talking months, quarters, maybe up to a year."

Speaking about the Denali Alaska gas pipeline project, proposed last June by ConocoPhillips and BP, Mulva said President Barack Obama has identified the 4 Bcf/d project as a means of reducing US dependence on foreign oil.

The pipeline would bring North Slope gas down to a pipeline in Alberta for transport to the Lower 48 states. "We know it's going to get far more federal attention," he said. "Obviously, Alaska would like to see it go."

Mulva repeated the partners plan a 2010 open season for gas deliveries; first gas deliveries are eyed for 2019.

While current gas prices have led ConocoPhillips to cut back on its Canadian operations, Mulva discounted the low prices as a roadblock to the pipeline project's development.

"You can't look at gas prices today," he said. "You have to look at prices 10 years from now."

Lower 48 Shale Gas Plays

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United States Shale Gas Plays

www.eia.doe.gov
Energy Information Administration
Office of Oil and Gas

Shale Gas Plays
Basins

Stacked Appalachian Plays
Marcellus
Utica
Devonian (OH shale)

November 2008
Miles
0 150 300 600

N

Shale Gas Provides About 5% of Domestic Production

AGIA
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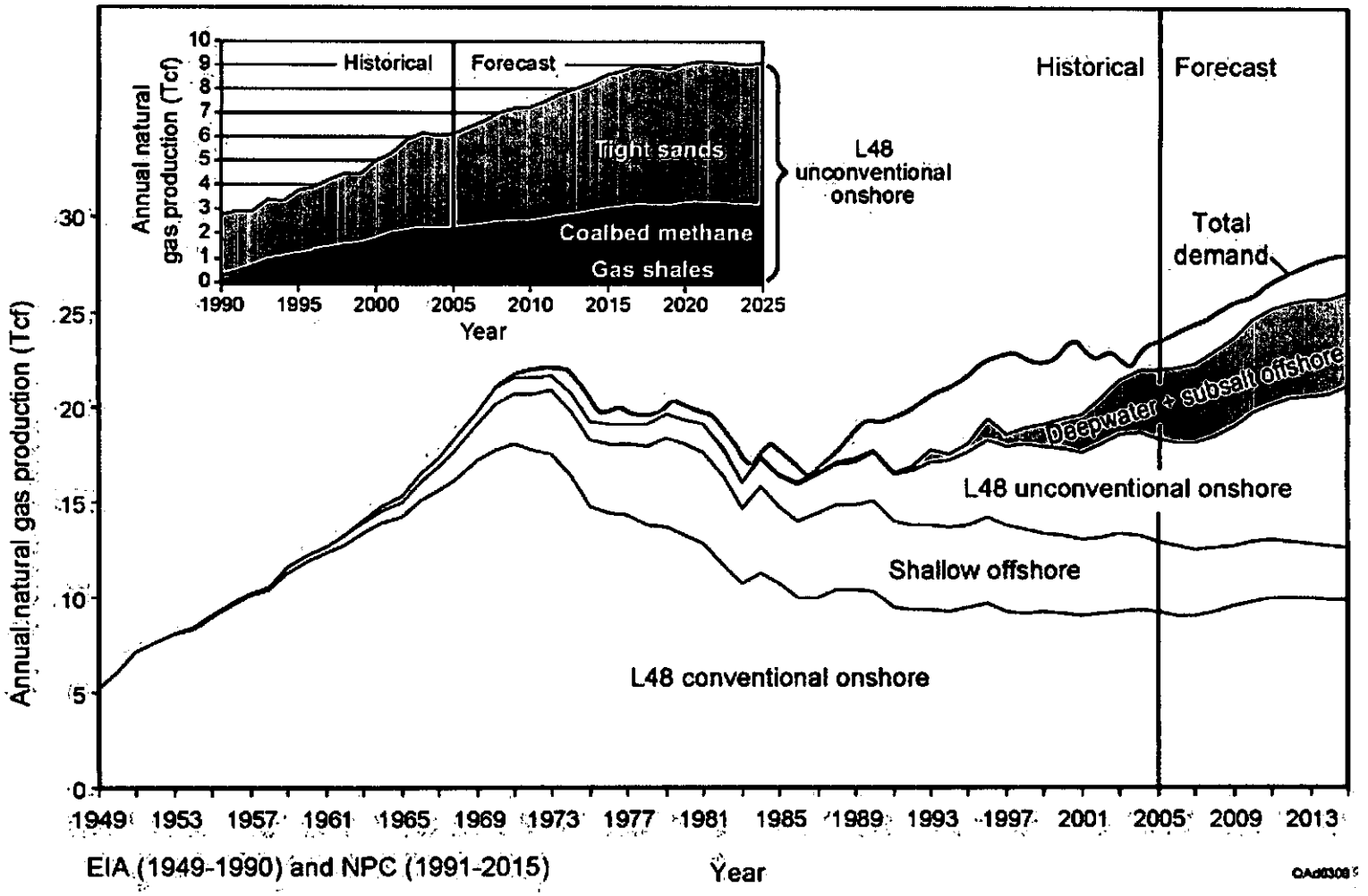

Development of New Unconventional Gas Resources

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"Declines [in North America] are expected to accelerate after 2030 coinciding with the increase in LNG import volumes. Black & Veatch expects near-term production growth in the Rockies and shale plays to offset declines in the Gulf Coast and other Lower 48 production basins."

- AGIA Findings and Determination; Appendix G1 – *AGIA NPV Report*

Wyoming Gas Reserves & Production History

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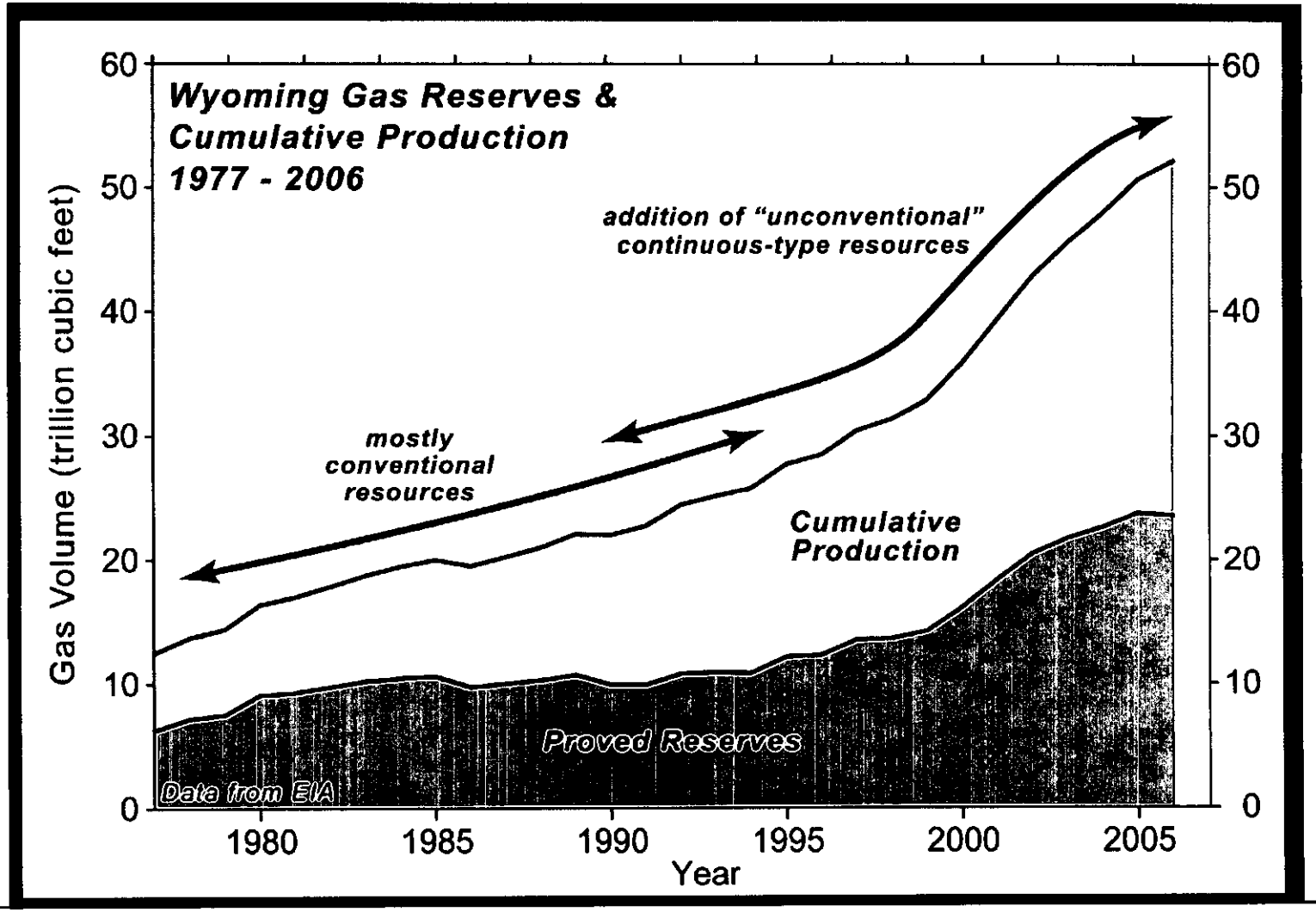
The Alaska Gasline Inducement Act

Courtesy of USGS



Arctic Alaska and Russia at the Top

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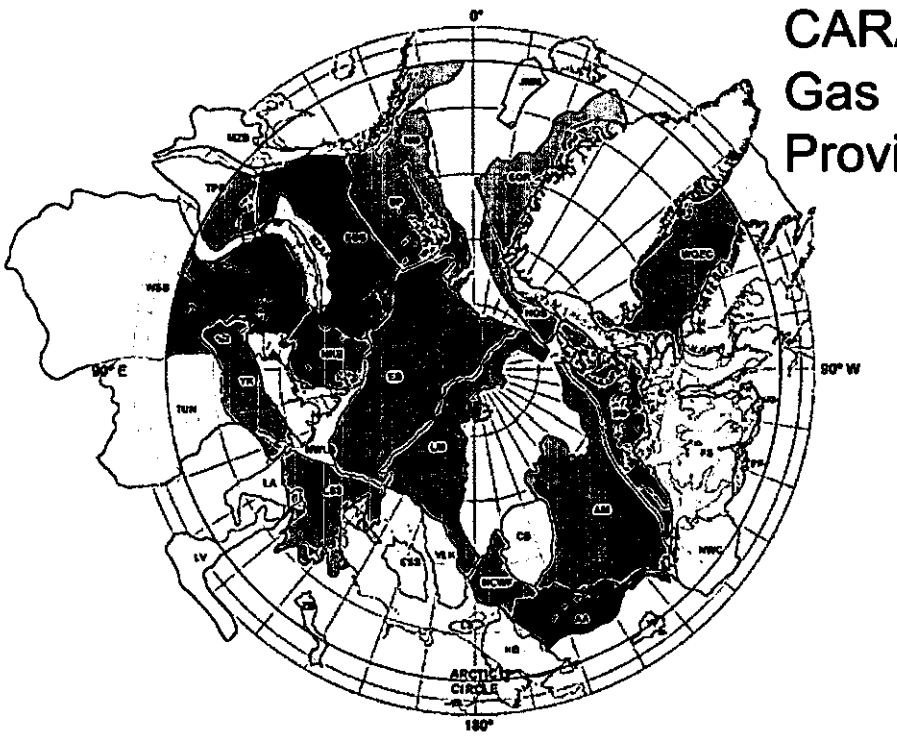
UNDISCOVERED GAS
(trillion cubic feet)

- >100
- 6–100
- <6
- Area not quantitatively assessed
- Area of low petroleum potential



CARA Gas Provinces

Province Code	Province	Oil (MMBO)	Total Gas (BCFG)	NGL (MMBNGL)	BOE (MMBOE)
WSB	West Siberian Basin	[illegible]	[illegible]	[illegible]	132,571.66
AA	Arctic Alaska	29,960.94	221,397.60	5,904.97	72,765.52
EBB	East Barents Basin	7,406.49	217,657.07	[illegible]	61,755.10
EGR	East Greenland Rift Basins	8,902.13	86,180.06	8,121.57	31,387.04
YK	Yenisey-Khatanga Basin	5,583.74	99,964.26	2,675.15	24,919.61
AM	Amerasia Basin	9,723.58	56,891.21	541.69	19,747.14
WGEC	West Greenland-East Canada	7,274.40	51,818.16	1,152.59	17,063.35
	a Shelf	3,115.57	32,562.84	867.16	9,409.87
	n Margin	1,437.29	32,281.01	504.73	7,322.19
	latform	2,055.51	26,218.67	278.71	6,704.00
	asin	1,342.15	19,475.43	520.26	5,108.31
	Basins and Platforms	1,807.26	14,973.58	390.22	4,693.07
	chora Basin	1,667.21	9,062.59	202.80	3,380.44
	enland Sheared Margin	1,349.80	10,207.24	273.09	3,324.09
	w-Makarov	1,106.78	7,156.25	191.55	2,491.04
	Basin	851.11	8,596.36	191.20	2,475.04
	bar Basin	1,912.89	2,106.75	56.41	2,320.43
	ikchi-Wrangel Foreland	85.99	6,065.76	106.57	1,203.52
	lasin	98.03	5,741.87	101.63	1,158.63
	t Laptev Sea Shelf	172.24	4,488.12	119.63	1,039.90
	i Basin	376.86	1,335.20	35.66	635.06
	Basin	47.82	1,505.99	40.14	338.95
	ian Sea Basin	19.73	618.83	10.91	133.78
	in	2.47	648.17	11.37	121.87
	t Canada Interior Basins	23.34	305.34	15.24	89.47
	asin	NQA	NQA	NQA	NQA
	mlya Basins and Admiralty	NQA	NQA	NQA	NQA
	Basin	NQA	NQA	NQA	NQA
	lorderland	NQA	NQA	NQA	NQA
	ts (part of Central Alaska ce)	NQA	NQA	NQA	NQA
	it	NQA	NQA	NQA	NQA
	n Microcontinent	NQA	NQA	NQA	NQA
	n Shelf	NQA	NQA	NQA	NQA
		89,983.21	1,668,657.84	44,064.24	412,157.09

Source: USGS Fact Sheet 2008-3049

Undiscovered, Conventional Gas Resources of the U.S.

Alaska resources = 36% of national total

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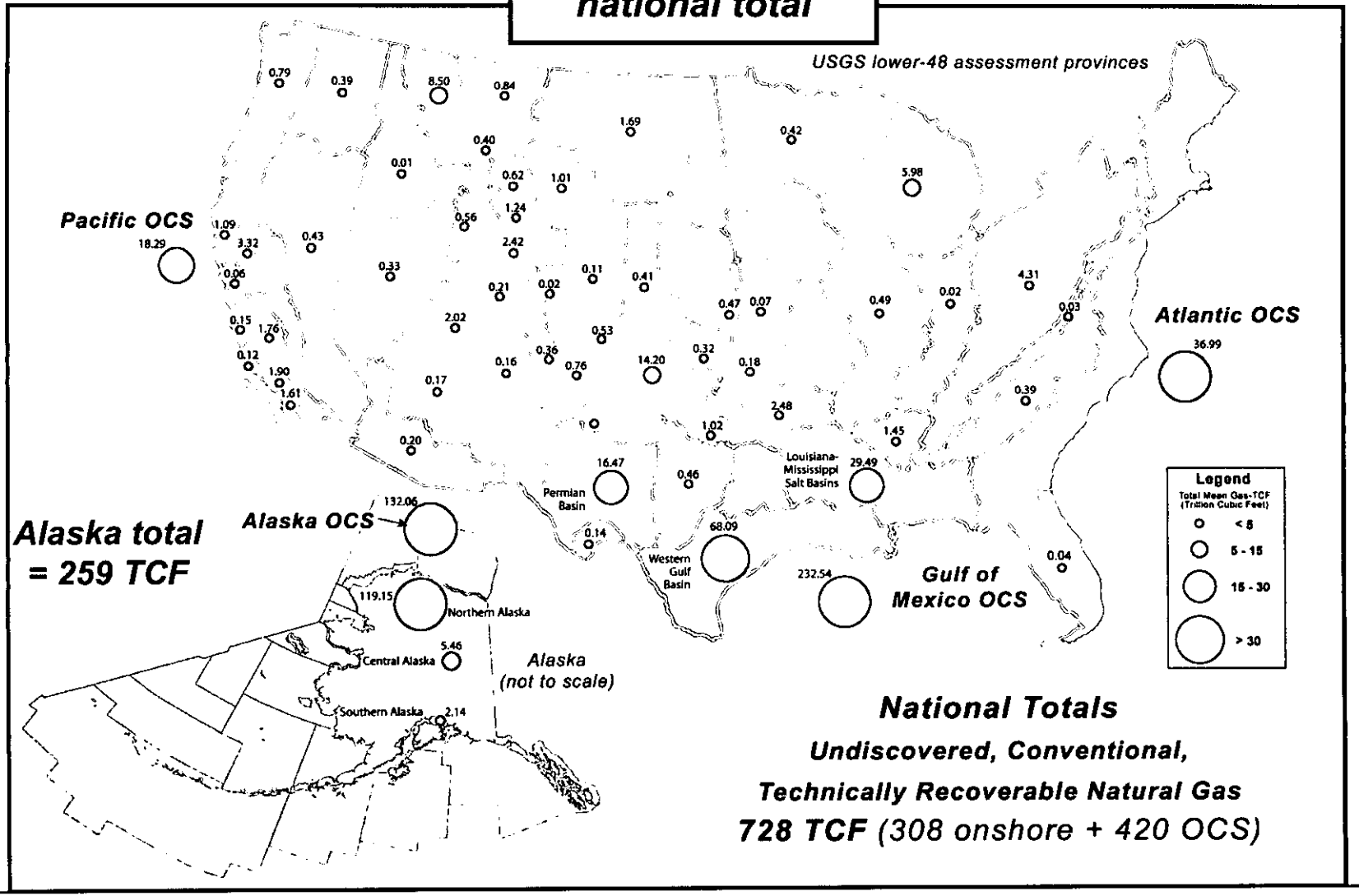
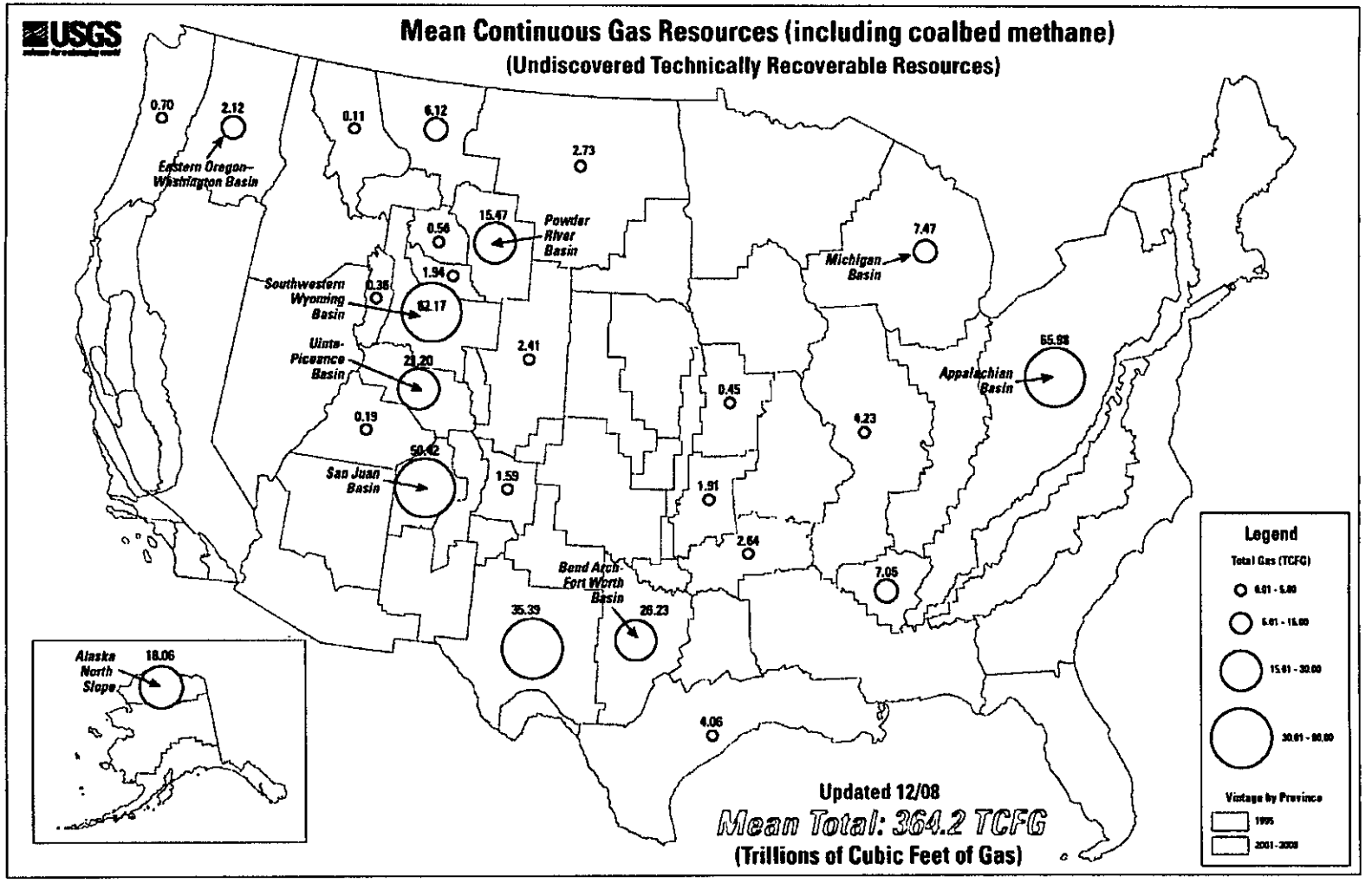
The Alaska Gasline Inducement Act

