EERC
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018 • Grand Forks, ND 58202-9018 • P. 701.777.5000 • F. 701.777.5181
www.undeerc.org

January 12, 2018

Ms. Karlene Fine
Executive Director
North Dakota Industrial Commission (NDIC)
600 East Boulevard Avenue, Department 405
State Capitol, 14th Floor
Bismarck, ND 58505-0840

Dear Ms. Fine:

Subject: Quarterly Progress Report for the Period of October 1 – December 31, 2017, "Bakken Production Optimization Program 2.0"; Contract No. G-040-080 EERC Fund 22010

Enclosed please find the Energy & Environmental Research Center (EERC) Quarterly Progress Report for the subject project. If you have any questions, please contact me by phone at (701) 777-5276 or by e-mail at bkalk@undeerc.org.

Sincerely,

Brian P. Kalk
Director of Energy Systems Development

BPK/bjr

Enclosure

E-Mailed Report Only: Brent Brannan, NDIC Oil and Gas Research Council
Lynn Helms, NDIC Department of Mineral Resources, Oil and Gas Division
Ron Ness, North Dakota Petroleum Council

EERC
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018 • Grand Forks, ND 58202-9018 • P. 701.777.5000 • F. 701.777.5181
www.undeerc.org

January 12, 2018

Mr. Jeffrey Parker
Marathon Oil Company
5555 San Felipe
Houston, TX 77056

Dear Mr. Parker:

Subject: Quarterly Progress Report for the Period of October 1 – December 31, 2017, "Bakken Production Optimization Program 2.0"; Contract No. G-040-080 EERC Fund 22010

Enclosed please find the Energy & Environmental Research Center (EERC) Quarterly Progress Report for the subject project. If you have any questions, please contact me by phone at (701) 777-5276 or by e-mail at bkalk@undeerc.org.

Sincerely,

Brian P. Kalk
Director of Energy Systems Development

BPK/bjr

Enclosure

E-Mailed Report Only: Vitaly Kuchinskiy, Marathon Oil Company
B.J. Boening, Marathon Oil Company
Vernon Moore, Marathon Oil Company
Curtis Ryland, Marathon Oil Company

EERC
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018 • Grand Forks, ND 58202-9018 • P. 701.777.5000 • F. 701.777.5181
www.undeerc.org

January 12, 2018

Mr. Gordon Pospisil
Vice President of Business Development
Liberty Resources LLC
1200 17th Street, Suite 2200
Denver, CO 80202-5854

Dear Mr. Pospisil:

Subject: Quarterly Progress Report for the Period of October 1 – December 31, 2017, "Bakken Production Optimization Program 2.0"; Contract No. G-040-080 EERC Fund 22010

Enclosed please find the Energy & Environmental Research Center (EERC) Quarterly Progress Report for the subject project. If you have any questions, please contact me by phone at (701) 777-5276 or by e-mail at bkalk@undeerc.org.

Sincerely,

Brian P. Kalk
Director of Energy Systems Development

BPK/bjr

Enclosure

E-Mailed Report Only: Bryan Bugg, Liberty Resources

EERC
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018 • Grand Forks, ND 58202-9018 • P. 701.777.5000 • F. 701.777.5181
www.undeerc.org

January 12, 2018

Mr. Jason Swaren
Vice President of Operations
Oasis Petroleum
1001 Fannin, Suite 1500
Houston, TX 77002

Dear Mr. Swaren:

Subject: Quarterly Progress Report for the Period of October 1 – December 31, 2017, "Bakken Production Optimization Program 2.0"; Contract No. G-040-080 EERC Fund 22010

Enclosed please find the Energy & Environmental Research Center (EERC) Quarterly Progress Report for the subject project. If you have any questions, please contact me by phone at (701) 777-5276 or by e-mail at bkalk@undeerc.org.

Sincerely,

Brian P. Kalk
Director of Energy Systems Development

BPK/bjr

Enclosure

E-Mailed Report Only: Jim Jolly, Oasis Petroleum
Jay Knaebel, Oasis Petroleum
Steven Cottle, Oasis Petroleum

EERC
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018 • Grand Forks, ND 58202-9018 • P. 701.777.5000 • F. 701.777.5181
www.undeerc.org

January 12, 2018

Ms. Stephanie Erickson
Supervisor, Reservoir Characterization/Base Reservoir Engineering
Williston Asset
Rockies Business Unit
ConocoPhillips
600 North Dairy Ashford
EC3-13-13W086
Houston, TX 77079

Dear Ms. Erickson:

Subject: Quarterly Progress Report for the Period of October 1 – December 31, 2017, "Bakken Production Optimization Program 2.0"; Contract No. G-040-080 EERC Fund 22010

Enclosed please find the Energy & Environmental Research Center (EERC) Quarterly Progress Report for the subject project. If you have any questions, please contact me by phone at (701) 777-5276 or by e-mail at bkalk@undeerc.org.

