

**Subject:** Analysis Report on the results of a Bureau of Land Management data call for information on NEPA records for geophysical exploration of oil, gas, or geothermal energy.

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## **Introduction**

The purpose of this document is to explain the basis for enabling the Bureau of Land Management (BLM) to establish a categorical exclusion (CX) for authorizing geophysical (i.e., seismic) exploration activities. The proposal covers the following activities:

Proposed 516 DM citation 11.9(B)(6):

*Establishment of terms and conditions and approval of Notices of Intent to conduct geophysical exploration of oil, gas, or geothermal pursuant to 43 CFR 3150 or 3250 when no road construction is proposed.*

To make an informed determination regarding the proposed CX, key questions (listed below) were posed, and data relevant to answering these questions were collected through a census inquiry of geophysical exploration actions that were authorized by the BLM from 2000 to 2005. Responses to the following NEPA process questions were analyzed:

- What type of NEPA document preparation process was used to enable the geophysical exploration activity?
- What type of geophysical exploration was performed?
- Was there road construction associated with the action?
- Were there significant individual or cumulative impacts in the NEPA analysis for the project? If yes, were the significant individual or cumulative impacts mitigated?
- Were there any unexpected impacts? If there were unanticipated impacts, what were they?
- How were the results validated?

This report describes the administrative process and methods used to construct and manage the data call, and to compile and analyze the data received. Relevant findings to the above questions are presented in tabular and textual format, and subsequently discussed. The discussion concludes with a recommended action for the proposed CX.

## **Background**

Today's energy development is dependent upon geophysical exploration to maximize recovery potential while minimizing the number of necessary platforms and wells. Seismic operations that occurred on public lands twenty plus years ago often involved road building and heavy truck mounted drill rigs. This type of exploration had much greater environmental impacts on the landscape than the exploration occurring today. Most modern geophysical exploration involves low impact and state-of-the-art techniques that minimize surface disturbance. The seismic operations BLM authorizes today are typically conducted by vibroseis trucks or small portable drill rigs transported by either off-road vehicles with low pressure tires, or helicopter. Thus, the traditional work camps and bulldozers that accompany heavy equipment have been abandoned and the seismic crews greatly reduced in size. Using best management practices (BMP) such as seasonal restrictions, equipment restrictions and other mitigation measures are employed, operators are able to minimize the impacts associated with modern seismic operations.

## **Data Call Administrative Process**

An interdisciplinary team of subject matter experts within the BLM and Department of the Interior (DOI) identified the information needed to determine whether the existing data supports the proposed CX. Instruction Memorandum (IM 2006-031), issued on November 8, 2005, requested information on the NEPA procedures used to support a census collection of geophysical exploration activities for five years. Source materials to complete the data call included land use plans, project plans, and associated NEPA documents, including internal reports and subject matter expert opinion.

Washington Office staff created data entry spreadsheets and instructions for entering appropriate data as a means of collecting information. Per direction of the IM, BLM state offices collected and compiled a 100% sample of the referenced activity from available records in applicable field offices. Lead energy contacts in each field office were responsible for reporting requested data on 21 items (fields) back to the state office. The census examined those actions authorizing geophysical exploration from October 1, 2000 through September 30, 2005.

Electronic access to environmental documents is not currently available due to a court-ordered shutdown of most Internet service to the DOI, for which the BLM is a sub-agency. The shutdown, ordered by U.S. District Judge Royce Lamberth on March 15 2005, is the result of litigation against DOI for management of Indian trust data and assets. Due to the court order, information related to a small number of geophysical exploration projects may not have been accessible. It is projected that any geophysical exploration activities not reported due to the injunction is similar in scope and nature to those records collected through the data call.

## Basis for Proposed Changes to 516 DM part 11

### Scope of Representation

Table 1 contains the number of geophysical exploration projects authorized by each BLM state office within the five year period and the percent of geophysical exploration action by State in the 244 population from the census inquiry.

**Table 1: Geographic Distribution of Geophysical Exploration Activities**

<b>State</b>	<b>Number of Geophysical Exploration projects authorized from 10/1/00 through 09/30/05</b>	<b>Percent of total Geophysical Exploration projects authorized</b>
Alaska	13	5.3
Arizona	1	.4
California	2	.8
Colorado	23	9.4
Montana	57	23.4
Nevada	9	3.7
New Mexico	25	10.3
Utah	9	3.7
Wyoming	105	43
<b>Totals</b>	244	100

Data entry sheets created in Microsoft Excel contained a record for each state and fields for providing data based on the CX criteria. The first eight fields contained the following identifying information for each geophysical exploration project: State, Field Office Name, BLM Organization Code, Contact's Name, Phone Number, Project Name, Type of NEPA Document, and NEPA Document Number. Each State listed above in Table 1 was provided its own worksheet containing recording the requested information.

