



# **Radiological Reporting in DOE Annual Site Environmental Reports (ASERs) & Environmental and Radiation Protection Performance Dashboards**

---

**Ross Natoli**

**Environmental Protection Specialist**

**Office of Environment, Health, Safety and Security**

**Office of Analysis (AU-23)**

**Environmental Radiological Assistance Directory (ERAD) Webinar  
November 19, 2014**



# Overview



- **ASER Background**
- **ASER Guidance**
- **Radiological Reporting in ASERs**
- **ASER Use at DOE-HQ and DOE Sites**
- **Multi-Year ASER Rad Summaries**
- **Env. and Radiation Protection Dashboards**
- **Summary**



# Background: Purpose of the DOE Annual Site Environmental Reports



- **Characterize site's environmental monitoring and surveillance programs (rad and non-rad), identify effluents and releases, doses to the public, demonstrate environmental protection and performance results**
- **Confirm compliance with environmental statutes, orders, standards and requirements**
- **Capture CY environmental occurrences and responses**
- **Highlight significant site programs, initiatives and progress including property clearance activities**
- **Provide snapshot of a site's environmental compliance status, summary of monitoring and surveillance programs, environmental management and sustainability program performance and public outreach efforts for use by DOE Headquarters organizations, field elements, the public and other stakeholders**



# Requirements and Guidance on Preparing ASERs



- **ASERs are required by DOE Order 231.1B, “Environment, Safety, and Health Reporting” (6-27-11)**
- **AU-23 guidance is intended to supplement DOE Order 231.1B requirements and suggest standard reporting formats to promote consistency among ASERs produced by DOE sites**
- **Use ASERs to meet requirements of DOE Order 231.1B, confirm compliance with DOE Order 458.1 (2-11-11), support EO 13514 (10/4/09) and DOE Order 436.1 (5/2/11) reporting, and to meet other site and stakeholder needs**
- **ASERs are intended to be understandable to the public and should provide mechanisms to solicit feedback from the public and stakeholders**



# ASER Guidance



- Prepared annually by AU-23 pursuant to DOE O 231.1B
- AU-23 guidance is intended to supplement DOE Order 231.1B requirements and suggest standard reporting formats to promote consistency among ASERs produced by DOE sites
- Includes suggestions on confirming compliance with DOE Order 458.1 including:
  - Radiological Discharges and Doses
  - Clearance of Property Containing Residual Radioactive Material
    - Discuss property clearance activities and a summary of authorized limits used for clearance
- Addressing Radiation Protection of Biota



# 2014 ASER Guidance: Proposed Schedule



- **December 2, 2014-** AU-23 distributes Draft Guidance for Preparation of the 2014 ASERs to all appropriate DOE-HQ and Field Elements for comment
- **December 16, 2014-** Comments due to AU-23
- **December 23, 2014-** Final Draft ASER Guidance entered into AU Correspondence Tracking System (AUCT) for DOE-HQ and AU final review
- **February 2015** - 2014 ASER Guidance approved, sites notified when posted on AU-20 webpage, and distribution to all appropriate DOE PSOs and Field Elements



# Radiological Reporting in ASERS



- Continued focus on compliance with DOE Order 458.1
- Clarity of radiological dose and releases reporting
  - Dose to the representative or maximally exposed individual in millirem (mrem)
  - Collective (population) dose in person-rem
  - Total population within 50 miles (80 km)
  - Estimated Background Dose
  - Radionuclides released to air and water during the year in curies (Ci)
  - Example formats provided in ASER Guidance
- Addressing protection of biota in ASERs
  - The DOE Technical Standard, *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota* (DOE –STD-1153-2002 )
  - RESRAD-Biota Code
- DOE O 458.1 requirement to discuss property clearance activities and a summary of authorized limits used for clearance in ASERs