Sincerely,

Brian P. Kalk
Director of Energy Systems Development

BPK/bjr

Enclosure

E-Mailed Report Only: Kyrre Johansen, ConocoPhillips

EERC
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018 • Grand Forks, ND 58202-9018 • P. 701.777.5000 • F. 701.777.5181
www.undeerc.org

January 12, 2018

Mr. Jeff Herman
Region Land Manager
Petro-Hunt, LLC
400 East Broadway, Suite 414
PO Box 935
Bismarck, ND 58501

Dear Mr. Herman:

Subject: Quarterly Progress Report for the Period of October 1 – December 31, 2017, "Bakken Production Optimization Program 2.0"; Contract No. G-040-080 EERC Fund 22010

Enclosed please find the Energy & Environmental Research Center (EERC) Quarterly Progress Report for the subject project. If you have any questions, please contact me by phone at (701) 777-5276 or by e-mail at bkalk@undeerc.org.

Sincerely,

Brian P. Kalk
Director of Energy Systems Development

BPK/bjr

Enclosure

E-Mailed Report Only: Jason Stangel, Petro-Hunt, LLC

EERC
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018 • Grand Forks, ND 58202-9018 • P. 701.777.5000 • F. 701.777.5181
www.undeerc.org

January 12, 2018

Mr. Brent Lohnes
Director, Field & Plant Operation
Hess Corporation
3015 16th Street Southwest
Minot, ND 58701

Dear Mr. Lohnes:

Subject: Quarterly Progress Report for the Period of October 1 – December 31, 2017, "Bakken Production Optimization Program 2.0"; Contract No. G-040-080 EERC Fund 22010

Enclosed please find the Energy & Environmental Research Center (EERC) Quarterly Progress Report for the subject project. If you have any questions, please contact me by phone at (701) 777-5276 or by e-mail at bkalk@undeerc.org.

Sincerely,

Brian P. Kalk
Director of Energy Systems Development

BPK/bjr

Enclosure

E-Mailed Report Only: Vicky Sund, Hess Corporation

EERC
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018 • Grand Forks, ND 58202-9018 • P. 701.777.5000 • F. 701.777.5181
www.undeerc.org

January 12, 2018

Mr. William Westler
WPX Energy
3500 One Williams Center, MD 38
Tulsa, OK 74172

Dear Mr. Westler:

Subject: Quarterly Progress Report for the Period of October 1 – December 31, 2017, "Bakken Production Optimization Program 2.0"; Contract No. G-040-080 EERC Fund 22010

Enclosed please find the Energy & Environmental Research Center (EERC) Quarterly Progress Report for the subject project. If you have any questions, please contact me by phone at (701) 777-5276 or by e-mail at bkalk@undeerc.org.

Sincerely,

Brian P. Kalk
Director of Energy Systems Development

BPK/bjr

Enclosure

E-Mailed Report Only: Brian Wold, WPX Energy

EERC
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018 • Grand Forks, ND 58202-9018 • P. 701.777.5000 • F. 701.777.5181
www.undeerc.org

January 12, 2018

Dr. Rafael Longoria
Researcher Reservoir Geology and Petrophysics
R&T ST SOG
Statoil Gulf Services LLC
6300 Bridge Point Parkway, Building 2, Suite 100
Austin, TX 78730

Dear Dr. Longoria:

Subject: Quarterly Progress Report for the Period of October 1 – December 31, 2017, "Bakken Production Optimization Program 2.0"; Contract No. G-040-080 EERC Fund 22010

Enclosed please find the Energy & Environmental Research Center (EERC) Quarterly Progress Report for the subject project. If you have any questions, please contact me by phone at (701) 777-5276 or by e-mail at bkalk@undeerc.org.

