



**PLAN OF ACTION  
FOR SEISMIC EXPLORATION  
BLM ROCK SPRINGS WY FIELD OFFICE  
RUBICON 3D SEISMIC SURVEY**

Devon Energy Production Company LP (Devon) will operate a heli portable 3D survey in Townships 12-13 North, Ranges 106-107 West; Sweetwater County, Wyoming. Devon will hire and direct the operations of various contract permitting, survey, drilling, recording and reclamation contractors necessary to conduct the survey. Devon and its contractors will comply with all Federal, State and local laws and regulations.

This report addresses the following criteria:

- 1: Cultural Impact
- 2: Wildlife Protection
- 3: Visual Impact
- 4: Reclamation Plan

In compliance with NEPA, Devon and the Rock Springs Field Office (RSFO) for BLM will agree upon specific special stipulations for the program.

The following personnel will be responsible for compliance:

John Hughes	- Project Supervisor, Devon OKC
Richard Hall	- Project Manager, Devon OKC
Steve Sohrenszen	- Safety Supervisor, Devon Houston
Dave Newman	- Permit man, CGGVeritas, Rock Springs
Dave Newman	- Project Manager, CGGVeritas, Rock Springs
Dennis Remmler	- Operations Supervisor, CGGVeritas, Denver

As early as possible prior to start up, BLM will be provided with a detailed schedule of crew activities and name of sub contractor(s). Prior to commencement of each operational phase (i.e. survey, drilling and recording and reclamation), a meeting will be held. Crew members will be informed of BLM regulations and requirements specific to the Rubicon 3D Seismic Survey. These meetings will be documented and signed by crew members. Devon and subcontractor personnel will be held accountable for their personal performance with respect to these policies. BLM personnel will be advised of meeting time and venue and are welcome and encouraged to attend to ensure correct information is imparted and add comments as required.

## OPERATIONS SCHEDULE

### Rubicon 3D Seismic Survey

This project is divided into four activity segments as outlined below. Time lines are tentative at this time due to uncertainty with weather conditions. A detailed schedule will be provided as early as possible prior to any field activities. **Table 1** provides a brief overview of operations. Detailed plans may be found further in this document.

**Table 1**

ACTIVITY	SCOPE	TIMING	PEOPLE INVOLVED
<b>ARCHAEOLOGICAL / SURVEY / PERMITTING</b>	<ul style="list-style-type: none"> <li>-Survey proceeds under Casual Use definition with consultation from BLM</li> <li>- Survey source points (shot holes) with GPS. Walk only off road.</li> <li>- Mark points with 2 foot lathe or 2x2 hub, and flagging.</li> <li>- Access and staging areas cultural Class III survey in undisturbed areas</li> <li>- Archaeological inspection, walk only off road.</li> <li>- Arch report to BLM</li> <li>- Surface and mineral permitting of non Federal lands.</li> <li>- Midget Faded Rattlesnake habit survey</li> <li>- Habitat survey for pygmy rabbit</li> <li>- Raptor survey</li> <li>- Habitat survey for sensitive plant species</li> <li>- Wildlife survey for small mammals</li> </ul>	<ul style="list-style-type: none"> <li>- Start field work as soon snow cover melts, approx 30 days to complete.</li> <li>- Arch start soon after survey</li> <li>- Arch completed by mid-June 2008</li> <li>- Delivery 30 days after field work completion.</li> <li>- Permitting on going as required.</li> <li>- Biological and wildlife surveys prior to start of disturbance activities</li> </ul>	<ul style="list-style-type: none"> <li>- 10 survey crew members, staying in Rock Springs</li> <li>- 3 Arch personnel based in Rock Springs</li> <li>- Approximately 15 environmentally qualified personnel</li> </ul>
<b>RE-SURVEY / SHOT HOLE DRILLING</b>	<ul style="list-style-type: none"> <li>- re-survey of source points damaged since Arch survey</li> <li>- Survey receiver locations.</li> <li>- locate and monitor explosive magazine site.</li> <li>- Heli-portable drilling of all</li> </ul>	<ul style="list-style-type: none"> <li>- re-survey commences mid June, continuing thru August 2008</li> <li>- Access and post plot mapping on going.</li> <li>- Explosive magazine arrives on</li> </ul>	<ul style="list-style-type: none"> <li>- 6 to 8 person survey crew using GPS.</li> <li>- approx. 25 people working on drill</li> </ul>

