APPENDIX M—THE ADAPTIVE MANAGEMENT PROCESS FOR IMPLEMENTATION OF ALTERNATIVES B, C, AND D

This appendix describes the adaptive management (AM) process Bureau of Land Management (BLM) will employ in implementing Alternatives B, C, and D. The purpose of including an AM framework in this resource management plan (RMP) is to authorize the use of AM at the plan implementation stage and to describe the system-level AM assessment process.

1. BACKGROUND

The National Research Council defines AM as follows:

> *Adaptive management [is a decision process that] promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a 'trial and error' process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals, increases scientific knowledge, and reduces tensions among stakeholders.*

In September 2003, the National Environmental Policy Act (NEPA) Task Force issued a report to the Council of Environmental Quality (CEQ) entitled "Modernizing NEPA Implementation." Employing AM approaches is one practice the task force encourages to improve NEPA. Also in 2003, the Department of Interior (DOI), Office of Environmental Policy (OEPC) Review issued OEPC ESM03-6 providing initial guidance to all Interior agencies on implementing AM practices to comply with NEPA; however, this guidance does not provide specifics on processes and procedures for integrating AM into the NEPA process. The BLM Land Use Planning Handbook (H-1601-1) also references AM and states that when policies and procedures are developed, they will be incorporated into the handbook. The DOI is currently working on an AM guidebook for implementing AM in department NEPA documents. The Little Snake RMP was selected as a DOI pilot project for integration of AM. Although many BLM RMPs contain aspects of an AM framework, no RMP to date has fully integrated AM. The Moffat County Commissioners, a cooperating agency for this RMP revision, have been strong advocates of integrating an AM framework into this RMP/Environmental Impact Statement (EIS).

Several important terms are frequently used in any AM strategy: outcome, indicator, and trigger point.

An outcome, which is also referred to as a desired outcome, can be thought of as a resource objective. Outcomes should be specific, measurable, achievable, realistic, and time-sensitive.

An indicator is used to measure whether an outcome or resource objective is being reached. Indicators should be able to measure long-term as well as short-term changes. Trends in population or health of a species, such as sage-grouse, could be used as indictors for certain systems, such as the sage brush biome. Appendix A includes examples of indicators, and Appendices E and F list the standards and guides.

A trigger point is a predetermined value of an indicator that "triggers" thought or action. Trigger points can also be thought of as critical minimums or thresholds. Examples of trigger points include when a

predetermined amount of surface disturbance related to oil and gas or coal development occurs or when wild horse numbers fail to meet population goals.

There are a number of reasons for adopting an AM approach to decisionmaking. Among them are—

- To enhance the ability to achieve plan outcomes
- To get the most out of the NEPA/planning process
- To provide plan flexibility
- To validate impact predictions, ensure mitigation is effective, and adapt to unintended consequences.

Ultimately, the RMP resource objectives are paramount. AM policies and procedures must enhance BLM's ability to achieve desired outcomes. The rigid nature of traditional prescriptive plan decisions is not the most effective means of achieving desired outcomes in all cases. In the traditional process, should the prescriptive actions not lead to the desired outcomes, additional analysis, new decisions, and plan amendments are required. However, when the NEPA process and BLM planning process are effectively used and when mechanisms are built into the decision to validate impact predictions, ensure mitigation is effective, and adapt to unintended consequences, the plan will have the flexibility to enhance the ability to achieve plan outcomes.

Risks are involved in implementing any strategy to change resource outcomes, and BLM must gauge these risks when approving AM projects. If the risk is too great, BLM may choose not to proceed with AM; however, even in traditional processes, the risk that prescriptions will not accomplish the intended effect exists. In an AM process, when a problem is discovered, the BLM anticipates making real-time changes to adjust the approach to meeting desired outcomes.

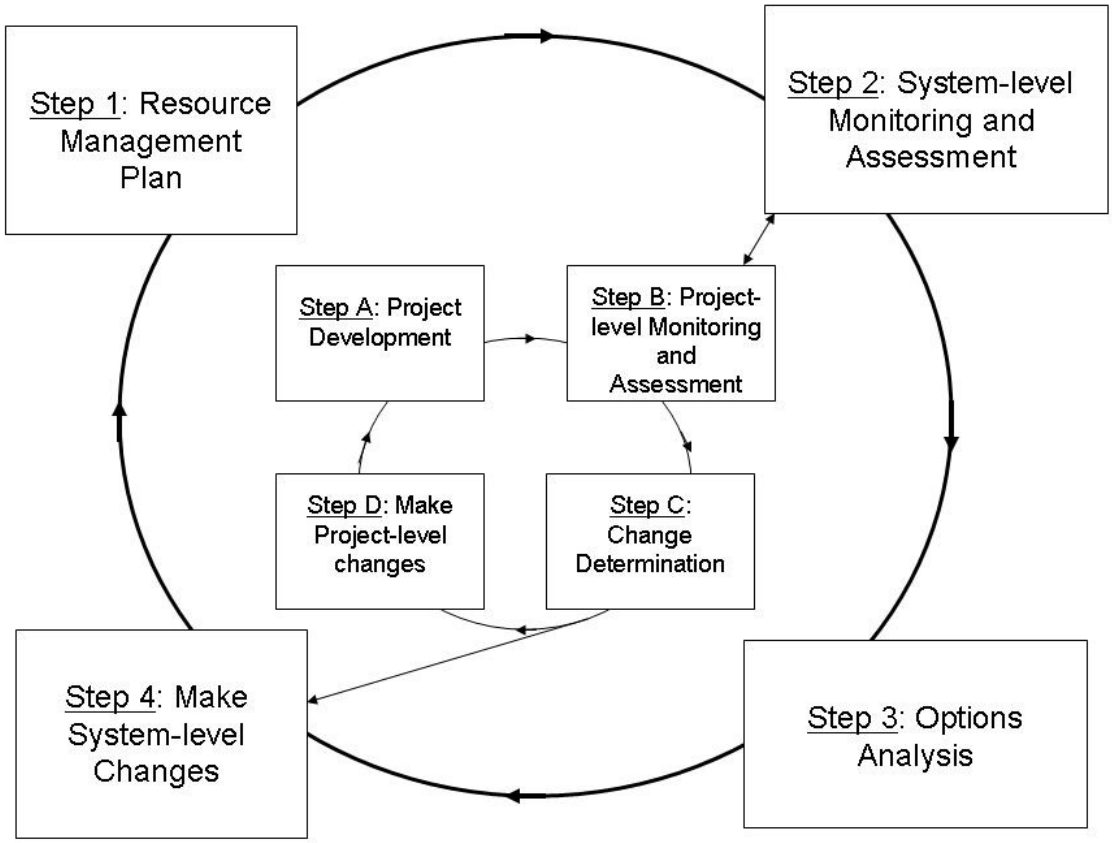
The discussion in this Appendix is based on the following assumptions:

- The underlying objective in adopting AM is to better achieve desired outcomes by supporting changes or modifications in management actions.
- The key to achieving that underlying objective is outcome- or performance-based decisions.
- The key to performance-based decisions is clearly defined, measurable performance standards.
- Measuring the outcomes of performance standards requires appropriate monitoring.

2. THE AM PROCESS

There are two tiers of an AM framework that are equally important to implementing AM on the ground: a system-level framework and a project-level framework. The system-level framework is needed to assess larger, more long-term changes in the landscape. The project-level framework is needed to ensure specific outcomes are being met for individual projects. This framework is more site-specific and focuses on meeting local objectives. Figure 1 shows how the project-level process (the inner loop) interfaces with the system-level approach (the outer loop).

Figure 1. Integrating the System-Level and Project-Level AM Approaches



2.1 The System-Level AM Approach

The system-level AM process would be an inclusive public process. DOI and BLM guidance on AM emphasize the importance of implementing AM collaboratively. A balanced multi-stakeholder group or public group could participate in the process in an advisory capacity. This group could be either formal (Federal Advisory Committee Act [FACA]-chartered) or informal in nature. Collaboration would be encouraged but not required for an AM project to move forward. Input on technical or scientific issues would be sought from participants with technical backgrounds. Timelines for making recommendations will be established to ensure decisionmaking moves forward in a timely fashion. The specific role of the public would be detailed during the creation of the Assessment Guidance Document (AGD) or in the proposed RMP/final EIS. The AGD will be developed collaboratively within a 2-year period after the record of decision (ROD) is signed and tiered off the RMP, and it will describe how the AM process will be implemented. The AGD would include the monitoring protocols to be employed and the role of a multi-stakeholder group.

Step 1: RMP. The RMP authorizes the use of AM during plan implementation. In addition, the RMP contains management prescriptions that will act as a fallback for the AM process. See Section 2.4 of this appendix for a description of when fallback prescriptions would be employed.

Step 2: System-Level Monitoring and Assessment. Standards will serve as the system-level outcomes for the AM process, and the resource goals and objectives for each resource in the RMP will be considered when assessing whether the standards are being achieved. Standards include indicators that are evaluated to determine landscape health status. They also describe conditions of public land health and can be related to all uses of the public lands. The standards that are described in Appendix A are applied on a landscape scale and relate to the potential of the landscape. The goals and objectives of the RMP are also an important element, and progress toward meeting these goals and objectives will be evaluated during the system-level assessment process.

Using standards as the system-level indicators is advantageous for several reasons. First, the Landscape Health Assessment process is familiar to the BLM, resource users, and the public. Second, this monitoring and assessment protocol is realistically implementable and affordable for the BLM. Third, the standards and guides process is already considered by many to be an adaptive process, wherein BLM adapts management prescriptions based on new information. This AM system-level approach would expand on the currently existing standards assessment process. Fourth, Little Snake Field Office (LSFO) is scheduled to complete the initial round of Landscape Health Assessments for all 16 watersheds in the planning area by 2009, which will provide a baseline from which to compare trends—an important element in an AM framework.

However, there are several reasons why using standards might be problematic. Standards are mostly qualitative, as illustrated by the indicators listed for each standard in Appendix A. In addition, they are somewhat subjective and could be assessed differently by different BLM interdisciplinary teams. This raises issues related to measurability, repeatability, and consistency. These potential issues can be avoided by further development of the assessment process. Each standard may need additional detailed direction concerning the specific assessment techniques and protocols to be used, measurable thresholds assigned to each indicator, and other information to ensure consistency and accountability in application. Assessment of the standards and guides should also relate to the resource goals and objectives included in the RMP. To ensure action is taken before it is too late to correct a problem, the indicators would need to be crafted to measure both long- and short-term changes. An example of a well-defined and measurable assessment process is the proper functioning condition (PFC) assessment process. The best available technical and scientific information will be used during refinement of the indicators and during the assessment process. In 2005, the DOI and Department of Agriculture published a guidebook called *Interpreting Indicators or Rangeland Health,* which is a step in the direction of better facilitating consistent application of the rangeland health assessment process.

