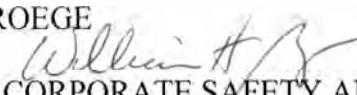




Department of Energy
Washington, DC 20585

June 30, 2010

MEMORANDUM FOR DISTRIBUTION

FROM: WILLIAM ROEGE
DIRECTOR 
OFFICE OF CORPORATE SAFETY ANALYSIS
OFFICE OF HEALTH, SAFETY AND SECURITY

SUBJECT: Guidance for the Preparation of the Department of
Energy Annual Site Environmental Reports for Calendar
Year 2009

This memorandum provides guidance for reporting under Department of Energy (DOE) Order 231.1A, *Environment, Safety and Health Reporting*, and DOE Order 5400.5, *Radiation Protection of the Public and Environment*. It updates previous guidance regarding the preparation, approval and release of the DOE Annual Site Environmental Reports (ASERs), and is prepared to comply with Chapter 1, Section 2.b of DOE Manual 231.1-1A, *Environment, Safety and Health Reporting Manual*, that requires the Office of Corporate Safety Analysis, within the Office of Health, Safety and Security, to issue guidance for the preparation of ASERs. We are recommending some changes to format and content for your consideration in the preparation of the 2009 ASERs. These suggestions are consistent with discussions held at the last annual ASER workshop held in Amarillo, TX near the Pantex site in October 2009. They include:

- Discussing Environmental Management System implementation effectiveness, green procurement, green building and electronics stewardship site efforts as reported in the site's annual submission for the DOE Environmental Stewardship Scorecard;
- To the extent practicable, discuss reporting on greenhouse gas Scope 1 and Scope 2 reduction targets for FY 2020 relative to a site's 2008 baseline pursuant to Executive Order 13514, *Federal Leadership in Environmental, Energy and Economic Performance* (October 5, 2009);
- Discussing any DOE, Federal, State or industry-sponsored recognition awards received by the site in 2009;
- A discussion of sites' efforts made to ensure the quality and defensibility of data reported in the ASER, including participation in the Department's Consolidated Audit Program, Mixed Analyte Performance Evaluation Program and utilization of Visual Sample Plan analytical methodology.



The ASERs provide important information needed by site managers and DOE Headquarters to assess field environmental program performance, site-wide environmental monitoring and surveillance effectiveness, and confirm compliance with environmental standards and requirements. They are also the means by which DOE sites demonstrate compliance with the radiation protection requirements of DOE Order 5400.5. In addition, ASERs are an important means of conveying DOE's environmental protection performance to stakeholders and members of the public living near DOE sites.

The calendar year 2009 ASERs should be submitted to Glenn S. Podonsky, Chief Health, Safety and Security Officer and made available to the public, by October 1, 2010. This memorandum and guidance are intended to provide sites with a useful and adaptable framework to prepare effective ASERs and are not intended to adversely impact 2009 ASER planned production schedules.

Thank you for your ongoing efforts and continued cooperation as we work together to continually improve the quality, consistency and effectiveness of the DOE ASERs. If you have questions regarding the attached guidance, please contact Ross Natoli, of my staff, at (202) 586-1336 or by e-mail at: Ross.Natoli@hq.doe.gov, for more information. The attached guidance is available at http://www.hss.energy.gov/nuclearsafety/env/reports/aser/2009_aser_guidance.pdf.

Attachment: Guidance for Preparation of the 2009 DOE Annual Site Environmental Reports

cc: Under Secretary for Nuclear Security, US
Under Secretary of Energy, US
Under Secretary for Science, S-4

ASER Distribution Distribution

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Guidance for Preparation of the 2009 Department of Energy Annual Site Environmental Reports

June 2010



**Guidance for Preparation of the 2009
Department of Energy Annual Site Environmental Reports**

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Guidance for Preparation of the 2009 Department of Energy Annual Site Environmental Reports

1.0 BACKGROUND

This guidance provides recommendations for reporting that may be used to help supplement the requirements of Department of Energy (DOE) Order 231.1A, *Environment, Safety and Health Reporting*, which are contractually applicable to DOE sites, and the requirements of DOE Order 5400.5, *Radiation Protection of the Public and the Environment*.

As stated in DOE Order 231.1A, the purposes of the DOE Annual Site Environmental Report (ASER) are to present summary environmental data to:

- Characterize site environmental management performance
- Summarize environmental occurrences and responses reported during the calendar year
- Confirm compliance with environmental standards and requirements
- Highlight significant site programs and efforts.

This report is the principal document that demonstrates compliance with DOE Order 5400.5 requirements and is a key component of the Department's effort to keep the public informed of environmental conditions at DOE sites. The 2009 ASERs should contain the most accurate and complete radiological and non-radiological monitoring data and up-to-date compliance information for calendar year (CY) 2009. They should also highlight new site programs and initiatives, compliance successes, noteworthy practices, site environmental performance measures and/or performance indicators programs, and, if applicable, site assessments that occurred during CY 2009. Significant environmental issues and events that occurred in 2010 (up to the time of public distribution of the ASERs) may also be noted and summarized with the release of the ASERs if deemed appropriate by the site.

1.1 Public Information Source

Consistent with the Department's commitment to openness and public involvement in DOE operations, the ASERs should be prepared in a manner that addresses likely public concerns and solicits feedback from the public and other stakeholders on site environmental management performance and compliance. Some recent successful approaches include the following.

- (1) A summary pamphlet targeted for the general public or non-technical reader that accompanies the ASER. Some noteworthy examples include the 2007 or 2008 ASER Summary Reports for Sandia National Laboratories, New Mexico; Argonne National Laboratory (ANL); Nevada Test Site; Oak Ridge Reservation; Brookhaven National Laboratory; Los Alamos National Laboratory (LANL) and Hanford. Community involvement in preparing the summary pamphlet is encouraged. The Oak Ridge, ANL, and LANL sites have effectively involved local high school and college students in the preparation of these summary pamphlets in recent years. (See Attachment V, item 13, ASER Summary Reports).
- (2) An executive summary within the ASER that concisely highlights site operations, characterizes site environmental management performance and compliance, and describes significant environmental issues and programs.

- (3) Site-specific electronic, Internet, or Web-based approaches that facilitate public outreach to, and feedback from, stakeholders on ASERs. Sites should consider providing a user-friendly Internet link on their home pages to allow easy, direct electronic access to ASERs.

1.2 Coordination and Production

Since most DOE Headquarters (DOE-HQ) program secretarial officers (PSOs) have delegated authority to field elements to prepare, approve, and release the ASERs, field elements should determine the appropriate level of PSO involvement and coordinate the review and comment period, as necessary. It is recommended that PSOs make commitments to field elements regarding the timeframes for PSO review and comment, and should forward all significant comments directly to the appropriate field elements within this comment period. The Office of Corporate Safety Analysis (HS-30) is available to provide advice regarding the preparation of ASERs; however, HS-30 does not have a formal review and comment role.

DOE-HQ comments should be addressed and incorporated, as appropriate, into the final draft of the 2009 ASERs. The 2009 ASERs should be approved by the heads of field elements (i.e., field managers or appropriate designees); submitted to Glenn S. Podonsky, Chief Health, Safety and Security Officer, for the Office of Health, Safety and Security (HS-1); and released to the public and/or placed on the site Internet home page by October 1, 2010. If deemed appropriate by the site, any additional significant environmental compliance issues, events, or noteworthy practices that emerge between the end of CY 2009 and the actual public distribution of the ASERs may be summarized in the transmittal memorandum releasing the ASERs to the public or as a separate attachment. The public release of the 2009 ASERs should also include a statement by the heads of field elements, or appropriate designees, confirming DOE's commitment to environmental protection, compliance, sustainability and the site's efforts to ensure the validity and accuracy of the monitoring data.

1.3 Distribution

Heads of field elements should distribute copies to pertinent PSOs, the Office of Scientific and Technical Information, the Environmental Protection Agency (EPA), State agencies, and other relevant agencies, organizations, or individuals. An electronic file of the approved 2009 ASER should be submitted to Ross Natoli in the Office of Analysis (HS-32). HS-32 will provide further distribution to the appropriate offices within the Office of Health, Safety and Security.

1.4 Goals and Content

A chief purpose of the ASERs is to document the following: the radiological and non-radiological condition of a site's environs; the effluents and emissions released from DOE operations; and noteworthy trends with regard to these releases and environmental conditions. ASERs should accurately portray the radiological monitoring programs, non-radiological monitoring programs, and regulatory compliance information required by DOE Orders and other applicable Federal and State regulations and requirements. They should also describe the environmental impacts of DOE site operations. Where appropriate, the models and assumptions used to estimate releases and environmental conditions should be clearly documented.

ASERs are the primary reports documenting compliance with the public radiation protection requirements of DOE Order 5400.5. Therefore, a comprehensive description of each site's radiological environmental protection program and real or potential radiological environmental impacts should be included.

Additional non-radiological information that HS-32 recommends reporting in the ASER includes: (1) the Superfund Amendments and Reauthorization Act (SARA) Title III or Emergency Planning and Community Right-to-Know (EPCRA) information (see Section 5.0, Environmental Non-Radiological Program Information, and Section 2.3, Compliance Summary); and (2) information supporting site environmental performance measures. DOE field elements are encouraged to report on their environmental performance indicators and/or performance measures programs and initiatives at their site, including the measures used and the results of those measures. This reporting could include the site's progress on meeting the measurable environmental goals, objectives and targets identified in their Environmental Management System (EMS). These measures and accomplishments should be summarized in the ASER Executive Summary and detailed in the Environmental Management System chapter of the ASER.