	source points	site 1 July, 2008 - Heli portable drills arrive first week July, start as soon as practical there after.	crews, based in Rock Springs
<b>RECORDING</b>	- using heli portable recording procedures; - lay geophones, cabling and ancillary equipment necessary to record seismic data. - detonate pre drilled shot holes using as many as 6 shooters.	- start laying cable when drills are 80% complete, approx mid Aug, 2008. - continue cable pick up, lay out and detonation until project completed approx. mid September, 2008 -if this timeline is acceptable it will allow for our program to be completed prior to the start of the hunting season	- approx. 45 people working on recording crew, based in Rock Springs.
<b>RECLAMATION</b>	- travel each source and receiver line in teams of two on foot - pick up and dispose of all trash, survey flagging, wire and man made debris. - return staging areas and roads to same condition as found.	- as soon as reasonably practical after recording operations have complete segments of the survey. - continue thru recording operations, complete approx end September, 2008 - repairs to staging areas / roads by early October, 2008 -this activity can be conducted in a low impact manner with limited or no helicopter support	- approx. 6 people assigned to reclamation / clean up.

## OVERVIEW

The Rubicon 3D Seismic Survey project will utilize 3D recording techniques which will provide high resolution of subsurface geological formations. These features may provide images that indicate the potential for hydrocarbon accumulation. This 3D data set will provide Devon with a tool for determining future drilling operations. Future surface disturbance may be substantially reduced after evaluations are made by Devon technical staff.

The outside perimeter of this survey encompasses approximately 42 square miles. Because this project will be conducted using heli portable procedures, actual acreage used for source and receiver lines is 135.43 acres. Staging areas will require an additional 12.5 acres.

A map showing the project location will be provided with the NOI, and any updated maps will be forwarded to RSFO. **Table 2** depicts the lands within the project area, which consist of approximately 89% BLM Lands, 10% State Lands, and 1% Private Lands. Permits from state and private lands will be acquired before the program begins.

**Table 2**

<b>Surface Ownership</b>	<b>Sq Miles</b>	<b>Acres</b>	<b>Percentage of Program</b>
Bureau of Land Management	37.22	23821.06	89.01%
Private	0.51	323.69	1.21%
State	4.09	2617.78	9.78%
<b>total</b>	<b>41.82</b>	<b>26762.53</b>	<b>100%</b>

The project will be conducted using heli portable drilling and recording techniques. Light trucks will be used when possible to ferry personnel and equipment to various sites, but will only travel on pre-approved access routes. These access routes will be identified in the Environmental Assessment. In addition, all terrain vehicles (ATV's), or other similar mechanized vehicles may transport personnel and equipment on approved routes, which includes existing two tracks and improved roads. No mechanized vehicles will be operated during periods of saturated soil conditions when surface ruts greater than 4 inches would occur along straight traveled routes. In the event that ruts occur, which are caused directly by Devon's seismic operations, reclamation measures will be undertaken as soon as possible to restore these areas as close to their original condition as possible.

Field operations will be conducted from staging areas in or near the project area. Activities at the staging areas includes offloading / loading of equipment from tractor trailer units, transfer of equipment to, and from light trucks and helicopter(s), temporary storage of equipment, several light trailers used to charge batteries, minor equipment repairs and logistical coordination. In addition, staging areas can be used as muster points should the Emergency Response Plan be enacted. Proposed Staging Areas are indicated on the map submitted and on file. Any fuel stored on these remote sites will have secondary containment.