In addition to issues concerning measurability, standards fall short in assessing certain impacts, including cumulative effects. One area where the standards do not measure effects sufficiently and need further development is disturbance to wildlife populations. To measure cumulative effects, BLM would need to take a broader look at the landscape in addition to individual watersheds. One possible way to assess cumulative impacts would be to use digital photos or satellite imagery to assess habitat fragmentation and to correlate the fragmentation to known population trends. Integration of these new measurements into standards would be done during the creation of the AGD. In addition, because resource objectives are also an important element of an AM process, they would need to be rewritten in the AGD to be quantifiable so progress towards meeting the objectives is measured during the system-level assessment.

This process is intended to work within the current standards and guides process and will not conflict with any aspect of this policy. Watersheds will continue to be assessed per BLM policy. However, to detect changes in the larger landscape in time to take corrective action, the indicators listed under each standard would be assessed at 5-year intervals instead of 10-year intervals. This change entails a significant increase in funding needed for monitoring. Landscape Health Assessments are open to the public, and

continuing to involve the public in the assessment process would be important for a successful AM strategy.

Watersheds would be prioritized for assessment within the 5-year cycle. Prioritization could be based on areas where BLM or stakeholders notice use conflicts, resource concerns, or other indicators mentioned in Appendix F. Watersheds will be assessed following BLM guidelines outlined in *IM 98-91: Healthy Rangeland Initiative: Implementation of Standards and Guidelines.* Every BLM field office has some flexibility to implement the assessment process differently. The rangeland form used by LSFO for site assessments, which illustrates the indicators assessed at each site, is attached to this appendix.

After each watershed assessment, a Landscape Health Assessment is generated, which will detail the conclusions of the assessment. If the watershed is meeting standards, the report will not culminate in an immediate management change, although it would be possible to change management to address areas within the watershed that could benefit from a change. If it is determined that the watershed is not meeting standards, BLM would not wait to make management changes. Instead, the process would proceed to Step 3: options analysis. It is at this stage where appropriate changes in management will be determined.

At the end of the 5-year Landscape Health Assessment cycle, BLM staff will prepare a technical document, called a System-Level Assessment Report, that presents an assessment of whether standards are being achieved over the entire planning area. The assessment will also consider whether the goals and objectives of the plan are being achieved at the landscape level. This report includes summaries of all Landscape Health Assessments and will also include a cumulative assessment. In addition to the scheduled 5-year review, Landscape Health Assessments will be referenced during the project-level assessment process, as outlined below.

Placed into an AM context using the terminology defined above, standards and guides would be the system-level outcomes. Using Standard 1 (upland soils) as one set of outcomes, the example below illustrates how this would work.

Landscape: Douglas Mountain

Outcomes for That Area:

Standard 1.

A. Upland soils exhibit infiltration and permeability rates appropriate for the soil type, climate, land form, and geological processes.

B. Adequate soil infiltration and permeability allows for the accumulation of soil moisture necessary for optimal plant growth and vigor, and minimizes surface runoff.

Indicators to measure whether Standard 1 is being reached:

- Expression of rills and soil pedestals is minimal.
- Evidence of actively eroding gullies (incised channels) is minimal.
- Canopy and ground cover are appropriate.
- Litter is accumulating in place and is not sorted by normal overland water flow.
- There is appropriate organic matter in soil.
- There is diversity of plant species with a variety of root depths.
- Upland swales have vegetation cover or density greater than that of adjacent uplands.
- There are vigorous, desirable plants.

Trigger Point: Adaptive management would be triggered when the outcomes (standards) are not met. For example, if upland soils did not exhibit acceptable infiltration and permeability rates or if soil infiltration did not allow for accumulation of soil moisture, the assessment site would not meet Standard 1. In this case, options for change would be considered and remedial actions adopted.

Step 3: Options Analysis. Assessing options for corrective change at the system level would commence if an individual watershed is not meeting standards following the 5-year System-Level Assessment Report or if a project-level assessment indicated a larger problem in the landscape or a faulty prescription in the RMP. Standards would represent the "floor" or threshold levels at which BLM must take corrective action to address any problems. Under existing regulation, if a watershed is not meeting standards because of livestock grazing, BLM is required to make changes within 1 year that are designed to bring the watershed back into compliance. Under the AM approach incorporated into the RMP, a change in management would be made regardless of the cause of not meeting standards.

Using standards represents a common sense approach to AM. As in any Landscape Health Assessment process, a series of questions would be asked. In the interdisciplinary team's professional conclusion, why is the watershed not meeting standards? What is the cause? What actions should be taken to remedy the problem? BLM will change management depending on how these questions are answered. As shown by a connecting line in Figure 1, the system-level and project-level assessments must be considered together to determine causation and potential solutions. As part of the System-Level Assessment Report, in conjunction with other agencies and a multi-stakeholder group, BLM will develop alternative actions that could be taken to correct the problem. Depending on the problems and solutions identified, this change may or may not entail discontinuing AM at the implementation level in that watershed under similar circumstances.

