

Conversation Contents

USGS Plan for SO3352

Attachments:

- /8. USGS Plan for SO3352/1.1 USGS Resource Assessment Prop - Alaska North Slope V4.docx
- /8. USGS Plan for SO3352/2.1 USGS Resource Assessment Prop - Alaska North Slope V4.docx
- /8. USGS Plan for SO3352/9.1 USGS Resource Assessment Prop - Alaska North Slope V4.docx

"Hitzman, Murray" <mhitzman@usgs.gov>

From: "Hitzman, Murray" <mhitzman@usgs.gov>
Sent: Wed Jun 14 2017 12:13:14 GMT-0600 (MDT)
William Werkheiser <whwerkhe@usgs.gov>, "Applegate, David" <applegate@usgs.gov>, Judy Nowakowski <jnowakowski@usgs.gov>, Joanne Taylor <jctaylor@usgs.gov>, Walter Guidroz <wguidroz@usgs.gov>, David Houseknecht <dhouse@usgs.gov>, "Meinert, Lawrence" <lmeinert@usgs.gov>
To:
Subject: USGS Plan for SO3352
Attachments: USGS Resource Assessment Prop - Alaska North Slope V4.docx

Bill et al.

USGS was directed last week by Vincent DeVito to prepare a plan for how we will update assessments for North Slope energy resources as per secretarial order 3352. The final plan will incorporate plans from BLM and BOEM. We were directed to send the plan by tomorrow to Mr. DeVito as well as Kate MacGregor and Scott Cameron. (it should also be copied to Kerry Rae).

I am attaching a draft USGS plan that has been developed primarily by Walter Guidroz and Dave Houseknecht. I would like your review and then, if you approve, for you to send it to the individuals mentioned above, copying myself, Walter, and Dave.

Thanks
murray

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Murray W. Hitzman
U. S. Geological Survey
Associate Director - Energy and Minerals
12201 Sunrise Valley Dr., MS 102
Reston, VA. 20192
703-648-4576

"Taylor, Joanne" <jctaylor@usgs.gov>

From: "Taylor, Joanne" <jctaylor@usgs.gov>
Sent: Wed Jun 14 2017 15:10:50 GMT-0600 (MDT)
To: "Applegate, David" <applegate@usgs.gov>, Judy Nowakowski <jnowakowski@usgs.gov>
Subject: Fwd: USGS Plan for SO3352
Attachments: USGS Resource Assessment Prop - Alaska North Slope V4.docx

FYI ... Per Dave, I told Walter it would be fine to share this draft with the other bureaus, at this time. -- Joanne

----- Forwarded message -----

From: Hitzman, Murray <mhitzman@usgs.gov>
Date: Wed, Jun 14, 2017 at 2:13 PM
Subject: USGS Plan for SO3352
To: William Werkheiser <whwerkhe@usgs.gov>, "Applegate, David" <applegate@usgs.gov>, Judy Nowakowski <jnowakowski@usgs.gov>, Joanne Taylor <jctaylor@usgs.gov>, Walter Guidroz <wguidroz@usgs.gov>, David Houseknecht <dhouse@usgs.gov>, "Meinert, Lawrence" <lmeinert@usgs.gov>

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"Applegate, David" <applegate@usgs.gov>

From: "Applegate, David" <applegate@usgs.gov>
Sent: Wed Jun 14 2017 15:17:05 GMT-0600 (MDT)
To: "Hitzman, Murray" <mhitzman@usgs.gov>
William Werkheiser <whwerkhe@usgs.gov>, Judy Nowakowski <jnowakowski@usgs.gov>, Joanne Taylor <jctaylor@usgs.gov>, Walter Guidroz <wguidroz@usgs.gov>, David Houseknecht <dhouse@usgs.gov>, "Meinert, Lawrence" <lmeinert@usgs.gov>
CC:
Subject: Re: USGS Plan for SO3352

Murray/Walter,

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Many thanks, Dave

David Applegate, Ph.D.
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12201 Sunrise Valley Drive MS 111, Reston VA 20192
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applegate@usgs.gov

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"Hitzman, Murray" <mhitzman@usgs.gov>

From: "Hitzman, Murray" <mhitzman@usgs.gov>
Sent: Wed Jun 14 2017 16:17:01 GMT-0600 (MDT)
To: "Applegate, David" <applegate@usgs.gov>
William Werkheiser <whwerkhe@usgs.gov>, Judy Nowakowski <jnowakowski@usgs.gov>, Joanne Taylor <jctaylor@usgs.gov>, Walter Guidroz <wguidroz@usgs.gov>, David Houseknecht <dhouse@usgs.gov>, "Meinert, Lawrence" <lmeinert@usgs.gov>
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"Hitzman, Murray" <mhitzman@usgs.gov>

From: "Hitzman, Murray" <mhitzman@usgs.gov>
Sent: Wed Jun 14 2017 16:19:29 GMT-0600 (MDT)
To: "Applegate, David" <applegate@usgs.gov>
CC: William Werkheiser <whwerkhe@usgs.gov>, Judy Nowakowski <jnowakowski@usgs.gov>, Joanne Taylor <jctaylor@usgs.gov>, Walter Guidroz <wguidroz@usgs.gov>, David Houseknecht <dhouse@usgs.gov>, "Meinert, Lawrence" <lmeinert@usgs.gov>
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"Nowakowski, Judy" <jnowakowski@usgs.gov>