Based on current planning, the project is expected to begin in the North West corner and proceed in a generally southerly direction.

**RUBICON 3D SEISMIC SURVEY**

Source Line Spacing = 1,980 feet  
 Total Source Line Length = 114.6 miles  
 Total Number Source Lines = 20  
 Average Source Line width = 3 feet

Receiver Line Spacing = 880 feet  
 Total Receiver Line Length = 258.45 miles  
 Total Number Receiver Lines = 36  
 Average Receiver Line Width = 3 feet

Shot Hole Depth = 50 feet

**SURVEY LAYOUT PARAMETERS**

Source Point Interval = 220 feet  
 Total Source Points = 2,752  
 Density per Square Mile = 65.5  
 Estimated Total Acreage = 41.45 acres

Receiver Point Interval = 220 feet  
 Total Receiver Points = 6156  
 Density per Square Mile = 147.7  
 Estimated Total Acreage = 93.98 acres

Explosives per hole = 10 pounds

**NOTE:** All holes will be double capped

# **1      ARCHAEOLOGICAL / SURVEY / PERMITTING**

## **1.1    SOURCE POINT SURVEY**

The ideal location of source and receiver points is determined prior to survey commencement. Pre-plot coordinates are sent to the surveyor who in turn uploads this to his GPC receiver. Using only source point coordinates, his team of 10 GPS operators will walk from source point to source point (in this case 220 feet). When the location of the GPS operator matches the ideal location he marks the spot with a wooden hub and/or surveyors flagging.

GPS operators will be dropped off each morning and picked up each night at whatever nearby existing road or trail is convenient. Truck traffic will **NOT** be allowed off existing two tracks or improved roads. In very hilly or remote terrain personnel and equipment may be shuttled with the helicopter. All personnel or teams of people will carry hand held radios and, if required, survival packs in remote areas.

The survey team will also erect a tower and radio transmitter at several locations throughout the project area (usually on hill tops). These sites are used to transmit GPS corrections necessary for real time, high accuracy positioning. It may be necessary, based on individual source point conditions to move the source point, (example: terrain too steep to safely land the helicopter). In these cases, source points may be moved as much as 1,000 feet to a more suitable location. Skid and offset locations as well as the helicopter Landing Zones (LZ) are thoroughly inventoried, documented and mapped.

During source point layout, GPS operators will make sketches of obstacles, hazards, and archaeological site and exclusion zones. This “hazard” map will contain the entire post plot positions of the source and receiver points surveyed. This will be used by all of the crew and forwarded to the BLM.

## **1.2    ARCHAEOLOGICAL SURVEY**

Prior to starting field work, a registered Archaeologist will complete a Class I Archaeological survey to identify previously recorded archaeological, historic or prehistoric sites.

During the Class III clearance, the archaeologist will work behind the survey crew identifying additional archaeological sites and flagging them for avoidance. The archaeological clearance will consist of a corridor of 50 feet from the centerline of the hole on each side for the length of the source lines. This would create a contiguous 100 foot swath down line.

The archaeologist will utilize a unique color of flagging to mark areas for avoidance. If an access route or source point falls within a site, the archaeologist will flag the site and re-route the access flagging. The surveyors will be notified and source points that fall within the site will be relocated.

Vehicular traffic will only be allowed on existing two tracks or improved roads. These areas will be restricted to foot traffic and recording equipment only. The project manager and surveyor will work closely with the archaeologist, to ensure a safe, thorough and timely survey. Devon or its contractor will develop a Travel Plan for the project identifying by GPS existing two tracks that will be utilized. Once the Travel Plan has been completed, any two tracks used for this project will be surveyed for Class III clearance. This will also include all helicopter Landing Zones (LZ)

In order to conduct the project as expeditiously as possible, the archaeological reports will be submitted in two phases split approximately between Receiver Line 189 and receiver Line 185. This will allow drilling operations to commence from the North half in those areas that have been cleared and approved.

