The AEDC 10-Year Resource Extraction Projects Projection

Overview

As part of its effort to contribute to the business communities planning efforts, and to promote a more robust dialog about Alaska's economic future, AEDC has developed the 2010 version of its 10-year resource extraction projects projection. The components of this 10-year projection are proposed new projects in the oil & gas and mining sectors, as well as industry related issues such as aging workforce.

Most of the issues and projects contained in the projection are those that would create new direct, full time equivalent jobs not currently in existence in Alaska, or will require significant replacement numbers for existing workers. There are no indirect jobs accounted for in this projection.

This is not the first time this projection has been presented. What's different this year is the qualified nature of the research put into this projection. In the past, this projection has been more of a "back of the napkin" informal estimate, with modest levels of peer review given to the projection.

This year, AEDC is pleased to announce that sister newspapers Petroleum News and North of 60 Mining, Alaska's two premier oil & gas and mining publications, have joined AEDC in preparing this projection by providing the key research the projection is based on. AEDC would like to thank Kay Cashman of the Petroleum News and Shane Lasley of North of 60 Mining for their help in putting this projection together. Thanks to their research, AEDC today can present a much more comprehensive projection.

Before we begin our look at projects proposed for the next 10-years, it is important to make it very clear that optimism does not drive this forecast. This forecast offers a view of possible projects, all of which are challenged by issues that could delay or kill most of the opportunities described today.

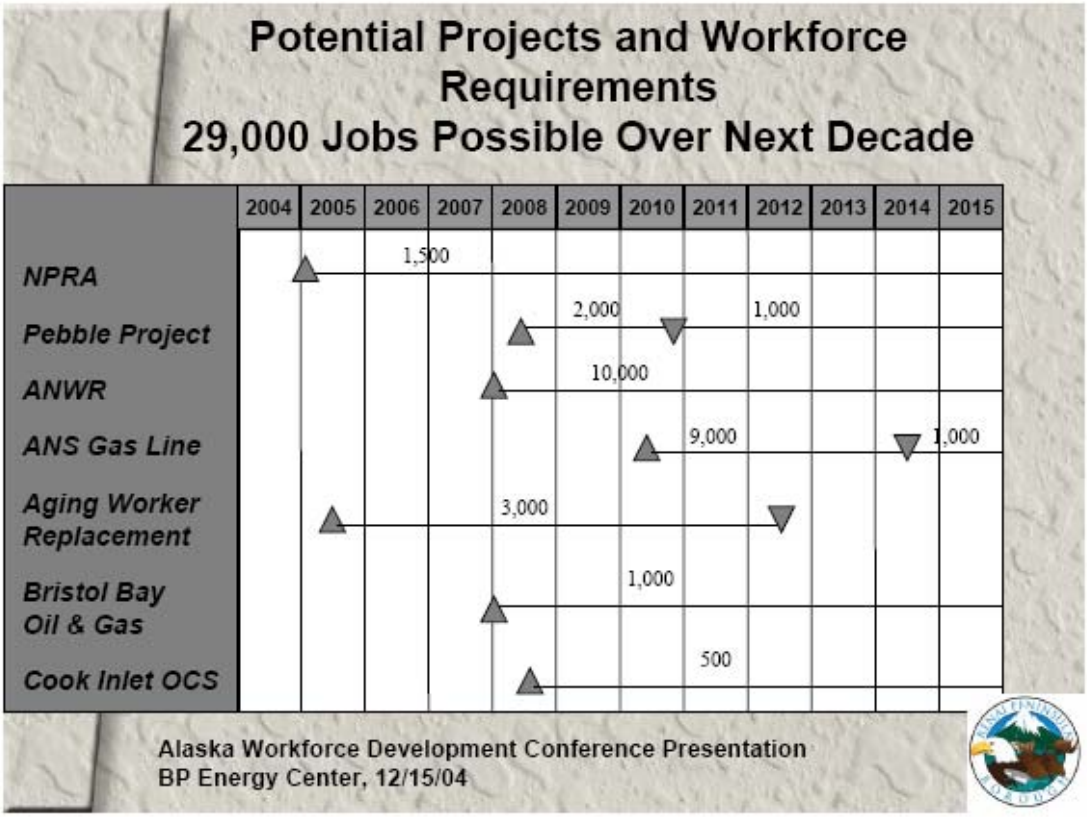
These issues include taxation, permitting, public opinion and commodity market conditions that affect the price of a barrel of oil, an ounce of gold, a pound of copper, a ton of coal, etc. AEDC presents this projection as a list of opportunities with varying odds for potential success in the future. No guarantees of success are offered or implied.

Polarized points of view have created gridlock for many of these projects and unless the public, the state and industry begin to seek out how we can successfully launch these projects on terms that benefit all stakeholders, many of these projects will not come to pass. Simply put, Alaska must find a way past "no" and instead ask "how" we can collaboratively make these projects happen to the benefit of Alaska and industry.

If preparations are not made for the growth that results from these projects, Alaska will face the same social and economic problems seen in the 1970's during TAPS construction and, even more recently, the inflationary spiral seen in oil industry costs during the 2007/2008 run up of the price of oil. And if preparations are not made to train Alaskans to compete for the high demand jobs these projects could create, we will again repeat the mistakes of the past.

Alaska must look beyond the coming year from an economic perspective and think strategically in terms of decades in the future. Alaska must also have a memory that goes beyond the previous year and clearly remembers the economic lessons of decades past to improve our odds of not repeating those mistakes in the future.

Previous Projections



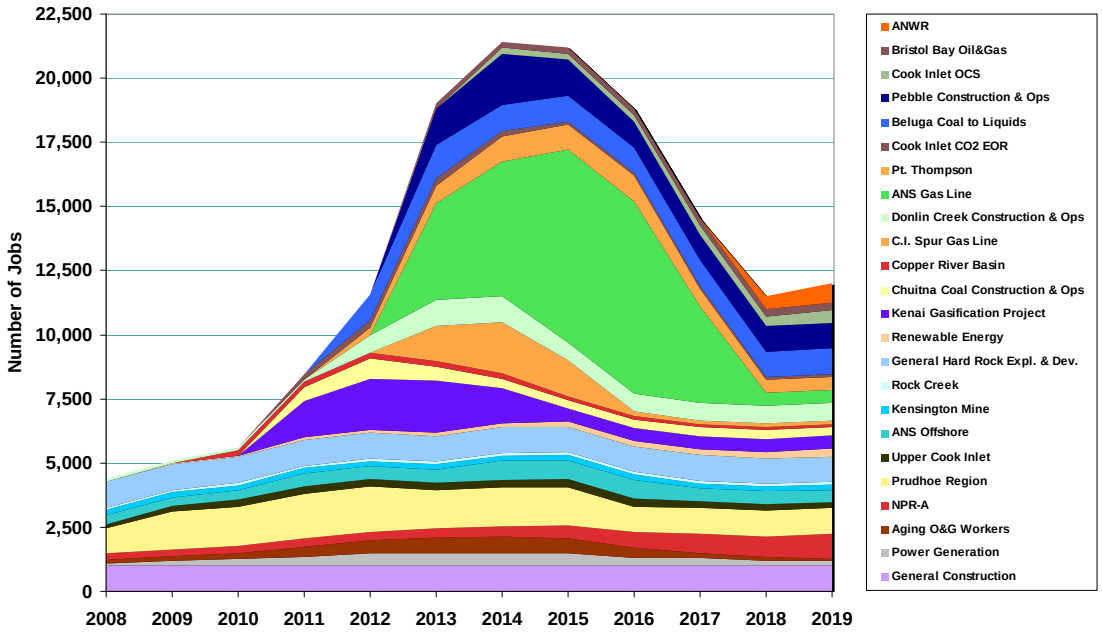
First, let's look back at previous projections. In 2004 the Kenai Peninsula Borough was asked to give a projection of future worker demand for a workforce conference at the BP Energy Center hosted by the University of Alaska. It appeared at that time that there was no entity or agency had any kind of future projection for projects in Alaska, other than individual projects. Mostly, North Slope gas pipeline projections.

So in this first attempt at trying to develop some kind of forward look of possible projects, this projection was developed. As you can see, it was a pretty simple model and perspectives were much different just five years ago.

In 2004, the common belief was that ANWR was going to happen in the coming decade, given the state of congress and the presidency. Pebble mine was on the cusp of permit applications. The natural gas pipeline should be just getting ready to break ground in 2010, and Bristol Bay oil & gas appeared to be gaining local support.

Given how most of these projects have been either seriously delayed or eliminated, this clearly underscores the challenges these kinds of projects face in the future.

Last Year's Point of View (2008)
Potential Annual Workforce Requirements
Over the Next Decade



Over time, the projection became more sophisticated and grew to include multiple proposed projects. This is the 10-year projection AEDC presented in late 2008. With over 20,000 possible FTE's being created if all these projects went forward, the latter part of the next decade seemed to hold a lot of opportunities.