Finally, to allow for public involvement and feedback on the ASER, sites are encouraged to provide a website link to a questionnaire or reader comment form on the website where the ASER is electronically posted, soliciting public input and feedback on the current and future ASERs. If sites distribute hard copies of the ASER, this form should be placed inside the front cover of the ASER for maximum visibility and easy public access.

2.0 SUGGESTED FORMAT FOR ANNUAL SITE ENVIRONMENTAL REPORTS

The ASERs should, to the extent possible, follow the reporting format described herein. The main chapters of the ASER are:

- Executive Summary
- Introduction
- Compliance Summary
- Environmental Management System
- Environmental Radiological Protection Program and Dose Assessment
- Environmental Non-Radiological Program Information
- Groundwater Protection Program
- Quality Assurance.

DOE sites may also elect to generally format some sections of their ASERs by media, or other alternate formats, rather than by radiological and non-radiological chapters as long as the applicable requirements of DOE Order 231.1A and DOE Order 5400.5 are met. These chapters may include the detailed monitoring data and results that support discussion of environmental laws and media generally included in the Compliance Summary chapter. Alternate formats could include chapters on air monitoring, meteorological monitoring, water monitoring, drinking water, wastewater, surface water, environmental restoration and waste management, soil monitoring, natural and cultural resources management, historic perseveration, terrestrial monitoring/surveillance, ecological monitoring, agricultural products, wildlife monitoring, and/or groundwater monitoring. (See Attachment V, item 12, Alternate General ASER Formats.) ASERs should also include, as appropriate, a glossary of definitions and lists of acronyms, abbreviations, symbols, units of measure, tables, figures, appendices, and references.

2.1 Executive Summary

The Executive Summary should highlight: (1) the purpose of the ASER; (2) major site programs¹; (3) other key initiatives, including environmental performance indicators and/or performance measures programs; and (4) a brief description of the site EMS and its functional status within the framework of DOE's Integrated Safety Management System (ISMS), as appropriate. To streamline ASER reporting and avoid redundancy, it is not necessary for sites that prepare and publish an ASER Summary Report to include an Executive Summary in their full ASER.

The Executive Summary should include a summary of radiological releases and doses to the public resulting from site operations, as well as a summary of significant non-radiological releases. The dose to the maximally exposed individual (MEI), the effective dose, the collective population dose (effective dose equivalent), and the estimated natural background radiation dose at the site should be mentioned here. If no radionuclides were released from the site, an affirmative/declarative statement should be made here. The Executive Summary should not simply repeat information found in the main body of the report and should be written in a manner understandable to the non-technical reader. It should be concise, balanced, and targeted at an audience that may not read the entire report.

2.2 Introduction

The Introduction should include the following general information: (1) site location; (2) general environmental setting; (3) site mission; (4) primary operations and activities at the site; and (5) relevant demographic information.

2.3 Compliance Summary

The Compliance Summary should be a separate chapter in the ASER. It should summarize the site CY 2009 compliance status for the following: (1) major environmental statutes and regulations; (2) environmental Executive Orders (EOs); (3) DOE internal environmental and radiation protection Orders, including DOE Order 450.1A, *Environmental Protection Program*, DOE Order 430.2B, *Departmental Energy, Renewable Energy and Transportation Management*, DOE Order 5400.5, *Radiation Protection of the Public and Environment*, DOE Order 231.1A, *Environment, Safety and Health Reporting*, and DOE Order 435.1, *Radioactive Waste Management*; (4) the Atomic Energy Act of 1954 (42 USC 2011 et seq.); (5) compliance and/or cleanup agreements (both in place and currently under negotiation); (6) environmental violations cited by regulators (including any fines and penalties assessed); (7) Notices of Violation, Notices of Deficiency, Notices of Intent to Sue, and other types of enforcement actions issued to the site (as defined in DOE Manual 231.1-2, *Occurrence Reporting and Processing of Operations Information*); (8) any reportable environmental occurrences that require notification to an outside regulatory agency; (9) any major issues, instances of non-compliance and corrective actions; (10) the status and results of any ongoing self-assessments and/or environmental audits; and (11) existing permits. These items are discussed in detail below.

Before compiling and summarizing “environmental violations” for 2009, sites should consult EPA’s Enforcement & Compliance History Online (ECHO) database (<http://www.epa-echo.gov/echo/>). This is EPA’s official record of the current compliance status for a given DOE site or particular facilities within

¹ If the primary remaining site mission is decontamination/decommissioning (D&D) and environmental restoration (cleanup), a brief statement discussing site historical operations should be included here.

the site. To support DOE-wide environment, safety, and health performance indicator initiatives, the Compliance Summary should include a discussion of compliance and/or cleanup agreements in place at the site. This discussion should include the enforceable milestones completed versus the milestones that were scheduled for completion in CY 2009 pursuant to these agreements. Additionally, the Compliance Summary should contain a summary table or brief narrative of applicable operating permits in effect at the site.

When possible, quantitative information should be provided. For example, if underground storage tanks have been removed from the facility, state the number of tanks that have been removed and the number of tanks that still remain on site. The Compliance Summary should not present the large volume of supporting data provided in other sections of the ASER, such as the chapter on Environmental Radiological Protection Program and Dose Assessment and the chapter on Environmental Non-Radiological Program Information.

The Compliance Summary should refer to other sections of the ASER, as appropriate, to minimize redundancy.

2.3.1 Compliance Status

The compliance status with respect to applicable major environmental statutes, DOE directives, and EOs should be discussed, including, but not limited to the following.

2.3.1.1 Environmental Restoration and Waste Management

- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
- Superfund Amendments and Reauthorization Act (SARA)
- Resource Conservation and Recovery Act (RCRA)
- Federal Facilities Compliance Act
- National Environmental Policy Act (NEPA)
- Toxic Substances Control Act
- Federal Insecticide, Fungicide, and Rodenticide Act.

2.3.1.2 Radiation Protection

- DOE Order 5400.5, *Radiation Protection of the Public and the Environment*
- DOE Order 435.1, *Radioactive Waste Management*

This section should briefly summarize site progress in achieving compliance with DOE Order 435.1, *Radioactive Waste Management*. At a minimum, information on the wastes that are managed at the site (e.g., high level, low level, transuranic) and what type of waste management the site is performing (e.g., generation, treatment, storage, disposal) should be included. For sites that are authorized to manage a low-level waste facility, there should be a table or a listing of the status of each phase of the low-level waste management process, such as performance assessment/composite analysis (PA/CA), closure plan, PA/CA maintenance program, and disposal authorization statement. This section should also include a narrative description of the site low-level waste management program. Radioactive waste management activities can be discussed in more detail in the chapter on Environmental Radiological Protection Program and Dose Assessment (see Section 4.0).

Note: If the site manages 11e.(2) byproduct material as defined in the Atomic Energy Act, residual radioactive material as defined in the Uranium Mill Tailings Radiation Control Act, and naturally occurring radioactive material, these activities should be discussed under DOE Order 5400.5.

- Atomic Energy Act of 1954 (42 USC 2011 et seq.)

2.3.1.3 Air Quality and Protection

- Clean Air Act (CAA)

This section should include a discussion of the compliance status of site air emissions, including criteria pollutants and hazardous air pollutants. This section should generally summarize air permit exceedances, Notices of Violation (NOV), other air quality non-compliances, and any CAA compliance agreements in place at the site. Any major events that occurred at the site in CY 2009 pertaining to CAA compliance should be specifically discussed. The section should also address whether a major source of air pollutants (as defined in 40 CFR Part 70.2) is present at the site and should include information on those operations for which emissions contribute most substantially to the major source. Conversely, if the site does not have a major source, then this should be explicitly stated. Additional guidance for reporting of ozone-depleting substances (ODSs) is provided in Section 3.0, Environmental Management System.

- National Emission Standards for Hazardous Air Pollutants (NESHAP) 40 CFR Part 61 Subpart H, (*National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities*)

The 2009 ASERs should summarize efforts to comply with the monitoring procedure requirements for the Subpart H radionuclide NESHAP. For example, NESHAP compliance agreement negotiations and other discussions with regulatory agencies or applications for waivers should be noted. If sites are exempted from any requirements, the reasons for the exemptions should be stated.

Detailed reporting and discussion of site radiological Subpart H air emissions and doses should be included in the Environmental Radiological Protection Program and Dose Assessment chapter of the ASER (see Section 4.0 and Attachment I, “Suggested Formats for Radiological Dose and Release Reporting in ASERs”). Issues concerning the status of site compliance with radionuclide NESHAP and NESHAP-specific radionuclide monitoring should be discussed in this section.

Information on Subpart H compliance for DOE sites is reported annually in the NESHAP report for radionuclides required by the EPA. Guidance for this report, entitled *Guidance for Preparation of 1990 Air Emissions Annual Report Under Subpart H, 40 CFR 61.94*, was issued by the Office of Environmental Guidance in January 1991. The information provided in the 2009 ASERs should be consistent with the information reported in the 2009 site NESHAP report for radionuclides to demonstrate compliance with the Subpart H requirements for 2009. This report may be referenced for more information, and any significant differences between the ASER and the Subpart H air emissions and estimated doses reported should be clearly explained.

2.3.1.4 Water Quality and Protection

- Clean Water Act (CWA)

Sites are encouraged to report National Pollutant Discharge Elimination System (NPDES) and State Pollutant Discharge Elimination System (SPDES) data in the tabular form below, and should identify

the permit type, number of regulated² outfalls in use at a facility, the total number of permit exceedances per outfall, the date corresponding to each exceedance, and monitoring parameters and/or constituents. Additionally, the number of samples taken, the number of compliant samples, and the facility's percent compliance for all measured samples should be provided. The exceedances, their causes, and the nature of the corrective actions should be described in summary form. Progress on implementing previous corrective actions should also be addressed.