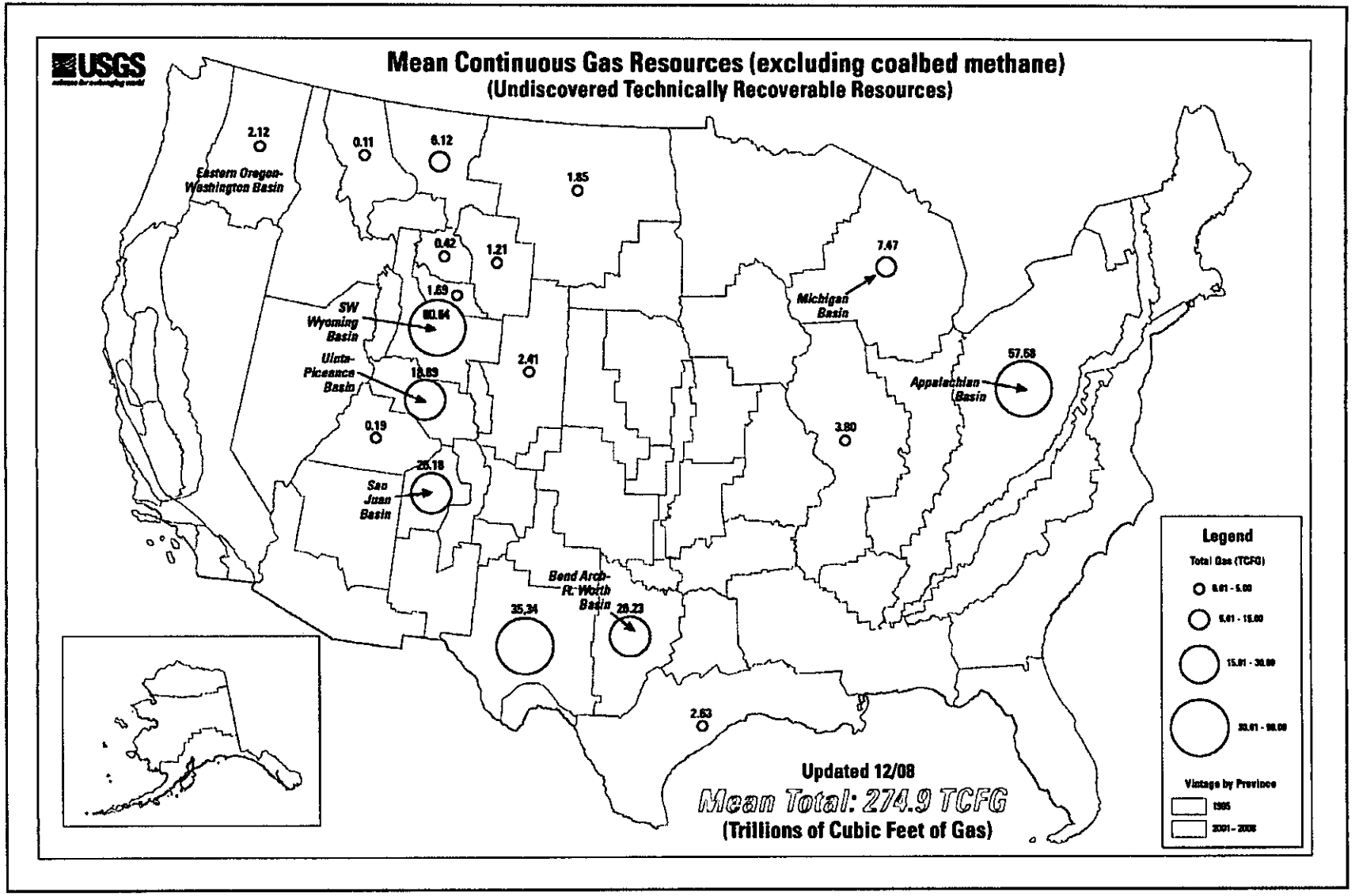


National Totals

Undiscovered, Conventional, Technically Recoverable Natural Gas

728 TCF *(308 onshore + 420 OCS)*


USGS
Mean Continuous Gas Resources (including coalbed methane)
(Undiscovered Technically Recoverable Resources)
0.70
2.12
Eastern Oregon–Washington Basin
0.11
6.12
2.73
15.47
Powder River Basin
0.56
7.47
Michigan Basin
1.94
Southwestern Wyoming Basin
0.38
52.17
Uinta-Piceance Basin
23.20
2.41
65.88
Appalachian Basin
0.45
4.23
0.19
50.42
San Juan Basin
1.59
1.91
2.64
7.05
Bend Arch-Fort Worth Basin
35.39
26.23
4.06
Alaska North Slope
18.06
Updated 12/08
Mean Total: 364.2 TCFG
(Trillions of Cubic Feet of Gas)
Legend
Total Gas (TCFG)
0.01 - 5.00
5.01 - 15.00
15.01 - 30.00
30.01 - 90.00
Vintage by Province
1995
2001 - 2008


USGS
Mean Continuous Gas Resources (excluding coalbed methane)
(Undiscovered Technically Recoverable Resources)
2.12
Eastern Oregon-Washington Basin
0.11
6.12
1.85
0.42
1.21
1.69
80.64
SW Wyoming Basin
Uinta-Piceance Basin
18.89
2.41
7.47
Michigan Basin
57.68
Appalachian Basin
3.80
0.19
25.18
San Juan Basin
Bend Arch-Ft. Worth Basin
35.34
26.23
2.63
Updated 12/08
Mean Total: 274.9 TCFG
(Trillions of Cubic Feet of Gas)
Legend
Total Gas (TCFG)
0.01 - 5.00
5.01 - 15.00
15.01 - 30.00
30.01 - 98.00
Vintage by Province
1995
2001 - 2008

Undiscovered Conventional Gas Potential

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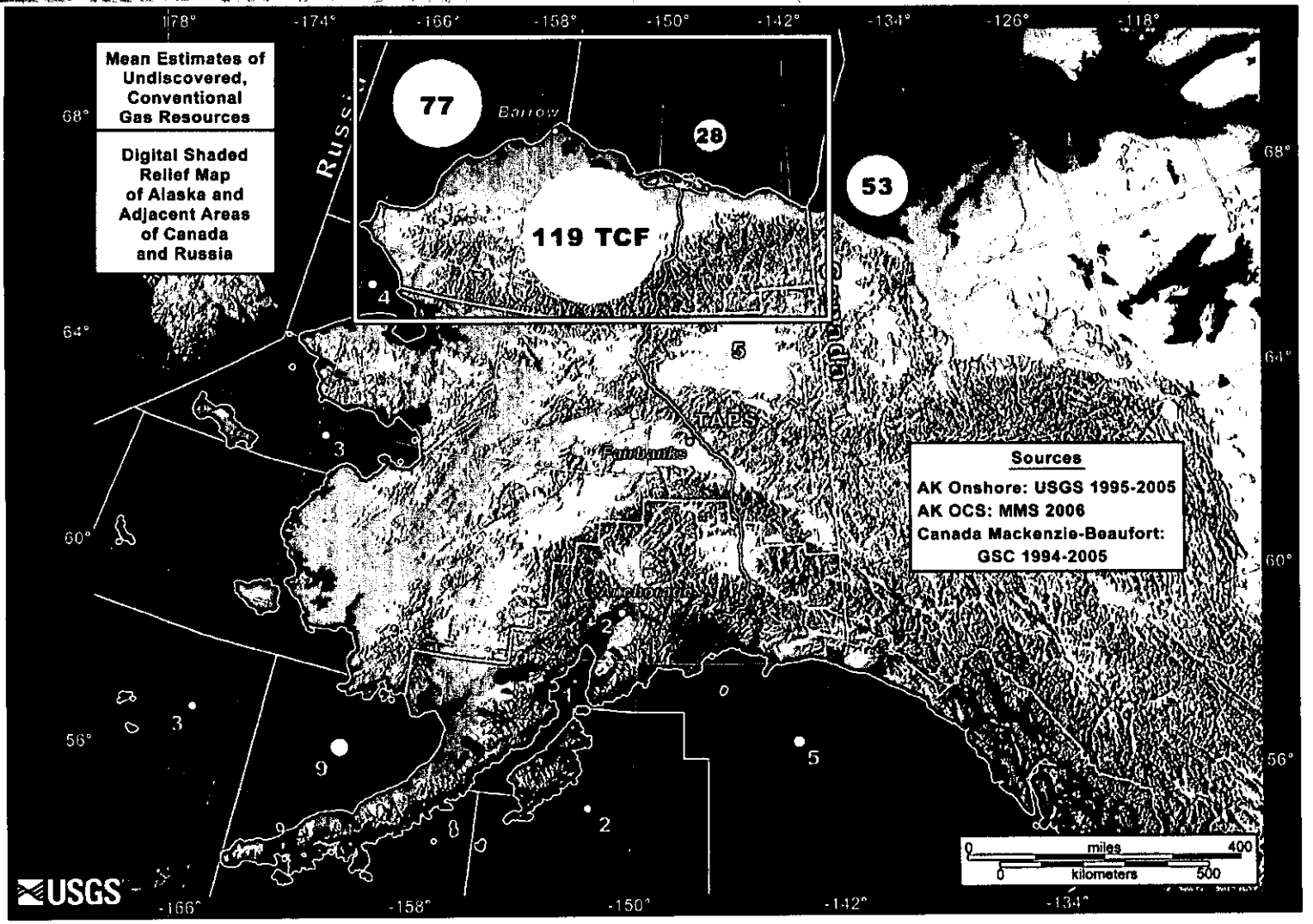

Potential for Undiscovered Petroleum in Arctic Alaska

USGS /MMS

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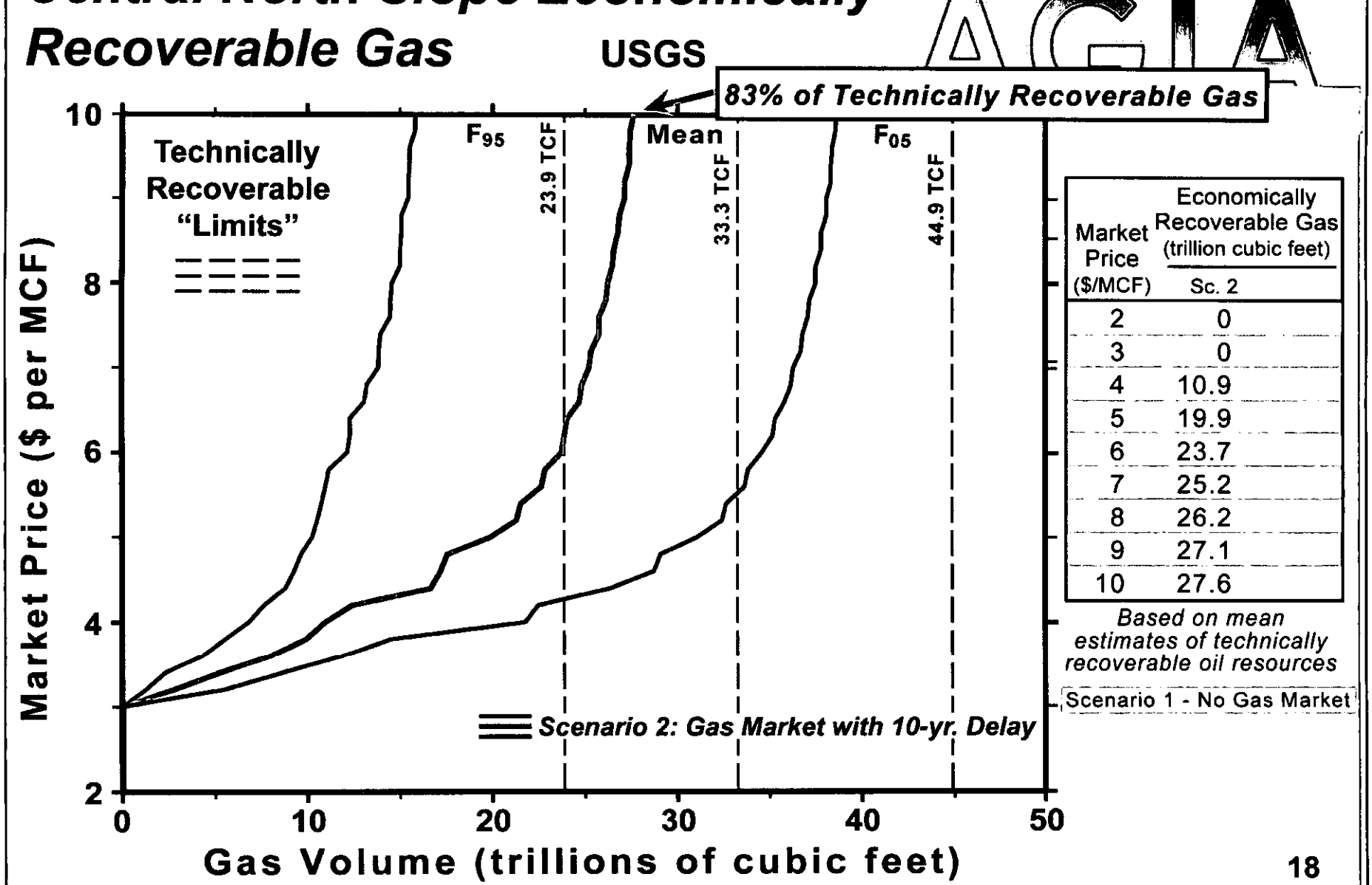
Mean Estimates of Undiscovered, *Conventional* Natural Gas in Arctic Alaska (trillion cubic feet)

	Non-Associated Gas	Associated Gas	Total Gas
Onshore & State Offshore Areas (USGS estimates)			
NPRA	61.35	11.68	73.03
Central North Slope	33.32	4.20	37.52
ANWR, 1002 Area	3.84	4.76	8.60
Subtotal	*98.51*	*20.64*	*119.15*
Federal Offshore Areas (MMS estimates)			
Chukchi Shelf	na	na	76.77
Beaufort Shelf	na	na	27.65
Hope Basin	na	na	3.77
Subtotal	na	na	*108.19*
TOTAL			*227.34*

Central North Slope Economically Recoverable Gas

USGS



Market Price ($/MCF)	Economically Recoverable Gas (trillion cubic feet) Sc. 2
2	0
3	0
4	10.9
5	19.9
6	23.7
7	25.2
8	26.2
9	27.1
10	27.6

Based on mean estimates of technically recoverable oil resources

Scenario 1 - No Gas Market

North Slope Gas Potential

DOE

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Location	Estimate of undiscovered technically recoverable conventional natural gas (Trillion Cubic Feet) Mean	Estimate of economically recoverable* natural gas reserves (Trillion Cubic Feet) Mean
National Petroleum Reserve, Alaska	73.0	31.0
Central North Slope, State Lands	37.5	33.3
ANWR 1002 area	8.6	1.0
TOTAL Onshore Potential	119 TCF	66.3 TCF
Chukchi Sea	76.8	50.0
Beaufort Sea	27.7	21.0
Hope Basin	3.8	
?		
TOTAL Offshore Potential	108 TCF	71.0 TCF
TOTAL	227 TCF	137.3
TCF		

Data Sources: Regional Resource Assessments from the U.S. Geological Survey, http://energy.usgs.gov/alaska/ and Minerals Management Service http://www.mms.gov/alaska/re/reports/2006Asmt/

*NETL This study did not include Hope Basin.

