INTERAGENCY REFERENCE GUIDE

REASONABLY FORESEEABLE DEVELOPMENT SCENARIOS

and

CUMULATIVE EFFECTS ANALYSIS

For Oil and Gas Activities
On Federal Lands
In the Greater Rocky Mountain Region

Rocky Mountain Federal Leadership Forum
on
Oil and Gas, NEPA, and Air Quality

U.S.D.I. Bureau of Land Management U.S. Environmental Protection Agency
U.S.D.I. Fish & Wildlife Service U.S.D.I. National Park Service
U.S.D.A. Forest Service

June 2003

Table of Contents

Figures

Tables

Appendices

Executive Summary

Purpose

This reference guide addresses the process of cumulative effects analysis for oil and gas activities on federal lands and discusses the types of information needed for such analysis. The guide serves a dual purpose: 1) Provides a reference for interdisciplinary teams, resource specialists, and managers that prepare, review, and use environmental analysis (NEPA [1]) documents for oil and gas activities; and 2) Documents interagency agreement on major terms and concepts associated with cumulative effects analysis and reasonably foreseeable development in the context of oil and gas resource management.

This guide primarily focuses on *future* actions – the development of Reasonably Foreseeable Development scenarios (RFDs) and identification of Reasonably Foreseeable Future Actions (RFFAs). It provides information about the use of RFDs and RFFAs in cumulative effects analysis for both leasing (plan level) decisions and exploration/development (project level) decisions.

This guide is oriented towards oil and gas activities, but much of the direction and many of the ideas it provides can be applied to NEPA analysis for other types of proposed actions.

Background

During the late 1990's, rapidly increasing levels of oil and gas development generated parallel concerns about environmental issues in the greater Rocky Mountain Region. A group of principle managers of Rocky Mountain land management and regulatory agencies identified the need to address growing concerns about expanding development and associated environmental effects. Consequently, this interagency group – the Rocky Mountain Federal Leadership Forum (FLF) – convened to work towards "achieving a more unified approach to NEPA for oil and gas decisions". This reference guide is one of a series of informational and guidance documents developed by special teams working under the direction of the FLF to meet that goal.

[1] Use of the term "NEPA", the acronym for National Environmental Policy Act, generally refers to the environmental analysis process and resulting documents, such as Environmental Impact Statements (EISs) and Environmental Assessments (EAs).

Approach

The FLF commissioned a technical team to review issues related to cumulative effects analysis and prepare guidance for field teams to use in conducting NEPA analyses of oil and gas actions. The team consisted of representatives from the Bureau of Land Management (BLM), U.S. Forest Service (USFS), and Environmental Protection Agency (EPA). Team members with experience and job duties related to planning, NEPA, petroleum geology, oil and gas resource management, and wildlife management met periodically over 3 years to refine issues and concepts, agree on approaches to thorough and effective cumulative effects analysis, and develop written guidance that would be understood and used by field personnel not always familiar with NEPA or oil and gas resource management.

Findings and guidelines

Levels of land management decisions. Decisions about managing oil and gas resources on public lands are made at two general levels. Plan level decisions include leasing decisions that result in issuance of oil and gas leases with the expectation that some exploration or development activity may be proposed some time in the future. Project level decisions encompass exploration and development decisions that result in ground disturbance with wells, roads, and associated infrastructure.

Environmental (NEPA) analysis must include cumulative effects analysis at both decision levels. Analysis at each level of oil and gas decision-making is based on technical information associated with the proposed action (leasing or exploration/development), as well as information about other reasonably foreseeable future actions in and near the area of the proposal.

Source of technical information for analysis for leasing decisions. In the case of leasing (plan level decisions), an RFD scenario provides information about the type and level of oil and gas activity and associated disturbance that could occur subsequent to leasing in a specified area. The scenario is presented in a professionally prepared technical report. The RFD is unconstrained by management-imposed conditions as it is based primarily on geology and historical exploration and development activity. It provides information necessary to analyze long-term and/or widespread effects that could result from possible exploration and/or development activities on oil and gas leases issued in implementation of a leasing decision. The RFD is not a decision, and it neither establishes nor implies a "cap" on development.

Sources of technical information for analysis for exploration/development decisions. In the case of exploration and/or development actions (project level decisions), APD(s) and/or development plans provide technical information about the proposed action. Technical information about a proposed exploration or development action is similar to that provided in an RFD for a leasing decision, but is much more detailed and definitive and not speculative like the RFD.

Factors for effective cumulative effects analysis. Effects analysis must address direct, indirect, and cumulative effects of proposed leasing and exploration/development proposals. Direct or indirect environmental effects from a proposed oil and gas action could be minimal. But cumulative effects from both a proposed oil and gas action,

along with effects from other reasonably foreseeable future actions in the area, including other unrelated oil and gas activities, could be significant.

Clearly defining the scope and scale of potential environmental consequences of a proposed oil and gas action, along with identifying other reasonably foreseeable future actions, is the key to effective cumulative effects analysis. Determining the appropriate scope and scale of analysis depends on a well-defined proposed action, identification of resources that could be affected by the action, and issues about the proposed action identified in the scoping process.

Definition of cumulative effects boundaries. The spatial and temporal boundaries of cumulative effects from an action are likely to vary for different affected resources or socioeconomic areas. Different areas of cumulative effects for different affected resources should be clearly identified on maps. Reasons for the selection of boundaries should be clearly documented in the analysis. Cumulative effects boundaries should be based on the occurrence and nature of the affected resource and the distance or time over which effects may remain significant, not on land ownership or administrative jurisdictions.

Limitations on exploration/development in alternatives to a proposed action. Effects analysis for leasing actions is based on information about potential oil and gas exploration and production identified and described in the RFD. A proposed leasing action and each of its alternatives may have different types and levels of constraints or conditions on oil and gas activities for mitigation of effects from those activities. Mitigation through the use of lease stipulations may limit access to part(s) of the area covered by the RFD. In such cases, each alternative – and possibly the final leasing decision – may have associated activity projections different from the RFD. The scope and scale of CEA for each alternative in such cases should be determined based on the activity projection associated with the alternative.

Accomplishing thorough cumulative effects analysis despite limited options for decisions. Mixed land ownership or administrative jurisdictions, as well as active leases, generally complicate environmental analyses for both leasing (plan level) and exploration/development (project level) actions. Such complicating circumstances may narrow options for a land manager in making decisions about leasing or exploration/development. Despite narrow options for decisions, the environmental analysis, including cumulative effects analysis, for a proposed oil and gas action must still be thorough. With a thorough cumulative effects analysis, both the decision-maker and the public will be able to evaluate the significance of the environmental effects resulting from a proposed action in combination with effects from other reasonably foreseeable future actions.

Introduction

Purpose: This reference guide addresses the process of cumulative effects analysis for oil and gas activities on federal lands and discusses types of information needed for such analysis. The guide serves a dual purpose: 1) Provides a reference for interdisciplinary teams, resource specialists, and managers that prepare, review, and use environmental analysis (NEPA) documents for oil and gas activities. 2) Documents interagency agreement on major terms and concepts associated with cumulative effects analysis and reasonably foreseeable development in the context of oil and gas resource management. Use of this guide should result in improved and more efficient NEPA procedures, as well as better determination and documentation of cumulative effects analysis for proposed oil and gas activities.

Overview: This guide initially introduces short definitions of key terms, specifically "cumulative effects analysis" (CEA), "reasonably foreseeable development scenario" (RFD), and "reasonably foreseeable future actions" (RFFA). It subsequently provides in-depth discussion about each of these terms, their relationship to one another, and the process in which each is used or applied to management of resources [1] and decision-making. In order to "set the scene", the guide provides background information about the types, or levels, of decisions associated with oil and gas resource management under the jurisdiction of different land management agencies. The guide then provides detailed definition and discussion of the relationships between and among RFD, RFFA, and CEA in the context of the environmental analysis (NEPA) process. Key points are emphasized in text boxes. Specifically, this guide

Text boxes throughout this guidance emphasize key points.

- Addresses identification of issues and determination of scope of analysis associated with proposed oil and gas projects;
- Provides detailed definition of and guidelines for developing an RFD for use in environmental analysis and decisions on leasing and development of oil and gas resources;
- Clarifies the relationship between RFD and RFFA;
- Offers guidelines on achieving thorough and adequate cumulative effects analysis for oil and gas activities through the use of RFDs and RFFAs; and
- Provides examples and references that will be useful to interdisciplinary teams performing environmental analyses of proposed oil and gas activity.

Background: The Rocky Mountain Federal Leadership Forum (FLF), a group of principle managers of federal Rocky Mountain land management and regulatory agencies, identified the need for this type of guidance. The FLF convened in October 1998 to address potential effects of increasing levels of oil and gas development on air

[1] The term "resource" in this guide refers to natural resources such as wildlife, air quality, minerals, and cultural resources, as well as ecosystems and human communities.

quality, as well as other environmental issues associated with oil and gas development. Most of the issues were related to requirements of the National Environmental Policy Act (NEPA) for the environmental analysis process used in decision-making for oil and gas activities. The FLF set a goal of achieving a more unified approach to NEPA for oil and gas decisions with an emphasis on air quality.

The FLF established interagency teams to identify and implement actions necessary to reach their identified goal. One of these teams categorized and prioritized issues that the FLF had identified. The team emphasized a need for in-depth consideration of issues related to cumulative effects analysis for oil and gas activities. These issues included uncertainty and inconsistency in what to include in RFDs and RFFAs, and in how to relate a proposed action to other RFFAs for adequate cumulative effects analysis.

The RFD/CEA Team (Team B), with representatives from the Bureau of Land Management (BLM), U.S. Forest Service (USFS), and Environmental Protection Agency (EPA), consequently reviewed the issues related to cumulative effects analysis and prepared this guidance. In so doing, the team recognized that one of the benefits of the NEPA process is the framework it provides for collaboration. Such a framework enables agencies to reduce barriers to efficient and effective environmental analysis. Appendix B identifies and discusses some of these barriers. Knowledge about such barriers should help NEPA teams and agencies more easily determine common ground and minimize differences that may not be particularly significant and sometimes get in the way of an efficient and effective NEPA analysis.

This reference guide is one of a series of informational and guidance documents developed by special teams working under the direction of the FLF to help meet the goal of a more unified approach to NEPA for oil and gas decisions. The RFD/CEA Team's subject of investigation overlapped in part with investigations of other FLF teams, particularly the Regional Assessment Team. The Regional Assessment Team's goal was to establish a multi-agency strategy for development and use of regional resource assessments, and to develop criteria for determining the area and scope of an assessment. The team was charged with defining what a regional assessment is and determining the purposes one would serve. Outcomes of that team's efforts will provide for additional understanding of the relationships between and among RFDs, RFFAs, CEA, and resource assessments. (Federal Leadership Forum, 2001.)

This guide is oriented towards oil and gas activities, but much of the direction and many of the ideas it provides can be applied to NEPA analysis for other types of proposed actions. It is neither prescriptive, nor so detailed that it cannot be applied to a wide variety of site-specific situations. It is not exhaustive, and it is not intended to provide the final word in how to do any particular analysis. Many other references provide information that, combined with this guidance, will lead to more consistent NEPA analyses for oil and gas activities.

Important concepts

Cumulative Effects (Impact) Analysis

Definition from CEQ regulations at 40 CFR 1508.7: "Investigation of impact on the environment which results from the incremental impact of [a proposed] action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." The term "effects" is used in this document; however, the terms "effects" and "impacts" are used interchangeably in many other documents and within and among agencies.

Reasonably Foreseeable Future Actions (RFFA)

The RFFA is a projection of activities (industrial and minerals development, recreational activities and development, wildlife management, air and water resource management, urban development, transportation, etc.) within a defined geographic area and for a specified timeframe. Reasonably foreseeable future actions are defined by available information on resource occurrences, past and present activities or uses and trends, economics, existing project proposals and other reliable indications of anticipated activities, and other identified factors specific to the area of analysis.

Reasonably Foreseeable Development Scenario for Oil and Gas ("RFD")

The "Reasonably Foreseeable Development Scenario" for oil and gas (RFD) is the portion of the RFFA that is a model or projection (scenario) of anticipated oil and gas exploration and/or development activity (leasing, exploration, development, production, and abandonment) for a defined area and period of time. The scenario is based primarily on geology (potential for oil and gas resource occurrence) and past and present oil and gas activity. The scenario is also developed with consideration of other significant factors such as economics, technology, and physical limitations on access, existing or anticipated infrastructure, and transportation.

A Reasonable Foreseeable Development Scenario (RFD):

- Is a reasonable technical and scientific approximation of anticipated oil and gas activity based on the best available information.
- Includes all interrelated and interdependent oil & gas activities in a defined area regardless of land ownership or jurisdiction.

The scenario should be scientifically credible and presented in a technical report that may be subject to professional peer review. The report will be included in the administrative record of any analysis for which it is used.

The section titled "Technical oil and gas information for analysis" provides further discussion about RFDs. Additional terms and acronyms that may be unfamiliar to the reader are defined in Appendix A.

.

Analysis (NEPA) Process for Oil and Gas Decisions

Types of decisions

Land management agencies make decisions about management of resources in a tiered process. Beginning with planning level decisions, each subsequent level of decisions is based in part on higher-level decisions and information used in making the higher-level decisions.

Bureau of Land Management and Forest Service decision-making processes for oil and gas actions may use different terms or descriptions for similar processes. Table 1 summarizes some of the general differences between BLM and Forest Service planning and project decision-making processes.

Table 1. Similarities and differences in Forest Service and BLM decision-making processes.

	BLM		FOREST SERVICE	
	DECISION	ANALYSIS	DECISION	ANALYSIS
PLAN LEVEL DECISIONS	Resource Management Plan Leasing decisions; goals & objectives for managing oil and gas resources and associated exploration and development activities; resource allocations; no ground disturbance.	Broad scale; very speculative with respect to projecting activity	Land and Resource Management Plan (Forest Plan, Grassland Plan) Leasing decisions; goals & objectives for managing oil and gas resources and associated exploration and development activities; resource allocations; no ground disturbance.	Same as BLM
	Activity Plan More definitive than Resource Management Plan, but broader in scope than a project level decision	More localized and less speculative		Landscape Assessments Resource information – no associated decision
PROJECT LEVEL DECISIONS	Project XYZ Specific proposed action with ground disturbance	Site or area specific analysis of proposed action and alternatives to proposed action	Same as BLM	Same as BLM

Different levels of decisions for BLM and Forest Service are as follows:

Management plans. The highest level of decisions specific to land use is in the management plan. BLM Resource Management Plans (RMPs) and Forest Land and Resource Management Plans (LRMPs) are examples of management plans. Management plans generally make land allocations and provide goals and objectives for managing specific areas of land. They provide the framework for management of oil and gas resources by identifying areas available and not available for leasing. They identify where and under what conditions leasing can occur, determine stipulations to be placed on oil and gas leases, and establish conditions under which oil and gas operations are managed and administered. Oil and gas leasing decisions can be made in conjunction with a plan or can be made in separate decisions that may result in a plan amendment. Plan decisions are based on a public NEPA disclosure process, usually with an Environmental Impact Statement (EIS).

Activity plans. For BLM, mid-level decisions are provided in activity plans. These plans encompass more detailed management decisions than land use management plans. Activity plans address management of specific programs. An activity plan usually selects and applies best management practices to meet land use plan objectives. Decisions that cover major (often geographically extensive) oil and gas proposals, coordinated activity plans that cover all programs in an integrated manner, or program oriented activity plans such as a "habitat management plans" are examples of activity plans. In the case of oil and gas, industry proposals for the development of a field are analyzed for effects in an EIS or Environmental Assessment (EA). The oil and gas activity plan decisions based on a NEPA analysis are made in a Record of Decision (ROD) or Decision Record (DR) depending on the type of NEPA document prepared. In some cases, specific wells are approved in conjunction with the field development (activity plan) decision. In other cases, subsequent additional NEPA analysis may be done for individual wells or, in some areas, for field development plans involving multiple wells.

Project decisions. For BLM, individual wells or groups of wells in an established field are analyzed for localized or site-specific effects based on Applications for Permit to Drill (APD). The APD provides the site-specific detail of industry's proposal, including the type of development that will occur under the oil and gas lease. A NEPA document presents effects analysis for the proposed well(s). A documented project decision allows the wells to be drilled and completed with site-specific mitigation. Forest Service makes similar project decisions on individual wells or groups of wells without doing an activity plan or mid-level decision as BLM does.

For purposes of simplified direction, this guidance will refer to two, rather than three, decision-making levels – planning and project (Table 2). Decisions at both levels generally require NEPA analyses. Similar types of information about oil and gas resources and their possible development are necessary for adequate NEPA analysis at both decision levels. However, the scope and scale of analysis and the information necessary for analysis may differ between the two levels of decisions, as illustrated in Table 2.

Table 2. Stages of oil and gas activity associated with decision levels.

DECISION LEVEL	STAGE OF OIL AND GAS ACTIVITY
Planning	**Leasing – Land Management Plan Allocation** Speculative; lands available or not available determined and allocated for leasing; lease stipulations determined; right to surface disturbance given but no surface disturbance actually authorized.
Project **(Industry proposed activity)**	**Exploration** Generally highly speculative, such as a wildcat, consisting of one or a few wells, with low levels of surface disturbance. (Category includes strat test wells, seismic surveys, etc.)
	Exploration/development (Confirmation and delineation of new field discovery) Generally with reasonable expectations of discovery and completion of several to many wells and associated infrastructure, with low to moderate levels of surface disturbance.
	Development Generally with a high level of certainty that a discovered reservoir will require many wells (hundreds to thousands) and associated infrastructure (pipelines, power lines, processing facilities, compressor stations, tank batteries, separators, dehydrators), with high levels of surface disturbance.
	Production Ongoing oil and gas extraction activities with established well-sites, production equipment, and roads, sometimes with enhanced recovery operations requiring additional in-field drilling with low additional surface disturbance. Category includes development of storage fields.
	Abandonment Plugging of wells, removal of equipment, and subsequent reclamation of disturbed areas.

Technical oil and gas information for analysis

This guidance provides direction specific to development of RFDs because the RFD is significant for CEA for leasing decisions, and because those land management agencies making decisions on oil and gas leasing are responsible for developing RFDs. In some cases, an RFD may need to include or be supplemented with information that is specifically relevant to an issue or issues identified in scoping. Ideally, in most cases, an RFD that includes specific types of information as presented in the following section can be used to address issues identified in scoping without a need to supplement the RFD.

RFD may need to include technical information relevant to issues identified in scoping.

Effective and thorough analysis of the environmental consequences of a proposed oil and gas action requires specialized technical information about the action. Analysis also requires information about other actions in the area (RFFA), and the affected environment. Table 3 presents categories of information necessary for developing comprehensive and thorough effects

Thorough analysis requires information about the proposed action and other activities and proposals in the area.

analysis, including – and especially – cumulative effects analysis for proposed oil and gas actions. This section of this guide focuses on types of information needed for analysis of effects of proposed oil and gas actions.

In the case of a planning (leasing) decision, an RFD provides information about potential future oil and gas activity. In the case of a project decision, the proposed oil and gas action, along with other projected oil and gas activity in the area, provides information about future oil and gas activity. Analysis for both proposed planning decisions and proposed oil and gas projects should describe:

- Petroleum geology and petroleum system;
- Past and present oil and gas activities;
- Projections (for planning) or proposals (for projects) of oil and gas activities (RFD for leasing/planning decisions or project proposal for exploration/development projects);
- Other past and present activities (sources of change) in addition to oil and gas;
- Other anticipated future activities (RFFA) in addition to oil and gas; and
- Potentially affected resources of concern.

This guide primarily focuses on *future* actions – the development of the RFD and identification of RFFA. It provides information about the use of RFDs and RFFAs in cumulative effects analysis for both leasing (plan level) decisions and exploration/development (project level) decisions.

RFD differs from RFFA in definition and scope. In relation to oil and gas, an RFD scenario is a reasonable projection of potential oil and gas resource development activities, including details about that development. On the other hand, RFFA includes all categories of potential future actions within a defined area of analysis, including, but not limited to, actions related to oil and gas development. In a sense, RFD is a subset of RFFA.

Both the RFD and RFFA are conceptually interrelated in the NEPA process as applied to land use planning.

Table 3. Types of information needed for analysis of proposed oil and gas actions. For purposes of this report, leasing decisions are associated with planning and project decisions refer to more site-specific, ground-disturbing activities including exploration wells and field development.

LEVEL OF DECISION AND ANALYSIS	PLANNING [1]	PROJECT [2, 3]
CATEGORIES OF INFORMATION NEEDED FOR EFFECTS ANALYSIS	**Information from:**	
	Oil and gas resource assessment (potential reservoirs, occurrence, reserves, etc.)	
	RFD for proposed leasing action Details about projected future oil and gas activity	**Proposed action** Details of proposed oil and gas activities.
	Past and present oil and gas activities General locations, characteristics, and trends.	**Past and present oil and gas activities** Specific locations, characteristics, and trends.
		Relationship of proposed action to RFD
	Past and present sources of change (existing environment) Activities, developments, or events that have changed or have the potential to change the physical and/or biological nature of all or parts of the planning area.	**Past and present sources of change** (existing environment) Activities, developments, or events that have changed or have the potential to change the physical and/or biological nature of an area defined by the extent of effects from proposed action.
	RFFA Anticipated future sources of change in addition to that presented in RFD. (All other categories of proposed and reasonably projected activities in area potentially affected by possible oil & gas development projected in RFD.) **Includes other proposed and reasonably projected oil and gas activity in the area, including wells, infrastructure, roads, etc.**	**RFFA** In addition to the proposed action, anticipated future sources of change (All other categories of proposed and reasonably projected activities in area potentially affected by a proposed project) **Includes other proposed and reasonably projected oil and gas activity in the area, including wells, infrastructure, roads, etc.**
	Potential resources of concern Resources that can be affected by identified sources of change.	**Potential resources of concern** Resources that can be affected by proposed action and other identified sources of change.

[1] Plan level decisions (leasing) and implementation (issuance of oil and gas leases) do not automatically allow ground-disturbing activity.

[2] Implementation of project decisions (approving APDs) results in ground-disturbing activity.

[3] Details of project include, but are not limited to, number, nature, and locations (if known) of wells; extent and nature of ground disturbance (including roads), nature and location of related infrastructure (wellsite equipment, gathering and processing facilities within area of analysis, pipelines, etc.), socio-economic factors (revenues related to production, income), etc.

What, exactly, IS an "RFD"?

The oil and gas RFD scenario, though speculative, is based primarily on geology (potential for oil and gas resource occurrence) along with past and present oil and gas activity. The scenario is also developed with consideration of other significant factors including (but necessarily limited to) economics, technology, physical limitations on access, existing or anticipated infrastructure, and transportation. Surface uses necessary to implement the anticipated oil and gas exploration and/or development are also included in the description of the RFD.

Geology, along with past and present oil and gas activity, is the primary basis for an RFD.

The RFD is a reasonable projection of the most likely anticipated oil and gas activity supported by a clearly stated set of assumptions. Technically and scientifically qualified specialists (petroleum geologists and/or petroleum engineers) must develop the RFD scenario and present it in a technical report subject to professional peer review. Development by qualified specialists ensures that the RFD scenario is scientifically sound, reasonable, and defendable. The report/information must clearly identify all assumptions made in deriving projections. It must also clearly describe the projected scenario of development so that a non-technical specialist can easily understand and use it for analysis.

Qualified professionals must prepare the RFD.

A technical report that includes information about proposed oil and gas activities similar to that provided in an RFD may or may not be necessary for a proposed exploration or development project. Information associated with the project proposal generally serves the same purpose as an RFD prepared for plan level (leasing) decisions. At the project level, people knowledgeable about petroleum geology and engineering, existing local development, and potential future development should develop the project level oil and gas development information.

The oil and gas RFD scenario should be presented in terms of net disturbance, not just in terms of numbers of wells. Resources to consider in identifying net disturbance include (but are not limited to) soil, water, air, wildlife, human communities, and cultural resources. In addition, all RFDs must not only address anticipated future activity, but also existing activity and anticipated changes in existing activity. Changes in existing activity include plugging and abandonment, actions that serve to mitigate overall effects from oil and gas resource development.