- A summary of all CY 2009 NPDES/SPDES permit exceedances or non-compliances should be provided in the following format.

NPDES/SPDES NON-COMPLIANCES ²

Permit Type	Outfall	Parameter	# of Permit Exceedances	# of Samples Taken	# of Compliant Samples	Percent Compliance	Date(s) Exceeded	Description/ Solution

This tabular format will allow users to easily identify and collect information from the ASERs in a consistent manner, rather than having to make separate data requests annually to field elements for site compliance history and for development and compilation of DOE-wide environmental performance measures initiatives.

Any analyses or reviews conducted to select Best Available Technology for radiological effluent control to comply with DOE Order 5400.5 requirements may be discussed here if they are not summarized elsewhere in the Radiation Protection section of the ASER (see Section 2.3.1.2).

- Safe Drinking Water Act

2.3.1.5 Other Environmental Statutes

This section may be used to report on activities related to other laws and regulations not addressed elsewhere, such as:

- Endangered Species Act
- National Historic Preservation Act
- Migratory Bird Treaty Act.

Include a statement on the number of migratory birds of each species intentionally taken during the conduct of any program, activity, or action, including, but not limited to, banding, marking, scientific collection, taxidermy, and depredation control.

2.3.1.6 DOE Order 450.1A, *Environmental Protection Program*; DOE Order 430.2B, *Departmental Energy, Renewable Energy and Transportation Management*; Executive Order 13423,

² Note: Radionuclides regulated under the Atomic Energy Act are not subject to CWA requirements. If the site has accepted or is using NPDES or SPDES permit values for radionuclides out of comity, the table in the text should include a footnote to indicate whether there is a formal agreement in place that establishes the basis for their use.

Strengthening Federal Environmental, Energy and Transportation Management; and Executive Order, 13514, Federal Leadership in Environmental, Energy and Economic Performance.

- DOE Order 450.1A (June 4, 2008) and DOE Order 430.2B (February 27, 2008) describe DOE's requirements and responsibilities for implementation of EO 13423. Pursuant to DOE Order 450.1A, sites should describe their progress in implementing an EMS at all appropriate facilities and integrating their EMS with the ISMS, as appropriate. Under the previous DOE Order 450.1 (January 15, 2003), sites were required to have an EMS in place by December 31, 2005, and, under DOE Order 450.1A, were required to demonstrate validation for full implementation by June 30, 2009. The DOE EMS Status Report for Fiscal Year (FY) 2009 will be provided to the EPA and the Council on Environmental Quality (CEQ) in April 2010. The EMS implementation information from the site submittal to DOE-HQ in December 2009 can be referenced and summarized in the ASER.
- This section should include a summary of the site's energy, transportation, and environmental sustainability performance. Sites should describe their progress in meeting the energy efficiency, water conservation, transportation fleet management, and sustainable design/high performance buildings goals in DOE Order 430.2B. Each DOE site, pursuant to DOE Order 430.2B, should have had an Executable Plan in place by December 31, 2008, that identifies their respective contributions toward meeting these goals. A site's progress toward meeting the goals identified in their 2008 Executable Plan during 2009 can be referenced and summarized in the ASER.
- EO 13514, *Federal Leadership in Environmental, Energy and Economic Performance* (October 5, 2009) requires Federal agencies to establish greenhouse gas (GHG) reduction targets and achieve sustainability goals to reach those targets. EO 13514 includes and expands upon EO 13423 goals and requirements by focusing attention on GHG reductions and establishing quantitative metrics for sustainability goals. DOE sites are required to report a percentage reduction target for Scope 1 (direct GHG emissions owned or controlled by the site) and Scope 2 (direct GHG emissions from purchased utilities) by fiscal year (FY) 2020, relative to an FY 2008 baseline. Although this information was not required to be reported pursuant to EO 13514 until January 5, 2010, sites may summarize and discuss this in the 2009 ASER to the extent that this information was available and finalized in 2009. Otherwise, this information should be captured and discussed in the 2010 ASER
- The following additional information should also be reported in ASERs and may be descriptive or quantitative, as appropriate to the site. This information will be included in DOE's annual report to the EPA detailing DOE's progress in implementing the requirements of EO 13423 and also support achievement of future reporting goals mandated in EO 13514 when those reporting mechanisms are finalized. The following information should be included:
 - (1) Use of sustainable practices and pollution prevention activities to achieve and maintain environmental compliance
 - (2) Results of site environmental compliance and/or EMS audits
 - (3) Summary of site progress in meeting the *Sustainable Environmental Stewardship Goals* of DOE Order 450.1A, including the progress of site efforts to phase out the use of ODSs. Data to be reported should include: (1) reductions in the generation and/or toxicity of hazardous waste at the source through pollution prevention; (2) reduction or elimination of acquisition of toxic and hazardous chemicals and materials; (3) environmentally preferable purchasing; (4) electronic stewardship practices; and (5) recycling practices.

Accomplishment Reports are available on sustainable environmental stewardship and pollution prevention projects that saved money and/or reduced waste. All of these data can be aggregated by

site or by PSO. The FY 2009 data are already available for downloading at the Office of Health, Safety and Security Pollution Prevention website at: <http://www.hss.energy.gov/pp/dataentry.html> and may be summarized in the ASER, as appropriate. These data are also included in the Department's corporate FY 2009 report on *Sustainable Acquisition, Recycling, and Pollution Prevention Practices*, which was provided to the EPA and the CEQ in February 2010.

Additional information regarding how sites effectively implement, update and manage their EMS can be provided here or in the ASER chapter on Environmental Management System (see Section 3.0).

- EPCRA and Title III of SARA

EPCRA and Title III of SARA require Federal facilities that use, produce, or store extremely hazardous substances in quantities that exceed specific release thresholds to report these inventories and planned or accidental environmental releases to Federal, State, and local emergency planning authorities. This information should include responses to emergency situations involving these hazardous materials. The ASER should include summary information on the site-specific chemical inventory and toxic release inventory and should reference the site submission to the EPA.

DOE facilities should comply with EPCRA provisions (see below) once certain thresholds are met. Those EPCRA reporting requirements that were completed, or will be completed, for CY 2009 should be indicated and discussed. If the site reported under the provision, indicate "yes." If the site should have reported under the provision, but did not, indicate "no." If the site was not required to report under a provision (e.g., did not meet the threshold, did not have an extremely hazardous substance release), indicate "not required." A short table is provided below to assist in presenting this information:

Status of EPCRA Reporting

<i>EPCRA Section</i>	<i>Description of Reporting</i>	<i>Status*</i>
EPCRA Sec. 302-303	Planning Notification	
EPCRA Sec. 304	EHS Release Notification**	
EPCRA Sec. 311-312	MSDS/Chemical Inventory***	
EPCRA Sec. 313	TRI Reporting****	

- * An entry of "yes," "no," or "not required" is sufficient for "Status."
- ** Extremely Hazardous Substance
- *** Material Safety Data Sheet
- **** Toxic Release Inventory

- EO 11988, *Floodplain Management*
- EO 11990, *Protection of Wetlands*

Any other major statutes or EOs applicable to the site should also be included in the Compliance Summary chapter. If a major statute is not applicable, it should be listed with the notation, "Not Applicable," along with a short explanation as to why it is not applicable.

2.3.2 Other Major Environmental Issues and Actions

This section should identify other significant issues and accomplishments for CY 2009. For example, issues such as lawsuits, NOVs, alleged violations, environmental occurrences, non-routine releases, unresolved compliance issues, and NEPA actions not previously presented should be addressed.

Summaries of DOE environmental audits, progress assessments, DOE program or contractor self-assessments or program appraisal findings and follow-up actions should be provided in this section. Publicly available documents that can be referenced for additional information should be cited.

2.3.3 Continuous Release Reporting

Continuous release reporting under CERCLA, Section 103, requires that a non-permitted hazardous substance released in a quantity that is equal to or greater than its reportable quantity be reported to the National Response Center (55 Federal Register 30166, July 24, 1990). CERCLA Section 103(f) allows for modified reporting of releases of hazardous substances that meet certain criteria. The EPA requires all facilities that release a hazardous substance meeting the above requirement to report annually to EPA. The regulations include a requirement for an annual evaluation of releases. Summaries of this evaluation should be included in the ASER. Continuous release reporting not characterized or discussed in the Unplanned Releases section should be reported separately in this section.

2.3.4 Unplanned Releases

Summary information on significant, non-routine releases of pollutants or hazardous substances, including causes and corrective actions taken to prevent their recurrence, should be discussed here, especially as they pertain to facility operations, waste handling programs, and emergency response programs. The 2009 ASERs should discuss unplanned radiological and non-radiological releases in effluent, such as spills and leaks, whether onsite or offsite. This discussion should include releases that are reportable occurrences under DOE Order 231.1A. Releases reported to the Headquarters Emergency Operations Center and releases reported to the Coast Guard National Response Center should be summarized. The protective action recommendations that were implemented (if applicable) to mitigate the effects of the occurrences should also be discussed.

Consistent with the section regarding Unplanned Radiological Releases (see Section 4.4), this section of the ASER should also clearly state the bases for any estimates regarding the magnitude of potential impacts of releases, in terms that the non-technical reader can easily understand.

A table or discussion should also be provided that includes the date each release occurred, the amount of material released, an explanation of the release, and corrective actions taken.

Generalized statements such as “no significant offsite effects occurred” or “doses were small” should be avoided. If such statements are necessary, release information should be compared to known values; for example, say that the dose was small relative to applicable dose limits or to doses received from natural background at the site (and include the numerical value for this dose). This approach ensures that the ASER clearly states the bases for any scientific judgments regarding the magnitude of potential impacts of releases in terms that the non-technical reader can easily understand.

