APPENDIX A

Best Management Practices

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List of Acronyms

BMP	best management practice
COR	Contracting Officer's Representative
CFR	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
ER	Engineering Representative
FERC	Federal Energy Regulatory Commission
Forest Plan	Santa Fe National Forest Plan
FSH	Forest Service Handbook
FSM	Forest Service Manual
ID	interdisciplinary
IRM	Integrated Resource Management
NEPA	National Environmental Protection Act
NFS	National Forest System
SAM	Sale Area Map
SPCC	Spill Prevention Control and Countermeasures
STORET	EPA STOrage and RETrieval
SWCP	Soil and Water Conservation Practices
TES	Terrestrial Ecosystem Survey
TSA	timber sale administrator
USDA	U.S. Department of Agriculture
USFS	USDA Forest Service

A. BEST MANAGEMENT PRACTICES

A.1 INTRODUCTION

Best management practices (BMPs) are the primary mechanism to enable the achievement of water quality standards (U.S. Environmental Protection Agency [EPA] 1987). BMPs include, but are not limited to, structural and non-structural controls and operations and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 Code of Federal Regulations [CFR] 130.2, EPA Water Quality Standards Regulation). Usually BMPs are applied as a system of practices rather than a single practice. BMPs are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility.

The U.S. Department of Agriculture (USDA) Forest Service (USFS) employees in the Santa Fe National Forest incorporate BMPs as outlined in the Region 3, Soil and Water Conservation Practices (SWCP) Handbook (Forest Service Handbook [FSH] 2509.22) into all land use and project plans as a principal mechanism for controlling nonpoint pollution sources, meeting soil and water quality goals, and protecting beneficial uses. New Mexico State Water Quality Standards require the use of BMPs as the controlling mechanism for nonpoint pollution. Use of BMPs is also required in the Santa Fe National Forest Plan (Forest Plan). Listed below are the key soil and water conservation practices:

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The SWCP described herein are tiered to the practices in FSH 2509.22. They were developed as part of the National Environmental Policy Act (NEPA) process and meet state and forest water quality objectives. SWCP are used during the Southwestern Region's Integrated Resource Management (IRM) process to create BMPs for each project. The Southwestern Region's IRM process is a 13-step, interdisciplinary approach used to design, implement, and monitor projects identified in Forest Land and Resource Management Plans. The purpose of this appendix document is to establish the connection between the SWCP commonly employed by the USFS and BMPs identified in New Mexico Water Quality Standards (New Mexico Administrative Code 6.1).

A.2 BMP IMPLEMENTATION PROCESS

In cooperation with the state of New Mexico, the USFS's primary strategy for the control of nonpoint sources is based on the implementation of BMPs determined necessary for the protection of the identified beneficial uses.

The Forest Service Nonpoint Source Management System consists of:

- BMP selection and design based on site-specific conditions; technical, economic and institutional feasibility; and the designated beneficial uses of the streams
- BMP application
- BMP monitoring to ensure that they are being implemented and are effective in protecting designated beneficial uses
- Evaluation of BMP monitoring results
- Feeding back the results into current/future activities and BMP design

The District Ranger is responsible for insuring that this BMP feedback loop is implemented on all projects.

A.3 BMP SELECTION AND DESIGN

Water quality goals and objectives are identified in the Forest Plan (pages 12-13 and 20). These goals and objectives meet or exceed applicable legal requirements, including state water quality regulations, the Clean Water Act, and the National Forest Management Act. Environmental assessments for projects are tiered to Forest Plans, using the NEPA process.

Appropriate BMPs are selected for each project by an interdisciplinary (ID) team. Each time BMPs are applied to a new location, flexibility is allowed to design different BMPs depending on the local conditions and values, and the downstream beneficial uses of water.

BMP selection and design are dictated by water quality objectives, soils, topography, geology, vegetation, and climate. Environmental impacts and water quality protection options are evaluated and alternative mixes of practices are considered. A final collection of practices are selected that not only protect water quality but meet other resource needs. These final selected practices constitute the BMPs.

A.4 BMP APPLICATION

The BMPs are translated into contract clauses, special use permit requirements, project plan specifications, and so forth. This ensures that the operator or person responsible for applying the BMP is required to implement it. The site-specific BMP prescriptions are taken from plan-to-ground by a combination of project layout and resource specialists (hydrology, fisheries, soil, geology, etc.). This is when final adjustments to fit the BMP prescriptions to the site are made before implementing the resource activity.

A.5 BMP MONITORING

When the resource activity (i.e., timber harvest or road construction) begins, timber sale administrators (TSA), engineering representatives, resource specialists, and others ensure that the BMPs are implemented according to plan. BMP implementation monitoring is done before, during, and after resource activity implementation. Once BMPs have been implemented, sample monitoring is done by the District Hydrologist to evaluate if BMPs are effective in meeting management objectives and protecting water beneficial uses.

A.6 BMP MONITORING EVALUATION

The technical evaluation/monitoring described above will determine how effectively BMPs protect and/or improve water quality. Water quality standards and conditions of the beneficial uses of water will serve as one evaluation criteria. If the evaluation indicates that water quality standards are not being met and/or beneficial uses are not being protected, corrective action will consider the following three components:

- The BMP: Is it technically sound? Is it really best, or is there a better practice that is technically sound and feasible to implement?
- The implementation program or processes: Was the BMP applied entirely as designed? Was it only partially implemented? Were personnel, equipment, funds, or training lacking that resulted in inadequate or incomplete implementation?
- The state water quality criteria: Do the parameters and criteria that constitute water quality standards adequately reflect human-induced changes to water quality and beneficial uses?

Feedback of the results of BMP evaluation is both short and long term in nature. Where corrective action is needed, immediate response will be undertaken. This action may include modification of the BMP, modification of the activity, ceasing the activity, or possible modification of the state water quality standards. Cumulative effects over the long term may also lead to the need for possible corrective actions. The District Ranger is responsible for insuring that this BMP feedback loop is implemented on all projects.

A.6.1 Format of the BMPs

The SWCP are described as follows:

- *Title:* Includes the sequential number of the practice and a brief title.
- *Objective:* Describes the desired results or attainment of the practice as it relates to water quality protection.
- *Explanation:* Further defines the brief title and expresses how the practice is applied. Describes criteria or standards used when applicable.
- *Implementation:* Describes where the practice is applied, who is responsible for application, direction, and supervision, and when the practice is employed.

A.6.2 Items Common to all Soil and Water Conservation Practices

A.6.2.1 Responsibility for Implementation

The District Ranger (through the Presale Forester) is responsible for insuring that the factors identified in the following SWCP are incorporated into: Timber Sale Contracts through the inclusion of proper B and/or C provisions, or Public Works Contracts through the inclusion of specific contract clauses.

The Contracting Officer, through his/her official representative (TSA and/or Engineering Representatives for Timber Sale Contracts; and Contracting Officer's Representative (COR) for Public Works Contracts) is responsible for ensuring that the provisions are properly administered on-the-ground.

A.6.2.2 Monitoring

Unless otherwise noted, the SWCP will be monitored by the TSA as part of BMP Implementation Monitoring of timber sale activities, and by the COR on public works road construction work.

A.6.2.3 Practice 24.10—Timber Harvest Unit Design

Objective: To ensure that timber harvest cutting unit design will secure favorable conditions of water flow and water quality.

Explanation: This is an administrative and preventative practice. The proposed timber harvest units are evaluated to estimate the response of the watersheds involved to the proposed timber sale. This includes a field examination of the ability of the watershed to absorb the impacts of the proposed harvest. Characteristics to be evaluated can include the recovery from past harvests; the protection of channels; the number, size, and location of harvest units; estimated location and size of roads and skid trails; logging system design; the condition of the protective ground cover in filter strips; and the potential natural recovery rate of the watershed. Where adverse water quality impacts and undesirable streamflows can result, the harvest unit design should be modified, and/or the natural recovery rate can be accelerated using watershed treatment measures.

