American Shale Oil, LLC

February 4th 2013

Mr. Kent Walter, Manager
White River Field Office
Bureau of Land Management
220 East Market Street
Meeker CO 81641

RE: Oil Shale Lease COC69169
Notice of Intent for Geophone Orientation Survey

Dear Kent:

We have on our Pilot Site six Tomography wells which are designed to help us to be able to image the growth of the downhole retort. Five of these wells have seismic techniques installed, provided by the Lawrence Berkeley National Laboratory. Amongst this downhole equipment, there are some 3 component geophones. The orientation of these geophones needs to be ascertained so that the data can be correctly interpreted.

AMSO is, therefore, organizing to carry out an Orientation Survey, using explosive shots. Following guidance from your Paul Daggett, we have completed a Notice of Intent and Authorization to Conduct Oil and Gas Geophysical Exploration Operations that is enclosed, with Attachments A and B for your approval.

The intention is to perform this survey in late February to early March.

Please contact me if you need more information or if you have any questions on this application.

Sincerely,
American Shale Oil, LLC

John Foulkes
Deputy Project Manager

cc Travis Marshall, Environmental Protection Specialist,
CDRMS,101 South 3rd Street , Suite 301, Grand Junction CO 81501

enc:-1

110 East 3rd Street, Suite 201 P.O. Box 1470; Rifle, CO 81650 970-625-4324 phone 970-625-4318 facsimile

BLM Form 3150-4
FS Form 2800-16
(May 2006)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
DEPARTMENT OF AGRICULTURE
FOREST SERVICE

FORM APPROVED
OMB NO, 1004-0162
Expires: February 28, 2009

NOI Case File No.

NOTICE OF INTENT AND AUTHORIZATION TO CONDUCT OIL AND GAS GEOPHYSICAL EXPLORATION OPERATIONS

Lessee or Operator American Shale Oil, LLC		Project Name American Shale Oil (AMSO) RD&D	
Address PO Box 1470		Do you have a bond on file with the Agency? ☑ Yes ☐ No	
City Rifle	State Colorado	Which Agency? ☑ BLM ☐ Forest Service	
Zip Code 81650	Phone No. *(Include area code)*	Bond No. 1277	Bond Amount: $ 25,000
E-Mail Address john.foulkes@total.com (John Foulkes)			

Geophysical Co. Lawrence Berkeley National Laboratory		Geophysical Co. Representative Michelle Robertson	
Address One Cyclotron Road		Address One Cyclotron Road	
City Berkeley	State California	City Berkeley	State California
Zip Code 94720	Phone No. *(Include area code)* 510/486-4000	Zip Code 94720	Phone No. *(Include area code)* 510/486-5096
E-Mail Address mcrobertson@lbl.gov (Michelle Robertson)		Cellular Phone No. *(Include area code)* 510/219-6382	

Local Rep./Party Chief John Foulkes - cell: 832/768-7210; e-mail: john.foulkes@total.com

1. Legal Description: Give the legal and land description of the lands involved using Meridian, Township, Range, and Section(s), or metes and bounds as appropriate:

AMSO's RD&D Lease (COC 69169) is described as: T.2S., R.98W., 6th P.M.; Sec 21, E1/2SW1/4, and W1/2SE1/4
Some seismic shots are planned just outside of the RD&D Tract boundary as shown on the Maps in Attachment A

You must also submit a map with a minimum scale of one-half inch per mile showing the general area and project location. We recommend a 7 1/2-minute USGS quadrangle or the scale commonly used in the area. For seismic operations, your maps should include source and receiver lines, surface ownership, and any Federal lands under lease. When survey lines are along property boundaries between Federal and private lands, indicate which side of the line you will use.

2. Do you hold any Federal leases within the project area? ☑ Yes ☐ No (If yes, indicate location and lease numbers on an attached map.) Note: There is no fee for operations on your Federal lease.

3. If you are proposing seismic exploration, how many miles of source line (2-D), or acres (3-D) (to the nearest 10 acres) of survey are on:

a. Your Federal Lease N/A (AMSO's Lease is for oil shale RD&D) b. Other Federal lands N/A

4. When do you expect to start exploration? Late February/Early March 2013 How long will the project last? 3 days.

Describe any of your critical time frames associated with the proposed project, such as equipment or contractor availability.