From: "Nowakowski, Judy" <jnowakowski@usgs.gov>
Sent: Wed Jun 14 2017 16:26:26 GMT-0600 (MDT)
To: "Hitzman, Murray" <mhitzman@usgs.gov>
"Applegate, David" <applegate@usgs.gov>, William Werkheiser <whwerkhe@usgs.gov>, Joanne Taylor <jctaylor@usgs.gov>,
CC: Walter Guidroz <wguidroz@usgs.gov>, David Houseknecht <dhouse@usgs.gov>, "Meinert, Lawrence" <lmeinert@usgs.gov>
Subject: Re: USGS Plan for SO3352

thanks for clarifying that, Murray. I'll ask Margo to send it to Vincent, Kate, and Scott under Bill W's name tomorrow.

On Wed, Jun 14, 2017 at 6:17 PM, Hitzman, Murray <mhitzman@usgs.gov> wrote:

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"Nowakowski, Judy" <jnowakowski@usgs.gov>

From: "Nowakowski, Judy" <jnowakowski@usgs.gov>
Sent: Wed Jun 14 2017 16:28:34 GMT-0600 (MDT)
To: "Hitzman, Murray" <mhitzman@usgs.gov>
"Applegate, David" <applegate@usgs.gov>, William Werkheiser <whwerkhe@usgs.gov>, Joanne Taylor <jctaylor@usgs.gov>,
CC: Walter Guidroz <wguidroz@usgs.gov>, David Houseknecht <dhouse@usgs.gov>, "Meinert, Lawrence" <lmeinert@usgs.gov>
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David Applegate <applegate@usgs.gov>

From: David Applegate <applegate@usgs.gov>
Sent: Wed Jun 14 2017 16:40:15 GMT-0600 (MDT)
To: "Nowakowski, Judy" <jnowakowski@usgs.gov>
CC: "Hitzman, Murray" <mhitzman@usgs.gov>, William Werkheiser <whwerkhe@usgs.gov>, Joanne Taylor <jctaylor@usgs.gov>, Walter Guidroz <wguidroz@usgs.gov>, David Houseknecht <dhouse@usgs.gov>, "Meinert, Lawrence" <lmeinert@usgs.gov>
Subject: Re: USGS Plan for SO3352

Murray,

Thanks for the clarification. I misinterpreted Walter's request to share and thought he wanted to get feedback before it went to the principals. Sounds like we are all straightened out and Judy will get it to Vincent and company.

Dave

David Applegate, Ph.D.
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"Nowakowski, Judy" <jnowakowski@usgs.gov>

From: "Nowakowski, Judy" <jnowakowski@usgs.gov>
Sent: Wed Jun 14 2017 16:42:54 GMT-0600 (MDT)
To: Vincent Devito <vincent_devito@ios.doi.gov>, Katharine MacGregor <katharine_macgregor@ios.doi.gov>, Scott Cameron <scott_cameron@ios.doi.gov>
CC: "Karen (Kerry) Rae" <kerry_rae@ios.doi.gov>, William Werkheiser <whwerkhe@usgs.gov>, David Applegate <applegate@usgs.gov>
Subject: Fwd: USGS Plan for SO3352
Attachments: USGS Resource Assessment Prop - Alaska North Slope V4.docx

Hi all,

On behalf of our Acting Director, Bill Werkheiser, I'm forwarding the USGS proposal for updating Alaska North Slope energy resource assessments, per SO 3352.

Please let us know if there are questions.

Thanks!
Judy Nowakowski
Chief of Staff
U.S. Geological Survey

Vincent Devito <vincent_devito@ios.doi.gov>

From: Vincent Devito <vincent_devito@ios.doi.gov>
Sent: Thu Jun 15 2017 05:57:14 GMT-0600 (MDT)
To: "Nowakowski, Judy" <jnowakowski@usgs.gov>
Katharine MacGregor <katharine_macgregor@ios.doi.gov>, Scott
CC: Cameron <scott_cameron@ios.doi.gov>, "Karen (Kerry) Rae"
<kerry_rae@ios.doi.gov>, William Werkheiser
<whwerkhe@usgs.gov>, David Applegate <applegate@usgs.gov>
Subject: Re: USGS Plan for SO3352

Outstanding turnaround. Initial is due Wednesday. Final is due the 31st. Thanks.

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<USGS Resource Assessment Prop - Alaska North Slope V4.docx>

"Cameron, Scott" <scott_cameron@ios.doi.gov>

From: "Cameron, Scott" <scott_cameron@ios.doi.gov>
Sent: Thu Jun 15 2017 10:21:14 GMT-0600 (MDT)
To: "Nowakowski, Judy" <jnowakowski@usgs.gov>
Vincent Devito <vincent_devito@ios.doi.gov>, Katharine
CC: MacGregor <katharine_macgregor@ios.doi.gov>, "Karen (Kerry)
Rae" <kerry_rae@ios.doi.gov>, William Werkheiser
<whwerkhe@usgs.gov>, David Applegate <applegate@usgs.gov>
Subject: Re: USGS Plan for SO3352

Hi Judy,

Am I reading this correctly to infer that ANWR Option 2 would cost \$1.35M beyond what is in the USGS enacted level in FY2017?