# Annual ASER Workshop



## Workshop Purpose:

- Provide an interactive forum for information exchange with DOE-HQ and among sites
- Discuss ASER reporting requirements, proposed ASER changes and reporting suggestions
- Share “lessons learned” and best practices in ASER production
- Provide recommendations to improve timeliness, consistency, and quality of ASERs across the DOE complex
- Incorporate ASER Workshop discussion recommendations into annual AU-23 ASER Guidance
- Conducted annually at a host DOE site in October/November each year
- 2015 Workshop planned at National Renewal Energy Laboratory (NREL)



# Current and Future ASER Uses

At

## DOE-HQ and DOE Sites



# How DOE-HQ Uses ASERs



- **Upper Management Inquiries**
- **Environmental Program Questions**
- **Internal DOE Needs**
- **NEPA Document Preparation**
- **Congressional Stakeholders Inquiries**
- **Public Stakeholders Inquiries, FOIAs**
- **Environmental Monitoring**
- **Radiological Information**
- **Review property clearance activities at DOE sites**



# DOE-HQ ASER Use Examples



- **Preparation of Radiological Summary Reports**
- **Radiological Dose Issues at Sites**
- **Groundwater Issues at Sites**
- **DOE-Wide Issues**
  - **Environmental Monitoring, DOE Orders, Policy, Guides development and implementation**
- **Support to DOE Office of Independent Enterprise Assessment (Oversight) ES&H Inspections**
- **Support development of Environmental and Radiation Protection Performance Dashboards**



# How DOE Sites Use ASERs



- Satisfy regulators needs
- Educate site workers across all operations
- Assist site managers in assessing site environmental performance
- Document and satisfy reporting requirements of DOE Orders 231.1B, 436.1, 458.1 and Executive Orders
- Community and Stakeholder Outreach



# Future ASER Uses



- **More Trending and Analysis**
  - Site Specific and DOE-Wide
- **Development and support of environmental monitoring program performance metrics (dashboards)**
- **Annual and Multi-Year Rad Dose and Release Reports**
- **Other ASER Reporting and Information/Data Analysis Opportunities**
- **Identify best practices, lessons learned and opportunities for improvement**



# ASER Summary



- **DOE- HQ, the public, and media view the ASERs as important documents**
- **ASER guidance availability and ASER review and production process should be streamlined to ensure ASERs are available to the public and DOE-HQ by October 1 of the next calendar year**
- **ASERs should be useful to DOE sites, DOE-HQ and reflect the concerns of site stakeholders**
- **ASER information presented in clear, concise and uniform format is valuable to DOE-HQ to gauge/measure individual site and DOE-wide environmental protection performance**



# **ASER Summary Reports on Radiological Doses and Releases**



# Purpose of ASER Radiological Summary Reports



- **Assess compliance with DOE reporting requirements**
- **Provide DOE-wide overview of radiological release and dose information**
- **Identify best practices among ASERs and opportunities for improvement**



## ASER Summary Reports cont.



- **Previous reports prepared for 1990–1994 (49 ASERs) and 1998–2001 (36 ASERs) included dose and release information, brief descriptions of site operations and environmental monitoring programs**
- **Summary reports address:**
  - **Doses to humans based on releases or potential for releases**
  - **Radiological releases to air and water**
  - **Groundwater radiological monitoring**
  - **Radiation protection of biota**
  - **Radionuclide Air Emissions - NESHAPs reports**



# ASER Summary Reports

## Radiological Dose Results



- Dose estimates reported in ASERs most often were less than one percent (<1%) of applicable standards.
- Over 90% of estimated doses to the MEI are less than 10 mrem, 10% of the DOE 100 mrem/yr all pathways limit.
- In more than 95% of the estimated doses to MEI, the air pathway contribution is less than 1 mrem or 10% of the Environmental Protection Agency's 10 mrem/yr air pathway limit.



# ASER Summary Reports

## Radiological Dose Results

(cont.)



