

Enhanced Oil Recovery Commission



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September 11, 2013 8:00 AM
Wyoming Oil and Gas Commission Building
2211 King Boulevard
Casper, Wyoming

Commission Members Present:

Bruce Williams, Chairman
Tom Drean
John MacPherson
Aaron Otteman
Rob Hurless (Governor Mead)
Jimmy Goolsby
Senator Eli Bebout
Tom Fitzsimmons – Via telephone
Eric Easton – Senior Assistant Attorney General

Enhanced Oil Recovery Institute Staff Present:

David Mohrbacher, Director
Glen Murrell, Deputy Director
Pepper McClenahan, Business Manager
Jeffrey Fife, Office Aid

I. Call to Order

Chairman Williams called the meeting to order at 7:59 a.m. A quorum was established.

II. Approval of Minutes

Minutes from the July 25, 2013 meeting were reviewed. Chairman Williams proposed some minor housekeeping amendments to the minutes. Senator Bebout proposed that the Director's overview be revised to include a discussion of numbers and statistics that document increased production from enhanced oil recovery (EOR) projects in Wyoming. Chairman Williams suggested that the notes reflect changes both attributed to increases in EOR and increases that can be specifically traced to the Institute.

Motion: Senator Bebout moved to approve the minutes as amended. Commissioner Otteman seconded. **Motion carried.**

III. Commission Open Discussion

- Discussion focused on increased oil exploration and development activity in the Powder River Basin and increased industry interest in the area. Director Mohrbacher stated the School of Energy Resources (SER) is addressing unconventional development and improved oil recovery (IOR). SER is receiving funding from industry to look at implementation of CO₂ injection as a primary mechanism for recovery for new reserves; using advanced techniques initially in reservoirs to recover more oil in place rather than using the traditional sequential approach of primary, secondary and tertiary recovery methods. EORI is collaborating with SER in this effort with multi-phase flow projects completed between the EORI lab and Dr. Piri's lab. SER is working with Saudi Aramco, Exxon Mobil and Hess, while EORI is working with Devon, Merit and Osborn Heirs to complete programmatic approaches to EOR.

Commissioner Fitzsimmons discussed the possibility of injecting gas from coalbed natural gas projects to enhance oil recovery in unconventional reservoirs stating it could be a value to State revenue. Director Mohrbacher indicated that ongoing work with double displacement processes by Marathon in the Pitchfork field is one example of use of a methane injection project.

- Deputy Director Glen Murrell discussed future collaborations at the University of Wyoming (UW) between the Energy and Environment Research Center, Montana Tech and EORI for work on improved oil recovery (IOR) and EOR projects. Dr. Murrell noted that North Dakota, Montana Tech and the EERC are ahead of Wyoming when evaluating use of methane and CO₂ to improve recovery in unconventional reservoirs. EORI has been developing relationships with the EERC, and Montana Tech.
- The Commission concluded that it just makes sense for the legislature to continue to support EORI with their mission of benchmarking EOR and IOR technologies, and transferring technical "know how" to Wyoming operators. EORI will continue to provide synergies with SER and the University.

Action Item: Include SER Director Northam in discussions with EERC, Montana Tech and the Colorado School of Mines about improved oil recovery technologies.

- Senator Bebout discussed the opportunity to enhance the visibility of EORI by getting involved with the Energy Council. Director Mohrbacher stated he had presented to the Council a few years ago at their meeting in Little Rock and that EORI will continue their relationship with the Council.
- The Commission discussed possible participation of EORI in the Wyoming Oil & Gas Fair held during the middle of September in Jackson Hole each year. The event has historically been a trade fair focused primarily on gas. EORI will consider participating next year.
- Discussion was held regarding the \$20 million grant awarded to SER, and how a separate \$1 million grant, which would be matched by industry funds, might be available for EOR field demonstration work.

- Commissioner Drean encouraged the development of work plans with objectives, goals and targeted projects so money is spent wisely. Senator Bebout echoed Commissioner Drean's comments, and stated the legislature granted SER latitude for development of programs funded by the monies, and that progress reports and accountability are expected by the legislature. Director Mohrbacher stated EORI would have project plans developed for any portion of the monies requested by EORI, although no specific projects have been identified at this time for use of up to \$1 million for matching industry contributions. Discussions are in progress with operators for characterization of residual oil zones (ROZs) at specified sites and existing well locations.

