THE STATE of ALASKA
GOVERNOR BILL WALKER

Department of Natural Resources
Division of Oil & Gas
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November 30, 2015

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Scott Digert
Manager of Reservoir Management
Alaska Resource
BP Exploration (Alaska) Inc.
PO Box 196612
Anchorage, AK 99519-6612

Re: Prudhoe Bay Unit, Western Satellites 2016 Plan of Development – Approval

Dear Mr. Digert:

On September 30, 2015, the State of Alaska, Department of Natural Resources, Division of Oil and Gas (Division) timely received the proposed Prudhoe Bay Unit (PBU) – Western Satellites 2016 Plan of Development (POD). The Division notified BP Exploration (Alaska) Inc. (BPXA) by email on October 12, 2015 that the POD was complete. The Division met with BPXA and the other PBU working interest owners on September 29, 2015 for the PBU Western Satellites annual agency review.

The PBU Western Satellites consist of five Participating Areas (PAs): Aurora, Borealis, Midnight Sun, Orion, and Polaris. The Aurora, Borealis, and Midnight Sun PAs produce primarily from the Kuparuk River Formation, while the Orion and Polaris PAs produce oil with higher viscosity from the Schrader Bluff Formation. The PAs commenced sustained production between late 1999 (Polaris PA) and mid-2002 (Orion PA) with oil production peaking in March 2004 at approximately 50,550 barrels of oil per day (BOPD). Production from the Western Satellites PAs during the latest report period ending September 2015 was ~25,450 BOPD. A major field shutdown for facility work and upgrades led to decreased oil production in all PAs this report period. The Gathering Center 2 (GC-2) turnaround event occurred from the end of July 2014 to the beginning of September 2014, shutting in production in the Western Satellites PAs. The reporting period for oil production rate totals listed below for each PA extends from July 1, 2014 to June 30, 2015.

Aurora PA POD

The overall oil production rate at the Aurora PA declined from 4,655 BOPD in 2014 to 4,305 BOPD in 2015. Two new sidetrack producer wells (S-42A and S-44A) were drilled in the third quarter of 2015 with production starting in late 2015. The S-42A replaces the abandoned S-108 well which was briefly returned to service in 2014. The S-128 water alternating gas (WAG) injector began injecting miscible injectant (MI) in May 2015. BPXA also performed wellwork operations including a rig workover to restart the S-101 well and a successful hydraulic

fracturing treatment of the S-129 well. There were 310 wellwork jobs reported in the Western Satellites PAs during the 2015 POD period, of which 46 were rate-adding jobs. In previous years, many of those operations occurred in the Aurora and Polaris PA.

For the Aurora 2016 POD, no new wells are proposed. Potential future infill targets have been identified and considered for future drilling. A producer well in the S-107 pattern is being evaluated in 2016. A new injection well to be drilled east of the S-105 well is being evaluated after being deferred in 2015. Work to maintain reservoir pressure for MI optimization and increase voidage replacement ratios in each fault block continues in the PA.

Midnight Sun PA POD

The small, fault-bounded Midnight Sun PA continues to produce from two wells with three water injectors online. Overall oil production rate at the Midnight Sun PA decreased from 1,106 BOPD in 2014 to 960 BOPD in 2015. A new WAG injector well (P1-122i) was drilled in early 2015 from the Point McIntyre P1 pad to the Midnight Sun PA. The Point McIntyre pad is the closest pad supplied with MI. The P1-122i injector well is experiencing casing integrity issues and challenges in isolating zones. With all other wells in the PA currently online, the priority for the 2016 POD period is remedial actions, and possibly a rig workover, to repair the new injector well. No other well or facility work is proposed in the 2016 POD.

Polaris PA POD

The Polaris PA is managed as a WAG flood with injectors alternating between produced water and MI. Overall oil production rate at the Polaris PA decreased again during the 2015 POD period from 4,080 BOPD in 2014 to 3,890 BOPD in 2015. No new drill wells are planned for 2016 and no wells have been drilled in the PA since June 2011. Much of the eastern portion of the PA remains undrilled. The M-Pad development and S-Pad expansion projects are included in BPXA's West End Development project which entered the Select Stage in 2014, but the expansion is now deferred. The 2016 POD lists plans, primarily focused on surveillance of the PA, which include running opportunistic logs for additional reservoir information, work on the dynamic model at the M- and S- Pad area to improve subsurface description, and balancing waterflood pattern voidage to provide proper pressure support.

Borealis PA POD

Overall oil production rate at the Borealis PA decreased from 9,932 BOPD in 2014 to 8,768 BOPD in 2015. No new wells were drilled during the 2015 POD period. A Z-pad booster pump was repaired which restored produced water injection to the L-117, V-100, and V-104 wells. The S-riser on the V-106 and V-117 wells were replaced. Additionally, the reprocessing of the S3 3D seismic survey was completed in the first half of 2015.