What does USGS mean by the parenthetical "(not procured or managed by USGS)" after the title of the ANWR Scenarios 2 and 3? If you got the money, wouldn't you both procure and manage the work?

Thanks,

Scott

Scott J. Cameron

Acting Assistant Secretary for Water and Science, and

Principal Deputy Assistant Secretary for Policy, Management and Budget

Office of the Secretary of the Interior

Desk 202 208 0969

Cell 202 706 9031

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From: "Nowakowski, Judy" <jnowakowski@usgs.gov>
Sent: Thu Jun 15 2017 10:38:22 GMT-0600 (MDT)
To: "Cameron, Scott" <scott_cameron@ios.doi.gov>, Murray Hitzman <mhitzman@usgs.gov>, Walter Guidroz <wguidroz@usgs.gov>
Vincent Devito <vincent_devito@ios.doi.gov>, Katharine MacGregor <katharine_macgregor@ios.doi.gov>, "Karen (Kerry) Rae" <kerry_rae@ios.doi.gov>, William Werkheiser <whwerkhe@usgs.gov>, David Applegate <applegate@usgs.gov>
CC:
Subject: Re: USGS Plan for SO3352

Hi Scott, best to have Murray or Walter answer directly...

Murray/Walter: can you help?

Thanks!

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From: Walter Guidroz <wguidroz@usgs.gov>
Sent: Thu Jun 15 2017 11:21:44 GMT-0600 (MDT)
To: Judy Nowakowski <jnowakowski@usgs.gov>, Scott Cameron <scott_cameron@ios.doi.gov>, Murray Hitzman <mhitzman@usgs.gov>
Vincent Devito <vincent_devito@ios.doi.gov>, Katharine MacGregor <katharine_macgregor@ios.doi.gov>, Kerry Rae <kerry_rae@ios.doi.gov>, William Werkheiser <whwerkhe@usgs.gov>, David Applegate <applegate@usgs.gov>, "Houseknecht, David" <dhouse@usgs.gov>
CC:
Subject: RE: USGS Plan for SO3352

Judy, happy to help. Answers are found below in **red font**. Please let us know if any additional follow-up is required.

Walter

From: Nowakowski, Judy [mailto:jnowakowski@usgs.gov]
Sent: Thursday, June 15, 2017 12:38 PM
To: Cameron, Scott <scott_cameron@ios.doi.gov>; Murray Hitzman <mhitzman@usgs.gov>; Walter

Guidroz <wguidroz@usgs.gov>

Cc: Vincent Devito <vincent_devito@ios.doi.gov>; Katharine MacGregor <katharine_macgregor@ios.doi.gov>; Karen (Kerry) Rae <kerry_rae@ios.doi.gov>; William Werkheiser <whwerkhe@usgs.gov>; David Applegate <applegate@usgs.gov>

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Yes, that's correct – the current enacted FY2017 funding for the existing USGS Energy Program Alaska Petroleum Systems Project (\$1.5 million) does not include funding for this option. Further, there is no source within USGS that allows for redirection.

What does USGS mean by the parenthetical "(not procured or managed by USGS)" after the title of the ANWR Scenarios 2 and 3? If you got the money, wouldn't you both procure and manage the work?

Considering that BLM is responsible for managing and archiving the vintage data, procurement would be more appropriately handled by BLM with collaborative technical input from USGS and BOEM. However, if USGS were funded either in FY2017 or FY2018, the USGS would procure and manage the reprocessing with collaborative input from BLM and BOEM.

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Scott Cameron <scott_cameron@ios.doi.gov>

From: Scott Cameron <scott_cameron@ios.doi.gov>
Sent: Thu Jun 15 2017 17:31:22 GMT-0600 (MDT)
To: Walter Guidroz <wguidroz@usgs.gov>
Judy Nowakowski <jnowakowski@usgs.gov>, Murray Hitzman <mhitzman@usgs.gov>, Vincent Devito <vincent_devito@ios.doi.gov>, Katharine MacGregor <katharine_macgregor@ios.doi.gov>, Kerry Rae <kerry_rae@ios.doi.gov>, William Werkheiser <whwerkhe@usgs.gov>, David Applegate <applegate@usgs.gov>, "Houseknecht, David" <dhouse@usgs.gov>
CC:
Subject: Re: USGS Plan for SO3352

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Acting Assistant Secretary for Water and Science, and Principal Deputy Assistant Secretary for Policy, Management and Budget
Department of the Interior

Phone: 202 208 0969
Cell service 202 706 9031

Sent from my iPhone

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"Hitzman, Murray" <mhitzman@usgs.gov>

From: "Hitzman, Murray" <mhitzman@usgs.gov>
Sent: Fri Jun 16 2017 07:22:33 GMT-0600 (MDT)
To:

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Reston, VA. 20192

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"Rae, Kerry" <kerry_rae@ios.doi.gov>

From: "Rae, Kerry" <kerry_rae@ios.doi.gov>
Sent: Fri Jun 16 2017 07:24:52 GMT-0600 (MDT)
To: "Hitzman, Murray" <mhitzman@usgs.gov>
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Subject: Re: USGS Plan for SO3352

It's in the works....+Michelle who is working to schedule now.