2.3.5 Summary of Permits

This section should provide a table of the numbers and types of environmental permits in effect for the operating facilities at the site.

3.0 ENVIRONMENTAL MANAGEMENT SYSTEM

According to the objectives of DOE Order 450.1A, DOE sites should implement sound stewardship practices that are protective of the air, water, land, and other natural and cultural resources potentially impacted by their operations. Through these practices, DOE cost-effectively meets or exceeds compliance with applicable environmental, public health, and resource-protection laws, regulations and DOE requirements. These objectives should be achieved by implementing an EMS at DOE sites that is integrated into the ISMS established by DOE Policy 450.4, *Safety Management System Policy*.

Since EO 13423 and DOE Order 450.1A required DOE sites to have an EMS in place by December 31, 2005, and fully implemented by June 30, 2009, this section should include a pertinent discussion of the status and highlights of the EMS currently implemented at the site during 2009. Although several recognized EMS frameworks exist, most are based on the International Organization for Standardization (ISO) 14001 EMS standard. A brief description of significant site EMS elements should be included here. (See Attachment V, item 4, Environmental Management System, Brookhaven National Laboratory and Lawrence Livermore National Laboratory example formats).

In addition, The Office of the Federal Environmental Executive tracks the progress of EMS implementation at Federal agencies using an annual Environmental Stewardship Scorecard that includes metrics to measure site-level progress in implementing them. This information is then submitted to the Office of Management and Budget, where a red, yellow or green score is assigned to each site. These metrics are provided to allow agencies and facilities that are implementing an EMS to plan for effective reporting of EMS progress, performance, and successes. To support DOE's reporting requirements under EO 13423 and DOE Order 450.1A, DOE has adopted these metrics. This information will also assist DOE leadership in assessing the Department's progress in implementing EMSs at DOE facilities and achieving the goals, objectives, and targets set forth in EO 13423, DOE Order 450.1A, and DOE Order 430.2B.

The 2009 ASERs should include a discussion that qualitatively describes the status of the site's EMS performance during calendar year 2009. Sites should list what they determined to be the significant environmental aspects of their operations in 2009 that have the potential to impact the environment. A summary of the site's 2009 EMS information submitted to the Federal Facilities Environmental Stewardship & Compliance Assistance Center (FedCenter) can be included here, along with the red, yellow, or green score received, based on the following EMS metrics:

- Environmental aspects were identified or reevaluated using an established procedure and updated (added/deleted/modified) as appropriate.
- Measurable environmental goals, objectives, and targets were identified, reviewed, and updated as appropriate.
- Documented operational controls to address significant environmental aspects consistent with objectives and targets were fully implemented.
- Training procedures were established to ensure that training requirements for individual competence and responsibility were identified, carried out, monitored, tracked, recorded, and refreshed as appropriate to maintain competence.

- EMS requirements were included in all appropriate contracts, and contractors fulfilled defined roles and specified responsibilities.
- EMS audit/evaluation procedures were established, an audit was conducted, and non-conformities were addressed or corrected.
- Senior leadership review of the EMS was conducted, and top management responded to recommendations for continual improvement.

Any change to the score received in 2009 from the score received in 2008 should also be explained here, as appropriate.

In this discussion, sites should also mention the status of or progress toward meeting the fully implemented EMS requirements of DOE Order 450.1A, §4.d. (2) by June 30, 2009 (i.e., site declaration of a fully implemented EMS). Sites should not only describe the progress made in implementing the EMS, but should also summarize how the EMS has been successfully integrated into the site ISMS pursuant to DOE Order 450.1A.

To the extent possible, sites should also describe the effectiveness of the EMS since its inception at the site. This should encompass the following:

- The benefit of the EMS to the facility or organization, including: (1) reduced risk to facility/organizational mission; (2) improved fiscal efficiency and/or cost avoidance; (3) greater understanding and recognition of environmental issues at all levels of the organization; (4) empowerment of individuals to contribute to the betterment of the organization's environmental footprint; (5) integration of environment into organizational culture and operations; (6) integration of environment into real property asset management; (7) improved community relations; (8) improved effectiveness in overall mission; and (9) improved cooperative conservation with other groups.
- The impact of the EMS on the environment and environmental issues, including: (1) improved overall compliance management; (2) personnel health and safety; (3) pollution prevention; (4) improved air and water quality; (5) improved hazardous material, hazardous waste, and solid waste management; (6) improved conservation of water, natural resources, energy in facilities, and fuel in vehicles; and (7) reduced number of permits needed to operate.

For 2009 and future ASERs, sites should also discuss pertinent feedback from EMS implementation experiences. This discussion should include the benefits and successes associated with EMS implementation at the site, EMS best practices and lessons learned, EMS challenges and identification of barriers to EMS implementation (including plans for resolution where appropriate), and how EMS implementation has enabled the site to operate more effectively in accomplishing its public missions. Other significant environmental protection programs associated with the EMS, such as site meteorology, monitoring and surveillance, groundwater protection and monitoring, environmental restoration and waste management, and effluent monitoring, should also be described here.

To further demonstrate adherence to the requirements of DOE Order 450.1A and the reporting requirements of DOE Order 231.1A, this section should briefly describe the major environmental programs ongoing at the site. For example, this section should include a discussion of site initiatives (e.g., efforts to improve water quality through collaborative approaches to watershed management) with States, Tribes, local governments, industry, other Federal agencies, and interested stakeholders, as appropriate.

Special environmental studies conducted, or in progress, at a particular site should be discussed here, avoiding redundancy with information presented in the Compliance Summary chapter and other sections

of the ASER. Additionally, pertinent information may be presented on other significant environmental activities at the site (e.g., environmental training programs) that are not adequately covered in other sections.

3.1 Environmental Performance Measurement

Environmental performance measurement is an integral component of an EMS. EO 13423, DOE Order 450.1A, DOE Order 430.2B, and EO 13514 include multi-year environmental, energy, transportation, and GHG reduction goals, objectives, and targets. This section should include the site's progress on meeting these goals via the measurable environmental goals, objectives, and targets identified in the EMS for 2009. Sustainable practices for enhancing environmental, energy, and transportation management performance may be discussed here. This discussion may include specific goals, objectives, and targets applicable to operations conducted at the site; the results in achieving those goals, objectives, and targets; a comparison of recent years' performance; and measures or goals planned for the future.

Site pollution prevention and waste minimization activity highlights or significant accomplishments should be mentioned here, including life cycle assessment and return-on-investment programs that have been instrumental in advancing progress in meeting DOE Order 450.1A, *Sustainable Environmental Stewardship Goals*. A summary of waste reduction and recycling goals that were met or exceeded in the calendar year (e.g., avoided the generation of "x" pounds of waste, resulting in a savings of "y" dollars in treatment and disposal costs) should also be included in this section.

Progress on meeting EO 13423 requirements to achieve ODS reductions should also be discussed in this section. This discussion may include how the site is maximizing the purchase and use of safe, cost-effective, and environmentally preferable alternatives to ODS; an evaluation of the present and future uses of ODS at the site; and any exemplary practices developed and used at the site. A description of the site plan to phase out the procurement of Class I ODSs³ for all non-excepted uses by December 31, 2010, should also be discussed briefly in this section. In addition, a short description of site coordination efforts with the Department of Defense prior to offsite disposal or transfer of material containing ODS could be included here, if applicable.

3.2 Awards and Recognition

The site should highlight and discuss any DOE or other Federal pollution prevention, environmental stewardship, or sustainability recognition awards received in CY 2009. These may include DOE Environmental Sustainability Star (*EStar*) awards, the President's Closing the Circle Award, and any State or industry-sponsored environmental awards or recognition.

4.0 ENVIRONMENTAL RADIOLOGICAL PROTECTION PROGRAM AND DOSE ASSESSMENT

This chapter should describe the radiological monitoring program at the site, as well as all assessments for doses to the public and releases to the environment conducted during the year. This information should address details of the models and assumptions used in performing the dose calculations and any new

³ Class I ODSs are those chemicals listed in Appendix A of Subpart A of 40 CFR 82 that cause or contribute significantly to harmful effects of the stratospheric ozone layer. Section 602 of the Clean Air Act directs the EPA to add to the Class I list any chemical that EPA determines has ozone-depletion potential of 0.2 or greater.

monitoring data, as appropriate. Consistent data reporting facilitates efforts to compare data from facility to facility and meaningfully aggregate the information.

4.1 Radiological Discharges and Doses

The following data should be presented in tabular form in this section:

- Maximum individual dose (maximum effective dose equivalent as defined in DOE Order 5400.5) in units of millirem (mrem) and millisievert (mSv),⁴ effective dose in units of millirem (mrem) and millisievert (mSv), and collective population dose (effective dose equivalent) in units of person-rem (person-Sv)⁵ and total population within 80 kilometers (km).⁶
- A comparison of the maximum individual dose with DOE, EPA or other standards and with the natural background at the site.
- Radionuclides released to air and water during the year in units of curies (Ci) and becquerels (Bq).⁷

For each radionuclide reported, the total released and its half-life should be reported. Gaseous releases, liquid releases to surface waters and soils, and environmental measurements of air, surface water, soil, and foodstuffs should be reported in appropriate units. Doses should be calculated following the requirements and effective standards cited in DOE Order 5400.5.⁸ Where appropriate, the ASER should state that because the doses are calculated rather than measured, they represent potential or estimated, rather than actual, doses.⁹ Data should also be presented using scientific notation (e.g., 3.2×10^{-3} for 0.0032), where appropriate. The number of significant figures should also be appropriate to the quality of the data.