Implementation: The hydrologic survey and evaluation of proposed timber harvest are accomplished through the IRM process. Incorporate prescriptions to ensure acceptable conditions of water flow into the project plan.

On-the-ground accomplishment of the project plan direction is carried out by the District Timber Sale Preparation Forester, the TSA, and the administrator of sale slash disposal and cultural activities, with follow-up review by qualified resource specialists. Identify the need for water quality monitoring in the project plan when necessary for water quality control.

A.6.2.4 Practice 24.11—Use of Terrestrial Ecosystem Survey Timber Harvest Limitation Rating

Objective: To identify severe and moderate erosion hazard areas and other soil limitations in order to adjust treatment measures to prevent downstream water quality degradation.

Explanation: This is a preventative practice. The Region 3 Terrestrial Ecosystem Survey (TES) contains a Timber Harvest Limitation rating that evaluates the potential erosion and soil disturbance hazards resulting from timber harvest. Moderate and severe ratings point to the need to consider various mitigation measures to improve and maintain water quality in order to comply with federal and state water quality standards, such as minimizing the use of ground-disturbing equipment or restrictions on operating season.

Implementation: Timber Harvest Limitation ratings are available through published TESs or can be made by soil scientists or other personnel specifically trained to perform these evaluations. Such information is then utilized in the IRM project design process.

A.6.2.5 Practice 24.12—Use of Sale Area Maps for Designating Water Quality Protection Needs

Objective: To delineate the location of protection areas and available water sources as a guide for both the Purchaser and the TSA, and to ensure their recognition and proper consideration and protection on-the-ground.

Explanation: The following features are designated on the Sale Area Map (SAM), which is an integral part of the Timber Sale Contract:

- Location of non-riparian ephemeral and intermittent streamcourses to be protected with filter strips
- Wetlands (wet meadows, lakes, potholes, and other riparian areas) that have a riparian streamside management zone or a filter strip to protect them
- Boundaries of harvest units
- Specified roads
- Roads where log hauling is prohibited or restricted (for example, roads located in filter strips and streamcourses)
- Structural improvements
- Areas where method of skidding and yarding is designated
- Sources of rock for road work, riprapping, etc.
- Water sources available for Purchaser's use
- Other features required by Division "C" contract provisions

This is an administrative and preventative practice.

Implementation: The IRM process results in identification of these and other features. The Sale Preparation Forester will include them on the SAM at the time of contract preparation. The areas are reviewed on-the-ground by the Purchaser and the TSA prior to harvesting.

A.6.2.6 Practice 24.13—Limiting the Operating Period of Timber Sale Activities

Objective: To ensure that the Purchaser conducts operations, including, but not limited to, erosion control work, road maintenance, and log landing drainage in a timely manner, within the time period specified in the Timber Sale Contract.

Explanation: The C6.3 "Plan of Operation" provision is required in all Timber Sale Contracts. This provision states that the Purchaser must submit a general plan of operation, which will set forth planned periods for and methods of road construction, timber harvesting, completion of slash disposal, erosion control work, and other contractual requirements. USFS written approval of the Plan of Operation is a prerequisite to the commencement of the Purchaser's operation.

The contract provision B6.31 "Operation Schedule" requires that the Purchaser shall provide an annual schedule of anticipated activities such as road maintenance and erosion control work.

Provision B6.6 can be used to suspend operations because of wet or saturated soils in order to protect soil and water resources.

Implementation: Limited operating periods are identified and recommended during the IRM process. The Sale Preparation Officer prepares the contract to include provision C6.314. Provisions B6.3, B6.31, and C6.3 are all mandatory provisions of the Timber Sale Contract. Provision C6.3 is only mandatory for sales over a 2-year contract period. The Purchaser must submit a general plan and annual plans to the USFS. The Purchaser may commence operations only after written USFS approval of the general plan under provision C6.3.

A.6.2.7 Practice 24.14—Protection of Extremely Unstable Lands

Objective: To provide for special treatment of unstable areas or soils with severe erosion hazard and thereby avoid unacceptable erosion and sedimentation.

Explanation: This practice is an administrative and preventative control. Where extremely unstable lands (landslide areas) and highly erodible soils (severe erosion hazard) are delineated, they are taken out of the suitable forest lands category and are reclassified as unsuitable forest land. Using existing harvesting technologies, unsuitable forest lands cannot be managed for timber production because irreversible damage to soils, productivity, or watershed conditions may occur. Timber harvesting is deferred until improved harvesting technologies are developed and proven.

A.6.2.8 Practice 24.15—Prescribing the Size and Shape of Even-Age Regeneration Cuts

Objective: To control the physical size and shape of even-age regeneration cuts as a means of reducing stream sedimentation.

Explanation: This is an administrative and preventative practice. The National Forest Management Act, October 22, 1976, Section 6, contains the following:

> "(F) ensure that clearcutting, seed tree cutting, shelterwood cutting and other cuts designed to regenerate an even-aged stand of timber will be used...only where...(iv) they are established according to geologic areas, forest types, or other suitable classifications the maximum size limits for areas to be cut in one harvest operation including provision to exceed the established limits after appropriate public notice and review by the responsible Forest Service officer one level above the Forest Service officer who normally would approve the harvest proposal: Provided, that such limits shall not apply to the size of areas harvested as a result of natural catastrophic conditions such as fire, insect and disease attack, or windstorm; and (v) such cuts are carried out in a manner consistent with the protection of soil, watershed, fish, wildlife, recreation, and esthetic resources, and the regeneration of the timber resource."

The limitation on even-age regeneration cut opening size in the Southwestern Region is 40 acres, unless the Regional Forester approves a specific request for a larger unit.

Implementation: The size and the shape of the proposed even-age regeneration units shall be reviewed on-the-ground in the IRM process. A map showing proposed units is included in the sale plan, which is reviewed and approved by the appropriate line officer. The timber sale should not be delineated on-the-ground (roads staked, timber marked) until after the NEPA document and sale plan is approved.

A.6.2.9 Practice 24.16—Streamside Management Zone (Filter Strip) Designation

Objective: To designate a zone along streams (including ephemeral and intermittent streams, wet areas, meadows, riparian areas, or any area that has the hydrological characteristics of carrying water on or near the surface and that the delivery of sediments to this area can effect water quality) where management actions are designed to minimize adverse effects on water and related resources.

Explanation: Factors such as stream class, existing ground cover conditions, soil erosion hazard, channel aspect, channel stability, side slope steepness, and slope stability are considered in determining the constraints of activities and width of streamside management zones. Fisheries habitat condition and its estimated response to the proposed activities are also evaluated in determining the need for and width of the streamside management zone. The streamside management zone is not a zone of closely managed activity. It is a zone that acts as an effective filter and absorptive zone for sediment, maintains shade, protects aquatic and terrestrial riparian habits, protects channel and streambanks, and promotes floodplain stability.

Implementation: Identify the streamside management zone requirements during the IRM process. Contracted projects are implemented by contractors or operators. Compliance with environmental analysis criteria, contract specification, and operating plans is ensured by the COR or TSA.

A.6.2.10 Practice 24.17—Determining Tractor Loggable Ground

Objective: Comply with federal and state water quality standards when tractor logging.

Explanation: This practice is intended to minimize soil erosion, subsequent sedimentation, and water quality degradation. The Timber Harvest Limitation rating provided by the TES is the basic method of determining tractor loggable ground.

