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Directives and Standards

Subject:	Review/Examination Program for High- and Significant-Hazard Dams
Purpose:	To ensure that the Bureau of Reclamation's Facility Review Program and related site inspections and examinations for high- and significant-hazard dams are effectively and consistently implemented throughout Reclamation. The primary benefits of this Directive and Standard (D&S) are that these dams are operated and maintained properly and effectively, will continue to provide authorized project benefits, and will not create unacceptable risks to public safety and welfare, property, the environment, or cultural resources.
Authority:	Reclamation Project Act of 1902 (ch. 1039; 32 Stat. 388), as amended and supplemented; and Departmental Manual Part 753 – <i>Dam Safety and Security Program</i>
Approving Official:	Director, Policy and Program Services (PPS)
Contact:	Maintenance Services Office, 84-57000; Dam Safety Office, 84-44000

1. **Introduction.** The review/examination program outlined under this D&S represents those related activities that were historically conducted on high- and significant-hazard dams under the Review of Operation and Maintenance (RO&M) Program and the Safety Evaluation of Existing Dams (SEED) Program. Because of the close coordination and program interface necessary in the implementation of the review/examination activities under these two programs, a determination was made in the mid- to late-1990's to combine the related activities under a single program.
2. **Applicability.**
 - A. This D&S applies to all dams presently classified as high- and significant-hazard dams under Reclamation's SEED Program, where failure or misoperation of the dam would probably cause loss of human life or would cause appreciable economic, environmental, or lifeline losses (rural area with notable agriculture, industry, work sites, or outstanding natural resources).
 - B. This D&S will apply to all existing and new high- and significant-hazard dams which have been transferred from construction status to operation and maintenance (O&M) status.
 - C. It is important to note that this D&S applies to all high- and significant-hazard dams regardless of whether the O&M responsibility has been transferred to an operating entity or remains with Reclamation operating staff.

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3. **Program Goals.** Reviews/examinations of these dams will be conducted to satisfy the following purposes to ensure that:
 - A. no dams create an unacceptable risk to public safety and welfare, property, the environment, or cultural resources;
 - B. all dams continue to provide authorized project benefits and other current public benefits;
 - C. each dam is operated and maintained properly and effectively;
 - D. operating and emergency management procedures are adequate and current;
 - E. liability to the Federal government is reduced;
 - F. the effectiveness of other program issues related to O&M activities is monitored;
 - G. technical exchange of information is promoted;
 - H. familiarity with the dam is maintained and adequate training is provided to operating staff; and
 - I. compliance with contract (water repayment contracts, water service contracts, O&M transfer agreements, etc.) provisions related to safe and reliable operation of the dam is verified.

4. **Responsibilities.** Responsibilities for proper administration of the review/examination program of high- and significant-hazard dams, as outlined in this D&S, will be shared by different levels of the organization. Primary responsibilities are as follows:
 - A. **Chief, Dam Safety Office.** The Chief, Dam Safety Office is responsible for providing overall intra-agency coordination for the scheduling and accomplishment of Comprehensive Facility Reviews (CFRs); establishing guidance for conducting formal facility reviews; and other related activities that had traditionally been addressed under the SEED Program for high- and significant-hazard dams, including the coordination of training opportunities for involved Reclamation offices and staff.
 - B. **Director, PPS.** The Director, PPS is responsible for establishing and maintaining related Policy and D&S for review/examination activities; coordinating and providing facility review workshop opportunities for involved Reclamation offices and staff; and other related activities that had traditionally been addressed under the RO&M Program for high- and significant-hazard dams.
 - C. **Regional Directors.** Regional directors, or their delegate, are responsible for implementing this D&S, overseeing and coordinating the regional program of review/examination activities [specifically, for Periodic Facility Reviews (PFRs)], and

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ensuring that area offices conduct and participate in appropriate review/examination activities related to high- and significant-hazard dams under their jurisdiction.

- D. **Area Managers.** Area managers, or their delegate, are responsible for the day-to-day management activities associated with administering the review/examination program of high- and significant-hazard dams. Area managers, or their delegate, will collaborate with operating entities of transferred works on all aspects of program coordination, scheduling, and accomplishment of all related review/examination activities.

5. Program Implementation.

- A. **Listing of Dams.** A comprehensive and current listing of significant- and high- hazard dams (Reclamation dams either by ownership or included as part of an authorized Reclamation project) will be maintained by the Dam Safety Office (or its designate) within the Dam Safety Information System (DSIS). RO&M examinations of all low-hazard dams (as part of the periodic reviews of “associated facilities” conducted by regional and area offices) will include a review of any changed downstream site conditions which may affect the dam’s hazard classification. The Dam Safety Office is to be notified of any significant observations downstream of these dams that could result in the need for a reassessment of the hazard classification. The related inventory of significant- and high-hazard dams will then be updated to reflect any changes.
- B. **Funding.** Unless otherwise noted within this D&S, the costs associated with the reviews/examinations performed on significant- and high-hazard dams for dam safety purposes will be non-reimbursable. The costs associated with the review of the O&M practices and procedures are considered to be an integral part of evaluating the structural condition and performance of the dam and for providing for the safety of the downstream public; therefore, these costs will also be non-reimbursable.