Attachment I provides a suggested format for radiological dose and release reporting. This reporting should list all radionuclides present at a site and their actual releases. In the reporting of atmospheric and liquid effluent releases, some radionuclides may not be applicable to certain DOE sites. If this is the case, indicate “NA” in the tables in Attachment I. In addition, a statement should be made confirming that all known radionuclides released in significant quantities from the site are documented in the ASER. It is noted that the format suggested in Tables 2 and 3 of Attachment I is intended to simplify the preparation of composite summary reports, not to replace site-specific-based presentations of data. Site-specific

⁴ Per DOE Order 5400.5, radiation doses should be expressed in units of mrem followed by the Standard International unit (mSv) in parentheses. The same is true for person-rem (person-Sv).

⁵ Estimates of collective dose for DOE facilities are required by DOE Order 5400.5. DOE has no de minimis level for these calculations.

⁶ In certain instances, populations outside the 80 km radius may be affected by releases to that region. For example, in a predominantly agricultural area, more foodstuffs may be grown than are considered to be consumed by the resident population. In such cases, the difference should be considered to be consumed outside the region, and the resulting collective dose should be estimated and reported. Similarly, if a major drinking water system is located beyond the 80 km distance, but the input for that system receives most of the liquid discharging from the site, it should be evaluated. In some situations, the population assumed for the calculations should be described.

⁷ Uranium releases should be reported in terms of both Ci and Bq, and grams.

⁸ In particular, the total dose in terms of the dose from external exposures plus the 50-year committed effective dose from intakes of radioactive material should be calculated and reported.

⁹ To demonstrate compliance with standards when sources are extremely small, the dosimetry models and evaluations are sometimes selected to be very conservative and simplistic. When this is the case, it should be so stated, and where possible, the qualitative level or magnitude of conservatism should be discussed.

examples of suggested reporting formats from the 2008 West Valley Demonstration Project and Waste Isolation Pilot Plant ASERs are referenced in Attachment V, item 2, Radiological Doses and Releases.

For compliance with the radiological emission standards in 40 CFR Part 61 Subpart H, the ASERs should report doses in terms of effective dose or effective dose equivalent, calculated using CAP-88 or another EPA-approved air dispersion model, and compared to the 10 mrem per year air emission DOE standard under Subpart H. This section should specifically state the version of CAP-88 used to recognize the associated dose factors: Federal Guidance Reports 11 and 12 from the International Commission on Radiological Protection (ICRP) 26/30, or Federal Guidance Report 13 based on post-ICRP 60 factors. Compliance with DOE public dose limits should also be evaluated in terms of effective dose equivalent. Compliance with the emissions limits in subparts Q and T should be discussed for those facilities subject to the specific requirements in 40 CFR Part 61. If a facility uses another air dispersion model deemed to be more site-specific than CAP-88 to calculate potential dose for compliance with DOE requirements, that information should be included and distinguished from the NESHAP compliance dose.

The MEI should be selected based on the requirements of DOE Order 5400.5, §II.6. (3). The annual dose calculation to the MEI should be an estimate based on a scenario and parameters that approximate an actual situation. The estimate should be reasonable but not likely to underestimate the MEI dose. Calculation of the dose to a person spending 100 percent of his time at the fence line is useful for comparison purposes, but it overestimates the dose to the MEI and biases comparative analyses. The 2009 ASERs should contain estimates based on realistic situations and should clearly describe the location of critical receptors and the scenarios used to calculate the estimated doses.

If monitoring data are below minimum detectable levels, those levels should be specified and, as noted in Section 4.4 below, should be reported consistent with guidance specified in DOE/EH-0173T, *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance* (January 1991) regarding the use of “Less-Than-Detectable-Values.”

The text associated with the tables should address the primary contributors to the doses (i.e., the radionuclides and the processes that created those radionuclides) and should identify the models and any pertinent assumptions used in estimating the doses. An example would be: “The maximum effective dose equivalent for a member of the public was estimated to be 5 mrem (0.05 mSv) from all pathways. This was principally from Cs-137 and Sr-90 airborne emissions from [facility/process] and was calculated using CAP-88.” If more than one radionuclide is a major contributor to the dose, a pie chart representing the relative contributions would be useful. If the maximum dose through the waterborne pathway and the airborne pathway is for different individuals, the report should briefly explain why these doses are not additive.

DOE Order 5400.5 specifies the use of ICRP 26/30 dose factors (i.e., Federal Guidance Reports 11 and 12). As a result of the revision of 10 CFR Part 835, which adopts post-ICRP 60 dose factors, some sites have been approved, for consistency, to use the newer dose factors (i.e., dose factors from the Federal Guidance Report 13 supplemental CD) for estimating public doses. In such cases, the report should identify the dose factors used.

DOE Order 5400.5 requires estimated reporting of collective doses to the public around DOE sites, as well as radiation doses to MEIs. Estimates of doses to individuals should include multiple exposure pathways and releases from multiple sources (e.g., point and diffuse) if they contribute to the dose to the same individuals. The collective dose should be an integration of estimates of average or representative doses to the public, not maximum potential doses.

4.2 Clearance of Property Containing Residual Radioactive Material

DOE's radiation protection framework and 100 mrem/year dose limit center on an "all sources and all pathways" policy. In addition to air and water discharges to the environment, the clearance of property (real or personal) containing residual radioactive material is another type of "release" to the environment and is a potential contributor to the dose received by the public. Specific authorized limits govern the radiological clearance of sites, structures, and materials; thus, authorized limits for clearance of property should be reported. It may be desirable to discuss real property (lands and structures) and personal property (equipment and soils) separately. The information regarding clearance under authorized limits should be summarized. This guidance provided here is not intended to be prescriptive; sites should use these recommended reporting elements in a way that best fits the format and style of the ASER for each site.

The ASER should summarize the authorized limits for the site, including: (1) the approved authorized limit used for clearance, the basis for its derivation (i.e., dose/As Low As Reasonably Achievable based or DOE-approved surface activity guidelines) and its date of approval or effective date; and (2) the type of material or property (i.e., open land, structures, material and equipment, or laboratory waste), the basis for its clearance, and its expected end-use scenario (i.e., disposal, recycle, reuse). If the clearance of property is for recycle or reuse purposes, any discussion of these activities in this section may also be referenced in the pollution prevention/waste minimization section of the ASER.

With regard to personal property clearance, and considering the guidance contained in the January 19, 2001, memorandum from the Secretary, *Managing the Release of Surplus and Scrap Materials*, it may be desirable to provide summary data to quantify property cleared under the authorized limits or subject to the authorized limits. Where practical, information should be provided on: (1) the volume, radionuclide concentrations, and total activity of the material; (2) the maximum dose to an individual and collective dose estimates; and (3) the estimated cost savings and other benefits from the clearance or a qualitative discussion of the benefits of the clearance program. Any actions taken to implement the improvements in monitoring, documenting, and coordinating clearance recommended in the memorandum should be briefly discussed, as should the locations or methods by which interested parties can obtain more detailed data on clearance (e.g., reading rooms, records centers, or other locations where certification and clearance data are publicly available).

Requirements for the selection and approval of authorized limits are contained in DOE Order 5400.5. Guidance on the development and approval of authorized limits is provided in several supporting DOE radiation protection guidance documents, which are available on line at: <http://www.hss.energy.gov/nuclearsafety/env>. At that page, select "Environmental Guidance" and scroll down to "Radiation Protection (Atomic Energy Act)."

4.3 Protection of Biota

4.3.1 Dose Rate Limits for Protection of Biota and Methods for Demonstrating Compliance

DOE Order 450.1A requires that as part of integrating EMSs into the site ISMS, DOE elements must, as applicable, consider protection of biota. Both aquatic and terrestrial evaluations should be conducted. DOE Order 5400.5 requires that populations of aquatic organisms be protected to a dose rate limit of 1 rad/day. Recommended dose rate limits of 1 rad/day for terrestrial plants and 0.1 rad/day for terrestrial animals are to be applied in the evaluation of terrestrial systems. The DOE Technical Standard, *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota* (DOE-STD-1153-2002), is

available for use in evaluating and reporting compliance with both aquatic and terrestrial biota dose limits.

4.3.2 The RESRAD-BIOTA Code as a Tool for Evaluating Doses to Biota

The RESRAD-BIOTA code provides a complete spectrum of biota dose evaluation capabilities, from general screening to comprehensive receptor-specific dose estimation. This code was principally sponsored and developed by DOE, with support from the EPA and the Nuclear Regulatory Commission. It was released in September 2003, and a User's Guide was published in January 2004. The RESRAD-BIOTA code was designed to be consistent with the DOE graded approach to biota and the method's Biota Concentration Guides. The RESRAD-BIOTA code is recommended as the preferred companion software tool to the Technical Standard for demonstrating protection of biota in the ASER.

DOE Technical Standard DOE-STD-1153-2002, the RESRAD-BIOTA code, and the RESRAD-BIOTA Code User's Guide (DOE/EH-0676; ISCORS Report 2004-02) are available from the DOE Biota Dose Assessment Committee website at <http://homer.ornl.gov/nuclearsafety/env/bdac/>. Refer to Attachment II and Attachment V, item 3, for specific details and site-specific examples for demonstrating and reporting compliance with dose limits for biota in the ASER.

4.4 Unplanned Radiological Releases

Doses associated with unplanned releases should be reported. If they are insignificant with respect to normal release-related doses (i.e., a few percent or less), they should be reported as such. If they exceed appropriate limits, this should also be noted.