Every data cell contained precise information to avoid ambiguity. Instructions were provided to support the data entry process. Data entry choices were limited to: explicit information about each geophysical exploration activity; a small choice of coded options; a single metric; or a "yes", "no", or not applicable response. Only 1 of the 21 fields required a narrative response that could generate dissimilar data entries. Narratives were necessary to answer the following question:

- If actual impacts were not the same as predicted impacts, what were the unanticipated impacts?

## Evaluation of the NEPA Process

The purpose of the geophysical exploration data call and subsequent analyses was to determine whether these activities are having either individual or cumulative adverse impacts on either the physical or human environment as determined through NEPA. Of the 244 projects in the census population, about 90% were conducted through the EA process (see table 2).

The geophysical exploration actions based on an EIS were either part of a larger geothermal project or the actions relied on a DNA, which tiered to a prior EIS. None of the geophysical exploration specific activities conducted under an EIS resulted in significant impacts.

The geophysical exploration activities authorized by use of a CX were based on a Departmental CX for data collection. The activities relying on the CX had to be checked against the Department's list of extraordinary circumstances for impacts to the physical or human environment. None of the geophysical exploration activities conducted under a CX resulted in significant impacts.

**Table 2: Type of NEPA Actions Used for Geophysical Exploration Authorizations**

<b>NEPA Type</b>	<b>Frequency from 10/1/00 through 09/30/05</b>	<b>Percent (%)</b>	<b>Number of Actions Resulting in Significant Impacts</b>
<b>EA</b>	218	90	0
<b>EIS</b>	18	7	0
<b>CX</b>	8	3	0
Total	244	100	

## Analysis Process

Project data from each state were combined in an Excel workbook. Washington Office staff and National Science & Technology Center staff collaborated to develop code for inconsistent and impractical inputs. Using the code, a BLM statistician specializing in the biophysical applied sciences (biometrician) ran the code against the data entries collected in the master data sheet. Key variables were checked and corrected for data-coding differences.

## **Quality Control Procedures**

Data received were reviewed by an interdisciplinary team of BLM personnel. Three persons independently examined the 21 data fields associated with each record for complete and appropriate information. Incomplete records were completed by interviewing the person responsible for the data entry. Inappropriate responses were similarly corrected through interviews. For example, there were several inappropriate responses for type of NEPA document. Where the use of documentation of NEPA adequacy (DNA) was entered, follow up calls were made to determine the type and name of the original NEPA document for which the impacts were analyzed.

Three iterations of data editing were done to correct inconsistencies and screen out unusable records such as those with incomplete information or duplications. Data from each edit-iteration were kept for the record. The analysis was conducted on the 3<sup>rd</sup> iteration of data cleaning.

The data call produced a complete record of required information for 247 geophysical exploration projects. Three records were eliminated during the independent quality review period because there was insufficient data either because the geophysical exploration activity had not been completed or because the file lacked needed information.

As a result of the data suitability review process, 244 records were ultimately found to have met validation criteria for use as evidence to answer the critical question: “Are certain activities associated with geophysical exploration routinely found to have no significant individual or cumulative impacts?” The answer to this question was “yes” for all 244 records, which demonstrates that these activities do not warrant NEPA review above a CX.

## **Findings**

The findings and discussions below are based on the results of the geophysical project reports generated in response to the IM 2006-031 data call.

### *Significance of Impacts*

In all 244 records submitted for geophysical exploration, none of the projects predicted individual or cumulative significant impacts. Two records did report that actual impacts were not the same as those predicted, however, neither resulted in significant impacts. For the other 242 records, results were as predicted and no significant impacts occurred from the geophysical exploration activity. As such, none of the 244 records resulted in significant impacts.

### *Type of Geophysical Exploration Conducted*

The BLM authorizes two predominant seismic methods for geophysical exploration on BLM administered lands. Geophysical exploration uses vibrations such as sound waves and shock waves to map the different layers of the ground, thus enabling the operator to predict the

earth's density at varying depths. Seismic geophones are able to collect their data from many sources that generate shock waves.

The shot hole or explosives method is one source for creating vibrations. By drilling small holes into the ground, and packing them with capped explosives (directed towards the center of earth), followed by detonation, the geophones will be able to get sufficient data to map the rock strata that are underneath the receivers. Computer based software is often used to calculate the distance needed between the location of such explosive holes.

Over fifty percent of the geophysical exploration activities conducted were those employing vibroseis trucks or buggies (see table 3). The vibroseis trucks generate vibrations underneath the ground by shaking for several seconds at a designated location, thus sending vibrations through the ground. This process is the most precise process because it uses controlled vibrations that are spread over a period of time, as opposed to the explosion vibration that is a single burst of energy. The trucks are able to operate even inside major cities, as the vibration is negligible due to the spread of vibration over a period of time.

The “Other” methods for conducting geophysical exploration on BLM administered lands include, but are not limited to, magnetotelluric (MT) survey with supporting time domain electromagnetics (TDEM), temperature gradient holes, and velocity tests.