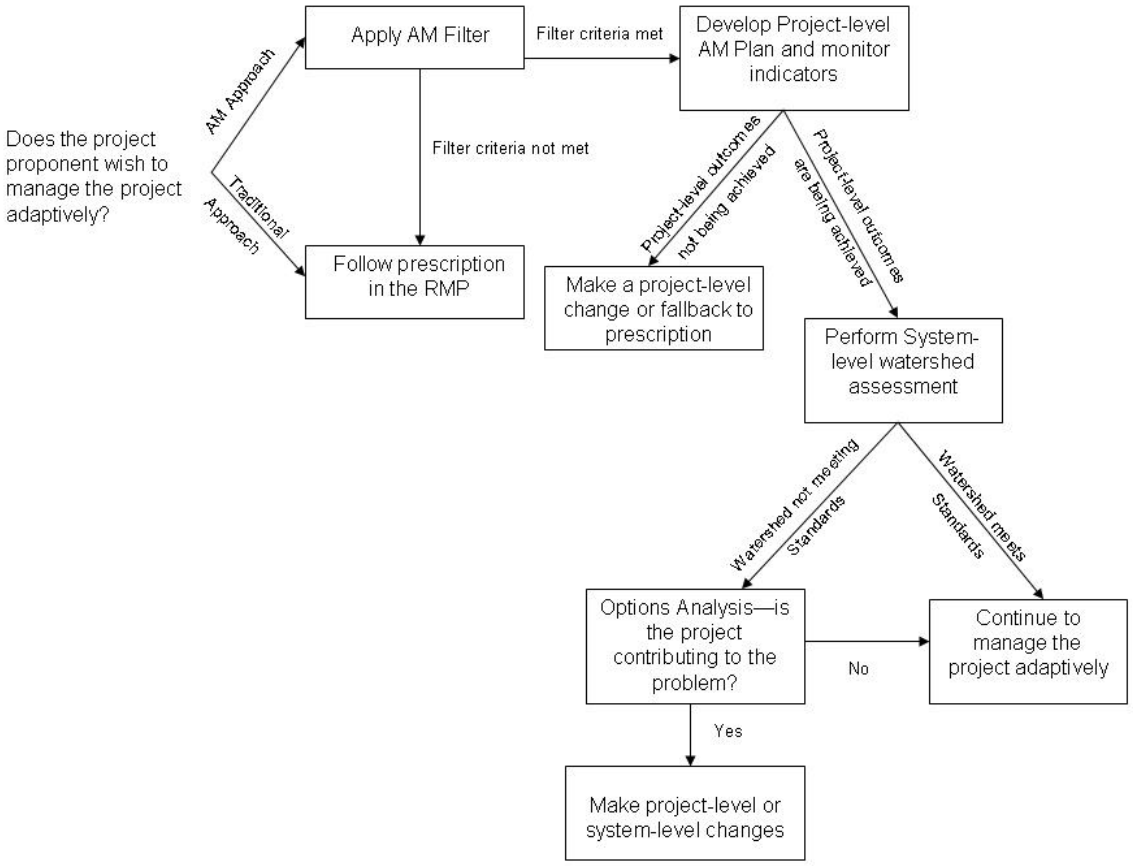
Step 4: Making System-Level Changes. Failing to meet system-level outcomes (standards) would entail an assessment of the problem and a change in management. The assessment and options analysis processes are described above. At this stage, depending on observations and options for changing management in the System-Level Assessment Report and Landscape Health Assessments, changes may need to be made at the system level.

System-level changes could be made to one or several documents, including the AGD or RMP. One reason AM was originally attractive to the BLM is that it presents a possible means to change management without undergoing a costly RMP amendment process. Although it will not always be possible, it would be more advantageous and cost-effective for the BLM to avoid amending the land use plan and instead make changes to the AGD.

2.2 The Project-Level AM Approach

It is somewhat easier to conceptualize AM at the project level as opposed to a broad system level. When a project is identified, specific information critical to an efficient and effective AM process is known. Such information includes the proposed use, characteristics of the landscape and ecosystem in which the project is proposed, indicators that best measure the outcomes, and monitoring necessary to measure indicators. These specific elements of a project-level AM plan differ widely, depending on the project, making it impossible to define those elements in the RMP. Therefore, this appendix cannot forecast and identify these elements; instead, it attempts to explain the process for doing so at the time the project begins. Impacts to resources and values from individual AM projects would be disclosed in project-level NEPA documents. Figure 2 illustrates a step-by-step description of the process, and it is also described below.

Figure 2. Project-Level Flow Chart



Step A: Project Development. Although system-level assessments would be performed at either scheduled increments (5 years) or after defined events (a watershed not meeting standards), employing AM at the implementation level is optional. When a project is proposed for BLM approval, the project proponent has the discretion to either abide by the appropriate prescriptions in the RMP or manage the project adaptively. However, to be authorized to use AM, the proposed project must meet the criteria in the AM filter described below to gauge its suitability to an AM approach. When the BLM initiates the project (such as a transportation plan), BLM will determine its appropriateness for AM and decide whether the project will be managed adaptively with input from an available multi-stakeholder working group. In this sense, a project is a BLM activity or implementation decision that requires appropriate site-specific planning and NEPA analysis (e.g., a range permit renewal, an Application for Permit to Drill [APD], a transportation plan).

A screen will be used to determine a project's suitability for AM. Not all projects lend themselves to AM decisionmaking. The policies and procedures for employing AM must clearly outline the decisions or projects on which AM may be used. This filter should be employed at each step of the NEPA/planning process to ensure the criteria are met.

The AM Filter:

AM decisionmaking should be limited to situations where all of the following conditions are met. Where all or some of these conditions are not met, proposed decisions should be reconsidered or modified to satisfy traditional planning requirements to most effectively manage the public lands.