6. **Review/Examination Procedures.** The review/examination program for all significant- and high-hazard dams will consist of annual site inspections, PFRs, CFRs, examinations of normally inaccessible features, and special examinations.

A. Annual Site Inspection.

- (1) **Scope/Content.** The inspection will consist of a general assessment of the condition of pertinent features of the dam using a checklist developed specifically for that dam. The checklist is to be combined with or augmented by, as appropriate, the information and recommended observations outlined in the onsite visual inspection checklist, developed as part of the Performance Parameters Technical Memorandum (TM).

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- (2) **Site Inspection Preparation.** Preparation for conducting the annual site inspections will consist of reviewing applicable material and completion of a Job Hazard Analysis (JHA) as outlined in Paragraph 6.B.(4) of this D&S.
- (3) **Frequency/Schedule.** The frequency will be annual, with the schedule for conducting these inspections at the discretion of the operating (area) office and/or operating entity. Consideration must be given to conducting these inspections at varying loading conditions (i.e., reservoir levels). Conditions identified in the Performance Parameters TM may provide additional basis for the timing of the inspection. Annual site inspections are only required to be performed during the years when periodic and comprehensive facility reviews are not performed.
- (4) **Personnel Involvement.** Conduct of annual site inspections is the responsibility of, and is generally conducted by personnel from the responsible area office. The inspections may be conducted by the responsible operating organization; however, Reclamation representation is required on all such inspections. Additionally, as part of the preparation or review of the Performance Parameters TM, particular expertise (e.g., a senior geotechnical engineer) to address particular concerns on these inspections will be identified and included in the group performing the inspection. It may be necessary that extra attention be given to a concern by persons with particular expertise at times other than the annual inspection.
- (5) **Training/Experience.** Personnel involved in conducting or participating in annual site inspections must have an understanding of principles related to the design, construction, O&M, and safety of a dam; have reviewed the Training Aids for Dam Safety (TADS) modules related to the inspection of dam features; and have attended either a SEED Seminar or a dam operator training session within the previous three years.
- (6) **Documentation.** The documentation will consist of a completed checklist with accompanying photographs, as stated on the general checklist format provided to the regions. Photographs will only be required for identified areas of concern and of those areas requested in the Performance Parameter TMs. The completed checklists must be distributed within 30 days of the inspection to appropriate operating offices/entities, area and regional offices, Dam Safety Office (84-44000), as well as to the Technical Service Center (TSC), attention: 86-68360, for inclusion within the Dam Safety Document Management System (DSDaMS).
- (7) **Costs.** Expenses incurred by Reclamation in conducting or participating in these annual site inspections will be considered non-reimbursable costs (e.g., non-reimbursable O&M) and funded by the responsible regional or area office. Expenses incurred by the responsible operating entity in conducting annual site inspections will be borne as a project O&M cost.

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B. PFR.

- (1) **Scope/Content.** The PFR is to be conducted as a combined RO&M/SEED examination, fulfilling the purposes of both examination programs relative to dam safety concerns. Content will encompass the following issues, as applicable:
 - (a) structural integrity and performance of the dam, foundation, abutments, and appurtenant structures;
 - (b) structural behavior and instrumentation;
 - (c) emergency preparedness/management;
 - (d) operating procedures/documentation;
 - (e) operator training (adequacy/needs);
 - (f) maintenance management/practices;
 - (g) operating personnel safety requirements and procedures;
 - (h) operational problems (e.g., utility crossings, right-of-way encroachment);
 - (i) floodplain management issues (e.g., safe downstream channel capacity);
 - (j) special examination needs and frequency (e.g., underwater, dewatered, technical climbing); and
 - (k) public safety concerns.
- (2) **Frequency/Schedule.** These reviews will be performed every 6 years, alternating every 3 years with the CFRs. The team leader from the regional office, or designate, will coordinate with all involved offices to develop the schedule for these PFRs. Site visits for Safety of Dams (SOD) technical studies [i.e., Modification Decision Analysis (MDA), Corrective Action Studies (CAS), etc.] will be combined with these reviews whenever practical for efficiency purposes on a case-by-case basis; however, funding for those involved in these technical studies will remain separate from the funding for PFRs.
- (3) **Personnel Involvement.** The team leader will be from the regional office; however, this can be delegated to an area office upon mutual agreement between the two offices, provided that the area office is one office removed from the operating office/entity (to provide an independent review). The regional office can also request the TSC to provide a team leader/member(s) for this review. Team size will be limited to the minimum number of personnel required to

