

Reclamation Manual

Directives and Standards

Subject:	Radio Communications Program
Purpose:	Provides oversight and requirements for radio systems within the Bureau of Reclamation. The benefits of this Directive and Standard (D&S) are to improve and standardize radio communication technologies and processes across Reclamation. These requirements will ensure that Reclamation radio communication systems comply with National Telecommunications and Information Administration (NTIA) and Department of the Interior requirements associated with design, acquisition, installation, operations, maintenance, and disposal of radio communications systems.
Authority:	The Communications Act of 1934 (47 U.S.C. 151); NTIA <i>Manual of Regulations and Procedures for Federal Radio Frequency Management</i> as described in paragraph 1.1 (Authority); NTIA Organization Act (Pub. L. 102-538; 106 Stat. 3533; 47 U.S.C. 901 et seq.); Executive Order (EO) 13821, <i>Streamlining and Expediting Requests To Locate Broadband Facilities in Rural America</i> ; Department of Commerce Organization Order 10-10 (DOO 10-10), <i>Assistant Secretary For Communications and Information</i> ; National Defense Authorization Act for Fiscal Year 2015 (January 3, 2014), Division A, Title VIII, Subtitle D-Federal Information Technology Acquisition Reform, Sections 831-837 (Pub. L. 113-291); North American Electric Reliability Corporation, Reliability Standard COM-001-3, <i>Communications</i> ; Department of the Interior Office of the Chief Information Officer (OCIO) Bulletin 2002-008, <i>Technical Approval of Radio Equipment Acquisitions</i> ; OCIO Directive 2006-020, <i>Department Radio Communications Encryption Policy</i> ; OCIO Directive 2008-019, <i>Technical Approval of Radio Equipment Acquisitions</i> ; OCIO Directive 2010-008, December 11, 2009, <i>Radio Communications Site Standards</i> ; Departmental Manual (DM) 112 DM 24, 212 DM 24, and 377 DM; OCIO IMT Circular 2018 08-01 and 2005-010 Radio Sharing
Approving Official:	Associate Chief Information Officer (ACIO), Information Resources Office (IRO)
Contact:	Enterprise Operations Division, Enterprise Telecommunications Management Branch (84-21150)

- 1. Introduction.** This D&S establishes the requirements and coordination for planning, design, acquisition, installation, management, disposal of equipment and infrastructure associated with radio communication systems. This D&S establishes procedures for Radio Frequency Authorization (RFA) requests/approval, radio encryption requests/approval, radio communication site reviews, and operation and maintenance of approved radio communications systems across Reclamation as well as outlines the minimum required

Reclamation Manual

Directives and Standards

technician competencies. These requirements will ensure proper authorization, operations, maintenance, safety, and security of radio systems throughout Reclamation.

2. **Applicability.** All Reclamation employees involved with owned, operated, leased, or maintained radio communication systems, including but not limited to specialized systems (e.g., Supervisory Control and Data Acquisition (SCADA), Hydromet, Geographic Information System, and Land Mobile Radio (LMR) systems), including high frequency (HF), ultra-high frequency (UHF), very high frequency (VHF), satellite, radar, and microwave radio operations.
3. **Program Oversight.**
 - A. The ACIO will oversee a reliable radio communication program for water and power operations, security, safety and law enforcement, mutual aid, maintenance, resource management, radio components of SCADA systems, telemetry, surveillance, and voice operations for Reclamation's dams, reservoirs, powerplants, canals, aqueducts and associated portions or projects within Reclamation.
 - B. Regional directors oversee the Radio Communications Program and management of radio assets within their region and shall provide a regional radio liaison (RRL) to the Reclamation Radio Program Manager (RPM).
 - C. The Manager, Information Management and Technology (IMT) Service Strategy Division (IMTSSD), will ensure the internal controls are developed and monitored over the radio compliance with applicable Federal laws, rules, regulations, policies, standards, and procedures including those issued by Office of Management and Budget (OMB), National Institute of Standards and Technology or NIST, and the Department for mission or business operations, practices, information and information systems.
 - D. The RPM:
 - (1) ensures compliance with Federal laws and regulation issued by NTIA, Federal Communications Commission (FCC), OMB, the Department, and Reclamation policies and guidelines serving as Reclamation's representative with the Department, bureaus, and other Federal agencies for the radio program;
 - (2) provides Reclamation's radio perspective and requirements to the Department to ensure the unique needs of Reclamation are met;
 - (3) oversees the implementation of Departmental radio initiatives within Reclamation;
 - (4) provides oversight for business, technical, operational, maintenance, coordination and guidance on radio interoperability efforts within Reclamation;