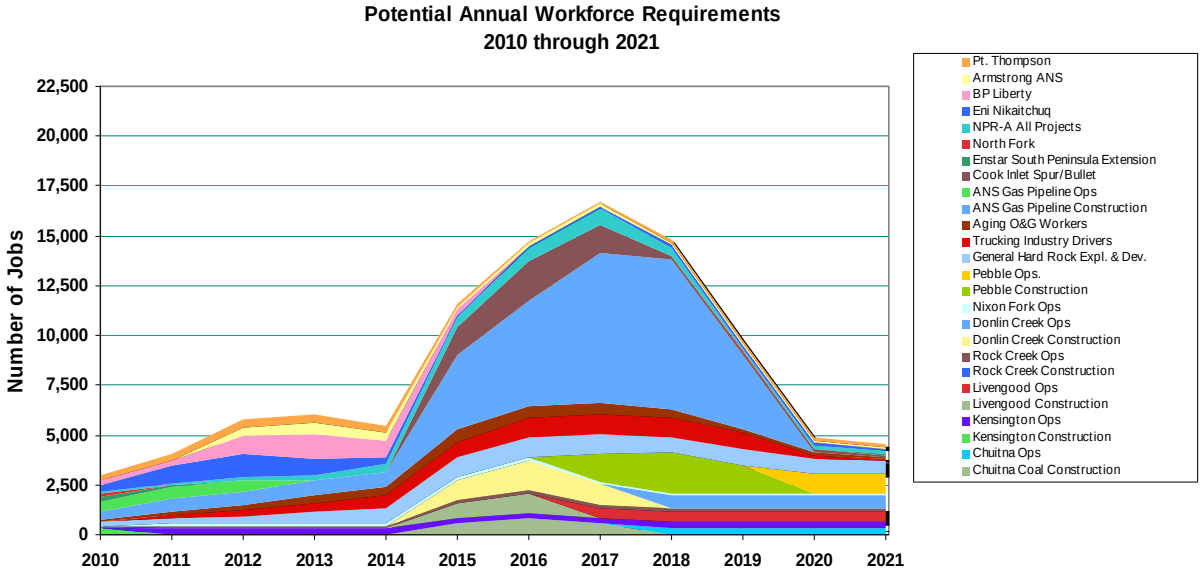
But as this last projection was developed, it became clear it needed a more comprehensive review by well informed 3rd parties. Some projects were added that, in hindsight, didn't really fit in the projection. And some projects were marginal and perhaps should have been separated from projects with a higher likelihood of being successfully launched.

So this year, with the help of the Petroleum News and North of 60 Mining, AEDC is pleased to present the updated version of the AEDC 10-year Oil & Gas and Mining projects projection.

The 2010 10-Year Projection

In recognition of the shortcomings of past projections, AEDC this year presents the 10-year resource extraction project in four parts. First is the model of projects with a 50/50 or better opportunity of actually being developed. Second is the model of projects with a less than 50/50 chance of being developed. Third is a combined model that includes projects from both of the first two models. The final part is a list of projects that bear watching in the coming years that are still not developed to a point that they can be included in either of the first two models.

Projects with a 50/50 or better chance of being developed

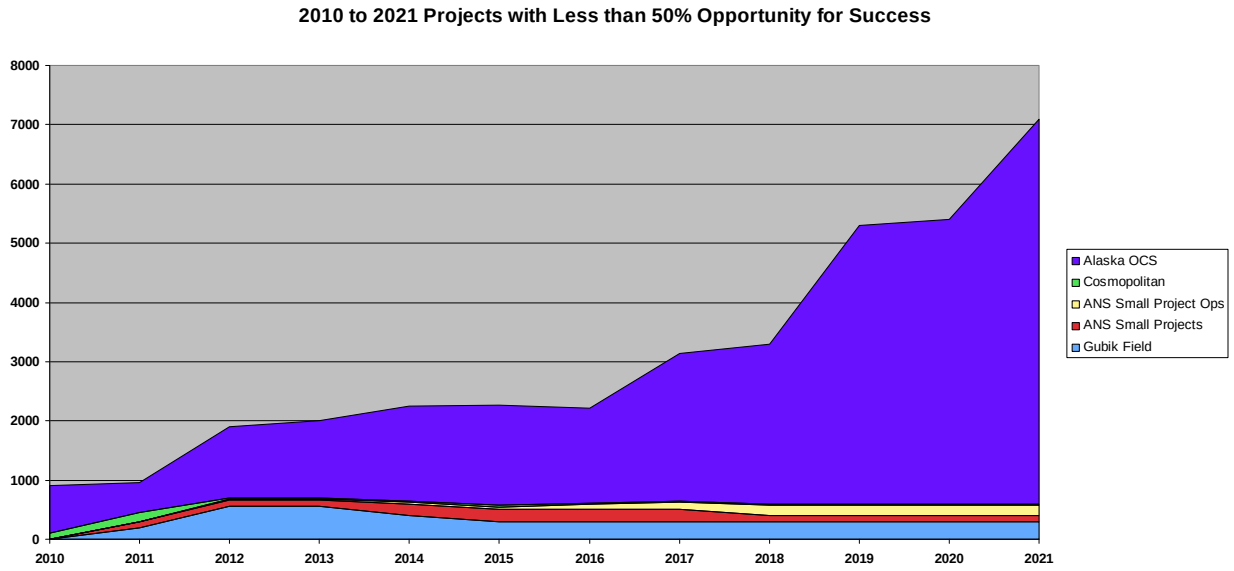


Here is the 50/50 projects projection for the next ten years. There are seven defined mining projects on this list and eight oil & gas projects and developments. Where appropriate, projects have been broken up into a construction/development phase and an operations phase.

Aging oil & gas workers, renewable energy projects, general hard rock mineral exploration employment, and truck driver demand also contribute to this projection.
Using basic workforce demand modeling ratios provided by the McDowell Group, AEDC has taken the total workforce figures for each project and proportioned them over the timeline for the construction or development of the given project.

As you can see, peak workforce demand if all projects went forward on time, takes place in about seven years. Again, that is not a likely outcome unless significant, proactive measures are taken to increase the odds these projects will become a reality.

Projects with less than a 50/50 chance of being developed



New to the projection this year is the profile of projects with less than a 50/50 chance. This is a short list, but one that could have a big impact on Alaska if some of these projects gain momentum and actually moves forward. There are a few smaller projects included, but most notable are exploration plans for natural gas within the Gubik Complex in the Brooks Range Foothills and for oil and gas offshore the North Slope in the federal OCS. According to Mark Hanley, who is the spokesperson for Gubik Complex operator Anadarko Petroleum, Gubik's success is primarily dependent on two factors: 1. discovering commercial volumes of natural gas, and 2. having a mechanism to get the gas to market, which can be a bullet line to Southcentral or the big gas pipeline to outside markets.

The OCS figures were developed by the Institute for Social and Economic Research (ISER) as part of an analysis commissioned by Shell Oil. OCS exploration is highly dependent on achieving permits to even begin to explore, let alone produce the vast resources available in the Outer Continental Shelf
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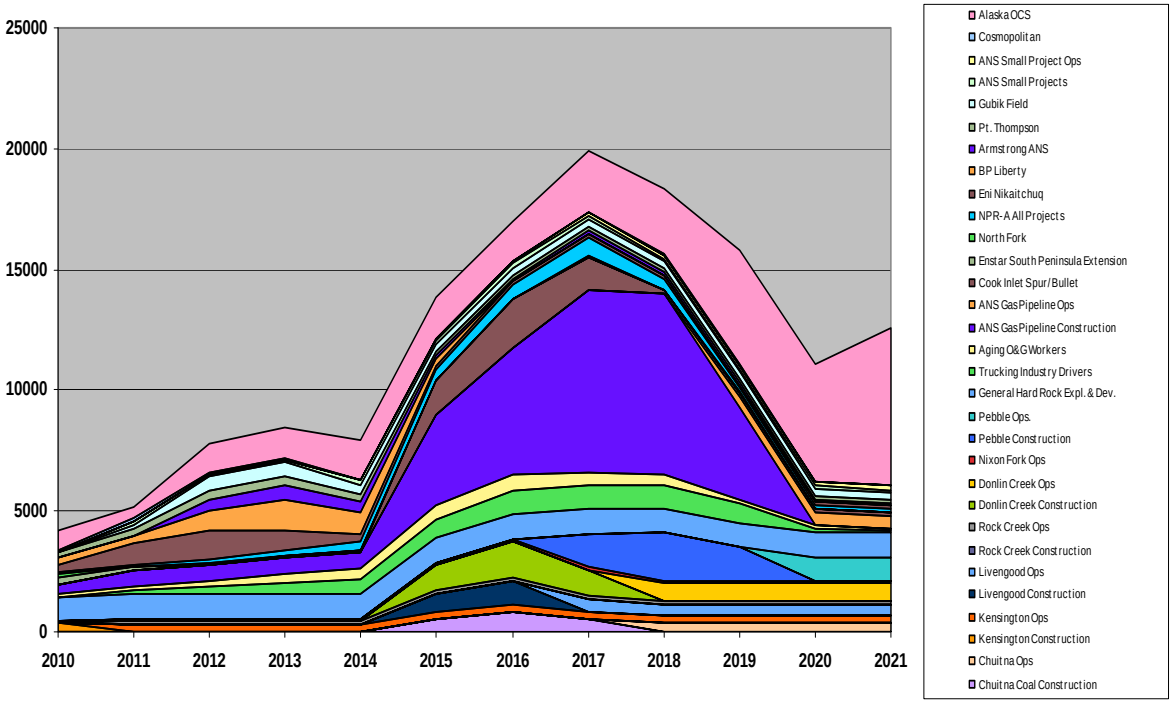
Given the challenges to date from North Slope stakeholders, this development is still highly problematic and has not achieved better than even odds that it will actually go forward in the next decade. Significant progress on revenue sharing, regulatory and social compact issues must to take place to improve those odds to an even chance or better.