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"Applegate, David" <applegate@usgs.gov>

From: "Applegate, David" <applegate@usgs.gov>
Sent: Fri Jun 16 2017 07:39:01 GMT-0600 (MDT)
To: "Hitzman, Murray" <mhitzman@usgs.gov>
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Murray,

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Dave

David Applegate, Ph.D.
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From: "Hitzman, Murray" <mhitzman@usgs.gov>
Sent: Fri Jun 16 2017 10:11:40 GMT-0600 (MDT)
To: "Applegate, David" <applegate@usgs.gov>
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hope the trip is fantastic - and that you don't get this until it is done!

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DATE: June 13, 2017
TO: Vincent DeVito, Department of Interior Energy Counselor
FROM: William H. Werkheiser, Acting Director, U.S. Geological Survey
SUBJECT: Alaska North Slope Assessment Proposal (S.O. 3352)

Secretarial Order 3352 (Section 4b) directs the Assistant Secretary – Land and Minerals Management and the Assistant Secretary – Water and Science to submit to the Counselor to the Secretary for Energy Policy a joint plan for updating current assessments of undiscovered, technically recoverable oil and natural gas resources of the Alaska North Slope, focusing on Federal lands including the National Petroleum Reserve in Alaska (NPRA) and the Section 1002 Area of the Arctic National Wildlife Refuge (ANWR). This document represents the USGS submission for the joint plan.

KEY TAKEAWAYS

- USGS can conduct energy resource assessments of NPRA, ANWR 1002 area, central North Slope, and west of NPRA. Assessments would be conducted in collaboration with Alaska Region BLM and BOEM. Alaska Department of Natural Resources Division of Geological and Geophysical Surveys (DGGS) and the Alaska Department of Natural Resources Division of Oil and Gas (DOG) personnel would be invited to contribute if funding can be secured.
- A USGS energy resource assessment of NPRA could be completed by late 4Q CY2017. Total USGS costs for this NPRA assessment are estimated at \$2.55 M. USGS FY17 costs of \$1.6 M can be covered but an additional \$0.5M for support of Alaska DGGS and DOG personnel is required. FY18 costs of \$0.95M for the project have not been fully included in the President's FY18 budget request.
- Three options are possible for a USGS energy resources assessment of ANWR 1002:
 - Determination of no new data so no assessment is conducted (cost \$0)
 - New USGS energy resource assessment based on reprocessing of 1984-85 2-D seismic data. However, USGS has neither the funds nor the administrative capacity to procure the reprocessed data. Public release of results of such an assessment would be planned for late 4Q CY2018. Total USGS costs (FY17-19) are estimated at \$4.85 M.
 - New USGS energy resource assessment utilizing data from a new 3-D seismic survey (not procured or managed by USGS). Release of the assessment results would occur during late CY2019. Total USGS costs (FY17-19) are estimated at \$3.575 M.
- USGS energy resource assessments could be completed by end CY2020 for the central North Slope and by late CY2021 for the area west of NPRA. Funding for the proposed assessments has not been included in the President's FY18 request.
- The Energy Resources Program would have to secure additional funding for FY18 and beyond to undertake the proposed assessments.

Background

USGS assesses undiscovered, technically recoverable oil and gas resources of the U.S. and the world, using a variety of methodologies that have been peer reviewed by the American Association of Petroleum Geologists Committee on Resource Evaluation. USGS conducts assessments when directed to do so by the Administration or Congress, when requested to do so by Federal land-management agencies, or when compelling new data become available that may substantially modify the scientific perspective of undiscovered resource potential.

This plan for energy assessments of the North Slope of Alaska (Figure 1) was prepared by the U.S. Geological Survey (USGS) in collaboration with the Bureau of Land Management – Alaska Region (BLM) and the Bureau of Ocean Energy Management – Alaska OCS Region (BOEM). USGS’s mission includes assessing oil and natural gas resources of all onshore and State waters areas of the United States. BLM and BOEM manage oil and gas resources of Federal lands and the Outer Continental Shelf (OCS), respectively. Their missions include conducting lease sales and collecting and archiving pertinent exploration and development data.

These assessment plans include personnel from the Alaska Department of Natural Resources Division of Geological and Geophysical Surveys (DGGS) and the Alaska Department of Natural Resources Division of Oil and Gas (DOG) to work in support of the assessments.

Current Alaska North Slope Assessments

Current USGS assessments of the North Slope include:

- * Conventional oil and gas in NPRA (2010)
- * Conventional oil and gas in the Central North Slope (2005)
- * Conventional oil and gas in the ANWR 1002 area (1998)
- * North Slope-wide assessments of “unconventional” oil and gas in shale (self-sourced) reservoirs (2012), gas in coal beds (2006), and gas in hydrates (2008)

USGS assessments of the Alaska North Slope differ somewhat from those of the Lower 48 because the North Slope is an under explored basin, with fewer exploration wells and producing fields than most Lower 48 basins. North Slope assessments therefore rely more heavily on interpretation of seismic reflection and other subsurface data and on information derived from field work focused on rock formations that may be exploration objectives beneath the North Slope.