Reclamation Manual

Directives and Standards

- (5) reviews all radio contracts for appropriate language and compliance;
- (6) provides oversight and review to ensure safe operation of all radio systems in Reclamation; and
- (7) assists the Department National Radio Spectrum and Program Management Office with radio frequency coordination and radio interference issues when they impact Reclamation radio communication systems.

4. Program Administration.

- A. RPM is a technical designation responsible for providing support to bureau, regional, area, and field offices in radio system and/or site design, radio frequency (RF) coverage analysis, programming, maintenance, and site or system decommissioning. The RPM keeps Reclamation offices informed of and in compliance with NTIA, Department, and Reclamation regulations and spectrum management procedures.
- B. RRLs provide support to area and field offices in radio system and/or site design, RF coverage analysis, acquisitions, programming, installation, operations and maintenance, training, and site or system decommissioning.
- C. Area managers provide budget activity plans, justification letters, unfunded requests not included in the current fiscal year, and extraordinary maintenance submissions as required. Ensure contract language related to the radio program complies with this D&S.

5. Reclamation Radio Inventory.

A. Inventory Requirements.

- (1) All radio assets within the Financial Business Management System (FBMS) shall be inventoried annually in accordance with Department of the Interior 114-60.3 and the Reclamation Supplement 114S-60.3 - Property Inventories. Detailed information shall be collected and retained on all equipment radio assets and infrastructure associated with all radio communication systems, including radio components integrated into other larger systems.
 - (a) RRLs will coordinate regional radio equipment inventory requirements.
 - (b) Area managers will ensure the accuracy of the equipment and infrastructure inventory for all radio sites and systems.
- (2) Equipment information shall include the following as a minimum:
 - (c) manufacturer/model/model year;

Reclamation Manual

Directives and Standards

- (d) device location (e.g., latitude and longitude);
 - (e) install date; and
 - (f) inventory number.
 - (3) Infrastructure information shall be recorded in the internal control review (ICR) or documented after major changes. Area managers or radio system owners ensure Reclamation-owned radio sites are properly recorded in the Federal Real Property Profile (FRPP) in accordance with EO 13821.
 - (4) Infrastructure information shall be collected and recorded/documented as part of annual maintenance operations or after major changes. Documentation shall be reviewed as part of the scheduled 5-year ICR process. RRLs will coordinate Reclamation-owned radio sites and ensure they are in FRPP.
 - (5) Collected information shall be provided to the RPM who will verify Reclamation-owned radio sites are in FRPP.
- B. **Maintenance and Updates.** The radio inventory shall be formally reviewed by the system owner and updated by the system owner every 5 years as part of the ICR process.
6. **Radio Site Inspection Requirements.**
- A. **Job Hazard Analysis (JHA).** JHAs must be completed in accordance with [Reclamation Safety and Health Standards \(RSHS\) Section 1.04: Work Safety Planning](#).
 - B. **Annual Inspections.** Annual inspections will be conducted at all sites containing radio assets. The RPM will assist in performing radio site inspections by providing the inspection check sheet. Inspections will be conducted using the site inspection check sheet. Annual testing, including visual inspection and testing of the grounding system, shall be accomplished and documented during the annual inspection activities. Inspection recommendations, including safety, will be documented and progress tracked until the specific deficiencies are corrected. Annual inspection results and any inspection recommendations shall be provided to RRLs. Area managers are responsible for radio system annual inspections and operations.
 - C. **Annual Maintenance.** The RPM will provide the schedule of recommended/required preventative maintenance on the LMR equipment to include what checks must be made and the periodicity of each and will provide recommended communication checks on the LMR system to ensure operational status. The equipment maintenance sheet will be used to document annual maintenance or preventative maintenance data. Access this sheet by searching radio communications in the Reclamation Intranet site.