We require the results of this survey to be able to intrepret the data for the 3D geophones in our Tomography wells. We would, thus, like the results in the first quarter of 2013 which requires us to gather the data in late February/early March, 2013.

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. (Section 1212 make it a crime for any person knowingly and willfully to make to any Department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Continued on page 2)

Description and Type of Operations *(check all that apply)*:

a. Survey Type: ☐ 2-D ☐ 3-D ☐ Gravity/Magnetic ☑ Other (explain): Orientation survey for 3D Geophones in our Tomography wells

Orientation survey for 3D Geophones in our Tomography wells

Describe the survey type:

The survey is a combination of a Mini-vibe survey with a Velocity Seismic Profile (VSP) in our TM-1 Tomography well, followed by a 15 explosive shot acquisition, preceded by 2 test or calibration shots to ensure the correct size of explosive charge. Full details are given in Attachment A.

b. Survey Method: ☐ Surface charge ☑ Shothole ☑ Vibroseis ☑ Other (explain): Velocity Seismic Profile (VSP) in our TM-1 Tomography well

What type and amount of explosives per source point will you use? Geoprime: either 1.5kg or 2kg, depending on calibration shot results

What shotpoint pattern and spacing will you use? see Maps in Attachment A What will be the shothole depth? 40 feet

Did you attach or display a diagram of the shotpoint pattern on the project map? ☑ Yes ☐ No

Describe the survey method:

See Attachment A

c. Transport Method: ☐ Vibrator Trucks ☑ Pick-up Truck ☑ Buggy/ATV ☐ Backpack ☐ Helicopter

Describe your transportation plans, including types and numbers of vehicles and how you will access the project area:

All survey points are on or next to existing roads or tracks or AMSO infrastructure as per the Maps in Attachment A.
Details of the equipment to drill the shotsholes are given in Attachment A.

d. Operating Procedures--Describe your operating procedures, including how you will minimize surface impacts. Describe support facilities you need, such as helispots, camps, or powder magazines; construction of roads or trails, proposed plugging procedures for shotholes, and general clean-up procedures:

Access roads will be closed during the drilling of the shotholes (one day) and during the firing of the shots (one day).
Details of the outline Traffic Control Plan are given in Attachment B. A1 Traffic Control of Silt, Colorado, have been employed to provide the service.

(Continued on page 3)

Terms and Conditions

1. The Bureau of Land Management (BLM) or Forest Service (FS) (Agency) must approve any Surface disturbing activities in addition to those approved in this NOI, such as route changes, placement of magazines, towing with a tractor, blading, dozing, snow removal, and vegetation removal. I must notify the Agency in writing of any changes in the original proposal and have Agency approval in writing for the changes before proceeding with them. Stacking sourcepoints to avoid sensitive resources or areas does not require prior Agency approval.
2. This NOI expires on _____, unless the Agency extends it in writing before that date.
3. I understand that this NOI does not grant any exclusive right to the described lands for geophysical exploration, or other purposes. The land area described above is at all times subject to any other lawful uses by the United States, its lessees, permittees. licensees, and assigns.
4. I must notify the Agency at least _____ days, but no more than _____, prior to initiating the project and entering upon the public lands.
5. In the field, each seismic crew must have with it a copy of the approved NOI and its terms and conditions.
6. The Agency may suspend or terminate this NOI if there is a violation of any of its conditions.
7. I must suspend operations when the operations may unnecessarily damage the surface, such as when rutting would occur due to wet soil conditions.
8. I must indemnify the United States for any liability for damage to life or property resulting from the occupancy or use of public lands under the NOI.
9. I must take all reasonable precautions to prevent and must suppress fires. The Agency may specify in writing the fire prevention and firefighting equipment I need. At my expense, I must extinguish all fires set or caused as a result of operations under this NOI and must report all fires to the Agency.
10. I must diligently protect from unnecessary damage United States land and property covered by this NOI. I must pay the United States for any damage resulting from my or my agents' or employees' violation of the terms of this NOI or any law or regulation applicable to the lands involved.
11. I must store and handle powder magazines and explosives according to U. S. Bureau of Alcohol, Tobacco and Firearms standards (see 27 CFR Part 55). I must properly secure loaded shotholes.
12. I must complete shothole plugging under Agency guidelines and the guidelines of any other local, Federal or State regulatory authority.
13. I must remove all materials and equipment I placed on the premises and restore the site to the Agency's satisfaction immediately after I complete the project unless the Agency approves other arrangements.
14. I must file a Notice of Completion (NOC) Form within 30 days after completing operations and reclamation. If the location of the project is different from that in the approved NOI, I must submit a revised map with the NOC (1:24,000 scale, where available), including source points.
15. I must pay to the United States $ _____ per _____ according to the regulations.
16. This geophysical exploration project is subject to the attached Conditions of Approval _____ through _____ and Exhibits _____.