Sincerely,

Brian P. Kalk
Director of Energy Systems Development

BPK/bjr

Enclosure

BAKKEN PRODUCTION OPTIMIZATION PROGRAM 2.0
QUARTERLY PROGRESS REPORT
OCTOBER – DECEMBER 2017

BACKGROUND

The Energy & Environmental Research Center (EERC) was awarded an extension to the previously conducted and highly successful North Dakota Industrial Commission Oil and Gas Research Council (NDIC OGRC)-sponsored Bakken Production Optimization Program (BPOP). The purpose of this extension is to facilitate a 3-year continuation of the program to address emerging opportunities and challenges related to petroleum production in North Dakota. The extension is a continuation of the collaborative effort between the state of North Dakota and the North Dakota petroleum industry to apply North Dakota resources to provide North Dakota solutions to North Dakota challenges and opportunities.

The goals of BPOP 2.0 are to:

- Employ a "system of systems" approach to enhance overall production efficiency, recognizing that improved coordination among various design factors (reservoir management, well design, surface processing, gas management, waste management) can lead to significant improvements in resource recovery efficiency.

- Conduct applied research in topic areas that positively impact the efficiency of production and reduce the environmental footprint of operations.

- Advise industry and state entities on scientific aspects of exploration and production activities, especially as they pertain to economic and environmental impacts.

- Facilitate collaboration on issues that may not otherwise receive collaborative attention from industry and/or the state of North Dakota.

The anticipated outcomes of BPOP 2.0 are 1) increased well productivity and economic output of North Dakota's oil and gas resources, 2) decreased environmental impacts of wellsite operations, and 3) reduced demand for infrastructure construction and maintenance. Specific results will include improved resource recovery efficiency, reduced land use impacts, increased royalties and tax revenue from harnessed associated gas and natural gas liquid streams, and increased revenue from added product streams captured earlier in the well life cycle.

This report summarizes achievements of the October–December 2017 quarter.

QUARTERLY PROGRESS REPORT (October – December 2017)

ACCOMPLISHMENTS DURING REPORTING PERIOD

Enhanced Oil Recovery Task

During this past quarter, work was performed under U.S. Department of Energy (DOE) award to support EERC efforts under the rich gas enhanced oil recovery (EOR) project that is being conducted in close collaboration with Liberty Resources. Four milestones were accomplished, including the project kickoff meeting, completion of the initial assessment of test site rich gas quality and quantity, finalization of a fluids sampling collection and analysis plan, and completion of an initial reservoir geocellular model. Specific activities conducted during this past quarter are presented below.

- Activities to accomplish the BPOP 2.0 goals for the pilot project stated above were conducted this quarter. Specific activities include the following:

  - Laboratory-based examinations of rich gas interactions with obtained reservoir fluids and core/cuttings are being conducted to determine the ability of various rich gas mixtures to mobilize oil in the Bakken petroleum system. During this reporting period, experiments were conducted in conjunction with the DOE award mentioned previously. Rock extractions were begun using pure methane, ethane, and propane on both Middle Bakken and Lower Bakken Shales from four Liberty wells located close to the junction of Burke, Williams, and Mountrail Counties. Extractions with methane and ethane were completed, and extractions with propane were begun. Analysis of the hydrocarbon recovery rates with the different fluids from the four Middle Bakken and four Lower Baken Shales was also begun.

  - Evaluations of the changes in gas and fluid compositions over time in both the reservoir and surface infrastructure environments are being conducted as well as examinations of how those changes affect reservoir and process facility performance. Crude oil and produced water samples were collected from a newly completed and producing well in the Stomping Horse complex to determine baseline compositions. These samples have been received at the EERC from collections occurring between September 7 and November 18, 2017. Sample collection will continue periodically throughout the first 12 to 18 months of production to provide a temporal aspect to well fluid.

  - Iterative modeling of surface infrastructure and reservoir performance was conducted using the data generated by the various project activities to optimize the EOR pilot test design and operations. The DSU (drill-spacing unit) model created in the previous quarter was the basis for history-matching modeling that was performed using data provided by Liberty Resources. Simulation modeling of several potential injection and production scenarios was also conducted. A model of the surface operations and infrastructure of the Stomping Horse complex, including the County Line Gas Plant, has been created. Results from the reservoir and surface modeling are also being used to support the selection and

design of gas treatment and compression operations for the pilot test. Modeling results to date show significant improvements in oil production above the base case.

- An initial reservoir surveillance and operational monitoring plan was developed. The plan was incorporated into the injection permit application that was submitted to NDIC by Liberty Resources.