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adequately review the structure. Generally, this will consist of an area office representative, a regional office representative, and those selected by the team leader for specified technical expertise. Additionally, pertinent operating personnel are required to be onsite as part of the review. The area manager will also invite at least one representative of users or customers who have the responsibility for all or part of the dam's O&M costs to participate, at their own expense, as a member of the team conducting the PFR. This representative(s) will be involved in the review process from start to finish, including the development of specific O&M recommendations. However, the Reclamation examination team leader will determine the final recommendations to be included in the examination report. Participation in the onsite review activities by users and customers will be subject to applicable security and safety considerations. Users and customers will be informed that the number of representatives may need to be limited and will be determined on a case-by-case basis by the area office representatives involved in the review.

- (4) **Site Examination Preparation.** Preparation will include a review of the following:
- (a) history of the facility (if not already familiar);
 - (b) recent (since last formal facility review) annual site inspection checklists completed for the facility;
 - (c) previous RO&M and SEED examination reports (and facility review reports, including Report of Findings (ROF)) and related correspondence;
 - (d) past RO&M/O&M and SOD recommendations and their current status of completion;
 - (e) applicable operating criteria and procedures (i.e., Design Summaries, Designers' Operating Criteria, Standing Operating Procedures, Emergency Action Plan);
 - (f) structural behavior/instrumentation reports and Performance Parameter TMs; and
 - (g) past and ongoing dam safety analysis and construction work.
 - (h) JHA developed by the responsible area office. To help ensure the safety of personnel conducting the site examination, the responsible area office will prepare a JHA for each dam to be examined. The JHA must address all potential safety hazards for activities anticipated and correspondingly provide acceptable methods, procedures, and/or equipment to safely accomplish the activities. The JHA will be provided to each examination

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team participant prior to the time of the examination to allow review of it and to obtain necessary safety equipment. The JHA will be reviewed by the examination team members at the dam site during the entrance briefing for the examination.

- (5) **Training/Experience.** The team leader is required to have a thorough knowledge of principles related to O&M and safety of a dam; have significant experience in the inspection of dams; have reviewed TADS modules related to the inspection of applicable dam features; have reviewed RO&M Field Examination Guidelines; have attended the SEED Seminar; and have regularly attended workshops developed for facility review team leaders.
- (a) Other review team participants are recommended to conform to the above described training/experience.
 - (b) The team leader for these reviews is required to be a licensed professional engineer or the corresponding review report will be peer reviewed and signed by a licensed professional engineer. As an equivalent substitute for this professional engineering requirement, personnel who have 10 years of experience in the area of dam review/inspection are “grandfathered” into the requirement (as of January 1998). This experience substitution will not be allowed after January 1998.
- (6) **Documentation.** Documentation will consist of a detailed report that includes information normally documented within historic RO&M and SEED examination reports. At a minimum, the report will include:
- (a) the name of the author(s) and associated office(s);
 - (b) the date(s) of the examination;
 - (c) the names and offices of other participants in the review/examination;
 - (d) the operational conditions and weather data at the time of the review/examination (including any occurrence of precipitation prior to or during the facility review) which may have an impact on field observations;
 - (e) the status of previous O&M and SOD recommendations (those made during last review/examination and any others remaining incomplete at that time);
 - (f) a listing of new O&M and SOD recommendations made as a result of the review/examination;
 - (g) a brief description of the dam examined;

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- (h) a narrative to describe conditions of the dam and all appurtenances; items as described previously under Paragraph 6.B.(1); and deficiencies observed during the review/examination which support the recommendations made, including any significant events (i.e., operational incidents, historic high reservoir levels and releases, etc.) which have occurred since the last facility review;
 - (i) a statement as to the need for any special site examinations or special monitoring requirements;
 - (j) a description and results of equipment test operated (exercised);
 - (k) representative photographs of all features of the facility and identified concerns, and drawings, maps, and/or sketches of the dam features or dam site which document pertinent conditions and deficiencies for future reference purposes; and
 - (l) signatures of those (team leader/peer reviewers/participants) directly responsible for preparing/reviewing the report.
- (7) **Summary of Recommendations.** For informational purposes, a summary of known and proposed recommendations resulting from each PFR will be transmitted (either by formal memorandum or email) by the team leader within 2 weeks following the actual review/examination date, upon request by the regional or area office. This summary will be transmitted to all team participants and pertinent Reclamation offices, including the Dam Safety Office. Distribution of the summary to the operating entity will be the responsibility of the area/field office.
- (8) **Report Transmittal.** PFR reports will be transmitted as soon as practical following the review/examination, but within 120 days of the actual review/examination date, unless justifiable delays exist and are documented. Reports must be distributed to appropriate operating offices/entities, area and regional offices, the applicable State dam safety office, Reclamation's Dam Safety Office, as well as to the TSC, attention: 86-68360, for inclusion within the DSDaMS. A current distribution list will be periodically updated by the Dam Safety Office and provided to all pertinent Reclamation offices.
- (9) **Recommendation Data Entry.** Beginning, January 1, 1998, formal O&M and SOD recommendations resulting from these reviews will be entered into the DSIS by the office producing the report.