pd08

Alaska's North Slope is Very Under-Explored

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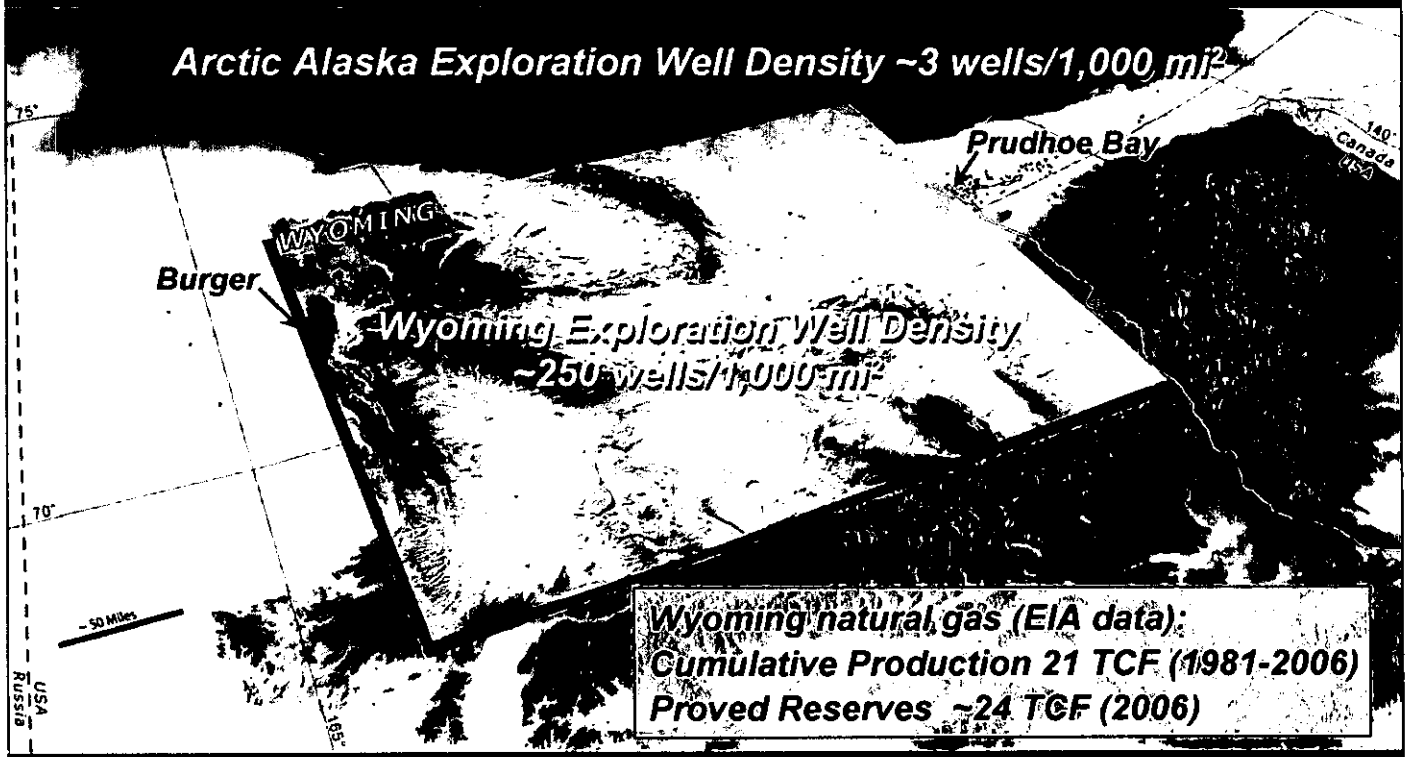
Arctic Alaska Exploration Maturity

- Prospective area onshore & offshore shelves ~ 150,000 mi² (~400,000 km²)
- Fewer than 500 exploration wells (red dots)



- Entire state of Wyoming ~100,000 mi² (~250,000 km²)
- Petroleum-prospective area ~75,000 mi² (~250,000 km²)
- ~19,371 exploration wells

14

Courtesy of USGS

Unconventional Gas Resources (continuous resources)

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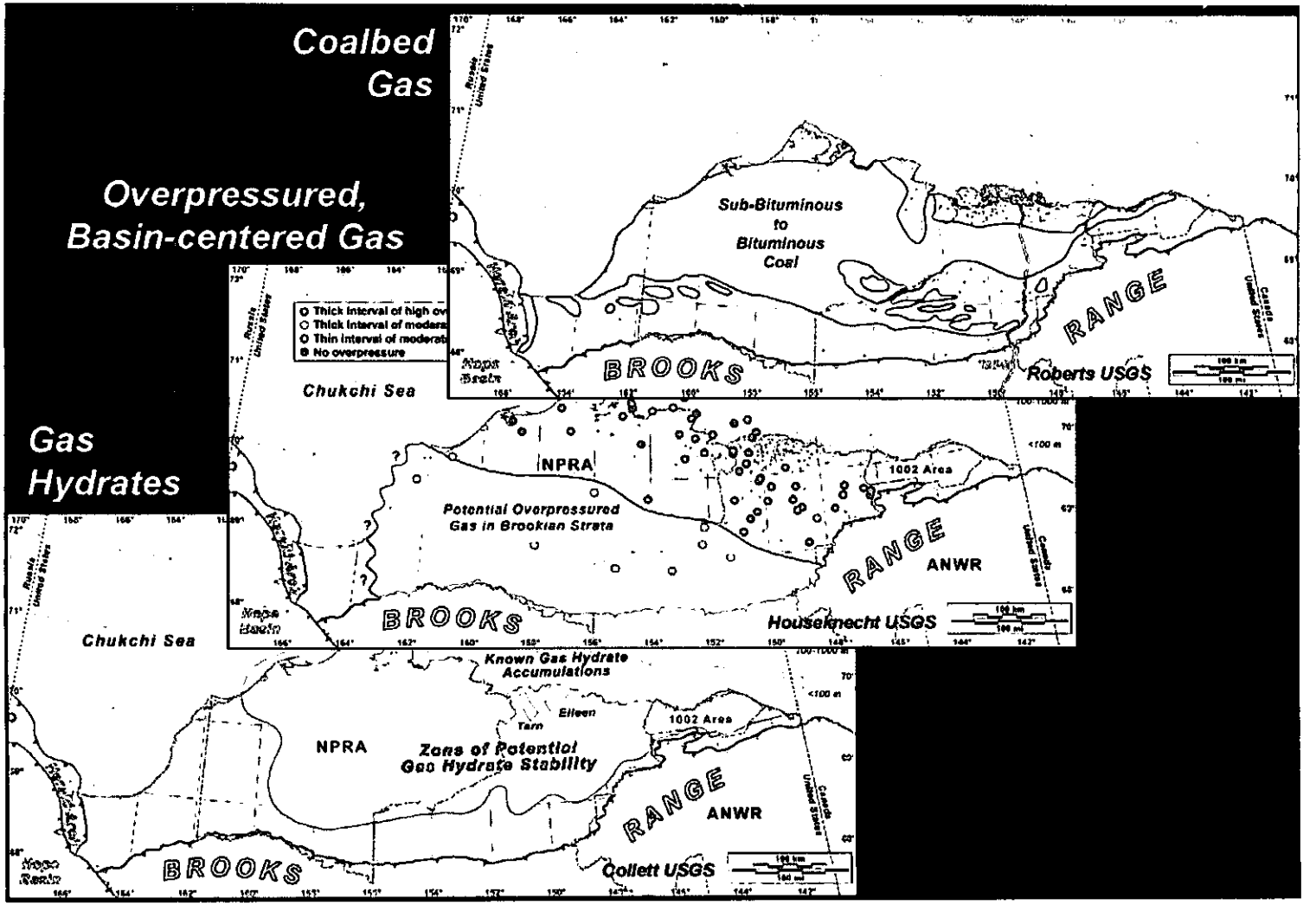

Alaska North Slope Natural Gas Hydrate Assessment Results

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[BCFG, billion cubic feet of gas. MMBNGL, million barrels of natural gas liquids. Results shown are fully risked estimates. F95 represents a 95-percent chance of at least the amount tabulated; other fractiles are defined similarly. Fractiles are additive, assuming perfect positive correlations. NGL, natural gas liquids; TPS, total petroleum system; AU, assessment unit.]

Total Petroleum System and Assessment Unit	Field Type	*Total Undiscovered Resources*							
		Gas (BCFG)				*NGL (MMBNGL)*			
		F95	F50	F5	Mean	F95	F50	F5	Mean
Northern Alaska Gas Hydrate TPS									
Sagavanirktok Formation Gas Hydrate AU	*Gas*	6,285	19,490	37,791	20,567	0	0	0	0
Tuluvak-Schrader Bluff-Prince Creek Formations Gas Hydrate AU	*Gas*	8,173	26,532	51,814	28,003	0	0	0	0
Nanushuk Formation Gas Hydrate AU	*Gas*	10,775	35,008	68,226	36,857	0	0	0	0
Total Undiscovered Resources		**25,233**	**81,030**	**157,831**	**85,427**	**0**	**0**	**0**	**0**

Source: USGS Fact Sheet 2008-3073

Alaska's Arctic Natural Gas: Critical Bridge to a Sustainable Future

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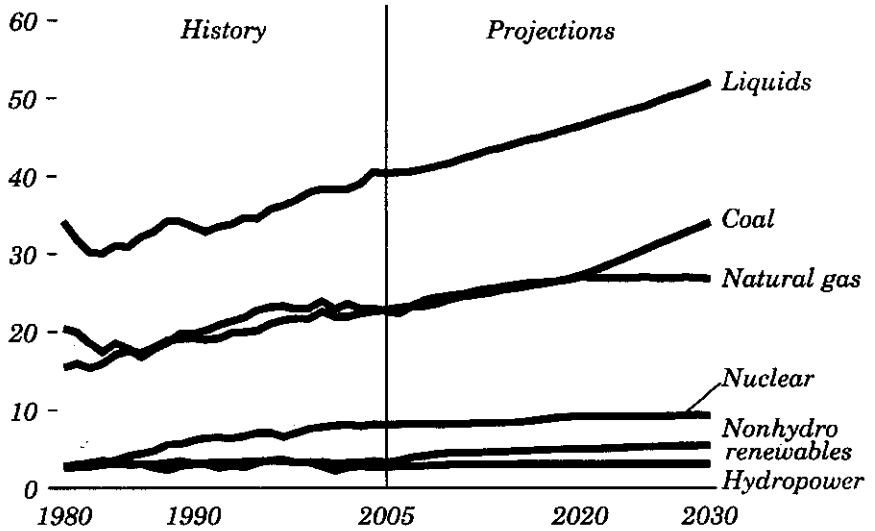
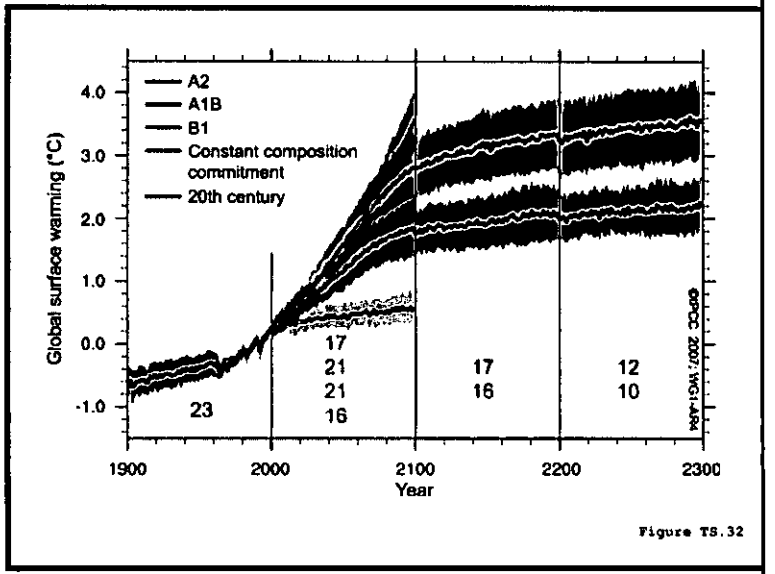
United States Energy Consumption by Fuel



EIA

USGS

Carbon Emissions



IPCC 2007: WG1-AR4

CARA Gas Provinces

Impact of Carbon Regulation on Natural Gas Demand

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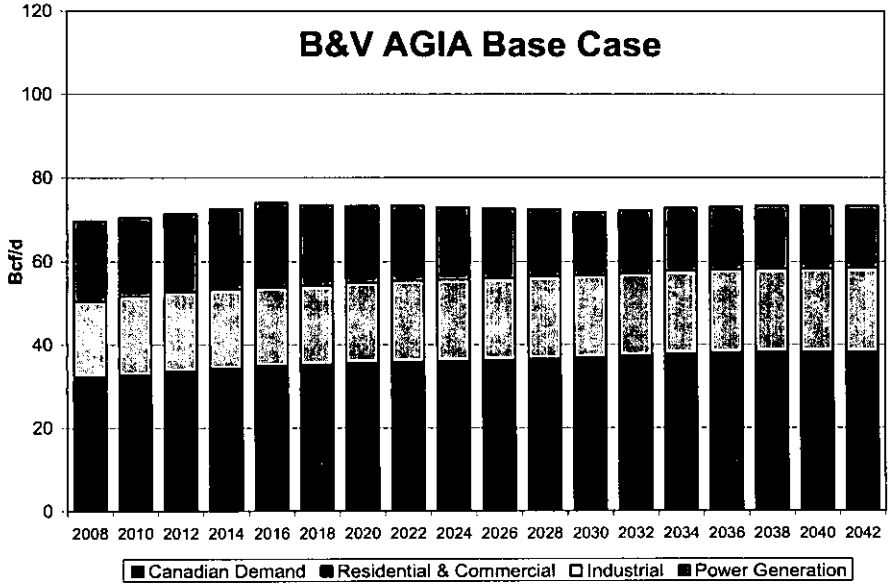
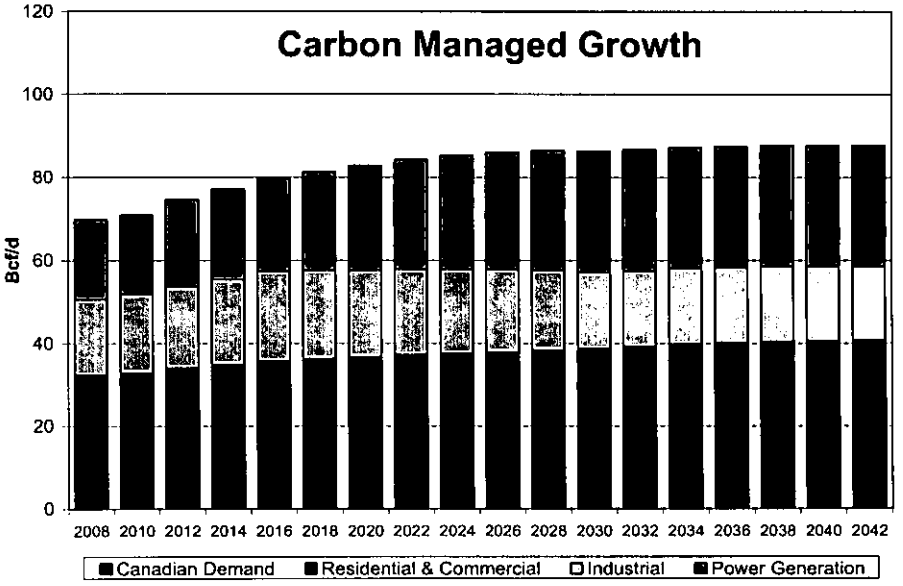
The Alaska Gasline Inducement Act

In a Carbon Managed Growth case, demand is 14 Bcf/d more than the B&V AGIA Base Case

- Policies and legislations designed to curb Green House Gas could reduce dispatch and construction of coal-fired generation facilities in favor of natural gas fired facilities, resulting in demand increase from the power sector in the US
- All resources, including renewables, nuclear and IGCC with CCS and gas fired combined cycles are all needed to meet electric demand growth. Gas demand from the power sector will grow from 19 Bcf/d in 2008 to 29 Bcf/d by 2030, with a CAGR of 2%
- Total demand in US lower 48 states is 12.1 Bcf/d higher than BV's AGIA Base Case by 2042. Canada demand is 2.3 Bcf/d higher in the Carbon Managed Growth case





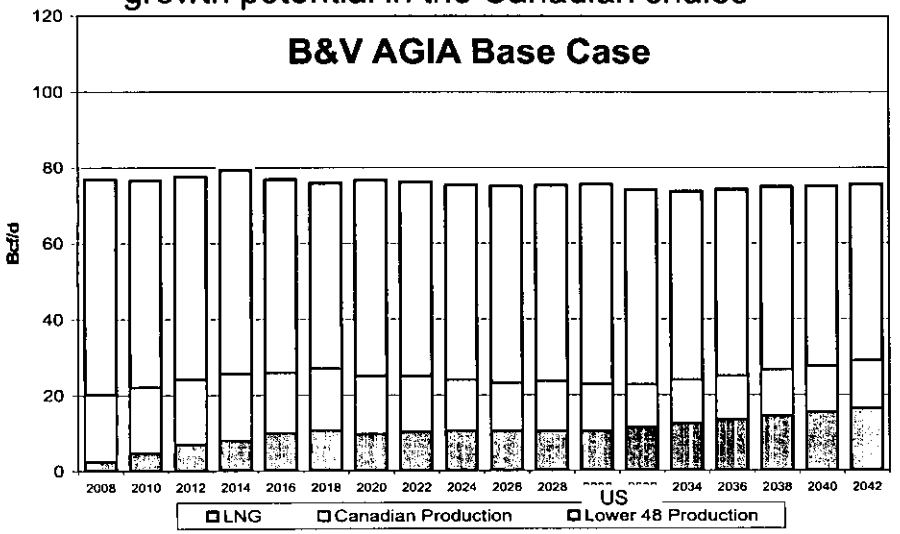
Source: Black & Veatch Analysis

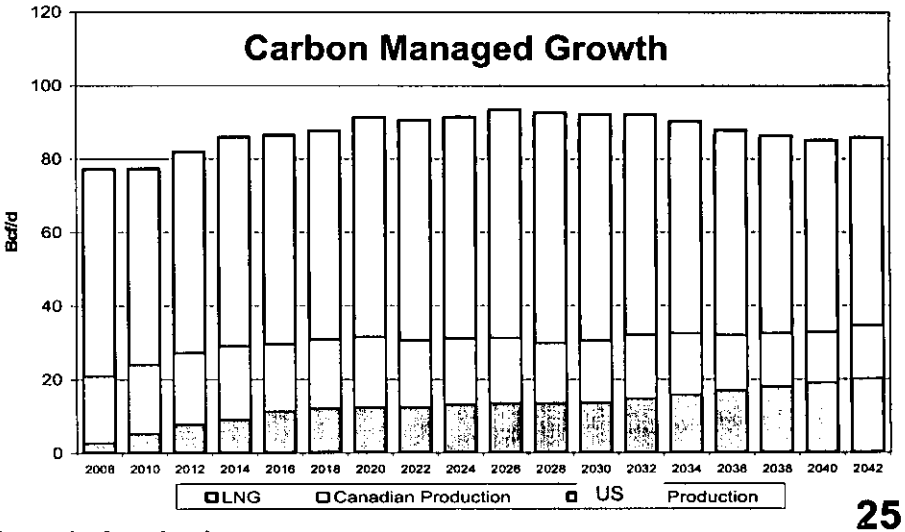
Multiple Different Sources of Natural Gas will be Needed to Meet Lower 48 Demand Growth

AGIA
The Alaska Gasline Inducement Act

Additional LNG imports and more unconventional productions from the US is necessary in order to meet the lower 48 demand growth

- Additional LNG imports will be needed to meet the demand growth; 6.4 Bcf/d by 2042 in the Carbon Managed Growth scenario
- US Production will average 58.3 Bcf/d from 2022-2042 in the Carbon Managed Growth case, which will be 7.8 Bcf/d higher than the B&V AGIA Base Case. Recent developments in shale discoveries in Haynesville and Marcellus indicate greater production potentials from these unconventional resources. The production growth can be considered as a proxy.
- Canadian production continues to decline in both cases. In the Carbon Managed Growth case, Canadian production is 3.7 Bcf/d higher than in the B&V AGIA Base Case, which may approximately reflect the growth potential in the Canadian shales