WARNING: If you purposely give false or misleading information, you maybe fined $10,000, sent to prison, or both (see Title 18 U.S. C. 1001 statement on page 1).

I agree that I and my agents must conduct the geophysical exploration under all Federal, State and local laws, and applicable regulations and must comply with this NOI and any attached terms and conditions.

John Foulkes		4th February 2013
(Printed Name of Authorized Company Representative)	(Signature of Authorized Company Representative)	(Date)

(Printed Name of Agency Signing Officer)	(Signature of Agency Signing Officer)	(Title of Agency Signing Officer)	(Date)

NOTICES

The Privacy Act of 1974 and the regulation in 43 CFR 2.48(d) provide that you be furnished the following information in connection with information required by this Notice of Intent and Authorization to Conduct Oil and Gas Geophysical Exploration Operations.

AUTHORITY; 30 U.S.C. 181 et seq.

PRINCIPAL PURPOSE: We use the information to Process your Notice

ROUTINE USES: (1) The processing of the operator s Notice of Intent and Authorization to Conduct Oil and Gas Geophysical Exploration Operations. (2) To determine that mitigating measures are made to protect the environment. (3) Transfer to appropriate Federal agencies when concurrence is required prior to granting a right in public lands or resources, (4) Information from the record and/or the record will be transferred to appropriate Federal, State, local or foreign agencies when relevant to civil, criminal or regulatory investigations or prosecutions.

EFFECT OF NOT PROVIDING INFORMATION: Disclosure of the information is voluntary. If all the information is not provided, your right to conduct geophysical exploration activities may be revoked.

The Paperwork Reduction Act of 1995 (44 U.S.C.. 3501 et seq.) requires us to inform you that:
BLM will collect this information under 43 CFR 3150.
FS will collect this information under 36 CFR 251.15.
BLM/FS will use this information to process geophysical exploration notices.
Response to this request is required to obtain a benefit.

BLM would like you to know that you do not have to respond to this or any other Federal agency-sponsored information collection unless it displays a currently valid OMB control number.

BURDEN OF HOURS STATEMENT: Public reporting burden for this form is estimated to average 1 hour per response, including the time for reviewing instructions, gathering and maintaining data. and completing and reviewing of the form. Direct comments regarding the burden estimate or any other aspect of this form to the U.S. Department of the Interior, Bureau of Land Management (1004-0162), Bureau Information Collection Clearance Officer (WO-630), 1849 C Street, N.W, Mail Stop 401 LS, Washington, D.C. 20240.

ATTACHMENT A

To NOI for 3C Geophone Orientation Survey

1.0 Purpose

Seismic monitoring equipment installed in five of the six tomography wells at the AMSO RD&D site (yellow arrow in AMSO site location Figure 1) will be used to image the progression of the retorting front during the upcoming AMSO Pilot Test. Three-component (3C) geophones are installed at well depths between 1900 and 2200ft for a total of 78 downhole channels at the tomography pad. The purpose of this proposed survey is to collect seismic data of sufficient energy to orient the downhole 3C geophones for improved data analysis and interpretation during the Pilot Test.

