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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8

1595 Wynkoop Street
Denver, CO 80202-1129
Phone 800-227-8917
http://www.epa.gov/region08

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JAN 23 2012

Ref: 8P-W-GW

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Roger L. Day
American Shale Oil, LLC
110 E. 3rd Street, Suite 201
P.O. Box 1470
Rifle, Colorado 81650

Division of Reclamation
Mining & Safety

GRAND JUNCTION FIELD OFFICE
DIVISION OF
RECLAMATION MINING & SAFETY

7-2008-046

RE: Draft Major Permit Modification: Change in
Temperature Monitoring Requirement
EPA UIC Permit CO52154-08524
Rio Blanco County, Colorado

Dear Mr. Day:

The U.S. Environmental Protection Agency Region 8 has received American Shale Oil, LLC's (AMSO's) letter on November 28, 2011, requesting a modification to the permit to modify the temperature monitoring requirements for the shallower portions of the injection well.

The EPA has reviewed the requested modification and agrees that the proposed request is reasonable given the lack of, or much lower concentrations of, oil shale that exists in the portion of the well bore where the monitoring change is proposed. The modification is not expected to pose any additional risks to underground sources of drinking water.

Environmental Protection Agency regulations and procedures for issuing UIC Permit decisions are found in Title 40 of the Code of Federal Regulations Part 124 (40 CFR §124). These regulations and procedures require a Public Notice and the opportunity for the public to comment on this proposed UIC Permit decision.

The public comment period will run for thirty (30) days from the latest date of publication. You may call Sallena Rodriguez at (800) 227-8917, extension 312-6279 to obtain the exact deadline for public comments. The Public Notice Announcement will be published in the following publication(s):

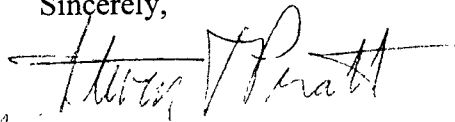
Rifle Citizen Telegram, Rifle
Rio Blanco Herald Times, Meeker

The enclosed copy of the Public Notice announcement, Draft Permit Modification decision and Statement of Basis are being sent to afford you an opportunity to also comment on the Draft Permit Modification decision during the comment period. Notice of EPA intent to issue this permit decision may also be sent to any surface landowner who could be affected by this proposed UIC permit decision.

The Final Permit Modification decision will not be made until after the close of the comment period. All relevant comments will be taken into consideration. If any substantial comments are received or if any substantial changes are made between the Draft Permit Modification decision and prior to the Final Permit Modification decision, the Effective Date of the Permit Modification will be delayed for an additional thirty (30) days as required by 40 CFR §124.15 (b) to allow for any potential appeal of the Final Permit Modification decision.

If you have questions regarding the above action, please contact Wendy Cheung of my staff by calling (303) 312-6242 or (800) 227-8917, extension 312-6242.

Sincerely,



for Callie A. Videtich
Acting Assistant Regional Administrator
Office of Partnerships and Regulatory Assistance

Enclosures: Draft Permit Modification
Draft Permit Modification Statement of Basis
Public Notice

cc: Paul Daggett
Bureau of Land Management
White River Field Office
220 East Market Street
Meeker, Colorado 81641

Travis Marshall
Colorado Division of Reclamation, Mining and Safety
Grand Junction Field Office
101 South Third Street, Suite 301
Grand Junction Colorado 81501

STATEMENT OF BASIS

AMERICAN SHALE OIL, LLC

AMSO T-1P

RIO BLANCO COUNTY, CO

EPA PERMIT NO. CO52154-08524

This STATEMENT OF BASIS gives the derivation of site-specific UIC Permit conditions and reasons for them. EPA UIC permits regulate the injection of fluids into underground injection wells so that the injection does not endanger underground sources of drinking water. EPA UIC permit conditions are based upon the authorities set forth in regulatory provisions at 40 CFR Parts 144 and 146, and address potential impacts to underground sources of drinking water. Under 40 CFR 144.35, issuance of this permit does not convey any property rights of any sort or any exclusive privilege, nor authorize injury to persons or property of invasion of other private rights, or any infringement of other Federal, State or local laws or regulations. Under 40 CFR 144 Subpart D, certain conditions apply to all UIC Permits and may be incorporated either expressly or by reference. General Permit conditions for which the content is mandatory and not subject to site-specific differences (40 CFR Parts 144, 146 and 147) are not discussed in this document.