For example, the USGS conducted an assessment of NPRA in 2002 following the discovery and development of the giant Alpine (Colville River) field, which represented a petroleum trap type previously unknown on the North Slope. However, subsequent industry drilling in NPRA on leases covering geologic features similar to Alpine revealed that the oil charge in the Alpine field changes to mainly a gas charge just 25 miles west of Alpine. As these results became known and a sufficient amount of data from the new wells became available, USGS updated the NPRA assessment in 2010, with the main result being a significant reduction in the volume of oil estimated to be present.

In the 2010 NPRA assessment, the two plays estimated to contain the greatest potential for undiscovered oil were the Torok and Nanushuk Formations, in which huge oil discoveries have been announced since 2015. Recently announced discoveries include Pikka (>1,200 million barrels of oil (MMBO) recoverable from Nanushuk), Willow (>300 MMBO recoverable from Nanushuk), and Smith Bay (perhaps >1,000 MMBO recoverable from the Torok). If these announced volumes of recoverable oil are verified by development, the estimated largest oil accumulation size (a significant input to the assessment methodology) would be increased by one to two orders of magnitude compared to the assessment input used in the 2010 assessment of these formations. Thus, these significant discoveries represent compelling new data that may substantially modify the scientific perspective of potential resources in these plays.

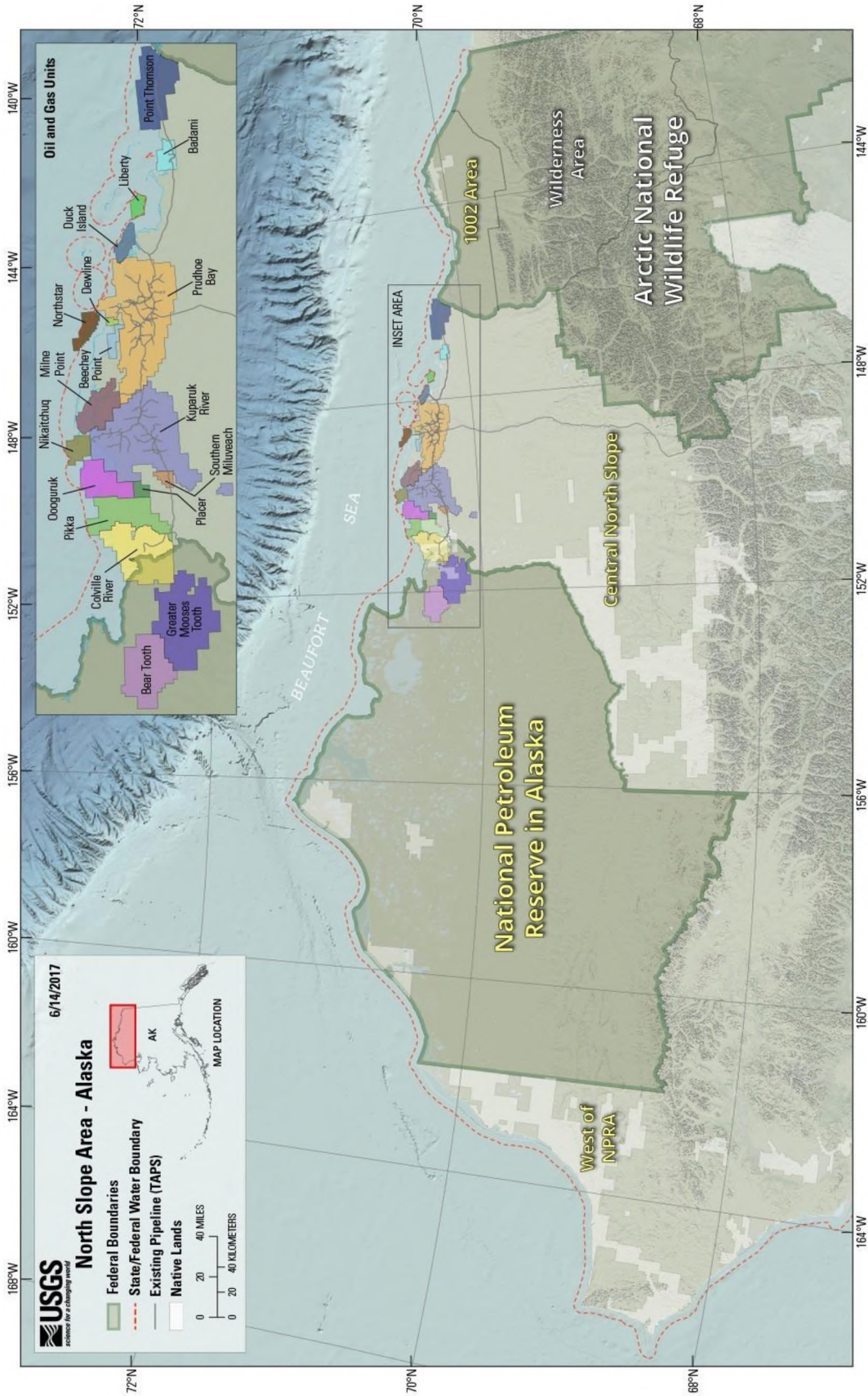


Figure 1: Map of Arctic Alaska showing oil and gas assessment areas (indicated by yellow text). Oil and gas units shown in inset map.

Generalized USGS Assessment Workflow

The assessments directed by Secretarial Order 3352 (Section 4b) will be conducted using the following generalized workflow that is followed for all USGS energy assessments. USGS protocol requires that steps 1-7 be as transparent as permitted by non-disclosure agreements related to proprietary data.