The RFD describes net disturbance, not just numbers of wells.

An RFD does <u>not</u> establish a threshold for number of wells that can be drilled in a specified area. Instead, it provides information necessary to adequately assess potential effects from oil and gas activity that could occur as a result of leasing.

Table 4 provides an example calculation and presentation of net surface disturbance. Other factors to consider in deriving net disturbance include such things as water production and air emissions from processing facilities. The level of discussion of the nature of projected development may be dependent on the significance of both the particular aspect of development (i.e., large quantities of produced water) and associated issues.

In the context of presenting the RFD in terms of net disturbance, certain unique characteristics of projected oil and gas development and production may be significant with respect to CEA. The variable nature of the types of gases and fluids a hydrocarbon reservoir can produce often is significant with respect to the effects of oil and gas development on other resources.

The RFD report should discuss anticipated production of natural gas with high concentrations of H_2S, CO_2, or natural gas liquids that may require the construction of processing facilities if they are not available or lack the appropriate extraction process or capacity. Gas production rates in excess of local gathering and transmission capacity may require the construction of pipelines and associated infrastructure.

RFD should discuss the nature of anticipated gases and fluids and types of infrastructure that may be needed for production.

Table 4. Example of calculating and displaying net surface disturbance for a hypothetical area. Disturbed acres on a per-well basis will vary depending on geologic, engineering, and physical characteristics of a particular area.

NET SURFACE DISTURBANCE						
Existing producing wells --------- Acres disturbed	Existing sites reclaimed --------- Acres disturbed	Future wells projected total	Future wells exploration (short-term) -------- Acres disturbed	Future wells producing (long-term) -------- Acres disturbed	Short-term acres disturbed	Long-term acres disturbed

Disturbance factors (assumptions)

X acres pad disturbance per producing well

Y acres pad disturbance per drilling well

Z acres average road disturbance per well

Formula for long-term disturbance

Net Surface Disturbance = existing well disturbance + [total future wells x (Ac/pad + Ac/road)] – [explor. wells x (Ac/pad + Ac/road)] – (prod. wells x Ac/pad recl.) – [(existing wells x (Ac/pad recl. + Ac/road recl.)]

Notes

Future wells based on geology and/or trends in development (includes producing wells and exploration wells immediately plugged, abandoned, and reclaimed)

Short-term disturbance: Years required for dirt-moving, operations, reclamation (pads and roads associated with dry holes)

Long-term disturbance: Years of use projected for producing sites

P&A: plugged and abandoned

The RFD report also should include information about standard management practices for produced water (subsurface disposal, tank collection, treating, hauling, surface disposal, etc.) for that particular area and hydrocarbon reservoir. Produced water quality and quantity may require treatment facilities and/or disposal wells. Appendix C provides additional guidance on information about oil and gas exploration and development that should be addressed in an RFD.

RFD should include information about standard management practices for produced water.

Using an RFD in the decision-making process

A scientifically based and well-documented RFD scenario is the critical component of information necessary for performing thorough cumulative effects analysis of oil and gas activities that could occur as a result of leasing. The RFD is also useful for evaluating existing land management decisions and for making new or revised decisions about management of oil and gas resources. The way RFDs are developed and used for effects analysis, including cumulative effects analysis, differ between plan and project level decisions (Table 5).

Land management plans provide the framework and direction for management of oil and gas resources, as described in the section titled "Types of decisions". An RFD provides information needed to facilitate the allocation of areas for leasing, and to build the management framework for oil and gas resource development. The RFD usually covers a relatively large area and presents activity forecasts in a general way. It may tier from a broader, basin-wide resource assessment (Federal Leadership Forum, 2001) and cover an area larger than the planning unit when oil and gas activities inside the planning unit are directly related or connected to activities outside the planning unit. It identifies areas where different levels and/or types of activities might occur, but usually does not identify specific sites of future drilling or development.

An RFD provides vital information for management decisions on leasing and development activities.

An RFD is a vital and necessary tool for

- Determining to what extent a management plan might need to be updated or revised
- Providing technical information for analyzing direct, indirect, and cumulative effects from oil and gas activity that reasonably could be expected as a result of a leasing decision;
- Serving as a context for more localized site-specific decisions on proposed exploration or development projects; and
- Making informed planning (leasing) decisions on management of oil and gas resources balanced with management of other resources.

Table 5. Activity descriptions, management constraints, and use of RFD at plan and project levels.

TYPE OF ACTIVITY DESCRIPTION	MANAGEMENT CONSTRAINTS/ CONDITIONS	USE OF RFD
PLAN [1]		
RFD based on geology & past and present activity without management constraints on future activity (baseline). (Generalized. Actual locations of future wells unknown and usually not identified.)	None	• Evaluation of existing land management plan decisions • Basis for effects analysis in NEPA for new or revised land management plan decisions • Context for analysis of and decisions on project proposals in planning area • Information for development of management plan objectives and standards and guidelines for oil and gas resource development activities
Constrained activity projections. Activity projections may be lower than those in "baseline" RFD due to management constraints on activities. Allowable oil and gas activities must be consistent with management objectives associated with proposed plan and/or leasing decision and each alternative to a proposed plan and/or leasing decision.	Variable, depending on objectives of proposed plan and each alternative to proposed plan. Discretionary constraints [2] can range from requirements of standard lease terms (minimal constraints) to decisions not to lease.	
PROJECT		
Proposed project: exploratory well(s) or field development. (Specific area, numbers of wells, and disturbance known. Actual locations of wellsites may be known.)	**Statutory and regulatory requirements** **Lease stipulations** from plan (leasing) decision. **Conditions of approval** on well permits consistent with lease rights.	Project can tier to plan RFD to provide: • Context for analysis of and decisions on project proposals in planning area • Point of reference for evaluating project proposal • Basis for determining other future activity in area of proposed project
Other **project level oil and gas development** in area of proposed action		
Development plans (scenarios) associated with alternatives to proposed action (different from proposed action)		

[1] Management prescriptions in a plan may be generalized and cover a range of constraints or conditions for oil and gas operations. For purposes of this report, leasing decisions are associated with plan level decisions and project decisions refer to more site-specific, ground-disturbing activities, including exploration wells and field development.

[2] Discretionary constraints are administrative decisions. Lease stipulations are an example of discretionary constraints. In contrast, non-discretionary constraints on oil and gas development are legally mandated (i.e. no leasing in wilderness areas).

The baseline RFD for a planning area should be unconstrained by management-imposed conditions.

Although usually inexact and non-specific with respect to where and when individual wells might be drilled, the baseline RFD for a plan is scientifically derived and is based on a set of reasonable geologic, engineering, and economic assumptions about resource occurrence only. Discretionary management-imposed conditions on where, when, or how exploration and development might occur should not constrain the baseline RFD. An unconstrained RFD provides a basis for comparison of a proposed management plan with its alternatives.

The management plan and its associated RFD should provide the context for any oil and gas projects proposed within the area covered by the plan. A proposed project is consistent with the plan when its specific characteristics (type and level of activity, nature of surface disturbance, and effects of disturbance) are similar to those projected and analyzed for the plan.

Industry's proposal for exploration or development provides the detailed description of the nature of development and surface disturbance.

In such cases, NEPA analysis for the proposed project (exploratory drilling or field development) can be tiered directly from the plan analysis, though it will be more specific. Exact location(s) and type of activity generally are known and may actually constitute the project proposal. If the nature of the proposed project varies considerably from the RFD, then the NEPA analysis for the project should address those dissimilarities.

The NEPA document for a project should include a thorough description of the similarities and differences among the proposed project, the RFD for the planning area in which the project is proposed, and the activity projected under the applicable land management plan (if it varies from the RFD). (See section titled "Alternatives to a proposed action".)

In addition, the project NEPA analysis should address potential for oil and gas development in and near the project area beyond that proposed for the project. The RFD for the planning area in which the project is proposed can serve as one source of information about potential for oil and gas development in and near the area of the proposed project.

The RFD provides the context and information for such consideration of future oil and gas activities in an area of a proposed exploration or development project, in addition to ongoing activity and other indications of future development. Description and discussion of potential development in/near the project area in addition to the proposed project can be presented in the analysis itself or in a separate document (project level oil and gas development report) referenced and summarized in the analysis. Table 5 summarizes the relationship between a proposed project and the applicable RFD.

Planning-project feedback loop

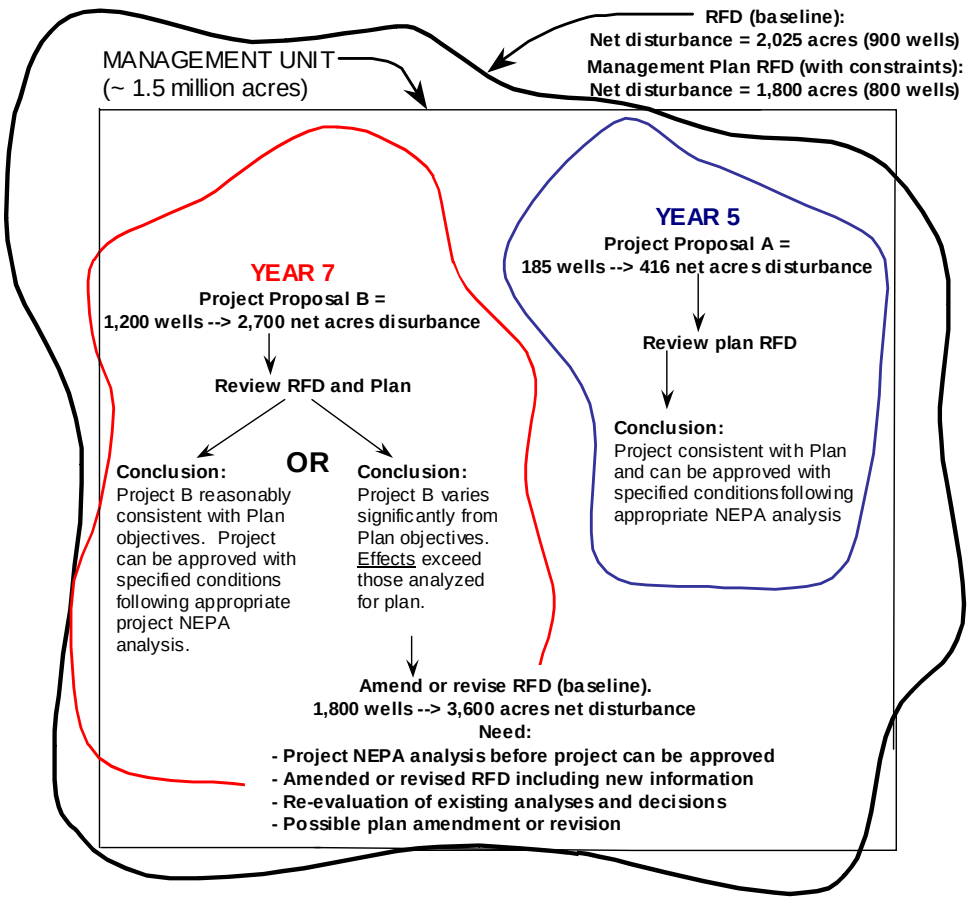
Over time, development (new drilling) and geophysical surveys in an area provide new information about the geology and nature of occurrence of oil and gas resources in the area. Likewise, over time, advanced technology becomes more affordable and more widely used and may change the approach industry uses to developing the resource. Consequently, at some point in time, ideas about the occurrence of oil and gas resources and how they can be developed may be different than those used for the RFD. When such differences are significant, the management agency may need to revise the original RFD. The agency should also review the plan to

An existing RFD may need to be amended or revised based on new information about resource occurrence and development technology.

which a revised RFD applies to determine whether or not there is a need to revise or amend the plan.

Large development proposals sometimes can be the "catalyst" for review and revision of a management plan. In large development situations, the number of wells, associated level of disturbance, and/or potential effects from disturbance may exceed those analyzed for the plan. In such cases, a project proposal may be the catalyst for revising the RFD, the activity projected under the plan (if it varies from the RFD), and possibly the plan itself. Depending on the specific circumstances and factors involved, the project level analysis may also serve as the analysis for a plan amendment or revision. Figure 1 illustrates these relationships and sequence of actions for a hypothetical management unit, area covered by the RFD, and proposed projects.

Analysis of proposed projects may reveal a need to review and revise an RFD and possibly a land management plan.



RELATIONSHIP OF RFD & MANAGEMENT PLAN TO OIL & GAS DEVELOPMENT PROJECTS

Figure 1

In addition to new information about occurrence and/or development of oil and gas resources, new information about a variety of other resources may also create a need for management plans to be changed (e.g. new listing of threatened or endangered species). Analysis of the new resource information may necessitate analysis and revision of activity projections in the plan. Also, amendments or revisions to a plan may include alternatives containing new mitigation measures or constraints that need to be analyzed for possible application to existing oil and gas decisions. In cases where provisions in a proposed plan amendment or revision affects an existing oil and gas decision, the NEPA document needs to identify and discuss the effects of any proposed constraints on the RFD. Figure 1 illustrates the relationships between an RFD and later project proposals that are either consistent with the RFD or have conditions and assumptions that vary significantly from those used to derive the RFD.

Reasonably foreseeable future actions (RFFA)

The concept of RFFA comes from CEQ regulations at 40 CFR 1508.7 that address cumulative effects (impacts): "Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and **reasonably foreseeable future actions** regardless of what agencies (federal or non-federal) or person undertakes such other actions."

RFFAs include activities, developments, or events that have the potential to change the physical, biological, and/or socio-economic nature of a specified area.

RFFAs are projections of activities that might occur in the proposed action's area of cumulative effects.

For the purposes of effects analysis for a proposed oil and gas action, RFFAs are projections of activities that might occur in the proposed action's area of cumulative effects. RFFAs, in conjunction with the proposed action, assist in determining the scope of cumulative effects analysis. Scope and scale of CEA are discussed further in the section titled "Analysis of effects, including cumulative effects".

RFFAs should include oil and gas activities in or near the identified effects area but which are not directly related to the proposed action. Identification of RFFAs (including other oil and gas actions) different from and/or unrelated to the proposed action is necessary for defining and analyzing cumulative effects from all the combined activities.

Existing activities, developments, and/or events within a defined area indicate the types of actions (RFFAs) that could reasonably be expected to occur in the future in addition to a proposed action. RFFAs should include actions that have been clearly identified as possible and/or likely to happen and should not be defined by worst-case scenarios. They should be quantified, if possible, in order for the decision-maker to develop a clear understanding of the cumulative effects of the proposed action and other RFFAs in the area.

RFFAs should include actions that have been clearly identified as possible and/or likely to happen.

RFFAs should include actions on adjacent lands, including non-federal lands, if such actions are determined to have potential effects in addition to effects from a proposed action on resources of concern.

RFFAs should include actions on adjacent lands if relevant.

Clear and concise documentation of assumptions and reasoning for arriving at RFFAs are necessary in supporting the "reasonableness" of RFFAs. Table 6 provides an example of a framework by which RFFAs can be identified and judged for their significance when performing cumulative effects analysis for a proposed action involving oil and gas. Comprehensive lists of RFFAs in an easy-to-use format (such as that presented in Table 6) kept up-to-date in appropriate land management agency offices can provide for efficient and thorough identification of RFFAs whenever needed for analysis. References to documentation about specific RFFAs may also be included in such a list.

Table 6. Categories of activities that might be included in RFFAs analyzed in conjunction with a proposed action. Table provided as example only. Specific projects may have different or additional categories or activity and/or resources of concern.

General Category of Activity [1]	Amount of Disturbance (Ac., Mi.)	Year of Activity	Reclamation (amount & Year)	Resource of Concern
Past and Present Actions				
Roads (specify type)				Air, water, wildlife
Mineral development (specify type)				Air, water, wildlife, visuals
Grazing (specify improvements)				Water, soils, wildlife
Timber				Water, soils, wildlife, visuals
Fire				Air, water, soils, wildlife, visuals
Recreation				Water, soils, wildlife
Inholdings				Water, soils, wildlife
Residential development				Air, water, soils, wildlife
Reasonably Foreseeable Future Actions				
Roads (specify type)				Air, water, wildlife
Mineral development (specify type)				Air, water, wildlife, visuals
Grazing (specify improvements)				Water, soils, wildlife
Timber				Water, soils, wildlife, visuals
Fire				Air, water, soils, wildlife, visuals
Recreation				Water, soils, wildlife
Inholdings				Water, soils, wildlife
Residential development				Air, water, soils, wildlife

[1] General categories are presented here as guides to identifying specific activities and details about them in an identified area of decision-making and analysis. Records of specific information should include specifics about the nature and location of past, present, and reasonably foreseeable future activities.

Determining cumulative effects depends on information about the proposed action as well as information about other reasonably foreseeable activities for each level of decision-making. Forecasting future activities, including expected levels of oil and gas development, is critical to adequately evaluating proposed oil and gas actions and alternatives, and determining appropriate mitigation measures for effects of the action. Forecasting of reasonably foreseeable activities is a vital component of effects analysis, even though predictions of future actions cannot be expected to be precise.

Analysis of effects, including cumulative effects

Beginning the analysis process

Identifying issues and determining the scope of analysis are critical to successfully completing adequate and thorough CEA under NEPA requirements. At the preliminary stages of the NEPA process, the lead agency collects information necessary for determining the scope [1] of analysis in a process known as "scoping" [2]. Information collected or identified in that process assists in determining

- The nature and complexity of the proposed action
- Environmental issues related to the proposed action;
- What other projects have a reasonable certainty to occur in the area
- How much analysis is necessary;
- Possible alternatives to the proposed action; and
- The disciplines required to guide environmental analysis and documentation.

The interdisciplinary team (IDT) designated to conduct environmental analysis refines the proposed action and issues identified through scoping. The IDT also determines and recommends to the responsible official the scope of analysis and assists in identifying what specific types of technical information are needed for proposed oil and gas actions. Accordingly, the disciplines and skills of the IDT must be appropriate to the scope of the action and the issues identified. For oil and gas decisions, the IDT should include a petroleum geologist and/or engineer, or at the very least a resource specialist with experience in oil and gas resource management.

The interdisciplinary team for an oil and gas analysis should include a petroleum geologist, engineer, and/or resource specialist experienced in oil and gas resource management.

[1] Scope: the range of actions, alternatives, and impacts to be considered in an environmental analysis. This guidance considers scope of cumulative effects analysis for oil and gas activities to be defined by the level of detail, extent, range, and type of information required for effective planning and project level analyses.

[2] Scoping: procedure by which the lead agency identifies important issues and determines the extent of analysis necessary for an informed decision on a proposed action.

Identification of issues

Issues, along with the character and complexity of the proposed action and decision to be made, help frame analysis. One of the roles of the IDT is to identify issues and then focus on those that are important and relevant issues of national, regional, or local significance to

- Focus the environmental consequences to be addressed and narrow the focus of CEA;
- Identify mitigation measures;
- Develop alternatives to the proposed action; and
- Identify technical information needed for analysis.

Focusing of issues results in part in distinguishing among insignificant issues, issues that can be addressed with mitigation common to all alternatives, and issues that drive the development of alternatives.

All issues need to be documented, regardless of their significance. Documentation should include references to other analyses, resource assessments, monitoring reports, etc. Documentation of insignificant issues ("small stuff") may be simple, such as in lists or tables. Issues addressed with mitigation that would be the same for all alternatives can be documented collectively in a concise text section that addresses "issues common to all alternatives". Some issues will be sufficiently significant as to drive the development of alternatives to the proposed action. The section titled "Alternatives to a proposed action – Role and relationship to cumulative effects analysis" provides further discussion of alternatives.

Document all issues identified during the NEPA process.

Information needed for analysis

Scoping for a proposed oil and gas action often results in identifying issues that require technical information for adequate and thorough CEA. Technical oil and gas information for CEA can be obtained through a variety of sources. In the case of proposed leasing decisions, an RFD provides primary technical information about oil and gas resource occurrence and potential development that could occur after leasing. Other geologic and engineering reports, databases, and references are other sources of technical oil and gas information.

In the case of proposed exploration and/or development projects, an Application for Permit to Drill (APD) and/or a Plan of Development (POD) provides primary technical information necessary for CEA of the proposed action. Other sources of information include the area-wide RFD, supplementary information provided by the project proponent, relevant geologic and engineering reports on file, and relevant databases and references.

Sources of technical oil and gas information for NEPA analyses:
RFD for leasing (plan level) decisions
APD or development plan for exploration/development proposals.

Environmental effects result from oil and gas related actions or activities, such as exploration, development, production, and abandonment. The analysis of effects should address:

- **Direct effects** from proposed activities, such as drilling wells, establishing production, etc.
- **Indirect effects**, such as increased use of an area due to roads related to oil and gas development
- **Cumulative effects** resulting from the proposed action plus past, present, and reasonably foreseeable future actions (RFFAs), e.g. additional field development (other than the proposed action), related infrastructure, or new power plants in the area.

The purpose of cumulative effects analysis is to ensure that federal decisions consider the full range of consequences of actions (the proposed action and alternatives). (CEQ, 1997.) In the case of oil and gas development, the direct or indirect environmental effects from a proposed oil and gas action could be minimal. However, the cumulative effects from both the proposed project and RFFAs could be significant.

EPA (1999) states the CEA should focus on the specific resources and ecological components that can be affected by the incremental effects of the proposed action and other actions in the geographic area. Based on EPA's general guidance, the potential for cumulative effects to other resources from oil and gas activities can be determined by considering whether:

- Other resources are especially vulnerable to incremental effects from the proposed oil and gas activity;
- The proposed oil and gas activity is one of several similar actions in the same geographic area;
- Other non-oil and gas activities in the area have similar effects on other resources;
- Effects have been historically significant for specifically identified resources; and
- Other analyses in the area have identified a cumulative effects concern.

CEQ (1997) provides a short list of "Principles of cumulative effects analysis" that is useful in guiding effective CEA. (Appendix D.)

CEA for planning and project level decisions differs in scope and scale, in both space and time. Determining scope and scale of CEA geographically and temporally depends on the following:

- A well-defined proposed action,
- Identification of natural resources and other aspects of the human environment that could be affected by the action, and
- Issues and concerns about the action and its potential effects.

Clearly defining the scope and scale of potential environmental consequences of a proposed oil and gas action, along with identifying RFFAs, is the key to effective cumulative effects analysis. Defining scope and scale of potential environmental consequences helps the interdisciplinary team manage the analysis process to effectively collect relevant data and information at the appropriate level of detail, resolution and coverage; to identify other potentially affected resources or environmental values; and to identify potential stakeholders. A good grasp of the role of scope and scale can promote effective decision-making that results in appropriate action at the appropriate level.

Clearly defining the scope and scale of potential environmental consequences of a proposed oil and gas action, along with identifying RFFAs, is the key to effective cumulative effects analysis.

Scope of cumulative effects analysis

CEQ (40 CFR 1508.25) defines scope in terms of

- The range of actions (connected, cumulative, and similar);
- Alternatives to a proposed action; and
- Impacts (direct, indirect, and cumulative) to be considered in an environmental impact statement.

This guidance considers scope of cumulative effects analysis for oil and gas activities to be defined by the level of detail, extent, range, and type of information required for effective planning and project level analyses.

Scope of cumulative effects analysis should focus on the diversity and significance of issues. Scope will vary on a case-by-case basis depending on the decision level (planning or project) and specific characteristics of the proposed action. For example, in addressing produced water associated with proposed oil and gas development, the analysis may be brief in describing the feasibility and cost of underground injection of produced water. However, the analysis may need to go into some detail in describing far-reaching effects on surface water resources from disposal of produced water both from the proposed action *and* from other RFFAs.

Determining scale

An interdisciplinary NEPA team determines geographic boundaries and timeframes of cumulative effects. CEA boundaries usually extend beyond those identified for direct effects from a proposed action. Spatial and temporal boundaries on cumulative effects may encompass not only direct effects from a proposed action, but also effects from other RFFAs on resources.