Two potential development wells were being evaluated in Borealis for late 2014 to early 2015. These wells were not mentioned in the 2016 POD. Recently drilled Z-Pad wells have been used to update the reservoir simulator model to evaluate scenarios for additional drilling or well

sidetrack potential. Reservoir surveillance and wellwork jobs will continue during the 2016 POD period.

Orion PA POD

Overall oil production rate at the Orion PA was down from 5,483 BOPD in 2014 to 4,693 BOPD in 2015. Decreases in oil production rate at the Orion PA is primarily due to shut-in L-Pad multilateral wells and their offset injectors. L-Pad well operability remained below 50 percent during the reporting period. Significant producer downtime at L-Pad is caused by sand production, matrix bypass events (MBEs), and downhole equipment failures. Producers L-200, L-203, L-204, L-205, and L-250 were all shut-in during some portion of the 2015 POD period and continue to be shut-in as of September 2015. There are also 10 of 16 injection wells offline at L-Pad; 4 of 20 injection wells offline at V-Pad, and one Z-Pad water injector shut-in because the offset producers are shut-in. Two MBEs were confirmed at Orion injectors V-211 and V-224 during this POD period. The MBE in V-224 was remediated in July 2015, and this well will return to injection service after waterflood regulating values are installed. Wellwork is pending in order to remediate V-211 and bring it back online.

No new development wells will be drilled during the 2016 POD. Plans for a conceptual test of a new openhole gravel-pack lateral producer and an associated closely-spaced injector have been deferred again due to the current economic climate. Increasing the time Orion wells are online will have a large impact on the ability to deliver projected rate streams. Other well technology trials will be closely followed to see if they offer an improvement in sand control. BPXA also plans to continue work to update the Orion structural framework and subsurface model, continue seismic inversion and attribute calibration to understand reservoir distribution of the N- and O-Sands, and continue geo-mechanical studies to understand potential mechanisms for sand production and MBE formation.

West End Development project: Orion, Borealis, Polaris, and I-Pad

The West End Development project incorporates the expansion of Schrader Bluff oil development mainly in Orion and Polaris. The plans for integrated development of these PAs entered “Select stage” in the June 2014. The West End Development project was established to address problems encountered with facility processing capability of sand-laden viscous oil, facilities debottlenecking, gas handling, mechanisms to provide artificial lift, reducing reservoir uncertainties, reducing viscous well downtime, and optimizing pad design. As of September 2015, BPXA deferred many plans for the West End Development project and cancelled the West End optimization project focused on facilities debottlenecking and enhancing gas and water handling capabilities.

A primary issue that has been consistently identified as preventing West End development is the bottleneck at GC-2 which processes production from the Borealis and Orion PAs. Over the past several years, the West End optimization project has focused on debottlenecking Western Satellite production into GC-2. The West End optimization project included West End Production Pipeline project (WEPP) and the water handling capacity project. In December 2014,

the U-Pad jumper, a three-phase flowline, was put into service and provides additional production benefit for West End production and allows for flexibility to optimize the production system given current facility capacities. Additionally, integration and updating of the West End reservoir model with the Prudhoe Bay full-field model indicates the previously estimated need for debottlenecking is lower than originally planned. These activities have rendered the continuation of the WEPP project and the water handling expansion project unnecessary, thus BPXA has cancelled the West End optimization project.

While the West End Development project has been deferred, some work will continue on this project. BPXA is evaluating designs to integrate multiple wells and production manifolds into single modules and creating templates to optimize fabrication and facility installations to achieve lower installed costs and higher operating efficiency which will continue into 2016. Work is ongoing to optimize the separation systems efficiency at GC-2 to improve processing the large volumes of sands being produced. During the past several years, solids handling at GC-2 was upgraded via installing a solids accumulator, improved sand jetting procedures, and dehydrator sand jetting. These upgrades realized some improvement in sand handling; however, they did not deliver the required level of improvement. Engineering work on facility and well design is ongoing to address the sand–laden oil production issue. Work will continue on the dynamic model in the I-Pad area to improve subsurface descriptions. During the deferral period, PBU owners will also evaluate learnings from other technology trials where Schrader Bluff oil is produced.

Consideration of 11 AAC 83.303 Provisions

When considering a POD, the Division must consider the criteria in 11 AAC 83.303(a) and (b). Accordingly, the Division considered the public interest, conservation of natural resources, prevention of economic and physical waste, protection of all interested parties including the state, environmental costs and benefits, geological and engineering characteristics of reservoirs or potential hydrocarbon accumulations, prior exploration activities, plans for exploration or development, economic costs and benefits to the state, and any other relevant factors, including mitigation measures. 11 AAC 83.303(a)-(b).