Reclamation Manual

Directives and Standards

- D. Testing of the grounding system, shall be accomplished and documented during the annual maintenance activities. Annual maintenance documents shall be provided to RRLs. Area managers are responsible for proper radio system maintenance.
7. **ICR Inspections/Activities.** ICRs shall be performed on a 5-year schedule at any site containing radio assets. ICRs shall be conducted by site personnel, under direction of the radio system owner or area manager with guidance from the RPM in performing radio site inspections. ICR scheduling will coincide with RFA renewal. ICRs will focus on sites that have larger structures whose primary purpose is to house radio communication equipment and must conform to the requirements of Department Form NRSPMO-SS-001. ICR inspection teams shall include as a minimum RRLs, and a member representing Safety. The RRL will schedule, perform, and monitor the radio ICRs and ensure resolution of deficiencies identified.
8. **Inspection Recommendation Requirements.**
- A. **Categorizing Recommendations.** Recommendations will be developed by Reclamation staff based on deficiencies identified during inspections. The IRO IMTSSD will maintain a record of all inspection recommendations identified during inspections. Area managers will develop plans of action for inspection recommendations identified during site inspections and provide annual progress status. Recommendations will be categorized according to the three types of recommendations defined below:
- (1) **Category 1.**
- (a) Recommendations involving the correction of severe deficiencies where immediate and responsive action is required to ensure structural safety, operational integrity of a facility, or operating personnel/public safety.
- (b) Based on the severity of the deficiency and the condition at the time of the inspection, the inspection team will prescribe an appropriate timeframe for completion of the recommendation. Suggested remedial measures will be discussed by the team at the time of the inspection and included in the inspection report. Within 30 days following transmittal (depending on office conducting the inspection) of an inspection report containing one or more category 1 recommendations, the responsible Regional Director will notify all concerned offices (i.e., Director, Dam Safety and Infrastructure, Attention: 86-67200 (bor-ovsha-amd-cirn@usbr.gov), ACIO (84-21000), and the Director, Operations) of the operating office's or entity's plan for accomplishing the work and a scheduled completion date.

Reclamation Manual

Directives and Standards

(2) **Category 2.**

- (a) Recommendations covering a wide range of important matters where action is needed to prevent or reduce further damage, preclude possible operational failure of the facility, or reduce safety risks to operating personnel/public.
- (b) Such recommendations are to be acted upon as soon as practical following receipt of the annual inspection or ICR report and must be scheduled for completion as soon as possible and prior to the next inspection or ICR review. Any category 2 recommendations that remain incomplete during the next cycle must be addressed in writing to the appropriate area manager within 30 days of the follow-on inspection.
- (c) It is desirable that those recommendations that can be included, scheduled, and accomplished as part of the normal Operation and Maintenance (O&M) Program be undertaken as soon as weather or conditions allow 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 is to be initiated in a timely manner.
- (d) Any past category 2 recommendations remaining incomplete at the time of the examination will be addressed during that examination and within the corresponding examination report.

(3) **Category 3.** Recommendations covering less important matters but believed to be sound and beneficial suggestions to improve or enhance the O&M of the system or site. The status of each category 3 recommendation will be provided in the subsequent inspection report. If the recommendation is still applicable, the current year designation will be reassigned to the recommendation number.

- B. **Recommendation Tracking.** Regardless of whether the system was inspected as part of an annual or ICR inspection, all Category 1, 2, and 3 recommendations resulting from the inspection will be given to the area manager, RRL, and RPM for tracking purposes and will be monitored until they are remediated or resolved. It is the responsibility of the regional and area offices to implement all recommendations and to ensure safety-related issues identified at the radio sites are coordinated with the Safety Office.

9. **Inspection Report Requirements.** A separate inspection report will be prepared even if the inspection was conducted as part of a radio, safety, or facility inspection.

- A. **Repairs/Improvements.** Inspection reports shall document all major repairs and maintenance improvements that have been performed at radio sites since the previous inspection. Inspection reports shall also document any recommendations identified

Reclamation Manual

Directives and Standards

during the current inspection. All recommendations shall be categorized according to the requirements of this D&S.