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(10) **Funding.**

- (a) All associated costs (including preparation, travel, per diem, field review, and report preparation) will be considered non-reimbursable and funded within each region.
- (b) Funding will be provided within regional and area offices' budgets to cover regional and area office participation in the PFR, as well as any other staff requested or approved by the team leader for technical expertise, irrespective of office location.
- (c) Any review activities performed at the time of the PFR that are not considered to be related to the evaluation of the safety of the dam/downstream public will be funded under other review program funding or cost recoverable similar to other project O&M costs.
- (d) Expenses incurred by the operating entity, as applicable, in participating in the PFR will be borne as an O&M cost to that facility.

C. **CFR.**

(1) **Scope/Content.** This review will consist of:

- (a) **State-of-the-Art Review and Performance Parameters TM Development.** This will include a review of the dam and its performance and previous studies/analysis and decisions relative to current state-of-the-art design, loading, structural response and downstream consequences, and construction practices. Included will be a review of the Performance Parameter TM for potential failure modes and a revision/development of monitoring requirements.
- (b) **Site Examination.** This site examination will have essentially the same scope as a PFR, with some additional focus on items as determined by the state-of-the-art team and review process (including participation by a Senior Dam Engineer.) Special focused discussions regarding the Performance Parameter TM will be held with operating personnel during the site examination. Additional emphasis will be placed on the operational adequacy and reliability of mechanical equipment and features. A JHA is to be prepared by the responsible area office for each dam to be examined (as directed for PFR site examinations).
- (c) **Examination of Normally Inaccessible Features.** As part of the CFR process, examinations of normally inaccessible features will be scheduled and accomplished within the year preceding, or in conjunction with, the

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corresponding site examination. Refer to Paragraph 6.D. of this D&S for related requirements and procedures regarding these examinations.

- (d) **ROF.** A report will be prepared containing a summary of the findings and conclusions drawn from the results of the above CFR review/examination activities, including an assessment of risk.
- (2) **Frequency/Schedule.** These reviews will be performed every 6 years, alternating every 3 years with the PFRs. The Dam Safety Office (or designated representative) and the regional/area offices will coordinate the scheduling of performing these reviews. Site visits for ongoing SOD technical studies (MDA, CAS, etc.) will be combined with these reviews, whenever practical, for efficiency purposes on a case-by-case basis.
- (3) **Personnel Involvement.**
- (a) **State-of-the-Art Review and Performance Parameter TM Development.** The overall team leader for these activities will typically be a Senior Dam Engineer from the TSC, as designated by the TSC and approved by the Dam Safety Office. Team participants will be selected by the TSC and regional/area offices. The operating entity, as applicable, may choose to participate on this review team; however, this will be at its own expense. Team size will be limited to the minimum number of personnel required to adequately review and evaluate the structure.
- (b) **Site Examinations.** For the CFR site examination, there will be co-team leaders, one from the regional office and one from the TSC (86-68360). Participants, in addition to the co-team leaders and the designated Senior Dam Engineer, will be limited to those required to adequately review and evaluate the structure. Generally, this will consist of an area office representative, a regional office representative, and those requested by the state-of-the-art review team and the co-team leaders for specialized technical expertise. The co-team leaders, during the early stages of coordinating the site examination, will mutually decide on examination and reporting responsibilities. Unless otherwise justified, all CFR site examinations will include the involvement of mechanical engineering expertise to verify the condition and operational reliability of all pertinent mechanical equipment associated with the dam. Personnel involved in the site examination will be those adequately crosstrained in the O&M of the various types of mechanical equipment to be encountered at the dam. If the timing is not conducive to participate at the time of the actual CFR site examination (due to access or operational constraints), the mechanical inspection portion of the CFR will take place at a mutually agreeable time determined by the responsible regional and area offices, sometime within the year preceding the CFR. For efficiency, the mechanical inspection must be combined with other onsite

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activities, where feasible, such as with the annual site inspection or onsite dam operator's training. When conducted at a time other than the actual CFR for the dam, resulting documentation of the mechanical inspection will be made in a separate report and appended to the CFR site examination report. The area manager will also invite at least one representative of users/customers who have the responsibility for all or part of the facility's O&M costs to participate, at their own expense, as a member of the team conducting the examination. This representative(s) will be involved in the examination process from start to finish, including the development of specific O&M recommendations. However, the Reclamation examination team lead will determine the final recommendations that will be included in the examination report. Participation in the examination activities by users/customers will be subject to applicable security and safety considerations. Users/customers will be informed that the number of representatives may need to be limited and will be determined on a case-by-case basis by the area office representatives involved in the examination.