1. The action is consistent with allowable uses in that area, as defined in the RMP.
2. The decision is outcome- or performance-based and defined by performance standards.

   The key to AM is outcome- or performance-based decisions. If the decisions cannot be written as an outcome or performance-based decision with clearly defined and measurable performance standards, then AM should not be employed.
3. The actions to achieve the outcome can be adapted based on monitoring or other new information.

   If no alternative methods to achieve the outcome-based plan decision exist, then AM should not be employed.
4. The effects of the action are unknown or uncertain because of incomplete information about resource conditions or development scenarios or because of potentially changing or new practices and treatments.

   For example, limited experience in assessing impacts of coal bed methane field development or limited baseline air quality information in an area where actions may affect air quality.
5. There are firm funding and workload priority commitments to conduct monitoring.

   Effective implementation of AM is heavily dependent on a commitment to appropriate monitoring. Without monitoring of performance standards, performance-based decisions are meaningless. AM should not be employed without defining how those commitments will be honored. Absent funding and resources for the monitoring commitment, proposed decisions should be reconsidered or modified, or plan decisions should be written with traditional prescriptive decisions as a fallback to most effectively mange the public lands. Funding for monitoring does not necessarily have to come solely from the BLM.
6. BLM decisions control the outcome.

   AM should only be considered in situations where management actions resulting from BLM decisions have control over the outcome. For example, in a situation where BLM manages a small acreage surrounded by private land and the plan applies only to BLM-managed lands, the management actions on the private lands more than likely have a controlling influence on the outcome of the public lands; therefore, AM should not be employed.

If a project proponent wishes to use AM and the project meets the criteria in the AM filter, the BLM must develop a Project-Level AM Plan with input from the project proponent. A Project-Level AM Plan will contain the following elements:

- Specific, measurable outcomes to be reached for the project
- Indicators used to measure whether outcomes are being reached
- Defined trigger points that initiate a change in management
- A disclosure of the potential risks involved in the project, as well as any mitigative measures to be taken to offset risk; offsite mitigation or other creative benefits to resources could also be built into the plan

- A specific monitoring and assessment plan; the monitoring plan will describe frequency of monitoring, assessment protocols (consistent with BLM policy), participants in monitoring and assessment activities, and who will pay for the monitoring.

Step B: Project-Level Monitoring and Assessment. The project is monitored and data are assessed in accordance with the Project-Level AM Plan. Monitoring data are collected, analyzed, and interpreted as prescribed in the Project-Level AM Plan, and conclusions are documented. Volunteers or other public land users may provide additional monitoring information. Communication with the public during the monitoring phase, including public disclosure of the monitoring results, will be in accordance with the provisions prescribed in the RMP and the Project-Level AM Plan.

Step C: Change Determination. A change in management is triggered at the project level when a project is not meeting the agreed-upon outcomes for that project. After the appropriate monitoring is carried out as prescribed in the Project-Level AM Plan, the monitoring data are evaluated against the outcomes established in that specific plan, and results are documented. Similar to the system-level approach, a series of questions need to be explored based on the observations of the project-level assessment. Were thresholds exceeded? Is the outcome being achieved? Is adaptive management triggered? What is the cause for not achieving the outcome? What is the appropriate action to take to achieve the outcome? Is supplemental NEPA required? The BLM addresses these questions are addressed with input from other agencies, stakeholder groups, or the public. Based on observations from the assessment, alternative actions would be proposed that could be taken to correct the problem. Communication and consultation with the public during the evaluation phase in accordance with the monitoring plan is important.

Closing the loop, or learning from past experience, is a critical aspect of AM. Some actions are reversible, so change can be made to the project to correct problems. For example, if a livestock permittee is not achieving the desired outcomes for the condition of vegetation on the allotment, changes could be made to the Project-Level AM Plan or livestock grazing permit to remedy the problem. However, other BLM-permitted actions may be irreversible. For example, a natural gas operator opts into an adaptive management plan for a gas well in sage-grouse winter range. Outcomes are designed to measure disturbance to the birds. If these outcomes are not met, obviously it is too late to move the well. Instead, the BLM would be committed to learning from this experience and would not authorize another project in a similar circumstance.

Step D: Make Project-Level Changes. After the BLM determines a course of action, changes may need to be made to the individual project. These changes could be accomplished by making changes to the Project-Level AM Plan. However, as illustrated by the divergent arrows following the Change Determination box in Figure 1, changes may also need to be made to the system-level approach or system-level documents (the RMP or AGD). Making changes at the project level could include altering any of the four elements of a Project-Level AM Plan, including requiring more or fewer strict outcomes, changing indicators or trigger points if science proves them inappropriate, monitoring at a greater frequency, or discontinuing AM and falling back to the prescription in the RMP or other relevant document (e.g. livestock grazing permit or transportation plan).

To the degree that the original NEPA document analyzes changes to an outcome, no additional NEPA should be required. If those changes have not been previously analyzed, supplemental NEPA will be required. The BLM would determine if the new proposed action is expected to be consistent with achieving the identified outcome. If it is, no new NEPA may be required. The BLM interdisciplinary team would review the action, determine if NEPA is required, and document it in the existing project file.

2.3 Situations Where Change is Triggered

This section summarizes situations in which management change could be triggered. The following situations could prompt a change in the system-level framework:

- A system-level assessment indicates one or more watersheds are not meeting standards. The BLM, with input from the multi-stakeholder group, determines that a change in management is needed to correct the problem at the watershed(s) or at the larger landscape level.
- An individual project, or a series of similar projects, indicates a problem in the system-level documents (RMP or AGD). For example, in learning from individual projects, it is determined that a prescription in the RMP is inappropriate (either too stringent or not stringent enough).