1. Acquire or access essential seismic reflection (and perhaps other pertinent data) to be used in conducting each assessment. This step in the workflow will determine the start date of each assessment and therefore will determine the date on which a completed assessment will be published. Possible start dates for North Slope assessments are addressed in the following section.
2. Assemble a team of scientists with expertise in pertinent disciplines of the earth sciences (e.g., petroleum geologist, geophysicist, seismic interpreter, organic geochemist, structural geologist, etc.). Assessment workflow steps 1 – 7 for NPRA and the ANWR 1002 Area will comprise a team that includes scientists from USGS, BLM and BOEM.
3. Compile all additional data pertinent to the assessment, determine additional data needs, acquire additional data as budget permits, integrate all data into digital data base, and analyze/interpret all data in a digital workflow.
4. Define petroleum systems, plays, or assessment units that fully represent formations known to contain or hypothesized to contain technically recoverable oil and natural gas resources.
5. Communicate and coordinate with Alaska technical agencies, as appropriate, throughout the data collection, analysis, and interpretation workflow. The Alaska agencies will include DGGs, DOG, and the Alaska Oil and Gas Conservations Commission.
6. Hold public review meetings in Anchorage, Houston and other locations as appropriate to (a) explain rationale for conducting, and timeline for completing, assessment; (b) present scientific basis of assessment (e.g., explain framework geology, regional and local petroleum systems, likely reservoir units, trap geometries, and key risk factors that determine the probability that technically recoverable resources are present; (c) present fundamental geological entities (i.e., plays or assessment units) to be assessed; (d) present details of assessment methodology to be used; and (e) seek constructive feedback from knowledgeable scientists. USGS experience indicates that these public meetings build buy-in and support for assessment results from State agencies and the oil industry.
7. Revise fundamental aspects of the geological framework of the assessment based on constructive feedback from public meetings and follow-up discussions with petroleum geology experts from State agencies and the oil industry.
8. Conduct assessment – USGS Alaska project team presents the assessment framework and inputs to USGS National and Global Assessment review panel. Results from this meeting are subjected to rigorous statistical analysis, which generates probabilistic results.
9. Technical reports will be produced that summarize the geological science that forms the foundation of the assessment. The assessment results are then incorporated into non-technical fact sheets summarizing results. These documents are submitted to USGS technical and

editorial review as required by USGS Science Integrity Policy. Fact sheets are given priority to assure timely release.

- Assessment results are released to the public by publication of fact sheet. Simultaneous briefings are presented to the Department of the Interior and elsewhere to share results with the Administration, Congress, and the public at large.

PROPOSED NORTH SLOPE ASSESSMENTS:

National Petroleum Reserve – Alaska (NPRA)

Review of technical data has been initiated and involves personnel from USGS, BOEM and BLM. Primary data will include 3-D seismic reflection data, exploration well data, and a large volume of ancillary data generated by ongoing USGS research and data submitted to the BLM by industry.

BOEM has conducted advanced analysis of 3-D seismic data for NPRA lease sales, and USGS has conducted research on all rock units to be evaluated. The first three tasks of the workflow, therefore, will comprise review of all data and analyses by an integrated team of USGS, BLM and BOEM personnel and building of consensus on plays to be assessed and risk structure to be imposed on the assessment. It is anticipated that this step can be completed late in the third quarter (3Q) of calendar year (CY) 2017.

Public review meetings and the USGS assessment could be held in 4Q CY2017, with a date for results release in late 4Q CY2017 (Figure 2). Total USGS costs for this NPRA assessment are estimated at \$2.55 million. Included in these costs is \$0.50 million dedicated to the Alaska Department of Natural Resources to conduct analytical services in support of the NPRA resource assessment.

Figure 2: Estimated completion timeline for NPRA Resource Assessment

Task	CY 2017				CY 2018				CY 2019			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Review technical data and interpret seismic data	■											
Refine interpretations of seismic and well data		■										
Define AUs; prepare for public review & assessment			■									
Conduct public review meetings				■								
Conduct assessment				■								
Prepare release document (fact sheet)				■								
Conduct technical and editorial review				■								
Release assessment				■								
Hold briefings for Admin., Congress, State et al.				■								

Alaska National Wildlife Refuge 1002 Area

Three ANWR 1002 Area assessment scenarios are considered, which are detailed below:

Scenario 1: Assumes that existing vintage 2-D seismic data are not reprocessed

No updated assessment would be conducted because no new post-1998 data exist that would compel the USGS to consider conducting a new assessment. The only new information available since completion of the 1998 assessment is summarized below.