4.5 Environmental Radiological Monitoring

Facilities are requested to provide information on the models and the assumptions used in estimating the data so that data can be consistently and usefully aggregated. The "background" radiation levels used for comparison with offsite monitoring results, and the locations at which the background levels were measured, should be clearly stated. Summaries or tables of measured concentrations or activity should follow the guidance in § 7.3.4 of DOE/EH-0173T, *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance* (January 1991, page 7-5), regarding the use of "Less-Than-Detectable-Values" for statistical analysis and data reporting.

5.0 ENVIRONMENTAL NON-RADIOLOGICAL PROGRAM INFORMATION

This section discusses the inclusion and display of non-radiological monitoring information in ASERs. When reporting non-radiological monitoring data, detection limits should be specified, where appropriate.

Non-radiological monitoring data should be included to provide a comprehensive summary of the environmental impacts associated with DOE site operations and the environmental monitoring efforts under way at DOE sites. Examples of the types of information that should be included and discussed in this section, if the data are available, are described below.

Graphical displays of non-radioactive emissions, including any discharges to air, surface water, soils, and groundwater, should be used in demonstrating compliance with applicable permit limits. For example, graphs can show that when a permit contains both daily and annual release limits, exceeding the daily limit may not necessarily constitute a compliance problem with respect to the annual limit.

Monitoring data related to non-radiological gaseous or liquid emissions for which there are applicable standards or other meaningful bases for interpreting the results should also be included in this section.

The Federal and State regulatory limits applicable to site emissions should also be described. Where appropriate, this section should show how the environmental pollutant discharge levels (resulting from site operations) compare to relevant parameters, such as background levels and applicable effluent or environmental standards.

6.0 GROUNDWATER PROTECTION PROGRAM

This section should provide a brief description of site hydrological conditions, including cross-sections of subsurface conditions at the site. Additional technical documents should be referenced as providing details of the hydrological conditions, including groundwater flow and potential receptors.

EPA and DOE continue to emphasize groundwater monitoring and public drinking water protection. This section should include data on facility up-gradient and down-gradient wells at RCRA hazardous waste units, DOE radioactive waste management units, RCRA or CERCLA remediation sites, and identified compliance points (i.e., points at which regulatory standards apply) to effectively track groundwater plume movement.

A summary description of the site's groundwater monitoring network should be provided. This summary should state the various monitoring objectives (e.g., RCRA hazardous waste management unit detection monitoring, environmental surveillance monitoring, or DOE Order 435.1 monitoring) and should describe the network established to meet these objectives. A series of tables could be used to summarize the number of active wells by area of the site and by purpose. The tables should address the number of wells installed or abandoned during the current year and any unique or innovative techniques used in the site groundwater monitoring network. Groundwater monitoring wells operated for other purposes should also be discussed. These monitoring wells would include subsurface or aquifer characterization wells (used for environmental surveillance), environmental radiological program monitoring wells, or wells operated for detection monitoring at non-RCRA and non-CERCLA facilities at the site.

A suggested tabular format that provides summary information on a site groundwater monitoring network is depicted in Attachment III. Site-specific examples from the 2008 Hanford ASER are referenced in Attachment V, item 7, Sitewide Groundwater Monitoring Program Summary Tables.

To make the ASERs more meaningful, trends in the groundwater data over time should be included. Each site should prepare tables to indicate trends in groundwater plume movement over a five-year period, at a minimum. Data for the current year and for the previous five years should be displayed graphically or presented as basic statistics (such as median values and ranges) for contaminants commonly detected at the site. The real or potential impact of groundwater plume and contaminant movement on public drinking water supplies should be discussed here. The 2009 ASERs should characterize groundwater monitoring results for CY 2009 and for the five previous years if the data are available. In addition, the ASERs should highlight monitoring wells with significant changes in contamination indicator parameters above background levels. This type of information should be compiled and organized in such a way that it is easy to locate and understand.

Aerial photographs and/or maps of the reporting facility are extremely useful in depicting groundwater monitoring points, and, if available, they should be included in the ASER in a manner consistent with site security requirements. In particular, maps that show the extent of contamination and migration of groundwater contaminant plumes over time should be included to meet the needs of regulators and the

interests of the public and site stakeholders. These maps should indicate the locations of the plumes with respect to site boundaries, lakes, rivers, aquifers, and relevant groundwater monitoring and drinking water wells. Foldout maps may be included, as appropriate.

7.0 QUALITY ASSURANCE

The ASER should describe the measures taken to ensure the quality of radiological and non-radiological data through the implementation of a quality system for the management of environmental data as required by DOE Order 414.1C, *Quality Assurance* (June 2005). This discussion should generally validate site data collection and analysis programs and should present summary information from participation in inter-laboratory cross-check programs, including site results and expected results. The general implications of the results of inter-laboratory comparisons should be discussed along with any actions taken or needed to improve data quality.

In addition, the ASER should discuss the extent to which the following were used:

1. The *Uniform Federal Policy (UFP) for Implementing Environmental Quality Systems* (March 2005)
2. EPA QA/G-4, *Guidance on Systematic Planning Using the Data Quality Objectives Process* (February 2006).

The UFP offers an implementation tool for meeting DOE Order 450.1A, *Environmental Protection Program*, Section 4.c.(6) requirements for: “Assurance that analytical work for environmental and effluent monitoring supports data quality objectives, using a documented approach for collecting, assessing, and reporting environmental data.”

EPA QA/G-4 provides information on how to apply systematic planning to generate performance and acceptance criteria for collecting environmental data. This guidance also provides a standard working tool for project managers to develop data quality objectives (DQOs) for determining the type, quantity, and quality of data needed to reach defensible decisions.

DOE field element sites that have contracted for analytical services with offsite environmental laboratories should utilize, when possible, the results of the Department’s corporate Consolidated Audit Program (DOECAP) and the results of the Mixed Analyte Performance Evaluation Program (MAPEP) for proficiency testing to help assure field managers about the quality of environmental data used as the basis for decisions. In addition, field managers should use the tracking and accountability of DOE waste streams sent off site to commercial waste vendor facilities in evaluating the risks and liabilities for potential treatment and disposal concerns raised in the DOECAP reports. Additional information on DOECAP is available at: <https://doecap.oro.doe.gov>. Further information on MAPEP is available at: <http://www.inl.gov/resl/mapep>.

Field managers should also consider the use of Visual Sample Planning (VSP) software toolkits regarding environmental field sampling statistical strategies for collecting data that has a proven record for cost efficiencies in meeting DQOs and regulatory acceptance. Additional information on VSP is available at: <http://vsp.pnl.gov>.

The quality assurance section of the ASER should discuss the extent to which DOE site contractors conducting environmental monitoring and DOE-contracted laboratories performing environmental analysis participate in the DOECAP, MAPEP, and VSP performance evaluation programs to ensure the

quality of analytic data obtained. Any additional quality assurance protocols, guidelines, or relevant national or international consensus standards that are used should be discussed here, as well.

Attachment I

Suggested Formats for Radiological Dose and Release Reporting in ASERs

The tables in Attachment I provide examples of formats used by HS-32 to summarize ASER radiological dose and release data. It is highly recommended that DOE sites use these formats for reporting doses, atmospheric releases, and liquid effluent releases in ASERs. Preparing data in these, or similar formats, will simplify aggregation of data across DOE and enable DOE-wide site comparisons. However, these example formats should not be used solely to replace site-specific-based presentations that contain more detailed radionuclide-specific information that are relevant to describing site-specific operations. Noteworthy site-specific examples from the 2008 West Valley Demonstration Project and Waste Isolation Pilot Plant ASERs are referenced in Attachment V.

The ASER should confirm that all of the types of radionuclides released from the site have been reported. If this is true, a clear statement should be made indicating that there are no known significant discharges of radioactive constituents from the site other than those reported in the tables. Such a statement would be informative to public stakeholders.

In addition, based on extensive review of past ASERs, most non-routine radiological releases typically do not significantly contribute to the overall radiological doses when compared to the doses resulting from routine DOE operations. This should also be clearly communicated in the ASER, where applicable.

Please contact Ross Natoli of HS-32 at (202) 586-1336 or by e-mail at Ross.Natoli@hq.doe.gov for additional information or guidance.

Example Table 1: Site X Radiological Dose Reporting Table for Calendar Year 2009

Pathway	Dose to Maximally Exposed Individual		% of DOE 100 mrem/yr Limit	Estimated Population Dose		Population within 80 km*	Estimated Background Radiation Population Dose (person-rem)
	(mrem)	(mSv)		(person-rem)	(person-Sv)		
Air				Average dose X population exposed		*	Pathway specific Background doses need not be estimated
Water				Average dose X population exposed		*	Pathway specific Background doses need not be estimated
Other Pathways				Average dose X population exposed		*	Pathway specific Background doses need not be estimated
All Pathways	{Note: This should be the total dose to the MEI, but it should not be the sum of the individual pathway doses unless all the pathway-specific MEI doses are to the same receptor.}			{Note: This should normally be the sum of the average pathway-specific population doses.}			

* Pathway-specific populations should be specified only if they are significantly different from the total population.

Attachment I

Example Table 2: Site X Radiological Atmospheric Releases for Calendar Year 2009 (in Curies) **

Tritium	⁸⁵ Kr	Noble Gases (T _{1/2} <40 days)	Short-Lived Fission and Activation Products (T _{1/2} <3 hr)	Fission and Activation Products (T _{1/2} >3 hr)	Total Radio-iodine	Total Radio-strontium	Total Uranium	Plutonium	Other Actinides	Other

Example Table 3: Site X Liquid Effluent Releases of Radioactive Material for Calendar Year 2009 (in Curies)**

Tritium	Fission and Activation Products (T _{1/2} >3hr)	Total Radio-iodine	Total Radio-strontium	Total Uranium	Total Plutonium	Other Actinides

**These example tables are to assist in DOE-wide comparisons. If used, they should be presented along with more detailed site-specific-based tables. They should not replace or limit more informative site-specific reporting formats.