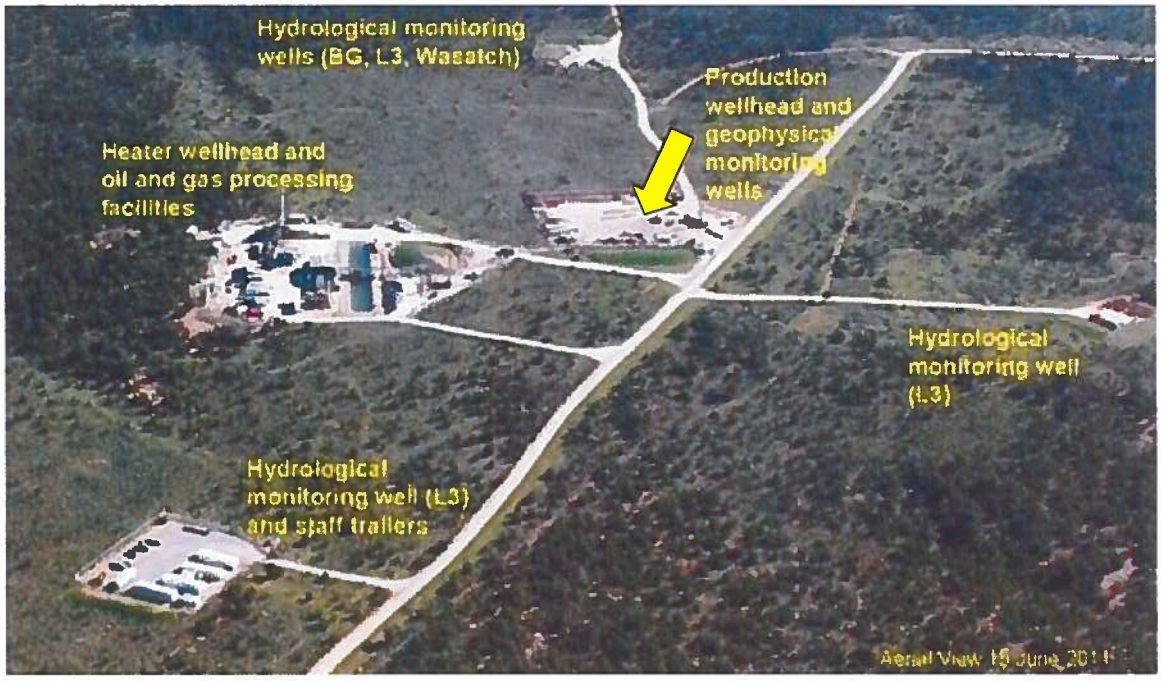

Figure 1. Five of the six monitoring wells on the tomography pad (yellow arrow) at the AMSO RD&D site have three-component (3C) monitoring geophones installed downhole. Results from this survey will assist in orienting the 3C geophones for improved data analysis and interpretation during the AMSO Pilot Test. [Photo source: AMSO website.]

2.0 Method

In the primary part of the proposed survey, explosive sources of 1.5 to 2.0kg will be detonated in 40ft shot holes with the source energy received on the tomography geophones. While these shot holes are being drilled, AMSO will complete a supplementary vertical seismic profile (VSP) survey in one of the tomography wells using a mini-vibe source. Figure 2 shows an aerial view of the proposed shot points, and Figure 3 includes the safe-offset buffer zones as defined in BLM Geophysical Handbook H3150-1, Release 3-330 dated 01/09/07.