Appropriate scale or scales is critical for effective cumulative effects analysis. If the boundaries of analysis are defined too broadly, the analysis becomes unwieldy; if they are defined too narrowly, significant effects may be missed, and decision makers will not be completely informed about the consequences of their actions (CEQ, 1997). Canter and Atkinson (1999) state that determining the spatial and temporal ranges of predicted effects from a proposed action is a reasonable beginning to boundary selection. These boundaries then can be adjusted based on connected actions and other RFFAs.

Predicted effects areas from a proposed action provide a reasonable beginning to selection of boundaries for CEA.

Selection of spatial and temporal boundaries on cumulative effects is somewhat subjective and depends on the resources being evaluated. An element to consider in establishing geographic and temporal boundaries on effects is threshold conditions of resources beyond which adverse change would cause significant degradation. The analysis should determine the potential for the resource to sustain itself in the future and whether the proposed action will affect that potential. The analysis should include a description of how conditions have changed over time and how they are likely to change over time with and without the proposed action. Thresholds of significant impact for each affected resource need to be identified and addressed on a case-by-case basis for each resource.

Thresholds of significant impact for each affected resource need to be addressed.

Interdisciplinary teams and specialists use knowledge gained through scoping, scientific information, and experience to determine the spatial and temporal boundaries of CEA for various resources. The analysis should include clear documentation of the rationale used to determine boundaries of CEA.

The analysis should include clear delineation of boundaries of CEA and documentation of the rationale used to determine those boundaries.

Table 7 provides some guidelines for defining spatial and temporal scale of analysis for oil and gas related activities. Analysis for proposed leasing (planning) generally covers a broad area for a period of time tied to the life of a land management plan. Analysis for proposed exploration drilling can be locally focused, covering a relatively small area (i.e., 1-5 acres for 1-2 wells) and a relatively short period of time (1-5 years for dry holes). Project areas and general analysis areas for proposed field development can vary widely, depending on expected field size and life expectancy (Table 7). In all cases, the location and extent of resources affected by a proposed action determine the scale of analysis.

Geographic boundaries of CEA (spatial scale)

Determination of geographic boundaries on cumulative effects depends on:

- The natural boundaries of the resource(s) of concern (EPA, 1999);
- The extent of effects from a proposed action (i.e., drilling, completing, and establishing production from a number of oil and gas wells); and
- The type and extent of effects from other RFFAs.

Table 7. Generalized spatial characteristics of proposed action and analysis area. Numbers are highly generalized and may vary widely from one area or project to another.

PROPOSED ACTION	CHARACTERISTICS OF PROPOSED ACTION	SCALE OF PROPOSED ACTION (PROJECT AREA)		SCALE OF ANALYSIS (GENERAL ANALYSIS AREA)	
		Spatial (Acres)	Temporal (Years) [1]	Spatial (Acres)	Temporal (Years)
PLANNING AND/OR LEASING DECISIONS AND ANALYSIS					
Leasing	Analysis based on RFD scenario for exploration and development that could occur subsequent to leasing.	10,000's – 1,000,000's	10+	10,000's – 1,000,000's	5 --10 +
PROJECT DECISIONS AND ANALYSIS					
Exploration drilling	1-2 wellsites with roads	<10 --20	1 -- 5 through reclamation if dry hole	10 – 1,000's	1 -- 5
Small field development	2-30 wellsites, roads, and associated infrastructure [2]	10 to 200 depending on well spacing and associated infrastructure	5-20 +	100's –1,000's	10 – 25
Medium field development	30-100 wellsites, roads, and associated infrastructure [2]	100 to 1,000 depending on well spacing and associated infrastructure	10 – 30 +	1,000's – 10,000's	15 – 35 +
Large field development	100-500 (or more) wellsites, roads, and associated infrastructure [2]	1,000 to 10,000 depending on well spacing and associated infrastructure	30 – 50++	1,000's – 100,000's	35 – 55 ++

[1] Life of a field is dependent on technology and reservoir characteristics. Improvements in engineering and economics may increase projected life expectancy of a field.

[2] Examples of infrastructure include (but are not limited to) pipelines, powerlines, compressors stations, gas processing facilities.

CEQ (1997) suggests using the "project impact zone" concept for setting geographic boundaries for CEA:

- Determine potential area affected by that action; that area is the project impact zone.
- Make list of resources in that impact zone that could be affected by the proposed action.
- Determine geographic areas occupied by those resources outside the project impact zone. In most cases, the largest of these areas will be the appropriate area for the analysis of cumulative effects.

Spatial and temporal boundaries of areas of impact are likely to vary for different affected resources or socioeconomic areas. For example, effects from proposed small field development may extend only a few square miles on elk winter range, but occur over 100 square miles on air quality. Impact areas also may coincide, overlap, or be separate from one another in space and time. Rationale used in determining effects and defining the spatial and temporal extent of effects by resource should be clearly documented in the analysis.

Spatial and temporal boundaries of the project impact zone are likely to vary for different affected resources or socioeconomic areas.

Canter and Atkinson (1999) defined factors for delineating spatial boundaries for CEA for a proposed project:

- Size and nature of the project and its anticipated effects;
- Availability of existing data and knowledge about the project and its environmental effects;
- Feasibility of collecting new data and knowledge;
- Size, nature, and environmental effects of past, existing, and future projects and activities in the area;
- Characteristics and sensitivity of the receiving environment (extent and degree of existing stress);
- Relevant ecological boundaries, for example: watersheds, sub-watersheds, and major landscape features; and
- Relevant jurisdictional boundaries.

Spatial boundaries for the CEA will differ from the boundaries of the project impact zone and will vary for different resources and socioeconomic areas.

Jurisdictional boundaries should not be a factor in defining a CEA area.

In the case of CEA for proposed oil and gas activities, jurisdictional boundaries should not be a factor in defining a CEA area for two reasons:

- Development is dependent on subsurface geology independent of jurisdictional boundaries.
- Effects from oil and gas activities can be extensive, potentially extending a considerable distance outside the planning or project area (i.e., effects on air quality).

CEA for oil and gas activities may include other factors in addition to those Canter and Atkinson have identified, such as 1) the unintended transport of fluids or materials (i.e., potential for an oil spill to travel down a stream), or 2) the modification of waste by-products (i.e., burning hydrogen sulfide to mitigate the poisonous nature of the gas creating sulfur dioxide, in turn affecting lake acidity).

Documentation of cumulative effects associated with a proposed action should include the rationale for the boundary selected and a map or maps of each CEA area (or area of potential impact) specific to the affected resource. Each map should show the location or area of the proposed activity along with appropriate past and present actions and RFFAs that may affect specific resources. Past and present activities include anything that has affected and continues to affect a resource and that generates effects common with those of a proposed action. Examples include such activities as existing refineries, compressor stations, highways, oil and gas fields, pipelines, and power plants.

CEA boundaries must be justified and documented in the NEPA analysis. Maps are a good way to illustrate areas of a proposed activity, relevant RFFAs, and impact zones.

Past and present activities, along with known resource trends, are usually discussed in the "existing environment" portion of the environmental analysis document. The existing environment section should document baselines for evaluation of anticipated change associated with a proposed action. RFFAs include future oil and gas activities in addition to the proposed action, as well as other actions. RFFAs can include activities on private, state, and federal lands that contribute to effects on a resource anticipated to be affected by a proposed action.

Planning level

An RFD for an area of proposed oil and gas leasing (planning) provides information for evaluating the type and extent of potential effects from oil and gas development that *could* occur. [1] Effects analysis (direct, indirect, and cumulative effects) for leasing is broad and generalized because it is necessarily based on a *hypothetical* scenario of exploration and development.

The geographic extent of analysis for a leasing decision should be based on the areal extent of the potentially affected resources. Figure 2 illustrates the geographic relationships among a planning area, the area covered by the RFD, area extent of four hypothetical affected resources, and the extent of effects ("impact zones") for those resources. The extent of effects from activities described in an RFD may be entirely within the planning area and geographically limited by the affected resource itself (deer winter range in Figure 2). For another resource (watershd or elk winter range in Figure 2), the resource may extend beyond the planning area, but effects may or may not extend outside the planning area.

Effects on some resources can be extensive, going beyond the boundaries of the planning area and determined by the distance over which effects remain significant (extent of effects from potential activity on air quality in example, Figure 2). The effects areas (impact zones) of particular resources may be superimposed (deer winter range and area of air quality effects

Effects on some resources can be extensive, going beyond the boundaries of the planning area and determined by the distance over which effects remain significant.

[1] Oil and gas development cannot occur until a leasing decision has been made and implemented (leases issued). After leases are issued, additional permits and environmental analysis are required before wells can be drilled.

in example), or may overlap only in part (deer winter range and area of watershed effects in example). All relevant effects, including those that extend outside the planning area, must be evaluated and considered in the leasing decision that is made for the planning area.

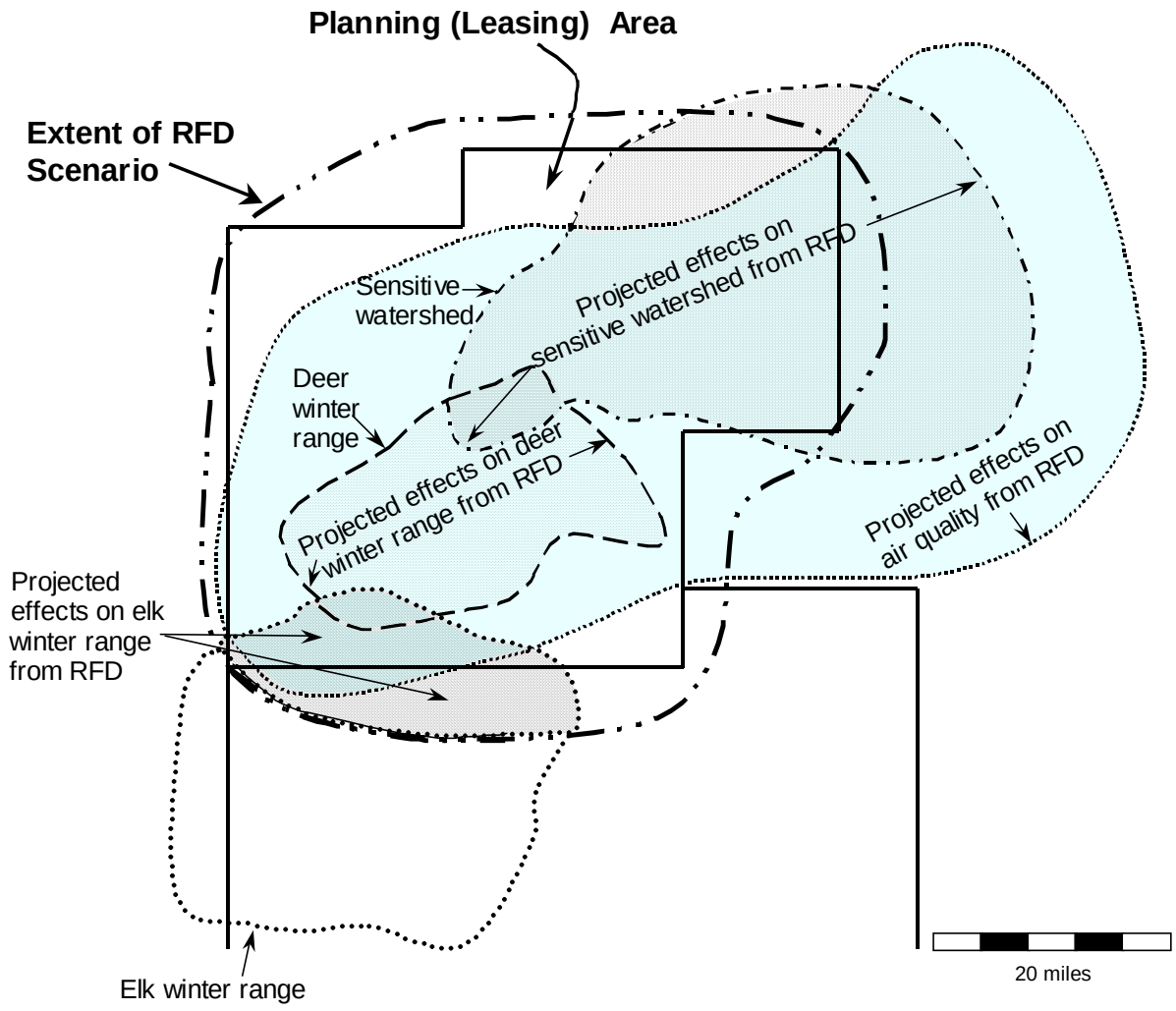
Cumulative effects analysis for oil and gas leasing (plan level decision) should consider not only effects based on the RFD associated with the proposed leasing action and alternatives (See "Alternatives to a proposed action – Role and relationship to cumulative effects analysis"), but must also consider effects from other RFFAs. CEA should include effects from RFFAs that are outside the planning area but within the area of an affected resource, in addition to effects from RFFAs anticipated inside the planning area.

Figure 3 illustrates the geographic extent of CEA for four resources:

- Deer winter range: Resource is completely inside the planning and RFD area. CEA should cover the entire deer winter range.
- Sensitive watershed: Resource extends beyond the planning area, but the entire resource may be affected by activities projected in the RFD. CEA should cover the entire watershed.
- Elk winter range: Resource extends beyond the planning area. Activities projected in the RFD are not predicted to affect the entire resource area. However, an RFFA outside the planning area, combined with activities projected in the RFD, cause cumulative effects on the resource. CEA should cover the entire range.
- Air: Resource extends far beyond the planning area. Activities projected in RFD are not predicted to affect air quality beyond limit shown in Figure 3. No RFFAs that affect air quality are identified. CEA may be equal to or slightly larger than the affected area, but it does not have to cover the entire resource area.

In some cases, the cumulative effects analysis area may be larger than the area of direct effects from a proposed action, but smaller than an extensive area covered by a particular resource. For example, in a very large watershed, cumulative effects from a proposed action and other RFFAs may become insignificant before reaching the full extent of the watershed. However the CEA area is defined, it should be justified and documented in the NEPA analysis.

The NEPA document should include rationale and documentation of the definition of an area of cumulative effects on a particular resource.



POTENTIAL EFFECTS AREAS (IMPACT ZONES)
FOR VARIOUS RESOURCES
Analysis for leasing (plan level)

Source of effects: Projected oil and gas activities documented in RFD

Figure 2

Figure 2. Potential effects areas (impact zones) for various resources, planning level. Map illustrates hypothetical areas of projected direct effects (impact zones) for particular resources in a planning (leasing) area covered by an RFD. RFD provides information for defining and evaluating the type and extent of potential effects from oil and gas development that could occur subsequent to implementing a proposed leasing decision. Effects on air quality, a sensitive watershed, a deer winter range, and an elk winter range are defined by the distance over which effects from projected oil and gas activities might be significant. That distance defines the effects area or impact zone for each resource. In some cases, that distance may cover the entire resource area (e.g., deer winter range). Relationships among projected activity (RFD) and each identified resource are as follows:

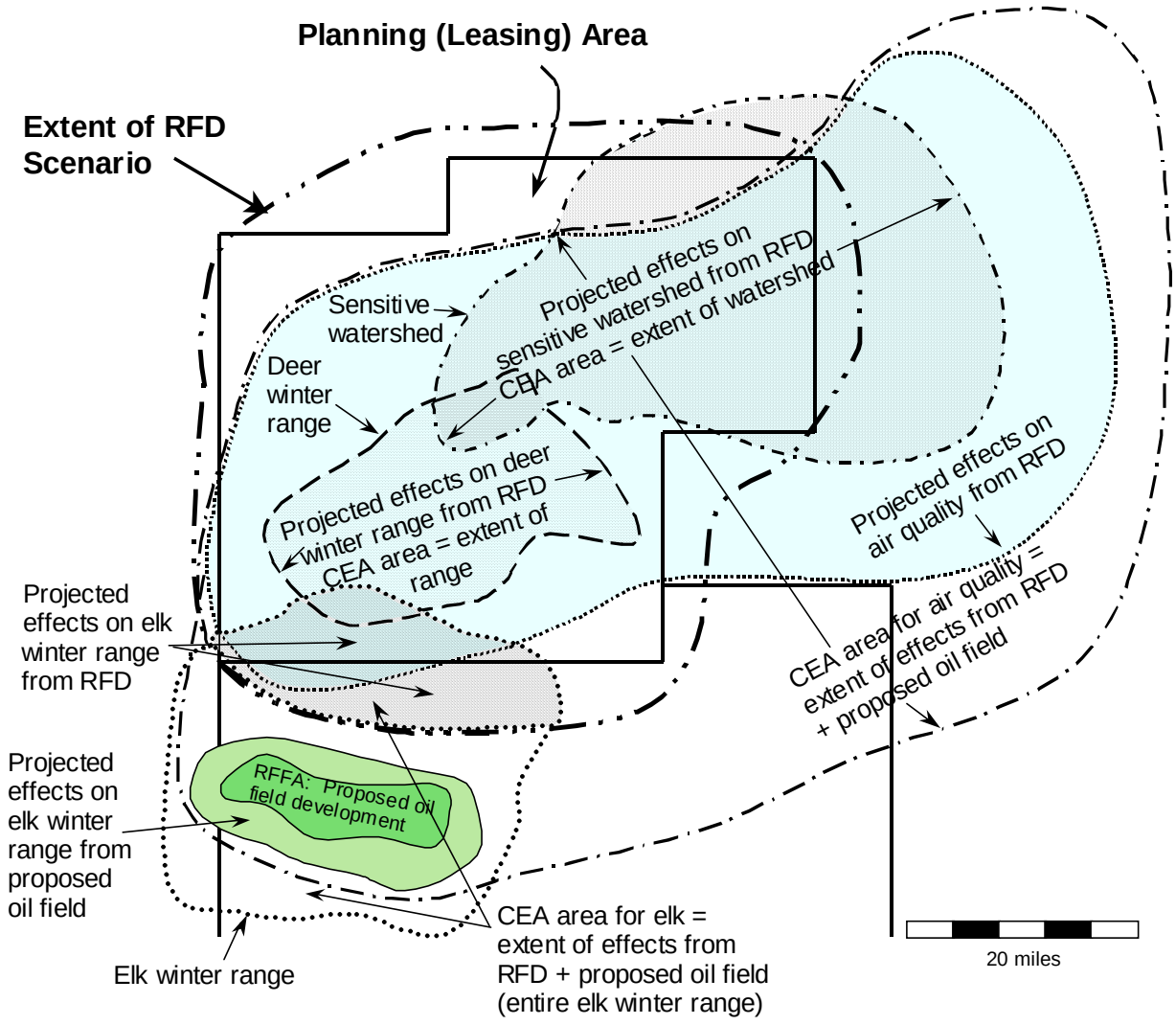
Deer winter range is within the planning area and area covered by the RFD. Projected oil and gas activities may potentially affect the entire deer winter range.

Sensitive watershed extends beyond the planning area and area covered by the RFD. Activities projected in the RFD potentially affect the entire watershed, including that part outside the planning area and limit of the RFD.

Elk winter range extends beyond the planning area and area covered by the RFD. Activities projected in the RFD potentially affect only that portion of the elk winter range within the limit of the RFD.

Air extends a long distance beyond the planning area and area covered by the RFD. Potentially significant effects on air quality from activities projected in the RFD extend beyond the planning area and RFD boundary, but it does not have to cover the entire resource area.

Note: Actual circumstances may vary considerably, and relationships may be more complex than those illustrated here. Each situation should be analyzed based on its own unique set of characteristics.



POTENTIAL CUMULATIVE EFFECTS AREAS FOR INDIVIDUAL RESOURCES
Analysis for leasing (plan level)

Source of effects: Projected oil and gas activities documented in RFD + RFFAs (proposed oil field development)

Figure 3

Figure 3. Potential cumulative effects areas for individual resources, planning level. Map illustrates hypothetical areas of projected cumulative effects for particular resources identified in Figure 2. Cumulative effects include effects on any particular resource from a proposed action (information from RFD for leasing decisions) plus RFFAs both inside and outside the planning area. In this case, only one RFFA – proposed oil field development in an adjacent planning unit – contributes to cumulative effects on elk winter range and air quality.

Deer winter range: Resource is completely inside the planning and RFD area. CEA should cover the entire deer winter range.

Sensitive watershed: Resource extends beyond the planning area, but the entire resource may be affected by activities projected in the RFD. CEA should cover the entire watershed.

Elk winter range: Resource extends beyond the planning area. Activities projected in the RFD are not predicted to affect the entire elk winter range. Projected effects from the proposed oil field development should be analyzed along with projected effects based on the RFD over the extent of the elk winter range, even though the direct effects areas do not overlap. The CEA area would be the entire elk winter range.

Air: Resource extends far beyond the planning area, beyond the area covered by figure. Activities projected in the RFD are not predicted to affect air quality beyond the limit shown. To address effects from activities projected in the RFD and the proposed oil development, the CEA area for air quality is defined by the extent to which the ID team determines effects are significant.

Note: Actual circumstances may vary considerably, and relationships may be more complex than those illustrated here. Each situation should be analyzed based on its own unique set of characteristics.

The type and level of information about RFFAs may not need to be as detailed as that for an RFD. The analysis and level of detail should be adequate to analyze the aspects of the resource in question. For example, the analysis for air quality may look at a range of emissions within the planning area. The RFD should supply information about sources and types of potential air emissions. If one emission in particular was identified by air quality specialists as an issue that may have cumulative effects, the level of detail for RFFA need only contain information about that particular emission.

The type and level of information about RFFAs may not need to be as detailed as that for an RFD.

Once cumulative effects have been analyzed for individual resources, the ID team must analyze the integrated and synergistic nature of cumulative effects on all the resources. The document should summarize all cumulative effects in a way that the reader and decision-maker can get a sense of the overall picture. For additional direction on cumulative effects, refer to CEQ, 1997.

Project level

Industry may propose exploration and/or development projects on leases that have been issued. An exploration or development proposal is definitive for activities that will involve ground disturbance, unlike the speculative RFD used to analyze effects related to a leasing decision. Consequently, the nature and extent of effects from the proposed exploration or development action can be determined with a higher degree of accuracy and confidence than that associated with a planning/leasing level RFD. Generally, the analysis area of proposed exploration or production (project level) will be smaller than that of leasing (plan level).

A project proposal for exploration or development is definitive, unlike an RFD that is speculative.

Like an analysis based on an RFD for leasing, the geographic extent of analysis for a proposed exploration or development project should be specific to affected resources, as illustrated in Figure 4. The geographical limits of the resource being affected can determine the geographic extent of effects analysis (elk winter range in Figure 4). Or, the distance from the source in which effects remain significant (effects on deer winter range from proposed gas development in Figure 4) can determine the geographic extent of effects analysis.

Limit of affected resource or distance from source in which effects may remain significant determine extent of cumulative effects analysis.

Cumulative effects analysis for exploration and development projects, like that for leasing, must consider not only effects based on the proposed project and alternatives, but must also consider effects from other RFFAs. If other RFFAs occurring outside a project area affect resources that are affected by the proposed action, they should be considered in CEA (oil field in Figure 4).

Cumulative effects analysis must consider effects from RFFAs in addition to effects from the proposed action.