Refracturing Optimization Task

- A membership meeting was held November 14 in Houston to discuss Bakken refracturing potential and a project execution plan to evaluate the issue. Several key EERC staff members traveled to Houston in support of this meeting:
  - Justin Kringstad, North Dakota Pipeline Authority, presented his previous work evaluating refracture results to date.
  - A literature survey was completed to learn more about past and current research and practices on refracturing, the candidate well selection process, techniques and approaches, key challenges faced, and lessons learned associated with the operation. Survey results were presented at the meeting.
  - Refracturing performance evaluation of 60 Bakken wells was presented.
  - Neal Nagel, consultant, presented concepts relevant to refracturing.
  - Marathon, ConocoPhillips, and WPX presented their observations on the subject.
  - Group discussion was held to help guide future EERC activity.

Produced Fluid Characterization Task

- During this reporting period, Marathon Oil was able to coordinate work in several areas. This work involved sampling of cuttings and poststimulation produced fluids of three different wells. The in-kind cost share reported in Table 1 includes pad and facilities construction and 33 days of drilling rig operation.
- Formal solicitation of produced fluids data from key industry partners has continued as we build a database of information on produced water, crude oil, and associated gas. These data will be integrated into the EERC-managed Bakken fluids database for support in understanding basinwide characteristics related to production and other reservoir/well statistics.
- Crude and produced water samples have continued to be collected from a newly completed and producing Liberty Resources well. These samples have been collected since initial production of the well in early September throughout the first few months of production.

Sampling will be repeated periodically throughout the first 12 to 18 months of production to provide a temporal aspect to produced fluid composition.

- Analysis of recently acquired cuttings and fluid samples has continued. Data will continue to be analyzed and used to support multiple activities conducted within the program.

- EERC staff traveled to the Liberty Resources field office in Tioga to retrieve samples on November 9, 2017.

Reservoir Performance Modeling Task

- Technical work and a draft topical report was completed on decline curve analysis for the 400-well database and multivariate analysis to identify production drivers for the Bakken petroleum system. Internal technical review is in progress.

Water Injection Reservoir Assessment Task

- A draft of the final topical report entitled "Modeling and Simulations of the Inyan Kara Formation to Estimate Saltwater Disposal Capacity: Final Report" was provided to select partners for review. Comments from one of the reviewers were incorporated into the report. If no additional input is received by the end of January, the report will be finalized and provided to NDIC and all member companies.

- Additional modeling outputs were compiled and provided to two program members after they enquired about what additional data had been generated by the model.

Brine Treatment and Storage Assessment

- This task was begun during the reporting period and will be reported in future quarterly and annual reports.

- A presentation was compiled summarizing the challenges associated with brine treatment and the pros and cons of current and emerging brine treatment technologies.

Facility Process Optimization Task

- Two operating companies have volunteered to provide facility design and operating data to allow the EERC to build a site-specific process model and evaluate different strategies to help meet crude oil vapor pressure targets. Communication has continued between EERC researchers and facilities personnel to acquire the necessary information, review vapor pressure data, and define modeling activities.

- Confidentiality agreements are being prepared with member companies to enable sharing of site-specific facilities information. Agreements will likely be complete early 2018.

Aromatic/Aliphatic Study Task

- An agreement was reached with the Canadian Geological Survey in which the EERC will provide approximately 40 Lower and Upper Bakken Shale samples collected to represent both the geographical and the thermal maturity variations throughout the Bakken reservoir. The Canadian Geological Survey has agreed to conduct two sophisticated tests that describe thermal maturity behavior in tight shales better than conventional methods used for nonshale reservoirs. "Extended slow heating rock evaluation" and vitrinite reflectance will be performed on the samples supplied by the EERC, and the data will be compared to the aromatic/aliphatic tracers measured by the EERC on the same sample suite. These investigations are expected to yield a better understanding of the shale thermal maturity across the basin as well as the relationship of the aromatic/aliphatic tracers to thermal maturity, oil sources and migration, and basin location and geology.

- The newly developed analytical method for quantitating aromatic and aliphatic hydrocarbon contents has now been applied to 70 different samples (ranging from Three Forks to Lower, Middle, and Upper Bakken samples) obtained from 13 wells. Final data reduction and quality vetting have been completed. Determination of the aromatic/aliphatic ratios on the new samples described above has begun.

- The collection of additional core samples for aromatic/aliphatic analyses in the Liberty Resources production areas approved by the North Dakota Geological Survey Core Library has been completed.