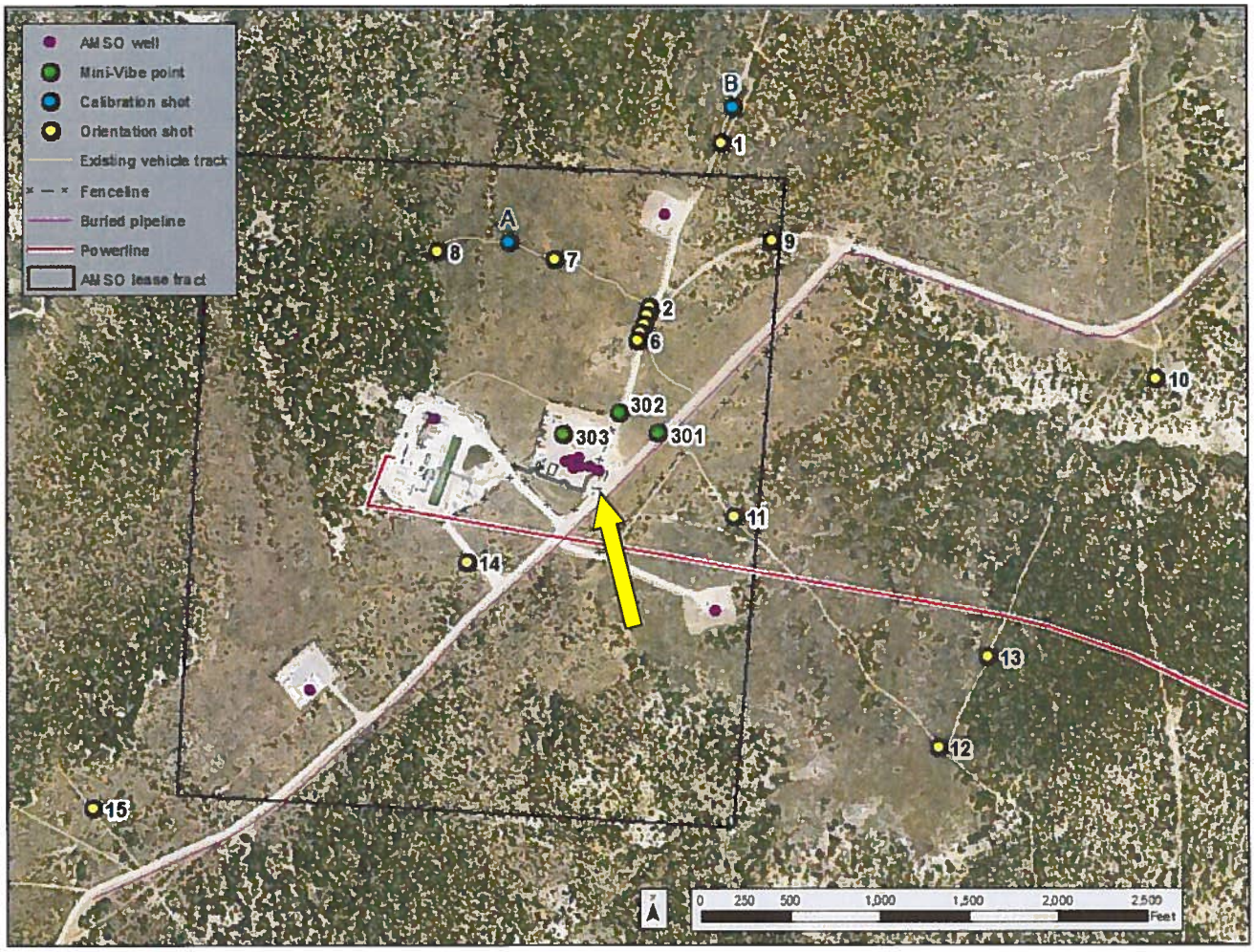

Figure 2. Proposed shot point layout at the AMSO site. All shot points are placed at the edges of roads or existing two-track vehicle trails to minimize disturbance. Calibration shots A and B (blue dots) are to the north of the tomography pad (yellow arrow), and shot points 1 – 15 (yellow dots) are spread in a range of azimuths and distances from the tomography pad for optimal collection of geophone orientation data. Mini-vibe points 301 – 303 are discussed below. Note that a buried pipeline parallels the main road and a powerline crosses to the heater pad.

2.1 Primary Survey: Downhole Geophone Orientation

Seventeen 40-foot shot holes will be drilled in preparation for the orientation survey. The first two shot holes (locations A and B in Figures 2 and 3) will be loaded and detonated with 1.5 to 2.0kg calibration shots with the results immediately analyzed to confirm that peak particle velocities are below 0.75in/sec at the safe-offset distances set out in BLM document H3150-1, and to determine the optimal charge size (1.5kg or 2.0kg) for the remaining 15 shot holes. Shot point locations have been selected based on existing vehicle access and required safe-offset buffer zones. All 17 shot points are placed at the edges of roads or existing two-track vehicle trails to minimize disturbance.

