



Office of Nuclear Safety and Environment (HS-20)

The Office of Nuclear Safety and Environment (HS-20) establishes nuclear safety and environmental protection requirements and expectations for the Department to ensure the protection of workers and the public from the hazards associated with nuclear operations, and the protection of the environment from the hazards associated with all Department operations. HS-20 provides assistance to field elements in implementing policy and resolving nuclear safety and environmental protection issues. Some examples of these efforts are described below.

NUCLEAR SAFETY

- **Nuclear Materials Packaging Manual**
- **The Operational Readiness Review Program**
- **DOE Order 433.1, Maintenance Management Program for DOE Nuclear Facilities Working Group**
- **Cross Cutting Nuclear Safety Issue Resolution**
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ENVIRONMENT

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- **Low-Level Radioactive Waste Federal Review Group (LFRG)**

NUCLEAR SAFETY

■ Nuclear Materials Packaging Manual

In March 2005, the Defense Nuclear Facilities Safety Board (DNFSB) issued recommendation 2005-1, *Nuclear Materials Packaging*, because it felt there were no explicit DOE-wide requirements to ensure the safe storage of nuclear materials. Typically, facilities used engineered features, such as the confinement structure and ventilation system, to protect offsite individuals and collocated workers. For facility workers, however, the controls were generally administrative, such as continuous air monitors, personal protective equipment, periodic contamination surveys, and evacuation training.

DOE, in response to this recommendation, developed a *Nuclear Materials Packaging Manual* which is currently in the DOE directives review and comment (RevCom) system. This draft manual provides requirements for packaging surveillance and testing, design, and documentation.

These requirements define a level of rigor and documentation to ensure the design of the package is appropriate for the material being stored and the storage life-time.

The identification of leak rate design values and testing to ensure appropriate design values are two important considerations. Leak rates are set for both normal storage conditions and those involving a drop of the package.

HS-20 sponsored testing of some containers to develop appropriate procedures and to determine whether existing containers can pass



ENVIRONMENT

■ Environmental Management Systems

Pursuant to a Presidential Executive Order, Federal agencies are required to implement Environmental Management Systems (EMSs) in order to systematically identify, manage and reduce the environmental impacts of government operations and activities. EMSs are implemented at DOE as a part of the Integrated Safety Management System (ISMS).

On January 24, 2007, President Bush signed Executive Order (EO) 13423 *Strengthening Federal Environmental, Energy and Transportation Management* which established new and updated goals, sustainable practices, and reporting requirements for environmental, energy, transportation performance and accountability.

The EO charges Federal agencies to lead by example in advancing the nation's energy security and environmental performance; implementing sustainable practices, and meeting goals in key areas (e.g., energy efficiency, renewable energy, water conservation, pollution prevention, reduction of acquisition toxic chemical acquisition and use).

The EO also requires agencies to implement EMSs as the primary management system for addressing the environmental aspects of agency operations and activities. Supplemental instructions issued by the Council on Environmental Quality (CEQ) provide specific direction for defining the scope and content of EMSs.

HS-20 assists sites and programs to address the requirements of the new EO and CEQ's implementation instructions. HS-20 is revising DOE Order 450.1, *Environmental Protection Program*, to incorporate new and expanded EO EMS requirements, sustainable environmental practices, and compliance management requirements. Drafts of the revisions have been coordinated with a number of DOE focus

the Manual's leak rate requirements. Test results are currently being analyzed and the Manual has been updated to require additional testing.

HS-20 expects to issue the final Manual in November and will continue to support its implementation, including additional testing and training development.

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■ The Operational Readiness Review Program

The Operational Readiness Review (ORR) Program is a corporate program managed by HS-20 which provides policy, guidance and technical support for the startup or restart of Departmental nuclear facilities.