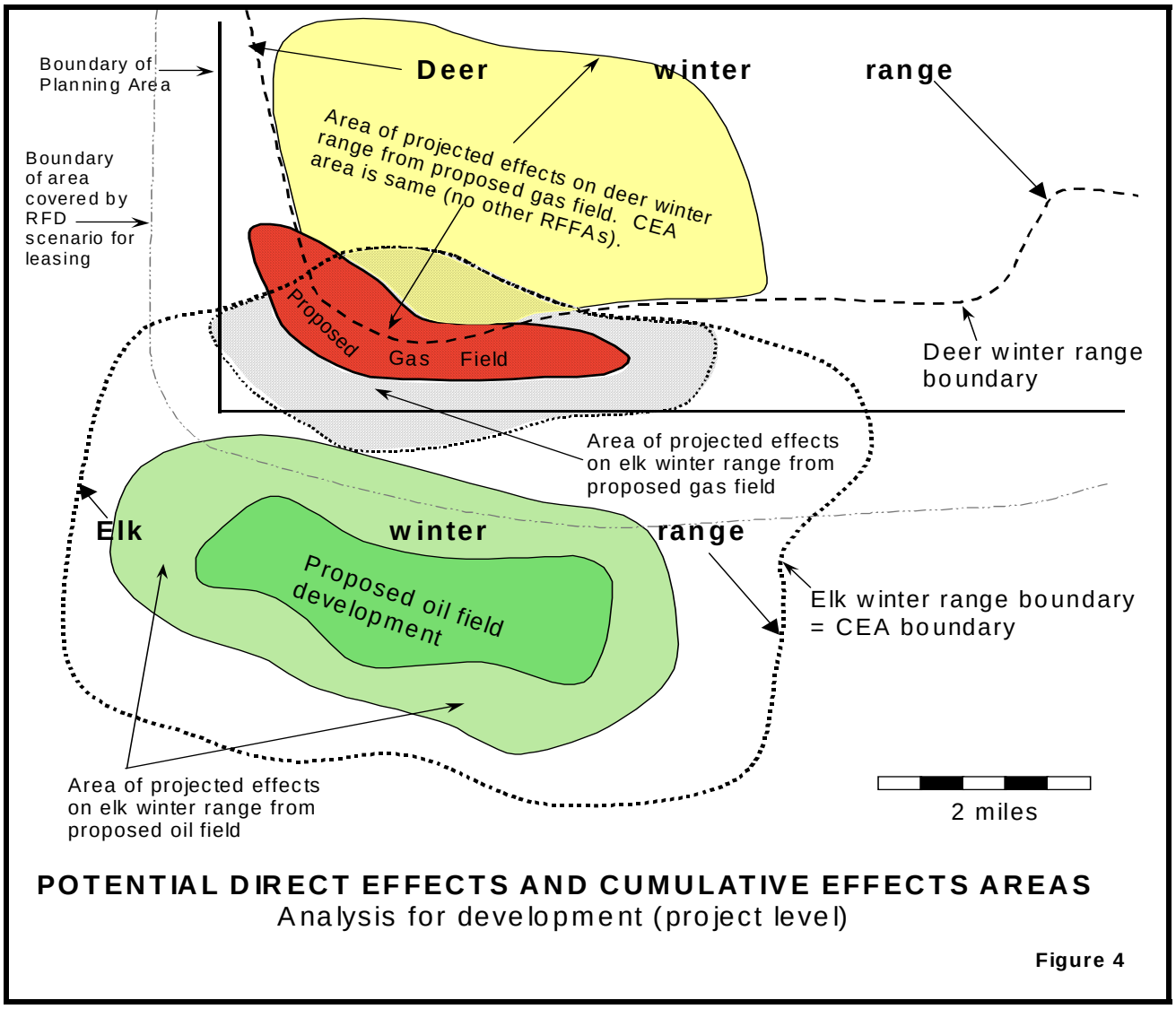


Figure 4. Direct effects and cumulative effects on specific resources, project level. Map illustrates hypothetical areas of projected impact zones and associated cumulative effects areas for two hypothetical resources. Area is a small part of that illustrated in figures 2 and 3.

Elk winter range: Oil field and proposed gas field each have effects on different parts of the elk winter range. The CEA area would be the entire elk winter range.

Deer winter range: Projected direct effects extend outside the project area, but are significant for only a portion of the deer winter range. In this case, no other RFFAs are found to affect the deer winter range. The CEA area should cover an area equal to or larger than the area of potential direct effects, but may not need to extend over the entire deer winter range.

***Note**: Actual circumstances may vary considerably, and relationships may be more complex than those illustrated here. Each situation should be analyzed based on its own unique set of characteristics.*

Actual exploration and development proposals may or may not match the RFD for the planning area in which the project level proposals are made. The RFD is speculative in nature and based on assumptions that may prove to be inaccurate over time. An actual proposed exploration or development project, however, is relatively well defined, and the actual locations, distribution, and characteristics of wells are known more precisely. The relatively definitive nature of an exploration or development project allows for more precise determination of cumulative effects than in analysis for a leasing proposal.

Cumulative effects analysis at the project level must consider the relationship of the proposed project to the plan RFD. Project level CEA also needs to reference other past and present actions and RFFAs, including other oil and gas actions, in the planning area to determine if they should be included in the CEA for the proposed project. RFFA to be considered in analysis for a proposed action may differ from those analyzed for leasing (planning) in the same area. Projects unforeseen at the time of planning analysis may be proposed between the time the planning decision is made and the time an oil and gas project is proposed.

Time frame of the CEA (temporal scale)

In determining how far into the future to analyze cumulative effects, the ID team should usually first consider the time frame of the planning or project analysis. There may be instances when the time frame of the analysis will need to be expanded to encompass cumulative effects occurring further into the future. The CEQ handbook (CEQ, 1997) offers some graphic portrayals of time frame settings in which to conduct a CEA.

Delineating the temporal boundaries for a CEA involves determining how far in the past to consider in establishing the historical boundary, and how far in the future would be relevant in establishing the time period encompassing reasonably foreseeable future actions (Canter and Atkinson, 1999). Unfortunately, no precise guidelines have been established for determining how far to extend the past or future. They present some examples of pragmatic questions, issues and information to consider in selecting temporal boundaries of an analysis, as well as options for consideration in establishing past and future temporal boundaries for a CEA.

EPA, 1999, states the CEA should extend a length of time as long as the effects may individually, or in combination with other anticipated effects, be important to the resources of concern. At the point where the contribution of effects of the action, or combination of all actions, to the cumulative impact is not significant, the analysis should stop. Because the important factor in determining cumulative impact is the condition of the resource (i.e., to what extent it is degraded), analysis should extend until the resource has recovered from the impact of the proposed action.

The timeline may vary for different resources similar to the spatial boundaries discussed above. For example, noise may be an issue during the drilling of a gas well but a non-issue during production and reclamation. Potential for spread of

noxious weeds may be concern from the first surface disturbance through the completion of reclamation.

The analysis of the timelines can be similar to determining the spatial scale. Most effects will occur within a definitive time, depending on the type of proposal. Projects or proposals with similar effects that occur within the core time should be included in the RFD or RFFA and CEA. (Project C and D in Figure 5.)

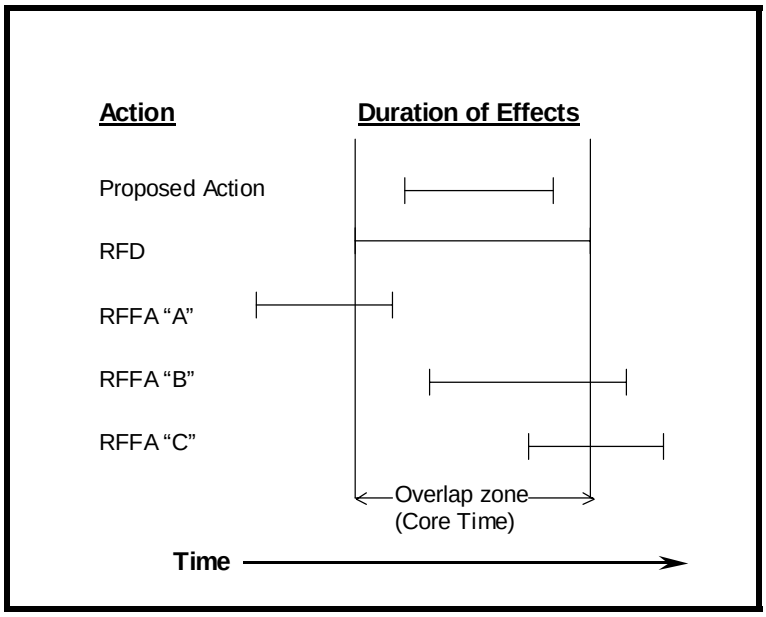


Figure 5. Conceptual illustration of relative temporal relationships among overlapping projects. Duration of effects can be measured on a scale of days, weeks, months, years, etc., depending on unique characteristics of effects from individual projects.

The effects for some resources may last much longer than the core time. The CEA can be less detailed for the outlying portion of the timeline. The amount of detail should be determined by the level of certainty or uncertainty for operations in the future. High levels of detail should not be used when there is a low level of certainty. Resource specialists should document the start and end of the timeline and the rationale for the points.

At times it may be difficult to determine when a project or plan ends. The core time discussed above should be bounded by the project or planning/leasing decision being made as a result of the NEPA analysis. Connected and cumulative actions need to be analyzed for cumulative effects.

Incremental analysis (discussed in section titled “Piecemeal or incremental analysis”) can be used as a tool to define the completion of one project and the beginning of the next. Incremental analysis is appropriate when subsequent steps of the sequence are not directly tied to the plan or project being analyzed and will require a separate NEPA analysis and decision. Incremental analysis is also appropriate when subsequent actions are so speculative as to preclude reasonable analysis.

Alternatives to a proposed action
Role and relationship to cumulative effects analysis

Analysis of the effects may be qualitative or quantitative. In order to present the alternatives in comparative form, the CEA for each natural resource (i.e. wildlife impacts, water quality impacts, socio-economic impacts) may be compared qualitatively. For instances where analytical models are used to predict effects, such as with air quality impacts, the differences in the CEA between alternatives can be quantified.

In all circumstances, the significant environmental effects have to be identified. An analysis does not have to be repeated if the CEA for two or more alternatives is essentially similar or possibly the same. The environmental impacts associated with each alternative should be given sufficient treatment to allow the reviewers to evaluate their comparative effects. Typically, a table, summarizing environmental consequences, is presented in Chapter 2 of the EIS. The "no-action" alternative is considered the baseline from which the other alternatives are compared. The cumulative effects of each alternative should be presented in a comparative table so that the merits of each alternative can be easily distinguished.

Issues related to the proposed action drive the development of alternatives. The proposed action is developed around a purpose and need for action. Alternatives to the proposed action are different ways of accomplishing the purpose and need for the action and should address significant issues.

Alternatives to the proposed action are different ways of accomplishing the purpose and need for the action.

CEQ considers the "alternatives" section of the document as “the heart of the Environmental Impact Statement.” [40 CFR 1502.14.] The evaluation of alternatives is governed by the "rule of reason" under which an EIS must consider a range of reasonable alternatives that could accomplish the agency's purpose and need and focus on issues identified as significant by the interdisciplinary NEPA team with authorized officer concurrence. A proposed action and its alternatives provide the basis for comparative analysis of environmental effects.

A proposed action and its alternatives provide the basis for comparative analysis of environmental effects.

The "environmental consequences" section in a NEPA document forms the analytical basis for the concise comparison in the "alternatives" section. Discussion of the environmental impacts of these alternatives can be summarized in comparative form, including charts or tables, thus sharply defining the issues and providing a clear basis of choice among options.

For oil and gas projects, the proposed action and its alternatives, developed in response to issues identified during scoping, set the stage for analysis of effects. For example, a proposal to drill four wells on four different locations within a defined area would result in a different set of effects than those from an alternative of drilling the four wells directionally from a single location.

Each set of effects would be analyzed separately for the proposal and its alternative in the "environmental effects" section, and presented in comparative fashion to clearly distinguish the differences between the proposed action and its alternative. Table 8 illustrates how the differences between alternatives can be compared clearly in the NEPA document.

Table 8. Example format of table showing comparison of alternatives for leasing decision. Mitigation of effects on a specific resource can be the same across all alternatives, or can differ for some or all alternatives. Effects on specific resources should be identified clearly for each alternative. Specific resources identified here are for example purposes only.

Alternative / Resource	Alt. A	Alt. B	Alt. C
Recreation sites			
Sensitive viewsheds			
Wetland & riparian			
Steep slopes (> 45%)			
Elk winter range			
Deer migration route			
Bald eagle nest sites			
Archeological sites			
Paleontological sites			
Socioeconomics			
Etc.			

Introducing mitigation in alternatives to a proposed action

Alternatives to the proposed action serve the purpose of introducing mitigation that can avoid, minimize, or eliminate significant environmental impacts. The alternatives deal with the significant issues identified in scoping. With respect to mitigation, alternatives to a proposed oil and gas project may be based on the following factors:

Alternatives to a proposed action can introduce mitigation to avoid, minimize, or eliminate significant environmental impacts.

- Statutory and regulatory requirements;
- Proponent proposed mitigation to develop good will with concerned local or national citizens;
- Mitigation proposed by interested or affected individuals or groups;
- Mitigation established through other related decisions, such as a land management plan or environmental analyses for project decisions in the area of the proposed action;
- Mitigation developed as a result of effects analysis in the "environmental effects" section of the NEPA document;
- State of the art industry practices, including cutting edge technology
- Best resource management practices that serve to meet goals of ecosystem management and sustainability;
- Mitigation to avoid or minimize significant cumulative environmental effects projected to occur after statutory mitigation has been applied.

Alternatives and/or mitigation can be outside the jurisdiction of the lead Federal agency. The EIS and ROD should identify which local / state / federal agency does have jurisdiction for activities that create environmental impairment and which agencies can implement suggested mitigation. For example, in the analysis of proposed oil and gas operations, if compressor station emissions would contribute to significant visibility impacts in Prevention of Significant Deterioration (PSD) Class I areas, then alternatives to the proposed action can be introduced to evaluate the feasibility, effects, and cost of emission controls and the resulting improvements to visibility impairment. The air emission controls evaluated can be stricter than those typically required by the permitting agency. Even though a ROD, Decision Record, or Decision Notice cannot require stricter emission controls, the decision can suggest that specific emission reductions would be desirable.

Alternatives and/or mitigation can be outside the jurisdiction of the lead Federal agency.

Range of alternatives, including the no action alternative

The range of alternatives considered in a NEPA document is important because the decision maker can only choose from alternatives or combinations of specific parts of alternatives that have been analyzed. Therefore, by having a broad range of alternatives to consider, the decision maker has greater latitude in managing the development of resources and their resulting environmental impacts.

The range of alternatives must include the alternative of no action. [40 CFR 1502.14(d)]

- For updating a land management plan, generally the no action alternative under NEPA is the continuation of the current management plan and its updates.
- Where the proposed action is a specific project, generally the no action alternative means the proposed project would not take place, and the resulting environmental effects from not completing the proposed project would serve as a baseline from which to compare the effects of permitting the proposed activity or an alternative to the proposed activity to proceed.

Whether updating a resource/forest management plan or planning for a specific project, the no action alternative provides a benchmark for comparison, enabling decision-makers to compare the magnitude of the environmental effects of the various alternatives.

The "no leasing" alternative

A "no leasing" alternative usually is different from a "no action" alternative.

A "no leasing" alternative is NOT a "no action" alternative.

Based on issues raised during scoping, the lead agency may have to consider an action alternative that analyzes no leasing in a specific portion of the analysis area due to other resource concerns. In the case of National Forest System lands, implementing regulations of the Federal Onshore Oil and Gas Leasing Reform Act require the Forest Service to include an alternative of "not allowing leasing" for the entire area for which a leasing decision is being made. [36 CFR 228.102(c)(2)] There is no parallel requirement for BLM to consider an alternative of "not allowing leasing" for an entire area under that agency's jurisdiction for which a leasing decision is being made.

Plan level: Addressing the RFD in analysis of a proposed leasing action

Each alternative to a proposed leasing action (plan level decision) addresses oil and gas activity projections provided in the RFD. A proposed leasing action and each of its alternatives may have different levels of constraints or conditions on potential future oil and gas activities, depending on management objectives, desired conditions identified in a plan, and mitigation necessary for protection of other resources. Constraints or conditions on development include requirements of standard lease terms (minimal constraints), lease stipulations [1] (including No Surface Occupancy), conditions of approval (COAs) for applications for permit to drill (APDs), and decisions not to lease.

[1] Lease stipulations are provisions that modify standard lease rights and are attached to and made a part of the lease. (Rocky Mountain Regional Coordinating Committee, 1989)

Mitigation presented in alternatives may also result in constraints on the type and level of activities projected in the RFD and lead to activity projections that vary from the RFD. The RFD itself does not change by alternative as it is based primarily on factors such as geology and historical activity that do not change by alternative.

The RFD does not change in alternatives to a proposed leasing action. Alternatives, however, may have different activity projections based on options for limited disturbance.

Limits on activity in a particular alternative may be extensive (i.e., large areas designated for leasing with No Surface Occupancy stipulations for maximum protection of a certain sensitive resource). In such cases, activities projected in the RFD may not be viable. Consequently, discussion and analysis of the alternative must include a projection of oil and gas activity that might occur if that alternative were selected as the decision. Leasing alternatives with projected wells and disturbance different from the RFD should document the calculation of wells and disturbance.

Ultimately, the RFD (baseline, unconstrained activity) may be different from the level of activity that might occur under a final plan decision that would prohibit access to some or all of the planning or leasing area. In such cases, both the RFD and the decision with lesser levels of projected activity serve as context for future project proposals within the planning or leasing area.

As an example, the RFD for a leasing decision may project 100 wells and 500 acres disturbance in a certain area over a certain time. An alternative may include a No Surface Occupancy lease stipulation for a part of the decision area that would prohibit drilling of some of the wells. The alternative would be analyzed for both the effect of the stipulation on 1) the development level projected in the RFD and associated socio-economic situation and 2) other important natural resources in the area.

Table 5 summarizes the nature and use of RFDs for leasing (plan level) decisions and the relationship of the RFD to oil and gas projects proposed within the planning area.

Project level: Addressing development proposals

In analysis of a proposed exploration or development project, each alternative to the proposed project (proposed action) may require different development descriptions as a result of suggested mitigation or management-imposed conditions. Different development plans associated with alternatives to a proposed oil and gas development project may be necessary under the following circumstances.

- The proposed project differs substantially from the RFD for the planning area in which the project is proposed. In such cases, the project NEPA analysis should thoroughly describe and consider the similarities and differences between and among the project proposal, the alternatives and associated development projections, and the contextual RFD.

- Management direction and/or issues raised in scoping may require consideration of protection of resources beyond that included in the project as proposed. Issues or management direction can only be addressed by development plans (scenarios) that are more restricted (i.e., location or timing), have lower levels of development than the proposed project, or are otherwise substantially different from the proposed project (i.e., multiple wells are required to be drilled directionally from a single site).
- The proposed project will not effectively and efficiently develop the oil and gas resource. Alternative(s) to the proposed project may represent a higher level of development than that proposed.

Development scenarios associated with different alternatives to a proposed project should be based on known factors and reasonable, clearly stated assumptions about such things as

- Oil and gas reservoir parameters;
- Petroleum engineering techniques (different types of production equipment and drilling methods);
- Economics;
- Expected production levels;
- Need for pipeline rights-of-way and other infrastructure construction;
- Limited surface access; and
- Other management-imposed requirements on leases, drilling, and development.

Piecemeal or incremental analysis

The ID team should seek a balance between piecemeal analysis of actions resulting in insufficient analysis and incremental analysis that can be justified. Some agencies use "incremental analysis" and "piecemeal analysis" interchangeably. For the purpose of this guide, "piecemeal analysis" and "incremental analysis" are defined as follows:

- Piecemeal analysis – Analysis of the environmental effects resulting from several projects without consideration of other past, present, or reasonable foreseeable future projects that cumulatively could cause a significant impact. Example: Analysis of a proposed new oil field with a road system, with no consideration of proposed development of wells and roads in an adjoining field area.
- Incremental Analysis – A term used to describe an analytical process that considers only one increment or step of a possible sequence of actions when subsequent actions are too speculative to be reasonably analyzed or will need a distinct decision. Example: Analysis for a remote exploratory well and associated road and infrastructure for that well without equally detailed analysis of any subsequent wells that may be

drilled if the proposed well discovers a field. Subsequent wells are analyzed at the time they are proposed.

Piecemeal analysis of projects may not adequately identify effects that are individually insignificant but cumulatively significant. CEQ guidance has identified piecemeal analysis as a potential weakness in NEPA analysis (EPA, 1997). The issues identified as significant and the scope of the analysis will help determine what projects, areas, and resources should be the primary focus of the NEPA analysis.

At some point, connected actions or other future actions may become speculative. Incremental analysis is appropriate when subsequent steps of the sequence of actions are not directly tied to the plan or projects being analyzed and will require a separate NEPA analysis and decision. Incremental analysis is also appropriate when subsequent actions are so speculative as to preclude reasonable analysis. The concept of incremental analysis can be a useful tool to determine a logical boundary for the scope of the CEA. The analysis should document the rationale for including or not analyzing possible, but speculative, projects.

Complex situations

New decisions, whether for new or modified plans or for specific projects, must account for existing rights granted to lessees. Most areas with potential for oil and gas resource occurrence contain existing leases. Consequently, the range of options in analyzing a proposed oil and gas action and its alternatives should include cumulative effects from current and future activity on existing leases under their original terms.

Decisions must account for existing rights granted to lessees.

Additionally, some areas of oil and gas resource occurrence have mixed land ownership (e.g., national grasslands). Any single reservoir (accumulation) of oil and/or gas is likely to transcend ownership or jurisdictional boundaries. Because the geographic occurrence of oil and gas reservoirs generally has no direct relationship to jurisdictional boundaries, the land manager may be limited in options for decisions about resource management.

Decisions must account for mixed land ownership and administrative jurisdictions.

Situations with respect to lease status, land ownership, and administrative boundaries must be analyzed on their own merits. In some cases, developing RFDs for planning and performing CEA for oil and gas activities should be interagency or inter-governmental efforts because of developing plays covering adjoining management areas or mixed land ownership, such as in national grasslands.

The relevance of existing RFDs and CEA for oil and gas activities should be considered in developing the RFD for a plan and performing CEA for activities

in an adjacent management area. Figure 6 illustrates a complex situation in which management responsibilities overlap (i.e., national grasslands), and consequently RFDs for leasing decisions must overlap or be consistent with one another.

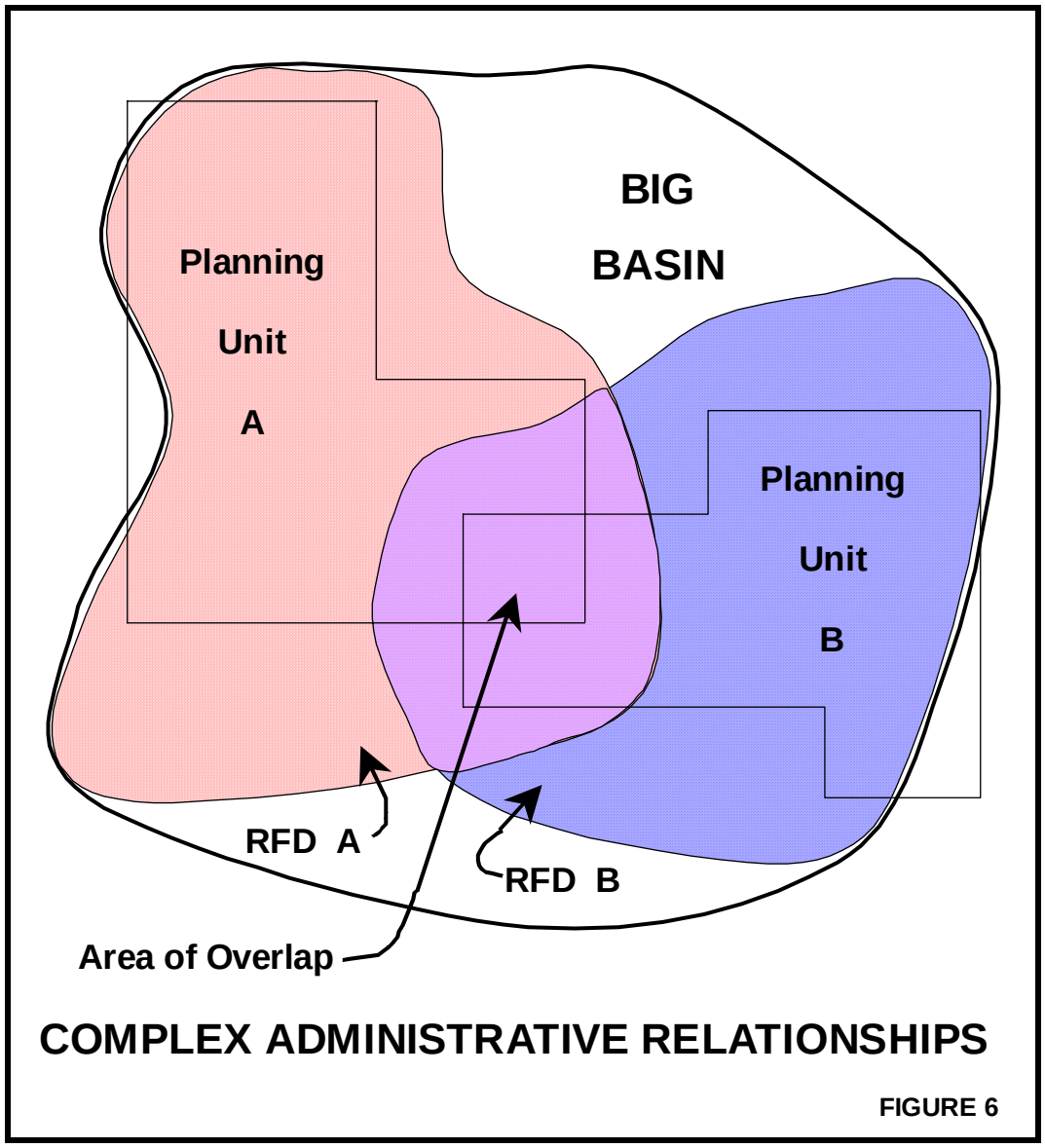


Figure 6. Complex administrative relationships. In area where management responsibilities overlap (i.e., mixed land ownership), management units and/or agencies need to work with one another on coordination of RFDs and CEA.