In approving prior PODs for the PBU Western Satellites, the Division considered 11 AAC 83.303 and found that the PODs promoted conservation of natural resources, promoted prevention of waste, and protected the parties' interests. The Division incorporates by reference those findings.

The Western Satellites PAs are all maturing fields where oil production has been declining. The continued wellwork involved in bringing wells back online is crucial to continuing production, stemming decline, and maximizing the recovery from these mature fields. Modest levels of wellwork were conducted in 2015. Average monthly oil production declined over the reporting period in all Western Satellites PAs; however, this is attributable to the major turnaround operation activities from July to September 2014. BPXA has made some strides forward in solving long-standing technical issues for the West End. Facility work and updated field models help to resolve the bottlenecking and water and gas handling issues at GC-2. This work will help

maximize recovery of the remaining hydrocarbons and economic returns to the state. Reprocessing the S-Cubed 3D seismic survey is an important factor in evaluating state resources. The 3D seismic reprocessing is also important for resolving the subsurface description in the Orion and Borealis PAs which is also necessary to advance the West End Development project.

The state has an interest in the efficient recovery of its resources and maximizing economic benefits to the state for the resources produced. With recoverable oil estimates as high as 145 MMSTB in the northwestern tracts of the Orion and Borealis PAs, it is in the public interest to see the Borealis and Orion PA I-Pad area resources developed sooner rather than later. During the 2014 POD period, the I-Pad development, which is associated with West End Development project, entered the "Select Stage". Unfortunately, BPXA has elected to defer the West End Development project until economic conditions improve. At the time of deferral, there continues to be an absence of physical, on-the-ground work conducted in the I-Pad area. Oil production is important for increasing state revenues and adding jobs associated with expansion of the Schrader Bluff development in PBU. It is not in the state's interest for areas with known hydrocarbon reservoirs to not be diligently produced.

Decision

Having considered the 11 AAC 83.303 (a) and (b) criteria, the Division finds that the 2016 POD complies with the provisions of 11 AAC 83.303. Accordingly, the 2016 POD is approved for the period January 1, 2016 through December 31, 2016.

This approval is only for a general plan of development. Specific field operations will require an approved Plan of Operations. Under 11 AAC 83.343, the 2017 POD is due on October 2, 2016, 90 days before the 2016 POD expires.

BPXA has deferred much of the work it planned to complete for the West End Development project until economic conditions improve. The debottlenecking issues associated with water and gas handling constraints appeared to be resolved after the U-Pad jumper was placed in service and increased handling benefits were realized through analysis of updated field models. While BPXA continues to list several hurdles to first oil at I-Pad, expansion of the M- and S-Pads, and increased mastery of Schrader Bluff oil production, resolving the debottleneck and gas and water handling issues on the west end of the PBU is a positive outcome. The Division understands the difficulties with developing viscous, sand-laden oil; however, it is expected that work continues to progress, as the 2016 POD sets forth, to advance critical elements of the West End Development project.

The Division makes the following requests for the 2016 POD approval which were first forwarded to BPXA in the 2014 PBU Western Satellites POD approval decision:

- Continue the semi-annual meetings on the progress of West End Development including I-Pad and other viscous projects when the West End Development project is reinitiated. BPXA committed to additional meetings to discuss West End development, specifically

I-Pad development, in a letter dated February 21, 2012 and provided the Division interim technical update meeting in April 2014 and June 2015.

- The Division again asks BPXA to consider the voluntary contraction of the non-producing NW Orion and NW Borealis PAs (Unit tracts 14, 15, and 16) until such time that BPXA is prepared to bring these areas into sustained unit production. To date, the oil allocated to the Orion and Borealis PAs lying beneath the proposed I-Pad area has remained undrilled and non-producing for over a decade after being included in participating areas.

A person affected by this decision may appeal it, in accordance with 11 AAC 02. Any appeal must be received within 20 calendar days after the date of "issuance" of this decision, as defined in 11 AAC 02.040(c) and (d), and may be mailed or delivered to Mark Myers, Commissioner, Department of Natural Resources, 550 W. 7th Avenue, Suite 1400, Anchorage, Alaska 99501; faxed to 1-907-269-8918; or sent by electronic mail to dnr.appeals@alaska.gov. This decision takes effect immediately. An eligible person must first appeal this decision in accordance with 11 AAC 02 before appealing this decision to Superior Court. A copy of 11 AAC 02 may be obtained from any regional information office of the Department of Natural Resources.

If you have questions regarding this decision, contact Kyle Smith with the Division at (907) 269-8807, or via email at kyle.smith@alaska.gov.

Sincerely,

Corri A. Feige
Director

cc: DOL