### **1.3 IMPACT**

The work area is in a remote area approximately 50 miles south of Rock Springs. There are few people living in the project area and when encountered will be treated with the utmost respect. Shot holes will not be drilled within 600 feet of any permanent structure. Buffers will be implemented with 1320 feet from any springs, 500 feet from riparian vegetation, and 100 feet from the inner gorge of ephemeral channels.

Crew members are not allowed to carry fire arms. Nor are they allowed to harass, or otherwise impede the movement of any wildlife, or livestock encountered.

The crew will not use power or hand tools to fall, or otherwise harm native or non native vegetation. Source and receiver lines will be accessed on foot, assuring disturbance to the land base to be negligible. Mechanized vehicles will only be permitted access on pre-approved routes.

Reclamation will be planned for any staging area on BLM land to include the planting of approved weed free certified native seed as approved by the authorized BLM official. In the event that rutting of roads or trails occurs, repairs will be conducted prior to the crew departing the area. Damages to roads and trails will be documented and reported to the BLM. Reclamation will, to the extent possible, repair the damaged area to as close to its original condition as possible. Failure of crew personnel to follow these and other plan or action commitments is grounds for immediate dismissal.



**GPS control station**

## 2 RE-SURVEY / SHOT HOLE DRILLING

### RE- SURVEY

Using methods and procedures outlined in **Section 1.1** above, re-survey is necessary to replace hubs and or lathe and markers previously established for the arch survey that will be destroyed by wind, wildlife or livestock.

The survey crew will concentrate on re-survey, or source points to enable uninterrupted progress of drilling operations. When source points are complete, lay out of receiver points will start. Source and receiver points will be marked with lathe, flagging and a 1 foot diameter spray paint mark.

### SHOT HOLE DRILLING

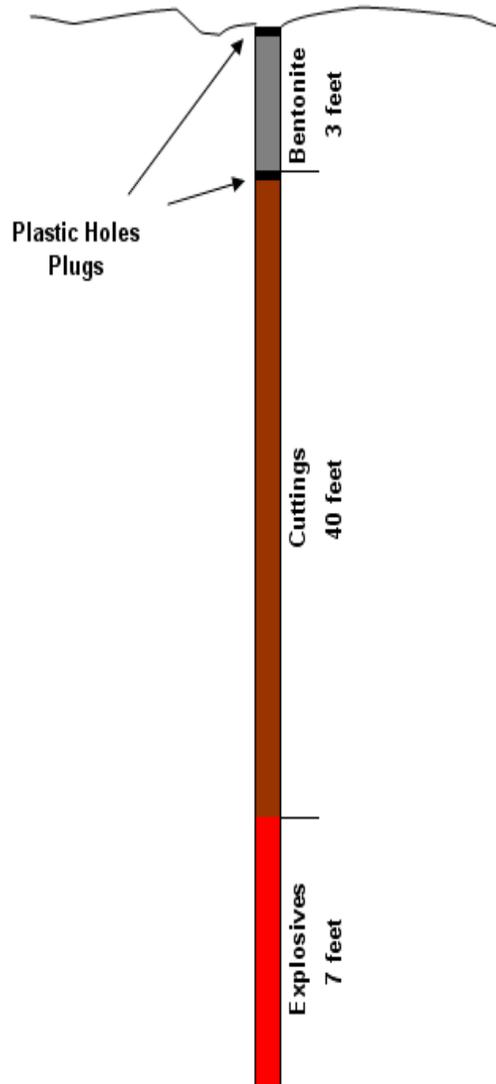
Shot holes will be drilled using heli portable drilling equipment. Shot holes will not be drilled closer than 1320' from any springs. A ground based drilling coordinator on foot will locate the surveyed shot hole location. He will then direct the helicopter via VHF radio communication to set the drill on location. Up to 10 drills could be utilized on this program concurrently. The drill is operated by a driller and drill helper. They work daylight hours. They may be flown to their drill every morning by helicopter and picked up at night.

