

Annual Nevada National Security Site Environmental Report (NNSSER)



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Nevada Site Specific Advisory Board

November 19, 2014



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Briefing Content

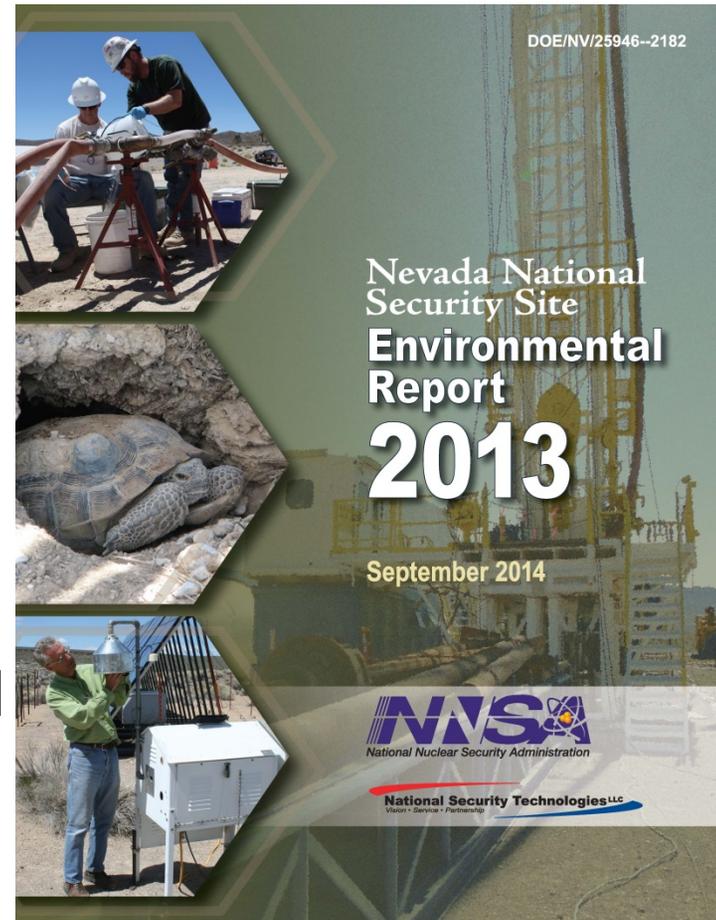
NNSSER Purpose

NNSSER Scope

Products and Distribution

Chapter Contents:

- Monitoring Objectives
- How Results Are Presented



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Purpose of the NNSER

Make available to the public an Annual Site Environmental Report per DOE Order 231.1B, "Environment, Safety and Health Reporting" that reports/describes:



Compliance status with environmental standards and requirements



Results of environmental monitoring of radiological and nonradiological effluents



Estimated radiological doses to the public from releases of radioactive material



Status of environmental restoration of contaminated legacy sites



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Purpose of the NNSER (cont.)

Make available to the public an Annual Site Environmental Report per DOE Order 231.1B, "Environment, Safety and Health Reporting" that reports/describes:



Environmental incidents of noncompliance and actions taken in response to them



The site's Environmental Management System and its performance



Significant environmental programs and efforts



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Scope of the NNSER

- Covers environmental activities conducted by the National Nuclear Security Administration/Nevada Field Office (NNSA/NFO) at:
 - Nevada National Security Site (NNSS)
 - North Las Vegas Facility
 - Remote Sensing Laboratory–Nellis
- Covers environmental restoration activities conducted by NNSA/NFO at:
 - NNSS
 - Tonopah Test Range (TTR)
 - Nevada Test and Training Range (NTTR)



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Scope of the NNSER (cont.)

- Covers environmental activities conducted by two federal entities:
 - NNSA is responsible for national security mission and overarching management of the NNS

(Not within the NSSAB's advisory role)

- The Department of Energy's (DOE's), Office of Environmental Management is responsible for remediating legacy contamination sites on the NNS and portions of the NTTR

(Within the NSSAB's advisory role)



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NNSSER Products and Distribution

- 80 full reports printed at Government Printing Office (~ 270 pages)
 - 310 Summary booklets (24 pages) with attached CDs produced in-house
 - Attachment A: Site Description (electronic file only)
 - CDs contain electronic files of the full report, Summary, and Attachment A
- Electronic files are posted on the NNSA/NFO and Office of Scientific and Technical Information (OSTI) web sites
 - E-mail notification of their web posting is sent to ~200 individuals
 - NNSA/NFO distributes Internet News Release
 - Hard copy full reports are mailed to ~60 individuals
 - Summary booklets with attached CDs are mailed to ~190 individuals
 - Summary booklets w/CDs (~100) are distributed throughout the year by NNSA/NFO at public/stakeholder meetings and to those requesting copies