- Several drill cutting samples from the Middle Bakken Formation from two Liberty Resources wells were analyzed for aromatic/aliphatic ratios. The cuttings were collected from the heel to the toe of the laterals and did show some significant variations from heel to toe cuttings. However, it is unknown whether the variations are a result of horizontal changes in the rock aromatic/aliphatic content over the length of the laterals or in distinct encountered facies over the length of the laterals. Additional attempts to remove diesel cutting fluids from drill cuttings in order to allow the rock drill cuttings to be used for aromatic/aliphatic analyses were not successful. The operator of these wells provided a sample of its diesel fluid, which was analyzed by gas chromatography–mass spectrometry (GC–MS) for the aromatic hydrocarbon composition and molecular weight distribution. Unfortunately, the diesel-based fluid has the same one- to three-ring aromatic hydrocarbons that are used for the aromatic/aliphatic tracer analyses. In turn, drill cuttings that include diesel-based drilling fluid cannot be used for aromatic/aliphatic tracer analyses.

Environmental Support Task

- EERC staff participated in the second education day of the Hydrocarbon Remediation Task Force on October 10, 2017, along with North Dakota Petroleum Council (NDPC) members, North Dakota Department of Health (NDDH) staff, and representatives of the Northwest Landowner's Association (NWLA).

- EERC staff prepared a set of slides summarizing the risk-based corrective action program in the state of Oklahoma and presented this information in a conference call to the NDPC Hydrocarbon Remediation Working Group on December 20, 2017.

Program Management and Development

- EERC staff traveled to San Antonio, Texas, to attend the Society of Petroleum Engineers Forum on EOR in Unconventional Reservoirs, November 6–10, 2017.

- A project kickoff meeting for the parallel DOE-sponsored effort was held via WebEx on December 14, 2017.

- EERC staff traveled to Pittsburgh, Pennsylvania, to participate in the Interstate Oil & Gas Compact Commission (IOGCC) Annual Meeting and to attend the associated Environmental & Safety Committee Meeting, held September 30 – November 4, 2017.

- EERC staff traveled to Dickinson, North Dakota, to present at the Western Dakota Energy Association annual meeting, held November 1–3, 2017.

- EERC staff traveled to Bismarck, North Dakota, to present at the North Dakota Legislature's Water Topics Overview Interim Committee meeting on October 12, 2017.

- EERC staff traveled to Houston, Texas, to participate in the NorTex Petroleum Cluster CO_2 Conference, held October 3–6, 2017.

- EERC staff traveled to Minneapolis, Minnesota, to participate in the AIChE 2017 meeting, held November 1–2, 2017.

MEMBERSHIP AND FINANCIAL INFORMATION

The original budget as proposed to NDIC OGRP is $13,280,000, as shown in Table 1.

Table 1. BPOP 2.0 – Original Budget

Sponsors	Y1 Nov 2016 to Oct 2017	Y2 Nov 2017 to Oct 2018	Y3 Nov 2018 to Oct 2019	Total
NDIC Share – Cash	$2,000,000	$2,000,000	$2,000,000	**$6,000,000**
Industry Share (Marathon Oil) – In-Kind	$2,500,000	$3,500,000	$1,280,000	**$7,280,000**
Total	**$4,500,000**	**$5,500,000**	**$3,280,000**	**$13,280,000**

The EERC continues to seek support for this program, and to date, additional cost share has been secured from the following Bakken producers: Petro-Hunt, Hess Corporation, ConocoPhillips, Oasis Petroleum, WPX Energy, Marathon Oil, Liberty Resources, and Statoil. Statoil payment was received during this reporting quarter.

In addition, the EERC has secured $2,000,000 from DOE to complement the ongoing work to determine the feasibility of reinjecting captured rich gas into a Bakken reservoir to enhance oil recovery. Liberty Resources is providing in-kind contributions that support this programmatic scope.

Table 2 presents a revised expected budget based on the additional cost share secured by the EERC, an increase of more than 20%. Expenses to date are also listed in Table 2.

Table 2. BPOP 2.0 – Expected Budget and Expenses to Date

Sponsors	Expected Budget	Actual Expenses as of 12/31/17	Balance
NDIC Share – Cash	$6,000,000	$1,952,891	$4,047,109
Industry Share – Cash	$600,000	$198,933	$401,067
Marathon Oil – In-Kind	$7,280,000	$4,749,086	$2,530,914
Liberty Resources – In-Kind*	$118,863	$118,863	–
DOE – Cash	$2,000,000	$151,234	$1,848,766
Total	**$15,998,863**	**$7,171,007**	**$8,827,856**

* An estimate for the total expected in-kind cost share from Liberty Resources is not available. Liberty Resources will periodically report actual costs to the EERC which will be subsequently presented in the quarterly report.