These rigs consist of a drill unit and a compressor unit, each weighing approximately 1,600 pounds. All industry safety requirements are met. All rigs are audited, prior to commencement of drilling, and a daily inspection of each unit is documented. Each unit is transported from source point to source point by a Bell 205 "Huey", or equivalent and set down beside each other. The drill and compressor are connected using "quick connect" air and hydraulic fittings. Drill cuttings from the hole are brought to the surface using compressed air.



**Heli-portable drilling rig**

Upon completion of the hole, 10 pounds of explosives is loaded into the hole (MSDS attached). The remainder of the hole is back filled and tamped using drill cutting and 20 pounds of bentonite as per diagram below. The shot holes will be plugged at the time of drilling in accordance with the Wyoming Oil & Gas Commission rules and regulations.



**Figure 1.**

## 2 SHOT HOLE DRILLING (CONTINUED)

Access to shot holes in sensitive areas will be approved before they are drilled. Explosive storage and staging areas are planned to be on fee or state land. If no suitable sites can be found on these lands the BLM will be contacted for possible locations on federal lands and if locations are selected on BLM properties, they will have archaeological clearance prior to entry.

Prior to deployment on the project area the equipment will be power washed to prevent spread of noxious weeds.

### EXPLOSIVES STORAGE

The safe handling, transportation and storage are of primary importance. These activities are strictly enforced by several federal agencies with policies and procedures. Briefly, explosives will be transported in industry standard portable magazines. Explosives will be handheld under the care and control of personnel possessing a federally approved explosives handling license. Storage of explosives will be in an approved magazine, temporarily established near or within the project area. The magazine will be accessible by truck and under the care and control of licensed personnel. Explosives not loaded into a shot hole must be returned to the central magazine each night and logged. A strict inventory is maintained.



**Explosives magazines**

## **IMPACT**

The greatest impact with this operation is thought to be the helicopter generated noise. Impact resulting from the actual drill operations will be limited to dust covering vegetation in an area of approximately 30 foot radius (depending on local wind conditions). Drill cuttings will be spread over an area with approximately a 3 foot radius, and not exceeding 2 inches depth in thickness.

Crews will be instructed to avoid overflights of domestic and wild animals. Harassment of wildlife is strictly forbidden.

Reclamation will be planned for any staging area on BLM land to include the planting of approved weed free certified native seed as approved by the authorized BLM official. In the event that rutting of roads or trails occurs, repairs will be conducted prior to the crew departing the area. Damages to roads and trails will be documented and reported to the BLM and reclamation measures will be undertaken as soon as possible to restore these areas as close to their original condition as possible.

The crew will not use power or hand tools to fall or otherwise harm native or non native vegetation. Spills of any fluid will be reported promptly to the BLM. Off road travel by mechanized vehicles is not permitted, except on pre-approved access routes.

An Emergency Response Plan (ERP) will be created prior to the activity commencing. In the unlikely event of a medical evacuation, the ERP will be initiated. The ERP will be provided to BLM prior to approval of the Environmental Assessment Decision Record.

## **3 RECORDING**

This survey will utilize helicopter and ATV support for moving recording equipment. Helicopters will utilize navigational devices which allow for accurate deployment of recording equipment regardless of ground cover. Post plot coordinates generated by the survey crew are uploaded into the device. The accuracies are within a few square feet. The crew may utilize Kawasaki Mules or other ATV's on pre-approved access routes where possible to assist in troubleshooting recording equipment and move personnel. The crew will be provided with updated hazard maps showing approved drive routes, and areas of avoidance as well as being supplied this information at a start up meeting prior to entry into the field.

During the recording phase, a minimum of 26 lines of recording equipment will be active at any given time. The "spread" (area occupied by live recording equipment), will encompass approximately 24 square miles. The parallel receiver lines are 880 feet apart with 220 foot intervals between receiver points. The parallel source lines are 1,980 feet apart with 220 foot intervals between source points. Receiver points are indicated on the Pre-Plot by a blue solid triangle and the source points with a red dot. Source lines are running North and South while Receiver lines are running East and West.