(4) **Training/Experience.**

- (a) **State-of-the-Art Review Team.** The Senior Dam Engineer and other team members are to possess current state-of-the-art practice and/or knowledge in the related technical field, have at least 10 years of experience in the related technical area, be currently licensed as a professional in the related field of technical expertise, and have an extensive knowledge of dam incidents and dam safety concerns and deficiencies. (Note: Seismology and Geology do not have a licensing program.) If the Senior Dam Engineer and members do not possess the above-described experience/qualifications, then it is required that a corresponding peer reviewer possess these experience/qualifications. In addition to these minimum requirements, the Senior Dam Engineer will be approved by the Dam Safety Office.
- (b) **Site Examination Team.** The same training/experience as that required/recommended for a PFR team leader and/or participants as outlined in Paragraph 6.B.(5) of this D&S.

(5) **Documentation.** Documentation for the CFR will consist of a report "package" consisting of the site examination report, the Performance Parameter TM, and the ROF. The ROF will address all dam safety issues in a risk context. For formats/language required for these CFR documents, refer to the document entitled *Comprehensive Facility Review Process, Procedures, and Responsibilities*. At a minimum, the report package will contain the following:

- (a) signatures of applicable team leaders/peer reviewers/participants directly responsible for preparing/reviewing the various included reports and any appropriate management concurrence;

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- (b) results of the background data/information review of the dam and its performance, and previous analysis and decisions relative to current state-of-the-art in design, loading, and construction practices;
 - (c) report from site examination (see below);
 - (d) analysis/evaluation of instrumentation data compiled;
 - (e) results of assessments of risk performed;
 - (f) evaluation of visual and instrumented structural performance;
 - (g) conclusions regarding dam safety and continued safe operation;
 - (h) updated performance/operating parameters;
 - (i) any recommended actions resulting from the review, including:
 - (i) SOD,
 - (ii) O&M,
 - (iii) schedule for instrumentation readings,
 - (iv) additional analytic studies (based on an assessment of risk),
 - (v) additional data gathering, including instrumentation or special monitoring needed (based on an assessment of risk),
 - (vi) need for and frequency of special site examinations, and
 - (vii) need for comprehensive assessment of risk;
 - (j) updated bibliography of reference documents;
 - (k) photographs, drawings, sketches, etc.; and
 - (l) documentation for the site examination for the CFR must conform to the requirements as outlined in Paragraph 6.B.(6) of this D&S for a PFR report. To indicate mutual consensus on the review and report, both team leaders and the Senior Dam Engineer will sign the site examination report.
- (6) **Summary of Recommendations.** For informational purposes, a summary of known and proposed recommendations resulting from the CFR site examination will be transmitted (either by formal memorandum or email) by the team leader

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within 2 weeks following the actual examination date, upon request of the regional or area office. This summary will be transmitted to all team participants and pertinent Reclamation offices, including the Dam Safety Office. Distribution of the summary to the operating entity will be the responsibility of the area/field office.

- (7) **Report Transmittal.** CFR reports will be transmitted as soon as practical following the site examination, but within 120 days of the actual examination date, unless justifiable delays exist and are documented. If it is expected that there will be a significant delay in transmitting the entire CFR document “package,” the CFR site examination report will be transmitted separately. Reports will be distributed to appropriate operating offices/entities, area and regional offices, the applicable State dam safety office, Reclamation’s Dam Safety Office, as well as to the TSC for inclusion within the DSDaMS.
- (8) **Recommendation Data Entry.** Formal O&M and SOD recommendations resulting from these reviews will be entered into the DSIS by the TSC.
- (9) **Funding.** All associated costs (including state-of-the-art review, site examination preparation, travel, per diem, site examination, and report preparation) will be considered non-reimbursable and funded in accordance with the following:
 - (a) funding for preparation and participation in the examination and associated report by a representative from each of the responsible regional and area offices, as well as examinations of normally inaccessible features associated with the review, will be the responsibility of each regional or area office;
 - (b) the remainder of the costs associated with the CFR (i.e., those costs incurred by TSC personnel) will be funded under the SEED Program by the Dam Safety Office;
 - (c) any review activities performed at the time of this review of features that are not considered to be related to the evaluation of the safety of the dam/downstream public will be funded under other review program funding or cost recoverable similar to other project O&M costs; and
 - (d) expenses incurred by the operating entity, as applicable, in participating in the CFR will be borne as an O&M cost to that facility.