Attachment II

Guidance for Demonstrating and Reporting Compliance with Dose Limits for Biota

Dose Limits for Protection of Biota

Since 1990, DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, has required that populations of aquatic organisms be protected using a dose limit of 1 rad/day. While there are no formal DOE dose limits for terrestrial biota, it is strongly recommended that ASERs demonstrate that DOE site activities are also meeting the dose limits recommended in the Technical Standard, *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota* (DOE-STD-1153-2002) for terrestrial biota.

DOE activities should demonstrate and document the following in the ASER, as appropriate to each site:

- (1) The absorbed dose to aquatic animals will not exceed 1 rad/day (10 mGy/day) from exposure to radiation or radioactive material. (The Gray, Gy, is the Standard International unit of absorbed dose.)
- (2) The absorbed dose to terrestrial plants will not exceed 1 rad/day (10 mGy/day) from exposure to radiation or radioactive material.
- (3) The absorbed dose to terrestrial animals will not exceed 0.1 rad/day (1 mGy/day) from exposure to radiation or radioactive material.

The screening and analysis methods described below provide a means of demonstrating that the above dose rate guidelines for aquatic and terrestrial biota are being achieved.

A Graded Approach for Demonstration of Protection

DOE-STD-1153-2002 provides practical screening and analysis methods for demonstrating compliance with the requirements for protection of biota. The Technical Standard provides a graded approach for demonstrating compliance with the biota dose limits and for conducting ecological assessments of radiological impact. The Technical Standard was developed by DOE through the Department's Biota Dose Assessment Committee (BDAC).

The graded approach consists of a three-step process that guides the user from an initial, prudently conservative set of screening values to (if needed) a more rigorous analysis using site-specific information. This process includes *data assembly*, a *general screening phase*, and an *analysis phase*. In *data assembly*, the site area to be evaluated is defined, and measured maximum or mean radionuclide concentration data are assembled for subsequent screening. In the *general screening phase*, measured radionuclide concentrations in environmental media are compared with the Biota Concentration Guides (BCG). Each radionuclide-specific BCG represents the limiting radionuclide concentration in environmental media that would not cause the biota dose limits to be exceeded. The *analysis phase* consists of three increasingly more detailed steps of analysis: a site-specific screening, using site-representative parameters instead of default parameters; a site-specific analysis, employing a kinetic modeling tool; and, if necessary, a site-specific biota dose assessment involving the collection and analysis of biota employing ecological risk assessment protocols. This three-phase scheme helps to ensure that the evaluation effort is commensurate with the likelihood and severity of potential environmental impacts. Implementation experience at DOE sites to date suggests that the majority of

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sites will likely be able to demonstrate compliance with biota dose limits using the general screening phase.

The RESRAD-BIOTA Code as a Tool for Evaluating Doses to Biota

The RESRAD-BIOTA code (released in September 2003; User's Guide in January 2004) is the preferred companion software tool for implementing the methods contained in DOE-STD-1153-2002 and for demonstrating protection of biota in ASERs. The code provides a complete spectrum of analysis capabilities, from methods for general screening to comprehensive receptor-specific dose estimation. The code contains many advanced features, such as sensitivity analysis for studying parameter sensitivity; text reports and graphing capabilities for easy interpretation of data; an advanced "Organism Wizard" for configuring user-defined organisms; and capabilities to save and retrieve evaluation data and user-defined organisms.

DOE-STD-1153-2002, the RESRAD-BIOTA code, and the RESRAD-BIOTA User's Guide (DOE/EH-0676; ISCORS Report 2004-02) can be downloaded from the BDAC web site at <http://homer.ornl.gov/nuclearsafety/env/bdac>. BDAC members are also available to provide technical assistance in the application of DOE-STD-1153-2002 or for consultation in conducting site-specific biota dose assessments where needed. DOE-STD-1153-2002 and the RESRAD-BIOTA code are the preferred tools for estimating and evaluating doses to biota, unless there are site-specific requirements that necessitate the use of an alternative method or model, or it is determined that such alternate approaches will provide better results.

Specific Guidance and Sample Reporting Format for ASERs

Compliance with biota dose limits should be reported in the *Environmental Radiological Protection Program and Dose Assessment* chapter or section of the ASER under *Protection of Biota*, or comparable section. The approach recommended by HS-32 is to prepare a text summary section and incorporate a supporting summary table for the evaluations conducted. To demonstrate compliance with DOE biota protection requirements, the following elements should be included when reporting evaluations and conclusions: (1) reference the biota dose limits being met (e.g., 1 rad/day for aquatic organisms per DOE Order 5400.5); (2) identify the method used to demonstrate compliance with these limits and briefly describe the process used (e.g., screening methods using DOE-STD-1153-2002 and the RESRAD-BIOTA code, or other site-selected method); (3) describe the site areas evaluated and supporting data used in the evaluation (i.e., sources of exposure to biota for the site area evaluated, specific organism types or receptors used, media type and radionuclide concentration data used); (4) summarize the results (e.g., concentrations of radionuclides in environmental media are less than screening values, doses calculated are less than biota dose limits); and (5) provide a conclusion (e.g., populations of biota are protected at recommended dose limits, and no impacts from ionizing radiation to populations of biota are indicated).

Additionally, the following areas should be highlighted as appropriate and beneficial: (1) any significant site outreach efforts or initiatives with stakeholders and local regulators; (2) integration of biota dose evaluation within the site environmental surveillance program; and (3) site recognition of biota protection as a good business practice and as an important element of environmental stewardship. Refer to Module 1, Section 8, *Documenting Your Biota Dose Evaluation Results*, in DOE-STD-1153-2002 for additional guidance.

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Examples of Biota Dose Evaluation Reporting Cited from Actual ASERS

Most sites have done a good job in communicating their biota dose evaluation results in their ASERS. The West Valley Demonstration Project, Pantex, and Idaho National Laboratory biota dose evaluation summaries, as presented in their CY 2008 ASERS, are referenced in Attachment V, item 3, Biota Dose Evaluations, as noteworthy examples of how to present and summarize this information in your ASER.

Please contact Janet Normandy, HS-22 at 202-586-7917 or by e-mail at Janet.Normandy@hq.doe.gov for additional information or guidance.

Attachment III

Suggested Reporting Format for DOE Sitewide Groundwater Monitoring Program

The summary table on the following page provides an example of a highly recommended format that sites should use to give an accounting of all active groundwater monitoring wells at the site. Active wells are those that are currently being used (i.e., samples are taken during the current calendar year). This summary table includes only monitoring wells; it does not include injection wells, production wells, extraction wells (e.g., for remediation), piezometers, drainage wells, and so forth, unless a sample is withdrawn for chemical, physical, radiological, or other analysis.

The summary table is structured according to the primary purpose (or driver) for sampling the well and includes the following broad categories.

1. Restoration – Wells that are associated with a groundwater remediation project, including subsurface investigation monitoring, and evaluation of the progress of the remediation.
2. Waste Management – Wells that are sampled to determine the impact, if any, of a waste management unit (e.g., RCRA hazardous waste, DOE low-level radioactive waste, other RCRA waste, CERCLA remediation waste) on the groundwater.
3. Surveillance – Wells that are sampled to detect possible impact of any other site operations (non-waste management units) on the groundwater, including both radiological and non-radiological sampling.
4. Other – Wells that are sampled for any other purpose.

This example summary table accounts for the number of samples taken during the calendar year at wells included in each of the four categories above (e.g., wells used for remediation, wells used for waste management). The table also accounts for analyses performed during the calendar year for all samples taken at each group of wells, corresponding to the same four categories. In addition, the table includes the percentage of all analyses performed for which the results were below the levels of detection. The final section of the table includes information on the ranges of concentrations for the most commonly detected contaminants. Site-specific examples from the 2008 Hanford ASER are referenced in Attachment V, item 7, Sitewide Groundwater Monitoring Program Summary Tables.

Please contact Colleen Ostrowski of HS-22 at 202-586-4997 or by e-mail at Colleen.Ostrowski@hq.doe.gov for additional information or guidance.

Attachment III

SUMMARY OF CY 2009 DOE SITEWIDE GROUNDWATER MONITORING PROGRAM*

	PURPOSES FOR WHICH MONITORING WAS PERFORMED			
	Remediation	Waste Management	Environmental Surveillance	Other Drivers
Number of Active Wells Monitored On Site				
Number of Active Wells Monitored Off Site				
Number of Samples Taken				
Number of Analyses Performed				
% of Analyses that are Non-Detects				
% of Analyses within an Acceptable Range				

Ranges of Results for Positive Detections				
Tritium				
Krypton-85				
Trichloroethene				
Heavy Metals				
Volatile Organic Compounds				
Other Contaminants (list separately)				

* Where appropriate, a second table could be included in this section to characterize offsite groundwater monitoring.

Attachment IV

ASER Reporting for Closure Sites

This attachment provides suggestions and guidance to DOE sites whose primary mission is environmental restoration with a goal of closure in the near future and to sites managed by the DOE Office of Legacy Management (LM). HS-32 recognizes the unique nature and diversity of many LM-managed sites makes them suitable candidates for alternate forms of ASERs. Some alternatives to preparing the traditional ASER may be available to these sites given their mission, current operation status, and desire to streamline DOE internal reporting requirements and avoid redundancy in reporting. These alternatives may include either preparing a scaled-down version of the ASER or submitting equivalent documentation to DOE-HQ along with a self-declaration from the site that this documentation satisfies DOE internal reporting requirements.

