

Methodology for Project Data Collection
And
Results of Review
Oil & Gas Exploration and Development Categorical Exclusion
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Introduction

For decades the Forest Service has administered permits for surface use and occupancy of National Forest System Lands for oil and gas exploration and development¹. Over time the agency has found that in certain circumstances the environmental effects of such projects have not been individually or cumulatively significant.

Executive Order 13212 (2001) (<http://ceq.eh.doe.gov/nepa/regs/eos/eo13212.html>) set forth “For energy-related projects, agencies shall expedite their review of permits or take other actions as necessary to accelerate the completion of such projects, while maintaining safety, public health, and environmental protections. The agencies shall take such actions to the extent permitted by law and regulation, and where appropriate.” The National Energy Policy (<http://www.whitehouse.gov/energy/National-Energy-Policy.pdf>) and the Forest Service Energy Implementation Plan (http://www.fs.fed.us/geology/mgm_leasable.html) call for streamlining of processing Applications for Permit to Drill (APDs) and other energy related permits in an environmentally sound manner.

The agency’s experience with the environmental effects of surface use and occupancy for oil and gas exploration and development, and direction to streamline energy-related projects, led the agency to propose adding a categorical exclusion for oil and gas exploration and development to its National Environmental Policy Act (NEPA) implementing procedures.

To examine whether it is appropriate to categorically exclude certain oil and gas exploration and development projects, the Agency:

- 1) Conducted on-site monitoring of oil and gas exploration and development projects on National Forest System lands. These projects were documented in an environmental assessment that had been implemented on National Forest System (NFS) lands in the last five years.
- 2) Contracted to acquire a historical view representative of oil & gas exploration and development on and adjacent to NFS lands. The Dakota Prairie Grasslands was determined to be representative for this historical view;

¹ A brief explanation of the oil and gas exploration and development leasing process can be found at http://www.fs.fed.us/emc/nepa/oged/includes/stages_summary_final.pdf

- 3) Contracted to collate Forest Service oil and gas leasing process and permitting restrictions (known as stipulations) for NFS lands determined to have the highest potential for future oil and gas development, and;
- 4) Contracted a review of peer-reviewed scientific literature on the environmental impacts of oil and gas exploration and development activities on wildlife and fishery populations, soils and groundwater.

Items #2, 3 and 4 are documents in the report “Summary Of Oil And Gas Exploration And Production Activities, Leasing Process, Permitting Stipulations For U.S. Forest Service Lands, And Literature Survey Of Observed Impacts To Wildlife And Fisheries” which can be found posted on the world wide web at

http://www.fs.fed.us/emc/nepa/oged/includes/0905_summary_oil_and_gas_report.pdf. This data, collected primarily to support the Energy Policy and Conservation Act, is additional information to the on-site monitoring data collected in Item #1.

The remainder of this paper focuses on and describes the methodology and results of the on-site monitoring and how that information was used to define the scope of the proposed categorical exclusion.

DATA COLLECTION

On June 9, 2005, the Deputy Chief for the National Forest System requested field units to perform on-site monitoring and submit corresponding data on 100% of oil and gas exploration and development projects that had been assessed in an Environmental Assessment (EA); and approved and constructed, or partially constructed, between October 1, 1999 and September 30, 2004. The projects were selected from this timeframe because there have been substantial improvements in technology and environmental protection requirements for oil and gas exploration and development on NFS lands in the last five years. Therefore, the projects that have been assessed in the last five years are more representative of how projects will be designed in the future.

As an example, during the last five years the following technological advances and environmental protections have improved oil and gas development on National Forest System lands:

- 1) Improvements in the capability to drill angled holes allowing multiple drills on a single pad reducing the surface footprint.
- 2) Development of best management practices with the BLM regarding road building, pipelines, and site development.
- 3) Additional conditions of approval added to Surface Use Plans of Operations addressing watershed, wildlife and archeology concerns.
- 4) Special stipulations developed during the leasing analysis to address management goals.

The objective of the on-site monitoring was to determine if surface operations for oil and gas activities approved in site-specific environmental assessments did or did not have individual or cumulatively significant effects on the human environment and therefore could or could not

qualify for a categorical exclusion in accordance with the Council on Environmental Quality regulations for implementing NEPA (40 CFR §1500 – 1508).

Environmental impacts resulting from oil and gas development projects were reviewed on the ground by an interdisciplinary team of journey-level specialists. Most teams included a wildlife biologist, archeologist, and hydrologist who were qualified to perform cumulative effects analyses and are able to assess the significance of environmental effects. Units were instructed that if a project had already been monitored, and the results of the monitoring were adequate for the line officer to make a determination on the significance of any environmental effects, then those projects did not have to be monitored again. Field units collected data in an Excel spreadsheet designed specifically for this monitoring effort. The data request and resulting data may be viewed at <http://www.fs.fed.us/emc/nepa/oged/>.