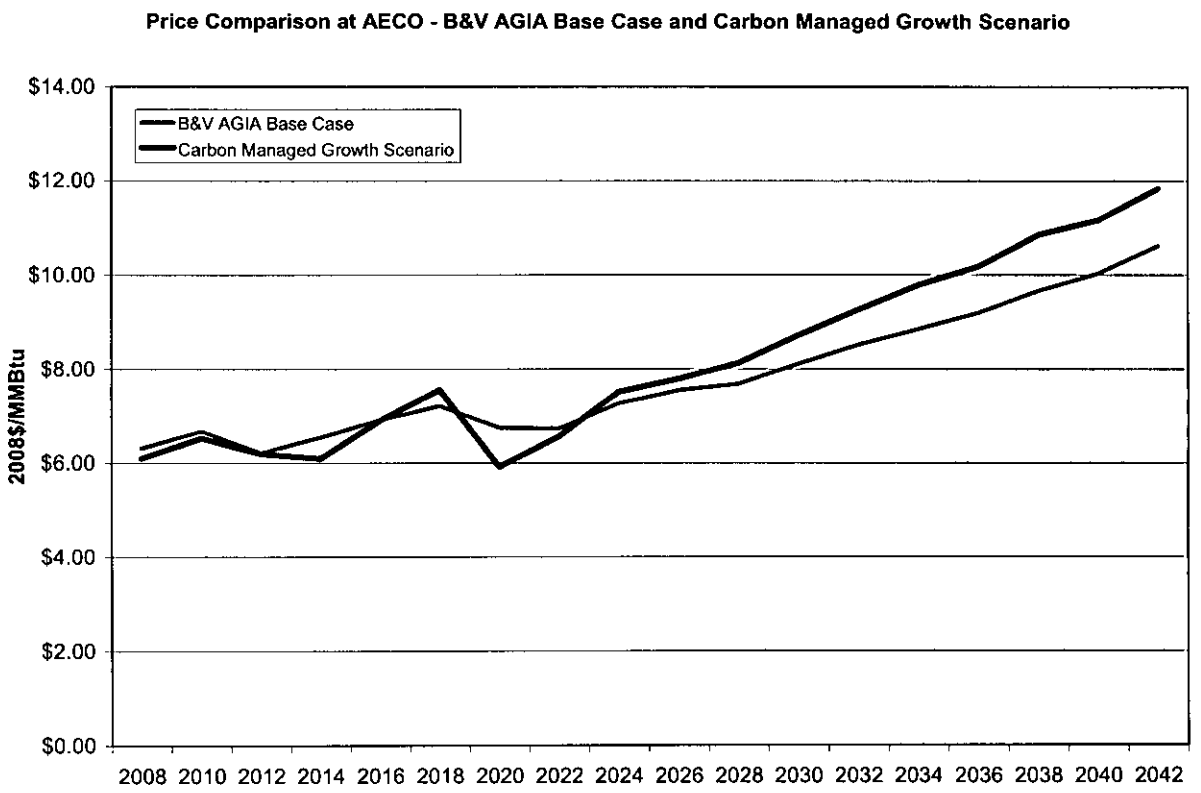


Source: Black & Veatch Analysis

Impact of Carbon Regulation on AECO Price Forecasts

AGIA
The Alaska Gasline Inducement Act

- The Carbon Managed Growth case has sufficient supplies from North America to meet the high demand from both unconventional production and slightly higher additional LNG volumes
- North American gas price is projected to have a higher price path than in the AGIA base case



Source: Black & Veatch Analysis

Liquid Natural Gas (LNG) Imports

AGIA
The Alaska Gasline Inducement Act

LNG import volumes have experienced little net change since the legislature approved the AGIA license

Total US LNG Import Volumes

July 2008:	31,019 mmcf
December 2008:	30,708 mmcf

UNITED STATES DEPARTMENT OF TRANSPORTATION
Pipeline and Hazardous Materials Safety Administration

Hearing on

The Overview and Update of Federal and State Agencies with Pipeline Oversight Responsibilities

Before the
Senate Resources Committee of the
Alaska State Legislature

Written Statement of the
U.S. Department of Transportation

WRITTEN STATEMENT
OF
DENNIS HINNAH, DEPUTY DIRECTOR, WESTERN REGION,
PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION
U.S. DEPARTMENT OF TRANSPORTATION
BEFORE THE
SENATE RESOURCES COMMITTEE
ALASKA STATE LEGISLATURE

March 25, 2009

INTRODUCTION

Co-Chairs McGuire and Wielechowski and members of the Committee, thank you for the invitation to appear today. I am pleased to discuss the actions of the Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) in overseeing the safe operation of pipelines in the State of Alaska.

PHMSA is the Federal agency that is responsible for the development and enforcement of pipeline safety regulations for natural gas and hazardous liquid transmission and distribution pipelines, as well as liquefied natural gas (LNG) facilities throughout the country. PHMSA does not currently regulate production facilities on the North Slope because we do not have authority. However, in Alaska, PHMSA does regulate and inspect interstate and intrastate gas transmission pipelines, hazardous liquid pipelines, gas distribution systems and LNG facilities. The hazardous liquids subject to our regulations include crude oil and refined petroleum products.

Ensuring the safety of 2.3 million miles of pipeline in the country is an enormous task. Our State partners in the lower 48 oversee 90 percent of the pipeline mileage that require operator compliance with pipeline safety regulations, because the vast majority of pipelines are gas distribution pipelines. Alaska is an exception; it does not participate in our Federal/State pipeline safety program. The only other State that does not participate is Hawaii. PHMSA takes pipeline safety in Alaska very seriously. Since 2006, PHMSA increased its staff in Alaska in order to enhance our current capabilities and prepare for oversight of numerous proposed natural gas pipelines. In 2008, I accepted the position of Deputy Director for the office in Anchorage. The Alaska Office currently has four full-time engineer/inspectors, an administrative assistant and me.

PHMSA REGULATED PIPELINES IN ALASKA

PHMSA in Alaska is part of the Western Region, headquartered in Denver, Colorado. We work closely with pipeline owners and operators, the Joint Pipeline Office, the Petroleum Systems Integrity Office, the Office of the Federal Coordinator and other Federal and State regulators.

PHMSA regulates over 40 hazardous liquid and gas pipelines and LNG facilities in Alaska (see attached list and map). We use a risk-based approach to determine which pipelines to inspect each year. Some pipelines such as TAPS are inspected annually, and all pipelines are inspected at least every three years. We also investigate accidents and safety issues. For example, we have been the lead Federal agency investigating the 2006 BP Exploration (Alaska), Inc. (BPXA) spills from two North Slope Oil Transit Lines (OTLs).

After these incidents, we issued a Corrective Action Order (CAO) that eventually contributed to BPXA's decision to replace its Eastern and Western Operating Area OTLs. We conduct inspections that cover pipeline design, construction standards, integrity management, operator qualifications and drug and alcohol requirements. The inspections include document reviews, field inspections and interviews. In addition, we have a role in ensuring operator preparedness and response to any oil spills that may occur.

INCIDENT NOTIFICATIONS AND INVESTIGATIONS

Normally, PHMSA is notified of an incident by the pipeline owner or operator or by the National Response Center. PHMSA regulations require owners and operators to report certain types of incidents. For pipelines we do not regulate, sometimes our first notification is through the news media. For pipelines that we do regulate, however, we contact the pipeline operator and then inform other Federal and State agencies advising them of our findings. For pipelines such as the Trans-Alaska Pipeline System (TAPS), much of the coordination is handled through the Joint Pipeline Office (JPO). The JPO is a consortium of 11 Federal and State agencies to provide oversight of the TAPS and shares information on other pipelines in Alaska. For pipelines that we do not regulate, we usually stay informed by the State or Federal agency conducting the investigation. Based on what we learn, we may investigate independently or with others. In certain cases, we follow up our investigation with an enforcement action.

Examples of the more recent investigations that PHMSA has conducted include: the TAPS PS-9 fire in 2007; the January 15, 2009 incident where

natural gas was pushed into TAPS PS-1; the sinking of M/V Monarch near the Granite Point Platform on the same date; and the residential natural gas explosion on March 12, 2009 in Anchorage.

ENFORCEMENT

In the past three years, PHMSA has initiated several enforcement cases against pipeline operators in Alaska. These cases include CAOs issued to BPXA, Notices of Probable Violation issued to Alyeska and Enstar Natural Gas and additional cases against other operators. These cases are currently in various stages of our normal enforcement process.

In the course of conducting our duty of oversight for the BPXA CAO issued in the aftermath of the March 2006 North Slope oil spill, we have closely monitored the corrective actions the company is required to take, including the replacement of the failed OTLs.

RISK ASSESSMENTS ON THE NORTH SLOPE

PHMSA's Integrity Management (IM) regulations require operators to assess the risks their pipelines pose to High Consequence Areas and to develop programs to mitigate those risks. Pipelines such as TAPS, Alpine and Endicott have already completed this process, and we periodically review the continual updates they are required to make to their IM programs. Under our 2008 Low Stress rule, additional pipeline operators must develop IM programs. We are aware of the risk assessment programs the State of Alaska is performing, and we are committed to sharing certain integrity and risk

information with the State on the pipelines which we have pipeline safety jurisdiction. For example, we are in the process of providing certain PHMSA data and information to the Alaska Department of Environmental Conservation (ADEC) in support of their Alaska Risk Assessment (ARA) project efforts.

RISK-BASED APPROACH

The responsibility for safety rests first with the owners and operators of pipeline facilities. Our mission is to achieve and maintain the safe, environmentally sound and reliable operation of the nation's pipeline transportation system. This requires understanding the condition of the pipelines and assuring that operators take action to address any unsafe condition. We manage oversight based on risk and take a "systems approach" to setting priorities. We make full use of our statutory authority, including new tools provided by the Pipeline Safety Improvement Act of 2002, and the Pipeline Inspection, Protection, Enforcement and Safety (PIPES) Act of 2006. Our progress with the IM programs positioned us to take effective action when BPXA's low stress OTLs failed in Prudhoe Bay in March and August 2006.

Over the past eight years, PHMSA has designed and executed a risk-based systems approach to oversight of the national pipeline infrastructure. We undertook rulemaking projects on a risk prioritized basis, acting first on those parts of the infrastructure that posed the greatest risk to people and then the environment. To begin the program, we defined High Consequence Areas and mapped the locations, including areas unusually sensitive to

environmental damage, in the National Pipeline Mapping System. We have completed, and are implementing, regulations that provide integrity management-based protection for people and the environment that could be affected by a failure from high and low pressure hazardous liquid pipelines, as well as high pressure gas transmission pipelines.

Given the impact of the 2006 BPXA incidents, we were concerned about other immediate risks that could lead to a shutdown of the other feeder lines to TAPS. Acting upon this concern, we deployed a team to update our knowledge of the risks to the other pipelines, including those at the Kuparuk, Alpine, Badami, North Star, Oliktok and Milne Point fields.

DOT'S PIPELINE REGULATIONS

Recently, PHMSA amended our Pipeline Safety Regulations to bring previously unregulated hazardous liquid gathering, and low stress pipelines in rural areas, into our regulatory oversight program. The Low Stress rule will add to our oversight not only of the pipelines in Prudhoe Bay but also those in the Cook Inlet and the Kenai Peninsula. By adding these lines, we are taking a risk-based approach to protect more lines that, in the event of a failure, could spill into an Unusually Sensitive Area (USA). Our assessment of which lines to regulate is based on how they can impact a USA in relation to the pressure of the line and the volume of product that could be spilled.

Through a phased-in approach, the pipeline safety regulations will provide additional and robust integrity protection to areas where oil pipelines in rural areas could affect drinking water resources and endangered species, as well as

other ecological resource concerns. These regulations will enhance corrosion protection by including requirements for continuous monitoring, integrity assessment and leak detection. They will require operators of these lines to follow, among other requirements, safety rules for design, construction, testing and maximum operating pressure. In addition, the regulations will require operators to protect their lines from corrosion and excavation damage, install and maintain line markers, establish operator qualification and damage prevention programs, provide public education and report accidents and safety-related conditions.

CONCLUSION

I assure the members of this Committee that the Administration, Transportation Secretary LaHood and the dedicated men and women of PHMSA share your strong commitment to improving safety, reliability and public confidence in our nation's pipeline infrastructure.

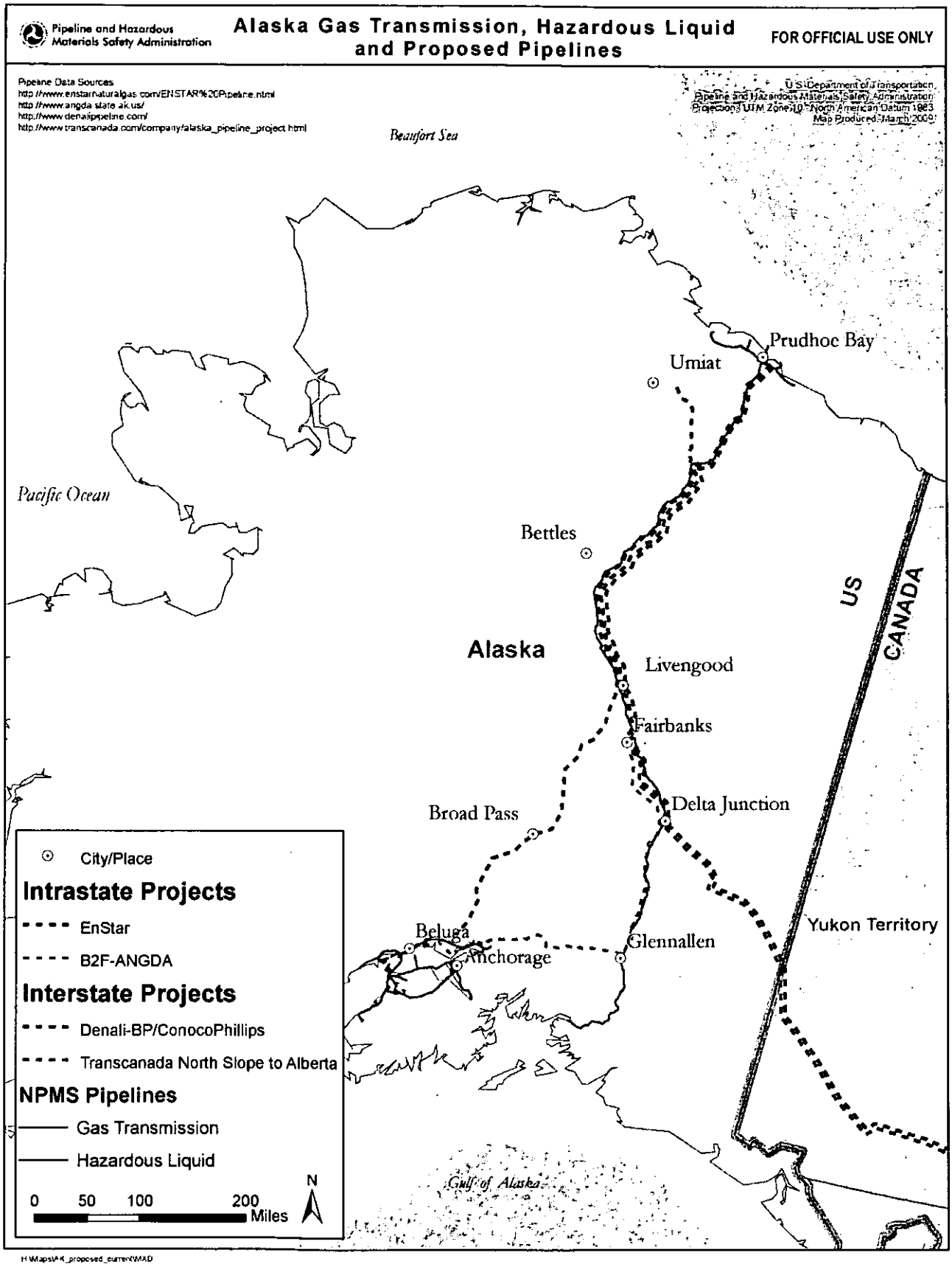
Like you, we understand the importance of our mission relative to the safety of our citizens and to both the energy security and continued economic growth of our great nation.

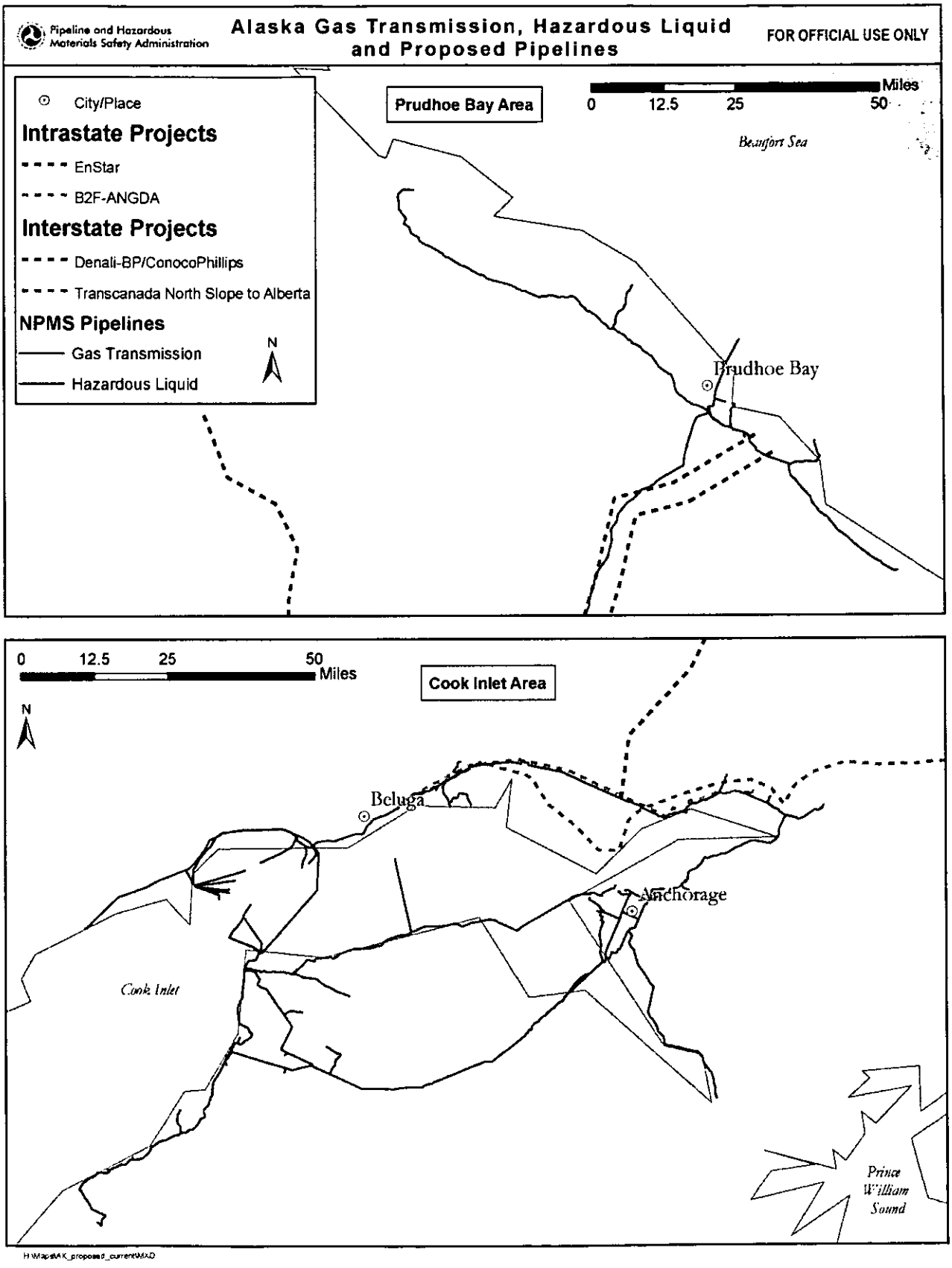
Thank you.