Implementation: The TES is utilized by a trained and qualified USFS representative during the on-the-ground assessment of the timber sale. Consider the resulting Timber Harvest Limitation rating during the selection of logging and silvicultural methods and use it in determining acceptable intensity of and restrictions for land-disturbing activities. Give interpretations of the considerations in the NEPA documentation. Provisions in the Timber Sale Contract specify the areas determined by the TES upon which tractors can operate.

Tractor logging is generally not permitted on slopes exceeding 40 percent. Exceptions may be made after a thorough investigation of on-site conditions and inclusion of special specified mitigation prescriptions in the Timber Sale Contract. Tight administrative control of such operations is also required.

A.6.2.11 Practice 24.18—Tractor Skidding Location and Design

Objective: To minimize erosion and sedimentation by designing skidding patterns to best fit the terrain. To maintain the integrity of the streamside management zones, riparian areas, and other sensitive watershed areas.

Explanation: This is a preventative practice. The watershed factors that are considered include slope, soil stability, exposure, vegetative cover, and any factor that may affect the peak flow and sediment yield potential of the land. The careful control of skidding patterns serves to minimize on-site erosion and downstream channel damage by preventing the concentration of runoff in skid trails.

- Proper skid pattern management involves such things as locating skid trails to avoid streamcourses and restriction of skidders to designated trails.
- Two complementary methods of complying with water quality standards when tractor skid trails are design:
  - End-Lining. This method involves winching the log directly out of the sensitive areas (streamside management zone, wet meadow, riparian area, and so forth) with a cable operated from outside the sensitive area.
  - Felling To The Lead. This method involves felling trees toward a predetermined skid pattern. Soil disturbance, compaction, and residual stand and site damage are minimized when this method is used.

Implementation: For skid trail design, identify and evaluate sensitive areas in the environmental assessment review during the IRM process. A special Timber Sale Contract provision can be included in the Timber Sale Contract for the location of skid trails. The TSA locates the skid trails with the timber Purchaser or by agreeing to the Purchaser's proposed locations prior to construction. Guidelines for skid trail locations are referenced in the sale plan, the TSA Handbook (FSH 2409.23), the Timber Sale Contract, and on the Presale Cutting Unit Summary card (R3-2400-50).

A.6.2.12 Practice 24.19—Suspended Log Yarding in Timber Harvesting

Objective: To protect the soil mantle from excessive disturbance. To maintain the integrity of the streamside management zone, riparian areas, and other sensitive watershed areas.

Explanation: Suspended log yarding includes cable or aerial yarding systems that suspend logs either partially or wholly off of the ground. The systems are used on steep slopes or other areas sensitive to excessive disturbance. All of the systems result in less soil disturbance since heavy machinery is not used over the sale area. In most cases these systems require fewer roads. Fewer roads and less soil disturbance will result in less impact on the water resource.

Implementation: Areas where suspended log yarding is to be used shall be determined during the pre-sale planning process and designed in the sale plan. The specific systems are included in the contract and designated on the SAM by the Sale Preparation Officer. The TSA shall oversee the project operation using the guidelines and standards established in the Timber Sale Contract and Sale Administration Handbook with reference to the sale plan.

A.6.2.13 Practice 24.20—Log Landing Location

Objective: To locate landings so creation of unsatisfactory watershed conditions that lead to water quality degradation is avoided.

Explanation: This practice is both administrative and preventative. Location of all landings shall be agreed to by the USFS and Purchaser prior to construction. The following criteria are used in evaluating landings:

- The cleared or excavated size of landings shall not exceed that needed for safe and efficient skidding and loading operations
- Landing locations are selected that minimize the amount of excavation and on-site soil loss
- Where possible, landings are located so that felled timber lying between drainages can be skidded to the landing without crossing channels
- Landings are located where the least number of skid roads are required, and side cast will neither enter drainages nor damage other sensitive areas
- Landings are positioned such that the skid road approach will be nearly level or less than 3 percent grade, far enough back to allow for good drainage
- Landings are located so a minimum number of tractor roads enter the landing
- Landings are not located in streamside management zones

Implementation: Landing locations chosen by the contractor must be agreed to by the TSA. The TSA can negotiate with the Purchasers' representative to select mutually acceptable landing locations. To be an acceptable landing, it must meet the above criteria. Should agreement not be reached, the decision of the USFS shall prevail within the limitations of law.

A.6.2.14 Practice 24.21—Erosion Prevention and Control Measures During Timber Sale Operations

Objective: To ensure that the Purchaser's operations shall be conducted reasonably to minimize soil erosion.

Explanation: Timber is purchased by individuals or companies who either harvest the timber themselves or contract harvest to other parties. Therefore, it is necessary to ensure that Purchasers understand and adhere to water quality prescriptions arrived at in the timber sale planning process. This is accomplished by setting forth the Purchaser's and the USFS's responsibilities in the Timber Sale Contract.

Implementation: Equipment shall not be operated when soil conditions are such that accelerated soil erosion will result. The kinds and intensity of control work required of the Purchaser shall be adjusted to soil and weather conditions and the need for controlling runoff. Erosion control work shall be kept current immediately preceding expected seasonal periods of precipitation or runoff.

If the Purchaser fails to do seasonal erosion control work prior to any seasonal period of precipitation or runoff, the USFS may temporarily assume responsibility for the work, and any unencumbered deposits may be used by the USFS to do the work.

A.6.2.15 Practice 24.22—Special Erosion Prevention Measures on Disturbed Land

Objective: To prevent accelerated on-site soil loss and sedimentation of streamcourses.

Explanation: This is an administrative and preventive treatment. When required by the contract, the Purchaser shall give adequate treatment by spreading slash or wood chips (or, by agreement, some other treatment) on portions of tractor roads, skid trails, landings, or temporary road fills. This provision is to be used only for sales that contain soil stabilization problems which are not expected to be taken care of by the normal methods prescribed under other contract provisions.

Implementation: The interdisciplinary (ID) team shall identify the treatment areas in the IRM process and in the timber sale plan. The District Timber Sale Preparation Officer shall identify the acreage to be treated in the legend of the SAM and prepare a special provision for the contract. The specific acreage to be treated shall be designated on-the-ground by the USFS.

A.6.2.16 Practice 24.23—Revegetation of Areas Disturbed by Harvest Activities

Objective: Establish a vegetative cover on disturbed sites to prevent accelerated on-site soil loss and sedimentation of streamcourses.

Explanation: Where soil has been severely disturbed by the Purchaser's operations, and the establishment of vegetation is needed to minimize erosion, the Purchaser shall take appropriate measures normally used to establish an acceptable vegetative groundcover, or take other agreed-upon stabilization measures.

This measure is applied in contracts where it is expected that disturbed soils in parts of the sale area will require vegetative cover for stabilization and the problems will not be mitigated by other contract provisions. Apply this measure on soil with moderate and severe erosion hazard ratings.

Implementation: Through the IRM process, an estimate of the need for vegetative cover is determined and included in the sale plan and in the timber sale appraisal. Where the establishment of vegetation is needed, use provision C6.6 in the Timber Sale Contract. The USFS shall designate on-the-ground the disturbed soils, such as skid trails, landings, and temporary roads, etc., that must be treated.

The USFS shall provide instructions as to soil preparation and the application of suitable seed mixtures, mulch, and fertilizer, and the timing of such work. It is the responsibility of the TSA to make sure that revegetation work is done correctly and in a timely manner.

A.6.2.17 Practice 24.24—Log Landing Erosion Prevention and Control

Objective: To minimize on-site soil loss and subsequent sedimentation of streamcourses from log landings.