IV. Director's Overview

- Director Mohrbacher presented work completed by EORI over the past two years to evaluate use of an innovative new chemical flooding technique being promoted by a company called VeruTek. While the chemical did not perform as expected, EORI did have an opportunity to evaluate the new chemical system. EORI also provided key technical papers and test data to VeruTek. Staff learned the value of looking at projects from an engineering perspective and conducting screening prior to investment of laboratory time. A second insight was to carefully evaluate chemical company's technologies prior to beginning work. The technology must be developed to an extent that EORI could reasonably expect to see increased oil recovery in a 3-5 year timeframe. In the future, expenses incurred to develop technologies for chemical companies to ready their products for market must be paid for by the chemical company. This is a change of EORI policy based on experience gained, in part, from work on the VeruTek chemical system.
- Commissioner Otteman inquired as to the applicability of the work conducted for VeruTek by using the new lab equipment to apply pressures in the studies, and conducting quick screening processes to evaluate similar chemicals or other similar variables/conditions. Director Mohrbacher stated the new laboratory has that capability and the new equipment adds a lot of opportunities for future EORI projects. Director Mohrbacher stated the engineering screening process now used at EORI mimics what is used in industry to evaluate chemicals. He noted that VeruTek provided about \$9,000 in contributions for the two-year period.
- Director Mohrbacher provided an update on work being performed with Sunshine Valley Petroleum Corporation (Sunshine). Sunshine is a small operator located in Evansville, Wyoming. They have recently purchased a large position in the Sage Creek Field located near Newcastle, Wyoming. The primary target for redevelopment is the Muddy reservoir. EORI is currently assisting Sunshine with evaluation of the water sensitivity of the clays in the Muddy reservoir. Additional work may follow.
- Director Mohrbacher discussed EORI's approach to management of project work. Two valid approaches to project team structure were presented; one for work by small, focused team, and one for collaborative work on larger teams that includes continuous participation by staff from the oil company partners organization.

Shaochang is a great example. Director Mohrbacher indicated that project plans with defined content are required before new EORI projects are initiated. The project plans

contain important information to the project team, including definition of project objectives, scope, schedule, budget, staff resources, other resources, and deliverables.

Senator Bebout asked if both styles would continue to be used by EORI, or if Director Mohrbacher thought one or the other would be adopted. Director Mohrbacher stated both have value and will be addressed in greater detail in the EORI Business Plan.

V. Unfinished Business

Review Outstanding Action Items

- A letter was sent to the minerals committee describing EORI's compliance with legislative intent, and it was well-received by the legislature. Senator Bebout indicated that EORI is operating within defined statutory guidelines. The legislature may need to address some changes in the legislation sometime in the future. It was also noted that the Minerals Committee may propose legislation next year during the interim that may involve EORI. Senator Bebout indicated that changes taking place at the University by the new administration may affect how proposed legislation is drafted. Director Mohrbacher stated he recently had a conversation with Representative and Co-Chair of the Minerals Committee Tom Lockhart about lending support as needed, including a presentation to the Minerals Committee.
- Deputy Director Glen Murrell gave an update on contact with the Wyoming Oil and Gas Commission to coordinate centralized data. Deputy Director Murrell has attempted to make contact with WOGCC staff several times but has not been successful. Attorney Eric Easton noted that the WOGCC staff person responsible for managing data has been unavailable due to medical issues. Deputy Director Murrell indicated he will continue to pursue a discussion with WOGCC.
- Business Manager Pepper McClenahan provided an update about the Bighorn Basin Resource Management Plan (RMP). Two new development alternatives were proposed by the U.S. Bureau of Land Management (BLM) in the recently revised Bighorn Basin RMP. Discussion was held regarding lands removed from development in the main pay zones (MPZs) of existing Residual Oil Zones (ROZs).
- Director Mohrbacher noted a meeting was held with Aaron Clark from the Governor's staff regarding sub-surface utility rights-of-way and pipeline corridors. The Wyoming Pipeline Authority (WPA) is defining those rights-of-way and preliminary mapping identifies more access to fields around the perimeter of the Bighorn Basin than in the original draft. The original draft showed pipelines coming in through the center of the basin. EORI played a role by providing information regarding access to the big EOR opportunities in the basin. The issue of shipping produced oil out of basin via pipeline was also discussed with the WPA and the Governor's Office. Pipelines to get the oil from the field to at least two rail facilities being built in the eastern part of the state were also discussed. Clarification was provided that the WPA mapping is not included as part of the Bighorn Basin RMP, but discussion are ongoing between the Governor's office and BLM to incorporate pipeline routes into future planning.
- Senator Bebout commented that the best proposed alternative in the RMP is Alternative C, and the EORC previously wrote a letter supporting that alternative. Newly proposed