####

PHMSA REGULATED PIPELINES IN ALASKA

ALPINE CRUDE PIPELINE	KENAI TRANSMISSION PIPELINE
ALPINE DIESEL LINE	KENAI UTILITY SERVICE
ALYESKA FUEL GAS LINE	KENAI-KACHEMAK PIPELINE (KKPL)
ANCHORAGE DIST. SYSTEM	KUPARUK OIL PIPELINE
BADAMI NATURAL GAS TRANSMISSION LINE	MAT SU VALLEY DISTRIBUTION SYSTEM
BADAMI PIPELINE	MILNE POINT PIPELINE
BARROW GAS FIELD TRANSMISSION LINE	NARL
BARROW UTIL & ELECTRIC COOP	NIKISKI AREA GAS LINE
BELUGA TRANSMISSION LINE	NORTHSTAR GAS PIPELINE
BARROW SOUTH GAS HANDLING FACILITY	NORTHSTAR LIQUID PIPELINE
CIGGS SYSTEM	NUIQSUT GAS DISTRIBUTION SYSTEM
COOK INLET PIPE LINE CO	NUIQSUT TRANSMISSION PIPELINE
DEADHORSE DISTRIBUTION	OFFSHORE COOK INLET
DILLON PLATFORM	OFFSHORE/ONSHORE COOK INLET
EAST FORELAND PLATFORMS (GAS)	OLIKTOK NGL LINE
EAST FORELAND PLATFORMS (OIL)	OIL TRANSIT LINES –NORTH SLOPE
ENDICOTT PIPELINE CO	POINT MCKENZIE LNG PRODUCTION FACILITY
FAIRBANKS DISTRIBUTION SYSTEM	TRANS-ALASKA PIPELINE
FAIRBANKS LNG TANKS AND VAPORIZER	PT MCKENZIE GAS TRANSMISSION LINE
FORT RICHARDSON	SIGNATURE FLIGHT SUPPORT PIPELINE
GRANITE POINT PLATFORMS (GAS)	SPARK/SPUR GAS
GRANITE POINT PLATFORMS (OIL)	TERMINAL (VALDEZ)
GRANITE POINT TO BELUGA	TESORO ALASKA PETROLEUM CO
GREATER PRUDHOE BAY (NGL)	TRADING BAY PLATFORMS (GAS)
GVEA PIPELINES	TRADING BAY PLATFORMS (OIL)
HAPPY VALLEY EXTENSION	WEST SIDE COOK INLET
KENAI GAS FIELD TO NIKISKI	WHITTIER/GIRDWOOD DISTRIBUTION PIPELINE
KENAI LNG PLANT	

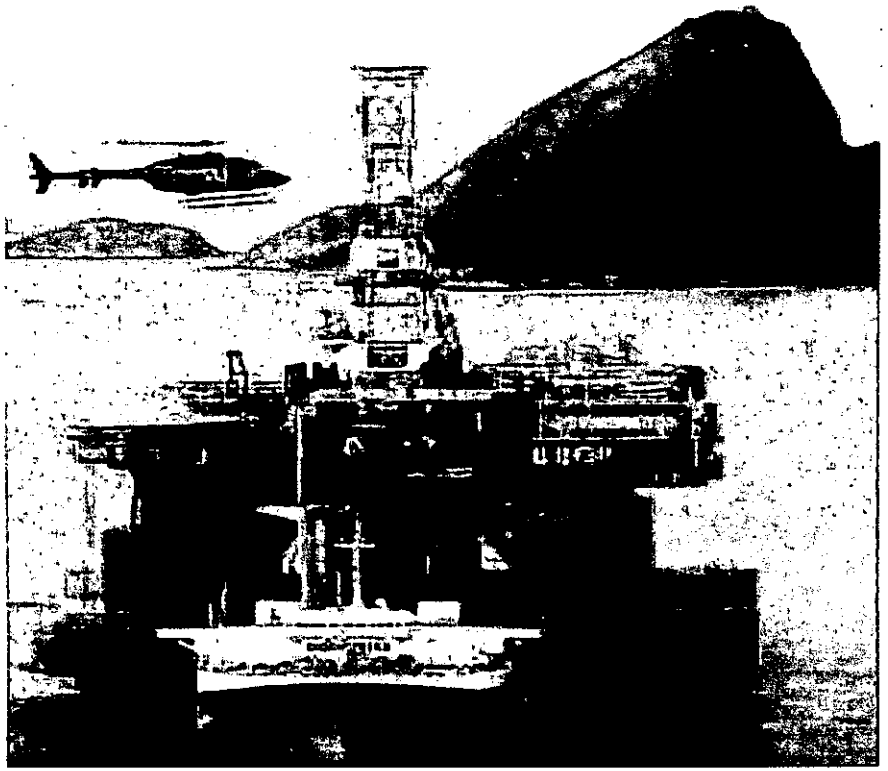

Pipeline and Hazardous Materials Safety Administration
Alaska Gas Transmission, Hazardous Liquid and Proposed Pipelines
FOR OFFICIAL USE ONLY
Pipeline Data Sources
http://www.enstarnaturalgas.com/ENSTAR%20Pipeline.html
http://www.angda.state.ak.us/
http://www.denalipipeline.com/
http://www.transcanada.com/company/alaska_pipeline_project.html
U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration
Projection: UTM Zone 10 North American Datum 1983
Map Produced: March 2009
Beaufort Sea
Prudhoe Bay
Umiat
Pacific Ocean
Bettles
US
CANADA
Alaska
Livengood
Fairbanks
Delta Junction
Broad Pass
Yukon Territory
Beluga
Anchorage
Glennallen
Gulf of Alaska
City/Place
Intrastate Projects
EnStar
B2F-ANGDA
Interstate Projects
Denali-BP/ConocoPhillips
Transcanada North Slope to Alberta
NPMS Pipelines
Gas Transmission
Hazardous Liquid
0 50 100 200 Miles
N
H:\Maps\AK_proposed_current\MXD


Pipeline and Hazardous Materials Safety Administration
Alaska Gas Transmission, Hazardous Liquid and Proposed Pipelines
FOR OFFICIAL USE ONLY
City/Place
Intrastate Projects
EnStar
B2F-ANGDA
Interstate Projects
Denali-BP/ConocoPhillips
Transcanada North Slope to Alberta
NPMS Pipelines
Gas Transmission
Hazardous Liquid
N
Prudhoe Bay Area
0 12.5 25 50 Miles
Beaufort Sea
Prudhoe Bay
0 12.5 25 50 Miles
N
Cook Inlet Area
Beluga
Anchorage
Cook Inlet
Prince William Sound

Petroleum Systems Integrity Office

May, 2000 Petrobras 36

World's largest floating oil platform off the coast of Brazil



(www.rootcauselive.com/files)

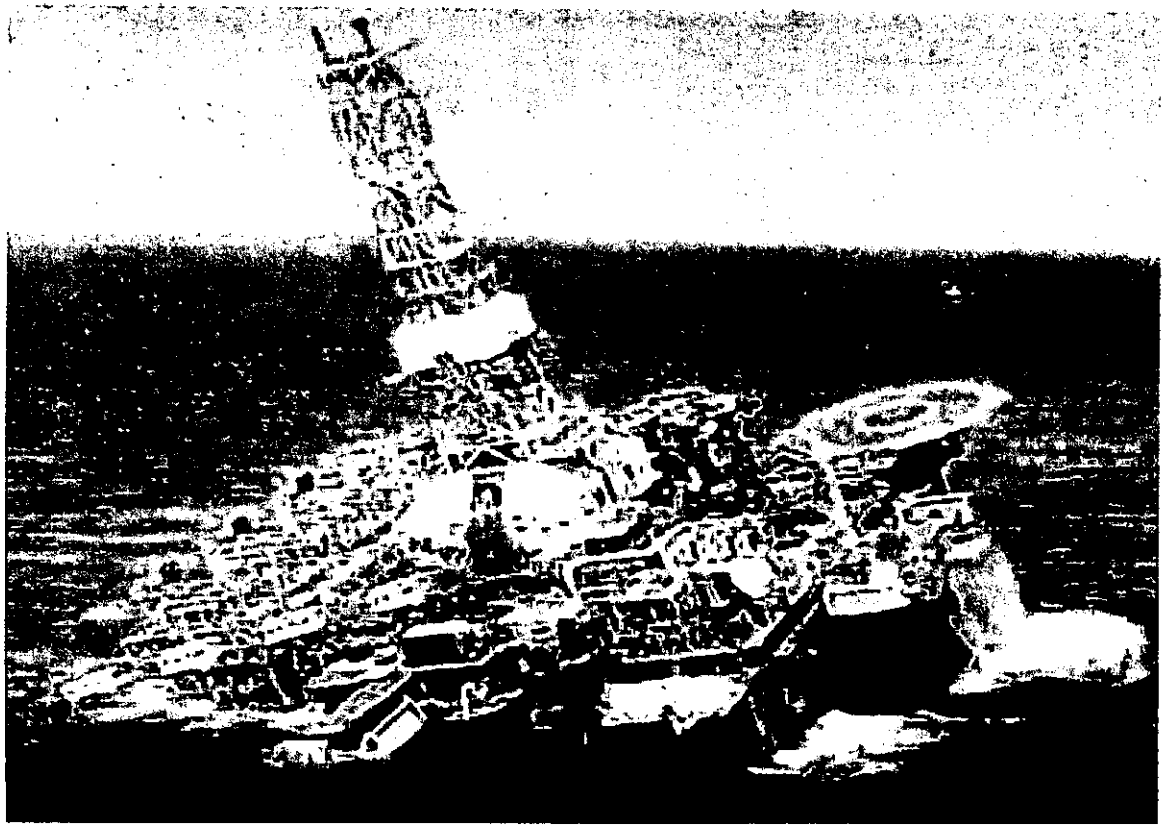
Speech on the new platform design
by a Petrobras executive

"Petrobras has established new global benchmarks for the generation of exceptional shareholder wealth through an aggressive and innovative programme of cost cutting on its P36 production facility. Conventional constraints have been successfully challenged and replaced with new paradigms appropriate to the globalised corporate market place.

Through an integrated network of facilitated workshops, the project successfully rejected the established constricting and negative influences of prescriptive engineering, onerous quality requirements, and outdated concepts of inspection and client control.

Elimination of these unnecessary straitjackets has empowered the project's suppliers and contractors to propose highly economical solutions, with the win-win bonus of enhanced profitability margins for themselves. The P36 platform shows the shape of things to come in the unregulated global market economy of the 21st Century."

March 15, 2001 Petrobras 36



(www.rootcauselive.com/files)

On March 15, 2001, the Petrobras 36 platform in the Roncador Field, Campos Basin, experienced an explosion during drainage operations. The operations were immediately suspended, and emergency trained crew attempted to put out the fire. Shortly later, a second explosion occurred, killing 11 of the 175 people onboard.

In May 2007, a federal judge ruled that Petrobras had to pay a fine of BRL100 million ($50.8 million) for environmental damages caused when the P-36 sank.

Inadequate safety inspections and virtually no quality assurance were blamed for the incident.

PSIO

- Established in April 2007 by Administrative Order 234
- Primary tasks:
  - Coordinate state, federal and local agencies
  - Incident investigation
  - Gap/Overlap Analysis
  - Quality Management

Designated Liaison Agencies

- Department of Environmental Conservation
- Department of Fish and Game
- Department of Public Safety
- Department of Revenue
- Department of Transportation and Public Facilities
- Department of Labor and Workforce Development
- Department of Law
- Department of Natural Resources
- Alaska Oil and Gas Conservation Commission
- Governor's Washington, D.C. Office

Coordinated Efforts Among Agencies

- Event notification and coordination of investigations
- Circulation of employee/public concerns
- Regular liaison interaction
- Regular contact with local, state and federal entities
- Combat the “silo effect”

Recent Coordinated Incident Investigations/Activities

- September 2008 Y-Pad artificial lift gasline rupture
- January 2009 Pump Station 1 pigging incident

Gap Analysis

The Goal of the Gap Analysis is to provide a **comprehensive and cost-effective approach to state oversight** of oil and natural gas facilities, equipment, infrastructure, and activities on state oil and natural gas units and leases.

Process

In coordination with Liaison Officers:

- Identify statutory and regulatory authorities;
- Identify how these authorities are implemented;
- Identify any gaps and overlaps;
- Assess risks associated with any gaps and overlaps;
- Coordinate the review of gaps, overlaps and risks;
- Provide recommendations to DNR Commissioner and Resources Subcabinet

Schedule

- Arcadis hired to do detailed analysis of statutory and regulatory gaps and overlaps
- Data compilation in progress – will begin meeting with PSIO liaisons soon
- Results expected August 2009

PSIO's Gap Analysis & DEC's Alaska Risk Assessment

- The Risk Assessment and Gap Analysis documents will serve as tools in determining how best to coordinate agency efforts to provide a comprehensive and cost-effective approach to oil and gas oversight activities
- Where high risks exist in areas of little or no oversight, those gaps will likely need to be filled.
- Where low risks exist in areas of duplicative oversight, those overlaps will likely need to be removed.

Quality Program

Designated agencies, to the extent authorized through existing legal authorities, shall require the industry businesses to provide a comprehensive description of current practices that includes the quality control, quality assurance, monitoring, inspection, and other practices the business uses to ensure the integrity and reliability of oil and natural gas facilities, equipment, infrastructure, and activities.

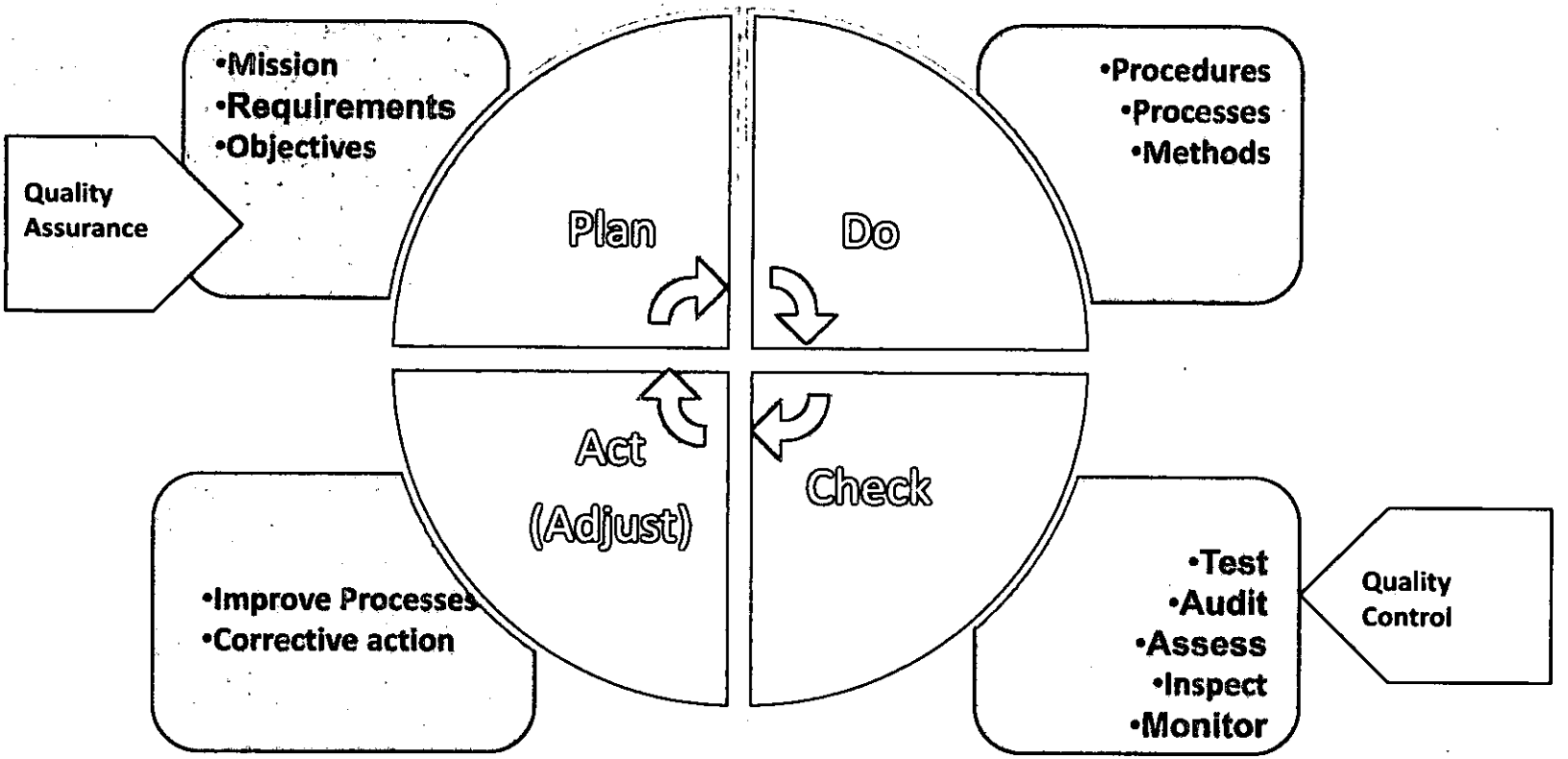
What is Quality Assurance?

- Quality assurance is any systematic process of determining if a product or service meets the mutually agreed upon characteristics and expectations for performance
- Establishes rules and methods (the process) to achieve expected results and conformance to requirements
- The "Plan" component of a quality management system
- Often confused with quality control

What is Quality Control?