Explanation: This practice employs administrative, preventive, and corrective controls to meet the objective. After landings have served the Purchaser's purpose, the purchaser shall ditch or slope the landings to permit the drainage and dispersion of water. Landings will be properly drained when constructed before timber sale operations begin. Provisions are also made for revegetation. Other provisions may include ripping, scarifying, smoothing and sloping construction of drainage ditches, prevention of water draining off roads from reaching a landing, spreading slash, covering with wood chips, or applying straw mulch. Unless agreed otherwise, cut and fill banks around landings shall be sloped to remove overhangs and otherwise minimize erosion. The specific work needed on each landing will depend on the actual ground conditions. As part of the IRM process the interdisciplinary team assesses the need for stabilization.

Implementation: Timber Sale Contract requirements provide for erosion prevention and control measures on all landings. It is the responsibility of the TSA to ensure that this practice is properly implemented on-the-ground.

A.6.2.18 Practice 24.25—Erosion Control on Skid Trails

Objective: To comply with federal and state water quality standards by minimizing on-site soil loss and sedimentation of streamcourses derived from skid trails.

Explanation: This practice employs preventive measures in order to meet the objective. The Timber Sale Contract requires the installation and maintenance of erosion control measures on skid trails, tractor roads, and temporary roads. Normally, the work involves constructing cross ditches and water spreading ditches. Grass seeding may also be required. This can be added to the Timber Sale Contract by use of contract clause C6.601. These areas are designated on-the-ground as logging and temporary access construction progresses.

Implementation: Location of all erosion control measures are designated and agreed to on-the-ground by the TSA. The TSA will identify site-specific preventive work to be required of the Purchaser. The Purchaser is obligated to maintain erosion control structures after construction, specified in contract provisions for 1 year unless maintenance need is caused by other National Forest users.

A.6.2.19 Practice 24.26—Meadow Protection during Timber Harvesting

Objective: To avoid unacceptable groundcover, a reduction of soil productivity, soil compaction, severe soil erosion, and water not being in compliance with federal and state water quality standards in meadows.

Explanation: This is an administrative and preventive action. Unauthorized operation of vehicular or skidding equipment in meadows that are designated on SAMs and marked on-the-ground is prohibited. Vehicular or skidding equipment shall not be used on meadows except where roads, landings, and tractor roads are approved. Unless otherwise agreed, trees felled into meadows shall be removed by end-lining. Logging slash shall be removed from the meadow.

Implementation: The concerns and constraints mentioned above are set forth in Timber Sale Contract requirements. It is the responsibility of the TSA to ensure that this practice is properly implemented on-the-ground.

A.6.2.20 Practice 24.27—Streamcourse Protection

Objective: To protect the natural flow of streams (including ephemeral and intermittent). To provide unobstructed passage of stormflows. To reduce sediment and other pollutants from entering streams. To restore the natural course of any stream as soon as practicable where diversion of the stream may occur as a result of timber management activities.

Explanation: This management practice employs administrative, preventive, and corrective measures to meet the objectives. The following points are fundamental to protecting streams and streamcourses:

- Location and method of streamcourse crossings must be agreed to prior to construction. This is done when locations of skid trails, tractor roads, and temporary roads are agreed on by the USFS and the Purchaser.
- Purchaser shall repair damage to a streamcourse, including damage to banks and channel.
- All timber sale debris shall be removed from streamcourses within 48 hours, unless otherwise agreed, and in an agreed manner that will cause the least disturbance.
- Equipment shall not operate within streamside management zones as determined in the IRM process. Streamside management zone boundaries may be modified by the TSA to meet unforeseen operation conditions.
- When ground skidding systems are employed, logs will be end-lined out of streamside management zones. Equipment is permitted to cross streamside management zones and streamcourses only at locations agreed to by the TSA and the Purchaser.
- Lead-out ditches, water bars, and other erosion control structures will be located to prevent channelizing drainage water directly into streamcourses. Energy dissipaters will be located at the end of these structures to spread the water. This allows the sediments to drop out and the water to infiltrate.

- Logs will be fully suspended in cable log harvesting operations within the streamside management zone when required.

- All streamcourses are to be protected with a streamside management zone.

Implementation: The TSA works with the Purchaser's representative to ensure that the Timber Sale Contract clauses covering the above items are carried out on-the-ground. Specialists can be called upon to help the TSA with decisions. In the event the Purchaser causes debris to enter streamcourses in amounts which adversely affect the natural flow of the stream, water purity, or fishery resources, the Purchaser shall remove such debris as soon as practicable, but not to exceed 48 hours, and in an agreed-upon manner that will cause the least disturbance to streamcourses.

A.6.2.21 Practice 24.28—Erosion Control Structure Maintenance

Objective: To ensure that constructed erosion control structures are stabilized and working.

Explanation: Erosion control structures are only effective when they are in good repair and stable condition. Once the erosion control structures are constructed and seeded, there is a possibility that they may not be adequately vegetated or they may be damaged by subsequent harvest activities or large storms. It is necessary to provide follow-up inspection and structural maintenance in order to avoid these problems and ensure adequate erosion control.

Implementation: During the period of the Timber Sale Contract, the Purchaser shall provide maintenance of soil erosion control structures constructed by the Purchaser until they become stabilized, but not for more than 1 year after construction. If erosion control structures are damaged by other National Forest uses, the Purchaser is not responsible.

The USFS may agree to perform such structure maintenance under B4.225 (Cooperative Deposits), if requested by the Purchaser, subject to agreement on rates. If the Purchaser fails to do seasonal maintenance work, the USFS may assume the responsibility and charge the Purchaser accordingly.

A.6.2.22 Practice 24.29—Acceptance of Timber Sale Erosion Control Measures Before Sale Closure

Objective: To ensure the adequacy of required erosion control work on timber sales.

Explanation: The effectiveness of soil erosion prevention and control measures is determined by the results found after sale areas have been exposed to the elements one or more years after a cutting unit or the entire timber sale has been closed. Although a careful check is required before a timber sale is closed to ensure that planned erosion work has been completed to the standard prescribed, the erosion prevention work done in previous years should be periodically inspected during the life of the timber sale. These inspections will help determine whether the planned work was adequate, if maintenance work is needed, the practicability of the various treatments used, and the necessity for modifying present standards or procedures.

Implementation: "Acceptable" erosion control means that established standards have been met. TSAs shall not accept erosion control measures that fail to meet set standards.

A.6.2.23 Practice 24.30—Slash Treatment in Sensitive Areas

Objective: To comply with federal and state water quality standards by protecting sensitive areas (including streamside management zones, landslide areas, etc.) from degradation that would result from using mechanized equipment for slash disposal.

Explanation: Special slash treatment may be prescribed in sensitive areas to facilitate slash disposal without use of mechanized equipment. Meadows, wetlands, streamside management zones, and landslide areas are typically sensitive areas where equipment use is normally prohibited. Slash treatment methods identified during the IRM process are indicated for each cut unit on the SAM.

Implementation: An assessment of the sale area shall be made in the timber sale planning process. Sensitive areas needing protection are identified. Results shall be documented in the sale plan and identified in the Timber Sale Contract and on the SAM. The TSA shall inspect the treatment for correct and satisfactory slash disposal accomplishment.

A.6.2.24 Practice 24.31—Five-Year Reforestation Requirement

Objective: To ensure a continuous forest cover and to limit disturbance on areas with limited regeneration potential.

Explanation: When timber production is a land management objective, regeneration cutting of timber is not permitted where the site cannot be reforested within 5 years of final harvest. If the timber cutting is for other resource objectives, this constraint does not apply. Regeneration areas will be planted with trees within 5 years if natural regeneration is not expected to occur within the 5-year period.