Upon the Effective Date, the Permit Modification authorizes the operation of the injection well so that the injection does not endanger underground sources of drinking water, governed by the conditions specified in the Permit Modification.

Project Description

The American Shale Oil, LLC (AMSO) has been issued a Class V Experimental Technology permit on January 4, 2011. Under the Research, Development, and Demonstration lease from the Bureau of Land and Management, AMSO intends to demonstrate technologies capable of developing oil shale resources. The goals of the project are to test the viability of their technology, experiment with different monitoring technologies, and to investigate materials and conditions that would provide the best insulation to protect the formation from the high operating temperatures.

Permit Modification

During installation of the aerogel insulation, compaction of the insulation occurred at the shallower portion of the well resulting in a section of the well that may not provide the needed insulation to prevent heating of the formation near the well bore to meet the maximum allowable temperature requirements in the final permit. The purpose of the temperature monitoring along the wellbore is to ensure that the high temperatures do not cause kerogen pyrolysis within the oil shale and therefore potential contamination of underground sources of drinking waters (USDWs). AMSO is requesting to modify the temperature monitoring requirements for the shallower intervals, from a depth greater than 350 feet below ground surface (bgs) to surface, where oil shale may not be present at all or exists at much lower concentrations

than used to develop the permit temperature limits.

Based on the testing and sampling of the outcrop approximately 1 mile away from the permitted well, onsite field observations and literature review, AMSO has concluded the following:

<u>Formation Name</u>	<u>Depth (feet bgs)</u>	<u>Geology</u>
Uinta Formation 6	0-240	sandstone, siltstone, and minor marlstone (lacks oil shale)
Black Sulphur Tongue	240-265	gray to very light brown marlstone
Uinta Formation 5	265-350	sandstone, siltstone, and minor marlstone (lacks oil shale)

Based on the field observations at the outcrop dated January 23, 2012, provided by Western Water & Land, Inc. (WWL), consultants to AMSO, the Uinta Formation 6 and 5 do not contain oil shale. Core samples from surface to approximately 500 feet bgs had not taken and evaluated. For future projects, core samples should be retrieved and analyzed for confirmation, particularly for projects whose project life well exceeds the planned one year duration for this pilot project.

WWL also sampled the outcrop of the Black Sulphur Tongue and the chemical analysis showed that the oil content varies between 0.63 and 2.50 gallons/ton (gpt), with an average of 1.4 gpt. The concentration used to derive the permit temperature requirements was 30 gpt, or approximately twenty times less. By adjusting the reaction constant by a factor of twenty, the equivalent temperature for shale oil to be produced is an increase in 50 degrees Fahrenheit (deg F) in temperature.

The proposed new temperature requirements are as follows from surface to 350 feet:

<u>Formation Name</u>	<u>Depth* (feet)</u>	<u>Temperature Monitoring</u>
Uinta Formation 6	0-230	no requirements
Black Sulphur Tongue	230-270	Table 1
Uinta Formation 5	270-350	no requirements
Below Uinta Formation 5	> 350	Table 2

*note: The Black Sulphur Tongue depth has been approximated to 240 to 265 feet. However, for the purpose of temperature monitoring, AMSO has proposed to increase the top and bottom depths, by 10 and 5 feet, respectively, to account for the uncertainty.

Table 1

Table 2

<u>Temperature (deg F)</u>	<u>Number of Days</u>	<u>Temperature (deg F)</u>	<u>Number of Days</u>
400 – 450	633	350 – 400	633
451 – 460	341	401 – 410	341
461 – 470	186	411 – 420	186
471 – 480	103	421 – 430	103
481 – 490	58	431 – 440	58
491 – 500	33	441 – 450	33

An automatic alarm will sound when 450 deg F is reached for the region monitored below 350 feet bgs. A second automatic alarm will sound in the event that the temperature within the Black Sulphur Tongue interval (230-270 feet) reaches 500 deg F.

The EPA has reviewed the requested modification and agrees that the suggested approach is reasonable, given the much lower concentrations or the lack of oil shale that exists in that portion of the well bore.