2010-2021: In a Perfect World, the Combined View



As a final perspective, this graph presents the combined view for the next decade of possible projects and includes both the 50/50 and less than 50/50 projects.

It is interesting to note the effect the OCS could have in the latter part of the decade just as several other projects begin to achieve completion of construction or development.
Speculatively speaking, this view conservatively represents over $50-60 billion in capital investments in the next decade and at peak demand, over 20,000 full time direct jobs created by these projects if all projects are sanctioned and go forward as proposed.

In any case, this is an overly optimistic point of view, given current circumstance and cannot be counted on unless there are significant successes in developing consensus and unified efforts between Alaska and industry to join in a strategic endeavor to move these projects forward.

In developing this projection, it needs to be noted that several projects included in the previous 2008 projection were dropped. These dropped projects include ANWR, lower Cook Inlet OCS, Bristol Bay oil & gas, general construction (does not belong in this projection), Copper River natural gas, Agrium's coal gasification project, with Cook Inlet CO2 EOR also dropped based on the Agrium decision, though there is still reasons to keep an eye on this in the future given the recently announced CIRI coal project.

Upper Cook Inlet oil & gas has been dropped due to lack of commercial alignment. For now, there is little optimism for upper Cook Inlet until this situation is resolved.

Finally, the Beluga Coal to Liquids project has now shifted to a gas to liquids model based on North Slope natural gas coming to Cook Inlet. Given its dependence on a North Slope gas pipeline to Cook Inlet, this project has been dropped from the projection, though it may be added back in the future.

Projects to be Watched

There are several possible projects that we should keep an eye on that may be added in the future as plans develop. A more defined list of these projects is noted later in this report.

Most are centered on the North Slope with the exception of the CIRI underground coal gasification project in Cook Inlet. The CIRI project could lead to CO2 EOR being restored to the projection. But both of these projects need more time to see how they develop.

The Alaska North Slope Renewal Projects could generate significant new investments in upgrades to handling and delivery systems on the Slope, costing billions of dollars if sanctioned. And ANS Heavy oil continues to loom as a huge resource opportunity waiting for the right ideas and a huge investment to make it a reality. We'll continue to track these project opportunities and update the projection when warranted.

Summary

In closing, it bears repeating that this is not an optimistic projection. Rather, it represents a series of opportunities that Alaska, in partnership with industry, must decide whether or not to pursue as part of a broader, long-term economic development strategic vision. These projects won't happen with out a well planned strategy and unified effort to push them forward.

There is opportunity in the future. But opportunity is meaningless unless all of "us", the public, government and industry, are willing to work together to find the common ground to exploit these opportunities to their full potential.

Mining Projects with a 50/50 or Better Opportunities Outlook Defined

North of 60 Mining has evaluated statewide mining projects in various stages of exploration and/or development and has provided the following list of projects that are viewed as having a 50/50 chance or better of actually being brought into operations during the next decade.

The reader should note that there are any numbers of challenges these projects must address to be successfully developed within the proposed time frame. These challenges include taxation, permitting, public opinion and commodity market conditions that could delay or cancel any or all of these projects.

Kensington Gold Mine

Coeur d'Alene Mines Corp.'s Kensington gold mine project is located about 45 miles northwest of Juneau. The U.S. Supreme Court voted 6-3 in June to uphold Coeur's tailings permit at Kensington. The permit was reissued by the U.S. Army Corps of Engineers in August and construction began later in the same month. Nearly 300 workers will be needed to complete construction of the tailings facility. Production is scheduled to begin in the third quarter of 2010. Once in production the mine will employ about 200 people, and produce about 140,000 ounces of gold per year. Kensington is expected to produce about 120,000 ounces of gold per year over a 12.5-year mine life, based on the 1.5 million ounces of proven and probable gold reserves. Coeur has already spent about US$300 million developing Kensington, and it estimates remaining construction and mine-related capital costs to bring the mine into production will cost another US$70 million.

Rock Creek Gold Mine

NovaGold Resources Inc.'s Rock Creek gold mine began production in September 2008. The main pit at Rock Creek has a resource of 500,000 ounces. Due to financial and permitting issues, operations have been suspended and the mine is in care and maintenance. NovaGold CEO Rick Van Nieuwenhuyse said in September 2009 that NovaGold management is taking a look at putting the Rock Creek gold mine in production. The company estimates capital costs to put the mine back in production to be in the US$20 million to US$25 million range. Rock Creek has 500,000 ounces of gold in reserves with an additional 1.9 million ounces of measured and indicated resources. NovaGold said it is working on an updated mine plan that will include an updated gold reserve and resource calculation. Once in full production, Rock Creek is expected to produce about 100,000 ounces per year and employ about 150 people.

Donlin Creek Gold Mine

Donlin Creek LLC, a 50/50 partnership between NovaGold Resources Inc. and Barrick Gold Corp, manages the Donlin Creek project in Southwest Alaska. NovaGold reported a resource estimate of 31.7 million ounces of measured and indicated resources grading about 2.5 grams gold per metric ton. The 53,500-metric-ton-per-day mine proposed in the

feasibility study is expected to produce about 1.6 million ounces of gold per year over its first five years of operation. Based on current reserves, the mine should produce about 26.2 million ounces of gold, or an average of about 1.25 million ounces per year, over a 21-year mine life. Permitting is expected to begin late in 2009 or early in 2010. According to a 2009 feasibility study construction of the mine and related infrastructure is estimated to be US$4.84 billion. Donlin Creek LLC plans to begin construction in 2012 and production is scheduled to begin in 2015. A workforce of at least 1,500 is expected to be needed during the construction phase and about 700 employees will be required during operations.

Pebble Copper-Gold-Molybdenum Mine

Pebble Limited Partnership, a 50/50 partnership between Northern Dynasty Minerals Ltd. and Anglo American PLC, is advancing the Pebble copper-gold-molybdenum project in Southwest Alaska toward permitting. The project consists of two deposits; the near-surface Pebble West and the deeper Pebble East. The combined measured and indicated resource for both deposits, using a 0.30 percent copper equivalent cutoff, is 5.1 billion metric tons grading 0.77 percent copper-equivalent, containing 48 billion pounds of copper, 57 million ounces of gold and 2.9 billion pounds of molybdenum. In addition the deposits have a combined inferred resource of 4.0 billion tons grading 0.55 percent copper-equivalent containing 24 billion pounds of copper, 37 million ounces of gold and 1.9 billion pounds of molybdenum. Permitting is scheduled to begin 2011 with construction is scheduled for 2014. Production is scheduled to begin 2016 at the earliest. A workforce of 2,000 to 4,000 is expected to be needed during construction with final project design and construction timeline will refining the manpower needs. Around 1,000 employees are expected to be needed during a 50-plus year mine life.

Livengood Gold Mine

International Tower Hills Mines Ltd.'s Livengood gold property about 70 miles north of Fairbanks currently has a resource of 12.5 million ounces of gold. International Tower Hill Mines has gathered the data needed to complete a preliminary economic assessment (scoping study), due to be released in the fourth quarter of 2009. A Fort Knox scale mine is anticipated. The project is advancing quickly and Permitting is anticipated to begin in 2011 or 2012 with production beginning as early as 2016. The size, scope and manpower needs of a mine at Livengood are expected to be similar to Fort Knox.

Chuitna Coal Project

PacRim Coal LP's Chuitna Coal Project is a surface coal mining and export development proposal for an ultra low sulfur, sub bituminous coal resource located in the Beluga Coal Field, about 45 miles west of Anchorage. The project proposal consists of a surface coal mine and support facilities, transportation infrastructure, personnel housing, logistic center, and coal export terminal. The current project predicts a minimum 25 year mine life with a production rate of up to 12 million tons a year. A complete permit application

for the project has been submitted to Alaska Department of Natural Resources and permitting is underway.