The purpose of the ASER is to characterize site environmental management performance, summarize environmental occurrences and responses reported during the calendar year, confirm compliance with environmental standards and requirements, and highlight significant site programs and efforts. ASERs can also serve as a vehicle to document site progress in implementing EMS within the framework of the Department's ISMS. DOE Order 450.1A, *Environmental Protection Program*, required DOE sites to have an EMS in place by December 31, 2005, and declare full implementation by June 30, 2009. The status of a site's EMS implementation and performance should be reported in the ASER.

ASERs provide information that is essential to DOE-HQ for assessing field environmental program performance and confirming compliance with regulatory environmental standards and requirements. DOE-HQ often uses ASERs to gather site-specific environmental program performance information, to report DOE's environmental performance to Congress and the EPA, and to respond to external inquiries. ASERs are also the means by which DOE demonstrates compliance with DOE internal standards and requirements, such as the radiation protection requirements of DOE Order 5400.5, *Radiation Protection of the Public and the Environment*. In addition, ASERs are an important means of conveying DOE's environmental performance to members of the public living near DOE sites and to other stakeholders.

Some DOE sites may consider preparing a scaled-down, streamlined version of the ASER that reflects the current nature and extent of site operations and monitoring programs. Sites nearing closure may be in a relatively static operational condition. The scaled-down ASER may summarize any relevant new information for the current year and appropriately reference the previous year's ASER for a description of unchanged or static conditions at the site. DOE Order 231.1A and annual ASER guidance allow for sites to use a graded approach and to tailor their ASERs considering the site mission, breadth of operations, and the potential impact site activities may have on the public and environment proximate to the site.

A second option is to submit the relevant and equivalent regulatory environmental compliance and radiological protection documentation to DOE-HQ in lieu of preparing the traditional ASER. For example, NESHAP, NPDES, and other regulatory environmental reporting that may be required and appropriate to the site may be submitted. This documentation should characterize site environmental monitoring program and results, site activities, regulatory compliance status, and compliance with DOE Order 5400.5. This equivalent documentation should be submitted to Glenn S. Podonsky, Chief Health, Safety and Security Officer, Office of Health, Safety and Security, via a transmittal memorandum from the Site Manager, Field Office Manager, or appropriate designee, by October 1 of each calendar year. This memorandum should state that the site is self-declaring compliance with the radiation protection requirements of DOE Order 5400.5 and that the associated documentation that is forwarded with the

Attachment IV

memorandum supports this self-declaration. This alternate approach should demonstrate compliance with the spirit of the environmental protection reporting requirements of DOE Order 231.1A and the annual guidance issued to Field elements regarding the preparation of ASERs.

Regardless of the option certain sites may choose to pursue, appropriate measures should be taken to effectively communicate site environmental status to DOE-HQ and the public in the future. Specifically, sites should identify the future mechanisms that will be used to keep the public informed of site activities, closure progress, environmental activities, and monitoring results. At the appropriate juncture in the future, when environmental restoration activities are concluded at the site, the final submittal of appropriate documentation to DOE-HQ should describe the closeout condition of the site, including such information as the nature and extent of final activities at the site, the status of present and future monitoring and surveillance programs, and any pertinent institutional controls that may be implemented at the site.

Please contact Ross Natoli of HS-32 at 202-586-1336 or by e-mail at Ross.Natoli@hq.doe.gov for additional information or guidance.

Attachment V

Site -Specific Examples of Suggested ASER Reporting Formats

This attachment provides references for model reporting formats from the 2008 ASERs. These models provide suggested reporting options for sites to consider for incorporation into their own ASERs, as appropriate. They include reporting formats for the Executive Summary, Radiological Doses and Releases, Biota Dose Evaluations, Environmental Management System, DOE Order 450.1A and ISMS/EMS Integration, EO 13423 Reporting, Sitewide Groundwater Monitoring Program Summary Tables, EPCRA Reporting, Environmental Performance Measures, NPDES Exceedances, the ASER Public/Reader Comment Form, Alternate General ASER Formats, and ASER Summary Reports.

Please contact Ross Natoli of HS-32 at 202-586-1336 or by e-mail at Ross.Natoli@hq.doe.gov for additional information or guidance.

Internet addresses are provided below to access the ASERs directly:

1. **Executive Summary:**

Nevada Test Site – <http://www.nv.doe.gov/library/publications/aser.aspx>

Hanford – <http://hanford-site.pnl.gov/envreport/2008/index.htm>

Brookhaven National Laboratory – <http://www.bnl.gov/esd/SER.asp>

2. **Radiological Doses and Releases:**

West Valley Demonstration Project – http://www.wv.doe.gov/Documents/2008_ASER.pdf

Waste Isolation Pilot Plant – <http://www.wipp.energy.gov/library/ser/09-2225.pdf>

3. **Biota Dose Evaluations:**

West Valley Demonstration Project – http://www.wv.doe.gov/Documents/2008_ASER.pdf

Pantex –

http://www.pantex.com/ucm/groups/exweb/@exweb/@regcomp/documents/web_content/073329.pdf

Idaho National Laboratory – <http://www.stoller-eser.com/Annuals/2008/index2.htm>

4. **Environmental Management System:**

Brookhaven National Laboratory – <http://www.bnl.gov/ewms/ser/>

Lawrence Livermore National Laboratory – <http://www.llnl.gov/saer/index.html>

5. **DOE Order 450.1A and ISMS/EMS Integration:**

Los Alamos National Laboratory – <http://www.lanl.gov/environment/all/esr.shtml>

Oak Ridge Reservation - http://www.ornl.gov/sci/env_rpt/aser2008/aser2008.htm

Argonne National Laboratory –

http://www.anl.gov/Community_and_Environment/Environmental_Reports/ser2008.pdf

Nevada Test Site – <http://www.nv.doe.gov/library/publications/aser.aspx>

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6. **EO 13423 Reporting:**
 - Jefferson Lab – <http://www.jlab.org/ehs/ser/SER2008.pdf>
 - Lawrence Berkeley National Laboratory - <http://www.lbl.gov/ehs/esg/Reports/assets/SER2008Vol1.pdf>
 - Waste Isolation Pilot Plant – <http://www.wipp.energy.gov/library/ser/09-2225.pdf>
 - National Renewable Energy Laboratory –
<http://www.netl.doe.gov/publications/others/env-rpts/aser2008.pdf>
7. **Sitewide Groundwater Monitoring Program Summary Tables:**
 - Hanford – <http://hanford-site.pnl.gov/envreport/2008/index.htm>
8. **EPCRA Reporting:**
 - Lawrence Livermore National Laboratory – <http://www.llnl.gov/saer/index.html>
 - Hanford - <http://hanford-site.pnl.gov/envreport/2008/index.htm>
9. **Environmental Performance Measures:**
 - Argonne National Laboratory –
http://www.anl.gov/Community_and_Environment/Environmental_Reports/ser2008.pdf
 - West Valley Demonstration Project - http://www.wv.doe.gov/Documents/2008_ASER.pdf
10. **NPDES Exceedances:**
 - Oak Ridge Reservation – http://www.ornl.gov/sci/env_rpt/aser2008/aser2008.htm
 - Savannah River Site – <http://www.srs.gov/general/pubs/ERsum/er09/index.html>
11. **ASER Public/Reader Comment Form:**
 - Savannah River Site – <http://www.srs.gov/general/pubs/ERsum/er09/index.html>
 - Pantex –
http://www.pantex.com/ucm/groups/exweb/@exweb/@regcomp/documents/web_content/073329.pdf
 - Energy Technology Engineering Center –
http://www.etc.energy.gov/Health-and-Safety/Documents/ASERS/ASER_2008.pdf
12. **Alternate General ASER Formats:**
 - Idaho National Laboratory - <http://www.stoller-eser.com/Annuals/2008/index2.htm>
 - Brookhaven National Laboratory – <http://www.bnl.gov/esd/SER.asp>
 - Hanford - <http://hanford-site.pnl.gov/envreport/2008/index.htm>
 - Nevada Test Site - <http://www.nv.doe.gov/library/publications/aser.aspx>
 - Lawrence Livermore National Laboratory – <http://www.llnl.gov/saer/index.html>
 - Sandia National Laboratory-Albuquerque -
<http://www.sandia.gov/news/publications/environmental/index.html>
 - Los Alamos National Laboratory – <http://www.lanl.gov/environment/all/esr.shtml>
 - Pantex -
http://www.pantex.com/ucm/groups/exweb/@exweb/@regcomp/documents/web_content/073329.pdf
 - Savannah River Site – <http://www.srs.gov/general/pubs/ERsum/er09/index.html>
 - Oak Ridge Reservation - http://www.ornl.gov/sci/env_rpt/aser2008/aser2008.htm
 - Argonne National Laboratory –
http://www.anl.gov/Community_and_Environment/Environmental_Reports/ser2008.pdf

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13. ASER Summary Reports:

Sandia National Laboratories, New Mexico –

http://www.sandia.gov/news/publications/environmental/2008_ASER_SAND2009_4984P.pdf

Argonne National Laboratory –

http://www.anl.gov/Community_and_Environment/Environmental_Reports/sser2008.pdf

Nevada Test Site –

http://www.nv.doe.gov/library/publications/NTSER/DOENV_25966_790SUM.pdf

Oak Ridge Reservation –

http://www.ornl.gov/sci/env_rpt/aser2007/2007_ASERsummary.pdf

Brookhaven National Laboratory – <http://www.bnl.gov/ewms/ser/>

Los Alamos National Laboratory –

<http://www.lanl.gov/environment/all/docs/reports/2008ESR-Students-LA-14410-ENV.pdf>

Hanford - <http://hanford-site.pnl.gov/envreport/2008/summary/pnnl-18427-sum.pdf>