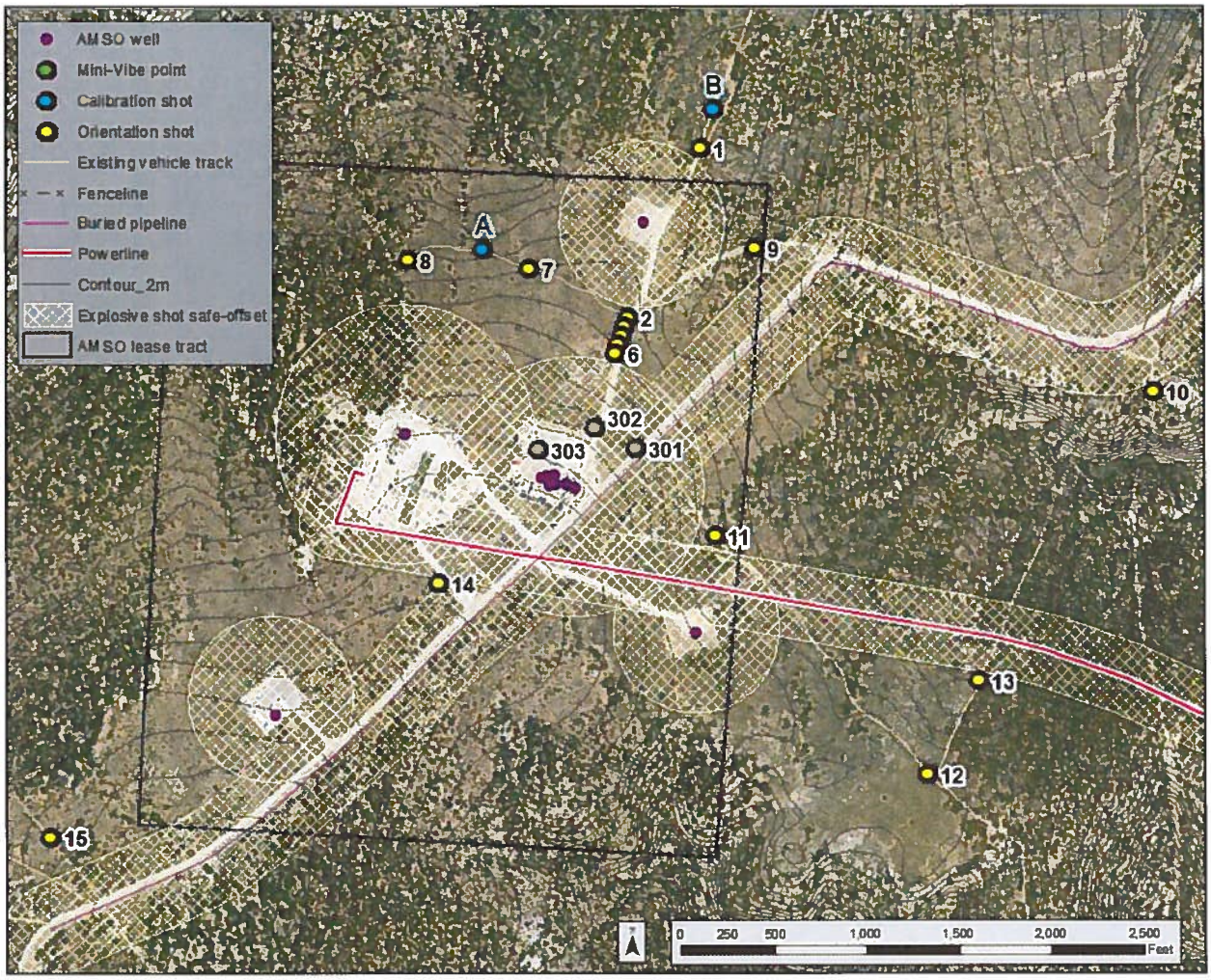

Figure 3. Proposed shot point layout with safe-offset buffer zones as indicated in the BLM Geophysical Handbook H3150-1. Buffers are set at 700ft for the production and tomography wells, 450ft for the water monitoring wells, 250ft for the pipeline parallel to the main road, and 200ft from the power line.

Data acquisition and overall technical supervision of the survey will be performed by Lawrence Berkeley National Laboratory (LBNL) personnel, with overall supervision and co-ordination under the responsibility of American Shale Oil (AMSO) personnel.

Shot hole drilling, loading, and detonation will be performed by Heli-Port Drilling personnel using explosives provided by Buckley Powder Company. LBNL will be responsible for the surveying in of the shot hole locations prior to the drill rig arriving onsite.

