

# Oil & Natural Gas Technology

DOE Award No.: DE-FC26-06NT15569

## Quarterly Progress Report With Summaries of Center-sponsored Research (July - September 2009)

### UTAH HEAVY OIL PROGRAM

Submitted by:  
University OF Utah  
Salt Lake City, UT

Prepared for:  
United States Department of Energy  
National Energy Technology Laboratory

October 30, 2009



Office of Fossil Energy

# Utah Heavy Oil Program

DOE Award No.: DE-FC26-06NT15569

## Quarterly Progress Report

July 2009 to September 2009

Submitted by:

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Project Period: June 21, 2006 to October 21, 2009

Prepared for:

U.S. Department of Energy  
National Energy Technology Laboratory

## EXECUTIVE SUMMARY

The Utah Heavy Oil Program (UHOP), part of the Institute for Clean and Secure Energy at the University of Utah, officially ends on October 20, 2009. All of the projects funded through UHOP are completed and final reports are being prepared for submission. In addition, the unconventional fuels repository and interactive map are online and available for use (<http://ds.heavyoil.utah.edu/dspace/index.jsp> and [http://map.heavyoil.utah.edu/website/uhop\\_ims/viewer.htm](http://map.heavyoil.utah.edu/website/uhop_ims/viewer.htm)). All copyright issues have been resolved by the Institute librarian and all duplicate material has been removed. Of the original 1400 files, only 166 did not receive copyright permission to post the full text. Those 166 files were uploaded to the repository in “Abstract only” form. The remaining files (minus the duplicates) are available for download in full text form. All scanned image files were processed using OCR software and both versions (the original and the fully-searchable OCR version) were uploaded to the repository.

## PROJECT MILESTONES/PROGRESS PERFORMANCE

### A. Progress in Program-Sponsored Projects

During this reporting period, final reports were being prepared on all remaining UHOP-sponsored projects. The status of those reports is summarized below.

#### 1. Detailed Study of Shale Pyrolysis for Oil Production

*Experimental Results:* The final report was submitted in the previous quarter and will be included as an appendix to the final UHOP report.

*In-situ Oil Shale Recovery Modeling:* The final report has been completed and will be submitted as an appendix to the final UHOP report.

#### 2. New Approaches to Treat Produced Water and to Perform Water Availability Impact Assessments for Oil Shale Development

*Water Resources Sustainability:* The final report was submitted in a previous quarter and will be included as an appendix to the final UHOP report.

*Biological and Chemical Treatment of Produced Water:* The final report was being prepared during this quarter and will be submitted as an appendix to the UHOP final report.

*Ozonation of Produced Water:* The final report was submitted in a previous quarter and will be included as an appendix to the final UHOP report.

### **3. In Situ Production of Utah Oil Sands**

The final report was being prepared during this quarter and will be submitted as an appendix to the UHOP final report.

### **4. Depositional Heterogeneity and Fluid Flow Modeling of the Oil Shale Interval of the Upper Green River Formation, Eastern Uinta Basin, Utah**

The final report was being prepared during this quarter and will be submitted as an appendix to the UHOP final report.

### **5. Analysis of Environmental, Legal, Socioeconomic and Policy Issues Critical to the Development of Commercial Oil Shale Leasing on the Public Lands in Colorado, Utah, and Wyoming under the Mandates of the Energy Policy Act of 2005; Economic Evaluation of Bitumen Upgrading**

In preparation for completing the final report, Michael Hogue, Institute economist, surveyed the socioeconomic experiences associated with past mineral resource booms in the western U.S.. He specifically focused on oil shale developments occurring in the late 1970s and early 1980s and what could be learned from those experiences which could be applied to avoid or mitigate adverse impacts from future developments.

Additional work involved surveying the market-based barriers for kerogen-derived crude. In the Rocky Mountain region, shale oil would face severely limited within-region refining capacity. Given the limited within-region market for refined products, there is little private incentive for increases in refining capacity. Thus, cost-effective means of conveying additional crude and refined crude products outside PADD IV is a crucial economic challenge to the successful development of an oil shale industry in the Rocky Mountain region.

A final report is in preparation and will be submitted as an appendix to the UHOP final report.

## **B. On-line Repository**

The suite of 1400 files received from the Utah Geological Survey (UGS) in 2006 has been checked for duplicates. For example, more recent Fischer assay data obtained from UGS replaced all the Fischer assay data originally in the repository. The remaining files have now all been verified for copyright permission and have been processed accordingly. Copyright permission could not be obtained for 166 documents. Those documents have been entered into the repository as “Abstracts only.” All other files have been uploaded in full text form to the Institute’s public repository and are available at <http://ds.heavyoil.utah.edu/dspace/index.jsp>.

## **CONCLUSIONS**

The UHOP program has nearly concluded. All five projects have submitted or will shortly be submitting their final reports. The repository has been carefully examined by the Institute librarian for adherence to all copyright law and all files available in the public view comply with those laws.