The survey must be recorded in a sequential manner, beginning at one end of the project and working through to the opposite end. The design of this 3D grid requires the survey to be recorded north to south or vice versa. Tentatively, we are planning to conduct the survey beginning in the northern end of the grid.



**Bell 205 helicopter moving air compressor for heli-portable drilling rig**

Two man teams of “shooters” will move down the source lines detonating the charges. There may be as many as 5 of these teams spread out on the active spread. Actual detonation of the charges is controlled by the observer in the recording vehicle. A sequence of procedures is completed prior to any detonation. This can take up to ten minutes between detonations or happen as quickly as 2-3 minutes. Conditions which may prevent the recording crew from recording the data are lightening, strong winds, animals chewing on the recording equipment, cattle, horses or human vandalism disrupting the geophones, surface noise created by vehicles or other industrial equipment.

A main staging area with a landing zone (LZ’s) will be utilized to bag and prepare the equipment to be transported by the helicopter. Staging areas are located on previously disturbed areas when possible and usually encompass approximately a 200-foot radius. Crew vehicles may be parked at the staging area as well as several 45-foot trailers. Mini LZ sites may be utilized in some remote areas to reduce helicopter flight time and speed the progress of the seismic program. An equipment truck may transport bagged equipment to a well pad or similar area utilizing existing two tracks or improved roads where the helicopter utilizing a long-line will pick up the equipment and fly it to nearby receiver lines. The seismic contractor will attempt to locate staging areas on private or state land when possible. Any staging areas on BLM lands, that are not located on previously disturbed areas, will be surveyed by the archaeologist and cleared with the BLM.



**Bell 407 helicopter with carousel for moving recording equipment**

A crew of approximately forty-five (45) people will perform operations seven (7) days a week for approximately 45 days during the recording phase. The majority of troubleshooting (locating and replacing bad equipment) will be completed on foot. The majority of crew will stay in Rock Springs and will be transported by bus to the main staging area in the morning after the morning safety and briefing meeting.

An ERP will be created, reviewed and updated as necessary and available for review to the BLM.

Prior to arrival on site the equipment will be power washed to prevent the spread of noxious weeds.



**Recording equipment in staging area**



A “mule” ATV

#### 4 SAFETY

Safety is a very important aspect of seismic operations. Keeping all of the workers safe, as well as the public, is of utmost importance to Devon. All contractors must adhere to Devon’s comprehensive Geophysical Safety Guidelines policy. This, as well, as the contractor’s corporate Safety Manual will address all potential safety issues. Devon has a dedicated Geophysical Safety Coordinator who works closely with the contractors to ensure compliance of all safety rules and regulations. Daily safety meetings are held and documented with all contractors. Fires are a major concern. Devon and its contractors will have various fire fighting apparatus on hand in various locations throughout the project area. Helicopter “Bambi Buckets” will also be placed in staging areas to allow for rapid deployment. Water source areas will be identified prior to start-up of recording, or drilling operations. Fire drills will be conducted on a regular basis.

If outside security is warranted onsite, Devon will provide the necessary personnel to secure the program area.



**Fire fighting backpacks at staging area**



**Fire drill with crew**

## **5 RECLAMATION**

Project reclamation will concurrently proceed with the completion of recording operations. All pin flags, flagging and trash will be collected as the program progresses. In the event that reclamation measures need to be implemented, they will be undertaken as soon as possible to restore these areas as close to their original condition as possible. As the program progresses forward, a final inspection will be completed.

Total overall impact from this type of seismic heli portable methodology is very minimal and is short term in duration. Linear lines will not be visible from the air or on the ground during or after the acquisition is complete. Shot holes will be unidentifiable the year following the seismic acquisition. All debris will be removed from the area.



Further information can be obtained from the authors of this document

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