- B. **Report Signature.** Every inspection report shall include the signature(s) of the reviewers. Printed names and date of signature shall also be included.
- C. **Report Transmittal and Distribution.** Final inspection reports shall be distributed to the responsible area manager within 120 calendar days of the inspection date by the reviewer(s) that authored the report. The area manager is responsible for further distribution of inspection reports within the area office. Reports distribution must include RRL and RPM in addition to any region or area office contacts.
- D. The RRLs will update the recommendation database based on the results of the inspection within 90 calendar days of the inspection date.

10. Encryption Requirements.

- A. All law enforcement and/or other sensitive radio communications shall be encrypted. Radio communication sensitivity for non-security and non-law enforcement operations radio systems shall be coordinated and determined by the area manager. Instruction provided in the Federal Information Processing Standard (FIPS) 199 shall be used to determine the sensitivity requirements of radio communication systems. Non-sensitive radio communications do not require encryption. The purchase of new radio equipment and systems requiring encryption shall use at a minimum Advanced Encryption Standard (AES) 128 algorithm and shall have the capability of AES 256. Older algorithms, such as Digital Encryption Standard (DES), DES extra Long (XL), and DES Output Feedback Mode shall only be used if required for interoperability with local cooperators.
- B. The purchase of new radio equipment and systems utilized to transmit or receive sensitive but unclassified information will use a cryptographic module that has been validated pursuant to FIPS 140-2 requirements with documentation. Under certain circumstances, the Secretary of the Interior may waive this requirement provided the FIPS 140-2 waiver procedures are addressed.

11. Acquisition Requirements.

Procurement of any radio equipment, regardless of cost, which utilizes radio frequencies to accomplish its task, must have prior technical approval from the RPM coordinated through RRL. Purchasing agents must receive a copy of this approval before equipment is ordered. This ensures that all wireless devices have the required radio frequency authorizations or frequency support and are compatible with existing wireless systems. RFAs or NTIA frequency support must be requested and assigned by the NTIA prior to equipment acquisition. The equipment must also meet the requirements set forth in 377 DM and NTIA's Manual of Regulations and Procedures for Federal Radio Frequency Management.

Reclamation Manual

Directives and Standards

- A. All new LMR radio communication systems will employ radios that conform to the Association of Public Safety Communications Officials (APCO) International, Project 25 (P25 or APCO-25) standards for digital narrowband radio technology. This standard was adopted as the Department's standard for digital narrowband radio equipment in IRM Bulletin 1996-003. These standards are now referred to as the TIA/EIA-102 suite of standards for digital radio.
 - B. The acquisition and use of Family Radio Service and Multi-Use Radio Service equipment is expressly prohibited.
 - C. All radio equipment acquisition costs will be tracked via Reclamation property, budget, and finance allocation procedures.
12. **Installation Requirements.** All radio communication systems must be installed in accordance with the Department Form National Radio and Spectrum Program Management Office (NRSPMO) NRSPMO-SS-001, Radio Electronic Site Survey Instruments, access this sheet by searching radio communications in the Reclamation Intranet site and using Motorola R56 Radio Site Design Standards for new operation, maintenance, and replacements (OM&R).
13. **RoIP Requirements.** All RoIP applications will follow Department OCIO Directives and be coordinated with Reclamation IMT operations, RRL, and the RPM prior to implementation.
14. **Environmental Requirements.** Prior to a major reconfiguration, upgrades or decommissioning of radio facilities, appropriate environmental staff must be consulted to address compliance under the National Environmental Policy Act, the Endangered Species Act, the National Historic Preservation Act, hazardous materials laws, and other applicable environment laws.
15. **Disposal Requirements.**
- A. All radio communication assets must be disposed of in accordance with Federal Management Regulations (FMR) (41 CFR 102) and the Reclamation Supplement to the FMR by the servicing property office. The asset owner shall complete the MS-880, Request for Removal of Property, or office specific turn-in documentation once the radio asset is no longer needed. The servicing property office can provide the proper documentation/form and complete the disposal process.
 - B. Radio equipment shall be zeroized to remove all encryption keys and frequency information. AES/DES encryption modules will be disposed of in the manner prescribed by National Security Agency, Department, and Reclamation procedures in coordination with the servicing property office. Encryption modules may be transferred by the servicing property office to other Federal organizations in lieu of destruction or disposal.