Nixon Fork Gold Mine

Fire River Gold Corp. is planning to put the Nixon Fork gold mine back into production in 2010 or 2011. Nixon Fork is complete with a 200-metric-ton-per-day flotation plant with a gravity gold separation circuit, a sulfide flotation circuit, and a brand-new carbon-in-leach circuit. The mine also boasts a fleet of mining vehicles, a power plant, maintenance facilities, an 85-person camp, office facilities, and a 1.5 kilometer-long airstrip. The project also has the bonds and the permits needed to move the project quickly back into production. Fire River is currently re-evaluating the project before putting it back into production. Nixon Fork is a small high-grade gold mine which will employ between 50 and 75 people.

General Hard Rock Exploration & Development

In addition to the research support provided by North of 60 Mining, AEDC also engaged the University of Alaska's Mining and Petroleum Training Service (MAPTS) for their views on the potential of demands of the next decade in the mining sector. MAPTS views corresponded with North of 60 Mining's perspectives with one addition. MAPTS view is that general hard rock mineral exploration efforts in the next decade could employ as many as 1,000 workers engaged in on-site work to fully explore and evaluate numerous mineral prospects across Alaska.

AEDC has included this broad demand for new mining workers in the 50/50 model based on MAPTS opinion for this need in the coming decade. For perspective, North of 60 Mining has identified 44 mineral prospects across Alaska that in various stages of exploration and development. All will generate a workforce of varying sizes and longevity before being deemed economic or non-economic to develop. It is these kinds of efforts that could continue into the next decade and will create up to 1,000 new jobs.

Oil and Gas Projects with a 50/50 Chance or Better Opportunities Outlook: Defined

Armstrong's 70 & 148 LLC Beaufort Sea and North Slope acreage

General location: On and offshore state leases, north, south and west of Kuparuk.
Status and background: In the October 2008 Beaufort Sea and North Slope lease sales held by the State of Alaska, an affiliate of Armstrong Oil and Gas of Denver picked up onshore and offshore acreage around the Kuparuk River unit. Armstrong majority owner and president, Bill Armstrong, chose the company's name "70 & 148 LLC" for, the latitude and longitude coordinates for the Prudhoe Bay oil field.
Armstrong sold its North Slope and Beaufort Sea interests to Eni Petroleum in 2005 and has since acquired Cook Inlet basin acreage (see North Fork project). This is the first lease sale it participated in since it left Alaska. Bill Armstrong said his company had identified "a lot of prospects" in the leases "in the old days, as well as some new ones." Between late 2001, when Armstrong first entered Alaska, and 2005, when it left, it was instrumental in bringing three new oil companies to northern Alaska – Pioneer, Kerr-McGee and Eni – to develop three of its prospects, Oooguruk, Nikaitchuq and Tuvaaq (being developed as part of Nikaitchuq).

After selling its assets in 2005, Bill Armstrong said his company would be back, noting there were still "huge opportunities on the North Slope. It's a great place to be and it's a great petroleum system." He also said he was "bullish on oil prices," which he pointed out were "much better than when we first went to the North Slope" in late 2001. "Oil was at $15 a barrel back then." When asked if 70 & 148 planned to explore during the upcoming winter season (2008-09), Armstrong said no: "But we don't go into an area not to create activity. Our game plan is some variation of what we did before, which is to create a lot of exploration activity."

Armstrong's subsequent track record on the North Slope was three out of four — i.e. in three out of four North Slope prospects that were drilled by Armstrong and the bigger partners it brought in between 2002 and 2005, three discoveries were announced. During its first stint in northern Alaska, Armstrong, under the direction of Stu Gustafson, also helped set records for the shortest time to permit exploration and development projects, initially working closely with both Pioneer and Kerr- McGee for the permitting of Oooguruk and Nikaitchuq.

In October 2009, Armstrong executive Ed Kerr said the company did not yet have any exploration work planned for the coming winter of 2009-10. Since the Nikaitchuq field is expected to cost $1.45 billion and is creating 1,200 jobs during development and construction and another 140 permanent jobs for production operations; and the Oooguruk field is expected to cost $1 billion and created 600 jobs during peak construction, another 100-140 for production operations, it is reasonable to project Armstrong will try to partner with another major and develop a project similar in size and scope to Oooguruk out of its 70 & 148 LLC acreage.

Total of 600 jobs expected to be created by development and construction phase and 140 jobs expected to be created by production operations.

Armstrong Cook Inlet LLC North Fork unit

Status: Two producing wells drilled to date. Working on getting pipeline built. Expect to have first gas in line in early 2011, if all goes well. Operator Armstrong Cook Inlet LLC recently signed a contract to sell North Fork gas to Enstar, overcoming a major hurdle facing the project. The contract has received regulatory approval. Armstrong is evaluating the possibility of acquiring seismic data in the North Fork area as early as this winter to help develop the gas field. The company believes the prospect is far from fully delineated, but said early results suggest a field between 7.5 billion and 12.5 billion cubic feet of gas, with the possibility of as much as 20 billion to 60 billion. Total of 150 jobs expected to be created by development and construction phase and 20 jobs expected to be created by production operations.

Enstar's southern Kenai Peninsula bullet line

General location: Pipeline to hook up the North Fork gas field on Alaska's southern Kenai Peninsula to the Enstar Natural Gas Co. system in Ninilchik where the gas would enter the Kenai Kachemak Pipeline.
Status: Anchor Point Energy, a company formed by the five North Fork unit working interest owners, has made an initial commitment of 1.2 billion cubic feet of gas annually from the North Fork unit, with the potential for future volumes to reach up to 10 bcf. The gas pipeline could be complete by early 2011. If approved by the RCA, the contract calls for Anchor Point Energy LLC to build an approximate 8-to-10 mile pipeline to Anchor Point, where it will connect with an Enstar-built pipeline coming south from Enstar's Kenai-Kachemak pipeline.

In the September RCA filings, Alaska Pipeline (a wholly owned subsidiary of Semco Energy Inc.; Enstar is also a wholly owned subsidiary of Semco) said the new line would help bring natural gas to Enstar's existing customers and would also enable the company to expand service to the Anchor Point area. More important, the routing of a pipeline past Anchor Point, near Pioneer Natural Resources' Cosmopolitan oil prospect, raises the possibility of using that same natural gas pipeline to ship out any gas produced at Cosmopolitan. And there are other gas prospects in the Anchor Point-North Fork area that might become tempting exploration and development targets, once there is a gas pipeline nearby.

Total of 250 jobs expected to be created by construction and 8 jobs expected to be created by operations.

BP's Liberty oil field development

General location: Reservoir under federal waters in the Beaufort Sea, about 6 miles offshore, 15 miles east of the Prudhoe Bay field.

Status: currently under construction, first oil expected 2011, full ramp up by 2013
Total of 1,250 jobs created by construction and 300 jobs created by development drilling starting spring 2010.

Total jobs expected to be created by production operations: according to BP, "it won't be many. One of the appealing elements of this project is that it takes advantage of and makes efficient use of existing Endicott plant. Endicott in early 1990s was processing and producing more than 100,000 barrels a day. Now it does about 15,000. Liberty will make use of that extra capacity at an existing facility," which means jobs won't be lost at Endicott.

Eni Nikaitchuq oil field development

General location: near-shore waters of the Beaufort Sea, next to Oooguruk and north of the Kuparuk oil field.
Status: Operator Eni Petroleum US LLC. Currently under construction, development drilling to start in the first quarter of 2010, first oil expected Dec. 31, 2010.
Total of 1,200 jobs created by development and construction and 140 jobs expected to be created by production operations. Nikaitchuq will be the first field that processes its own oil in northern Alaska that is operated by an oil company that is not one of northern Alaska's "Big 3" producers (BP, ConocoPhillips and Exxon).

ExxonMobil Point Thomson oil field development, phase 1

General location: Eastern North Slope
Status: currently under development and construction, began winter 2008-09, first production expected end 2014
Total of 400 jobs created by development and construction and 150 jobs expected to be created by production operations. Subsequent field development (more phases) will be determined and could include expanding injection capacity, oil production, pursuing natural gas sales if a gas pipeline from the North Slope is built, or a combination thereof.