Data were collected and submitted for all projects that met the criteria except for one Ranger District, the Jicarilla Ranger District, Carson National Forest. In total, thirteen units collected data on 73 oil and gas development projects (EAs). Table 1 shows the number of projects submitted, sorted by state.

The Jicarilla Ranger District on the Carson National Forest in New Mexico had 68 environmental assessments that met the criteria. Because the number of projects was disproportionately high compared to other units and monitoring that many projects would have had a major impact on the District’s workload, a statistically valid sample was selected resulting in 25 projects monitored on the Jicarilla. A description of the sampling design for the Jicarilla District is contained in Appendix A.

Table 1. Number of projects meeting criteria* and monitored by State

State	# of projects meeting criteria*	# of projects monitored
Arizona	1	1
Colorado	6	6
Kansas	10	10
Louisiana	1	1
Mississippi	11	11
North Dakota	9	9
New Mexico	68	25
Ohio	2	2
West Virginia	1	1
Wyoming	6	6
Oklahoma	1	1
	Total: 116	73
*Criteria = oil and gas exploration and development projects that had been assessed in an Environmental Assessment (EA); and approved and constructed, or partially constructed, between October 1, 1999 and September 30, 2004.		

It is worth noting that for any given project that met the criteria detailed above, and was subsequently monitored, the environmental assessment could have authorized one or more drill sites and each drill site may contain more than one well.

DATA REVIEW

None of the 73 projects reviewed predicted significant effects on the human environment before the project was implemented. After implementation, on-site monitoring of environmental effects of these projects was conducted by interdisciplinary teams of resource specialists. Projects were monitored for effects on:

- a) The five intensity factors listed in 40 CFR §1508.27 that are environmentally driven;
- b) Identified significant issues from the environmental assessment that weren't covered by the CEQ intensity factors in 40 CFR §1508.27, and;
- c) Any significant effects that were found during monitoring that weren't reported in the intensity factors or environmental assessment significant issues.

The five environmentally driven intensity factors from the CEQ NEPA regulations are related to effects on:

- Public Health and Safety
- Unique Characteristics of the Geographic Area
- Districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places
- Threatened and endangered species or its identified "Critical" habitat under the Endangered Species Act
- Federal, State or local laws.

To complete project monitoring, each unit assembled an interdisciplinary team whose membership was chosen based on the significant issues identified in the EA(s) or on the five CEQ intensity factors discussed in this above. The interdisciplinary review teams' measurements and observations were documented in narratives. These narratives and associated tabular data may be viewed at

http://www.fs.fed.us/emc/nepa/oged/includes/og_worksheets_all_forest_responses_101105.pdf.

Based on the resource specialists' review, Responsible Officials made a determination about whether the project individually or cumulatively did or did not have a significant effect of the human environment (40 CFR 1508.4).

Analysis of the post-implementation environmental effects revealed that 11 out of the 73 projects monitored had unexpected effects in one or more of the categories listed above. Examples of unexpected effects identified through monitoring are threatened and endangered species effects or potential violations of the Clean Water Act. However, none of the projects resulted in individually significant effects.

Appendix B contains a list of projects and associated expected effects, and Appendix C contains a list of projects and associated unexpected effects.

All of the projects monitored were determined to not have individually or cumulatively significant effects. The exception is the projects monitored on the Jicarilla Ranger District. On the Jicarilla Ranger District all 25 projects monitored were within the San Juan Basin, an area that is already largely developed. The District Ranger concluded that the projects individually do not have significant effects and that cumulative significance could not be determined. The Forest is currently preparing a leasing environmental impact statement that will, in part, analyze the cumulative effects of oil and gas development on the District.

The 73 EA projects monitored had the following statistical characteristics:

Table 2. Data Analysis of Oil and Gas Exploration and Development Activities

<u>Statistical Analysis</u>	<u>Classified Roads</u>		<u>Pipelines</u>	<u>Drill Sites</u>	<u>Well Type</u>	
	<u>New Road Construction</u>	<u>Reconstruction</u>			<u>Exploration Wells (Number)</u>	<u>Development Wells (Number)</u>
	<u>Road Construction (Miles)</u>	<u>Road Reconstruction (Miles)</u>	<u>Pipeline Construction (Miles)</u>	<u>Total Number of Drill Sites (Number)</u>		
Total for All EAs / Projects (Sum)	58.8	11.3	114.5	319.0	34.0	297.0
Maximum Number	23.8	3.4	79.4	156.0	8.0	156.0
Minimum Number	0.1	0.1	0.1	1.0	1.0	1.0
Average or Mean	1.1	1.1	2.9	4.4	2.1	5.2
Total Number of EAs (Projects) (Count)	54	10	40	73	16	57