The following circumstances would trigger a change at the project level:

- The project-level outcomes, which are specified in a Project-Level AM Plan, are not being met.
- The only solution or the best solution available to correct a problem observed at the system level is to change management of individual projects.

2.4 Employing the Fallback Prescription

The concept of being able to fall back to a defined prescription is an important element of a successful AM framework for several reasons. First, lease stipulations—one type of prescription—for oil and gas leases need to be placed on the lease at the time of purchase. Stipulations cannot be added later. Secondly, prescriptions need to be in place if monitoring is not possible because AM does not work without monitoring. Finally, some partners have expressed a need to choose whether to manage a project adaptively or to simply abide by the prescriptions.

This appendix describes a number of situations where the fallback prescription would be employed. A list of potential situations where a fallback to prescriptions might be warranted include—

- The project proponent or BLM chooses not to employ AM for a project.
- The project does not meet all of the criteria in the AM filter.
- Resources are initially identified for monitoring; therefore, the project meets the criteria in the AM filter. However, at a later point, the funds are not available to continue the agreed-upon monitoring and assessment.
- A project-level assessment indicates that project-level outcomes are not being met, and no acceptable change options can correct the problem other than discontinuing the AM approach for that project.
- A system-level assessment indicates that a larger problem exists in the landscape, and no acceptable change options can correct the problem other than discontinuing certain AM projects.

The intent is not for these prescriptions to conflict with an AM framework. As described in the project-level framework, as long as criteria in the AM filter are met, certain prescriptions can be temporarily waived in favor of adopting performance-based outcomes for that project.

2.5 Hypothetical Scenarios

The following are several hypothetical AM scenarios to clarify the AM process described in this appendix.

Scenario #1: Project-level outcomes are being achieved, but system-level monitoring concludes the watershed is not meeting standards.

A livestock grazing permittee approaches the BLM with the need for some flexibility in seasons of use. BLM runs the project through the AM filter and it meets each criterion. A Project-Level AM Plan is developed and the grazing AM project is approved. The Project-Level AM Plan details the outcomes to be achieved, indicators, and a monitoring schedule. For the first 2 years, the permittee meets the outcomes and the AM process continues.

During the third year of the project, an assessment of that watershed is performed. The Landscape Health Assessment indicates that the watershed is not meeting standards for Standard 1 (upland soils) or Standard 2 (riparian health). The BLM interdisciplinary (ID) team, with available advisory group input, determines that increased off-highway vehicle (OHV) use in the area is causing the problem. This triggers Step 3 in the system-level approach. The BLM and stakeholders outline several management options to alleviate the effects of OHV use.

Employing a common sense approach to standards, the grazing AM project would be allowed to continue because project-level outcomes were being met and livestock grazing was not causing the larger problems in the watershed. The project would be allowed to continue as long as the specific project-level outcomes are met and subsequent system-level watershed assessments do not indicate livestock grazing is the reason the watershed is not meeting standards.

Scenario #2: System-level assessments indicate that a watershed is meeting standards, but project-level outcomes are not being achieved.

A livestock grazing permittee approaches the BLM with the need for some flexibility in seasons of use. The project is run through the AM filter and it meets each criterion. A Project-Level AM Plan is developed and the grazing AM project is approved. The Project-Level AM Plan details the outcomes to be achieved, indicators, and a monitoring schedule. For the first year, the permittee meets the outcomes and the AM process continues.

During the second year of the project, an assessment of the watershed is performed. The Landscape Health Assessment indicates that the watershed is meeting standards. The Landscape Health Assessment is filed for later integration into the System-Level Assessment Document to be developed 4 years later.

Also during the second year of the livestock grazing AM project, monitoring indicates that the permittee is not meeting the agreed-upon outcomes. This triggers the next step in the project-level process: change determination. Possible courses of action to rectify the problem are developed in coordination with the multi-stakeholder group, which takes into account trends over the larger landscape. Is drought contributing to the permittee not achieving the outcomes? What about wildlife use? If other issues are not a factor, BLM could determine that the AM project must cease and the fallback prescription—in this case, the terms and conditions dictated in the livestock grazing permit—would be enforced. However, even if a situation were not the fault of the permittee, such as drought, BLM may still need to take action, including employing the fallback prescription if necessary.

Scenario #3a: Project-level outcomes are being achieved and system-level monitoring does not indicate the gas development is contributing to the watershed not meeting standards.

A gas company proposes to drill a well in big game winter range. A specific Project-Level AM Plan is drawn up, which contains multiple outcomes that must be achieved relative to animal disturbance and maintenance of certain aspects of the habitat. Other factors are taken into consideration before the project can proceed, such as current wildlife population trends, the importance of the particular area to wildlife, and, possibly, a commitment to perform offsite mitigation to enhance big game habitat in other areas. BLM consults with Colorado Division of Wildlife (CDOW) biologists. Once the plan is agreed to by the

operator and BLM, the BLM grants a one-time exception to the big game winter range timing stipulation. The well is drilled and all requirements of the Project-Level AM Plan are met.

The watershed in which the well lies is assessed, and it is determined that it is meeting standards. The next year, the same company comes to the BLM with another APD and asks for the big game winter range stipulation to be excepted again. Upon consultation with CDOW and the available multi-stakeholder group, the BLM could again allow winter drilling, as long as the operator is meeting the outcomes and subsequent system-level watershed assessments do not indicate gas development is contributing substantially to the watershed not meeting standards.