- The process steps, procedures and activities employed to measure or test physical characteristics and performance requirements against predetermined criteria
- Is concerned with the product or service
- The "Check" element of a quality management system
- Should not, but is often confused with quality assurance

PDCA Cycle


•Mission
•Requirements
•Objectives
Quality Assurance
Plan
Do
•Procedures
•Processes
•Methods
Act
(Adjust)
Check
•Improve Processes
•Corrective action
•Test
•Audit
•Assess
•Inspect
•Monitor
Quality Control

Quality Management Systems

Fundamentals:

- Quality control;
- Quality assurance;
- Monitoring;
- Inspection; and
- Other practices used to ensure the integrity and reliability of facilities, equipment and infrastructure

Agency Expectations of PSIO

- Help agency personnel become knowledgeable of the elements of quality management systems in order to maintain the integrity and reliability of:
  - Oil and natural gas facilities
  - Equipment
  - Infrastructure
- Understand the benefits of:
  - Plan, Do, Check (Study), Act
  - Performance measurement
  - Continuous Improvement

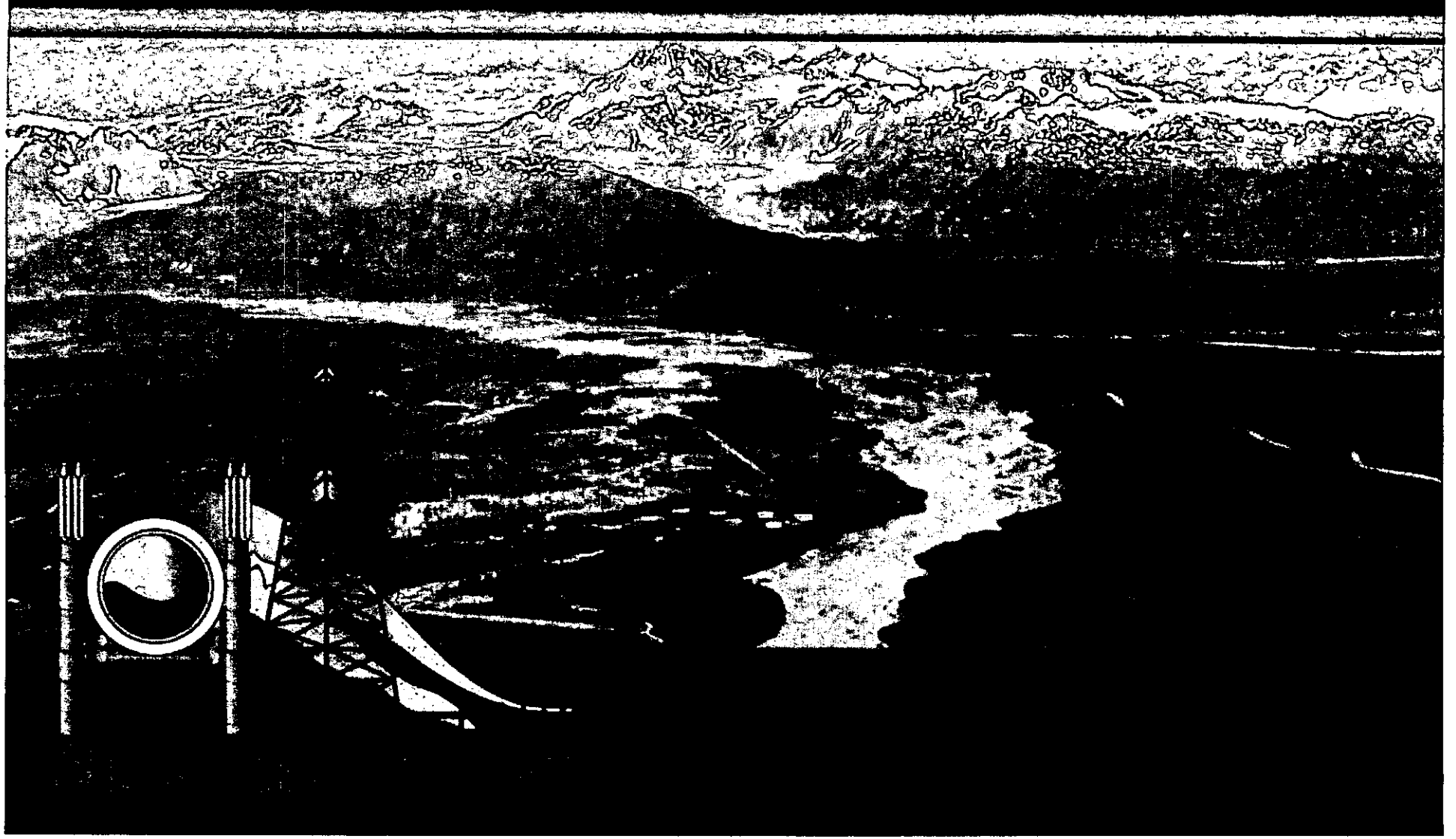
PSIO Expectations of Agencies

- Document evaluations of oil and gas facilities, equipment, infrastructure, work activities and where applicable in the context of quality management
- Effectively communicate results to industry
- Work with the PSIO Coordinator to coordinate review of evaluations, identify gaps, and seek remedial action.

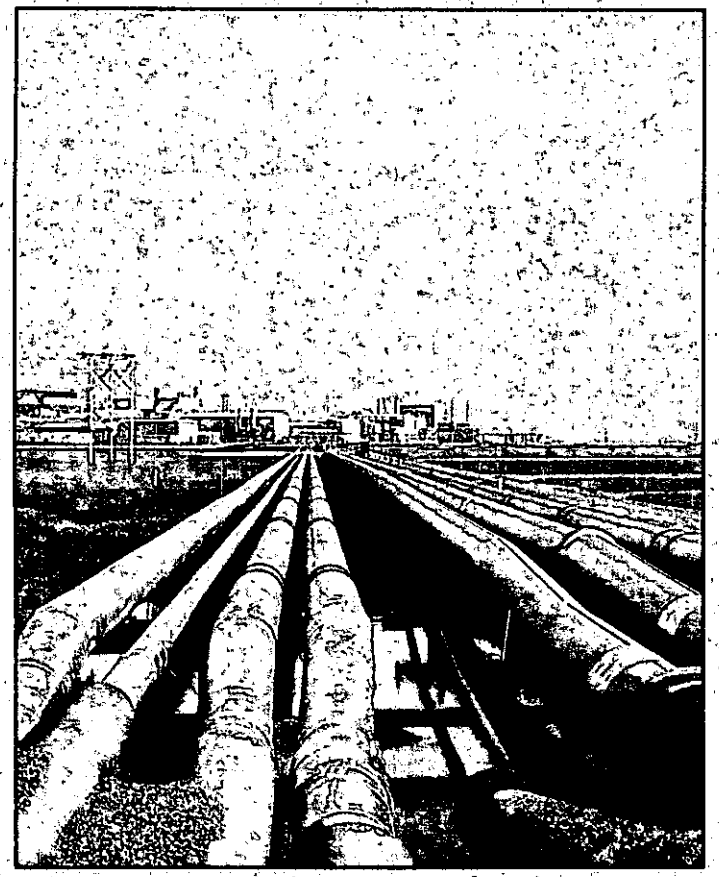
PSIO Expectations of Petroleum Industry

Provide evidence that management systems or processes for quality control, quality assurance, monitoring, inspection and other programs are implemented, effective, and periodically evaluated by upper management.

Alaska Risk Assessment of Oil & Gas Infrastructure



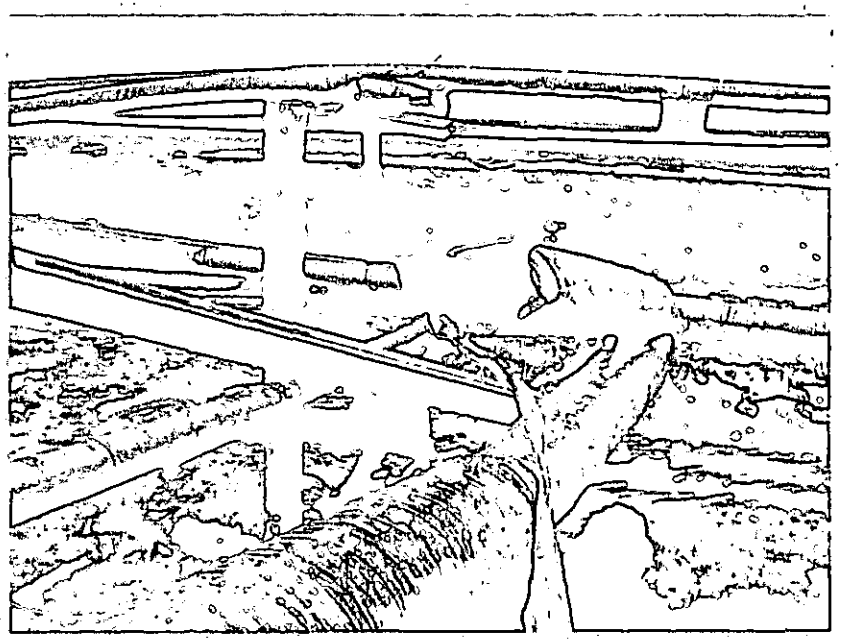
Project Objectives



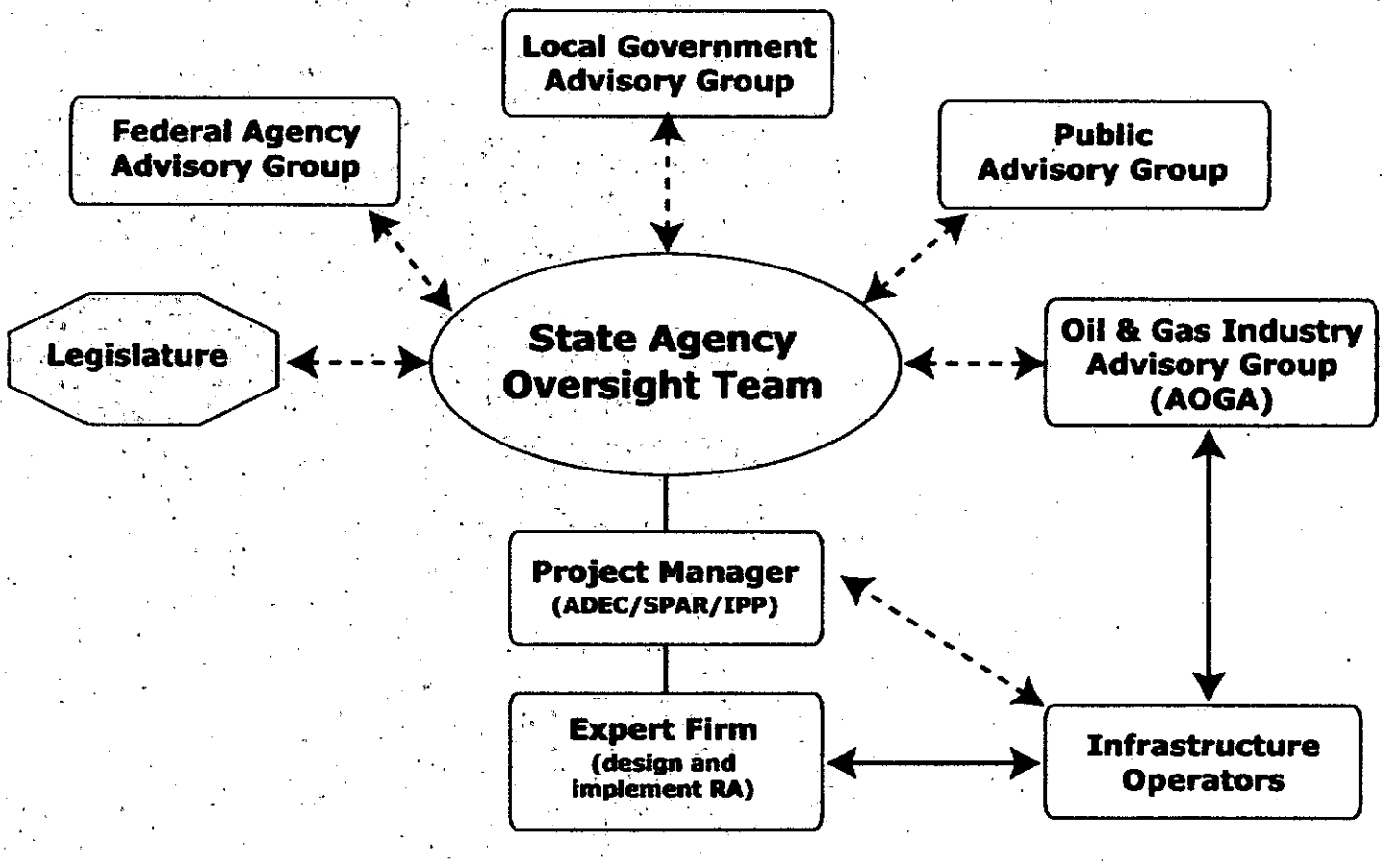
- Assess the current state of infrastructure & systems in place to operate it.
- Identify and rank areas of greatest risk.
- Present findings.

Project Background

- 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 engineered lifespan.
- In 2006, North Slope oil production was interrupted with a failure in one component of the system.



Project Organizational Structure

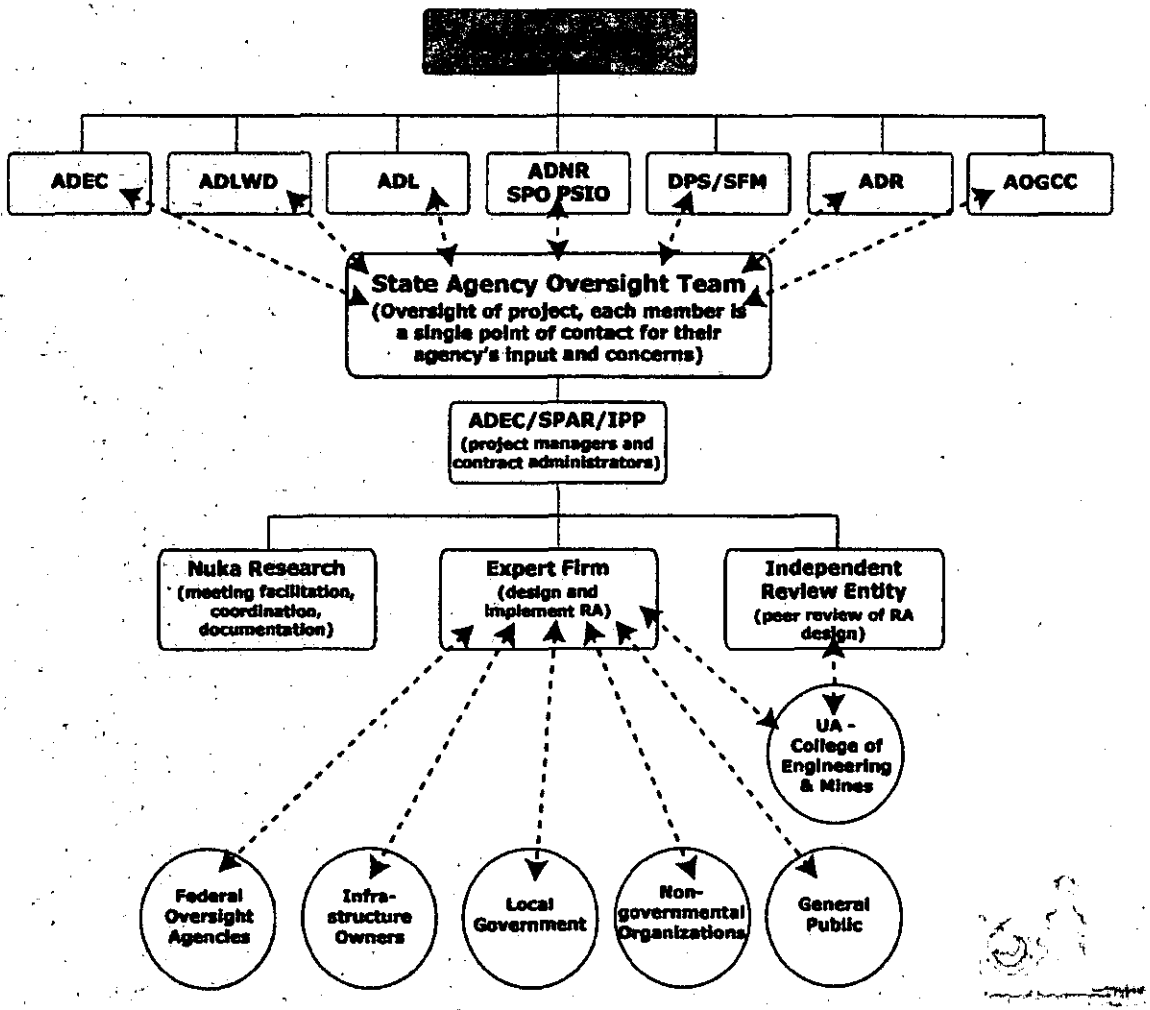


Project Organizational Structure

State Agency Oversight Team:

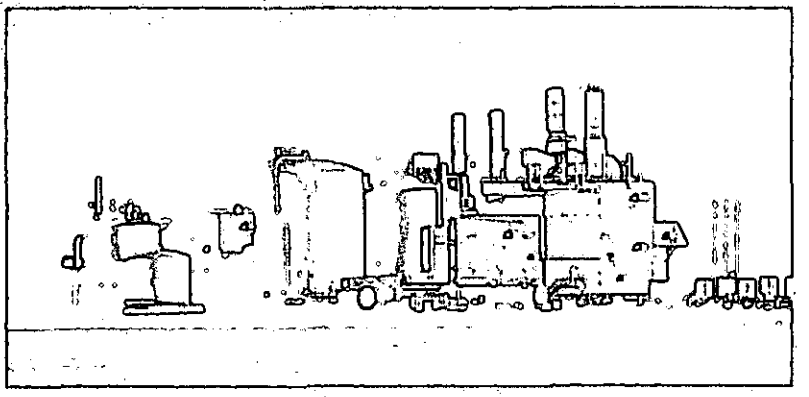
- Alaska Department of Environmental Conservation (ADEC)
- Alaska Department of Labor and Workforce Development (ADLWD)
- Alaska Department of Law (ADL)
- Alaska Department of Natural Resources (ADNR)
  - State Pipeline Office (SPO)
  - Petroleum Systems Integrity Office (PSIO)
- Alaska Department of Public Safety, State Fire Marshall (DPS/SFM)
- Alaska Department of Revenue (ADR)
- Alaska Oil & Gas Conservation Commission (AOGCC)

Alaska Oil & Gas Infrastructure Risk Assessment
Organizational Chart



Project Purpose

- Outcome of the Risk Assessment
  - "Picture" of the system as it stands today, highlighting the infrastructure components with the highest relative risk of a potential significant event.
  - Provide information to State agencies that is necessary for them to perform their mandated duties to oversee the steady flow of oil and gas without unplanned interruptions, while protecting the public's safety and the environment.



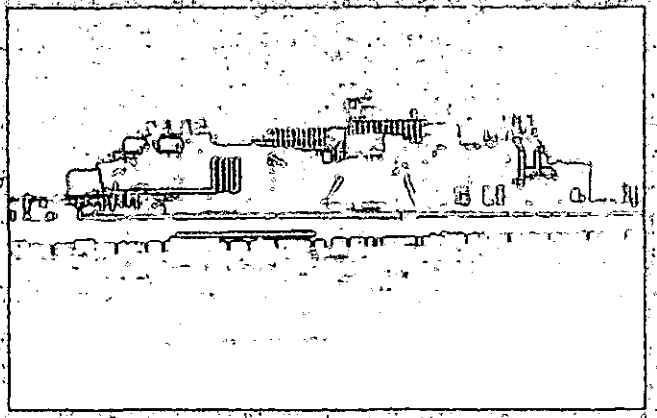
What is a Risk Assessment?