Alternatives E and F propose additional restrictions on development and the Commission should not support either of the new alternatives. Comments to the BLM should clarify why Alternatives E and F should be discouraged as a preferred alternative. Technical information from EORI and the Commission should provide BLM with the information needed to support Alternative C as the preferred alternative. Senator Bebout stated the next step would be to determine if the Commission wanted to provide further comment to the BLM on the proposed changes to the draft RMP. Senator Bebout noted that there should be one voice from the State of Wyoming, and Commission comments need to be consistent with comments from the Governor's Office and the Select Committee on Federal Resource Management.

- Discussion was held regarding the Commission's role in providing comment, the type of comments to provide, and to whom comments should be provided. Previous comments provided to BLM on the original draft were of a strictly technical nature. Commissioners felt similar technical comments should be provided on the Supplement to the Draft RMP, adding information from Dr. Ben Cook's work on the economic impacts from EOR development, and noting that it is important for BLM to recognize the potential for EOR development in the Bighorn Basin and from future technological advancements. Revisions to the preliminary comments provided by EORI staff were discussed.
- **Motion:** Commissioner Drean moved to recommend that EORI's evaluation of the Supplement to the RMP be revised with input from staff in the Governor's Office, that additional materials be provided to the Commission by October 1st, and that a phone meeting of the EORC be held on October 4th to discuss providing comments from the EORC to the BLM. Senator Bebout seconded. **Motion carried.**
- The action item to distribute the revised 2015-2016 biennium budget to the EORC has been completed.
- Commissioner Drean asked if EORI had considered use of performance-based contracts when providing research monies to faculty from the university. New contracts for work to be completed during the new biennium (2015-2016) will be presented and evaluated during the January Technical Advisory Board meeting and the EOR Commission meeting.
- **Action Item:** Director Mohrbacher to outline a pay for performance model to discuss with Chairman Williams and to be presented to the Commission for review in January.

UW Economics Model Available to Public

Deputy Director Glen Murrell provided an update on the economic model, noting there were still legal and IT issues to be resolved with the dual license system, including setting up web-based registration through the University. It was noted that EORI will continue to support provision of the on-line tool to Wyoming operators, but will not financially support commercialization of the model for other users (e.g. large, international consulting firms). It was suggested that business generated outside of Wyoming be supported by sources other than EORI.

Update EORI Spending

Business Manager McClenahan provided an update on spending, noting that the report is not a final report for the fiscal year, but rather just shows figures current through June 30, 2013. Expenses for 2013 are still being received and will be charged to the 2013 fiscal year budget. The report shows EORI is underspent by approximately \$500,000, mostly due to delays in hiring staff and under-spending on field demonstrations. Labor in the Commission and Support budget was overspent due to overtime, paying out vacation pay for the previous business manager, and an underestimate of payroll costs.

**** Break 9:50-10:00 AM****

**** Senator Bebout left the meeting at 10:00 AM****

Review Wyoming EOR Potential and EORI Focus

- Deputy Director Murrell reported on EOR potential in Wyoming, and summarized how EORI prioritized work to focus on the best opportunities to assist the State. He presented a table of Wyoming reservoirs based on potential for incremental oil recovery via EOR. He noted that most of the reservoirs were good targets for CO₂ flooding, and may support a combination of chemical flooding and CO₂ EOR.
- Also discussed was that EORI has previously been focused on outreach, screening and scoping, databases and modeling. It was suggested that EORI try to reach out to larger oil operators in Wyoming. It was noted that EORI outreach efforts have expanded to include multi-level contacts with larger operators. Additionally, over the last three years, EORI has focused on building relationships with a number of owners and operators, and it is expected that the addition of the new EORI lab will assist by providing new opportunities for collaboration.
- Discussion was held about potential outreach opportunities with larger developers in Wyoming. Director Mohrbacher stated that outreach efforts are ongoing, and have produced new relationships with operators. He noted that relationships like the one built with Marathon Oil provide operators with the opportunity for ongoing training and technology transfer through participation in EORI workshops. Several large oil companies including Chevron and Marathon are still pursuing methods for improving both vertical and horizontal conformance. Many opportunities exist for EORI to help Wyoming operators through technology transfer and sharing Wyoming case studies.
- Discussion was held about outreach strategy and how best to increase cooperation with larger operators. It was suggested that in addition to workshops, which are more likely to attract staff-level contacts, EORI reaches out to executive level staff at larger operators. Director Mohrbacher noted that EORI has been working on establishing relationships with executives of a number of operators, and that outreach efforts have expanded in scope over the past three years.
- It was suggested that EORI look at implementing some short-term projects with quicker turnaround, as opposed to focusing too much on longer-term, larger projects, many of which will involve CO₂ flooding. Director Mohrbacher noted that EORI supports projects with potential for both long- and short-term benefits for the State. Several EORI projects focus on expansion and optimization of waterfloods that can boost oil production