In January, representatives from HQ Program Offices, Field Offices and operating contractors met in Richland, WA to identify opportunities for improving how the Readiness Review community can keep abreast of the latest readiness review issues across the DOE complex, share innovative ideas and practices, and collaborate virtually on the development and implementation of new readiness review practices and documents.

The Department's ORR web site was re-designed to make it a "one-stop shop" for all ORR-related materials. In addition to an easily downloadable training curriculum, the web site also now allows users to easily browse topical categories of Criteria and Review Approach Documents (CRADS) and download CRADs which may be applicable to them and allows them to build upon the insights and best practices of other sites.

To learn more about the Department's ORR Program, visit:
<http://www.hss.energy.gov/NuclearSafety/NSEP/orr/index.html>.

groups, including Pollution Prevention Coordinators and over 200 Environmental Management System Assistance Network (EMSAN) participants. The resulting draft is now going through final reviews before it will be submitted to RevCom.

HS-20 is also working with other Headquarters offices to help ensure that DOE Order 450.1 and other directives incorporate the energy and transportation-related requirements (e.g., DOE Order 430.2A, *Departmental Energy and Utilities Management*) are consistent, complete, and non-duplicative. In addition, HS-20 represents the Department on the Interagency Environmental Leadership Workgroup, which develops government-wide EMS guidance and performance metrics.

HS-20 will update existing guidance and prepare new guidance to address the new and expanded EO and DOE Order requirements. Through the EMSAN, HS-20 will provide technical assistance to DOE elements to facilitate implementation of EMS requirements. EMSAN – composed of Headquarters and field staff – serves as DOE's cross-functional EMS support team. EMSAN helps coordinate policy and guidance development, provides technical assistance and awareness training, shares best practices, and coordinates the Department's progress reporting for the Office of Management and Budget's Environmental Stewardship Scorecard for Federal agencies.

The Executive Order and CEQ Implementation Instructions are available on-line through the Fed Center at:
<http://www.fedcenter.gov/programs/eo13423>.

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■ Managing Stocks of Mercury

Between May and September 2007, HS-20 participated in four meetings of the Mercury Stakeholder Panel formed by the U.S.

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■ **DOE Order 433.1, Maintenance Management Program for DOE Nuclear Facilities Working Group**

In accordance with Federal regulations and DOE policies, all contractors operating DOE facilities must perform general maintenance of the facilities to sustain these assets. However, nuclear facilities require more rigorous maintenance programs in order to preserve the designed-in performance characteristics of the features and controls that prevent accidents or mitigate their consequences so that workers, the public and the environment are not adversely affected by operation of the facilities. This level of rigorous maintenance is prescribed in DOE Order 433.1, *Maintenance Management Program for DOE Nuclear Facilities*.

DOE nuclear facilities are highly complex in terms of their engineering, operations and maintenance practices. DOE's expectations for facility safety, consequences of failure, reliability, cost effectiveness and maintainability are paramount and DOE has institutionalized them through this order and other related DOE directives.

To help ensure a continued level of rigorous maintenance at DOE nuclear facilities the Chief HSS Officer established, the DOE Order 433.1 Working Group, in December 2006, composed of DOE and contractor technical experts, to investigate and resolve emerging technical implementation issues associated with how DOE contractors are ensuring the reliable performance of the special features and controls that prevent accidents or mitigate their consequences.

The DOE O 433.1 Working Group recommended changes to policies, requirements and procedures in DOE's oversight of its

Environmental Protection Agency (EPA) to evaluate options for managing non-Federal stocks of elemental mercury. HS-20's participation was requested by the National Nuclear Security Administration (NNSA), Office of Environmental Projects and Operations (NA-56).

The Mercury Stakeholder Panel consisted of representatives from states, academia, industry, and non-governmental organizations and was established to provide the Federal government with an assessment of a range of options for managing non-Federal supplies of mercury.

HS-20 represented DOE as one of seven Federal technical advisors and provided presentations on mercury storage at the Y-12 National Security Complex and the estimated cost of the storage.