Scenario #3b: BLM integrating lessons learned into the AM process.

Similar to Scenario #3a, a gas company and BLM agree on a Project-Level AM Plan to drill during the big game winter range timing stipulation. However, in this scenario, the specific outcomes for that project are not being met. Monitoring data show that drilling the well affected big game or big game habitat. BLM must now integrate this information it into the AM process. In this scenario, BLM would document that the agency would not grant an exception to the big game winter range stipulation again in similar circumstances. BLM would detail the context in which this project was developed so the same mistake would not occur again.

Scenario #4: The five year system-level assessment indicates that habitat is being impacted by cumulative effects.

Five years after the ROD is signed, the BLM performs a system-level assessment. Landscape Health Assessments for each of the 16 watersheds are compiled and summarized. A cumulative analysis is carried out as part of the assessment. Together with its partners and available multi-stakeholder groups, BLM examines cumulative effects, such as habitat fragmentation over the landscape, by looking at route densities and wildlife movement patterns. BLM finds that big game is being negatively impacted by habitat fragmentation. These observations are recorded in a 5-year System-Level Assessment Report.

BLM and other interests then begin working on solutions to address the issues raised in the cumulative analysis. The BLM proposes several courses of action to correct the problem. Some recommendations might aim to change management at the project level (such as recommending conditions of approval that would reduce fragmentation); other solutions might entail changing decisions in the RMP or the AGD.

LAND HEALTH ASSESSMENT (LHA) FORM

Examiner(s)_____ Landscape_____ Date_____
Assessment Exam No._____ Allot./Pasture/Stream/Site_____Range Site_____
Location: LL/UTM _____ Photo/Object/Direction_____
Aspect_____ Slope_____Other Factors/Conditions_____

Description of resources/Rationale for Determination Standard Indicator		Applicable Standards, not shaded (Met, Not Met, N/A)				
		Upland Soils	Riparian/Wetland	Native Species	Special Status Species	Water Quality
1) Species Diversity: Low, Medium, High Dom. Cover spp.:_____ 2nd.:_____ Plant composition appropriate for site? Yes____No_____ Photo #s_____	Key species appropriate for site? Yes___ No____ Where appropriate, age class and structure of woody/or perennial species composition contribute to desired objectives? Yes____ No_____					
2) Plant Density and Production Overall density of dom. spp. Low____ Med____ High____	Is the density and production of key spp. appropriate for site? Yes____ No_____ Explain: Is the density and production of key spp. adequate to provide resilience from human activities? Yes_____ No_____ Explain:					
3) Surface Soil Characteristics Soil Movement C1 C2 C3 C4 C5 Surface litter C1 C2 C3 C4 C5 Surface rock C1 C2 C3 C4 C5 Pedestalling C1 C2 C3 C4 C5 Rills C1 C2 C3 C4 C5 Flow patterns C1 C2 C3 C4 C5 Gullies C1 C2 C3 C4 C5 Average Condition Class _____	Is there minimal evidence of accelerated erosion in the form of rills, gullies, pedestalling of plants or rocks, flow patterns, physical soil crusts/surface sealing, or compaction layers below the soil surface? Yes____ No_____ Explain if yes! Is canopy and ground cover adequate to protect from accelerated erosion? Yes_____ No_____ N/A_____ Explain:					
4) Upland swales present? Yes____ No____	Do upland swales contain a greater density of vegetative cover than the surrounding uplands? Yes____ No_____ Explain:					
5) Cryptogams present? Yes____No_____N/A_____ One___or Several___;Intact___ or Fragmented____	Are biological (microphytic or cryptogrammic) soil crusts in place where appropriate and not excessively fragmented? Yes___ No____					
7) Any non-native plant and animal species? Sp.:_____Acceptable level?Yes____No _____ Sp.:_____Acceptable level?Yes____No _____ Sp.:_____Acceptable level?Yes____No_____ Sp.:_____Acceptable level?Yes____No_____	Is the level of non-native species (plant/animal) acceptable? Yes____ No_____					
8) Any noxious/invasive species? Sp.:_____Acceptable level?Yes____No____ Sp.:_____Acceptable level?Yes____No____ Sp.:_____Acceptable level?Yes____No____ Sp.:_____Acceptable level?Yes____No____	Are noxious and invasive species at an acceptable level? Yes____ No_____ N/A_____					