- A. Information from two wells (Stinson and Warthog) drilled in nearby state waters prior to completion of the 1998 assessment was released after the assessment and analyzed by USGS. The Stinson well discovered oil in two rock units, but the volumes of oil were determined to be sub-economical. The Stinson lease blocks were relinquished and subsequently acquired by another company, although no further exploration has been conducted. The Warthog well was declared a dry hole, and the lease blocks were relinquished and never re-acquired. The formations in which oil was found in the Stinson well and the formation that was the main objective of the Warthog well were assessed by USGS in 1998. The information gleaned from data released from both wells is consistent with the results of the 1998 assessment.
- B. After nearly three decades of delays, the giant oil, gas, and condensate accumulation at Point Thomson is now being developed by ExxonMobil. The limited available seismic and well data indicate that little or none of the main reservoir extends into the 1002 area. Moreover, the structure of the hydrocarbon trap indicates unfavorable conditions in the 1002 area (i.e., the ANWR area is down dip from the Point Thomson accumulation).
- C. Oil accumulations discovered by Exxon in 1975 on Flaxman Island, just offshore from the 1002 Area, and by BP in 1994 at Sourdough, located less than a mile west of the 1002 area, have not been developed. BP dropped the leases over Sourdough, whose well data remain proprietary, after disappointing results at the nearby Badami field, but the leases have been incorporated into the Point Thomson Unit. ExxonMobil has indicated that it is evaluating the possibility of developing the Flaxman Island and Sourdough accumulations but no development decision has been made. Despite these recent developments, USGS was aware of the Flaxman Island and Sourdough discoveries prior to completion of the 1998 assessment.

Based on the information summarized above, the USGS concludes that no basis for conducting an updated assessment exists.

Scenario 2: Assumes that the 1984-1985 2-D seismic data will be reprocessed (not procured or managed by USGS)

The timeline for this scenario includes procurement of state-of-the-art industry reprocessing of the vintage data during 4Q CY2017, and reprocessing of the vintage data during late 4Q CY2017 through early 2Q CY2018 (the seismic company that collected original data estimates six months for reprocessing). USGS and BOEM scientists would make multiple visits to the company conducting the reprocessing to provide interactive geological constraints to assure optimal results. During the reprocessing, new data would be collected from well samples adjacent to the 1002 Area and from outcrop samples collected during a short field season in 2017. These data would include constraints on oil source-rock quality, uplift and exhumation history, and reservoir-rock quality. USGS recommends collection of an airborne gravity gradiometry survey across the 1002 Area pending sufficient funds

(would require approximately \$2.5M), but neither procurement nor interpretation of such a survey are included in the USGS budget.

After reprocessed seismic data were delivered, a team of USGS and BOEM scientists would interpret the data, produce maps, and define plays (assessment units) to be evaluated. It is estimated that these tasks could be completed during 1Q-3Q CY2018 (Figure 3). This schedule should allow public review meetings to be held during 3Q-4Q CY2018, with the assessment and technical review of release materials during 4Q CY2018. Public release of results would be planned for late 4Q CY2018.

Total USGS costs are estimated at \$4.85 million over three fiscal years. Included in these costs are \$0.75 million dedicated to the Alaska Department of Natural Resources to conduct tasks associated with analytical services in support of the ANWR 1002 Area assessment.

Figure 3: Estimated completion timeline for ANWR Resource Assessment (Scenario 2)

Task	CY 2017				CY 2018				CY 2019			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Seismic data reprocessing (existing 2-D data) *				█	█	█						
Review technical data and interpret seismic data					█	█	█					
Refine interpretations of seismic and well data						█	█					
Define AUs; prepare for public review & assessment							█	█				
Conduct public review meetings								█				
Conduct assessment									█			
Prepare release document (fact sheet)										█		
Conduct technical and editorial review											█	
Release assessment												█
Hold briefings for Admin., Congress, State, et al.												█

* USGS does not procure reprocessed vintage 2-D seismic data, but provides geological and geophysical advice to seismic vendor.

Scenario 3: Assumes that a 3-D seismic survey is conducted during 4Q CY2017 and 1Q CY2018 (not procured or managed by USGS)

This task, including initial processing of the new 3-D data, would be difficult, but not impossible, to achieve by end CY 2019 (Figure 4). Interpretation and mapping of the 3-D and ancillary data by USGS and BOEM scientists would occur during 3Q and 4Q of CY 2018 and 1Q of CY2019. Definition of plays (assessment units) through public review of the assessment work products would be completed by late 3Q of 2019, and the assessment, report preparation, technical review, and release of the assessment results would occur during 4Q of 2019.

If the 3-D seismic survey was not completed until winter 2018-2019, the timeline would be delayed by one year. In that case, the workflow for assessment of the Central North Slope would be advanced by one year and would commence during 3Q or 4Q of 2018.

Total USGS costs are estimated at \$3.575 million. Included in these costs are \$0.5 million dedicated to the Alaska Department of Natural Resources to collaborate in field work and ancillary analytical tasks.

Figure 4: Estimated completion timeline for ANWR Resource Assessment (Scenario 3)

Task	CY 2017				CY 2018				CY 2019			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
3-D seismic survey and processing of data *				[Orange bar spanning 4Q 2017 to 3Q 2018]								
Review technical data and interpret seismic data						[Blue bar spanning 3Q 2018 to 2Q 2019]						
Refine interpretations of seismic and well data									[Blue bar spanning 1Q 2019 to 2Q 2019]			
Define AUs; prepare for public review & assessment										[Blue bar spanning 2Q 2019 to 3Q 2019]		
Conduct public review meetings											[Blue bar spanning 3Q 2019 to 4Q 2019]	
Conduct assessment												[Blue bar in 4Q 2019]
Prepare release document (fact sheet)												[Blue bar in 4Q 2019]
Conduct technical and editorial review												[Blue bar in 4Q 2019]
Release assessment												[Blue bar in 4Q 2019]
Hold briefings for Admin., Congress, State, et al.												[Blue bar in 4Q 2019]

* USGS plays no role in designing or acquiring a 3-D seismic survey.

Central North Slope

Assessment of the Central North Slope would rely heavily on the public release of tax-incentive 3-D seismic reflection data by the Alaska Department of Natural Resources. Assuming that several of these data sets are released before or during 2Q CY2018 and that funding is available for the USGS to license other 3-D and 2-D seismic data, an assessment could be completed by the end of CY2020 (Figure 5). As no Federal lands are involved in this assessment, much or all of the technical analyses would be completed by USGS scientists, with the expectation that BOEM and BLM scientists could provide technical review of the interpretations. Alaska state agencies would be invited to collaborate on data interpretation and play (assessment unit) definition.

If the ANWR 1002 Area 3-D seismic survey is not completed until winter 2018-2019, the timeline in Figure 5 could be advanced by one year. In that case, the workflow for assessment of the Central North Slope would commence during 3Q or 4Q of 2018.

Total USGS costs are estimated at \$6.4 million. Included in these costs are \$0.4 million dedicated to the Alaska Department of Natural Resources to collaborate in field work and ancillary analytical tasks.

Figure 5: Estimated completion timeline for Central North Slope Resource Assessment

Task	CY 2019				CY 2020				CY 2021			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Acquire (license) existing 2-D/3-D seismic data			■									
Review technical data and interpret seismic data				■								
Refine interpretations of seismic and well data					■							
Define AUs; prepare for public review & assessment						■						
Conduct public review meetings							■					
Conduct assessment								■				
Prepare release document (fact sheet)									■			
Conduct technical and editorial review									■			
Release assessment									■			
Hold briefings for Admin., Congress, State, et al.									■			

West of NPRA

The area west of NPRA, both onshore and beneath Alaska state waters, contains only sparse and very old (1970s vintage) 2-D seismic data. Workflow for this assessment would include review with BOEM of seismic data in the Chukchi Sea to evaluate the extent to which those data may inform the geology of the onshore and state waters. Unless new seismic data become available, it is anticipated that existing data could be reviewed and interpreted, and that an assessment would be conducted between 3Q CY2020 and 4Q CY2021 (Figure 6). It is anticipated that much or all of the technical analyses would be completed by USGS scientists with the expectation that BOEM and BLM scientists will provide technical review of the interpretations. Because much of the onshore area consists of Native lands, USGS would also invite the Arctic Slope Regional Corporation to provide a technical review of USGS work.

Total costs are estimated at \$4.4 million. Included in these costs are \$0.2 million dedicated to the Alaska Department of Natural Resources to collaborate in field work and ancillary analytical tasks.

Figure 6: Estimated completion timeline for West of NPRA Resource Assessment

Task	CY 2019				CY 2020				CY 2021			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Acquire existing 2-D/3-D seismic data							■	■	■			
Review technical data and interpret seismic data								■	■	■		
Refine interpretations of seismic and well data									■	■	■	
Define AUs; prepare for public review & assessment										■	■	
Conduct public review meetings											■	
Conduct assessment												■
Prepare release document (fact sheet)												■
Conduct technical and editorial review												■
Release assessment												■
Hold briefings for Admin., Congress, State, et al.												■

USGS Budgets

Costs for each assessment by Fiscal Year are included in Table 1 on the following page. The current annual budget (FY17) of the USGS Alaska Petroleum Systems (APS) project is \$1.5 million. This budget includes research on North Slope and southern Alaska basins. The Energy Resources Program is currently redirecting a limited amount of funding (approximately \$0.1 million) from work in southern Alaska to the North Slope. The current budget shortfall to the APS to accomplish what is required for the assessments from the FY17 budget is \$2.85 million. To increase the efficiency of the rapidly upcoming in-state summer field work USGS requests that personnel from both the Alaska Division of Geological and Geophysical Surveys (DGGs) and the Alaska Department of Natural Resources Division of Oil and Gas (DOG) participate in field studies in support of the assessments if a second helicopter can be contracted; USGS would pay per diem costs for all personnel involved (cost of \$0.5M). The current budget does not cover the costs for the Alaska personnel. Funds to supplement the existing APS budget need to be secured as soon as possible within the Department.

Funding for the proposed assessments has not been included in the President’s FY18 request. Proposed budgets for the Energy Resources Program will have be modified to cover the proposed assessments and additional funding secured. Funding for the assessments in FY19 and beyond will be built into upcoming budget requests.

Table 1: Cost information, Alaska North Slope Assessment Options (numbers in millions of dollars)

Assessment	FY17	FY18	FY19	FY20	FY21	FY22	Total
National Petroleum Reserve – Alaska	1.600	0.950	0.000	0.000	0.000	0.000	2.550
Alaska National Wildlife Refuge							
ANWR – Option 1	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ANWR – Option 2	1.350	2.550	0.950	0.000	0.000	0.000	4.850
ANWR – Option 3	0.000	0.375	2.250	0.950	0.000	0.000	3.575
Central North Slope	0.000	0.000	3.250	2.200	0.950	0.000	6.400
West of NPRA	0.000	0.000	0.000	1.250	2.400	0.750	4.400

Note: Totals not provided due to range of assessment scenarios provided.

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