D. Examinations of Normally Inaccessible Features.

- (1) **Purpose.** Regular evaluation and visual examination/monitoring of such features are necessary to ensure safe and reliable dam operation. During the course of regularly scheduled PFRs and CFRs, there is a need for the review teams to

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address those features that are normally inaccessible much of the time due to reservoir or tailwater conditions, operational commitments, and/or access constraints.

(2) **Applicable Typical Features.** Typical features that are inaccessible include:

- (a) stilling basins (spillways/outlet works);
- (b) intake structures (spillways/outlet works);
- (c) gate structures (spillways/outlet works);
- (d) certain portions of bridges;
- (e) tunnels/conduits/pipelines (spillways/outlet works); and
- (f) abutments/faces of concrete dams.

(3) **Frequency.**

- (a) **Evaluation.** Similar to the way “readily accessible” features are evaluated while conducting PFRs and CFRs of all significant- and high-hazard dams, all normally inaccessible features associated with the dam require at least minimal level of evaluation every 3 years to determine the appropriateness for any further in-depth field examination, design analysis, and/or nondestructive testing. This type of evaluation is necessary to assert that past visual examination extent (or lack thereof) and frequency of these types of features is appropriate.
- (b) **Visual Examination.** Unless sufficient justification is provided to the facility review team, based on the factors, process and referred guidelines contained in Paragraph 6.D.(4) below, the maximum time interval between visual examinations (considered “hands on” or essentially equivalent) of all normally inaccessible features at significant- and high-hazard dams will be 6 years. Additionally, normally inundated outlet works features must be examined whenever facility operating conditions permit an examination with little additional provision or expense, such as when a low reservoir pool occurs.

(4) **Evaluation.**

- (a) **Factors.** The following factors must be considered in determining the extent and frequency for examining these features:
 - (i) results of previous “hands-on” or essentially equivalent examination;

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- (ii) relative progression of changed conditions that are noted about the feature;
 - (iii) operational history and performance of the feature since its previous examination;
 - (iv) relative costs for providing access for examination of the feature, including costs associated with lost water and power revenues;
 - (v) age of the feature;
 - (vi) critical function of the feature; and
 - (vii) any site conditions which exist that may compromise the safety of the feature.
- (b) **Process.** Based on the factors listed above, an evaluation must be made by the facility review team of the appropriate frequency and extent to which the feature will be examined. This will vary from examination to examination based on recent information. Facility review personnel making the evaluation will begin by evaluating whether 6 years is an appropriate frequency for a “hands on or equivalent” visual examination. Appropriate recommendations resulting from the evaluation performed by facility review personnel will be presented in the ROF (in a CFR) for consideration by the decisionmakers. If practical to do so, this examination will be scheduled during the year prior to the scheduled CFR or at the time of the CFR site examination itself.
- (c) **Related Discretionary Guidance.** Refer to the *Review of Operation and Maintenance Field Examination Guidelines* for related discretionary guidance. As noted in the guidance, suspected conditions for outlet works features are outlined further in the Assistant Commissioner – Engineering and Research (ACER) Technical Memorandum No. 6, *Guidelines for Determining Whether Normally Inundated Outlet Works Features Should be Examined* (1985).
- (5) **Documentation.**
- (a) **Evaluation.** Within the appropriate facility review report, documentation will be provided by the review team regarding the evaluation of the need and/or frequency related to the examination of normally inaccessible features. Sufficient rationale is required to support the determination of extending the frequency for examining any normally inaccessible feature beyond 6 years.

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- (b) **Examination.** Within the appropriate facility review report, a summary will be included of the latest examination performed and any resulting recommendations, as well as reference to applicable examination reports and dates. When examinations are performed on inaccessible features, a separate report will be prepared and contain a description of the findings, related recommendations, applicable photographs, marked-up drawings, and other pertinent information. Distribution of this examination report will be the same as that made for PFR and CFR reports.
- (6) **Personnel Involvement.** Examinations of normally inaccessible features may require the use of individuals with specific technical expertise. Selection of technically qualified personnel to participate in the examination may prove to be valuable in determining the appropriate examination frequency of that particular feature in the future.
- (7) **Training/Experience.** Many of the examinations of these types of features will require specialized personnel, trained in the safe access and operations related to the examination (i.e., underwater dive teams, climbing teams, etc.). Where safety is an obvious factor in conducting the examination, the personnel utilized must conform to established training/experience required by applicable Reclamation standards. This will also apply to all contractors performing these examinations.
- (8) **Examination Alternatives.** In some instances, there may be alternatives for accomplishing the examination of these types of features. The determination of the appropriate examination method must be made by operation personnel based on both the associated costs and the quality/quantity of information to be obtained, given the site-specific conditions. Facility review personnel will provide guidance on a recommended examination method, as appropriate. For example, for features normally submerged by reservoir or tailwater conditions, several options to consider are:
- (a) unwatering/dewatering;
 - (b) Reclamation divers/contract divers; and
 - (c) remotely operated vehicles with cameras and/or special instruments.
- (9) **Recommendation Data Entry.** Formal O&M and SOD recommendations resulting from these examinations will be entered into the DSIS by the responsible office authoring the examination report.
- (10) **Funding.** Examinations of these types of features are considered to be similar in scope and content as the facility reviews performed of other readily accessible dam features. Therefore, in a similar manner, these examinations are non-reimbursable. The regional and area offices will be responsible for funding the

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needed examinations of these features, as determined by the facility reviews conducted at each dam. Costs incurred by the operating entity (as applicable) for participating in or preparing for (e.g., dewatering a stilling basin) such examinations will be borne as an O&M cost for that dam.