QUALITY OF INFORMATION

To ensure and maximize the quality, objectivity, utility, and integrity of the information, data was requested directly from field units implementing oil and gas exploration and development projects. The data represented the on-the-ground knowledge, experience, and the judgment of the interdisciplinary specialists and responsible officials who provided it. Data were entered into an Excel workbook containing three worksheets. Where data were missing or unclear, follow-up contacts were made with field units to clarify or complete the fields. Once all data was corrected, each unit's data was read into a single Excel workbook. Field data are available to the public at

http://www.fs.fed.us/emc/nepa/oged/includes/og_worksheets_all_forest_responses_101105.pdf.

These steps are taken in conformity with the Office of Management and Budget and Departmental guidelines for quality of information

(<http://www.whitehouse.gov/omb/fedreg/reproducible.html>).

RATIONALE FOR THE SCOPE OF THE CATEGORY

Parameters of the proposed categorical exclusion (miles of road construction, road reconstruction, pipeline installation, and number of drill sites) were selected because they were found in the review to individually have no significant impacts on the human environment. The parameters were limited to 4 drill sites, 1 mile of road construction, 1 mile of road reconstruction, and 3 miles of pipeline based on the average values from the projects reviewed (See Table 3). These parameters were developed based on the following rationale:

1. Based on site-specific field monitoring of oil and gas development projects, these parameters were determined to not have extraordinary circumstances as defined in FSH 1909.15, Chapter 30;
2. The scope of the proposed new category is consistent with the scope of the 73 projects examined in the 2005 review, each of which had no significant environmental effects;
3. A review of the analyses supporting oil and gas leasing found that when future activities were expected to have a significant environmental effect or would be incompatible with other forest or grassland uses, such areas had been identified as not suitable and exploration or development had been prohibited. Furthermore, the use of best management practices such as class III archeological surveys, or biological surveys, resulted in avoidance or mitigation as necessary, and contributed to the defined category of oil and gas activities having no significant environmental impacts.
4. A study directed by the Energy Policy and Conservation Act to summarize Forest Service and BLM plan leasing decisions shows that oil and gas exploration or development activities are not allowed or are restricted where such activity would have a significant environmental effect or be incompatible with other forest or grasslands uses or management schemes. The screening that occurs at the leasing decision stage contributes significantly to the findings of no significant environmental impacts of the 73 projects studied.
5. Finally, the combination of agency leasing decisions, forest or grassland land management plan standards and guidelines, best management practices, and current laws and regulations reduce the potential environmental effects for certain oil and gas activity to insignificance. The limited scope of the proposed categorical exclusion leads the agency to conclude that implementation of the proposed category would not result in cumulatively significant effects on the human environment.

The CE scope is limited to a single field to address the inconclusive cumulative effects results from the Jicarilla Ranger District where numerous production wells are located in single fields.

Table 3. Average Values from the Projects Reviewed

<u>Road Construction (Miles)</u>	<u>Road Reconstruction (Miles)</u>	<u>Pipeline Construction (Miles)</u>	<u>Drill Sites Authorized (Number)</u>	<u>Rationale</u>
1.1 rounded down to 1 mile	1.1 rounded down to 1 mile	2.9 rounded up to 3 miles	4.4 rounded down to 4 drill sites	Based on Average (Mean)

CONCLUSION

The review concluded that none of the 73 projects individually had a significant effect on the human environment. Based on this review and the agency’s extensive experience with road construction and reconstruction, as well as oil and gas exploration and development activities such as pipeline and drill pad construction, the Forest Service proposes to add a new categorical exclusion to its Environmental Policy and Procedures Handbook (FSH 1909.15). This category would appear in section 31.2, Categories of Actions for Which a Project or Case File and Decision Memo Are Required, and would provide a specific, narrow categorical exclusion for oil and gas exploration and/or development.

The scope of the proposed new category is consistent with the scope of the 73 projects examined in the 2005 review, each of which had no significant environmental effects. Consequently, the level of effects associated with the proposed new category would also be below the level of significant environmental effects.

Appendices

Appendix A: Monitoring Design for Oil and Gas EA Projects during the last five years the Jicarilla Ranger District, Carson National Forest.

Appendix B: Oil And Gas EA Projects during the Last Five Years with Expected Effects found during Monitoring.

Appendix C: Oil And Gas EA Projects during the Last Five Years with Unexpected Effects found During Monitoring.

Appendix A

Carson National Forest, Jicarilla Ranger District, Monitoring Design

The population to be sampled consisted of all APDs approved, based on an Environmental Assessment, on the Carson National Forest Jicarilla Ranger District between October 1, 1999 (beginning of Fiscal Year 2000) and September 30, 2004 (end of Fiscal Year 2004). The population size was 72 well sites.