and booked reserves in a relatively short time. It was also discussed that increases in access to pipelines, both to bring CO₂ in and to transport oil out of portions of Wyoming (i.e. the Bighorn Basin) would increase and stabilize oil prices, and minimize risk to investors.

- Discussion was held about meetings between Director Mohrbacher and the Governor's Office relating to the importance of establishing new pipeline right-of-ways in Wyoming. Discussion was held on how the structure of oil companies has changed in recent years. Notably that many of them have eliminated their midstream business. It was suggested that having EORI engage independent midstream companies may help to promote investment for pipeline construction in Wyoming. A suggestion was also made to look into using Ben Cook's economic model to compare production volumes against pipeline costs.

Finalize MOU between EORC and University

The previously executed Memorandum of Understanding (MOU) between the EORC and the University of Wyoming was presented and discussed. It was noted that the purpose of the MOU was not to describe the relationship between EORI and UW, but rather just to describe the relationship between EORC and EORI. Commissioner MacPherson suggested an addition to the MOU outlining EORI's responsibility to perform technical outreach. New recommended language was provided to Senior Assistant Attorney General Eric Easton for review.

Motion: Commissioner Drean moved to approve the MOU with the proposed changes from Commissioner MacPherson with review by Senior Assistant Attorney General Easton. Commissioner Otteman seconded. **Motion carried.**

Action Item: Revise the MOU between EORC and UW to include the name change, extend expiration date, and language about EORI's responsibility to perform technical outreach as suggested by Commissioner MacPherson

The discussion of the MOU included the possibility of adding language to either the MOU or to EORI contracts stating that payments and/or budgets for faculty members will be conditioned on performance of contracted work. It was decided that during the January 2014 meeting the discussion would continue, and Director Mohrbacher would present a draft definition of performance standards.

VI. New Business

Discuss Intersection of EORI and SER Business Plans.

School of Energy Resources Director Mark Northam was unable to attend the meeting due to other obligations on campus. Commissioner Hurless presented a report in his stead. Commissioner Hurless noted that relationships between SER, EORC, and EORI are good, and they have been improved since moving into the Energy Innovation Center. Commissioner Hurless outlined goals set by the new President of the University, President Robert Sternberg, which include a new focus on fundraising. It was mentioned that during this time of expansion, EORI should remain focused on EOR, but that opportunities for collaboration on projects involving primary recovery and improved oil recovery should be considered as well.

Introduce New Staff

Jeff Fife, a new employee in the business office, was introduced to the Commission.

VII. Review EORI Calendar

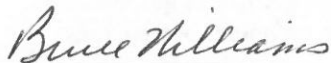
The EORI calendar of events was reviewed, and it was noted that the next Commission meeting will be in Denver on January 16, 2014.

VIII. Review action items

- Include SER Director Northam in discussions with EERC, Montana Tech and the Colorado School of Mines about improved oil recovery technologies.
- Revise the MOU between EORC and UW to include the name change, extend expiration date, and language about EORI's responsibility to perform technical outreach as suggested by Commissioner MacPherson
- Director Mohrbacher to outline a pay for performance model to discuss with Chairman Williams and to be presented to the Commission for review in January.

Motion: Commissioner Otteman moved to adjourn the public portion of the meeting and move into executive session, Commissioner Dreaan seconded. **Motion carried.**

**** Adjourned into Executive Session 11:55 AM****



Bruce Williams, Chairman