Summary

Levels of land management decisions. Decisions about managing oil and gas resources on public lands are made at two general levels. Plan level decisions include leasing decisions that result in issuance of oil and gas leases with the expectation that some exploration or development activity may be proposed some time in the future. Project level decisions encompass exploration and development decisions that result in ground disturbance with wells, roads, and associated infrastructure.

Environmental (NEPA) analysis must include cumulative effects analysis at both decision levels. Analysis at each level of oil and gas decision-making is based on technical information associated with the proposed action (leasing or exploration/development), as well as information about other reasonably foreseeable future actions in and near the area of the proposal.

Source of technical information for analysis for leasing decisions. In the case of leasing actions (plan level decisions), an RFD scenario provides information about the type and level of oil and gas activity and associated disturbance that could occur in a specified area. The scenario is presented in a professionally prepared technical report. The RFD is unconstrained by management-imposed conditions since it is based primarily on geology and historical exploration and development activity. It provides information necessary to analyze long-term and/or widespread effects that could result from possible exploration and/or development activities on oil and gas leases issued in implementation of a leasing decision.

Sources of technical information for analysis for exploration/development decisions. In the case of exploration and/or development actions (project level decisions), APD(s) and/or development plans provide technical information about the proposed action. Technical information about a proposed exploration or development action is similar to that provided in an RFD for a leasing decision, but is much more detailed and definitive and not speculative like the RFD.

Factors for effective cumulative effects analysis. Effects analysis must address direct, indirect, and cumulative effects of proposed leasing and exploration/development proposals. Direct or indirect environmental effects from a proposed oil and gas action could be minimal. But cumulative effects from both a proposed oil and gas action, along with effects from other reasonably foreseeable future actions in the area, including other unrelated oil and gas activities, could be significant.

Clearly defining the scope and scale of potential environmental consequences of a proposed oil and gas action, along with identifying other reasonably foreseeable future actions, is the key to effective cumulative effects analysis. Determining the appropriate scope and scale of analysis depends on a well-defined proposed action, identification of resources that could be affected by the action, and issues about the proposed action identified in the scoping process.

Definition of cumulative effects boundaries. The spatial and temporal boundaries of cumulative effects from an action are likely to vary for different affected resources or socioeconomic areas. Different areas of cumulative effects for different affected resources should be clearly identified on maps. Reasons for the selection of boundaries should be clearly documented in the analysis. Cumulative effects boundaries should be based on the occurrence and nature of the affected resource and the distance or time over which effects may remain significant, not on land ownership or administrative jurisdictions.

Limitations on exploration/development in alternatives to a proposed action. Effects analysis for leasing actions is based on information about potential oil and gas exploration and production identified and described in the RFD. A proposed leasing action and each of its alternatives may have different types and levels of constraints or conditions on oil and gas activities for mitigation of effects from those activities. Mitigation through the use of lease stipulations may limit access to part(s) of the area covered by the RFD. In such cases, each alternative – and possibly the final leasing decision – may have associated activity projections different from the RFD. The scope and scale of CEA for each alternative in such cases should be determined based on the activity projection associated with the alternative if it varies from the RFD.

Accomplishing thorough cumulative effects analysis despite limited options for decisions. Mixed land ownership or administrative jurisdictions, as well as active leases, generally complicate environmental analyses for both leasing (plan level) and exploration/development (project level) actions. Such complicating circumstances may narrow options for a land manager in making decisions about leasing or exploration/development. Despite narrow options for decisions, the environmental analysis, including cumulative effects analysis, for a proposed oil and gas action must still be thorough. With a thorough cumulative effects analysis, both the decision-maker and the public will be able to evaluate the significance of the environmental effects resulting from a proposed action in combination with other reasonably foreseeable future actions.

References

American Petroleum Institute (API),

Canter, L. and S. Atkinson, 1999, Cumulative Effects Assessment: Environmental Impact Training sponsored by Environmental Protection Agency, August 10-12, 1999, Norman, Oklahoma. 200+ pgs.

Code of Federal Regulations, NEPA: 40 CFR 1508.7.

Council on Environmental Quality, 1997, Considering Cumulative Effects Under the National Environmental Policy Act: Washington, D.C., 150+ pgs.

Environmental Protection Agency, 1999, Consideration of Cumulative Impacts in EPA Review of NEPA Documents: EPA 315-R-99-002, 22 pgs.

Environmental Protection Agency, 1999, Cumulative Effects Assessment (Training Document), August 1999.

Federal Leadership Forum, 1999, Improvements to the oil and gas NEPA process; Report of the Core Team, Air Quality Technical Subcommittee, and Blueprint Team, 61 pp.

Federal Leadership Forum, 2000, Supplemental National Environmental Policy Act guidelines for oil and gas activities on public land; Report of the Core Team, 10 pp.

Federal Leadership Forum, 2001, Framework for regional resource assessments; Report of the Core Team and Regional Assessment Sub-team, 10 pp.

Gautier, D.L., G.L. Dolton, K.I. Takahashi, and K.L. Varnes, Editors, 1996; 1995 National Assessment of the United States Oil and Gas Resources--Results, Methodology, and Supporting Data; U.S. Geological Survey Digital Data Series DDS-30, Release 2, Washington, D.C.

Klett, T.R., T.S. Ahlbrandt, J.W. Schmoker, and G.L. Dolton, 1997, Ranking of the World's Oil and Gas Provinces by Known Petroleum Volumes; U.S.Geological Survey Open File Report 97-463, Washington, D.C.

Peterson, E.B., Chan, Y.H., Peterson, N.M., Constable, G.A., Caton, R.B., Davis, C.S., Wallace, R.R., and G.A. Yarranton, 1987, Cumulative Effects Assessment in Canada: An Agenda For Action And Research: Canadian Environmental Assessment Research Council (CEARC), Hull, Quebec, Canada. 65 pp.

Reeve, A., and P. Krawczak, 1995, Fontenelle Natural Gas Infill Drilling Projects Draft Environmental impact Statement – Technical Report – Integrating Remote Sensing and GIS with Bayesian Probability Models of Wildlife Habitat to Evaluate Cumulative Impacts: PIC Technologies, Inc., Denver, Colorado.

Rumrill, J.N., and L.W. Canter, 1997, Cumulative effects – Addressing future actions in cumulative effects assessment: Beech Tree Publishing, *Project Appraiser*, Vol. 12, No. 4, p. 207-218.

USDA Forest Service Region One, 1993, Our Approach to Oil and Gas Leasing Decisions – Analysis and Documentation (July 1993).

USDA Forest Service Region One, 2001, Cumulative Effects Refresher Course (January 2001).

USDA Forest Service Region 2, 1992, Guidelines to the Oil and Gas Leasing Analysis Process, DRAFT, 09/02/92, V. Conducting the leasing analysis C. Conduct reconnaissance, p. 14.

USDA Forest Service, 1992, Environmental Policy and Procedures Handbook 1909.15-92-1, 9/21/92, 1909.15 Ch. 10, 15.1, p. 16 of 19.

USDA Forest Service, 1994, Suggested Format for Oil and Gas Potential Report and RFD, April 19, 1994.

USDA Office of General Council, 1995, NEPA Course 3.4, April/May 1995, Scope: Impacts, pp. 115-128.

USDI Bureau of Land Management, White River Resource Area, 1985; Piceance Basin Resource Management Plan and Environmental Impact Statement, Call No. TD-195.o4 P53.

USDI Bureau of Land Management, Buffalo Field Office, 1999; Wyodak Coalbed Methane Project, Final Environmental Impact Statement.

USDI Bureau of Land Management, Pinedale Field Office, 2000; Final Environmental Impact Statement for the Pinedale Anticline Oil and Gas Exploration and Development Project, Sublette County, Wyoming.

USDI Bureau of Land Management, 1970, Planning for Fluid Mineral Resources: BLM Handbook H-1624-1 Release 1-1583.

USDI Bureau of Land Management, 1986, Supplemental Program Guidance for Energy and Mineral Resources: BLM Manual 1624.2, Rel. 1-1471, U.S. Department of Interior, Bureau of Land Management, November 14, 1986.

USDI Bureau of Land Management, 1988, National Environmental Policy Act Handbook H-1790-1, Release 1-1547, Washington, D.C.

USDI Bureau of Land Management, 1990, BLM Planning for Fluid Mineral Resources, Handbook H-1624-1, 05/07/90, Chapter III – Conducting and documenting the analyses of factors, B. Procedural guidance, p. III-1-8.

USDI Bureau of Land Management, 1993, BLM Handbook for Energy and Mineral Resources Assessment H3031-1, DRAFT, Revised 07/15/93, V. Classification C. Reasonably Foreseeable Development Scenario, p. 44.

USDI Bureau of Land Management, 1994, Guidelines for Assessing and Documenting Cumulative Impacts, April 1994, ("Butterfly Document"), 70 pp.

USDI Bureau of Land Management, 1997, Wildlife Chapter Planning Aids For Cumulative Impacts Assessment (Oil and Gas Development/Wildlife); Prepared by The Cumulative Impacts Task Force (CITF), Cheyenne, Wyoming, January 7, 1997, 21 pp. with attachments.

USDI Bureau of Land Management, 2000, Land Use Planning Handbook; BLM Handbook H-1601-1 – Land Use Planning Handbook.

USDI Bureau of Land Management, 2000, Land Use Planning Manual; BLM Manual 1601 – Land Use Planning.

USDI Bureau of Land Management, 1999, Overview of BLM's NEPA Process, National Training Center Course Number 1620-02, June 1999.

Williamson, S.C., 1993, Cumulative Impacts Assessment and Management Planning: Lessons Learned to Date, *in* Hildebrand, S.G., and Cannon, J.B., editors, Environmental Analysis – The NEPA Experience, Lewis Publishers, Inc., Boca Raton, Florida, pgs. 391-407.

APPENDICES

APPENDIX A

Acronyms and Glossary of Terms

Acronyms

APD	Application for Permit to Drill
BLM	Bureau of Land Management
CEA	Cumulative Effects Analysis
CEQ	Council on Environmental Quality
DN	Decision Notice
DR	Decision Record
EA	Environmental Assessment
EIS	Environmental Impact Statement
FLF	Federal Leadership Forum
IDT	Interdisciplinary Team
LRMP	Land and Resource Management Plan
NEPA	National Environmental Policy Act
RFD	Reasonably Foreseeable Development Scenario
RFFA	Reasonably Foreseeable Future Actions
RMP	Resource Management Plan
ROD	Record of Decision

Terms

BASELINE: A benchmark from which the cumulative effects of the proposed action and reasonable alternatives can be prepared. Generally, the current environmental condition (i.e., affected environment) is used as the benchmark for comparing the environmental effects of the alternatives. If the affected environment has already been seriously degraded, a representation of the environment prior to its being degraded can be used as the benchmark.

BASELINE RFD: Oil and gas development scenario based primarily on geology and unconstrained by management-imposed conditions.

DEVELOPMENT: Drilling program to delineate an oil and/or gas reservoir and assess quantity, quality, and producibility of oil and/or gas. Development is an intermediate stage between exploration and production of a reservoir. Reserves are considered "developed" only after necessary production equipment has been installed or when the cost to do so is relatively minor. Developed reserves can be subcategorized as "producing" or "non-producing".

CONNECTED ACTIONS: Closely related actions that automatically trigger other actions, that cannot or will not proceed unless other actions are taken previously or simultaneously, and/or that are interdependent parts of a larger action and depend on the larger action for their justification.

EFFECTS/IMPACTS: Consequences of an action**. Direct effects** - are caused by the action and occur at the same time and place. **Indirect effects** - are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. (CEQ uses "effects" and "impacts" synonymously in its regulations).

ENVIRONMENTAL EFFECTS: Consequences of an action on natural resources, ecosystems, and/or aesthetic, health, historic, cultural, economic, and/or social resources. The term "environmental effects" is used synonymously with the term "environmental impacts" in this guidance.

EXPLORATION: To look for the occurrence of an economic mineral deposit through the use of tools such as geophysics, drill rigs, logs, drill hole cuttings, maps, etc using the information given from the use of these tools to locate and recover the mineral.

GUIDANCE: Any type of written communication or instruction that transmits objectives, goals, constraints or any other direction that aids/helps in the preparation of land use documents/plans.

GUIDELINES: Is a standard, criterion, threshold, optimum, or other desirable level for an indicator that provides a basis for judging whether an effect is beneficial or adverse. Guidelines are based on institutional, public, or technical recognition.

INTERDEPENDENT ACTION(S): Those actions that have no significant, independent utility apart from the action that is under consideration. Interdependent actions depend on the larger action for their justification. (Example: The service road along a pipeline right-of-way is <u>not a part of</u> the actual pipeline, but the road has no reason for being there without the pipeline.)

INTERRELATED ACTION(S) - Those actions that are an integral part of a larger action and are justified on the basis of the overall action. (Example: The telephone pole, or harness tower, <u>are part of</u> a powerline, even though they are not the actual transmission cable itself. Their impacts have to be considered as part of the larger action.)

LAND USE PLAN (LUP): A plan that reflects an analysis of activity systems and a carefully studied estimate of future land requirements for expansion, growth control, and revitalization or renewal. The plan shows how development in the area should proceed in the future to insure the best possible physical environment for living, the most economic and environmentally sensitive use of land, and the proper balance in use. The LUP embodies a proposal as to how land should be used in the future, recognizing local objectives and generally accepted principles of health, safety, convinces, economy and general living amenities.

MITIGATION: Includes **a)** avoiding the impact altogether by not taking a certain action or parts of an action, **b)** minimizing impacts by limiting the degree or magnitude of the action and its implementation, **c)** rectifying the impact by repairing, rehabilitating, or restoring the affected environment, **d)** reducing or

eliminating the impact over time by preservation and maintenance operations during the life of the action, and **e)** compensating for the impact by replacing or providing substitute resources or environments.

MODEL: A working hypothesis or precise simulation, by means of description, statistical data, or analogy, of a phenomenon or process that cannot be observed directly or that is difficult to observe directly; a representation of the relationships that define a situation under study. Models may be derived by various methods; by computer, from stereo photographs, or by scaled experiments.

OIL AND GAS RESOURCE ASSESSMENT: General term used herein to describe the set of scientific ideas and process whereby oil, gas, and natural gas liquid (NGL) resources are technically described, classified, and analyzed, and their magnitude evaluated according to their geologic occurrence and characteristics. This type of resource inventory may also include associated fluid minerals, i.e., carbon dioxide, helium, hydrogen sulfide, and geothermal resources.

OIL AND GAS PLAY: Set of known or postulated oil and/or gas accumulations sharing similar geologic, geographic, and temporal properties, such as source rock, migration pathway, timing, trapping mechanism, and hydrocarbon type. (Gautier and others, 1996.)

PETROLEUM PROVINCE: Spatial entity with common geologic attributes. A province may include a single dominant structural element (e.g., basin or fold belt), or a number of contiguous related petroleum geologic elements. Province boundaries are drawn as logically as possible along natural geologic boundaries, as interpreted from both surface and subsurface geologic mapping, although in some places (e.g., open ocean), they are located arbitrarily. (Klett and others, 1997.)

PIECEMEALING: Refers to focusing on or analyzing impacts in small parts/pieces (a piece at a time), rather than looking at impacts in a larger view or broader scale. Piecemealing is sometimes used synonymously with "incremental impacts" in contrast to "cumulative impact".

PRODUCTION: The amount of organic material (mineral) produced by biological activity in an area or volume and the economic extraction of that organic material (mineral).

REASONABLENESS: Actions or alternative actions that can be implemented in a manner consistent with the intended purpose of the action, that can be implemented consistent within the scope of the Federal agency's legal authority and jurisdiction, and that are economically and technologically feasible.

RESOURCE ASSESSMENT: Evaluation of the occurrence**,** condition, and trend of a natural resource (e.g., air, biological, water, etc.) or land use (e.g., oil and gas development, various recreation activities, livestock grazing, etc.), over a geographic area, unrestricted by jurisdictional or institutional boundaries, and including the factors affecting or affected by those conditions or trends.

RULE OF REASON: The courts have adopted criteria for applying "rule of reason" as stated in Sierra Club v. Corps of Engineers, 701 F.2d 1011 (2d Cir 1983), "…the impact statement must set forth sufficient information for the general public to make an informed evaluation, ...and for the decision-maker to consider fully the environmental factors involved and to make a reasoned decision after balancing the risks of harm to the environment against the benefits to be derived from the proposed action." (Mandelker, page10-30, footnote 14.)

SCOPE: Consists of a range of actions (connected, cumulative and similar), alternatives (no action, other reasonable courses of action and mitigation measures), and impacts (direct, indirect or cumulative) to be considered in an EIS. This guidance considers scope of cumulative effects analysis for oil and gas activities to be defined by the level of detail, extent, range, and type of information required for effective planning and project level analyses.

SCOPING: A process defined, according to the provision of the National Environmental Policy Act, as an early and open process for determining the scope of the issues to be addressed and for identifying the significant issues related to a proposed action.

SIGNIFICANCE: NEPA requires considerations of both context and intensity. **Context** - means that the significance of an action just be analyzed in several contexts such as society as a whole (human, national), the affected region the affected interests, and locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather in the world as a whole. Both short- and long-term effects are relevant. **Intensity** - This refers to the severity of the impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. Whether the action is related to other actions with individually insignificant by cumulative significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment.

STANDARDS AND GUIDELINES: The rules and limits governing actions, as well as the principles specifying the environmental conditions or levels to be achieved and maintained.

SUSTAINABILITY: To allow or admit action to occur for the purpose of harvesting/producing of a resource that can be maintained at a given intensity of management for an extended period.

TREND: Statistically detectable (traceable) patterns of change (cumulative effects) occurring over the course of time and affecting and continuing to affect the environment because of actions taken; traceable (statistically detectable) cumulative effect patterns of change occurring over time, having impacted and continuing to impact the environment as a result of actions taken.

APPENDIX B

Recognition of Need for Collaboration Among Agencies and Identification of Institutional Barriers

The greatest benefit of NEPA is its provision of a framework for collaboration between Federal agencies and those individuals and groups subject to the environmental effects of agency decisions (Canter and Atkinson, 1999). Williamson (1993) noted the combined objectives of CEA and resource management planning are to: 1) generate logical, scientific, and timely problem (cumulative effects) analysis; 2) bring agencies together collaboratively to develop an overall management plan and pro-active, measurable resource goals; and 3) meld those results into comprehensive management blueprints for the ecosystem(s) of concern. While these are noble objectives, we must also remember that in the "real world" agencies function in the atmosphere of their respective statutory and regulatory directives and mandates (i.e., missions).

Even though Federal agencies have different missions, all are subject to the requirements of the National Environmental Policy Act (NEPA). NEPA requires environmental analysis of major Federal actions significantly affecting the quality of the human environment. With varying histories, policies, missions, and terminology, agency interpretations of the NEPA process vary. Consequently, the steps agencies follow in performing analyses, conducting public involvement, and developing documentation may also vary. Public comment, court interpretation, policy direction, and regulatory requirements vary by agency and influence approaches to the NEPA process.

Different agency interpretations of NEPA requirements and CEQ regulations influence their concepts of cumulative effects evaluation and Reasonable Foreseeable Development Scenarios (RFDs) for oil and gas. The "RFD" concept comes from the CEQ approach to "reasonably foreseeable future actions." The process of developing Reasonable Foreseeable Development Scenarios for oil and gas has been formalized in the Bureau of Land Management, U.S. Forest Service, and National Park Service as a technical evaluation and report on future development of oil and gas resources. However, these Federal agencies currently have similar, but not entirely consistent approaches to developing Reasonable Foreseeable Development Scenarios for oil and gas.

For information and comparative purposes, a brief statement of the mission for agencies involved in the Federal Leadership Forum (FLF) follows:

EPA. The mission of the U.S. Environmental Protection Agency is to protect human health and to safeguard the natural environment-air, water, and land-upon which life depends.

BLM. The mission of the Bureau of Land Management is to sustain the health, diversity, and productivity of the Public Lands in a multiple-use context for the use and enjoyment of present and future generations.

USFS. The mission of the U.S. Forest Service is to achieve quality land management of national forests and grasslands under the sustainable multiple-use management concept to meet the diverse needs of people.

NPS. The mission of the National Park Service is to preserve, unimpaired, the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations.

USFWS. The mission of the U.S. Fish and Wildlife Service is to conserve, protect, and enhance fish and wildlife and their habitats for the continued benefit of the American people.

BIA. The mission of the Bureau of Indian Affairs is to enhance the quality of life, promote economic opportunity, and carry out the responsibility to protect and improve the trust assets of American Indians, Indian tribes, and Alaska Natives.

DOE – Oil and Gas Technology Program. The mission of the DOE Oil and Gas Technology Program is to promote policies and activities to enhance the efficiency and environmental quality of domestic oil and natural gas exploration, recovery, processing, transport, and storage, aimed at helping our nation maintain reliable and economic oil and gas supplies and enhancing U.S. technological leadership world-wide while protecting the environment.

Institutional Barriers

Regardless of the amount of care, diligence, and expertise that goes into the planning and preparation of a cumulative effects analysis, some barriers generally remain to a complete understanding and appreciation of processes within agencies. Although these barriers are often considered detrimental, and are usually frustrating to those individuals trying to work within a bureaucratic system, we must also understand the nature of these problems to be successful in dealing with them. Most barriers exist as a result of some past attempt to deal with a problem that arose, or in a misguided attempt to ease a process or simplify a task.

General Barriers

A lot of issues and concerns that really have very little to do with the analysis of environmental impacts for any specific action still have a collateral effect on the manner in which agencies address actions in front of them. Some of these issues and concerns function to create hurdles, or barriers, to the environmental analysis process. The following is a brief description of some of these hurdles and barriers:

- Political Boundaries. There is seldom any direct connection between the physical environment and political boundaries, but these boundaries often do have a significant effect on the statutory and regulatory authority of agencies. Sometimes these boundaries pose a hurdle to adequate analysis of cumulative environmental effects.

- Philosophical Impasses. There may be several ways to accomplish a particular task. Every administrator has his/her own preferred approach to completing a task, and this approach may not jive with the preferred approach of a collaborating administrator. While these differences

are often worked through, sometimes they become a true impasse requiring "outside" intervention or mediation to resolve.