Implementation: During the IRM process, the ID team assesses the capability of proposed areas to achieve reforestation within the prescribed period. The soil scientist uses information (for example, soil productivity, depth, and available moisture holding capacity) to determine the potential for reforestation. TES provides the reforestation potential rating for both artificial and natural reforestation. When TES is available, the silviculturist and soil scientist will use the information it contains, along with field observations, to determine whether lands are suitable, unsuitable, or unproductive for timber production. This information, along with pertinent information contained in Sale Area Improvement plans, harvest plans, and compartment inventory analyses, is used to determine harvesting and regeneration methods.

A.6.2.25 Practice 24.32—Non-Recurring "C" Provisions that can be Used for Water Quality Protection

Objective: To comply with federal and state water quality standards where standard "B" or "C" provisions of the Timber Sale Contract do not apply or are inadequate to protect watershed values.

Explanation: Special "C" contract provisions are sometimes needed to meet management objectives on a particular sale area. They are written and proposed by District Rangers or Forest Supervisors and approved by the Regional Forester. Such authorization shall apply only to the sale for which approval was given.

An example of a "C" provision that is commonly used for complying with federal and state water quality standards is the provision concerning the directional felling of timber. This provision is used for riparian areas where it is important to avoid felling trees into streams or into important areas of riparian vegetation or residual timber.

Another example is the use of a "swing yarding" special provision in situations where such a method would help protect water quality. Swing yarding refers to the use of more than one yarding system to accomplish a difficult yarding problem. In one situation, it might be possible to avoid building a stream crossing by using a tractor to yard logs to a point where they could then be lifted across the stream to a road by a skyline yarder.

This practice can be used for a variety of special situations which may occur on any timber sale. There are no standard or set provisions that can be referenced, since each Special "C" provision is unique and specific to one sale.

Implementation: The need for Special "C" provisions shall be identified and recommended during the IRM process by the ID team. The Sale Preparation Officer shall prepare Special "C" provisions needed and submit them through Line Officers to the Regional Forester for approval. The Regional Forester will prepare appropriate contract wording of the provision and return the approved provision to the district. The Special "C" provision shall be applied by the TSA in the same manner as the standard contract provisions.

A.6.2.26 Practice 24.33—Modification of the Timber Sale Contract

Objective: To modify the Timber Sale Contract if new circumstances or conditions indicate that the timber sale will irreversibly damage soil and water values.

Explanation: Once timber sales are sold, they are harvested as planned via the Timber Sale Contract. At times, however, it may be necessary to modify a Timber Sale Contract because of new concerns about the potential effects of land disturbance on the water resource. If new evidence raises serious concerns to the USFS representative, an ID team will be assigned to assess the evidence and implications. The environmental document prepared for the timber sale shall then be amended to reflect the findings of the ID team. The team will make recommendations to the appropriate Line Officer on whether the timber sale, as currently planned, will (1) irreversibly damage watershed conditions, or (2) inadequately protect streams (including ephemeral and intermittent), streambanks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of watercourses, and deposits of sediment.

Implementation: If the timber sale, as determined by the appropriate Line Officer, will unacceptably affect watershed values, corrective actions must be taken which may include contract modification. The timber sale modification can be accomplished by agreement with the timber sale Purchaser, or unilaterally by the USFS using an amended environmental document prepared by an ID team.

A.6.2.27 Practice 24.40—Site Preparation for Reforestation

Objective: To provide appropriate erosion and sedimentation protection for sites disturbed during site preparation. To protect existing erosion control structures or to replace damaged structures during and after site preparation.

Explanation: Site preparation has the potential to increase compaction and reduce groundcover. The possible result of such activity is an increase in the concentration of surface water along with its associated erosive forces. Additional erosion control work may be needed after site preparation. The quality of erosion control work required under the Timber Sale Contract needs to be upheld through completion of site preparation.

Implementation: Specific requirements for erosion control are included in each environmental assessment and timber sale contract. All these requirements need to be brought forward into site preparation contracts. The COR is responsible for enforcing contract provisions that pertain to erosion prevention and control during site preparation.

A.6.2.28 Practice 25.11—Conduct Floodplain and Wetland Hazard Analyses and Evaluations

Objective: To minimize the long- and short-term adverse impacts to hydrologic function associated with the occupancy and modification of floodplains.

Explanation: The condition of floodplains and wetlands plays an important role in the hydrologic functioning of a watershed. Development in the floodplain frequently has an adverse effect on hydrologic function. USFS policy is to recognize floodplains and wetlands as specific management areas, and to avoid adverse impacts which may be associated with the occupancy and modification of floodplains and with the destruction, loss, or degradation of wetlands.

Implementation: Floodplain analysis and evaluation are part of the environmental analysis process. Make flood hazard analysis and evaluation prior to acquisition or exchange of land within floodplains. A floodplain analysis and evaluation must be made when sites within floodplains are being considered for structures or developments. Include recommendations for alternative ways to achieve exchange, acquisition, or project goals, and protect hydrologic function in project designs and NEPA documents.

A.6.2.29 Practice 25.12—Protection of Wetlands and Riparian Areas

Objective: To avoid adverse impacts, including impacts to water quality, associated with disturbance or modification of wetlands.

Explanation: The USFS recognizes the beneficial values of wetlands, and will, in accordance with Executive Order 11990 of May 24, 1977, take action to minimize destruction, loss, or degradation of wetlands.

Implementation: During project planning, all potentially impacted wetlands are mapped. Wetland values are considered and evaluated as an integral part of the project planning process. Mitigating measures are incorporated into project plans and designs to maintain the hydrologic and biologic function of the wetlands.

A.6.2.30 Practice 25.13—Oil and Hazardous Substance Spill Contingency Plan and Spill Prevention Control and Countermeasure (SPCC) Plan

Objective: To prevent contamination of waters from accidental spills.

Explanation: A contingency plan is a predetermined organization and action plan to be implemented in the event of a hazardous substance spill. Factors considered for each spill are the specific substance spilled, the quantity, its toxicity, proximity of the spill to waters, and the hazard to life and property.

The SPCC Plan is a document which requires appropriate measures (40 CFR 112) to prevent oil products from entering the navigable waters of the United States. An SPCC Plan is needed if the total oil products on site and in above ground storage exceeds 1,320 gallons or if a single container exceeds a capacity of 660 gallons.

Implementation: The USFS staff at each forest shall be responsible for designating emergency spill coordinators and documenting in the contingency plan the names and telephone numbers of agencies to call regarding cleanup of spills. Individual forests should maintain an inventory of materials to use during the cleanup of a spill. Disposal methods and sites must be coordinated with the EPA, state, and local officials responsible for safe disposal.

All forests shall maintain a Spill Contingency Plan, and SPCC Plans are required for USFS owned and special use permitted facilities, as well as by timber sale operators and other contractors who store petroleum products.

A.6.2.31 Practice 25.14—Control of Activities Under Special Use Permit

Objective: To protect surface and subsurface water quality from physical, chemical, and biological pollutants resulting from activities that are under special use permit.

Explanation: Many activities and uses take place on National Forest System (NFS) lands that are not directly related to USFS management activities. Some examples are electronic sites, highway and railroad rights-of-way, wastewater treatment and disposal, solid waste disposal, and power transmission lines. There are other uses which are recognized USFS land management activities which are achieved through permits to a public or private agency, group, or individual. Examples of these types of uses are organization camps, recreation residence tracts, and ski areas.

Activities on lands withdrawn under Federal Energy Regulatory Commission (FERC) authority may be exempt from USFS control. When the FERC permit is renewed, the USFS makes a complete restudy of water quality and quantity impacts and updates the constraints with which the permittee must operate (Forest Service Manual [FSM] 2726.11).

Implementation: The special use permit under which agencies, groups, or individuals operate shall detail the conditions they must meet to continue operating, including measures necessary to comply with state and federal water quality standards. The permittees shall conform to all applicable state and local regulations governing water quality and sanitation. The regulations may in turn require the permittee to obtain a waste discharge permit from the state. Failure on the part of the permittee to meet the conditions of the special use permit may result in the permit being revoked.

A.6.2.32 Practice 25.15—Water Quality Monitoring

Objective: To verify the effectiveness of BMP through the collection of representative water samples.

Explanation: Water quality monitoring is a mechanism which evaluates the effectiveness of a management prescription in protecting water quality. A water quality monitoring plan may be made a part of an environmental assessment, a management plan, a special use permit, or it may be developed in response to other needs.

Implementation: If it is determined in the IRM process that a water quality monitoring plan is needed, a plan is written or reviewed by a hydrologist. The plan may be implemented by the hydrologist or by other qualified USFS personnel. The actual analysis of the samples are done by the hydrologist, state certified laboratory, or other trained USFS personnel. Interpretation of the data and any reporting is also done by the hydrologist or trained personnel. Use the EPA STOrage and RETrieval computer system (STORET) system for computer storage of all water quality data collected.

A.6.2.33 Practice 25.16—Soil Moisture and Wetland Limitations for Equipment Operation Vehicle Use

Objective: The objective of this measure is to prevent compaction, rutting, and gullying that may result in site degradation, sediment production, and turbidity.

Explanation: This is a preventative measure that reduces surface disturbance by equipment operating during wet soil conditions. Soil erodibility, climatic factors, soil/water relationships, and mass stability are factors used by soil scientists and hydrologists during the environmental analysis process to make recommendations on equipment limitations during wet seasons.

Implementation: The COR is responsible for determining when the soil moisture is such that the soil surface is unstable and susceptible to damage. The COR is also responsible for suspending or terminating operations for contracted projects when soil moisture content warrants. The project supervisor is responsible for determining when the soil surface is susceptible to damage, and is then responsible for terminating operations when USFS personnel or volunteers are used to accomplish a project. Project planners are responsible for including appropriate contract provisions and management requirements in project work plans and environmental documents.

A.6.2.34 Practice 25.17—Slope Limitations for Equipment Operation and Vehicle Use

Objective: The objective is to reduce erosion and associated sediment production by limiting equipment and vehicle use on steep slopes.

Explanation: This is a preventative measure that limits excessive surface disturbance and surface erosion. This measure facilitates proper drainage of disturbed areas by limiting equipment and vehicle operation to slopes where corrective measures such as water bars can be installed.

Implementation: The need for slope limitation is determined in the IRM process. The COR is responsible for ensuring implementation of the contract provisions that pertain to equipment operation on steep slopes. The project planners have the responsibility to ensure that appropriate tractor operation provisions are included in the contract. This practice is implemented on all vegetative manipulation projects where appropriate. The project supervisor is responsible for identifying areas where operations should be limited on projects accomplished by USFS personnel or volunteers. The supervisor's direction is taken from the project work plan and environmental documentation.

A.6.2.35 Practice 25.18—Revegetation of Surface Disturbed Areas

Objective: To comply with state and federal water quality standards by minimizing soil erosion through the stabilizing influence of vegetative groundcover.

Explanation: This is a corrective practice to stabilize the soil surface of a disturbed area. The vegetation selected will be a mix of species that is best suited to meet the erosion control objective, with consideration for range, wildlife, timber, or fuels management objectives. Fertilization and irrigation, along with placement of a tackifier, jute netting, or other soil surface stabilizing material may be necessary to ensure vegetation is established.

Implementation: When developing project plans using the IRM process, assess surface disturbed areas and prescribe vegetative species mix needed for revegetation. Monitor projects to assess their effectiveness and need for follow-up action.

A.6.2.36 Practice 25.19—Contour Disking, Contour Furrowing, Contour Terracing, Harrowing, and Ripping

Objective: The objective of these practices is to reduce on-site soil losses and associated sediment production by reducing overland flow.

Explanation: These measures reduce the concentration of surface water and its associated erosive forces by enhancing soil infiltration rates.

Implementation: Determine the need and suitability of these practices using the IRM process. The COR is responsible for enforcing the contract provision for contracted projects. The project supervisor is responsible for enforcing management requirements provided in the project NEPA documentation for in-service projects. The project planners are responsible for appropriate contract provisions or management requirements, including work plans, NEPA documents, and contracts.

A.6.2.37 Practice 25.20—Evaluation of Cumulative Watershed Condition Effects

Objective: To protect the beneficial uses of water from adverse effects of multiple land management activities.

Explanation: Watershed condition is a description of the health of a watershed in terms of water quality, quantity, and timing. Many management activities have an effect, either positive or negative, on watershed condition. Usually the effects of management activities are temporary or declining in magnitude over time. Natural events may also have a positive or negative effect on watershed condition.

The ability and rate of a watershed to recover from negative effects is determined primarily by climate and soil. Each watershed has some tolerance for negative effects. When this tolerance is exceeded, permanent impairment to the watershed may result. Measures of groundcover, estimates of erosion, road density, water yield or macro-invertebrate diversity can be used as indicators of the management effects on watershed condition. These indicators can also be used to set watershed tolerances. When a watershed tolerance will be exceeded by a proposed activity, managers will consider changing the activity, changing the activity schedule, or employing mitigative measures to reduce the effects.

Implementation: Conduct the cumulative watershed condition effects evaluation as part of the IRM process.

A.6.2.38 Practice 25.21—Soil Quality Monitoring

Objective: To ensure that management practices do not allow significant or permanent impairment of the productivity of the land.

Explanation: Soil quality monitoring is used to evaluate the effects of management activities on soil productivity and determine if soil management objectives have been achieved. Monitoring can be either through implementation, effectiveness, or validation.

Implementation: Soil scientists and other trained personnel routinely conduct implementation monitoring. Additional effectiveness or validation monitoring may be identified through the IRM process, in which case a complete soil quality monitoring plan will be prepared by the soil scientist or other trained USFS personnel.

A.6.2.39 Practice 41.10—Erosion Control Plan

Objective: To minimize erosion and sedimentation through effective planning prior to initiation of construction activities and through effective contract administration during construction.

Explanation: Land-disturbing activities including pioneer roads (routes cleared of vegetation before road construction is started) usually result in some erosion. By effectively planning for erosion control, water quality impacts can be reduced. Practices, locations of practices, and specifications for practices will be used to minimize erosion and sedimentations. Erosion control objectives usually require a combination of practices that promote the re-establishment of vegetation on exposed slopes, provide physical protection to exposed soil, prevents the downslope movement of soil, or controls drainage.

Implementation: Detailed practices are developed using an IRM process and the measures are incorporated in the contract's specifications and provisions.

A.6.2.40 Practice 41.11—Timing of Construction Activities

Objective: To comply with state and federal water quality standards.

Explanation: Scheduling operations during periods when the probabilities for rain and runoff are low is an essential element of effective erosion control. Equipment shall not be operated when ground conditions are such that unacceptable soil compaction or displacement result.

Erosion control work is kept current. Construction of drainage facilities and performance of other contract work that will contribute to the control of erosion and sedimentation shall be carried out in conjunction with earthwork operations or as soon thereafter as practicable. The area being graded at a site at any one time should be limited, and the time that an area is without protective cover (for example, vegetation, jute matting, etc.) should be minimized. Erosion control work must be kept current when construction occurs outside of the normal operating season.

Implementation: Detailed mitigative measures, including operation scheduling, are developed using the IRM process and are incorporated into the NEPA documentation and contracts.

A.6.2.41 Practice 41.12—Road Slope Stabilization

Objective: To prevent on-site soil loss from exposed cut slopes, fill slopes, and spoil disposal areas.

Explanation: Depending on various factors such as slope angle, soils, climate, and proximity to waterways, fill slopes, cut slopes, and spoil disposal areas will require vegetative and/or mechanical measures to provide soil stability. The level of stabilization effort needed must be determined on a case-by-case basis.

Vegetation measures include the seeding of herbaceous species (grass, legumes, or browse species) or the planting of brush or trees. Vegetative measures may include fertilization and mulching to ensure success. Mechanical measures may include, but are not limited to: wattling, erosion nets, terraces, side drains, blankets, mats, riprapping, mulch, tackifiers, pavement, soil seals, and retaining walls.

Implementation: Initial project location, mitigative measures, and management requirements and needs are normally developed during the IRM process. These requirements and needs are translated into project plans, contract provisions, and specifications.

USFS crew leaders, road inspectors, and their supervisors typically monitor work accomplishment and effectiveness to help ensure that design standards, project plan constraints, and mitigative measures are met.

Mechanical and vegetative surface stabilization measures shall be periodically inspected, as necessary, to determine effectiveness. In some cases, additional work may be needed to ensure that the vegetative and/or mechanical surface stabilization measures continue to function as intended.

A.6.2.42 Practice 41.13—Dispersion of Subsurface Drainage from Cut and Fill Slopes

Objective: To minimize the possibilities of cut or fill slope failure and the subsequent production of sediment.

Explanation: Roadways may change the subsurface drainage characteristics of a slope. Since the angle and height of cut and fill slopes increase the risk of instability, it is often necessary to provide subsurface drainage to avoid moisture saturation and subsequent slope failure. Where it is necessary because of slopes, soil, aspect, precipitation amounts, inherent instability or other related characteristics, one of the following dispersion methods should be used:

- Pipe under-drains
- Horizontal drains
- Stabilization trenches

Dispersal of collected water should be accomplished in an area capable of withstanding increased flows. Energy dissipators may need to be placed below pipes carrying large volumes of water.

Implementation: Project location and detailed mitigative measures are determined by the design engineers using the IRM process.

A.6.2.43 Practice 41.14—Control of Road Drainage

Objective:

- To minimize the erosive effects of concentrated water flows caused by road drainage features
- To disperse runoff from disturbances within the road clearing limits
- To lessen the sediment load from roaded areas
- To minimize erosion of the road prism by runoff from road surfaces and from uphill areas

Explanation: A number of measures can be used (alone or in combination) to control road drainage. Methods used to reduce erosion may include properly placed culverts, cross drains, water bars, dips, energy dissipators, aprons, downspouts, gabions, and/or debris racks, and armoring of ditches and drain inlets and outlets.

Dispersal of runoff can be accomplished by rolling the grade, insloping, outsloping, crowning, installation of water spreading ditches, contour trenching, or overside drains, etc. Dispersal of runoff also reduces peak downstream flows and associated high water erosion and sediment transport.

Sediment loads can be reduced by installing sediment filters, settling ponds, and contour trenches. Soil stabilization and dispersed water flows on borrow and waste areas, cut and fill slopes, and road shoulders can minimize sedimentation.

Implementation: Project location, design criteria, and detailed mitigative measures are determined through the IRM process.

A.6.2.44 Practice 41.15—Timely Erosion Control Measures on Incomplete Roads and Streamcrossing Projects

Objective: To minimize erosion and sedimentation from road construction sites where final drainage structures have not been completed.

Explanation: The best drainage design can be useless if projects are incomplete at the end of the normal operating season. The effected areas can include roads, fills, tractor trails, skid trails, landings, streamcrossings, bridge excavations, and firelines. Preventative measures include:

- The removal of water-controlling devices that will not carry anticipated seasonal water runoffs, such as temporary culverts, culvert plugs, diversion dams, or elevated stream-crossing causeways
- The installation of temporary devices that will carry anticipated seasonal water runoffs, such as culverts, side drains, flumes, cross drains, diversion ditches, energy dissipators, dips, sediment basins, berms, debris racks, or other facilities needed to control erosion

- The removal of debris, obstructions, and spoil material from channels and floodplains
- Grass seeding, planting deep-rooted vegetation, and/or mulching

Implementation: Apply protective measures to all areas of disturbed, erosion-prone, unprotected ground that is not to be further disturbed in the present year. When conditions permit operations outside of the Normal Operating Season, erosion control measures must be kept current with ground disturbance to the extent that the effected area can be rapidly "closed" if weather conditions deteriorate. Do not abandon areas for the winter with remedial measures incomplete.

Project mitigative measures and location are developed and documented during the IRM process.

A.6.2.45 Practice 41.16—Construction of Stable Embankments (Fills)

Objective: To construct embankments with materials and methods which minimize the possibility of failure and subsequent water quality degradation.

Explanation: The failure of road embankments and the subsequent deposition of material into waterways may result from a lack of compaction during the construction of the embankment as well as from the use of inappropriate placement methods.

To minimize this occurrence, the roadway should be designed and constructed as a stable and durable earthwork structure with adequate strength to support the pavement structure, shoulders, and traffic. Proper slope ratio design will promote stable embankments.

Implementation: Project constraints and mitigative measures are developed through the IRM process. The appropriate method of embankment placement is chosen during this process.

A.6.2.46 Practice 41.17—Control of Sidecast Material

Objective: To minimize sediment production from sidecast material during road construction, reconstruction, or maintenance.

Explanation: Unconsolidated sidecast material can be difficult to stabilize and is susceptible to erosion and/or mass instability. Site-specific limits or controls for the sidecasting of uncompacted material should be developed through interdisciplinary input and be shown on the plans. Loose, unconsolidated sidecast material should not be permitted to enter streamside management zones. Sidecasting is not an acceptable construction alternative in areas where it will adversely affect water quality. Prior to commencing construction or maintenance activities, waste areas should be located where excess material can be deposited and stabilized.

Implementation: Project location, selected disposal areas, and mitigative measures are developed through the IRM process.

USFS crew leaders and work supervisors are responsible for ensuring that projects accomplished by USFS organizations meet design standards and project NEPA analysis criteria. Road maintenance plans are developed for each forest, which include needed slide and slump repairs, and, in critical areas, disposal site locations for excess material.

Contracted projects are implemented by the contractor or timber sale operator. Compliance with project criteria, contract specifications, and operating plans is ensured by the COR or engineering representative (ER).

Timber sale contracts include C5.4 and T-Road Maintenance Specifications, which address slide and slump repair, surface blading, and ditch cleaning.

A.6.2.47 Practice 41.18—Servicing and Refueling of Equipment

Objective: To prevent pollutants such as fuels, lubricants, bitumens, raw sewage, wash water, and other harmful materials from being discharged into or near rivers, streams, and impoundments, or into natural or man-made channels leading thereto.

Explanation: During servicing or refueling, pollutants from logging or road construction equipment may enter a watercourse. This threat is minimized by selecting service and refueling areas well away from wet areas and surface water, and by using berms around such sites to contain spills. SPCC plans are required if the volume of fuel exceeds 660 gallons in a single container or if total storage at a site exceeds 1,320 gallons.

Implementation: The COR/ER or TSA will designate the location, size, and allowable uses of service and refueling areas. They will also be aware of actions to be taken in case of a hazardous substance spill as outlined in the Forest Hazardous Waste Contingency Plan.

Any SPCC needs to be reviewed and certified by a registered professional engineer.

A.6.2.48 Practice 41.19—Diversion of Flows around Construction Sites

Objective: To ensure that all stream diversions are carefully planned. To comply with state and federal water quality standards. To restore stream channels to their natural grade, condition, and alignment.

Explanation: Flow must sometimes be guided or piped around project sites. Typical examples are bridge and dam construction. Flow in streamcourses will be diverted, if necessary, to protect water and related resources. Such a diverted flow shall be restored to the natural streamcourse as soon as practicable and, in any event, prior to the major storm season.

Implementation: Where and when diversions are required will be determined in the IRM process. Design shall include mitigative measures necessary to protect fishery values and other downstream uses. The IRM process may require project review by other federal, state, and/or local agencies and private parties to ensure that all factors are considered.

A.6.2.49 Practice 41.20—Streamcrossings on Temporary Roads

Objective: To keep temporary roads from unduly degrading water quality, damaging streams, disturbing channels, or impeding fish passage by ensuring compliance with state and federal water quality standards.

Explanation: Culverts, coarse rock fills, hardened fords (using such features as rocked approaches), low water crossings, and temporary bridges shall be evaluated in the IRM process for each sensitive streamcrossing. Such facilities shall be designed to provide for unobstructed flows and the passage

of fish and to minimize damages to streamcourses. The number of crossings shall be kept to the minimum needed for access. Channel crossings shall be as perpendicular to streamcourses as possible. Streambank excavation shall be kept to the minimum needed for use of the crossings, and entry and exit ramps may need to be rocked. Fords or turnpike crossings hardened with washed rock or landing mats are sometimes an acceptable alternative, depending on fishery and hydrological considerations.

Crossing facilities will be removed when the facility is no longer needed or, if the crossing obstructs high flows, prior to closing down operations for the season.

Implementation: Project location and mitigated measures are developed using an IRM process.

A.6.2.50 Practice 41.21—Controlling In-Channel Excavation

Objective: To minimize sedimentation and turbidity resulting from excavation for in-channel structures, by ensuring compliance with state and federal water quality standards.

Explanation: Excavation is a common requirement for the installation of bridges, culverts, and minor streamside structures such as weirs, check dams, riprapping, or fish barriers. Spoil material developed in such operations should neither obstruct the streamcourse (including natural floodplains) nor the efficiency of the associated structures. If spoil or imported material is needed within the wetland as defined by the Army Corps of Engineers, then a 404 permit will need to be secured from the Corps. Preventative measures include:

- Keeping excavated materials out of streamcourses (including ephemeral and intermittent).
- Removing any materials stacked or stockpiled on floodplains prior to high water.
- Diversion of flowing water around work sites to minimize erosion and downstream sedimentation.
- Suitably locating bypass roads with plans made for their subsequent obliteration and stabilization when needed.
- Importing fill material for better soil compaction. Original fill may have to be exported to a disposal site.

For streams designated as important fisheries by the USFS wildlife specialists, culverts will be installed only during flow periods specified in the project plan. Normally, this work would occur during minimum flow periods when water could be more easily diverted; work may not be allowed during spawning periods. Downstream sediment basins may be necessary to mitigate impacts on low flows.

Implementation: Project location and detailed mitigative measures are developed during the design process to meet the project criteria using an IRM process.

A.6.2.51 Practice 41.22—Disposal of Right-Of-Way and Roadside Debris

Objective:

- To comply with state and federal water quality standards
- To ensure that debris generated during road construction is kept out of streams and to prevent slash and debris from subsequently obstructing channels
- To ensure debris dams are not formed that obstruct fish passage or could result in downstream damage from high water flow surges after dam failure

Explanation: As a preventative measure, construction debris and other newly generated roadside slash developed along roads near streams (in the streamside management zone) shall not be deposited in stream channels (including ephemeral and intermittent).

Some disposal methods are:

- On site:
  - Piling and burning
  - Chipping
  - Burying
  - Scattering
  - Windrowing
  - Disposal in cutting units
- Removal to approved disposal sites (especially stumps from the road prism).
- Large limbs and cull logs may be bucked into manageable lengths and piled alongside the road for fuelwood.

Implementation: Disposal of right-of-way and roadside debris criteria are established in the project plan by the responsible forest official with the help of the ID team. Project location and detailed mitigative measures are developed using the IRM process.

A.6.2.52 Practice 41.23—Specifying Riprap Composition

Objective: To minimize sediment production associated with the installation and utilization of riprap material. To comply with state and federal water quality standards.

Explanation: Riprap is commonly used to armor streambanks and drainage ways from the erosive forces of flowing water. Riprap must be sized and installed in such a way that it effectively resists erosive water velocities. On occasion this may require the use of filter blankets or other methods to prevent the undermining of fines. Stone used for riprap should be free from weakly structured rock, soil, organic material, and materials of insufficient size, all of which are not resistant to streamflow and would only serve as sediment sources.

Implementation: Project location and detailed mitigative measures are developed through the IRM and design processes to meet the constraints and requirements of the project plan.

A.6.2.53 Practice 41.24—Water Source Development Consistent with Water Quality Protection

Objective: To supply water for roads and fire protection while maintaining existing water quality. To comply with state and federal water quality standards.

Explanation: Water source development is normally needed to supply water for road construction, dust control, and fire control. Problems may arise when cofferdams or water holes are built in streams. In many instances earth fill is used as a dam. This practice creates sediment problems during installation and removal. Cofferdams and water holes should be built out of sandbags filled with clean sand or gravel, or other methods that will not contribute to nonpoint source pollution. Also, at no time shall downstream water flow be reduced to a level that may be detrimental to aquatic resources, fish passage, or other established uses.

Damage to resources caused by the Purchaser's or Contractor's operations or fire suppression activities shall be repaired by the Purchaser, Contractor, or fire suppression crews in a timely and agreed upon manner to the extent practical to restore and prevent further resource damage.

Overflow from water holding developments should be piped directly back to the stream. Approaches should be kept as close to perpendicular as possible to the stream. Streambank excavation should be kept to a minimum needed for entry and exit, and may be gravel surfaced as appropriate.

Implementation: TSAs and engineering representatives in conjunction with a hydrologist and fisheries biologist should evaluate streams in which water developments may be constructed. Water holes and other improvements shall be put into a condition, prior to a rainy season or winter, to avoid resource damage. Project location and detailed mitigative measures are developed by the design engineer using the IRM process to meet project criteria.

A.6.2.54 Practice 41.25—Maintenance Of Roads

Objective: To maintain roads in a manner that provides for water quality protection by minimizing rutting, failures, sidecasting, and blockage of drainage facilities (all of which can cause sedimentation and erosion).

Explanation: Roads normally deteriorate because of use and weather impacts that are not corrected with maintenance. This deterioration can be minimized through adequate maintenance and/or restriction of use. Our goal is to maintain all system roads to protect the road investment and to see that damage to adjacent land and resources is held to minimum. Maintenance scheduling requires an annual inspection to determine what work, if any, is needed to keep drainage functional and the road stable. Higher levels of maintenance may be chosen to reflect greater use or administrative needs. Additional maintenance measures could include resurfacing, outsloping, clearing debris from dips and cross drains, armoring of ditches, and spot rocking.

For maintenance of roads on active timber sales, the USFS and the Purchaser shall annually agree at the beginning of the operating season on an Annual Road Maintenance Plan outlining responsibilities and timing. If the road is subjected to commercial use, the USFS may collect deposits to facilitate road maintenance and to equitably assess the maintenance cost of each user.

Implementation: The work is controlled by the Forest Engineer who develops a road maintenance plan. Maintenance levels are declared for each road in a timber sale area, and are documented in the sale plan. On timber sales, maintenance is a Purchaser responsibility, and compliance with standards is ensured by the COR or ER. On system roads outside of active timber sales, USFS crews or contract crews perform road maintenance under supervision of an engineering representative.

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