National Petroleum Reserve- Alaska (NPR-A): All Projects

For the purposes of the 10-year projection, several projects slated for the NPR-A in the next decade have been aggregated into one general figure. Here is a list of those projects:

ConocoPhillips Greater Mooses Tooth unit development

General location: northeast corner of the NPR-A, west of the Colville River and the village of Nuiqsut.
Status: ConocoPhillips has agreed to spud an exploration well by the third quarter of 2015 in unit. Plans are not final, but the base plan for GMT-1 calls for eight wells, with an upside of 16 wells. GMT-2 is still under appraisal, the company said, but the base plan calls for 10 wells with an upside of 19 wells. Fiord West planning is a result of appraisal wells drilled since 2004, ConocoPhillips said, including Iapetus and the Char No. 1, with

positive results from the Char well confirming a potential satellite development about 4.5 miles north of Alpine West, an area identified in the 2004 Environmental Impact Statement as CD-12. While Fiord West is in the early conceptual planning stage, the company said the current plan assumes a development with 20-25 horizontal wells drilled from a gravel pad upsized to accommodate 39 wells, with an injection method of miscible water-alternating-gas.

Total jobs expected to be created by development and construction phase of each satellite: 245
Total jobs expected to be created by production operations for each satellite: 10 (Note CD-3 and CD-4 are unmanned but CD-5 and the other NPR-A satellites might require manpower.)
Investment: $350,000 (higher than CD-3 and CD-4 because of distance from infrastructure, but less than CD-5 because they do not include a bridge)
Greater Mooses Tooth unit was expanded in August 2009, from 147,456 acres to 164,014 acres. First ever NPR-A unit, originally formed in January 2008. All acreage is federal land, but 40,238 acres has been selected for future subsurface conveyance to Arctic Slope Regional Corp.

ConocoPhillips Alpine satellite CD-5 and others

General location: western North Slope, main Colville River unit reservoir is Alpine, just east of the Colville River, near the eastern border of the National Petroleum Reserve-Alaska.
CD-5 Alpine West location: CD-5 Alpine West satellite development is in the permitting phase. Its production pad would sit roughly midway between the Alpine field to the east and the Greater Mooses Tooth unit to the west.
Status: ConocoPhillips began permitting work on its most recent Colville satellite, CD-5, in 2005 but withdrew the applications, restarting the project in late 2008 when it reached agreement on the location of a bridge across the Colville River.

As of Oct. 23, 2009 the company needs just one permit before it goes for internal sanction. This latest Colville River unit expansion includes acreage in NPR-A, with some 8,200 acres of the expansion on federal lands, some 7,600 acres on ASRC lands and some 600 acres jointly held by the state and ASRC.

The project schedule shows permitting completed at the end of 2009; ice road construction in the fourth quarter of 2010; and gravel placement and bridge piers in 2011, the first year of construction. Following ice road construction in the fourth quarter of 2011, the second year of construction includes bridge structure, pipelines and power and facility construction beginning in 2012, with drilling beginning that year. Facilities construction and drilling would be completed in 2013, with CD-5 production startup in the fourth quarter of 2012.
ConocoPhillips owns 78 percent of the Colville River unit and Anadarko Petroleum owns 22 percent.

Total of 245 jobs expected to be created by development and construction phase and 10 jobs expected to be created by production operations by using existing personnel at Alpine processing center.

Notes: Anadarko is a partner in the ConocoPhillips Alaska-operated unit. ConocoPhillips has a 78 percent working interest in the unit; Anadarko a 22 percent interest. Alpine, the anchor field in the unit came online in late 2000.

After CD-5, at least three other Alpine satellite expansions, also referred to as Colville River unit expansions, are expected in the next 10 years, one smaller and two larger than CD-5 – all west of Alpine in NPR-A. But they are likely to cost less than CD-5 because it includes a bridge and more roads than CD-3 and Cd-4, which together cost $500 million. Development of CD-6 would be next, followed by CD-7 and Fiord West, ConocoPhillips said in an application filed in May 2009 with the U.S. Army Corps of Engineers. "Additionally, one or two unidentified drill sites may be tied into this NPR-A infrastructure if future exploration efforts in the vicinity prove successful," the company said.

Lookout CD-6 and CD-7 are in the Greater Mooses Tooth unit in NPR-A, ConocoPhillips said, and nomenclature for those will change to GMT 1 and 2 to distinguish developments in Greater Mooses Tooth from developments in the Colville River unit, although the processing of Mooses Tooth oil will be done at Alpine, where all of the Colville unit's oil is processed.

The company said sequential development and infrastructure sharing were key aspects of the Colville unit's expansion and NPR-A development. Sequential development "maximizes use of existing facilities and minimizes the need for future Alpine field processing facility expansions," resulting in the extension of its economic life.
More than 20 wells have been drilled during the eight exploration seasons since the 1999 Northeast NPR-A lease sale, but "the volume of oil discovered within the Northeast NPR-A is insufficient to economically support development of new standalone processing facilities," ConocoPhillips said.

By sharing the Alpine pipelines, processing plant, airstrip, roads, drilling support infrastructure and operations base camp, "several of these small oil accumulations can be developed to benefit multiple stakeholders," the company said.

NPR-A production coming, Talisman's FEX, Anadarko

ConocoPhillips has been the most active driller in the National Petroleum Reserve-Alaska, an Indiana-sized tract of northern Alaska land former President Warren G. Harding set aside in 1923 for its oil and gas potential.
Most of the exploration, and discoveries, have been confined to the reserve's northeast corner, closest to the existing pipelines, roads and processing plants of the central North Slope oil fields.

Still, NPR-A is considered a frontier where development dictates an accumulation be either very large or reasonably close to infrastructure. NPR-A's latest wave of leasing began in 1999. ConocoPhillips is marching toward first production from the NPR-A in late 2012 with its CD-5 Alpine West satellite development, which is in the permitting phase.

Another active NPR-A explorer is a subsidiary of Calgary independent Talisman Energy, which completed its last NPR-A well in the early winter of 2007. The company released promising results from several frontier wildcats in NPR-A, but also suspended drilling operations for at least two seasons (that has turned into three) while it evaluated its prospects.

Despite five wells under its belt and some 1.5 million gross acres held in the NPR-A, FEX worried about the cost of drilling wildcats, distance from infrastructure, short travel seasons and restricted access to federal lands. So rather than drill, the company sanctioned a large 3-D seismic program in Smith Bay to get a better sense of its holdings north of Teshekpuk Lake.

In May 2007, FEX said two wells of its five wells encountered more than 225 net feet of hydrocarbon-bearing sandstones. The company put the "initial estimate of contingent resources present" at 300 million to 400 million barrels net to FEX. FEX also cited "significant follow-up potential on many similar structures on Talisman's acreage if commercial productivity is proven," but marked one of the five wells as "sub-commercial given current infrastructure." Petro-Canada, now part of Suncor, is a minority partner with operator FEX in the aforementioned well/acreage in NPR-A.

Total of 800 jobs expected to be created by development and construction phase of two of the five FEX prospects and 140 jobs expected to be created by production operations, generating almost no major jobs impact by using existing personnel at Alpine processing center.

Alaska North Slope Natural Gas Pipeline Project

The $20-$30 billion natural gas pipeline to Alberta continues to move forward with a pair of competing open season processes in 2010. The TransCanada project and the Denali-The Alaska Gas Pipeline projects both are committed to completing their open season processes scheduled for next year, though neither company is necessarily predicting success in the first attempt.

Given the recent addition of ExxonMobil through an alignment with the TransCanada project, all three of the major North Slope producers are now engaged in efforts to monetize ANS natural gas reserves. This development in 2009 has kept the Alaska North Slope natural gas pipeline in the "50/50 or better" projection model. Based on numerous past public presentations by both companies, 7,500 construction jobs and 500 operational jobs could be created by this project if it is successfully constructed in the next decade.

North Slope Natural Gas Spur/Bullet Pipeline to Cook Inlet

As an offshoot of the larger effort to develop North Slope natural gas by developing a large diameter pipeline to Alberta, additional efforts have been underway to develop a commercially viable pipeline connection to Cook Inlet. For several years, this effort has been lead by the Alaska Natural Gas Development Authority (ANGDA). ANGDA's efforts have been focused on a spur pipeline off-take in the Big Delta region. And in the last two years, Enstar has also engaged in efforts to define the viability of a so-called "bullet" pipeline from the North Slope to Cook Inlet.

Increasing pressure on Cook Inlet gas deliverability and declines in proven reserves have been a growing issue for the future economic health of the Railbelt region. The State of Alaska has characterized the current situation as the result of "commercial misalignments" in the Cook Inlet natural gas markets. These issues, as well as access issues, permitting issues and endangered species rulings have all but stopped exploration for new gas discoveries in the Cook Inlet region.

While there are technical estimates that there are significant natural gas reserves yet to be discovered in Cook Inlet, industry officials note that these will be extremely expensive to find. Geological conditions in the inlet make obtaining quality data from seismic surveys very difficult, especially when seeking highly technical structures such as stratigraphic traps. Industry officials have further noted that if there is success in finding a significant new natural gas field (200 Bcf or more), it will likely take 7 to 10 years to deliver first gas from any new discovery.

But even if Cook Inlet utilities were to focus all their future supply contracting efforts on sources from the North Slope, the volumes generated would not be sufficient to underwrite the necessary commercial requirements for building either a spur or bullet pipeline project.