- **The median population dose associated with DOE operations over the reporting periods ranged from 0.1- 0.6 person-rem.**
- **Median population dose from background radiation for sites reporting background dose over the reporting periods is approximately 300,000 person-rem/year.**
- **This is 6 orders of magnitude greater than the median population dose associated with DOE operations.**



# ASER Summary Reports Radiological Dose Results (cont.)



- **Primary contributors to dose estimates continue to be**
  - Direct radiation
  - Residual radioactivity from historic releases
- **Both factors are relatively unaffected by contributions of current releases of radionuclides to the air or water**



# Releases of Radioactive Materials to Air and Water



- **Atmospheric releases** were predominantly tritium, noble gases, including  $^{85}\text{K}$ , and short-lived fission and activation products.
- **Liquid releases** were predominantly tritium.



# Radionuclides Released from DOE Sites to Air and Water (Ci)



Year	Atmospheric Releases	Liquid Effluent	Total*
1990	650,000	24,000	670,000
1991	390,000	16,000	410,000
1992	330,000	18,000	350,000
1993	280,000	16,000	300,000
1994	280,000	57,000	340,000
1998	130,000	11,000	140,000
1999	110,000	6,500	120,000
2000	120,000	5,500	130,000
2001	160,000	4,300	160,000

\* All data rounded to 2 significant digits



# Releases of Radioactive Materials to Air and Water (cont.)



- In general, DOE sites continued the trend toward lower emissions – less than half the levels released from 1990-1994 were released in 1998-2001.
- There were fewer unplanned releases involving radioactivity during 1998-2001 than in previous years.
- None of these non-routine releases resulted in radiation doses exceeding DOE or other regulatory limits.



# Radiation Protection of Biota



- Where biota dose assessments were performed for both aquatic and terrestrial systems, the results of dose evaluations reported in ASERs demonstrated compliance with applicable DOE requirements (DOE 5400.5 and DOE 458.1).
- Most sites began using the DOE Technical Standard, “*A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota*” (DOE-STD-1153-2002) in 2002 and the RESRAD-BIOTA Code in 2004 which resulted in an increase of biota dose evaluation reporting.



# Radiation Protection of Biota



## Increase of Biota Dose Evaluation Reporting

- For 36 ASERs reviewed, in 2002 and 2003, 24 and 21 sites, respectively, reported on biota dose assessments.
- Up from 2001, when half of the sites reported biota dose information.
- In 2013, most DOE sites that have radiological sources, activity or legacy rad contamination reported biota dose assessment results in their ASERs.



# ASER Summary Reports Conclusions and Lessons Learned



- **Most sites used a consistent, easy-to-follow format provided in ASER guidance**
- **Some ASERs could provide clearer explanation of assumptions and other factors that change from year-to-year**
- **Some ASERs could better summarize groundwater monitoring data (e.g., show trends)**
- **Some sites used very conservative assumptions in dose calculation**
  - **Worst-case scenarios may be implausible**
  - **Dose to population (collective dose) and MEI should be based on realistic situations**



# ASER Summary Reports Conclusions and Lessons Learned (cont.)



- **Emission data and public dose estimates compiled from DOE sites varied from year-to-year, however, no significant upward trends, or other trends potentially reflecting poor operation controls, were evident .**
- **These conclusions reflect the effective efforts throughout the DOE complex to maintain public doses as low as reasonably achievable (ALARA).**



# ASER Summary Reports Next Steps



- **AU-23 currently preparing 2006-2013 ASER radiological dose and release summary report (will include NESHAPs reports information)**
- **Intend to utilize more interactive graphics and tables that highlight trends and enable site to site, as well as PSO and DOE-wide comparisons.**
- **Plan to include opportunity for DOE HQ and field comment.**