- Differences in Agency Mission. Every government agency, and most other organizations, has different statutory authorities and/or organizational missions under which they operate. Sometimes these missions are not in synch, or even run parallel. Occasionally they are even in opposition. Lack of understanding of, and appreciation for, the other party's mission sometimes occurs. These situations may force a barrier to understanding between the participants. Even though federal agencies have different missions, all agencies are subject to the requirements of NEPA, and all agencies are responsible for complying with federal and state environmental laws and regulations.

- Differences in Agency Culture-Even when organizations have synchronous missions, they still typically develop a unique internal and external culture. The differing views of agency cultures and their customers sometimes create communication barriers, different operational "comfort zones," and territorial "turf" struggles among entities.

- Legal Constraints and Court Decisions-Legal interpretations (as provided by organizational legal counselors) and the outcome of administrative rulings and court decisions often predispose the operational positions of agencies and organizations. Legal opinions often vary, and in some cases, even court decisions can vacillate or contrast by jurisdiction. All of these outcomes can have an effect on environmental analysis.

- Technological Limitations-Not everything that is environmentally desirable is technically feasible, or economically sound. Differences of opinion regarding technical and economic feasibility often lead to communication hurdles and barriers. If these differences of opinion become too severe, they can create a polarization and disintegration of trust among collaborators.

- Fiscal / Budgetary Limitations-In many cases, the overriding factor in accomplishing environmentally sound management is simply having the financial means to do the job. Lacking unlimited funds, agencies/organizations commonly settle for some level of task accomplishment less than 100% environmentally adequate. This, too, can lead to the development of dissension and communication barriers.

Spatial / Geographic Boundary Barriers

Even though spatial boundary considerations are usually straightforward, there are sometimes difficulties and barriers associated with defining such boundaries. Canter and Atkinson (1999) have presented some examples of these barriers:

1. The lack of pertinent information;
2. The need for different boundaries for different resource zones and impact types;
3. Drawing the line on where effects stop and who settles disputes;
4. Incomplete understanding of linkages that may expand or confine the analysis area;
5. An incomplete knowledge or understanding of the analytical problem; and
6. Determining a balance between the environmental components, boundaries, and jurisdictions of the relevant controlling bodies.

Temporal Boundary Barriers:

Difficulties can occur in delineating the temporal boundaries for a CEA. They may include (Canter and Atkinson, 1999):

1. Defining where "short-term" ends and "long-term" begins;
2. Determining what constitutes a reasonable foreseeable future action, or a reasonable foreseeable development scenario, especially for non-Federal proponents;
3. Correlating old and current data for comparison (past data may be nonexistent, scarce, incomplete, or inaccurate);
4. Possible absence of fundamental scientific and historical data;
5. Determining a proper balance between the short-term interests (i.e., 10-20 years) of planning authorities and long-term sustainability of resources and interests;
6. Recognizing that appropriate analytical boundaries may shift over time;
7. Insufficient time to conduct the CEA; and
8. Uncertainty and lack of confidence in the predictions.

APPENDIX C

Criteria for Determining RFD Adequacy

A reasonable foreseeable development scenario (RFD) for oil and gas is a model (scenario) of anticipated oil and gas exploration and/or development activity (leasing, exploration, development, production, and abandonment) for a defined area and period of time. The scenario is based primarily on geology (potential for oil and gas resource occurrence) and past and present oil and gas activity. The scenario also addresses other significant factors such as economics, technology, physical limitations on access, existing or anticipated infrastructure, and transportation.

A reasonable foreseeable development scenario (RFD) for oil and gas:

- Is a reasonable technical and scientific approximation of anticipated oil and gas activity based on the best available information.
- Includes all interrelated and interdependent oil and gas activities in a defined area regardless of land ownership or jurisdiction.

Function of an RFD Scenario

- Is presented in a technical report that may be subject to professional peer review. The report will be included in the administrative record of any analysis for which it is used. Such reports may be utilized as part of expert testimony or as a technical exhibit in legal proceedings.
- Is integral to identification and assessment of a proposed action, alternatives to the proposed action, potential effects under each alternative, and cumulative effects.
- Serves as a basis for review and evaluation of existing management direction, analysis for a land management plan or plan amendment, or analysis for a project-specific proposed action.

Recommended Criteria for Adequate RFD Scenario

An RFD report should include:

- Background and framework for activity projections
  - Geologic setting (subsurface), with particular reference to character of petroleum province, identified oil and gas plays, and characteristics of reservoirs, traps, source rocks, seals, and hydrocarbon migration
  - Trends in exploration and development activities (including leasing, drilling, and completion rates)
  - Location and nature of existing oil and gas fields (history, life expectancy, and future development plans, including tertiary recovery)
  - Number and location of existing oil and gas wells
  - Information from existing oil and gas assessments (especially USGS assessments) pertinent to area of investigation

- Discussion and illustration of potential for occurrence of oil and gas resources based on resource assessments and other pertinent information sources [6]
- Designation of exploration and development potential (high, medium, low) for defined areas
- Price projections for oil and gas
- Estimated number, nature, and density of wells that could be drilled within specified area(s)
  - Number of exploration wells and number of those that might be completed for production
  - Number of development (producing) wells and estimated duration of production
  - Average depths of wells
  - Average amount of disturbance per well (pad + road) (Note: Pad disturbance dependent on well depth and completion practices. Long-term pad disturbance dependent on extent of partial reclamation of exploration site when well is completed for production.)
  - Type of production (oil, gas, oil and gas, water, injection)
  - Discussion of suitability and likelihood of slant, directional, or horizontal drilling and numbers of wells per pad (if applicable)
- Average amount of surface disturbance per well (pad + road) and/or area-wide disturbance
  - Pad acres (Note: Pad disturbance is dependent on well depth, completion practices, and number of wells per pad. Long-term pad disturbance is dependent on extent of partial reclamation of exploration site when well is completed for production.)
  - Road miles and/or acres
- Other disturbance factors depending on nature of projected activity and/or issues identified through scoping
  - Air emissions (type and amount)
  - Water production (quantity and quality)
  - Sound levels
  - Visuals/aesthetics (type of equipment, e.g. pump jacks vs. Christmas trees)
- Estimated number of existing wells that will be plugged, abandoned, and reclaimed
- Estimated amount of surface disturbance associated with well abandonments to be reclaimed
  - Acres of pads reclaimed
  - Miles/acres of roads reclaimed
- Estimated production (by well and cumulative) with distinction for oil, gas, natural gas liquids and water
- Identification of mineral estates under different ownerships and estimation of amount (percent) of activity likely to occur on lands under different management authorities (different federal agencies, state, and private)

[6] Potential information sources include U.S. Geological Survey (geology, oil and gas assessments), Department of Energy (technology), Energy Information Agency (supply and demand, activity, and price trends), state geological surveys (geology, activity and price trends), state oil and gas commissions (well and field data), academic institutions, professional associations, and industry.

- Description of likely production facilities
  - Production equipment on wellsites (separators, dehydrators, storage tanks, production pits, etc.)
  - Production equipment on separate sites (separators, dehydrators, storage tanks)
  - Gas processing facilities (metering houses, compressors)
  - Pipelines
  - Transmission lines
  - Disposal facilities for production wastes and by-products (such as produced water, hydrogen sulfide, carbon dioxide)
  - Enhanced tertiary recovery facilities
  - Water source wells

Assumptions made in arriving at the type and level of projected activity should be clearly stated and references to sources of information clearly identified.

Background: Origin and application of the RFD concept

Over time, the need for evaluating anticipated future actions, specifically future development, evolved into a formalized process for projecting future oil and gas activities in both the BLM and Forest Service. The term is recognized formally in reference to oil and gas in both the BLM and Forest Service.

References

BLM Handbook for Energy and Mineral Resources Assessment H3031-1, DRAFT, Revised 07/15/93, V. Classification C. Reasonably Foreseeable Development Scenario, p. 44.

BLM Planning for Fluid Mineral Resources, Handbook H-1624-1, 05/07/90, Chapter III – Conducting and documenting the analyses of factors, B. Procedural guidance, p. III-1-8.

USFS Region 2 Guidelines to the Oil and Gas Leasing Analysis Process, DRAFT, 09/02/92, V. Conducting the leasing analysis C. Conduct reconnaissance, p. 14.

USFS Suggested Format for Oil and Gas Potential Report and RFD, 04/19/94.

USDA Forest Service Region One, 1993, Our Approach to Oil and Gas Leasing Decisions – Analysis and Documentation, Appendix 5, July 1993.

APPENDIX D

Principles of Cumulative Effects Analysis

Source: Council on Environmental Quality, 1997, Considering Cumulative Effects Under the National Environmental Policy Act; Executive Office of the President, Washington, D.C., p. 8.

Cumulative effects are caused by the aggregate of past, present, and reasonably foreseeable actions.

The effects of a proposed action on a given resource, ecosystem, and human community include the present and future effects added to the effects that have taken place in the past. Such cumulative effects must also be added to effects (past, present, and future) caused by all other actions that affect the same resource.

Cumulative effect are the to effect, including both direct and indirect effects, on a given resource, ecosystem, and human community of all actions taken, no matter who (federal, nonfederal, or private) has taken the actions.

Individual effects from disparate activities may add up or interact to cause additional effects not apparent when looking at the individual effects one at a time. The additional effects contributed by actions unrelated to the proposed action must be included in the analysis of cumulative effects.

Cumulative effects need to be analyzed in terms of the specific resource, ecosystem, and human community being affected.

Environmental effects are often evaluated from the perspective of the proposed action. Analyzing cumulative effects requires focusing on the resource, ecosystem, and human community that may be affected and developing an adequate understanding of how the resources are susceptible to effects.

It is not practical to analyze the cumulative effects of an action on the universe; the list of environmental effects must focus on those that are truly meaningful.

For cumulative effects analysis to help the decision maker and inform interested parties, it must be limited through scoping to effects that can be evaluated meaningfully. The boundaries for evaluating cumulative effects should be expanded to the point at which the resource is no longer affected significantly or the effects are no longer of interest to affected parties.

Cumulative effects on a given resource, ecosystem, and human community are rarely aligned with political or administrative boundaries.

Resources typically are demarcated according to agency responsibilities, county lines, grazing allotments, other administrative boundaries. Because natural and sociocultural resources are not usually so aligned, each political entity actually manages only a piece of the affected resource or ecosystem. Cumulative effects analysis on natural systems must use natural ecological boundaries and analysis of human communities must use actual sociocultural boundaries to ensure including all effects.

Cumulative effects may result from the accumulation of similar effects or the synergistic interaction of different effects.

Repeated actions may cause effects to build up through simple addition (more and more of the same type of effect), and the same or different actions may produce effects that interact to produce effects that interact to produce cumulative effects greater than the sum of the effects

Cumulative effects may last for many years beyond the life of the action that caused the effects.

Some actions cause damage lasting far longer than the life of the action itself (e.g., acid mine drainage, radioactive waste contamination, species extinctions). Cumulative effects analysis needs to apply the best science and forecasting techniques to assess potential catastrophic consequences in the future.

Each affected resource, ecosystem, and human community must be analyzed in terms of its capacity to accommodate additional effects, based on its own time and space parameters.

Analyst tend to think in terms of how the resource, ecosystem, and human community will be modified given the action's development needs. The most effective cumulative effects analysis focuses on what is needed to ensure long-term productivity or sustainability of the resource.

APPENDIX E

Direction on Cumulative Effects – Summaries of Selected Documents

CEQ Guidance

Council on Environmental Quality, 1997, Considering Cumulative Effects Under the National Environmental Policy Act: Washington, D.C.. 150+ pgs.

This handbook is a framework document and is an excellent reference source for agency staffs to use when writing or reviewing a NEPA document. It provides the user an effective introduction to cumulative effects (CE) analysis (CEA).

The handbook begins with an introduction to the cumulative effects problem and its relevance to the NEPA process. The introduction defines eight general principles of cumulative effects analysis and lays out ten specific steps that the NEPA practitioner can use to analyze cumulative effects. The next three chapters parallel the environmental impact assessment process and discuss analyzing cumulative effects while (1) scoping, (2) describing the affected environment, and (3) determining environmental consequences. Each component in the NEPA process is the logical place to complete necessary steps in cumulative effects analysis, but practitioners should remember that analyzing for cumulative effects is an iterative process. Specifically, the results of cumulative effects analysis can and should contribute to refining alternatives and designing mitigation. Table E-1 in this document illustrates how the principles of cumulative effects analysis can be the focus of each component of the NEPA process. Chapter 5 discusses the methods, techniques, and tools needed to develop a study-specific methodology and actually implement cumulative effects analysis. Appendix A in the document provides summaries of 11 of these methods.

Also found in the document are some other references and helpful examples to aid the potential user.

EPA Guidance

Environmental Protection Agency, (year), Consideration of Cumulative Impacts in EPA Review of NEPA Documents: EPA 315-R-99-002, 22 pgs.

Section 4.1, pg. 4 - In reviewing cumulative impacts analysis, EPA reviewers should focus on the specific resources and ecological components that can be affected by the incremental effects of the proposed action and other actions in the same geographic area. EPA reviewers should determine whether the NEPA analysis has identified the resources and ecosystem components cumulatively impacted by the proposed action and other actions.

Pg.6 - To ensure the inclusion of the resources that maybe most susceptible, cumulative impacts can be anticipated by considering where cumulative effects are likely to occur and what actions would most likely produce cumulative effects.

Section 4.2 - Geographic Boundaries and Time Period, pg. 7. Geographic boundaries and time periods used in cumulative impacts analysis should be based on all resources of concern and all of the actions that may contribute, along with the project effects, to cumulative impacts. Generally, the scope of analysis will be broader that the scope of analysis used in assessing direct or indirect effects.

Pg. 8 - EPA reviewers should determine whether the NEPA analysis has used geographic and time boundaries large enough to include all potentially significant effects on the resources of concern. The NEPA document should delineate appropriate geographic areas including natural ecological boundaries, whenever possible, and should evaluate the time period of the project's effects.

Pg. 10 - Ultimately, the scope of the analysis will depend on an understanding of how the effects are occurring in the assessment area.

Section 4.3 - Past, Present, and Reasonably Foreseeable Future Actions. - EPA reviewers should determine whether the NEPA document considered all past, present, and future actions that contribute to significant cumulative effects on the resources of concern. The analysis should include the use of trends information and interagency analyses on a regional basis to determine the combined effects of past, present, and future actions.

Pg. 12 - The critical question is "What future actions are reasonably foreseeable?". Court decisions on this topic have generally concluded that reasonable foreseeable future actions need to be considered even if they are not specific proposals. The criterion for excluding future actions is whether they are "speculative."

Section 4.4 Describing the Condition of the Environment - Pg. 13. The NEPA analysis should establish the magnitude and significance of cumulative impacts by comparing the environment in its naturally occurring state with the expected impacts of the proposed action when combined with the impacts of other actions. Use of a "benchmark" or "baseline" for purposes of comparing conditions is an essential part of any environmental analysis.

Pg.14. For the evaluation of the environmental consequences to be useful, it is important that the analysis also incorporate the degree that the existing ecosystem will change over time under each alternative.

BLM Guidance

Bureau of Land Management, April 1994, Guidelines for Assessing and Documenting Cumulative Impacts, 70 pgs.

This document serves as the Bureau of Land Management's major internal guidance for the preparation of cumulative impact assessments. It is referenced along with the CEQ guidance document on cumulative impact assessment in most major documents as guidance for the analysis content and format. It provides a good description of the principles of the analysis of cumulative impacts in any NEPA document. This guidance document discusses the process of cumulative impact assessment through the major steps of the environmental document preparation process. The importance of beginning the analysis early in the scoping process is emphasized, along with the development of reasonably foreseeable future action

(RFFA) scenarios. Documenting the analysis is discussed in detail, as well as important considerations such as the space considerations relative to determining the boundary of impact consideration.

The BLM guideline document provides the answers to the most frequently asked questions about cumulative impacts as they relate to both environmental assessments (EAs) and environmental impact statements (EISs). Definitions for the major terms used in cumulative impact assessment are provided for the preparer's understanding, and concepts for impact analysis are discussed for both additive and cumulative approaches.

Excellent examples are provided in the appendixes in this document. Samples of RFFAs are provided along with methodology for their use. Appendix C provides summaries of pertinent court cases relative to cumulative impact assessment, along with Board of Interior Land Appeal opinions.

This is a very comprehensive document although somewhat generally written. It provides excellent overall knowledge of the process of cumulative impact assessment as well as how this process fits into the overall steps of NEPA evaluation and documentation. It is not detailed in terms of individual program approaches for cumulative impact analysis, but provides a very useful discussion of all elements of the concept. It provides a very useful overall guidance document for most users who are in the process of cumulative impact assessment.

Bureau of Land Management Cumulative Impacts Task Force (CITF), 1997, Wildlife Chapter Planning Aids for Cumulative Impacts Assessment (Oil and Gas Development/Wildlife): Cheyenne, Wyoming, 21 pgs. with attachments.

This is a compilation that highlights the main features of a cumulative impact analysis (CIA). It should be viewed as an operational aid, or supplemental reference in developing CIAs where potential impacts to wildlife resources are an issue.

This document strongly emphasized coordination among all affected parties in the preparation of CIAs, most specifically on the importance of early informal discussions. Specific topics of discussion include: (1) geographic area; (2) timeframe; and (3) species of concern. Additionally, various methods and approaches for performing a CIA are included. There is considerable discussion about resource information gathering and possible inventory methods. Examples are provided to clarify differences between site-specific NEPA analysis and cumulative impacts analysis. A process model is offered to guide the conduct of a CIA. Various resource information sources pertinent to wildlife in Wyoming are supplied. A glossary defining common CIA terms is provided. Helpful CIA references and applicable Federal laws are listed. The presentation of wildlife data in the NEPA document is discussed. An explanation is included about proponent proposed mitigation and the importance of carrying mitigation commitments into the decision document. The chapter concludes by emphasizing the importance of monitoring the predictions of the analysis as well as the effectiveness of the mitigation.

The document is directed at the wildlife resources as they would be addressed in the NEPA evaluation of oil and gas development activities. The document was prepared for, and therefore focuses on, Wyoming resource values, issues, and concerns.

Bureau of Land Management, 1988, National Environmental Policy Act Handbook H-1790-1, Release 1-1547, Washington, D.C.

This is an excellent reference source that will walk/aid a user or agency in the development of its NEPA documents. It follows the required steps as outlined in the National Environmental Policy Act with definitions of key terms and formats spelled out. It provides very good flow diagrams/charts to follow that will guide the user to the next step in NEPA procedures. It will also give any interested party a clear understanding of what BLM's responsibility is under NEPA.

The handbook provides the user/agency with a list of environmental laws, statutes, and regulations; a guide as to the user/agency responsibilities under NEPA; and a glossary of terms both in-house and outside the BLM.

This document will likely be revised in the future when the new BLM Guidance is published later in the year 2000. However, in the mean time, these are very good guidelines for anyone doing a NEPA document. It may have to be tweaked to fit certain requirements the user/agency might have, but that would not be very hard to do.

Bureau of Land Management, 1970, Planning for Fluid Mineral Resources: BLM Handbook H-1624-1 Release 1-1583.

This handbook is intended for use by the Bureau of Land Management (BLM) specialists involved in preparing planning and associated environmental analysis and documents. It is also intended for use by BLM officials responsible for development, oversight and compliance with Section 202 of the Federal Land Policy and Management Act (FLMPA) and the National Environmental Policy Act (NEPA) within the fluid minerals program.

The purpose of this Handbook originally was to provide guidance on how to comply with the resource management planning requirements set forth in the supplemental program guidance for fluid minerals (BLM Manual section 1624.2). The 1624.2 Manual establishes the fluid mineral determinations that, except under certain specified circumstances, are required in every resource management plan (RMP) prepared by BLM. The BLM manual section 1624.2 also identifies factors that should be analyzed and considered in making fluid mineral determinations.

The Handbook does not clearly distinguish between reasonable foreseeable development analysis as applied to resource management planning and NEPA and project/action specific NEPA. It also is in need of updating of some of the recommended information and data sources.

Bureau of Land Management, 1986, Supplemental Program Guidance for Energy and Mineral Resources: BLM Manual 1624.2, Rel. 1-1471, U.S. Department of Interior, Bureau of Land Management, November 14, 1986.

This BLM manual section sets forth supplemental program guidance for resource management planning for oil and gas resources. The guidance set forth in this manual section applies to all public lands or interests in lands where the disposal of oil and gas resources is under the administration of the Bureau of Land Management, except in those areas where disposal actions are to be taken based on anther agency's plan or environmental analysis.

It defines the required factors to be considered in arriving at oil and gas related land use plan determinations. For example, potential for oil and gas resource occurrence, cumulative impacts of reasonably foreseeable development, and necessity of constraints on development of the resource. Necessary information resources and required data themes are identified in a general manner.

This manual section is adequate as general guidance. However, some of the manual section language is in need of revision to reflect changes stipulated in the Federal Onshore Oil and Gas Leasing Reform Act of 1987.

General References

Canter, L. and S. Atkinson, 1999, Cumulative Effects Assessment: Environmental Impact Training sponsored by Environmental Protection Agency, August 10-12, 1999, Norman, Oklahoma. 200+ pgs.

This is a training manual / handbook about how to prepare CIAs. It contains 14 chapters addressing scoping, assessment methodology, effects considerations, effects monitoring, mitigation of effects, procedural barriers, and examples of CIAs. This is a good reference.

The purpose of this book is to present the state-of-the art of the worldwide practice of cumulative effects assessment (CEA). The emphasis is on principles, procedures, methods, monitoring, and mitigation for cumulative effects. Illustrations from case studies are also included.

The referenced journal articles, reports, paper, and books used in the preparation of this book were identified from computer-based literature searches and contacts with environmental science, legal, and public policy professionals throughout the world. Literature searches of several databases (e.g., Biosis, NTIS, Enviroline, and Water Resources Abstracts, etc.) were conducted in 1992, 1994, and 1996. Professional environmental scientists provided information via questionnaire surveys and contacts at professional conferences and training courses.

Peterson, E.B., Chan, Y.H., Peterson, N.M., Constable, G.A., Caton, R.B., Davis, C.S., Wallace, R.R., and G.A. Yarranton, 1987, Cumulative Effects Assessment in Canada: An Agenda For Action And Research: Canadian Environmental Assessment Research Council (CEARC), Hull, Quebec, Canada. 65 pgs.

This is a Canadian report that documents the review of scientific and institutional aspects of cumulative effects assessment in Canada to identify concerns and research priorities for a representative sampling of natural environments. The report extensively discusses the meaning of cumulative effects and different ways in which relationships can be examined.

Basic functional pathways that contribute to cumulative effects are closely examined and categorized to help in understanding impact cause/effect relationships. Numerous specific examples are offered to illustrate these impact causal relationships. A definition and discussion of the importance of “thresholds” in the context of cumulative effects assessment is also presented. The report also discusses the triad of ecosystem values, research, and management. The report offers some alternative institutional arrangements for responding to perceived cumulative effects. Several large case studies are presented as examples of cumulative effects assessment, and finally, the report sets forth 12 recommendations for dealing with cumulative effect issues in Canada. An extensive reference section is also provided.

APPENDIX F

Examples of Cumulative Effects Analysis – Summaries

Pinedale Anticline Oil and Gas Exploration and Development Project Draft Environmental Impact Statement

Introduction. The cumulative impact analysis (CIA) that was completed for the Pinedale Anticline Oil and Gas Exploration and Development Project Draft Environmental Impact Statement (DEIS) provides an excellent example of a large-scale approach to such evaluations of impact from a Federal project. This document, completed in early 2000, is a good reference for users of these guidelines of an approach to cumulative impact analysis that is considered by many to be a successful evaluation. The following summary of the approach is only that, and the full Chapter V of the DEIS covers the approach to the CIA.