Ultimately, industrial users purchasing large volumes of natural gas and natural gas liquids such as ethane and propane will be key components to successfully launching either a spur or bullet pipeline project. With recent changes in feedstock markets, specifically the significant spike in naphtha prices versus the major decline in ethane prices in global markets, opportunities may be developing to attract chemical manufacturer's to the Cook Inlet region. These chemical companies would anchor a spur or bullet pipeline if efforts are successful to attract them to the 2010 open season processes.

Using ANGDA estimates, 2,000 construction jobs and 150 operational jobs would be created by this project if it is successfully constructed.

Aging Oil and Gas Workers

In addition to the research support provided by Petroleum News, AEDC also engaged the University of Alaska's Mining and Petroleum Training Service (MAPTS) for their views

on the potential of demands of the next decade in the oil and gas sector. MAPTS views corresponded with Petroleum News perspectives with one addition. MAPTS view is that the aging of the oil and gas workforce in the next decade could require replacement of as much as one third of the workers currently employed in Alaska's oil and gas industry. Oil and gas employment in 2009 has averaged in excess of 13,000 workers in the first 3 quarters of the year.

AEDC has included this broad demand for new mining workers in the 50/50 model based on MAPTS opinion for this need in the coming decade. For perspective, numerous industry officials estimate that nearly a third of oil and gas workers in Alaska are age 50 or older. Anecdotally, oil and gas workers tend to retire by age 55. This presents a significant challenge for any number of companies with operations in Alaska in the coming decade, especially given that this trend extends beyond Alaska and is prevalent in most other oil and gas regions in the U.S. and Canada.

For the purposes of this projection, 4,000 retirees will need to be replaced in the next decade in the oil and gas industry.

Trucking Industry Drivers

Under the premise that several of the projects listed in this projection go forward in the next decade as proposed, logistics systems in Alaska will be called upon to deliver significantly higher volumes of goods and materials to job sites through out Alaska. In particular, the North Slope natural gas pipeline project would create significant demands on logistics companies, in particular trucking companies. Initial 2008 estimates by the Alaska trucking industry project demands for as many as 1,000 or more commercial truck drivers will be needed to meet the needs of projects and construction in Alaska in the coming decade if even a portion of the possible projects come to pass. For the purposes of this projection, 1,000 additional commercial truck drivers are estimated to be needed at peak demand points in the middle portion of the coming decade.

Oil and Gas Projects with Less Than a 50/50 Chance Opportunities Outlook: Defined

Anadarko Petroleum's Gubik Complex

General location: The Gubik Complex is near Umiat, in the gas-prone Brooks Range Foothills. It consists of a series of natural gas prospects and known, but undeveloped, natural gas fields, including Gubik, Chandler and Wolf Creek.
Status: The first exploration program for natural gas in northern Alaska, Gubik Complex exploration and delineation wells were drilled in the early winters of 2008 and 2009. Results of the first well was made public by Petro-Canada, which reported it tested at rates of up to 15 million cubic feet per day, proving up the previously discovered, but undeveloped, Gubik gas field .Operator Anadarko Petroleum and its partners BG and Petro-Canada expected two more years of the same to prove up resource. Companies

have mentioned 2016 as a tentative date for starting production, but Suncor Energy's mid-2009 acquisition of Petro-Canada might have killed plans to drill this coming winter. Anadarko says it will have an answer from Suncor by the end of October.

Total jobs created by exploration phase: 560
Total jobs expected to be created by development and construction phase: 2,400
Total jobs expected to be created by production operations: 3,300
Investment: $4-$6 billion range

Alaska North Slope Small Development Projects

The Petroleum News believes that in the next decade, the North Slope region could see up to 15 small in-field oil development projects seeking to monetize small known oil deposits in the 5-10 million barrel size ranges. These projects will be developed by small independent oil companies and will likely have a short development time frame of a year and small budget compared to previous developments seen in the history of Alaska's North Slope oil fields. Operational jobs will also be proportionally smaller than seen in the past.

Given the tougher financial environment small companies must operate within, these projects are included in the less than 50/50 opportunities section. Total construction jobs expected to be created by these projects are approximately 1200 and approximately 140 operational jobs.

Here is an example of one of those projects:

Example: Brooks Range Petroleum's small North Shore oil development

General location: within the Beechey Point undeveloped unit, in the Gwydyr Bay area, about 3.5 miles northeast of Prudhoe Bay's S Pad and about a mile west of the Kuparuk River. The North Shore pad would be used to tap several small oil accumulations. A project description on the company's Web site says Brooks Range expects to recover 5 to 10 million barrels of oil.

Status: Permitting stage, some legal disputes between owners might delay project; company hopes to drill a second well at North Shore this winter; if legal despite gets settled soon, first oil could come in mid-2012.

Total jobs created by development and construction: 50-100
Total jobs expected to be created by production operations: 12
Investment: $100 million

Pioneer's Cosmopolitan, Cook Inlet basin

Location: Southcentral Alaska's Cook Inlet basin, approximately 30-50 million barrels of oil equivalent, lies about two miles offshore from Anchor Point on the southern Kenai Peninsula.
Status: Work on the Cosmopolitan oil offshore prospect, which will be developed from an onshore drill site, has ramped back up, per operator Pioneer Natural Resources. In January 2009, Pioneer had put plans to drill an appraisal well on hold until 2010 because of low oil prices. Statement secured by Petroleum News from Pioneer: "Pioneer will conduct additional appraisal work at Cosmopolitan during the fourth quarter of this year and first quarter of 2010. The company plans to work over and flow test the Hansen 1A L1 well — originally drilled in 2007 — in order to gain additional reservoir information. Pioneer continues to move forward with permitting and facility planning activities as well as plans for a second appraisal well."

Total of 100 jobs estimated to be created during development and construction phase and 20 jobs to be created by production operations.

Notes: Pioneer has envisioned trucking Cosmopolitan oil to the Tesoro refinery at Nikiski and producing some natural gas for the local gas market. The recent news of routing of a gas pipeline past Anchor Point (see North Fork and Enstar briefs) raises the possibility of using that same natural gas pipeline to ship out any gas produced at Cosmopolitan.

Outer Continental Shelf (federal waters) oil and gas field exploration and development:

Best job potential of this development is noted in the March 2009 report "Economic Analysis of Future Offshore Oil and Gas Development: Beaufort Sea, Chukchi Sea, and North Aleutian Basin" that was done for Shell Exploration and Production by the Institute of Social and Economic Research, University of Alaska Anchorage. These direct employment estimates are used in the "Less than 50/50" projection graph.

Petroleum News does not see the North Aleutian Basin being explored and developed for many years. There is a much better chance of OCS exploration and development in the Beaufort and Chukchi seas, where majors such as Shell hold a significant number of leases and have already invested hundreds of millions of dollars in lease acquisition and preliminary exploration activities, such as seismic. However, we have left the North Aleutian Basin data in this assessment because it was such a small part of the whole.

ISER's study concluded that bringing oil and gas fields into operation in the Beaufort Sea, Chukchi Sea and North Aleutian Basin would create thousands of new jobs. (For the purposes of the economic evaluation, the study considered a 50-year timeframe ending in 2057 and with oil prices averaging $65 per barrel.)

Based on the current MMS lease sale program, the analysis assumed for the 50-year study period the development of seven Beaufort Sea platforms producing a total of 6.3 billion barrels of oil and 7 trillion cubic feet of natural gas; four massive, gravity-based Chukchi Sea platforms, a Chukchi Sea shore base, with oil and gas transportation

pipelines across the National Petroleum Reserve-Alaska, delivering 6.2 billion barrels of oil and 7.8 trillion cubic feet of gas; and, in the North Aleutian basin, two offshore platforms coupled with pipelines across the Aleutian Peninsula to export 390 million barrels of oil and 5 trillion cubic feet of gas.

First offshore oil would flow in 2019 from the Beaufort Sea, in 2021 from the Chukchi Sea and in 2022 from the North Aleutian basin. ISER estimated that first gas from the Arctic offshore would not flow to market until 2029 for the Beaufort Sea and until 2036 for the Chukchi Sea.

After a 10-year ramp-up, oil production rates would peak at about 1.5 million barrels per day before entering a multiyear decline, with the peak throughput necessitating an upgrade to the trans-Alaska oil pipeline. OCS gas production would require the capacity of the North Slope gas line to also be expanded.

For more than 20 years direct employment from OCS work could exceed 7,000, with average annual employment levels during the complete 50-year timeframe for OCS development and production running at about 6,000.

Taking into account the in-state spending of people directly employed in OCS work, the resulting indirect employment, including service jobs in transportation, health care and public utilities, would raise peak Alaska employment levels to perhaps an annual average of 35,000. That total employment figure could peak as high as 50,000 around 2038, ISER said.