Reclamation Manual

Directives and Standards

16. **RFA Review Requirements.** The process and preparing of a complete RFA review package will be coordinated by RRL with updated information provided by system owner or area manager. RRL will send updated RFA package to RPM for review. RPM will send to the Department's Spectrum Management Office, who coordinates with NTIA for frequency assignment. The following comprise an RFA package:
- A. radio frequency request memorandum (template located on the Reclamation Intranet site), with system description, justification, and action request;
 - B. radio frequency proposals in Pseudo-GMF Spectrum XXI format via Data Exchange;
 - C. system drawings provided in both portable document format (PDF) as well as generic computer aided drawing (CAD) format using software such as Design CAD or AutoCAD;
 - D. map showing the locations of the radio system or sites;
 - E. all memorandums of understanding (MOU) describing terms and conditions for frequency and system use between Reclamation and non-Reclamation entities;
 - F. radio sharing assessment; and
 - G. verified data entered on existing RFAs with field conditions.
17. **MOU Requirements.**
- A. MOU templates will be provided by RPM. RRLs assist in the development of and reviewing MOU for radio sites and/or systems within their region.
 - B. MOUs shall be established in accordance with the Department, Reclamation and cooperator requirements and signed prior to shared operation of the frequency or system.
 - C. MOUs shall list transmit and receive frequencies as well as respective transmit locations. Locations shall be identified by name and RFA serial number or FCC license.
 - D. MOUs shall require that all transmitters, Reclamation and non-Reclamation, be properly licensed.
 - E. MOUs shall be signed by authorized official from each entity involved. Signatories organizational authority level shall match across all entities of area manager authority or higher.

Reclamation Manual

Directives and Standards

18. **Radio Site Leasing Requirements.** Real Property Leasing Office (RPPS) is responsible for the lease of space for communication equipment. Leases shall be established in accordance with Department and Reclamation RPPS requirements.
- A. Leases of space for radio communications sites for use by Reclamation will be signed by a lease contracting officer.
 - B. RPM will verify leased space is coordinated with RPPS.
 - C. RRL assists in the development and reviews space leases for radio sites and/or systems within their region.
 - D. Area managers will coordinate or facilitate space leases for radio sites.
19. **Radio Personnel Requirements.** Personnel working with radio equipment and radio systems shall possess the knowledge and required skills to perform tasks. Radio related tasks include the following:
- A. troubleshoot RF, microwave, analog, and digital circuits;
 - B. using RF analysis and using various communication software;
 - C. using various electronic test equipment to include but not limited to RF communications test set, spectrum analyzers, watt meters, digital volt meters, oscilloscopes, power meters, ground resistance meters, and frequency counters;
 - D. programming radio equipment and radio systems to include encryption, Network Access Codes or NAC and talk groups;
 - E. understanding and applying telecommunication theories, concepts, principles, standards, and practices;
 - F. integrating and testing of RF technologies;
 - G. operate and properly maintain radio sites, regularly inspecting as required and in accordance with applicable standards and codes;
 - H. comply with RSHS; and
 - I. utilizing resources for training to acquire skills to perform the above tasks. Access the “Resources for Radio Training” document by searching radio communications in the Reclamation Intranet site.

Reclamation Manual

Directives and Standards

20. Site Requirements.

- A. All new construction or OM&R of existing radio sites shall comply with Motorola R56 standards, Departmental requirements, as well as applicable industry codes. The RPM ensures the RRL, area managers and system owners have the cited references to comply with this requirement.
- B. All sites shall have an established grounding system that is properly bonded and meets this D&S's cited regulations and standards. All radio equipment and supporting infrastructure shall be properly grounded. This will be ensured by following the installation requirements and ICR inspection activities.