Summary. In Chapter V of the document, potential cumulative effects generated as a result of continued exploration and development of the Pinedale Anticline project are described for each potentially affected resource within a cumulative impact analysis area (CIAA). These CIAAs were defined by BLM and the cooperating agencies for each resource with public involvement. These CIAAs cover different geographic areas depending on the specific resource being evaluated. Evaluation of potential effects considers incremental effects that may occur from the proposed project (roughly equivalent to this report's definition of RFD) in addition to effects from past, present and reasonably foreseeable development (equivalent to rfd in this report) within each of the CIAAs. RFD is defined as those future actions that have been committed to or that are known proposals that could take place within the next 10-15 years within the CIAAs. These CIAAs are mapped and described in the document.

Commentary. The approach to cumulative impact analysis presented in the DEIS presents a somewhat new and different approach as partially defined by input from early coordination between BLM and EPA as well as later efforts of the combined agencies of the Federal Leadership Forum. Agency reviewers have commended the BLM for this approach and the early involvement of the agencies and the public in defining the cumulative impact areas and the effects of project alternatives on these potentially affected resources. This is one of the latest approaches to cumulative impact analysis in an EIS and is considered one of the better approaches presented in recent documents. It should be very helpful as a successful example.

"RFD" as used in the Pinedale Anticline DEIS follows the definition of "rfd" as defined in this report (RFD/CEA Team Report). There is a separate write-up in the Pinedale Anticline DEIS that defines the "RFD" approach used in that analysis to future oil and gas resource development.

Piceance Basin Resource Management Plan and Environmental Impact Statement: White River Resource Area, Colorado

Introduction. The decision was made in May 1982 to prepare the Piceance Basin RMP/EIS. The intent was to incorporate the necessary land use planning decisions for a long-term, commercial oil shale leasing program within the context of a broad, multiple-use plan. The RMP described the framework within which future land use decisions would be made for the public lands and resources within the Basin. An EIS was incorporated into the plan, fulfilling the requirements of NEPA. The Record of Decision for the Piceance Basin RMP and EIS was approved May 1987. This RMP/EIS identified and analyzed future options that would be required for managing the public lands and resources in the Piceance Basin Planning Area.

Summary. Chapter IV of the document analyzed the cumulative effects to the environment and communities in the region. The environmental consequences of the alternatives were identified in comparative, general terms. The alternatives described management objectives for the Basin and did not propose specific on-the-ground projects or actions. That meant that subsequent analyses would be required and more detailed or site-specific studies made to implement future decisions in compliance with NEPA. The chapter discussed effects by environmental element (air quality, soils, social and economics, etc) and compared alternatives within each environmental element in order to emphasize the differences in effects anticipated for each alternative. A summary of the effects was provided at the end of the chapter including a comparative table.

Commentary. This plan was among the early generation of RMP's in the BLM's planning process and was well written. The cumulative impact analysis fully addressed the range of alternatives. The other criteria the Team listed as important for a good cumulative impact analysis (components, extent and time-frame of analysis, significance of effects, mitigation, monitoring and references) were also met in the Piceance Basin Plan.

In this early generation of planning, as exhibited in the Piceance Basin RMP, clear distinctions between RFD and rfd as presented in this report (RFD/CEA Team Report) had not yet been fully developed.

Wyodak Coalbed Methane Draft Environmental Impact Statement

Introduction. The air quality analysis prepared in support of BLM's Wyodak Coalbed Methane EIS analyzed the cumulative effects that could result from the operations of the proposed project (5000 coal-bed methane wells). The analysis also included all sources in the modeling domain that began operation after 1995, as well as other reasonably foreseeable future actions, such as additional gas pipelines, additional coal-hauling trains, and expanded coal mining. The modeling domain for this analysis encompassed an estimated 80,240 square miles in northeastern Wyoming, southeastern Montana, western South Dakota, and northwestern Nebraska.

Summary. The Wyodak DEIS was prepared to analyze the potential environmental impacts resulting from the development of coalbed methane wells in Campbell and Converse Counties, Wyoming. Development scenarios of 3,000 and 5,000 new productive wells were analyzed in combination with 640 productive wells previously addressed n the Gillette South CBM Project EIS and 250 productive wells previously analyzed in the Gillette North CBM EA. Production statistics indicated 420 wells by February, 1998; 638 wells by November 1998; 890 wells by the end of 1998.

EPA was pleased with the cumulative impacts analysis for air quality. However, EPA was concerned with the expected impacts resulting from the cumulative surface water discharges from all potential wells in the Wyodak CBM Project Assessment Area. EPA recommended that the ROD state how the BLM plans to coordinate its water management plans with the multiple Coalbed Methane operators, landowners, the Wyoming Dept. of Environmental Quality, other State agencies, and other appropriate Federal agencies.

Commentary. By meeting the intent of the NEPA regulations, BLM was able to identify significant visibility impacts that were forecasted to occur at a number of Class I areas in Montana and South Dakota. With this knowledge, state agencies and the EPA as a partnership can begin planning on ways of mitigating visibility impacts in these Class I areas. Potential impacts to nine Class I and Class II areas in South Dakota, Wyoming and Montana were modeled with the CALPUFF air dispersion model.

Presentation of all foreseeable actions for air quality analysis in the Wyodak EIS is generally consistent with definitions presented in this report (RFD/CEA Team Report).

Helena National Forest and Elkhorn Mountains Portion of the Deerlodge National Forest Oil and Gas Leasing Supplemental EIS (SEIS)

Introduction. The Helena and Elkhorn Mountains (Helena) FEIS was completed in April 1995. The Record of Decision was signed in February 1996. During the interim, additional reasonably foreseeable activities were identified that could have cumulative effects with the reasonably foreseeable oil and gas development. After appeal of the decision, the Responsible Official withdrew the decision and prepared a Supplemental EIS (SEIS) specifically to analyze a broad range of reasonably foreseeable activities including oil and gas. The Final SEIS and new decision were completed in May 1998. The decision makes the leasing decisions for approximately 850,000 acres in central Montana. The analysis area included the Helena NF and surrounding lands.

Summary. The Helena SEIS provides information and analysis about the interaction and potential cumulative effects on resource issues from predicted oil and gas development and an array of reasonably foreseeable projects. Examples include planned timber sales, proposed burning and watershed improvement projects, proposed mining operations, proposed abandoned mine clean-ups, proposed reintroduction areas for TE&S fish, and subdivision of private land adjacent to the forest. The resource issues were identified through the scoping effort for the DEIS and FEIS.

RFD in the Helena FEIS is equivalent to this report's definition of RFD and projects oil and gas activities over a 15-year time frame. The reasonably foreseeable projects analyzed in the SEIS were recent or those future actions that had been committed to or that were known proposals that could take place within the next 5-10 years.

Commentary. The approach to cumulative impact analysis presented in the SEIS includes a matrix that summarizes the potential for cumulative effects between the RFD and other reasonably foreseeable projects. (See sample section of matrix following this section.) The matrix allows the reader to quickly identify the areas and projects that may have cumulative effects with the oil and gas RFD. The environmental consequences of the alternatives were identified in comparative, general terms in the text of the SEIS. The analysis area was also divided into four landscape areas to allow a more specific look at cumulative interactions in certain areas in and near the Forests.

Example Matrix
Comparison of Cumulative Effects
From Helena and Elkhorn Mountains Final and Supplemental EIS

Table IV-1 Cumulative Effects Potential by Alternative

CE = Cumulative Effects, NSO = No Surface Occupancy stipulation, CSU = Controlled Surface Use stipulation, TL = Timing Limitation Stipulation. Ratings are for potential, not magnitude.

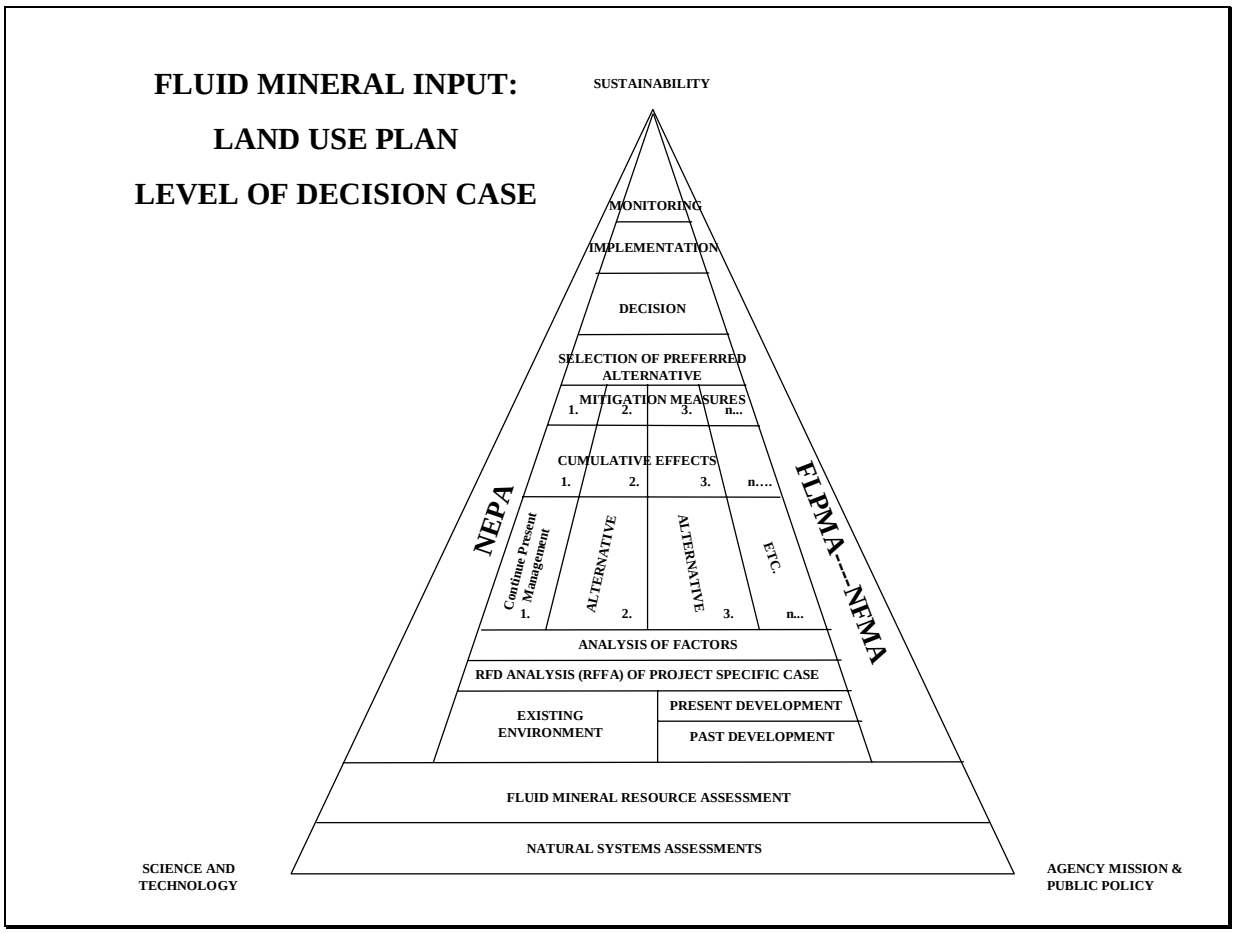
ELKHORNS AREA

Project	Petroleum Development Potential	CE Potential Alt 1	CE Potential Alt 2	CE Potential Alt 3	CE Potential Alt 4
Diamond Hill Mining, Elkhorns, T7N, R1W	Low	Low, minimal effects will extent onto National Forest land	Low, CSU and TL stipulations will be attached to leases on adjacent lands, minimal effects are expected from the Diamond Hill project, less potential than alt 1	None, the area adjacent to the Diamond Hill project is NSO	Same as alt 2
Santa Fe Gold, Elkhorns, Mining, T6N, R2,3W	None, project is no longer being considered	None	Same as alt 1	Same as alt 1	Same as alt 1
North Elkhorns, Elkhorns, vegetation treatment, T8N, R2W, T9N, R2W	Low/no	Low because of low mineral development potential	Low because of low mineral potential, CSU and Timing Limitations reduce CE potential, less potential than alt 1	None, area has a NSO stipulation	
Tizer Lake Exchange, Elkhorns ad Divide Areas land exchange, T8N, R5W, and T7N, R2W	Low/no, low	None, there should be no environmental effects from the land exchange	Same as alt 1	Same as alt 1	Same as alt 1
Reintroduction of West Slope Cutthroat Trout, Elkhorns, Muskrat, L. Tizer, Eureka and White horse Creeks	Low/no to low	Low because of low/no to low development potential	Low because of low/no to low mineral potential, NSO, CSU and Timing Limitations reduce CE potential, less potential than alt 1	None, area has a NSO stipulation	Same as alt 2

APPENDIX G

Concept Diagrams
For Plan and Project Decision-making

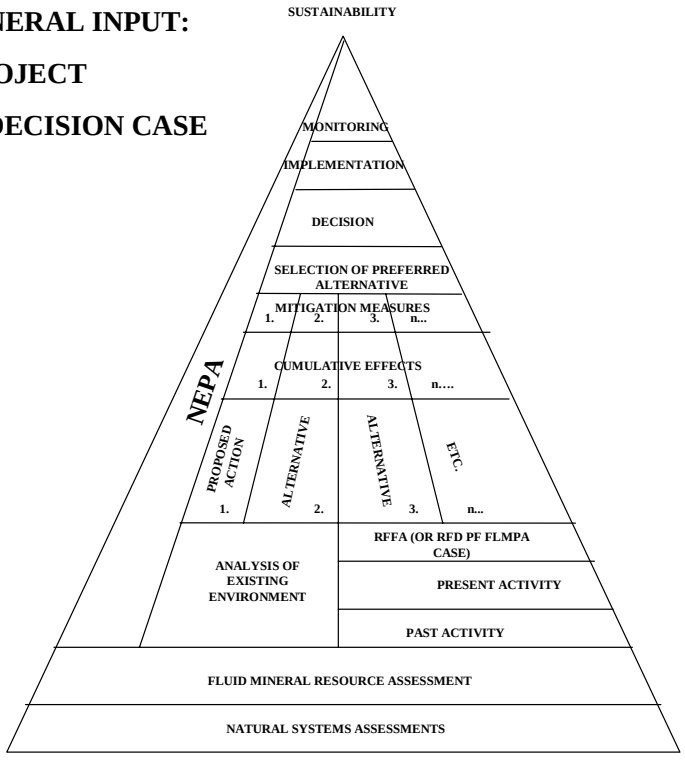
Generalized concept diagrams illustrating relationship of RFD and RFFAs to cumulative effects and other NEPA, FLPMA, and NFMA processes and concepts. The desired relevance and effectiveness of these projections in cumulative effects must be assessed within the context of agency mission & public policy, current state of science and technology, and commitment to sustainability goals and objectives.



FLUID MINERAL INPUT:

PROJECT

LEVEL OF DECISION CASE



APPENDIX H

Direction from the Courts and IBLA Pertinent to Cumulative Effects Analysis

Introduction

NEPA does not contain a judicial review provision. Despite NEPA's failure to provide for judicial review, an early and influential court of appeals decision held that federal compliance with NEPA's environmental decision-making responsibilities was judicially enforceable. This decision has made the federal courts the main enforcers of NEPA and its environmental mandates. Because of the vague NEPA statutory provisions and terminology, the federal courts have had the opportunity to create an extensive NEPA "common law."

Some agencies have an internal judicial review provision. For instance, BLM has internal review provisions beginning with State Director Reviews (SDRs) in the 43 CFR 3165.2. This decision may then be appealed to the Interior Board of Land Appeals (IBLA) (43 CFR 3165.4 and 43 CFR 4.4). IBLA, composed of nine administrative law judges, makes decisions constituting the final agency action. For BLM, once the internal process has satisfied, then the appellant may take the process into federal district court. The following case law contains opinions from the federal court system as well as IBLA.

Case Law

Akers v. Resor, 443 F. Supp. 1355 (W.D. Tenn. 1978) The impact statement for the water tributaries project must discuss the cumulative impact of other projects but not in as much detail. The court ruled that information required to account for cumulative impacts included: a list of projects producing related or cumulative impacts; and a reasonable analysis of the combined or cumulative effects. This analysis should include the projects of other agencies. (Mandelker, 2000, pg.10-82; Rumrill, J. N. and L. W. Canter, 1997, Cumulative effects, addressing future actions in cumulative effects assessment, Project Appraisal, vol. 12, no. 4, pg. 214).

Blue Mountains Biodiversity Project v. Blackwood, 161 F.3d 1208 (9th Cir. 1998) Court ruled the agency must consider in the EIS several actions that have a cumulative environmental effect. There was no discussion of total quantities of timber or proposed acreage. Roads or stream crossings were not identified. The court did not agree with the strategy of conducting separate NEPA analyses on subsequent projects that were reasonable foreseeable (these had been advertised to the timber companies) to simplify the process and allow some projects to go forward if others got "snagged" in litigation. Forest Service should have done a coherent and comprehensive up-front environmental analysis. (Draft "How to do Cumulative Effects Analysis", Appendix C, pg. 3).

Cabinet Mountains Wilderness/Scotchman's Peak Grizzly Bears v. Peterson, 510 F.Supp. 1186 (1981) The court upheld the Forest Service's decision on a mineral exploration program. In addition to ESA considerations and that mitigation measures were appropriately used in the FONSI, the court held that the cumulative impact on the land was considered to the limited extent possible. The court found that

the government appropriately analyzed the cumulative impacts of the proposed four year exploratory drilling program. The government did not analyze the effects of a mining program that might ultimately be presented because further environmental studies would be needed if and when there is a proposal for mining.

Coalition for Canyon Preservation v. Bowers, 632 F.2d 269 (9th Cir. 1980) The court ruled the impact statement need not discuss effect of road widening on adjacent areas because plans for upgrading roads in these areas are speculative. The court also stated that "subjective good faith is not the test for determining adequacy of an environmental impact statement; [the] test is an objective one." (Mandelker, 2000, pg.10-83; Rumrill, J. N. and L. W. Canter, 1997, Cumulative effects, addressing future actions in cumulative effects assessment, Project Appraisal, vol. 12, no. 4, pg. 217).

Colorado Envtl. Coalition v. Dombeck, 185 F.3d 1162 (10th Cir. 1999) The court ruled agencies must disclose that information is incomplete or unavailable and must obtain that information "if the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of doing so are not exorbitant." If the costs of obtaining the information are exorbitant or the means of obtaining it are not known, agencies must fulfill four elements. (Mandelker, 2000, pg. 10-39).

Commonwealth of Massachusetts v. Watt, 716 F.2d 946 (1st Cir. 1983) If an agency decides not to prepare a supplemental EIS, it should carefully explain its reasoning, providing more than one sentence addressing supplementation. This case indicates a court may require a supplemental statement when substantial changes in the environmental impact of an action become apparent after the original impact statement is prepared. (Mandelker, 2000, pg. 10-107).

Conner, et al. v. Burford, et al., 848 F.2d 1441 (9th Cir. 1988), cert. denied, 489 U.S. 1012 (1989) The Court held that 1) the issuance of leases containing "no surface occupancy" (NSO) stipulations did not require filing of an EIS; 2) issuance of leases without NSO stipulations required the filing of an EIS; 3) Fish and Wildlife Service was required to consider consequences of all stages of oil and gas activity in rendering a biological opinion as required by the ESA, and 4) Fish and Wildlife Service violated the ESA by failing to analyze consequences of all stages of oil and gas activity on forests in connection with issuance of leases.. Appellate court will uphold an agency decision that a particular project does not require an EIS unless that decision is unreasonable, but the reviewing court must assure an agency took a hard look at the environmental consequences of its decision.

Friends of Endangered Species, Inc. v. Jantzen, 596 F.Supp. 518 (N.D. Cal. 1984) The court accepted the agency's conclusion that the primary alternative (the substitute for the agency's proposed action that accomplishes the action in another manner) was not feasible, would not accomplish the objective of the proposed action in as satisfactory a manner, or would have environmental problems. (Mandelker, 2000, pg. 10-59).

Friends of Endangered Species, Inc. v. Jantzen, Director, US Fish and Wildlife Service et al, 760 F.2d, 987, 988 (1985) The Service (U.S. Fish and Wildlife Service) conducted a thorough analysis of the proposed action and imposed specific mitigation measures. NEPA does not demand a full discussion of land use alternatives "whose implementation is deemed remote and speculative". An agency need only consider those alternatives necessary to permit a "reasoned choice". "A detailed statement of alternatives will not 'be found wanting simply because the agency failed to include every alternative device and thought conceivable by the mind of man.'"

Fritiofson v. Alexander, 772 F.2d 1225 (5th Cir. 1985) This case differs from Kleppe in that the court remanded the case with instructions to the Corps to prepare a cumulative impact analysis of the housing

development on an island in Galveston Bay, Texas and to reassess its environmental significance in light of this analysis. The court made a distinction between the requirement to analyze cumulative actions and the requirement for an analysis of cumulative impacts. The court determined the CEQ regulations imply that the impact of other actions, in cases where those other actions are predicated on the original action, must be considered with the proposed action, even though they have not yet reached the proposal stage. (Rumrill, J. N. and L. W. Canter, 1997, Cumulative effects, addressing future actions in cumulative effects assessment, Project Appraisal, vol. 12, no. 4, pg. 209; Swartz, pg. 13 of 24).

Greenpeace v. National Marine Fisheries Serv., 55 F. Supp.2d 1248 (W.D.Wash. 1999) The court ruled that the agency must consider the cumulative impact of individually minor but collectively significant changes in the fisheries management plan. (Mandelker, 2000, pg. 10-82).

Hart & Miller Islands Area Environmental Group, Inc. v. Corps of Engineers of United States Army, 505 F. Supp. 732 (D. Md. 1980) The court held the agency need not consider the cumulative impact of the dredging of an access channel and the deepening of a harbor that were related to the facility but not yet approved. The court quoted language from Kleppe indicating an agency could approve a project covered by an impact statement and prepare an impact statement on related actions later when they were proposed. The court believed that this language did not require consideration of the cumulative impact of speculative proposals. (Mandelker, 2000, pg. 10-83, 84; Rumrill, J. N. and L. W. Canter, 1997, Cumulative effects, addressing future actions in cumulative effects assessment, Project Appraisal, vol. 12, no. 4, pg. 208).

Headwaters, Inc. v. Bureau of Land Mgmt., 914 F.2d 1174 (9th Circuit 1990) The court ruled there was no need to consider the cumulative impact of the logging access road because the road did not imply further development. (Mandelker, 2000, pg. 10-85).

Kleppe v. Sierra Club, 427 U.S. 390 (1976) "The only role for a court is to insure that the agency has taken a "hard look" at environmental consequences; it cannot "interject itself within the area of discretion of the executive as to the choice of the action to be taken…" An impact statement is required only when an agency makes a "precise" proposal for an action. An impact statement is not required when an action is only planned or contemplated. Kleppe considered only the question of when a program impact statement had to be prepared on a group of related actions. The Court did not consider the related question of what actions must be considered in an impact statement's discussion of cumulative impacts. If the future plans of the agency were not formalized into some type of program proposal, or regional development plan, they were not sufficiently foreseeable to trigger cumulative effects assessment requirements. (Swartz, p. 10 of 24; Mandelker, 2000, pg. 10-83).

Krichbaum v. Kelley, 844 F. Supp. 1107 (W.D. Va. 1994) The court ruled that the forest management plan considered an adequate range of alternatives. (Mandelker, 2000, pg. 8-121).

Manygoats v. Kleppe, 558 F.2d 556 (10th Cir. 1977) The court ruled the impact statement for the exploration and mining project must adequately discussed the cumulative impact of related projects. (Mandelker, 2000, pg. 10-82).

Marsh v. Oregon Natural Resources Council, 490 U.S. 360, 109 S.Ct. 1851 (1989) An agency has a duty to continue reviewing environmental effects of a proposed action even after its initial approval. New information does not always compel an agency to prepare a supplemental EIS. An agency need not supplement an EIS every time new information comes to light after an EIS is finalized. To require otherwise would render agency decision-making intractable, always waiting for updated information only to find the new information outdated by the time a decision is made. An agency must take a hard look at possible new environmental effects and apply a rule of reason when it makes a decision regarding EIS

supplementation. If a major Federal action is to occur and if the new information will affect the quality of the human environment in a significant manner or to a significant extent not already considered, a supplemental EIS must be prepared. Agencies may rely on their own experts in the face of conflicting views. Reviewing courts must apply the arbitrary and capricious standard of the Administrative Procedure Act, Section 706(2)(A). Although reviewing courts grant a degree of deference to any agency's decision, they should carefully review the record. (Swartz, pg. 15 of 24; Mandelker, 2000, pg. 10-100).