- Organized and systematic effort to identify and analyze hazardous scenarios;
- Starts with answering the question "What can go wrong?"
- Evaluate "how likely" it is that a significant event will occur;
- Evaluate "how damaging" the event would be to people, the environment, or production and state revenue if the event were to occur; and
- Combine the factors to determine an objective risk level.

Three Step Process

Step 1

- Define the significant events
- Design the risk assessment



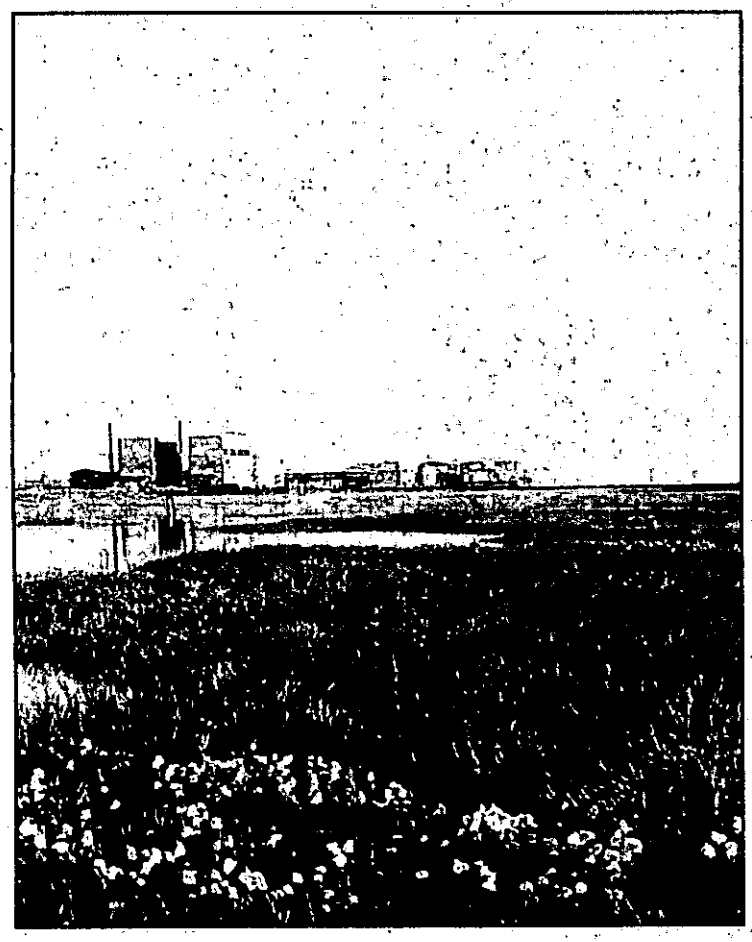
Step 2

- Conduct the risk assessment

Step 3

- Analyze the results
- Develop risk mitigation recommendations

Potential Recommendations



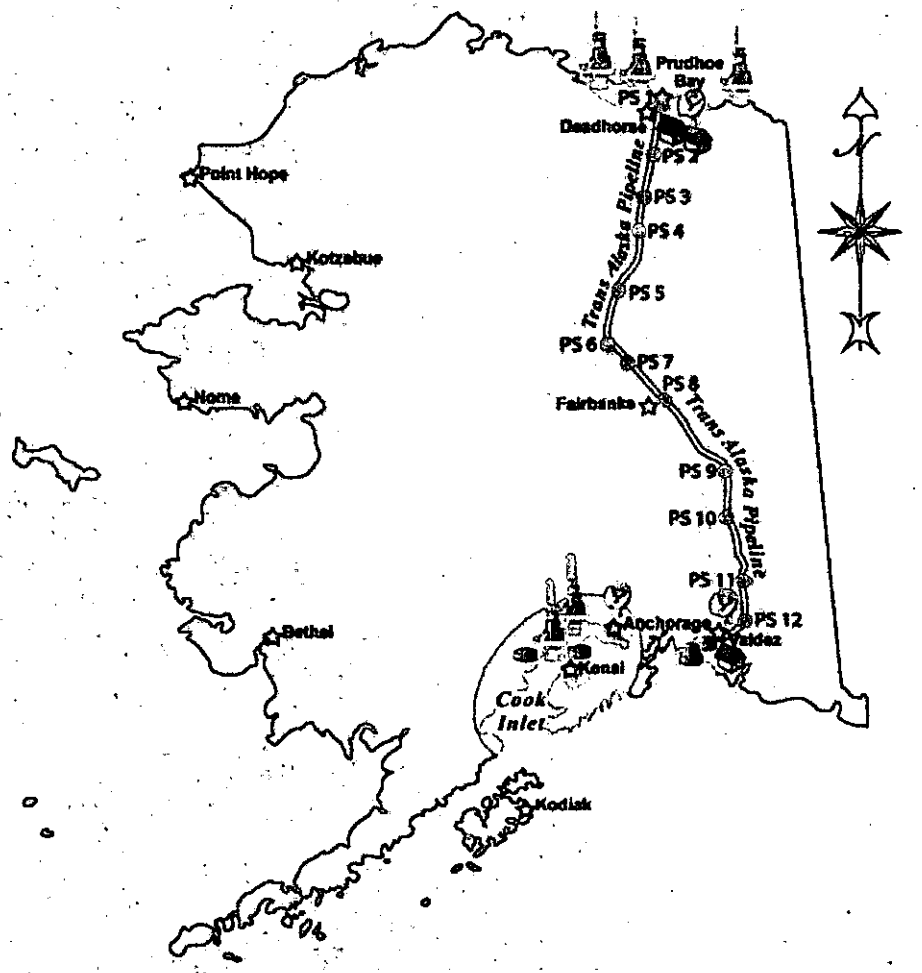
- Physical changes to infrastructure
- Changes to policies, procedures, standards, or regulations
- Changes to infrastructure audits, management, or oversight

General Project Scope

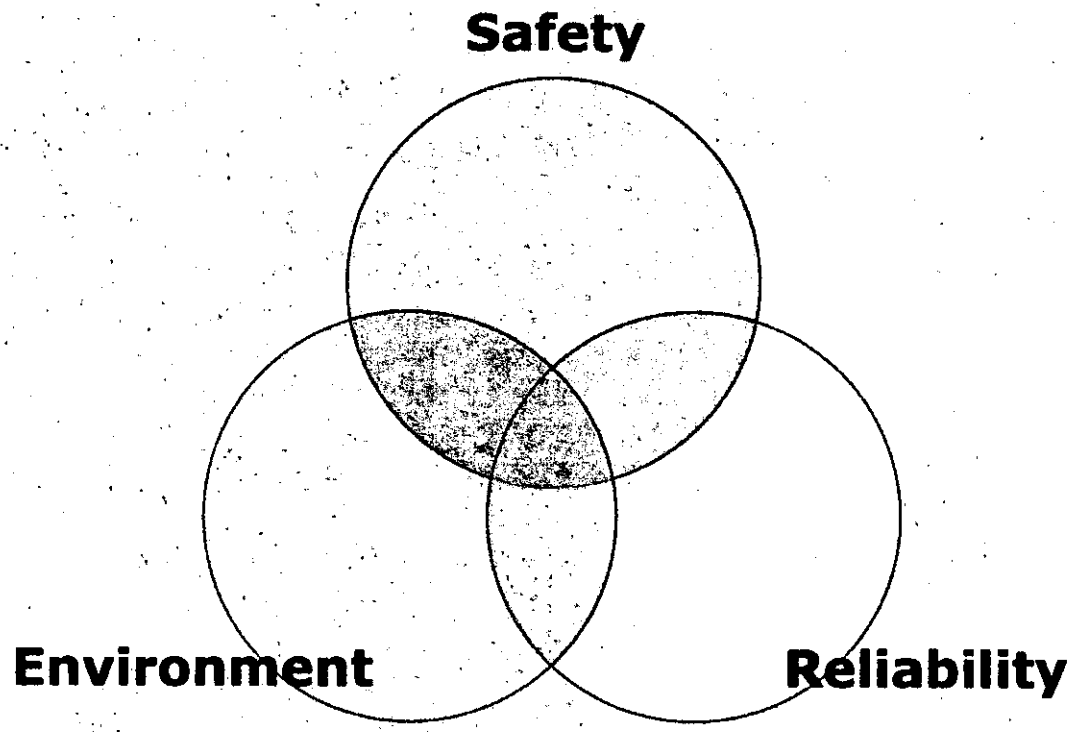
North Slope

TAPS

Cook Inlet



Areas of Interest

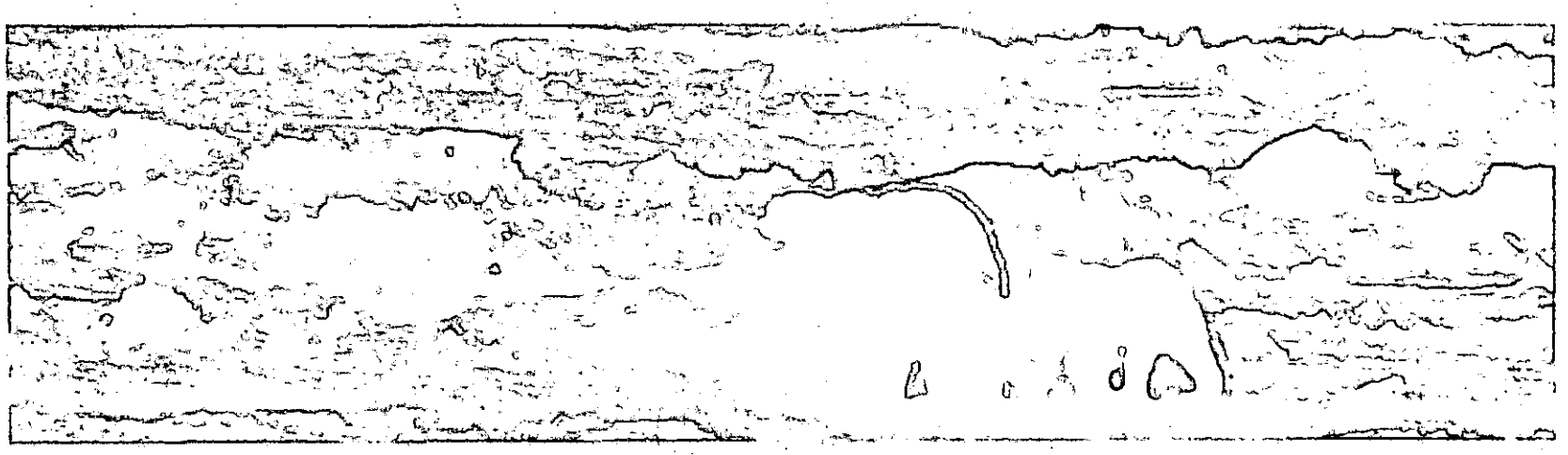


Schedule

Phase 1:
Risk Assessment
Methodology Design
June 2008 – Aug 2009

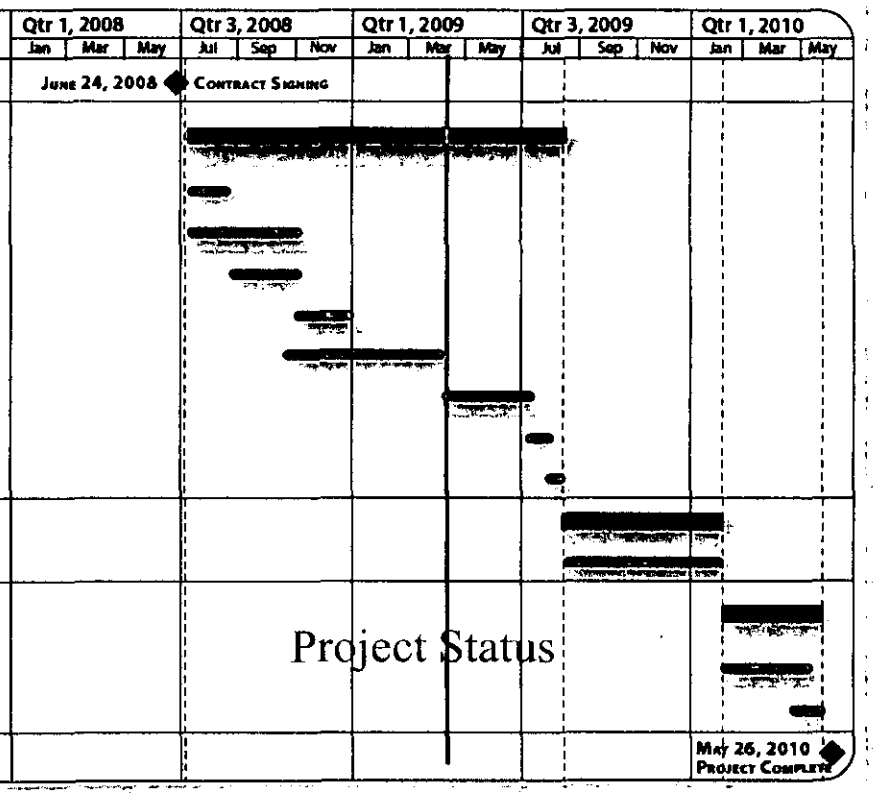
Phase 2:
Risk Assessment
Implementation
Aug 2009 – Feb 2010

Phase 3:
Analysis & Final Report
Feb 2010 – May 2010



Status

STATE OF ALASKA OIL & GAS INFRASTRUCTURE RISK ASSESSMENT	DURATION (in months) 22.14	START Tue 6/24/08	FINISH Wed 5/26/10
CONTRACT SIGNING	0 days	Tue 6/24/08	Tue 6/24/08
PHASE I: DESIGN RISK ASSESSMENT (RA) METHODOLOGY	13.5	Wed 6/25/08	Tue 8/25/09
Task 1a - Project Plan	1.14	Wed 6/25/08	Tue 7/29/08
Task 1b - Stakeholder Consulation	4.55	Wed 6/25/08	Tue 11/11/08
Task 1c - Existing Data/Information Review	3.41	Wed 7/30/08	Tue 11/11/08
Task 1d - Interim Report	1.25	Wed 11/12/08	Fri 12/19/08
Task 2 - Proposed RA Design	4.55	Wed 10/8/08	Fri 3/6/09
Task 3 - Evaluate RA Design	4.09	Mon 3/9/09	Fri 7/10/09
Task 4 - Proposed Final RA Design	1.14	Tue 7/6/09	Fri 8/7/09
Task 5 - Final RA Design	.55	Mon 8/10/09	Tue 8/25/09
PHASE 2: IMPLEMENT RA METHODOLOGY	5.23	Wed 8/26/09	Thu 2/11/10
Task 6 - Implement RA	5.23	Wed 8/26/09	Thu 2/11/10
PHASE 3: ANALYSIS, RECOMMENDATIONS, AND REPORT	3.23	Fri 2/12/10	Fri 5/21/10
Task 7 - Produce Draft Report	2.73	Fri 2/12/10	Thu 5/6/10
Task 8 - Produce Final Report & Presentation	0.73	Fri 4/30/10	Fri 5/21/10
PROJECT COMPLETE	0 days	Wed 5/26/10	Wed 5/26/10



Draft Methodology Report

STATE OF ALASKA
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Press Release
COMMISSIONER'S OFFICE

FOR IMMEDIATE RELEASE

New step in study of Alaska's oil and gas infrastructure

State invites public comment on risk assessment methodology; National Academy of Sciences also to review approach

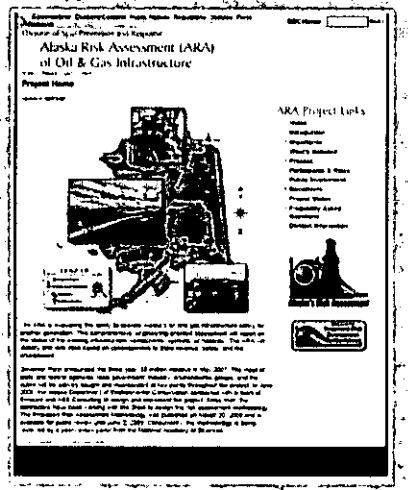
Contact: Ira Rosen, DEC project manager, (907) 465-5219

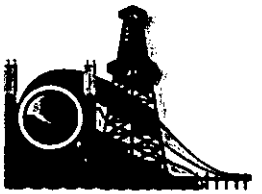
Juneau – March 21, 2009) Members of the public now can comment on the approach developed to assess the health of the state's oil and gas infrastructure. Public meetings are planned for Anchorage, Fairbanks, Kenai, Barrow and Valdez to present the approach and answer questions. The comment period will end June 2.

Development of the methodology – a mathematical model to quantify risks – is the focus of the first phase of the Alaska Risk Assessment, a three year, $5 million initiative to evaluate Alaska's oil and gas infrastructure. The study is an outcome of the spills, leaks and corrosion discovered on the North Slope in recent years. When complete, the assessment will report on the status of the existing infrastructure, components, systems and hazards. It will identify and rank risks based on consequences to state revenue, safety and the environment and will assist the state in making mitigation recommendations. The Alaska Department of Environmental Conservation (ADEC), working in cooperation with the Petroleum Systems Integrity Office (PSIO), is leading the risk assessment project.

"Finalizing the method we use to evaluate the condition of Alaska's oil and gas infrastructure is a key step in the overall assessment of this complex system," said Larry Dietrick, ADEC director of Spill Prevention and Response.

As part of the project, the State gathered input from government agencies, industry and the public in 2008. Those ideas helped shape the design of the risk assessment model. "Stakeholders now have a chance to confirm issues and concerns they identified have been included in our approach," said Ira Rosen, DEC project manager.