HS-20 also:

- Provided briefings for NA-56 summarizing the presentations and key issues,
- Participated in regularly-held conference calls between NNSA and the Defense Logistics Agency (DLA) to discuss the status and issues related to storage of DLA and DOE mercury stockpiles,
- Provided support to NA-56 in its preparation of testimony before a Congressional sub-committee and responses to follow-up inquiries,
- Participated in an EPA-led subgroup that focused on costs associated with long-term storage of mercury stockpiles, and,
- Supported NA-56 in its participation in the Interagency Senior Leadership Group on non-Federal commodity mercury.

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contractors, such as revisions to DOE Order 433.1, its implementation guide and associated DOE and contractor training courses.

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■ Cross Cutting Nuclear Safety Issue Resolution

HS-20 supports the resolution of cross cutting nuclear safety issues and has several efforts ongoing in this area including: (1) Safety System Oversight Program Improvement, (2) Digital Instrumentation and Control, (3) Confinement Ventilation Systems, and (4) Use of Justification for Continued Operation.

(1) Safety System Oversight (SSO) Program Improvement Project

DOE's SSO programs were established in 2004 in response to a Defense Nuclear Facilities Safety Board recommendation and provide assurance that safety systems will perform as designed in an emergency.

However, Independent Oversight assessments of SSO programs have found wide variations in their implementation and effectiveness at DOE sites. HS-20 has assembled a working group with representatives of the Federal Technical Capabilities Panel (FTCP), Chief of Defense Nuclear Safety, Chief of Nuclear Safety, Y-12, INL, and SRS to identify potential improvements in program definition and execution.

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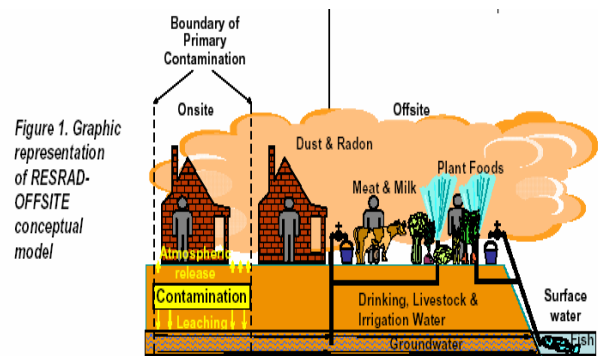
(2) Digital Instrumentation and Control

Digital Instrumentation and Control (DI&C) systems are widely used in nuclear power plants for safety-critical applications. DI&C systems are also used in DOE nuclear facilities for various safety controls, such as ventilation systems and process systems. Although the use

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■ RESRAD-Offsite, A Tool for Evaluating Radiation Doses and Risks to Humans

In August 2007, the availability of the new RESRAD-offsite computer program was announced by HS-20. This new program estimates the radiological consequences to a receptor located onsite or outside the area of primary contamination. It also calculates the potential radiological dose and corresponding excess lifetime cancer risk using the predicted radionuclide concentrations in the environment, and derives soil cleanup guidelines corresponding to a specified dose limit. Nine exposure pathways (see figure below) are included in RESRAD offsite to accommodate differing land uses and site conditions, and pathways may be deleted or modified to fit actual circumstances. The code was developed by HS-20 and the Office of Environmental Management, with support from the U.S. Nuclear Regulatory Commission.



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■ Revising DOE Order 5400.5, Radiation Protection of the Public and the Environment

DOE Order 5400.5 is the Department's primary Order for protecting the public and the environment against undue risk from radiation

of DI&C technology has the capability to improve performance and safety, it also introduces complexity in failure modes which are not readily detectable. Presently, DOE does not provide specific guidance for the use of DI&C systems in the nuclear safety applications. HS-20 is leading an effort to evaluate the need for guidance or a standard to ensure that DI&C are accounted for in safety system designs and maintenance.