The survey is expected to take 2-3 days with the first 1-2 days covering the drilling of the shot holes (dependent on drill site conditions) and the final day for the actual shooting. Access roads will be closed during drilling and shooting as per the Traffic Control Plan outlined in Attachment B to the NOI.

All shots will be loaded and detonated on the same day with no explosives left onsite overnight.

Heli-Port Drilling personnel will drill the 17 shot holes using their track-mounted Morooka rig shown in Figure 4 below. The Morooka rig is 7ft wide, 23.5ft long, and weighs 24,000lbs with rubber tracks rated at 5psi ground pressure. Each shot hole will be backfilled after being loaded with charge, and immediately re-filled after detonation if required. Any cuttings from shot hole drilling not used in the backfilling of the hole will be scattered appropriately about the nearby area to blend in with natural surroundings and reduce visual impact.

Heli-Port Drilling has the following permits:
Colorado Explosives Permit Type I: 077-2579, expires 12-31-13
Colorado Explosives Permit Type II: 077-2214, expires 12-13-14
Federal ATF License #: 5-CO-077-33-3H-00463, expires 08-01-13

While off-road vehicle traffic is not anticipated, all tire tracks leading off road from this survey will be hand-raked to blend in with the natural surface. All flagging and lath used in this project will be removed from the site at the end of the survey.

Figure 4. Morooka track-mounted drill rig used by Heli-Port Drilling, dimensions 7ft wide x 23.5ft long, weighing 24,000lbs with a 5psi ground pressure track rating.

2.2 Supplementary Survey: Mini-vibe VSP

2.2.1 Purpose:

Results from a previous mini-vibe survey on the tomography pad at the AMSO site showed clear energy arrivals on only 10% of the 78 downhole geophone channels in the tomography wells. This indicated either poor coupling of downhole geophones or a source that was too weak for the site area. As a follow-up investigation, this proposed VSP (vertical seismic profile) survey is to determine whether the mini-vibe source energy is reaching geophone depths, assist in determining the state of health of the downhole geophones, and provide information for the velocity model. The VSP string will remain in place during the 17-shot geophone orientation survey described above.

2.2.2 Method:

LBNL will deploy a 20-channel hydrophone string down the fluid-filled tubing of AMSO tomography well TM-1 and use a 6000lb trailer-mounted mini-vibe (Figure 5) as the seismic source at 2 to 3 locations (Figure 6).

All mini-vibe source locations will be either on an access road or within the tomography pad fenceline. The mini-vibe will remain on existing roads and vehicle tracks while transiting between points. Vibe-point #301 located on the side of the main access road near the tomography pad entrance, vibe-point #302 is just outside of the NE corner of the tomography pad fenceline, and vibe-point #303 is located within the tomography pad boundary. Initial calibrations of the mini-vibe will confirm that peak particle velocities are below 0.75 in/sec at the safe-offset distances.

The hydrophone string is a single cable with 20 hydrophones set at 5m spacing (95m total) with a long lead cable to the recording trailer at the surface. Using a powered winch the string will be incrementally lowered for continuous 5m spacing between the surface and 400m depth, and then 1m continuous spacing between 400m and the cemented bottom of the borehole tubing, estimated at or near 670m. A slickline survey will determine tubing depth prior to the VSP.

Starting at vibe-point #301, the mini-vibe source will sweep frequencies between 20-120Hz while the hydrophone string is incrementally lowered toward the bottom of well TM-1. If insufficient energy is reaching the hydrophones from #301, the mini-vibe will be moved to alternate vibe-point #302 closer to well TM-1. Dependent on the results and time available, LBNL may also collect data from vibe-point #303 providing a near-vertical source for the shallower section of the well.

The VSP mini-vibe survey is expected to take 2 days and will be completed while the 17 shot holes are being drilled. At the end of the VSP survey the hydrophone string will be lowered to recording depth in well TM-1 in preparation for the 17-shot orientation survey. In the case of an extended VSP schedule, all mini-vibe operations will be shut down during loading and detonation of the shot points.

Figure 5. Trailer-mounted mini-vibe. The vibe pad is hydraulically lowered between the two trailer axles; the tanks at the rear of the trailer are filled with water for increased ground force output to a maximum trailer weight of 6000lbs. VSP vibe-points #301, 302, 303 are shown in Figure 6 below.