E. Special Examinations.

- (1) **Purposes.** In general, the need for these special examinations is satisfied by performing the required annual site inspections, PFRs and CFRs. These examinations will be conducted on an as-needed basis for the following purposes.
 - (a) Evaluation of those concerns identified during the preparation/review of the Performance Parameters TM or during the site examinations of the facility (i.e., ongoing seepage or stability concerns). Generally, these special examinations will be performed and documented in conjunction with the annual site inspection.
 - (b) Following natural phenomena events (unusual loading events such as earthquakes or major floods).
 - (c) Site visits resulting from SEED analysis activities (CAS, MDA, etc.).
 - (d) Site visits to investigate an instrumentation anomaly or a visually observed anomaly.
 - (e) Special unscheduled exposure of dam features that are advantageous to examine because of existing site/reservoir conditions or planned operations.
 - (f) Examinations for which personnel with specialized technical expertise are required.
 - (g) Special inspections/monitoring of a dam where exceeding maximum reservoir level is considered part of “first fill” procedures (historical high reservoir elevation). More rigorous inspections and monitoring, as typically outlined in the Standing Operating Procedures and/or Performance Parameters TM, is generally required when new historic reservoir levels are attained. If “first fill” procedures are not available or were developed prior to 1980, a review is necessary by the Dam Safety Office and the TSC to determine whether new or revised procedures are appropriate.
- (2) **Scope/Content.** These examinations will be very site-specific and concentrate only on those features identified as being of concern.
- (3) **Personnel Involvement.** For these examinations, except for those performed following natural phenomena events, the determination of participation from

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which offices and how the examination is to be accomplished in conjunction with other scheduled reviews/examinations/inspections will be made collaboratively by the area/regional offices and the Dam Safety Office. For those field examinations specifically associated with a natural phenomena event, regional and area office personnel will decide upon and coordinate any needed participation from their offices and the TSC.

- (4) **Training/Experience.** Training and experience necessary for personnel participating in these special examinations will be as outlined for PFRs in Paragraph 6.B.(5) of this D&S, unless accomplished as part of an annual site inspection or the completion of a performance parameter checklist.
- (5) **Documentation.**
 - (a) With the exception of the special examination needed in the case of natural phenomena, all other special examinations/reviews will be documented in a special examination report. At a minimum, the content of the report will include the following information:
 - (i) the name of author(s) and associated office(s);
 - (ii) the date(s) of the examination;
 - (iii) the names and offices of other participants in the examination;
 - (iv) the operational and weather data at the time of the examination (including precipitation during or prior to the examination) which may have an impact on field observations;
 - (v) a brief description/background of the particular concern and the need for the special examination;
 - (vi) a narrative/text to describe conditions and deficiencies observed during the review/examination;
 - (vii) any resulting recommendations for future actions based on the examination and an assessment of risk, including a statement regarding the scheduling of the next needed examination;
 - (viii) representative photographs, drawings, etc., of the concerned features which document pertinent conditions and deficiencies for future reference purposes; and
 - (ix) signatures of the team leader and those participants directly responsible for preparing the report.

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- (b) A checklist, which can be the same as that used for the annual site inspections, will be completed for documenting any special examination conducted following a natural phenomena event.
- (c) Distribution of special examination/review reports or completed checklists will be made in the same manner as that outlined for the distribution of other facility review documentation within this D&S.
- (6) **Recommendation Data Entry.** Formal O&M and SOD recommendations resulting from these examinations will be entered into the DSIS by the responsible office authoring the examination report.
- (7) **Funding.** Generally, these special examinations/reviews, with the exception of those for natural phenomena events, are considered to be similar to other SEED Program activities (i.e., specific purpose of the examination/review is dam safety related) and the costs thereof are considered non-reimbursable. The costs associated with examinations/reviews related to natural phenomena events will be treated similar to other project O&M costs.