The addition of OCS oil to the throughput of the trans-Alaska pipeline would reduce the unit cost of transporting oil in the pipeline, thus increasing the wellhead value of North Slope oil, encouraging the development of additional onshore oil reserves and extending the life of the pipeline, both of which would lead to even more jobs during this 50-year period. OCS gas production would require the capacity of the North Slope gas line to also be expanded.

Shell's strong interest and investment in both the Beaufort and Chukchi seas is a matter of public record. But because the company has not said as much publicly, it's not as obvious that ConocoPhillips is very focused on Chukchi exploration, where it had more than $506 million in winning bids in a February 2008 lease sale. A ConocoPhillips spokeswoman confirmed that focus is still strong in a September 2009 statement to Petroleum News.

Projects to be Watched: Defined

In addition to the "50/50 or better" and the "less than 50/50" projects listed, there are other projects in various stages of development that may have better odds of being fully developed in the future. These projects, if developed, are significant in scope and could have significant impacts on future projections. The following are this year's projects that bear watching in the future.

Alaska North Slope Renewal Projects (ANSR): Modernizing North Slope field infrastructure ($15 to $30 Billion)

BP is working on several fronts to modernize its North Slope oil field infrastructure. One of these was a two-year project to replace 16 miles of oil transit pipelines in the Prudhoe Bay oil field. Completed at the end of 2008 to the tune of about $500 million, it included pig launchers and receivers, anti-corrosion chemical injection facilities and leak-detection systems.

Another major effort, an in-line inspection program using state-of-the-art corrosion detection technology, is also under way, and expected to take about 10 years to complete. About 140 miles of North Slope pipelines were inspected in 2008. There are 1,600 miles of pipelines in the Greater Prudhoe Bay area alone.

ConocoPhillips also has a very robust corrosion detection and mitigation program for its facilities on the Slope.

Some of the planned ANSR projects under the projects directorate organization include consolidating oil and gas separation facilities (gathering centers) and flow stations, building new power stations, installing more gas handling and water injection capacity, building new worker housing facilities, and constructing flow lines and transit lines. In addition, facilities will be updated with more sensitive safety equipment that automatically detects and responds to gas leaks or fires.

“With ANSR, we’re talking about the potential for investing $5-$10 billion over the next 10 years,” says Gary Boubel, who heads up the projects directorate organization. “These renewal projects easily rival anything done on the North Slope to date.” Petroleum News believes it is reasonable to multiply the estimated BP investment range investment by three to cover ConocoPhillips and ExxonMobil’s matching investment.

Pioneer’s Oooguruk oil field: a production facility

General location: near-shore waters of the Beaufort Sea, next to Nikaitchuq and north of the Kuparuk oil field.

Status: Oooguruk is the first field in northern Alaska operated by an independent oil company, although its oil is processed at the Kuparuk River field by operator ConocoPhillips. Field went into production in June 2008. Although initial construction finished, development drilling continues, yielding better and better results and suggesting Oooguruk will be expanded. Originally slated as a 70 million-to-90-million-barrel field, Oooguruk in early 2009 Pioneer said it was raising estimates of recoverable oil equivalent to between 120 million and 150 million barrels.

Petroleum News sources say Pioneer is looking at building its own production facility, which Pioneer has not officially confirmed that.

Total jobs that were created during peak construction: 600
Total jobs created by production operations: 100-140
Investment: $1 billion

Note: Other significant firsts on the North Slope: Oooguruk is the first field to use multiphase metering to measure fluids moving between units and the first pipe-in-a-pipe flowline. Pioneer holds a 70 percent working interest in the horizons targeted for development at Oooguruk; Eni holds the remaining working interest. From a financial perspective, Pioneer's second quarter 2009 financial report included an after-tax credit of $55 million from ACES — Alaska's Clear and Equitable Share petroleum production tax.

TAPS strategic reconfiguration
General location: Trans Alaska Pipeline System, oil pipeline stretches from Prudhoe Bay 800 miles south to the Port of Valdez.
*Status: At the end of May 2009, the switchover to new electric pumps at pump station 4 of TAPS marked the latest major step in the upgrade of the pipeline system to accommodate declining rates of oil production from Alaska's North Slope (in 1988 flow was 2.1 million barrels per day; today it averages 700,000 bpd, and unless major new sources of oil are discovered and developed, will drop to 500,000 bpd in the next decade). One pump station switchover left to do, which should be complete by late 2011 or early 2012. At the Valdez Marine Terminal cutbacks in berths and tanks are also part of the plan. And Alyeska is engaged in a three- to four-year, $100 million retrofit of the entire ballast water plant at the marine terminal, including the installation of vapor control equipment.

Note: Alyeska foresees further technical challenges along the pipeline system as oil throughput continues to go down. The company has initiated a $10 million low-flow study, to find solutions to the various issues involved. The study is slated for completion at the end of 2010.

ConocoPhillips Greater Mooses Tooth unit development
General location: northeast corner of the NPR-A, west of the Colville River and the village of Nuiqsut.
Status: ConocoPhillips has agreed to spud an exploration well by the third quarter of 2015 in unit. Plans are not final, but the base plan for GMT-1 calls for eight wells, with an upside of 16 wells. GMT-2 still under appraisal, the company said, but the base plan calls for 10 wells with an upside of 19 wells. Fiord West planning is a result of appraisal wells drilled since 2004, ConocoPhillips said, including Iapetus and the Char No. 1, with positive results from the Char well confirming a potential satellite development about 4.5 miles north of Alpine West, an area identified in the 2004 Environmental Impact Statement as CD-12. While Fiord West is in the early conceptual planning stage, the company said the current plan assumes a development with 20-25 horizontal wells drilled from a gravel pad upsized to accommodate 39 wells, with an injection method of miscible water-alternating-gas.

Total jobs expected to be created by development and construction phase of each satellite: 245
Total jobs expected to be created by production operations for each satellite: 10

CD-3 and CD-4 are unmanned but CD-5 and the other NPR-A satellites might require manpower. Greater Mooses Tooth unit was expanded in August 2009, from 147,456 acres to 164,014 acres. First ever NPR-A unit, originally formed in January 2008. All acreage is federal land, but 40,238 acres has been selected for future subsurface conveyance to Arctic Slope Regional Corp.

FEX prospects on state land outside NPR-A

In the October 2006 North Slope area-wide lease sale held by the State of Alaska, Talisman Energy's subsidiary, FEX, took its first onshore state acreage, a block of seven leases west of the trans-Alaska oil pipeline including the old Atlantic Richfield Susie 1 well. The company bid $413,805 for the tracts.

The Susie 1 was drilled in 1966 by Richfield (which would eventually become ARCO) at a surface geological structure north of Sagwon on the Sagavanirktok River. Richfield drilled down through the crest of the surface anticline at Susie. "That well went down to 13,500 feet and had some oil shows in the … upper part of the hole," Gil Mull, an on-site geologist, told Petroleum News in 2002.

Unfortunately, the shows did not prove economic for a remote well by 1968 standards and Richfield abandoned the well in December 1966. A year later Atlantic Richfield, predecessor to ARCO, and Humble Oil, predecessor to Exxon, drilled the discovery well at Prudhoe Bay, about 60 miles north of Susie 1.

Mull, who gained a reputation as one of the top geologists working northern Alaska, also said "some of us were pushing hard to continue the Susie well on down to test the Sadlerochit before that well was abandoned." The top of the Sadlerochit group is the Ivishak formation that forms the main reservoir in the Prudhoe Bay field. Prior to the sale FEX shot seismic over the area.

Then, in October 2007 FEX bid $298,828.80 in the next state North Slope lease sale, high bidder on four tracts southwest of Chevron's White Hills prospect on the southern edge of the North Slope lease sale area, between the Itkillik and Kuparuk rivers, in an area known as the Itkillik Hills that is south fo the Kuparuk River unit. The tracts are adjacent to a block of Anadarko Petroleum, Petro-Canada and BG leases which are in the Foothills lease sale area to the south. One of the four leases, Tract 17, contains BP's 1 Itkillik Unit well.

In the October 2008 State of Alaska North Slope lease sale, FEX bid $590,400 for six tracts -- three adjacent to a four-tract FEX block that contains the Itkillik well and three farther east, adjacent to FEX's leases west of the trans-Alaska oil pipeline.

ConocoPhillips' Bear Tooth unit gas development

General location: northeast corner of the NPR-A, west of the Colville River and the village of Nuiqsut.
Status: Unit approved in August 2009, BLM paperwork (Greg Noble letter) says natural gas has been discovered in the unit, but no oil, so at this point contingent on gas pipeline being built. In order to get the unit approved and the leases extended another 10 years, ConocoPhillips had to agree to drill a well to the primary target in what's designated as Unit Area A. The company also must test the Scout 1 well to the secondary target in lieu of drilling a well for Unit Area B. Both must be completed by June 1, 2012.