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

Proposed Risk Assessment Methodology

–Revision 1–

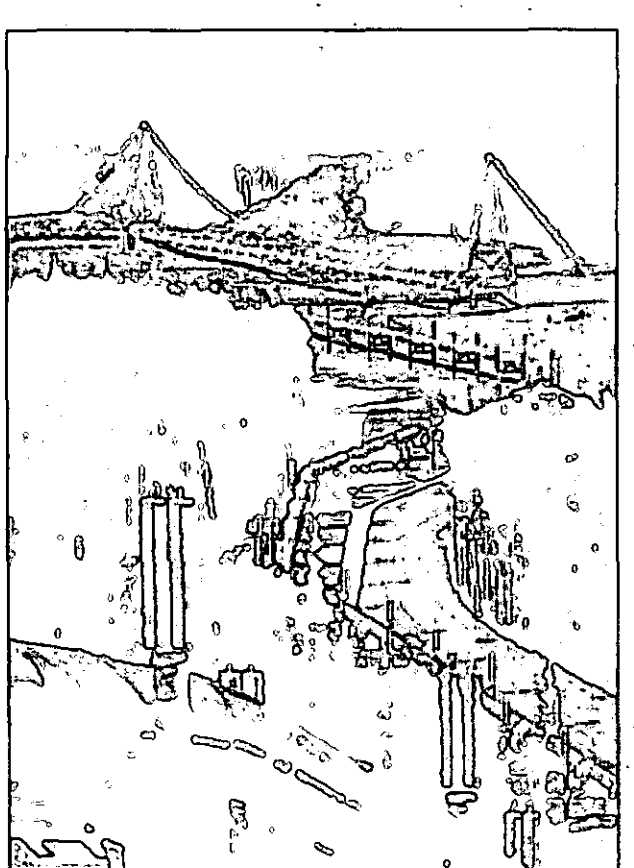
March 20, 2009

Prepared By

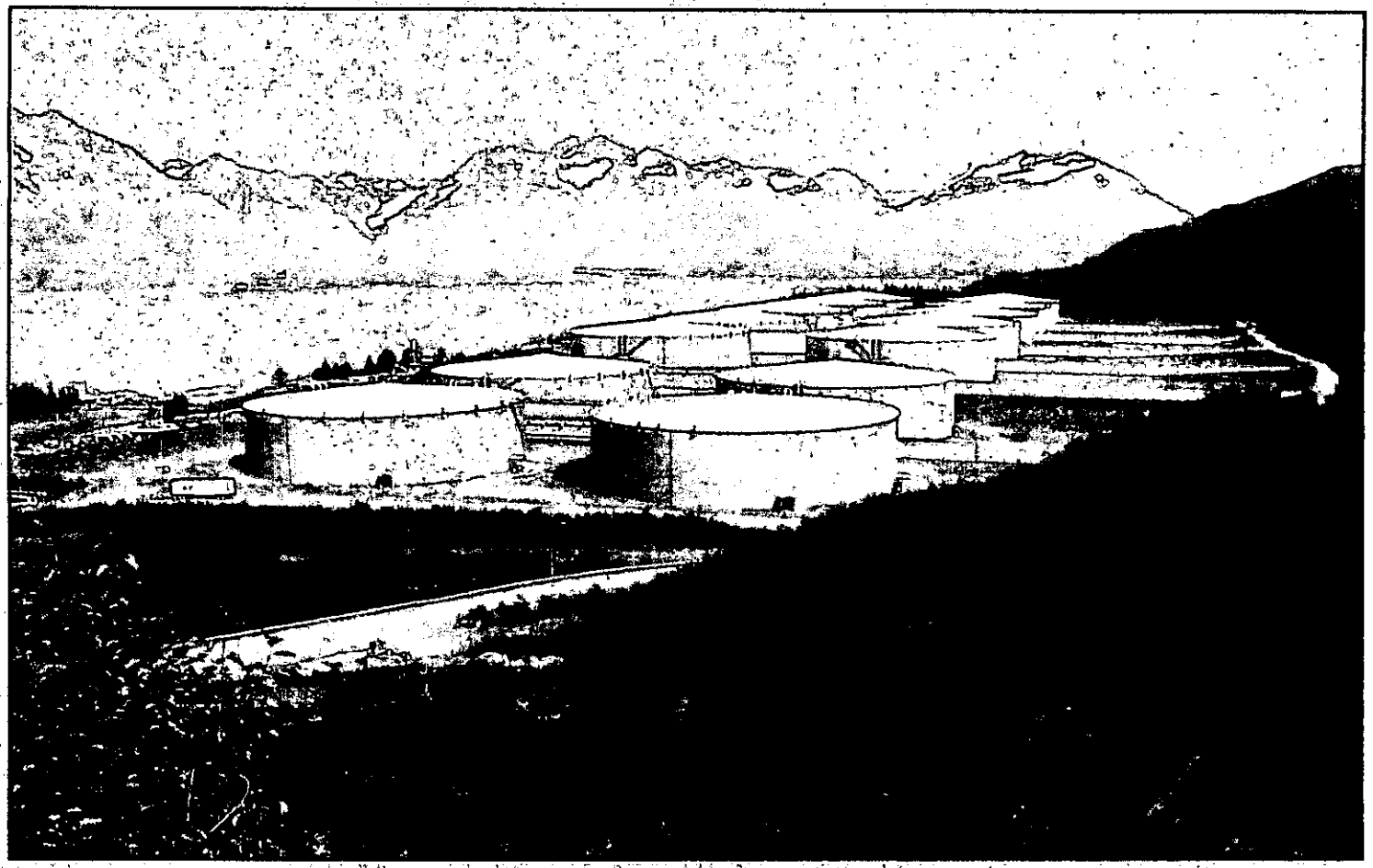
DOD/ONE/MERALD
ABS Consulting

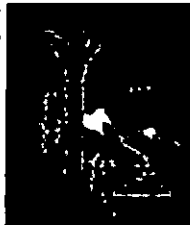
Press Release announces availability of the Draft Methodology Report

Project Results



- Provide risk profile of infrastructure.
- Provide input for risk management decisions by Industry and the State.





Methods

Risk Analysis

Screening

Reliability

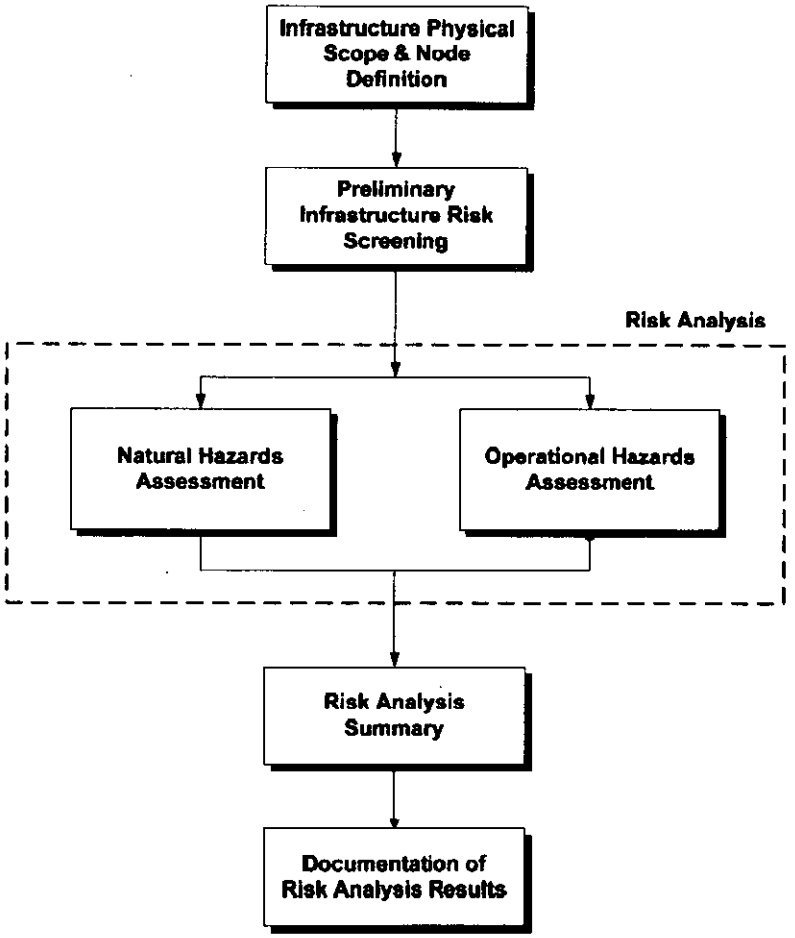
Environmental Spill Calculations

Environmental Consequences

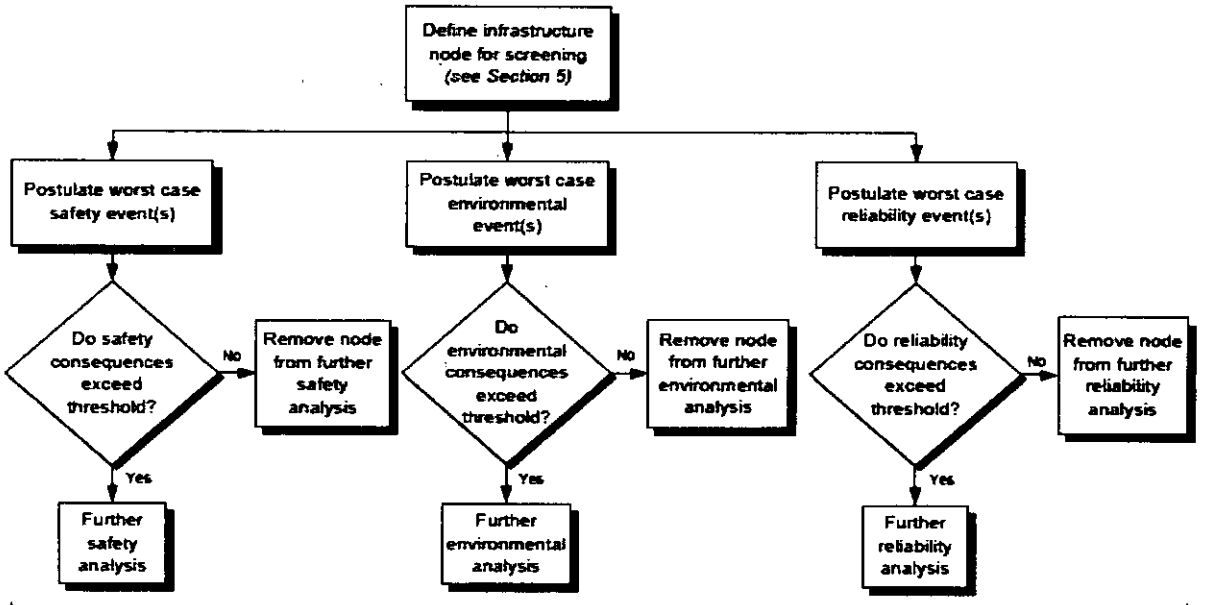
Operational Hazards

Safety

Risk Analysis



Screening



Document Screening Results

1. Nodes that are potential contributors to significant events in all three consequence categories (SER)
2. Nodes that are potential contributors to significant events in one or two consequence categories (SE, SR, ER, S, E, or R)
3. Nodes that are NOT potential contributors to significant events in any consequence categories

Reliability

Table 6-3 Reliability Consequence Levels for Preliminary Risk Screening

Category	Category Production Loss Boundaries	Explanation (see Note)
3	>42,000,000 bbls	Corresponds to about a two month full outage for TAPS
2	4,200,000 to 42,000,000 bbls	Corresponds to an outage range which includes an approximate 30 day outage for TAPS or a two week outage for a production source that is half of the TAPS throughput
1	<4,200,000 bbls	Corresponds to less than a week outage for TAPS or a 60 day outage for a production source that is 10% of the TAPS throughput.

Note: Outages assume 700,000 barrels per day TAPS throughput

Environmental Spill Calculations

Table 7-3 Release Quantity Categories

Release Quantity	Category Index Number	Explanation
Large release (>10,000 barrels)	6	Release quantities will be assessed based on normal process flow, the nature of the worst-case release considered, and the expected detection and isolation time.
Medium Release (1,001 to 10,000 barrels)	5	
Small Release (10 to 1,000 barrels)	4	

Note: The release quantity categories are assigned numbers from 4 to 6 in order to reflect the overall importance of the spill size compared to the other contributing categories (i.e., release quantity is more heavily weighted than the other factor categories, which have an index range from 1 to 3). This also allows the environmental impact to reflect an approach that adjusts spill size by expected recoverability (i.e., subtracting the recoverability category from the release quantity category) to represent the impact of the material which may actually remain in the environment long term.

Table 7-4 Release Recovery/Remediation Factor Category

Recovery/Remediation Capabilities	Category Index Number	Explanation
Little to no ability to recover/remediate this type of release	1	This category includes: • Direct spills to moving bodies of water other than contained entirely on ice (such as ocean/sea, river systems, and tributaries) • Spills to subsurface areas • Other situations assessed as difficult to recover (including requiring input from State and remediation experts
Limited to moderate capability to recover/remediate this type of release	2	This category includes: • Spills to land and tundra in other than frozen conditions • Spills to unprepared surfaces (i.e., prepared surfaces include gravel pads which have been land for remediation ease) • Other situations assessed as limited to moderate to recover (including requiring input from State and remediation experts)
Very effective capability to recover/remediate this type of release	3	This category includes: • Spills in winter conditions contained on ice or recovered from frozen land or tundra (i.e., limited migration) • Spills to gravel pads or other prepared surfaces where recovery can be accomplished by direct removal of contaminated materials

Table 7-5 Local Environment Sensitivity Categories

Type of Environment	Category Index Number	Type of Environment
Waterways	3	This category includes: • Waterways or direct pollution routes to waterways that support commercial fishing, aquaculture, or subsistence activities
Sensitive Lands (including surface and subsurface areas)	2	This category includes: • A land area that supports unique flora and fauna or wildlife breeding and migratory areas, which may support subsistence hunting activities (e.g. tundra or wetlands) • An area that encompasses a cultural or historical site • A Recreational Area (defined as an area that supports hunting, fishing, hiking or other outdoor recreational activities) • Areas that have been branded based on pristine conditions and which support tourism activities
Other Lands	1	This category includes: • A land area (surface or subsurface) not defined as "sensitive" in Category 2 above.

Environmental Consequences

Calculating Environmental Consequence Categories

An environmental consequence score will be calculated for each of the release events that are considered, based on the index values that are assigned in each of the above contributing factor categories. The overall environmental consequence score will be calculated using Equation 7-2:

$$\mathcal{N}_i = M_i * (Q_i - R_i) * S_i$$

Equation 7-2 Environmental Consequence Scoring Calculation

Where:

$\mathcal{N}_i$ = Event i Calculated Environmental Consequence Score (1 to 45)

M_i = Event i Material Composition Index (1 to 3)

Q_i = Event i Release Quantity Index (4 to 6)

R_i = Event i Recoverability/Remediation Index (1 to 3)

S_i = Event i Environmental Sensitivity Category Index Number (1 to 3)

Example calculation:

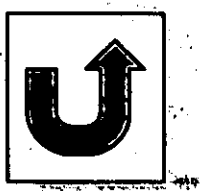
A significant release of crude oil (M = 3) that is 2,000 barrels in size (Q = 5) in an area of very high sensitivity (S = 3), but where recovery and remediation efforts can be highly effective (R= 3), would be scored as:

$\mathcal{N}_i = 3 \times (5-3) \times 3 = 18$

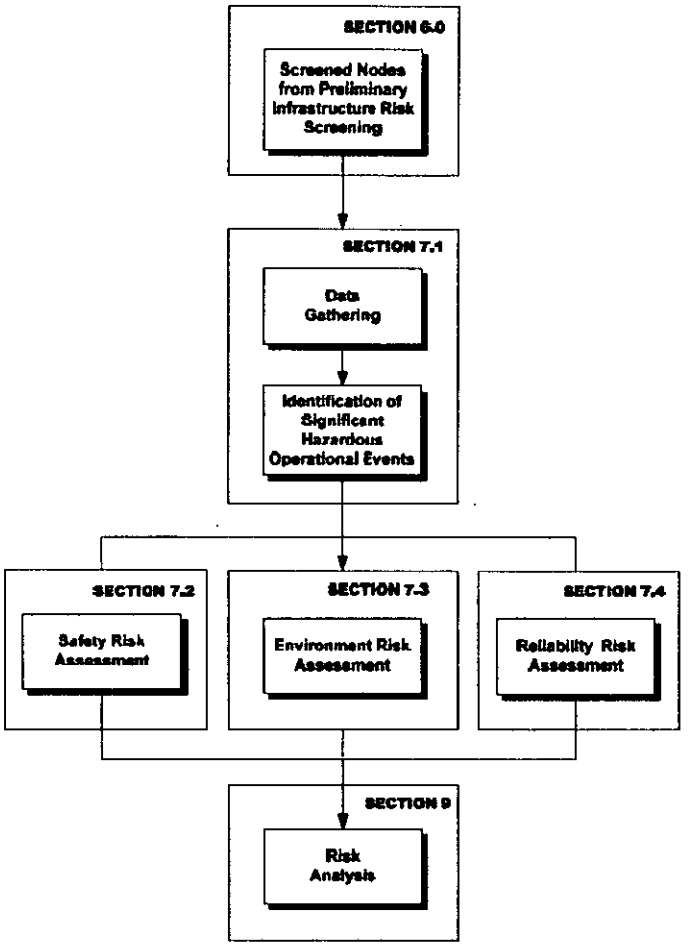
This approach represents a relative ranking of releases; it cannot be correlated to any physical meaning based on the absolute value of the numbers or index that is assigned to each factor. The value of the overall environmental consequence score can range from 1 to 45, depending on the assigned values of the contributing factor categories. Ranges of the environmental consequence score will then be used to categorize the relative environmental impacts of the potential release scenarios. See Appendix G for example scenarios that have been processed through this model.

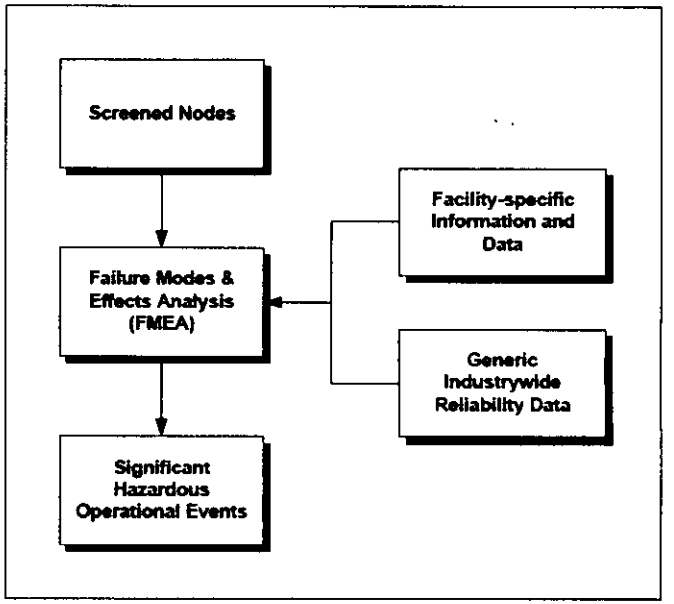
Table 7-6 presents preliminary values that will be used for assigning the environmental consequences to each of the potential release events. The definitions and descriptions for the qualitative range of significant environmental consequences for this project in Table 7-6 were derived from input from the stakeholder consultation process that was executed at the commencement of the project.

Category Number	Environmental Impacts	Consequences Score
3	**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 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.	Greater than or equal to 30
2	**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.	Greater than 15, but less than 30
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.	Less than or equal to 15



Operational Hazards





Safety

After the incident scenarios for each node have been identified, the safety risk calculation will entail three major tasks:

1. Consequence Analysis – Evaluation of physical effects of incidents on people
2. Likelihood Analysis – Estimation of incident frequencies
3. Risk Calculation – Calculation of risks, which are a combination of likelihood and consequences/impacts, and presentation of results

Risk is then calculated using the "risk triplet" model, shown in Equation 7-1:

$$\mathcal{R} \equiv \langle \mathcal{E}_i, C_i, \mathcal{L}_i \rangle_n$$

Equation 7-1 Risk Triplet Model

Where:

$\mathcal{R}$ = Calculated risk

$\mathcal{E}_i$ = Significant Incident Scenario i (from the FMEA Hazard Events Identification process)

C_i = Event i consequence (from the Consequence Analysis)

$\mathcal{L}_i$ = Event i Likelihood (from the Likelihood Analysis)

n = Number of significant incident scenarios