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NSSER Content Summary / Introductory / Overview Chapters

Executive
Summary

Chapter 1:
Introduction and
Helpful
Information

Chapter 2:
Compliance
Summary

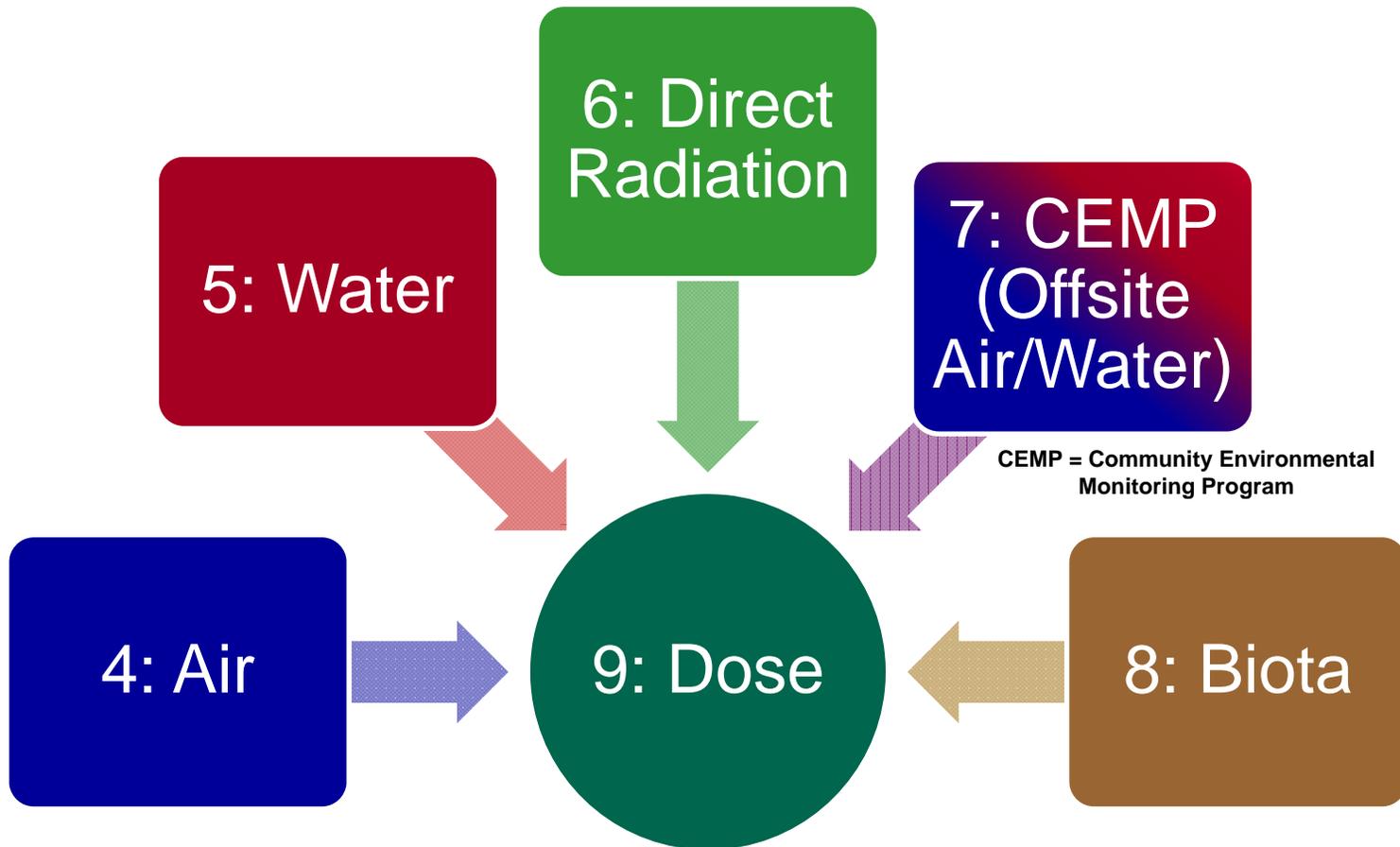
Chapter 3:
Environmental
Management
System