Alaska North Slope Heavy Oil

There is an estimated 20 billion barrels of heavy and viscous oil in place under the North Slope, most of it under existing fields in the Greater Prudhoe Bay and Kuparuk River unit areas. Currently Petroleum News sources at ConocoPhillips and BP say a sizable portion of 500 million barrels is producible with today's technology and under the current state fiscal system, which would rank it as one of the largest oil fields in the world.
In order to manage the risks, BP and its partners have adopted an "invest-as-you-learn" strategy for viscous oil on the North Slope, which overlies the main producing reservoirs in the Milne Point, Kuparuk River and Prudhoe Bay fields.

The focus of BP's initial development efforts has been the deepest and most prolific reservoir targets, with each new development more challenging than the last.
Because it's cold and thick, viscous oil doesn't flow to the surface as easily as oil from the main reservoirs.
The West Sak/Schrader Bluff and Ugnu formations where the viscous oil is located are much shallower than the main reservoirs at 2,000 to 5,000 feet beneath the surface, compared to 7,000 to 10,000 feet for the others. That means they're closer to the permafrost layer, so it's not surprising that West Sak/Schrader and Ugnu oil ranges from 40 to 95 degrees Fahrenheit whereas oil in the main Prudhoe Bay reservoir is close to 200 degrees.

Cold, thick oil results in low well productivity and conventional wells in viscous reservoirs produce only 200-300 barrels per day as compared to 10,000 bpd for many of the early Prudhoe wells. It's one of the reasons investments in viscous oil development have trouble competing for capital.

BP is moving into the next phase of its research into the development of North Slope heavy oil, a form of oil with a consistency of chocolate syrup, not producible by conventional means and with a wellhead value perhaps $8 to $15 below that of conventional crude, Mike Utsler, BP senior vice president for greater Prudhoe Bay, told Petroleum News in mid-2009.

In September 2008 BP successfully demonstrated the production of heavy oil from the Ugnu formation at Milne Point S-Pad on Alaska's North Slope, with a technique called cold heavy oil production with sand, or CHOPS, involving the use of a down-hole pump

with an augur-like rotor sucking a mixture of sand and oil up a vertical production well, with the oil being separated from the sand at the surface.

This initial production test did not demonstrate that heavy oil could be produced viably: Viable production would require high production rates combined with acceptable production costs, perhaps involving the use of horizontal wells and new designs of processing facilities.

Specialized production facilities for further tests of heavy oil production were built in Anchorage and shipped to the North Slope this past summer, and BP has drilled a horizontal well at Milne Point for the testing, Utsler said. BP wants to test the feasibility of sustained production from a horizontal well and to test two other types of well completion.

The next well testing of the horizontal CHOPS well got underway in September. Utsler said it will take six to nine months."
Because it can't move on its own, heavy oil would have to be mixed with light oil for shipment down the trans-Alaska oil pipeline.
"It's an unproven technology, but we remain encouraged by our preliminary results," Utsler said.

BP is continuing its research into the development of heavy oil in the expectation that future rising oil prices and improved production technologies will eventually justify heavy oil production.

In addition to producing light oil from the main Prudhoe Bay reservoir, BP has been developing viscous oil, but is too thick to produce economically by conventional means. But with relatively low flow rates and high-cost facilities, high state production taxes combined with fluctuating oil prices have put the dampers on viscous oil development, especially on a large-scale project planned for the western part of the Prudhoe Bay unit, Mike Utsler, BP senior vice president for greater Prudhoe Bay, told Petroleum News in mid-2009.

In particular, state production tax deductible costs, fixed at 2006 cost levels plus 3 percent per year for inflation, limit tax benefits to whatever was in place in 2006, rather than applying to new developments, he said.

"In these challenging times of lower oil prices again (June 2009), where every dollar is critical in terms of its value of investment return, we and our working interest owners are slowing our development of viscous oils, and slowing our development of heavy oils," Utsler said. "… It was a $2 billion, 250 million-barrel (viscous) oil development in greater Prudhoe Bay, but those economics no longer justify the pace of development of that resource."

Cook Inlet Region Inc.'s (CIRI) Underground Coal Gasification & CO2 EOR Project

In October of this year, CIRI announced an ambitious project to establish an underground coal gasification project to generate synthetic gas for power generation and CO2 streams for enhanced oil recovery (EOR) in aging Cook Inlet oil fields. Using proven technology already in use commercially in other regions, CIRI proposes to use a controlled process of gasifying coal in place at depths of 3,000 feet underground. This process eliminates particulate and green house gas emissions and provides a synthetic gas stream that can be used to fire power generation that would otherwise use natural gas as an energy source.

CO2 produced by the gasification process would be captured, liquefied, and then injected into aging oil fields in Cook Inlet to increase oil recovery rates from those fields. The U.S. Department of Energy has initially estimated those oil recovery rates at 300 million additional barrels of oil produced in the Cook Inlet Basin.

This project is in the early stages of development and has not been fully defined for project costs yet. Additional work must also be completed to develop necessary partnerships with oil producers, power companies and oversight agencies in Cook Inlet.

Operating Mines: Additional Information

The following are descriptions of currently operating mines that are not included in the 10-year projection of new projects, but that are making investments to extend the life of the mine or have recently begun operations. In either case, while these mines will not contribute new jobs in the next decade, these descriptions will give the reader an overview of existing operations that provide the foundation upon which new jobs could be added by any projects that are developed in the next decade.

Fort Knox

Kinross Gold Corp.'s Fort Knox gold mine, about 26 miles north of Fairbanks has been in production since 1996 and currently produces about 330,000 ounces of gold per year. The carbon-in-pulp mill at the open-pit mine processes between 33,000 and 45,000 metric tons of ore per day. In February, 2008 Kinross' board of directors approved the construction of a heap leach facility and expansion of the open pit mine. These upgrades are expected to extend the life of the project from 2012 to 2018 and double the expected life-of-mine production to 2.9 million ounces of gold. First gold from the heap leach process was poured on November 11, 2009. Fort Knox currently employs nearly 500 people.

Red Dog Zinc and Lead Mine

Teck Resources Ltd. and NANA Regional Native Corp. are seeking permits to mine the Aqqaluk deposit, which lies adjacent to the north side of the Red Dog Main Pit currently being mined. Aqaaluk contains 51.6 million metric tons of reserves with an average zinc content of 16.7 percent along with 4.4 percent lead, enough ore for Red Dog to continue to be a global zinc supplier for the next two decades. Since Teck and NANA began

mining Red Dog's Main Pit in 1989, they have removed more than 9 million tons of zinc, about 1.5 million tons of lead and nearly 93.5 million ounces of silver. Red Dog Operations provides 475 full-time jobs and about 80 temporary jobs annually.

Greens Creek Silver Mine

Hecla Mining Company became 100 percent owner of the Greens Creek silver mine after spending US$750 million to buy out Rio Tinto's 70.27 percent interest in the in Southeast Alaska operation in April 2008. Hecla currently has about 8 million tons in reserves at Greens Creek, enough ore to operate the 2,100 metric ton per day mill for a little more than 10 years. The mine opened about 20 years ago with 2.9 million metric tons of reserves and has continued to replenish and add to the reserves through exploration. About 350 people currently work at Greens Creek.

Pogo Gold Mine

The Pogo Mine, located about 110 miles southeast of Fairbanks, is Alaska's second largest gold mine. The underground gold mine, Sumitomo Metal Mining Co. Ltd. and Sumitomo Corporation closed a deal in July to purchase Teck Resources Ltd.'s 40 percent interest in the Pogo Gold Mine in Interior Alaska. The transaction required the Japanese companies to pay Teck US$245 million, plus an undisclosed amount of working capital. As a result, Sumitomo Mining and Sumitomo Corp. now own 100 percent of Pogo. Pogo produced 347,219 troy ounces of gold in 2008 from 818,237 tons of ore processed at a rate of 2,236 tons per day. Pogo poured its one millionth ounce of gold in October, 2009. Pogo has a workforce of about 300 people.

Usibelli Coal Mine

The Usibelli Coal Mine is a fourth-generation family owned company founded in 1943 by Emil Usibelli. The company started off supplying coal to the newly constructed Ladd Army Air Field (now Fort Wainright). The company transports coal to six power plants in Interior Alaska, and ships 500,000 metric tons overseas. Usibelli Coal Mine Inc. completed a property wide reassessment of all available geologic data of its leases in the Nenana Coal Field in Interior Alaska, increasing its surface mineable coal reserves to around 700 million tons. Usibelli Coal Mine said future exploration and analysis is expected to push its reserves up to nearly 1 billion tons. With its low-sulfur coal located next to established infrastructure, the Usibelli mine is positioned to address opportunities for new clean coal technology initiatives, such as coal-to-liquids production, and projected expansion in coal demand from the Pacific basin. Usibelli currently has a workforce of about 95 employees.

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