FUTURE ACTIVITIES

The planned activities for the next quarter are detailed below.

Enhanced Oil Recovery Task

- Future activities under this task will be focused on supporting the rich gas EOR pilot test at Liberty Resources Leon-Gohrick DSU in the Stomping Horse complex.

- Gas-handling and compression strategies will continue to be evaluated, with a goal of identifying cost-effective, timely solutions.

- Reservoir-, facility-, and gas compression-modeling activities will be coordinated to ensure the development of an integrated EOR strategy.

- Sampling and analysis of fluids (oil, gas, and water) from the Stomping Horse complex will continue.

- The comparative rock extraction hydrocarbon recoveries using pure methane, ethane, and propane on Middle Bakken and Lower Bakken shale rock samples will be completed.

- Methods to mix stable methane/ethane/propane mixtures for lab experiments will begin.

- Rock samples from wells in the Stomping Horse area will be used for rock extraction studies of the Bakken shales and the productive zones of the Middle Bakken and Three Forks Formations.

- Reservoir-modeling activities will be continued. In particular, additional potential injection and production schemes will be modeled as part of the effort to support the determination of final design and operational parameters of the pilot test.

- A monitoring plan for the pilot test will be developed in close collaboration with Liberty Resources. The selection, design, and application of monitoring techniques for the pilot test will be documented. In addition to providing the fundamental data needed to assess pilot performance, the monitoring program for the Leon-Gohrick DSU test will also establish the effectiveness of selected monitoring techniques as a means of reservoir surveillance and injection conformance monitoring in the Bakken petroleum system.

Refracturing Optimization Task

- A revised work plan will be created to take into account the feedback received at the November 14, 2017, membership meeting.

Produced Fluid Characterization Task

- Additional sampling, analysis, and data review will continue as new opportunities arise.

- Data collection and additional sampling and analysis will continue as needed to support BPOP Program goals.

- All fluid data and associated well production information collected will be entered into the EERC-specific database to support BPOP goals. The database structure will be refined to enhance use by BPOP researchers.

- Industry partnerships will continue to be developed to further understand specific needs related to Bakken production issues and practices and to expand the geographical extent of the sampling and analysis effort.

Reservoir Performance Modeling Task

- The draft of the final topical report will be finalized and submitted to NDIC.

Water Injection Reservoir Assessment Task

- No additional activities are planned during the next quarter.

Brine Treatment and Storage Assessment

- The EERC team will begin to evaluate specific brine treatment technologies of interest for comparison to Bakken brine chemistry data to better assess their potential applicability in the Bakken petroleum system. Discussions will also be held with member companies that have expressed interest in brine treatment to discuss potential options for pilot-scale testing.

Facility Process Optimization Task

- Site-specific facility modeling will be performed as soon as agreements are in place and information is obtained from members.

- Upon creation of site-specific models, model validation will be performed using operational data and results from field sampling.

- The validated process models will be used to simulate multiple strategies to meet vapor pressure targets, and a summary of results will be prepared and shared with members.

Aromatic/Aliphatic Study Task

- Analysis of the aromatic/aliphatic ratios on the additional Three Forks, Lower Bakken, Middle Bakken, and Upper Bakken Shale samples collected across the reservoir will begin.

- An operator who agreed to collect crude oil samples for aromatic/aliphatic ratio analyses from the beginning of crude oil production into the decline curve has begun to provide temporal samples. After a sufficient number have been collected, we will analyze them to determine any changes in aromatic/aliphatic ratios. These samples will be used in an attempt to

determine the relative contribution of the Upper and Lower Bakken shales to crude production over the life of the well.

Environmental Support Task

- The third education day event is scheduled for January 26, 2018, in Bismarck, North Dakota, and will focus on the following topics:

  – Risk-based corrective action design to be presented by Mr. Will Folland of the Environmental Protection Agency, Region 8.

  – Real-world application of risk-based corrective action to be presented by Oasis Petroleum and Continental Resources.

  – Summary of Oklahoma risk-based corrective action program to be presented by EERC staff.

Program Management and Development

- The EERC will continue to solicit additional industry membership in the BPOP consortium during the coming quarter.