In developing the sampling design, the general characteristics of the area and activity design were considered to identify resources that might have the greatest risk of adverse effects.

General Characteristics of Area – The general characteristics of the area is that of a Southwestern ecosystem. The climate is arid to semi-arid with limited ground covering vegetation. The soils are prone to erosion - as evidenced by the presence of arroyos. There is a rich history of aboriginal use and correspondingly high occurrence of historic sites. There is also habitat for wildlife species, including those listed as threatened, endangered, or sensitive.

Activity Design – Activities are routinely designed to avoid or mitigate the potential for adverse effects on the aforementioned resources (soils, cultural, and wildlife). Best management practices are used to minimize potential effects related to soil erosion. The protection of cultural resources is afforded through field surveys, assessment, avoidance, and consultation with the State Historic Preservation Office. The protection of listed species is afforded through field surveys, assessment, avoidance, and consultation with the U.S. Fish and Wildlife Service as needed.

Soil erosion was deemed as having the greatest risk of adverse effects. Well sites on steep slopes are believed to have the greatest potential for soil erosion. To address potential soil erosion concerns, a 100% sampling was completed on slopes greater than 20%. This consisted of 4 well sites (Carracas 19B #010, Carson 204, San Juan 30-4 41B, and San Juan 27-4 58M).

The remaining population, on slopes less than 20%, consisted of 68 well sites. A simple random sampling design was used to determine how many of these well sites should be sampled, see Figure 1. This resulted in a sample size of 19 well sites, with a 90% confidence interval. A random number chart was generated from Random.org and applied to the population of 64 well sites to select the 19 well sites monitored.

The Forest then evaluated the above samples in terms of distribution and representation of cover, slope, aspect, special management areas (e.g., valley bottoms, wildlife areas of special concern) and resource type. Two judgmental samples were added to represent the Ponderosa Pine vegetation type across the District: one within a Wild and Scenic River Corridor and possible floodplain (Schalk 52A #006A), one with a known significant cultural site adjacent to the well site (San Juan 27-4 69M).

In conclusion, 26 well sites were sampled. Four well sites were sampled on slopes greater than 20%. Twenty one well sites were sampled on slopes less than 20% (19 well sites randomly selected, 2 well sites judgmentally selected).

Figure 1 – Simple Random Sampling Design for Projects on Slopes less than 20%

Assumptions:

1. The population to be randomly sampled on slopes less than 20% consisted of 68 well sites. (This does not include the 4 well sites on steep slopes, greater than 20%, for which a 100% sample is used).
2. Use disturbance size (acres) as variable to indicate disturbance relative to soil and water quality – erosion.
 - a) Maximum disturbance size is 7 acres (considered conservatively large)
 - b) Minimum disturbance size is 1.0 acres (considered conservatively small)
 - c) Disturbance size is a normally distributed variable
 - d) Since variance of disturbance size is unknown, use (max - min)/4 as estimate of the standard deviation.
3. Sites with potential cultural impacts have been avoided or effects mitigated.
4. Sites with potential wildlife habitat issues have been avoided or effects mitigated.
5. Reference for simple random sampling: Avery, T. E. and H. E. Burkhart. 1994. Forest Measurements. (Fourth Edition. McGraw-Hill, Inc. 408p.)
6. Confidence Interval: estimated range of values which is likely to include an unknown population parameter (the mean well pad size, here)
7. Confidence Limit: lower and upper boundaries / values of a confidence interval, that is, the values which define the range of a confidence interval.
8. Confidence Level: The level of certainty to which an estimate can be trusted. The degree of certainty is expressed as the chance that a true value will be included within a specified range, called a confidence interval. (www.ojp.usdoj.gov/BJA/evaluation/glossary/glossary_c.htm)
9. Margin of Error: the desired half-width of the confidence interval.
10. Simple random sampling.
11. These examples are specific to the assumptions made here.

Wellpad-associated disturbance area sample size calculation examples:

<i>Margin of Error</i> (acres)	<i>Confidence Interval</i> (%)	<i>Calculated Sample Size</i>	<i>Field Sample Size</i>
0.5	99	32.884675	33
0.5	95	23.538462	24
0.5	90	18.349065	19
1.0	99	12.89997	13
1.0	95	7.9480519	8
1.0	90	5.7511881	6
1.5	99	6.4087506	7
1.5	95	3.7777778	4
1.5	90	2.6821073	3

E= Margin of Error
t= Student's t statistic for confidence level.
N= Population size (68 well sites).
s= estimated standard deviation (1.5 acres).
Simple random sampling sample size formula from Avery and Burkhart (1994), p. 153.

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