## **COST STATUS**

**COST PLAN/STATUS**

Baseline Reporting Quarter	Year 1							
	Q1		Q2		Q3		Q4	
	6/21/06 - 9/30/06	10/1/06 - 12/31/06	1/1/07 - 3/31/07	4/1/07 - 6/30/07	Q1	Total	Q2	Total
<b>Baseline Cost Plan</b>								
Federal Share	126,295	239,349	41,357	147,911	126,295	365,644	407,001	554,912
Non-Federal Share	31,574	34,342	25,969	38,387	31,574	65,916	91,885	130,272
Total Planned	157,869	273,691	67,326	186,298	157,869	431,560	498,886	685,184
<b>Actual Incurred Cost</b>								
Federal Share	126,295	239,349	41,357	164,491	126,295	365,644	407,001	571,492
Non-Federal Share	31,574	34,342	25,969	30,841	31,574	65,916	91,885	122,726
Total Incurred Costs	157,869	273,691	67,326	195,332	157,869	431,560	498,886	694,218
<b>Variance</b>								
Federal Share	0	0	0	16,580	0	0	0	16,580
Non-Federal Share	0	0	0	(7,546)	0	0	0	(7,546)
Total Variance	0	0	0	9,034	0	0	0	9,034

Baseline Reporting Quarter	Year 2							
	Q5		Q6		Q7		Q8	
	7/1/07 - 9/30/07	10/1/07 - 12/31/07	1/1/08 - 3/31/08	4/1/08 - 6/30/08	Q5	Total	Q6	Total
<b>Baseline Cost Plan</b>								
Federal Share	147,911	850,734	147,911	1,146,556	147,911	702,823	147,911	1,146,556
Non-Federal Share	38,620	207,512	38,620	284,752	38,620	168,892	38,620	284,752
Total Planned	186,531	1,058,246	186,531	1,431,308	186,531	871,715	186,531	1,431,308
<b>Actual Incurred Cost</b>								
Federal Share	161,343	911,405	165,243	1,191,077	161,343	732,835	178,570	1,191,077
Non-Federal Share	29,299	162,063	36,285	198,348	29,299	152,025	10,038	217,368
Total Incurred Costs	190,642	1,073,468	201,528	1,408,445	190,642	884,860	188,608	1,408,445
<b>Variance</b>								
Federal Share	13,432	60,671	17,332	44,521	13,432	30,012	30,659	44,521
Non-Federal Share	(9,321)	(45,449)	(2,335)	(67,384)	(9,321)	(16,867)	(28,582)	(67,384)
Total Variance	4,111	15,222	14,997	30,219	4,111	13,145	2,077	30,219

Baseline Reporting Quarter	Year 3							
	Q9		Q10		Q11		Q12	
	7/1/08 - 9/30/08	10/1/08 - 12/31/08	1/1/2009 - 3/31/09	4/1/09 - 6/30/09	Q9	Total	Q10	Total
<b>Baseline Cost Plan</b>								
Federal Share	147,911	1,329,269	34,802	1,398,873	147,911	1,294,467	34,802	1,398,873
Non-Federal Share	38,620	332,130	8,758	349,646	38,620	323,372	8,758	349,646
Total Planned	186,531	1,661,399	43,560	1,748,520	186,531	1,617,839	43,560	1,748,520
<b>Actual Incurred Cost</b>								
Federal Share	144,808	1,374,211	72,324	1,434,688	144,808	1,342,302	31,909	1,434,688
Non-Federal Share	37,868	259,502	45,111	328,757	37,868	255,236	4,266	328,757
Total Incurred Costs	182,676	1,633,713	117,434	1,763,445	182,676	1,597,538	36,175	1,763,445
<b>Variance</b>								
Federal Share	(3,103)	44,942	37,521	35,815	(3,103)	47,835	(2,893)	35,815
Non-Federal Share	(752)	(72,628)	36,353	(20,889)	(752)	(68,136)	(4,492)	(20,889)
Total Variance	(3,855)	(27,686)	73,874	14,925	(3,855)	(20,301)	(7,385)	14,925

Baseline Reporting Quarter	Year 3			
	Q13		Q14	
	7/1/09 - 09/30/09	10/01/09 - 10/20/09	Q13	Total
<b>Baseline Cost Plan</b>				
Federal Share	34,802	8,701	1,433,675	1,442,376
Non-Federal Share	8,758	2,190	358,404	360,594
Total Planned	43,560	10,890	1,792,080	1,802,970
<b>Actual Incurred Cost</b>				
Federal Share	2,149	0	1,436,837	
Non-Federal Share	29,904	0	358,661	
Total Incurred Costs	32,053	0	1,795,498	
<b>Variance</b>				
Federal Share	(32,653)	0	3,162	
Non-Federal Share	21,146	0	257	
Total Variance	(11,507)	0	3,419	

Note: The Cost Plan has been revised to reflect the agreement's extension through 10/20/2009.

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## **MILESTONE STATUS**

Both milestones relating to the repository have now been completed. The Task 1.5 milestone was to develop on-line repository for all types of material pertaining to unconventional resources in North America and the Task 1.8 was to refine the repository, incorporating information provided by user community. All files available in the repository comply with acceptable library standards for metadata and for copyright permission.

One final milestone, a technical report for Institute-based research projects, is being wrapped up and will be sent to DOE/NETL prior to the end of 2009.

## **PROBLEMS OR DELAYS**

None

## **RECENT AND UPCOMING PRESENTATIONS/PUBLICATIONS**

Andy Hong, "New Ozonation Process for Water Treatment Toward Sustainable Energy Development," Water/Energy Sustainability Symposium at the Groundwater Protection Council Annual Forum, September 13-16, 2009, Salt Lake City, Utah.

Z. Cha, A. Hong, C.F. Lin (2009). "Pressure-assisted Ozonation of Produced Water." Near completion for submission to review and journal publication.

S. Burian, E. Jones, and A. Kalyanapu (2009). "Impacts of Energy Development in Utah on Water Resources Availability." Journal of American Water Resources Association, to be prepared for submission in fall 2009.

E. Jones (2009). "Feasibility of White River to meet water requirements to support energy development in the Uinta Basin." MS thesis, Department of Civil & Environmental Engineering, University of Utah (in progress, to be completed fall 2009).

## **REFERENCES**

None

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