Description of resources/Rationale for Determination Standard Indicator		Applicable Standards, not shaded (Met, Not Met, N/A)				
		Upland Soils	Riparian/Wetland	Native Species	Special Status Species	Water Quality
9) Any special status species? Circle ans. SSS:_____ Up Down Stable Habitat:Good Fair Poor Connected: Y N Why?? SSS:_____ Up Down Stable Habitat:Good Fair Poor Connected: Y N Why?? SSS:_____ Up Down Stable Habitat:Good Fair Poor Connected: Y N Why??	If special status species are present, are they healthy and in numbers that appear to ensure stable to increasing populations? Explain: Are habitat areas large enough to support viable populations or connected adequately with other similar habitat areas? Explain:					
10) Wildlife habitat quality acceptable? Yes__ No__ Seral stage appropriate? Yes__ No__ NA_ Structure: Good Fair Poor Why? Patch size: adequate inadequate	Do wildlife habitats include seral stages, vegetation structure, and patch size to promote diverse and viable wildlife populations?					
11) PFC Checklist, Lentic or Lotic _____% habitat at PFC _____% habitat at risk (up, down, static) _____% habitat Non-Functional	Are Riparian/Wetland Habitat(s) in Proper Functioning Condition?					
12) Aquatic organisms and plants appropriate for site? Yes___ No___ Any invertebrates? Yes___ No___ Do they indicate: Good quality or Poor Quality Fish present? Yes__ No__ Algae present? Yes___ No___	Do aquatic organisms and plants (macro-invertebrates, fish, algae, and plants) indicate support for beneficial uses? Describe types of organisms found or types of organisms that would be expected to be present and are not.					
13) Is riparian/wetland quality acceptable? Yes___ No___ NA____	Does riparian/wetland quality contribute to beneficial uses?					
14) Surface water present? Yes____ No____	Does surface water contain only substances (sediment, scum, floating debris, odor, heavy metal precipitates) attributable to humans within the amounts and concentrations allowable by State of Colorado Water Quality Standards? Yes____ No_____ Explain:					

Narrative Section: (Note any disturbances such as fire, flood, insects (or lack of, esp. pollinators), cattle, horses, etc. and obvious lack of key resources)

Species Diversity:_____

Surface Soil Characteristics:_____

For those indicators rated as "Not Met", describe those factors that are contributing to the rating (e.g. livestock grazing, roads, OHV activity, etc.)_____

SPECIES LIST

Circle species present and list additional species below

Shrubs	*Forbs*	*Grasses*	*Trees*
Wyoming big sagebrush	Arrowleaf balsamroot	Sandberg bluegrass	Utah juniper
Basin big sagebrush	Stemlessless goldenweed	Kentucky bluegrass	Pinon pine
Fringed sagebrush	Penstemmon	Western wheatgrass	Ponderosa pine
Black sagebrush	Wild onion	Streambank wheatgrass	Lodgepole pine
Budsage	Sego lily	Slender wheatgrass	Aspen
Shadscale saltbush	Lupine	Bluebunch wheatgrass	
Nuttall's saltbush	Astragalus	Crested wheatgrass	
Four-wing saltbush	Winterfat	Needle-and-thread	
Greasewood	Kochia	Squirreltail	
Bitterbrush	Ephedra	Indian ricegrass	
Green rabbitbrush	Yarrow	Prairie junegrass	
Rubber rabbitbrush		Basin wildrye	
		Galleta	
		Sixweeks fescue	

Soil Characteristics Form Date_____ Examiner(s)_____
Allotment/Landscape Name_____ Assessment Exam No._____

	C5	C4	C3	C2	C1
Soil Movement	No visual evidence of movement 0 1 2 3	Some movement of soil particles 4 5	Moderate movement of soil is visible and recent, slight terracing generally less than 1" in height 6 7 8	Movement occurs with each event. Soil and debris deposited against minor obstructions. 9 10 11	Subsoil exposed over much of area, may have embryonic dunes and wind scoured depressions. 12 13 14
Surface Litter	Accumulating in place 0 1 2 3	May show slight movement 4 5 6	Moderate movement is apparent, deposited against obstacles 7 8	Extreme movement apparent, large and numerous deposits against obstacles 9 10 11	Very little remaining litter (use care on low productive sites) 12 13 14
Surface Rock	If present, surface rock or fragments are evenly distributed 0 1 2	If present, surface rock or fragments have a spotty distribution created by surface water flow 3 4 5	If present, surface rock or fragments have a poorly developed distribution pattern 6 7 8	If present, surface rock or fragments exhibit some movement and accumulation of smaller fragments behind obstacles 9 10 11	If present, surface rock or fragments are dissected by rills and gullies or are already washed away 12 13 14
Pedestalling	No visual evidence of pedestalling 0 1 2 3	Slight pedestalling, in flow patterns 4 5 6	Small rock and plant pedestals occurring in flow patterns 7 8 9	Rocks and plants on pedestals generally evident, plant roots exposed 10 11	Most rocks and plants pedestalled and roots exposed 12 13 14
Rills	No visual evidence of rills 0 1 2 3	Some rills in evidence but less than ½" deep at infrequent intervals over 10' 4 5 6	Rills ½" to 6" deep occur in exposed places at approximately 10' intervals 7 8 9	Rills ½" to 6" deep occur in exposed intervals of 5' to 10' 10 11 12	May be present at 3" to 6" deep at intervals less than 5' 13 14
Flow Patterns	No visual evidence of flow patterns 0 1 2 3	Deposition of particles may be in evidence 4 5 6	Well defined with intermittent deposits 7 8 9	Flow patterns contain silt and sand deposits and alluvial fans 10 11 12	Flow patterns are numerous and readily noticeable. May have large barren fan deposits 13 14 15
Gullies	May be present in stable condition. Vegetation on channel bed & side slopes. 0 1 2 3	A few gullies in evidence which show little bed or slope erosion. Some vegetation is present on slopes. 4 5 6	Gullies are well developed with active erosion along less than 10% of their length 7 8 9	Gullies are numerous and well developed with active erosion along 10-15% of their lengths or a few well developed gullies with active erosion along more than 50% of their length 10 11 12	Sharply incised gullies cover most of the area and over 50% are actively eroding 13 14 15
Subtotal					
Total=		Erosion condition classes: Stable 0-20 (C5); Slight 21-40 (C4); Moderate 41-60 (C3); Critical 61-80 (C2); Severe 81-100 (C1)			

Narrative or notes: