

**Forest Service Handbook
National Headquarters – Washington Office
Washington, DC**

**Forest Service Handbook 7509.11 – Dams Management Handbook
Chapter 20 - Operation and Maintenance Plans**

Amendment:7509.11-1993-1

Effective date: August 5, 1993

Duration: This amendment is effective until superseded or removed.

Superseded Directive: 1, August 8, 1990; Entire Handbook issued, December 1986

Approved by: F. Dale Robertson, Chief

Date approved:

Responsible Staff:

Explanation of changes: Following is an explanation of the changes throughout the directive by section.

Posting Instructions: Amendments are numbered consecutively by Handbook number and calendar year. Post document in numerical order of chapters (1109.12, sec. 4.32, ex. 01). Remove entire national text of the Handbook and replace with this amendment. DO NOT REMOVE SUPPLEMENTS OR INTERIM DIRECTIVES. Retain this transmittal as the first page of this document.

Revises and updates entire Handbook. Significant changes in direction are as follows:

05: Moves select definitions from FSM 7500. Modifies definitions to agree with Glossary of Terms for Dam Safety, prepared by the Interagency Committee for Dam Safety (ICODS), and Federal Emergency Management Agency (FEMA).

08: Updates reference list and adds names and addresses of agencies, associations, and groups publishing reference materials related to dams and dam safety.

10: Changes chapter title from Project Files to Records and Files.

40: Changes chapter title from Safety Evaluation/Hazard Potential to Safety Inspections and Hazard Assessments. Replaces the term "safety evaluation" with "safety inspection" throughout.

42: Replaces the term "Hazard - Potential Evaluations "with" Hazard Assessment."

42.3: Adds hazard classification examples.

53: Adds direction on location of copies of emergency action plans.

54: Adds direction on testing emergency action plans.

62: Revises direction to exclude Regional dam or water resources engineer from serving on a dam failure investigation team in cases of potential or apparent conflict of interest.

70: Changes title from Dam Inventory to Management of Special Use and Other Non-Forest Service Projects. Previous direction contained in this chapter is moved to FSM 7514; moves direction from previous chapter 80 to chapter 70.

80: Changes title from Management of Special-Use and Other Non-Forest Service Projects to Planning and Design.

Completes previously reserved FSM 7520 and incorporates it into FSH 7509.11.

81: Provides guidance and definitions for four phases in the design schedule.

82: Provides guidance for planning and designing channel layout.

83: Provides guidance for assigning hazard classification.

This Handbook is now available electronically in the National Information Center in the same format as the paper copy. Henceforth, amendments to this Handbook will be issued to Forest Service units electronically on a document basis.

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Most Forest Service-owned structures are relatively small, are generally operated infrequently, and require standard maintenance. This section addresses these types of structures. For large, complex dams a more comprehensive operation and maintenance manual should be prepared to cover many of the items discussed herein, as well as any mechanical and operational features unique to the facility.

20.2 - Objectives

1. To properly prepare operation and maintenance plans and review those prepared by holders of special-use authorizations.
2. To plan cost-effective Forest Service operation and maintenance activities.

20.5 - Definitions

Maintenance. Work required to keep improvements in, or restore them to their original physical and functional condition. This term includes the performance of work and application of measures to prevent deterioration as well as to restore, rebuild, replace, and put together parts that are deteriorated, worn, or broken.

Operation. The administration, management, and performance of nonmaintenance actions needed to keep completed improvements functioning as planned.

21 - General Requirements

Prepare an operation plan and a maintenance plan for all Class A, B, C, and high-hazard Class D structures (FSM 7515). Plans may be brief or complex, depending on the circumstances and the operational requirements of the structure. The plans for dams with similar operational characteristics may be combined. For example, all dams on a Ranger District or a National Forest or all dams owned by a special-use authorization holder may be included in one plan.

Many operation and maintenance features are common to most structures; therefore, many sections of a plan can be standardized thereby simplifying preparation. However, take care to identify features of a dam that will require special explanation or instruction.

The plan should be prepared or reviewed by an experienced dam inspector who is familiar with the purpose of the structure. The plan should be signed by the special-use authorization holder (if applicable), the District Ranger, and the Forest Staff Officer for engineering activities and approved by the Forest Supervisor. Keep a current copy of the operation and maintenance plan in the project file for the dam (FSH 7509.11 ch. 10).

22 - Operation and Maintenance Plans

Use operation and maintenance plans to provide instructions on the proper care of a dam and as a tool for developing funding requests and scheduling maintenance work.

Use operation and maintenance plans to help provide management continuity regardless of personnel changes or operator experience.

The plan usually includes both the operation and maintenance requirements in one document. The length can vary from a single page for a small, simple dam to a detailed and indexed manual for a large, complex dam. A sample plan for a simple structure is shown in exhibit 01.

22 - Exhibit 01

Sample Format

OPERATION AND MAINTENANCE PLAN
GUPPY LAKE DAM
JOHNSON RANGER DISTRICT |
JAMESWAY NATIONAL FOREST

Prepared by:

Civil Engineer J. Jones Date 3/21/83

Reviewed by:

Engineering Staff P. Brown Date 3/28/83

District Ranger J. Svenson Date 3/28/83

Approved by:

Forest Supervisor P. George Date 4/04/83

Project Location: Section 4, T3S, R14E, MDBM; Lake County, Oregon

Operator/Maintenance Officer: Eager Beaver

Hazard: Moderate

General.

The purpose of this plan is to identify specific operation and maintenance needs and responsibilities and to ensure timely repairs and safe operation of the dam.

This plan shall be updated at the time of the periodic safety evaluation or at 5-year intervals, whichever period is shorter.

Operation.

This reservoir is operated for recreational use. Flow is unregulated except that a minimum release is required for fishery habitat protection downstream:

1. Maintain a minimum flow of 3 cubic feet per second by opening sluice gate when flow through the service spillway drops this minimum. (Memorandum of Understanding - Forest Service and Oregon Department of Fish and Wildlife. FSM 1541, June 1961).

2. By November 1 of each year, check the sluice gate for full flow and the oil level in gate stem. Remove gate handwheel when not in use and store it in west-wall closet of the District Maintenance Shop.

22 - Exhibit 01--Continued

3. As practical, make occasional observations of dam and report immediately to the Forest Staff Officer for engineering activities any unusual conditions that seem critical or dangerous. Examples include evidence of (or change in) leakage, erosion, seepage, settlement, and cracking.

4. Inspect the dam and appurtenant structures following floods and earthquakes.

Maintenance.

Perform preventive maintenance with District work force:

1. Make needed repairs identified in the latest inspection report prepared by the inspector. Complete "priority one" items promptly.

2. Perform the following maintenance annually or as needed:

- a. Remove small trees from the dam embankment and spillway.
- b. Clear log boom and spillway of debris in the fall.
- c. Fill rodent holes or begin rodent control measures if problem becomes serious.

Instrumentation.

Seepage is being monitored at one location. The flow is being routed through a V-notch weir located 50 feet downstream from the dam. The staff gauge should be read at no less than 2-week intervals when road access to the dam is possible. Staff gauge readings should be recorded on the enclosed data form and all forms should be filed in the project folder.

Notify the Forest Staff Officer for engineering activities within 24 hours if any new seepage areas develop or if the flow has increased significantly (greater than 50 percent) from the previous reading.

Keep the V-notch weir clear of debris (especially when taking a reading) and check the installation for seepage and repair, if necessary.

Attachments.

Rodney Hunt Slide Gate O-M Manual
Data Form for Seepage Monitoring

22.1 - Operation Plan

In the operation plan, describe briefly and simply how the dam will be operated. Describe the function of the dam and list operational requirements such as required water releases or required reservoir pool elevations. State the reason for the operational requirements and cite any operating agreements. Note maximum and/or minimum flow releases and specified release dates. Note maximum and/or minimum flow releases and specified dates. Include the name and job title of the individual responsible for performing the operations.

Operational requirements may have changed since the dam was constructed. For example, the original plans may have required programmed or continuous water releases for irrigation, but current use of the reservoir for recreation, with no irrigation uses or rights, may no longer require regulated releases to be made. Releases may be controlled by state game laws or state water right laws. Review past requirements and describe all current operational requirements to ensure that proper actions are taken.

The following checklist includes some common operational processes that may be applicable:

1. Following release requirements to satisfy downstream water rights.
2. Following State Fish and Wildlife Department requirements for maintaining minimum flows for fish protection and fish ladders.
3. Controlling seasonal reservoir level for improving fish habitat and reproduction.
4. Maintaining minimum reservoir level for seasonal use and maximum drawdown rates.
5. Notifying State engineer or other appropriate authority when regulating the water level in conflict with the water right or when draining the reservoir.
6. Locking the outlet gate or designating the location of the handwheel, if it is removed.
7. Operating mechanical equipment and outlet works annually for high-hazard dams and every 2 to 3 years for other dams. Outlet works should be checked in the fall to determine possible gate closure problems. Gates should be operated at full-flow capacity.
8. Checking dam and outlet works after earthquakes and floods.

22.2 - Maintenance Plan

In the maintenance plan describe briefly the maintenance and recordkeeping to be done and how it will be accomplished. The job title or name of the person responsible for the work should appear on the plan.

Keep cost records for all maintenance work performed on a dam. Use these records in developing cost estimates for programming future work.

List in the maintenance plan the routine or recurring maintenance work items. The following checklist includes some of the more common items that could be included in the plan:

1. Remove trees and reeds growing on the dam embankment and spillway.
2. Remove floating logs and debris from the spillway, log boom, and upstream face of the dam.
3. Fill rodent holes or take rodent control measures, as necessary.
4. Check for obstructions in spillway channels and outlet works.
5. Ensure that roads needed for maintenance, operation, or other access are kept in usable condition.
6. Review the most recent operation and maintenance inspection checklist.
7. Use riprap or seeding, as appropriate, to restore or stabilize areas damaged by erosion.
8. Clean fish ladders.
9. Paint and repair appurtenant structures, as necessary.
10. Maintain all mechanical equipment in good working order. Attach applicable manufacturer's instructions for operation and maintenance of mechanical equipment.

23 - Instrumentation

Include a special section on instrumentation in the operation and maintenance plans if data collection devices have been installed. Include instructions for monitoring certain aspects of the dam, such as seepage, movement, and settlement. Instrumentation is usually confined to larger or higher-hazard structures.

1. Provide clear and specific instructions and necessary training in the use of specialized instruments such as inclinometers and piezometers to field personnel responsible for data collection and recordkeeping.

2. Ensure that instructions include, as a minimum, details for:

- a. Frequency and method of observation or collection;
- b. Notification procedure for any significant departure in readings;
- c. Necessary data forms;
- d. Maintenance and calibration of monitoring device; and
- e. Data distribution.

3. Check accuracy of instruments at least once a year to ensure that instructions are being followed and that measurements are accurate.

24 - Financial Planning

Assign responsibility for initiating action to obtain funds for timely accomplishment of inspection and maintenance of dams.

Develop work plans two years in advance so they can go through the budgeting process. Use past records to form a reasonable basis for estimating recurring inspection and maintenance needs. Take into account that no special funding exists for this work; it must be paid for by the benefiting function, such as Recreation, Wildlife, or Range.

Develop the budget at the District level with input from the Staff responsible for engineering activities. Since this procedure varies, become familiar with the budgeting method used on the Forest. Coordinate with the District and with the Forest Staff Officer for engineering activities in programming this work, as District personnel usually will be involved in the maintenance or repair to some degree. Consult the Management Information Handbook (FSH 1309.11) for the appropriate activity coding.