Mejia v. United States Dept. of Housing & Urban Development, 688 F.2d 529 (7th Cir 1982) The court ruled the environmental assessment did not need to consider other community development projects in the area. (Mandelker, 2000, pg. 10-81).

Muckleshoot Indian Tribe v. United States Forest Service, 177 F.3d 800 (9th Cir. 1999) The agency considered only a no-action alternative and two virtually identical physical alternatives, and did not consider a purchase alternative to land exchange. The court ruled that the land exchange EIS was too broad with general statements and was devoid of specific, reasoned conclusions. Cumulative effects requires the analysis of reasonably foreseeable future actions. (Draft "How to do Cumulative Effects Analysis", Appendix C, pg.2; Mandelker, 2000, pg. 10-57).

National Wildlife Federation v. Federal Energy Regulatory Commission, 912 E.2d 1471 (D.C. Cir. 1990) The court reasoned that Phase II of the project (hydroelectric plant) was not yet proposed and that "NEPA merely requires an agency to consider all other proposed actions that may, along with the proposed action in issue, have a cumulative or synergistic effect on an environment." This case is an example of a court confusing the requirement to consider all connected or cumulative actions together in the same comprehensive EIS with the requirement to assess the cumulative impacts of the proposal and other reasonably foreseeable future actions. (Swartz, pg. 14 of 24).

Natural Resources Defense Council, Inc. v. Hodel, 865 F.2d 288 (D.C. Cir. 1988) The impact statement on the offshore lease sale must consider the cumulative impact of simultaneous development on migratory birds. An agency is not required to prepare an impact statement until it is committed to an "action" or until it has made a "proposal". (Mandelker, 2000, pg. 10-82).

Natural Resources Defense Council, Inc. v. Callaway, 524 F.2d 79 (2d Cir. 1975) In this case the Lower Courts ruled that unproposed actions are not speculative. The content and scope of the discussion of alternatives to the proposed actions depends upon the nature of the proposal. EIS must consider alternatives to the proposed action that may partially or completely meet the proposal's goal and evaluate their comparative merits. This case was a segmentation case where the lower courts disapproved segmentation even when one of the segments had not reached the proposal stage. Requiring the consideration of informal proposals contradicts the 'formal proposal only' decision in Kleppe. (Swartz, pg. 4 of 24; Rumrill, J. N. and L. W. Canter, 1997, Cumulative effects, addressing future actions in cumulative effects assessment, Project Appraisal, vol. 12, no. 4, pg. 209).

Natural Resources Defense Council v. Morton, 458 F.2d 827 (D.C. Cir. 1972) EIS for proposed oil and gas lease sales off the coast of Louisiana. EIS dealt adequately with the environmental impacts of the proposed sale and discussed modifications to the proposal to delete some of the tracks with higher environmental risks. Discussion of alternatives need not be exhaustive. Information sufficient to permit a reasoned choice of alternatives is what is required, including alternatives not within the scope of authority of the responsible agency. (Swartz, pg. 3 of 24).

Neighbors of Cuddy Mountain v. United States Forest Service, 137 F.3d 1372 (9th Cir. 1998) The court noted that the Forest Service provided only a cursory description of its survey of the old growth

timber in the sale area and has not provided the actual survey results. Cumulative effect analysis on old growth was inadequate because three other sale proposals were in the area. The court said the analysis was very general and did not constitute a "hard look". There was no detail regarding how the proposed sales would cumulatively impact and reduce old growth habitat. The court detailed four requirements of the consideration of cumulative effects. (Draft "How to do Cumulative Effects Analysis", Appendix C, pg. 4).

North Slope Borough v. Andrus, 642 F.2d 589 (D.C. Cir 1980) The court ruled the impact statement for the offshore lease sale adequately discussed cumulative impacts of related energy projects in the area. (Mandelker, 2000, pg. 10-81).

Northern Alaska Envtl. Center v. Lujan, 961 F.2d 886 (9th Cir. 1992) An analysis of the cumulative impacts of specific projects need not be considered in a program impact statement when the agency can consider these impacts at the site-specific project stage. (Mandelker, 2000, pg. 10-83).

Northwest Envtl. Defense Center v. Bonneville Power Admin., 117 F.3d 1520 (9th Cir 1997) BPA used computer modeling to study cumulative impacts on fish. Court rules BPA may reasonably incorporate information from an impact analysis for a prior action to evaluate cumulative effects when those effects result exclusively from the prior actions. (Draft "How to do Cumulative Effects Analysis", Appendix C, pg. 5).

Park County Resource Council, Inc. v. United States Dept. of Agriculture, 817 F.2d 609 (10th Cir. 1987) The 10th Circuit affirmed the District Court's holding that an EIS was not required for issuance of the oil and gas lease. The court held that BLM took the "hard look" at the environmental consequences of oil and gas leasing, which is required by NEPA. The court emphasized that NEPA does not require analysis of "speculative possibilities" such as drilling, let alone development, on a federal oil and gas lease. The court, in its discussion, ratified the approach taken by BLM to comply with NEPA in its oil and gas leasing program.

Resources Limited, Inc. v. Robertson, 35 F.3d 1300 (9th Cir. 1994) This case concerns a forest management plan. The court ruled cumulative impacts must be considered in an impact statement as well as the scoping stage and must consider nonfederal impacts but need not consider them in the programmatic impact statement.

Roanoke River Basin Assn. v. Hudson, 940 F.2d 58 (4th Cir. 1991), cert. Denied, 502 U.S. 1092 (1992) The courts have held that mere opposition is not enough to make an action controversial. This is one of several cases considering the adequacy of a discussion of cumulative impacts. In this case, the court rejected a claim that an environmental assessment that formed the basis for a finding of no significant impact did not adequately consider the impact of the withdrawal on water quality considering the anticipated growth in population, irrigation and development in the region. (Mandelker, 2000, pg. 10-81).

Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 109 S. Ct. 1835 (1989)

This case is a companion case to Marsh v. Oregon Natural Resources Council. NEPA does not impose a substantive duty on agencies to mitigate adverse environmental effects or to include in an EIS a fully developed mitigation plan. Agencies will take a "hard look" at environmental consequences and will assure public dissemination of relevant information. NEPA itself does not impose substantive duties mandating particular results. NEPA prohibits uninformed agency action. An important ingredient of an EIS is the discussion of steps that can be taken to mitigate adverse environmental effects. The requirement that an EIS contain a detailed discussion of possible mitigation measures flows form the language of NEPA and the CEQ regulations. Without the discussion, the public will be uninformed and

not able to evaluate the severity of the adverse effects. "There is a fundamental distinction, however, between a requirement that mitigation be discussed in sufficient detail to ensure that environmental consequences have been fairly evaluated, on the one hand, and a substantive requirement that a complete mitigation plan be actually formulated and adopted, on the other". (Swartz, pg. 11 of 24).

Seattle Audubon Society v. Lyons, 871 F.Supp. 1291 (W.D. Wash. 1994), affd, 80 F.3d 1401 (9th Cir. 1996) This case was on the forest management plan affecting the Northern Spotted Owl. The courts ruled that the discussion of environmental impacts in the impact statement was adequate.

Sierra Club v. Babbitt, 69 F. Supp.2d 1202 (E.D. Cal. 1999) The District Court held that a road reconstruction project in a national park was properly segmented from the park's transportation and planning efforts. The agency may delay the analysis of mitigation measures until the start of construction, when more detailed information on environmental impact will be available.

Sierra Club v. Lynn, 502 F.2d 43 (5th Cir.), cert denied, 421 U.S. 994, 422 U.S. 1049 (1975) The court ruled the impact statement adequately discussed cumulative impact of the new community on population distribution, land use patterns and financial and economic resources of the surrounding area.

Sierra Club v. Morton, 510 F.2d 813 (5th Cir. 1974) Impact statement on an offshore lease sale held adequate the discussion of the cumulative impact of additional oil platforms and structures on oil spills as well as an adequate discussion of cumulative impacts of possible oil spillage from increased tanker traffic. This case illustrates a cumulative impact "added to…past" actions.

Sierra Club v. Peterson, 717 F.2d 1409 (D.C. Cir. 1983) When an agency has taken a final action in a proceeding, such as a commitment to lease national lands, an impact statement is required.

Sierra Club v. United States Army Corps of Engineers, 701 F.2d 1011, 1036 (2d Cir. 1983) Mere passage of time does not compel supplementation of an EIS. A supplemental impact statement is required when new information becomes available that significantly affects the quality of the environment affected by the proposed action. The new information must present "a seriously different picture of the likely environmental consequences of the proposed action" not adequately discussed in the original impact statement. "[T]he…[impact statement] must set forth sufficient information for the general public to make an informed evaluation…and for the decision-maker to "consider fully the environmental factors involved and to make a reasoned decision after balancing the risks of harm to the environment against the benefits to be derived from the proposed action."" (Mandelker, 2000, pg. 10-31, 10-102, 103).

Sierra Club v. Watkins, 808 F.Supp 852 (D.D.C. 1991) The court ruled that cumulative effects of accident risk from shipments of nuclear fuel must be considered. (Mandelker, 2000, pg. 10-82).

Thomas v. Peterson, 753 F.2d 754 (9th Cir. 1985) The court discussed Kleppe and held the environmental impacts of related actions must be discussed together. The road and timber sales were "connected" because the timber sales would not proceed without the road and the road would not be built if the timber sales were not contemplated. Evidence in the record showed the road and sales together would have significant cumulative impacts. (Mandelker, 2000, pg. 10-85, 86).

Town of Huntington v. March, 859 F.2d 1134 (2d Cir.1988) The agency must discuss impacts of the waste disposal at the designated disposal site. (Mandelker, 2000, pg. 10-82).

Webb v. Gorsuch, 699 F.2d 157 (4th Cir.1983) In the discussion about the environmental assessment, the court ruled the cumulative impacts of other mines planned in an area need not be considered. (Mandelker, 2000, pg. 10-81).

IBLA Cases

Michael Gold, et al., 108 IBLA 231; Michael Gold (on reconsideration), 115 IBLA 218; and Michael Gold (Secretary's Decision on Review in Michael Gold (on reconsideration) 115 IBLA 218 IBLA decided on April 24, 1989 that where an environmental assessment was prepared for consideration of an APD is deficient, its discussion of possible effects of the proposed action on wildlife, failure to discuss relevant mitigation measures, and failure to document reasons why it rejects various alternatives to the proposed action causes the approval of the APD based on such an environmental assessment must be set aside. IBLA decided in Michael Gold (on reconsideration) that where an initial exploratory well has been successfully where an initial exploratory well has been successfully drilled and a lessee files an APD for additional development wells, the filing of the APD normally triggers the requirement for an environmental impact statement. IBLA goes on to say that no EIS is needed if an environmental impact statement has already been prepared which analyzes the impacts expected from full field development. The Secretary's Decision upheld IBLA's ruling on the inadequacy of the EA but rejected the general rule concerning the preparation of EISs for development wells.

National Wildlife Federation, Wyoming Outdoor Council, Wyoming Wildlife Federation, 150 IBLA 385 (1999) NEPA requires a full informed, well-considered decision supported by reasonable forecasting and speculation but it does not require a particular result or course of action. An agency is required to take a hard look at the environmental consequences of a proposed action. "In alleging a failure to consider the cumulative impacts of a natural gas development project, it is not sufficient merely to note the existence of other gas fields and gas development projects in Wyoming without concretely identifying the adverse impacts caused by such other fields and projects to which the action being scrutinized will add."

National Wildlife Federation, *et al*, v. BLM, Utah Farm Bureau Federation, and Ute Mountain Ute Indian Tribe, Intervenors-Appellents, American Farm Bureau Federation, Amicus-Curiae, 140 IBLA 85 (1997) BLM violated section 102 (2) (C) of NEPA because its environmental documentation in the EIS for the RMP authorizing grazing on the Comb Wash Allotment did not provide any site-specific environmental analysis of the impact of grazing on the resource values in five canyons on the allotment. BLM also violated the multiple-use mandate of section 302 (a) of FLPMA when it authorized livestock grazing in the five canons without a reasoned and informed decision-making process showing BLM had balanced competing resource values to best meet the present and future needs of the American people. Tiering requires a minimum of two NEPA documents, general environmental document and a later-developed site-specific environmental document. When the record shows a lack of the site-specific document, BLM may not justify site-specific actions by reliance on the general environmental document.

San Carlos Apache Tribe, et al, 149 IBLA 29 (1999) CEQ regulations require a Federal agency must consider the potential cumulative impacts of a planned action together with other past, present, and reasonable foreseeable future actions. BLM did not analyze direct or indirect adverse effects form mining in the FEIS (under applicable CEQ regulations) because mining is not an impact of the land exchange, but is an identified use of the land whether the exchange occurs or not. Mining-related activities on the selected lands would be the same for all alternatives and BLM was not required to include the impact of prospective mining activity in the FEIS.

Southern Utah Wilderness Alliance, et al, 141 IBLA 85 (1997) BLM is not precluded from approving Conoco's APD to drill in the Grand Staircase-Escalante National Monument because BLM is preparing a

plan for managing the entire Monument at the President's direction. The record shows BLM complied with section 102 (2) (C) of NEPA, in approving the APD without preparation of an EIS, by taking a hard look at the environmental consequences, identifying all relevant areas of concern, and making a convincing case no significant impact will result from the proposed action or mitigation measures will reduce such impact to a minimum.

Southern Utah Wilderness Alliance et al, 150 IBLA 158 (1999) A finding of no significant environment impact and record of decision on a proposed action based on an environmental assessment will be set aside and remanded where the record establishes BLM failed to take a "hard look" at the environmental impacts of the activity or consider reasonable alternatives. BLM did not consider important questions bearing on the environmental consequences of its decision to build a visitor contact center in an environmentally and culturally sensitive area despite having identified those questions as relevant in an earlier environmental review.

Wyoming Outdoor Council, 147 IBLA 105 (1998) IBLA found the record establishes preparation of an EIS is not required because BLM has considered all relevant matters of environmental concern and has taken a hard look at potential environmental impacts of the projects and reasonable alternatives.

Wyoming Outdoor Council, 151 IBLA 260 (1999) An EIS must ensure a Federal agency is fully informed regarding the environmental consequences of an agency action when the agency is exercising the discretion to approve or disapprove a project. When deciding if an EIS has done so, the rule of reason will be whether or not the statement contains a reasonable thorough discussion of the significant aspects of the probable environmental consequences.

Other Cites

Hapke, "Thomas v. Peterson: The Ninth Circuit Breathes New Life into CEQ's Cumulative and Connected Actions Regulations", 15 Envtl. L. 10289 (1985)

Mandelker, Daniel R., 2000, NEPA Law and Litigation, 2nd edition, West Group

Mansfield, "Through the Forest of the Onshore Oil and Gas Leasing Controversy Toward a Paradigm of Meaningful NEPA Compliance", 24 Land & Water L. Rev. 85 (1989)

Rumrill, J.N., and L.W. Canter, 1997, Cumulative effects - Addressing future actions in cumulative effects assessment, Project Appraisal, vol.12, no. 4, pgs. 207-218.

Sources used for the Court and IBLA cases cited above

Information on cases was gathered from copies of IBLA decisions, copies of Court decisions, and the following sources:

Mandelker, Daniel R., 2000, NEPA Law and Litigation, 2nd Edition, West Group.

> "Mandelker" is an annually updated book entitled NEPA Law and Litigation produced by the West Group in its environmental law series. Mandelker states "This treatise reviews the case law that has become a "common law" interpreting NEPA's brief and incomplete statutory provisions. The cases determine what NEPA means and what federal agencies must do to comply with the statute."

Swartz, L. L., Esq., Major Cases Interpreting the National Environmental Policy Act, http://www.naep.org/NEPAWG/majorcas.htm**, 24 pgs.**

Linda L. Swartz has written short briefs of major cases interpreting NEPA for www.naep.org.

United States Forest Service, Regions 1 and 4, "How to do Cumulative Effects Analysis", Draft, Appendix C: Recent Court Decisions, 7 pgs.

APPENDIX I

Team Members

Daniels, Bill, Senior Resource Advisor, USDI Bureau of Land Management, Wyoming State Office, Cheyenne, Wyoming.

Bill Daniels works for the Bureau of Land Management (BLM) currently as Senior Resource Advisor in the Division of Resources Policy and Management. This Division oversees the management of natural resource programs on Federal lands and with minerals administered by the Wyoming BLM. Bill has over 30 years with the Federal government. With BLM he has held positions of Area Manager in Newcastle and Kemmerer, Wyoming and been a Branch Chief in both the Wyoming and Colorado State Offices. He also worked in New Mexico as an EIS team leader. For nearly four years, Bill was in the Washington Office of BLM where he was a coordinator for coal development in Wyoming, Montana, the Dakotas, the southern states, and Alaska. He also spent six years with the Corps of Engineers as an Environmental Specialist, managing teams that prepared environmental documents.

Bill has a Bachelor's degree from Texas Tech University, a Masters degree from Texas A&M, and he worked on a Phd at the University of Texas. His major subjects were in the agriculture, regional planning, and natural resource management fields.

Edgar, Robert, Environmental Specialist, Environmental Protection Agency, Region 8, Denver, Colorado.

Robert has an extensive experience in the field of air quality modeling, air quality permitting and air quality analysis as used in environmental impact statements. Robert wrote and provided air quality modeling analysis for three environmental impact statements at the DOE Savannah River Site in South Carolina. As a consultant, he led a team for writing a Prevention of Significant Deterioration air quality permit for the BMW automobile manufacturing facility in Greenville, South Carolina. He also wrote air permits and reports on hazardous air pollutants for private industry.

Robert has a Ph.D. and Master of Science in environmental science from the University of Texas at Dallas. He also has two Bachelor of Science degrees: Mathematics from University of North Texas and Meteorology from New York University.

Holm, Melody R., Energy Resources/Leasable Minerals Program Manager, USDA Forest Service, Rocky Mountain Region (R-2), Lakewood, Colorado. Wyoming Professional Geologist PG-81.

Melody has over 25 years of experience as a geologist, 15 of which were in oil and gas exploration and production. Her experience in exploration and production geology with major oil companies and as a consultant has been in Rocky Mountain basins, the Idaho-Utah-Wyoming Thrust Belt, California, and Alaska. She joined the Forest Service in 1992 as the national liaison with the USGS, with duties related to the National Assessment of U.S. Oil and Gas Resources and the developing Forest Service oil and gas leasing program. Her current primary duties are related to the management of oil, gas, and coal resources

on National Forest System lands in the U.S. Forest Service Rocky Mountain Region (Region 2). She also coordinates and conducts interdisciplinary training on geology and ecosystems. Melody has a strong background in field geology, sedimentology, structural geology, and petroleum exploration and production. She has authored a number of technical papers and reports. Melody is a registered Professional Geologist in the State of Wyoming.

Melody has a Bachelors degree in geology from the University of Texas at Austin and a Masters degree in geology with emphasis on sedimentology from Indiana University.

Mistarka, Vickie D., Physical Scientist, USDI, Bureau of Land Management, Wyoming State Office (WSO-922), Cheyenne, Wyoming. Wyoming PG-2170

Vickie has 24 years of experience as a geologist, working for National Park Service, USGS, BLM and with Industry. Industry experience was in oil and gas exploration in the Williston Basin (North Dakota, Montana, and South Dakota). Federal government experience includes duties related to general geology, oil, gas and coal resources, mining law and mineral materials within Utah, New Mexico, Montana and Wyoming. Current primary duties include pre-operational oil and gas (including CBM) as related to NEPA, leasing, and the other resources such as wildlife, cultural, air and water. She has participated on teams dealing with Cumulative Impacts - wildlife and oil and gas, lease stipulations, NEPA compliance, ecosystem management,

Vickie has a Bachelor of Science degree in Geology and a Master of Science degree in Geology specializing in field geology, stratigraphy, structural geology, paleontology, and geomorphology.

Karl S. Osvald, Senior Geologist, U.S. Department of Interior, Bureau of Land Management, Wyoming State Office Reservoir Management Group, Casper Wyoming.

Karl has 27 years experience in environmental and economic geology with Interior's U.S. Geological Survey and BLM. He has worked with mineral resource development and environmental analysis of oil, gas, geothermal, coal and other economic minerals of the southeastern OCS and the Pacific area, western and central onshore regions of the U.S. From 1984-1995, he served as Chief, Branch of Fluid Minerals, BLM, Casper District, Wyoming.

Karl is a graduate of the University of Georgia, B.S., 1973, and the Defense Mapping Agency's (DMA) Defense Mapping School, 1980.

Professional affiliations include the Geological Society of America, American Geophysical Union, American Association for the Advancement of Science, Society of Vertebrate Paleontology, American Society of Photogrammetry and Remote Sensing, Rocky Mountain Association of Geologists, and the Wyoming Geological Association.

Pope, Jordon - Senior Planning and NEPA Analyst, USDI Bureau of Land Management, BLM Washington Office, Washington, D.C..

Jordon is a native of Fort Lauderdale, Florida. He has worked for the BLM in a variety of positions: Group Administrator/Manager for Fluid Minerals (Oil and Gas) - Washington, D.C., Chief, Division of Planning and Environmental Coordination - Washington, D.C., Planning and Environmental Coordination

Analyst - Washington, D.C., Associate District Manager - Salt Lake City, Utah, Employee Development Specialist - Washington, D.C., Chief, Office of International Affairs - Washington, D.C., Chief, Branch of Biological Resources - Phoenix, Arizona, Mineral's Program Lead for Surface Protection and Reclamation - Washington, D.C., Wildlife Management Specialist - Washington, D.C., and Wildlife Management Specialist - Ukiah, California.

In Jordon's career, he has worked for three Federal agencies - The Bureau of Land Management in Washington, D.C., Ukiah, California, Phoenix, Arizona, Portland Oregon, and Salt Lake City, Utah; The United States Fish and Wildlife Service in Carterville, Illinois; and The United States Forest Service in Anaconda, Montana. With these agencies, he has held positions from a field natural resource specialist to senior level management.

Jordon's education is in the areas of Biological, Chemical and Physical Sciences and Wildlife and Natural Resources Management.

Roberts, David A., Wildlife Management Biologist/Wildlife Program Leader; USDI – Bureau of Land Management, Wyoming State Office (WSO-930), Cheyenne, Wyoming.

Dave has over 28 years of professional experience in the field of biological resources management. In his current position, in the Wyoming State Office of the BLM in Cheyenne, he has been the wildlife management biologist/wildlife program leader for the state. In his current capacity, Dave has been the principle wildlife advisor to the Wyoming State Director (BLM), and has had wildlife program oversight for all the BLM wildlife activities in the state. Throughout his career, he has been particularly involved with leasable mineral development and livestock grazing functions.

Dave graduated from Montana State university (MSU) in Bozeman in 1968 with a Bachelor of Science degree in Fish and Wildlife Management and again in 1970 from MSU with a Master of Science degree, also in Fish and Wildlife Management.

Vaculik, Leslie S., Leasable Mineral Specialist/Leasable Program Lead, Forest Service, Region One, Missoula, Montana

Leslie is a petroleum engineer who works for Forest Service Region One that includes Montana, North Dakota, Northern Idaho and portions of South Dakota. She has authored regional guidance on the oil and gas leasing decision and associated NEPA, works with the inspection and enforcement program and is involved with Forest and Grassland management planning efforts.

Prior to the Forest Service, Leslie worked for the National Park Service at the national level. Her duties included developing mitigation measures for drilling and development for parks across the country, plugging abandoned wells, and coordinating the I&E program.

She began her career in 1977 with Amoco Oil and, later, Gary Energy, in the Rocky Mountains, Illinois Basin and West Virginia, concentrating on field development, drilling, and production operations.