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(3) Confinement Ventilation Systems

In response Defense Nuclear Facilities Safety Board recommendation 2004-2 (Confinement Ventilation System), DOE is performing evaluations of the functional classification and performance criteria for the confinement ventilation systems at its defense nuclear facilities. HS-20 is leading an Independent Review Panel to review these evaluations, ensure consistent implementation, and identify lessons learned and propose potential revisions to DOE directives.

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(4) Use of Justification for Continued Operation

Justification for Continued Operation (JCOs) are used at DOE facilities to provide the technical basis for continuing operation when a facility identifies an inadequacy in its documented safety analysis, such as an error in analysis or a deficiency in a facility system or structure that results in the safety analysis not adequately reflecting the current facility condition.

As a result of concerns regarding the regulatory basis for JCOs and the appropriateness of their use at DOE nuclear facilities, the National Nuclear Security Administration and the Office

associated with its operations, and it applies to a broad range of DOE activities nationwide.

First issued in 1990, the Order was last revised in 1993. The current revision of DOE Order 5400.5 will focus on specific radiation protection goals and requirements and support changes to internal DOE organizational structure and management systems. The National Nuclear Security Administration (NNSA), for example, and HSS did not exist when the Order was last revised.

Revising the Order provides a timely opportunity to: 1) incorporate the principles governing Departmental directives established in Secretary Bodman's September 10, 2007, memorandum, 2) align the Order more closely with the June 2007, amendments to 10 CFR Part 835, especially those related to dosimetric terminology, and 3) reflect more recent radiation protection concepts, technical standards and approaches.

The new Order will be clearer and more concise, emphasize the "what" vs. "how," provide more flexibility, an up-to-date approach to radiation protection, and more effectively integrate radiation protection programs into an overall systems approach to the management of site operations. This, in turn, can promote more efficient and cost effective implementation of Order requirements.

In revising DOE O 5400.5, HS-20 has involved a team of radiation protection specialists from throughout that DOE community. To date, over two dozen representatives from DOE and NNSA Headquarters and field elements, national laboratories and site contractors have participated in this Work Group.

The Work Group goals are: (1) promote participation among DOE organizations and radiation protection experts to assist HS-20 develop a revised Order. (2) exchange views on

of Environmental Management are (in coordination with HS-20) collecting and analyzing data on JCO use, evaluating the regulatory basis for its use, providing direction to the field, and revising DOE directives.

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■ Fire Protection Program

DOE's fire protection programs include: (1) establishing and maintaining policy, requirements and implementation guidance, (2) reviewing exemptions and variances to DOE requirements and adopted National Fire Protection Association standards, (3) evaluating operational data, and (4) supporting fire protection assessments.

Some recent fire protection program activities include:

- Revision of the fire protection guide (DOE G 420.1),
- Review of variance of sprinkler requirements at the Advanced Retrieval Project at INL,
- Issuance of the annual fire protection program summary report, and
- Support of Assessment of fire protection program at West Valley.

A major current initiative is the establishment of a fire protection committee to support information sharing and work on new projects, such as the revision of the fire protection design criteria.

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■ DOE Technical Standards Program

The DOE Technical Standards Program (TSP) is managed by HS-20 under

technical and policy issues related to proposed revisions, (3) share information on successes and lessons learned in implementing the current Order, (4) foster consistency and flexibility in implementing the revised Order, and (5) work with HS-20 to identify and prioritize development of final implementation guides and plans of actions and milestones.

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■ Radiological Control and Release of Property

DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, is the primary directive for the control and release of property. HS-20 has the responsibility for developing and updating policy and guidance for the control and release of property, and for assisting field elements with the developing, reviewing and approving release packages. Since 1990, DOE has issued guidance for meeting its requirements. DOE G 441.1-xx, *Implementation Guide for the Control and Release of Property with Residual Radioactive Material*, will consolidate and update DOE's property release guidance.