7. O&M Recommendation Categorizing and Tracking.

- A. **Categorizing.** Current recommendation categories as outlined under the existing RO&M Program will be used.
 - (1) **Category 1 recommendations.** Category 1 O&M recommendations will be made for the correction of severe deficiencies where immediate and responsive action is required to ensure structural safety and operational integrity of a facility.
 - (a) Based on the severity of the deficiency and the condition of the structure/facility at the time of the examination, the examination team will mutually prescribe an appropriate timeframe for completing the recommendation. Suggested remedial measures will be discussed at the time of the examination and included in the examination report. Within 30 days following preparation or receipt (depending on the office conducting the examination) of the examination report containing a category 1 recommendation, the responsible regional director will notify all concerned offices (i.e., Director, PPS, Attention: 84-57000 and the Director, Operations, Attention: 96-40000) of the operating office or entity's plans for accomplishing the work and a scheduled completion date.
 - (2) **Category 2 recommendations.** Category 2 O&M recommendations will be made for a wide range of important matters where action is needed to prevent or reduce further damage or preclude possible operational failure of the facility.

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- (a) Such recommendations are intended to be acted upon as soon as practicable following receipt of the corresponding examination report by the operating office or entity. Those recommendations that can be included, scheduled, and accomplished as part of the normal O&M program, will be undertaken as soon as weather or water conditions allow, to permit quality remedial actions. Some recommendations may require a longer time to accomplish because of the need to budget funds, complete designs, or secure equipment, materials, or personnel. In such cases, the related planning and budgeting must be initiated in a timely manner.
 - (b) Any category 2 recommendation remaining incomplete at the time of the following examination will be addressed during that examination and within the corresponding examination report.
- (3) **Category 3 recommendations.** Category 3 O&M recommendations will be made for less important matters but believed to be sound and beneficial suggestions to improve or enhance the O&M of the project or facility. The status of each category 3 recommendation will be provided in the subsequent examination report. If the recommendation is still applicable, a current year designation must be used.
- B. **Tracking.** Relative to the tracking of O&M recommendations resulting from the facility reviews conducted on dams:
- (1) **Category 1.** Status reports will be provided by the responsible area manager and corresponding regional director and to the Director, PPS, Attention: 84-57000 and the Director, Operations, Attention: 96-40000 every 6 months (January 1 and July 1) until the recommendation is complete.
 - (2) **Category 2.** Status reports will be provided by the responsible area manager to the corresponding regional director on an annual basis (month/date?).
 - (3) **Category 3.** Status reports on an annual basis are not required for these recommendations.
- C. **Database.** The DSIS database will be used to maintain the information related to the required tracking/status reports on Category 1 and 2 recommendations.
- (1) Through the DSIS, the status of all recommendations can be accessed by all Reclamation offices. Each area or regional office will update the status of any O&M recommendations (that are already entered into DSIS) at the frequency indicated for each recommendation category under Paragraph 7.B. of this D&S.
 - (2) All current and historically completed O&M recommendations will be included within the DSIS.

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- D. **Annual Summary Report.** PPS (84-57000) will prepare an annual report summarizing the effectiveness in accomplishing Category 1 and 2 recommendations related to these dams. This report will be based on the data and completion status of all current recommendations entered into DSIS by the regional and area offices.
8. **SOD Recommendations.**
- A. **Purpose.** SOD recommendations will be used to document the need for data collection, analyses, and decisionmaking associated with dam safety issues for identified and potential dam safety related deficiencies. These recommendations are not to be used in identifying O&M type activities that will ultimately be funded with project O&M funds and accomplished as part of a facility's O&M program; these types of activities will be identified by the above-described O&M recommendations. All SOD recommendations are important to the safety of the dam. Hence, they must be accomplished as soon as practical, but within 6 years, unless otherwise justified and documented. Critical SOD recommendations must be accomplished in a timely manner.
- B. **Tracking.** The completion status of SOD recommendations will be formally tracked every 3 years in conjunction with each PFR and CFR. The current status of each recommendation will be provided within each corresponding examination/review report. The status on the SOD recommendations will be updated annually within DSIS by the Dam Safety Office (or designated representative), as status information on specific recommendations become available.
- C. **Database.** Based on the status of recommendations provided within each examination/review report, the Dam Safety Office (or its designee) will update the existing database of recommendations within the DSIS. Through the DSIS, the status of all recommendations can be accessed by all Reclamation offices. All current and historically completed SOD recommendations will be included within the DSIS.
9. **Related Discretionary Guidance.** In addition to the training/experience requirements cited in this D&S, the following are referenced as related discretionary guidance to assist personnel in conducting the various reviews/examinations and inspections:
- A. RO&M Field Examination Guidelines;
 - B. SEED Manual;
 - C. Guidelines for Safety Evaluation of Mechanical Equipment;
 - D. Comprehensive Facility Review Process, Procedures, and Responsibilities;
 - E. TADS Program modules;

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- F. Federal Guidelines for Dam Safety;
- G. Association of State Dam Safety Officials – membership or affiliation; and
- H. United States Committee on Large Dams (USCOLD) committee on Dam Safety – membership or affiliation.