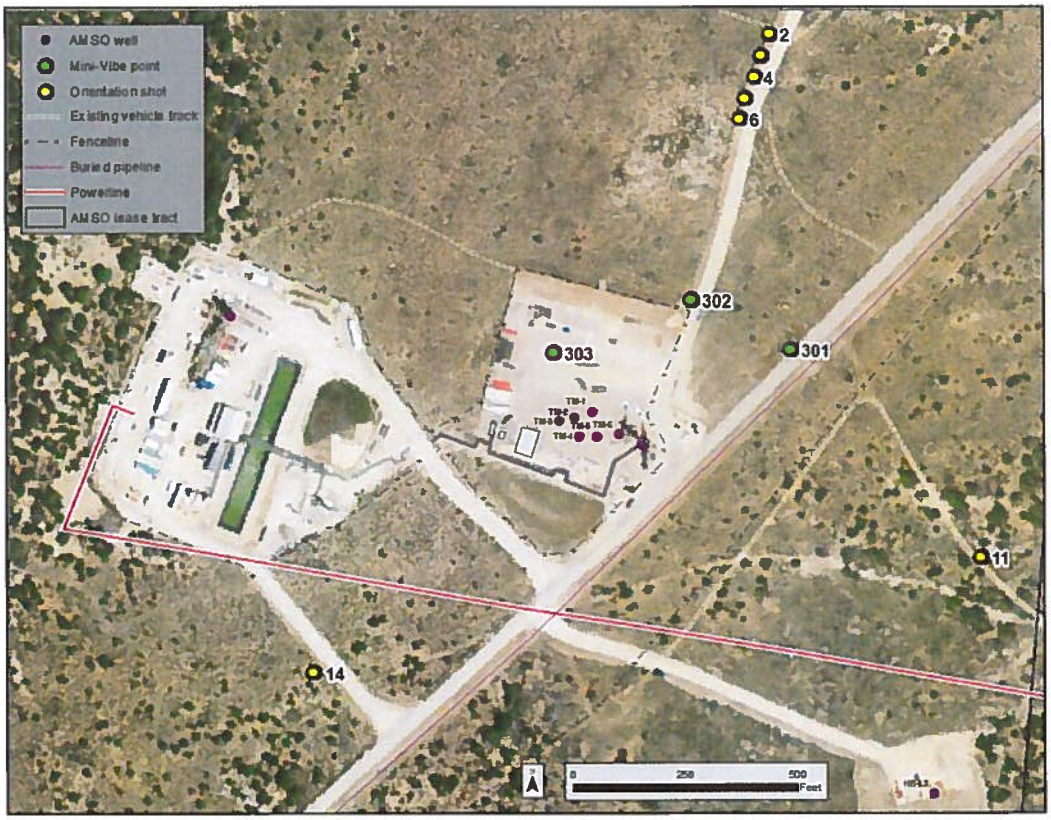

Figure 6. Mini-vibe source points (green dots) and tomography well locations (purple dots) for the mini-vibe VSP survey at the AMSO site. The VSP survey is scheduled to be completed before the loading and detonating of the 17 shots for the primary survey (yellow dots).

Attachment B to NOI for Orientation Survey

Traffic Control Plan

The following actions will be taken during the American Shale Oil (AMSO) seismic survey activities on BLM 1019 Road as described in Attachment A to the NOI:

- Road closure pre-warning signs will be placed at the intersection of County Road 85 and County Road 26. This signage will be placed three days prior to the seismic activities.
- A road closure pre-warning Electronic Sign Board will be placed at the intersection of BLM 1019 Road and County Road 26. This signage will be placed three days prior to the seismic activities.
- There will be three manned road closure points for all days of the seismic survey, as marked on the map below (yellow arrow marks AMSO site):
    - At the intersection of County Road 26 and BLM 1019 Road. This will also serve as an informational check point (marked as "X" on the map).
    - At the intersection of BLM 1019 Road and County Road 85 ("Y").
    - On BLM 1019 Road northeast of the AMSO site at the first intersection ("Z")

- A-1 Traffic Control of Silt, Colorado, will be providing traffic control services and if required will also provide a formal Traffic Control Plan.