DOE uses dose-based authorized limits, or residual radioactivity concentrations, with an as-low-as-reasonably-achievable (ALARA) process to make property control and release determinations. DOE applies a dose constraint of 25 mrem per year, plus ALARA, for the release of real property, and 1 mrem per year, plus ALARA, for release of personal property. Models and guidance to develop the documentation for release of property are easily available and user-friendly. DOE's dose-based release process results in cost savings while achieving protection of human health and the environment.

Recently, HS-20 co-sponsored a Workshop at Argonne National Laboratory on the release of property, which was attended by approximately

DOE O 252.1, *Technical Standards Program*, and DOE G 252.1-1, *DOE Technical Standards Program Guide*. The program provides the technical and administrative structure for developing, approving, and maintaining DOE's technical standards, including Technical Qualification Program Standards. DOE Technical Standards, in turn, are used in critical applications across DOE to establish acceptable ways to design and construct facilities, implement work management systems, procure goods and services for work, and conduct work safely and effectively.

The TSP also provides the means for DOE to comply with Federal requirements and policies stated in Public Law 104-113 and Office of Management and Budget (OMB) Circular No. A-119, which requires the use of voluntary consensus standards (VCSs), wherever practical, and to develop them, as appropriate, with Standards Development Organizations (SDOs). TSP Technical Standards Managers are appointed from each major DOE and contractor organization to conduct standards activities on behalf of DOE. TSP functions include:

- Maintaining and posting over 200 DOE Technical Standards (TSs), including Technical Qualification Program Functional Area Qualification Standards,
- Supporting TS development and revision through RevCom,
- Publishing monthly and quarterly TSP publications to keep the DOE community informed of DOE and other standards, and participating in external interagency standards development organizations (SDOs), and
- Participating in interagency SDOs related efforts, including compiling information on the involvement of all DOE organizations with the various SDOs, for the Annual Report from the

100 DOE and contractor employees. Its purpose was to share best practices in Order implementation, offer assistance to field offices, and foster continuous improvement in the control and release of property through presentations and discussions.

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■ **Low-Level Radioactive Waste Federal Review Group (LFRG)**

Under the Atomic Energy Act of 1954 the Department of Energy has the responsibility and authority for regulating the disposal of its low-level radioactive waste (LLW) and non-WIPP disposal of transuranic (TRU) radioactive waste to assure protection of the public and the environment from radiation. DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, directs compliance with the requirements of DOE Order 450.1, *Environmental Protection Program*, and DOE Order 435.1, *Radioactive Waste Management*. Order 435.1 implements the requirements of Order 5400.5 and Order 450.1 and specifies a process for carrying out DOE's regulatory responsibilities. Order 435.1 establishes the LFRG as an important part of this process.

The LFRG is a review panel established by the appropriate Deputy Assistant Secretaries in the Office of Environmental Management to review low-level waste disposal facility performance assessments (PAs) and composite analyses (CAs) and to make recommendations to the Deputy Assistant Secretaries on disposal facility compliance determinations. HS-20 has a representative and an alternate representative on this panel.

Compliance determinations are required before construction of a facility, and initial determinations have been made for existing facilities. Annual summaries of LLW disposal operations are prepared and a determination of continued compliance or of the need to revise

Secretary of Energy to OMB on TS use and participation.

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the PA and CA is made. PAs and CAs are also revised and reviewed when significant changes occur in disposal facility conditions or operations.

PA and CA reviews are conducted in accordance with criteria and procedures in a manual which has been prepared by the LFRG. HS-20 staff members have participated in the initial development of this manual and are assisting with revising the manual.

Detailed technical reviews of PAs and CAs are done by review teams consisting of LFRG members and other DOE technical experts. A report on these in-depth reviews is provided to the LFRG members for use in formulating further questions and recommendations on compliance. HS-20 staff participates as members of the review teams as needed.

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