# Environmental & Radiation Protection

## Performance Dashboards



# Background



- DOE sites are required to periodically report a variety of important information to DOE HQ pursuant to DOE Orders, and external drivers such as Executive Orders and regulatory authorities.
- Examples Include:
  - Periodic reporting to EPA and States for regulatory compliance
  - ORPS Reporting pursuant to DOE O 232.2 to DOE-HQ for ES&H reportable occurrences
  - Annual Progress on Environmental Management System Implementation to FedCenter pursuant to EO 13423 and EO 13514
  - Annual ASERs pursuant to DOE O 231.1B
  - Radiological Reporting pursuant to DOE 458.1
  - Demonstrating progress in achieving sustainability requirements and goals of EO 13514, *Federal Leadership in Environmental, Energy and Economic Performance* and DOE O 436.1, *Departmental Sustainability*



# Purpose of AU Environmental & Radiation Protection Performance Dashboards



- **Provide a consolidated report in a useful format to DOE-HQ and AU managers in advance of planned or event driven site visits. Reporting areas include:**
  - External Awareness and Public Interest Events
  - Recent AU site activities and assistance efforts
  - Organizational Competencies and Recognition of Best Practices, Awards
  - Compliance, Oversight and Enforcement
  - Facility Operations and ORPS occurrences
  - Site Sustainability Performance
  - EMS Implementation
  - Radiation Protection of the Public and Environment
  - Radiological Authorized Limits and Clearance Activities
  - Radiological Waste Management



# Purpose of Dashboards (continued)



- **Demonstrate a site's progress in achieving sustainability requirements and goals established in EO 13423, EO 13514, and DOE 436.1, DOE SSPP and SSPs.**
- **Information is gathered from PSO's, DOE Sites and the Office of Sustainability Performance on sustainable practice performance including GHG reduction efforts.**
- **Data gathered from FedCenter for EMS implementation reporting**
- **Environmental compliance information is culled from EPA's publicly available Environmental Compliance History Online (ECHO) system and ORPS**
- **Facility Operations performance from ORPS reporting**
- **Radiation Protection, radiological waste management and clearance activities from ASERs and NESHAPS reports**



# Benefits



- Prepare DOE-HQ managers for site visits and demonstrate to DOE Sites that their data submissions are valued and reviewed
- AU-23 with assistance from AU-21 and AU-22 conducts analysis of this information to measure and gauge site performance in several areas
- Identify trends, vulnerabilities and areas for improvement
- Share best practices among DOE HQ, PSOs and sites
- Compare a site's performance by PSO, Under Secretary or DOE- wide
- Dashboards for some specific sites are being finalized



# DOE Corporate Safety and Health Performance Dashboard



- Consists of DOE-wide information on significant issues that warrant DOE-HQ management attention.
- Strategic Safety Goals (events DOE strives to avoid) including fatalities, radiological exposures > 2 rem, radiological releases above regulatory limits, chemical/hazardous material releases above regulatory limits and infrastructure losses >\$5million
- Total ORPS occurrences vs. High Consequence ORPS events
- Injury and Illness Information from CAIRS database
- Subject-Specific Information including:
  - Environmental Areas of Interest - Compliance, ORPS events, sustainability and EMS performance
  - Nuclear and electrical safety
  - Radiation Exposure Management System data
  - Worker Safety and Health



## DOE-HQ Lead Offices For Development of Dashboards



- **The Office of Analysis, AU-23 in consultation with Office of Environmental Policy and Assistance, AU-22, and Office of Sustainability Support, AU-21, have the lead for developing and reinvigorating the DOE Corporate Safety and Health Performance dashboard and site specific Environmental and Radiation Protection Performance dashboards.**



# Summary



- **2014 ERAD Participation Opportunities:**
  - **Guidance for Preparation of 2014 ASERs**
  - **2006-2013 ASER Rad Dose and Releases Summary Report**
  - **ASER Workshop in October/November, 2014**
  - **Input to Dashboards for rad dose, authorized limits and clearance activities, rad monitoring and rad waste management issues at sites**



# Questions?

For Further Information:

**Ross Natoli, AU-23**

**202-586-1336**

**[ross.natoli@hq.doe.gov](mailto:ross.natoli@hq.doe.gov)**