21. Definitions.

- A. **Advanced Encryption Standard or AES.** Encryption algorithm based on FIPS publication No. 197. This type of encryption is also referred to as strong encryption.
- B. **Area Manager.** The term area manager includes the official heads of offices that are specifically designated area offices within the jurisdiction of each region. For purposes of this release, area managers are included when the general term manager is used. For the purposes of this document, the following positions are also considered area managers as used in this release as these positions carry out the functions of other area managers; examples include: Grand Coulee Power Office Manager and Manager, Lower Colorado Dams Office.
- C. **Association of Public Safety Communications Officials or APCO.** An association of communications professionals that influences public safety communications decisions of government and industry.
- D. **Digital Encryption Standard or DES.** DES is a block cipher that uses shared secret encryption. It was selected by the National Bureau of Standards as an official FIPS for the United States in 1976 and which has subsequently enjoyed widespread use internationally. It is based on a symmetric-key algorithm that uses a 56-bit key.
- E. **Federal Information Processing Standard or FIPS.** These are publicly announced standards developed by the United States Federal government for use in computer systems by all non-military government agencies. Many FIPS standards are modified versions of standards used in the wider community (American National Standards Institute, Institute of Electrical and Electronics Engineers, International Organization for Standardization, etc.)
- F. **Land Mobile Radio or LMR.** A wireless communications system intended for use by users in vehicles (mobiles) or on foot (portables).

Reclamation Manual

Directives and Standards

- G. **National Telecommunications and Information Administration or NTIA.** An agency in the U.S. Department of Commerce that serves as the executive branch agency principally responsible for advising the President on telecommunications and information policies and managing the Federal use of spectrum.
- H. **Operation and Maintenance or O&M or Operation, Maintenance, and Replacement or OM&R.** The ongoing, regular, or routine operation, maintenance, repairs, replacements, and other activities and actions necessary for continued structural integrity and operational reliability of project facilities required for the delivery of contract water.
- I. **Pseudo-Government Master File (GMF) Spectrum XXI Format.** Information format similar, but slightly modified, from the data format used by the NTIA in the GMF for radio frequency assignments. This data format is only used by the Spectrum XXI program to request additions, deletions, or changes to the GMF.
- J. **Radio Assets.** Radio assets in FBMS are system-controlled personal property, such as equipment consisting of transmitters, receivers, antennas, and associated equipment, that is employed to emit or receive a radio frequency signal. Radio assets are classified within asset class numbers 33CA58RD and 33NC58RD.
- K. **Radio Communication System.** A working combination of facilities, stations, or circuits intended to perform and information transfer functions by the use of the radio spectrum.
- L. **Radio Equipment.** Hardware which is utilized to emit or receive radio frequency signals. Wireless 802.xx and cellular equipment are not considered radio equipment for the purposes of this D&S.
- M. **Radio ICR.** A management means to inspect radio communications sites for compliance with Motorola R56¹ standards and to track remediation progress of identified deficiencies until the resolution of deficiencies is completed.
- N. **Radio over Internet Protocol (RoIP).** RoIP is similar to voice over Internet protocol (VoIP), but augments two-way radio communications rather than telephone calls. With RoIP, at least one node of a network is a radio (or a radio with an IP interface device) connected via IP to other nodes in the radio network. The other nodes can be two-way radios or could be dispatch consoles. RoIP can be deployed over private networks as well as the public Internet. It is useful in LMR systems used by public safety departments and fleets of utilities spread over a broad geographic area.

¹For the Motorola R56 Standards contact your RRL.

Reclamation Manual

Directives and Standards

- O. **Radio Package.** A radio package is the required documentation to add, change, or delete a radio system. The radio package is submitted to the Reclamation RPM for approval. Instructions for the completion of the package can be found in DM 377.
 - P. **Radio Sharing Analysis.** A study to determine if existing radio assets or an existing radio communication system can be shared, rather than installing a new independent radio communication system.
 - Q. **Radio Frequency Authorization or RFA.** An authorization from the NTIA to operate on an assigned radio frequency.
 - R. **RFA Request.** A request, via NTIA, to gain authorization to transmit a radio signal on an assigned radio frequency.
 - S. **Supervisory Control and Data Acquisition or SCADA.** A communication system used for information collection and/or to monitor or control automation equipment.
 - T. **Telecommunications Industry Association/Electronic Industries Alliance or TIA/EIA.** A trade association representing the global information and communications technology industries through standards development, government affairs, business opportunities, market intelligence, certification, and world-wide environmental regulatory compliance.
22. **Review Period.** The originating office will review this release every 4 years.