None of the types of geophysical exploration activities collected in the data call resulted in significant impacts. This is not to say that the potential for impacts is non-existent. Reducing the impacts resulting from geophysical exploration is BLM’s standard set of Conditions of Approval (COA) that accompany every authorization for geophysical exploration. The COAs contain standard stipulations, including but not limited to, protections for cultural resources, suspending geophysical exploration activities when soils are saturated and limited surface disturbance to the fullest extent possible. Additionally, before authorizing officials could approve a geophysical exploration project under the proposed CX, the official would have to check the activity against DOI’s list of extraordinary circumstances (516 DM 2, Appendix 2).

**Table 3: Type of Geophysical Exploration Conducted**

<b>Type of Geophysical Exploration Activity</b>	<b>Frequency from 10/1/00 through 09/30/05</b>	<b>Percent (%)</b>
Shot Hole/Explosive	52	21.3
Vibroseis	123	50.4
Combination	54	22.1
Other	15	6.2
Total	244	100

### *Type of Road Construction*

As part of the criteria for the proposed geophysical exploration, field contacts were queried regarding the type of road construction associated with geophysical exploration. Over 94% of the 244 geophysical exploration activities involved no road construction (see table 4). Where geophysical exploration activities did not involve road construction, trucks and equipment used existing roads and trails or traveled overland to conduct seismic operations. Those activities with temporary road construction were mostly located in Alaska where ice roads are utilized in winter months. The roads melt when temperatures rise, leaving no lasting impacts. No significant impacts resulted from use of existing or temporary roads for geophysical exploration.

**Table 4: Type of Road Construction Associated with Geophysical Exploration Activity**

<b>Type of Road Construction</b>	<b>Frequency from 10/1/00 through 09/30/05</b>	<b>Percent (%)</b>
Permanent Road Construction	0	0
Temporary Road Construction	14	5.7
No Road Construction	230	94.3
Total	244	100

### *Administrative or Legal Challenges to Geophysical Exploration Activities*

The NEPA analysis of eight geophysical exploration projects, supported by EAs, was challenged through administrative appeals or litigation. Six of the NEPA analysis based appeals have been upheld in the Courts. The remaining two challenges resulted in a decision remanding the EA back to the BLM and a dismissal. Two of the eight challenges resulted in a decision remanding back to the BLM or was dismissed as joint BLM-Forest Service project. In the two rulings not upholding BLM NEPA analysis, neither was due to significant impacts associated with geophysical exploration.

### *Validating Results of Geophysical Exploration Activities*

Geophysical exploration activities and associated impacts were validated by either personal observation by the field staff associated with the project, field data collection through a monitoring program, systematic evaluation of information received, or a combination of methods (see table 5). The two projects validated by “Other” methods are due to the fact that the project is still open and results are based on ongoing assessments of the impacts.

**Table 5: NEPA Process Results for Validating Predicted Impacts**

<b>Validation Method</b>	<b>Frequency from 10/1/00 through 09/30/05</b>
Professional Judgment	61
Personal Observation	50
Monitoring	32
Combination	99
Other	2
Total	244

### **Policy Logic and Business Practices**

The BLM has routinely approved geophysical exploration activities over the last five years. There have been EAs or other NEPA analysis prepared on each seismic operation and none of them have resulted in significant impacts, regardless of the type of geophysical exploration used. Further, no significant impacts resulted even where there was temporary road construction, which is excluded from the proposed CX . The impacts from these seismic operations are usually short term and have not contributed to significant cumulative impacts.

By placing a strict criterion on the type of seismic activity allowable for exclusion (i.e., no road construction), the opportunity for significant impact is minute, either cumulatively or on an individual basis. The BLM uses business practices, such as a standard set of Conditions of Approval (COA), that are mandatory for geophysical exploration activities. This protection is augmented with the BLM's mandatory use of Extraordinary Circumstances as found in 516 DM 2, Appendix 2. Before any CX can be applied, the analyst must ensure no conditions exist that would be adverse to the circumstances designated as priority for the Department of the Interior. This CX is a narrow exclusion that reflects current technology and improved environmental protection.

Engaging in geophysical exploration as a method for detecting energy resources is consistent with the BLM's multiple-use mandate, which seeks to accommodate valid uses of the public lands while protecting the resources on these lands. This CX would help BLM streamline the authorization process for routine geophysical exploration. EAs and additional NEPA analysis have repeatedly shown that no significant impacts result from geophysical exploration. The time spent in preparing EAs would be more efficiently spent in the prompt implementation of these routine actions.

### **Conclusions**

In sum, none of the geophysical exploration projects resulted in significant individual or cumulative impacts during NEPA document preparation. The policy logic and factual evidence pertinent to protecting natural and cultural resources while reducing costs support implementation of the proposed CX. The CX review process ensures that in the absence of



extraordinary circumstances (516 DM 2, Appendix 2) there are no individual or cumulative significant effects on the human environment. Establishing a CX for certain geophysical exploration activities identified in 516 DM 11.9(B)(6) is recommended.