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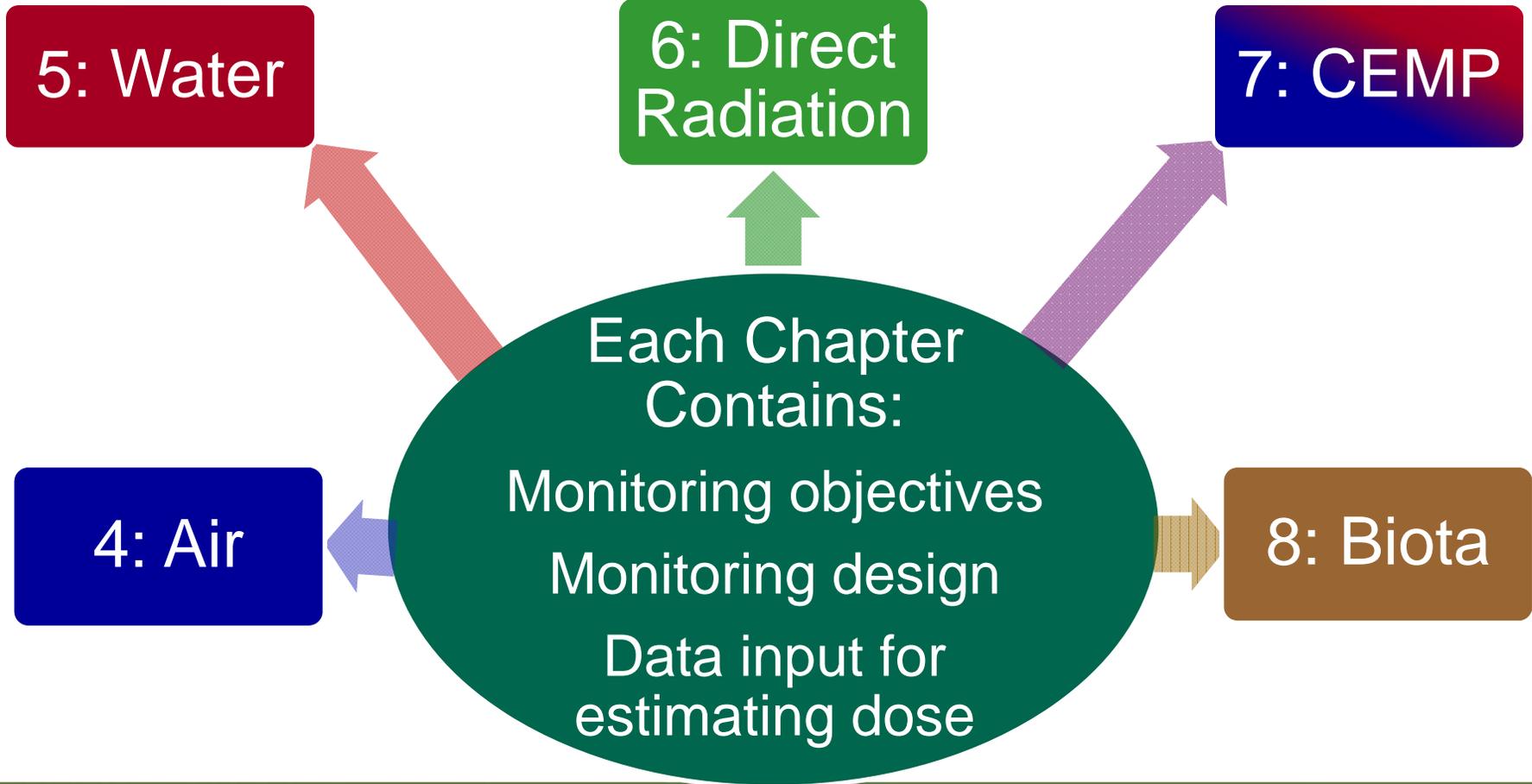
NSSER Content Monitoring Chapters



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NNSER Content Monitoring Chapters (cont.)



Why Monitor Air? (Chapter 4)

Detect accidental and unplanned releases

Measure quantity of radionuclides emitted by historical and current sites/activities

Ensure that NNSA/NFO complies with the Clean Air Act requirements to monitor radiological air emission sources

Estimate the radiation dose from NNSA/NFO air emissions to the general public



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Data Presentation in Chapter 4 (cont.)

Area	Sampling Station	Number of Samples	^{238}Pu ($\times 10^{-18}$ $\mu\text{Ci/mL}$)			
			Mean	Standard Deviation	Minimum	Maximum
1	BJY	12	2.48	3.67	-5.01	6.51
3	Bilby Crater	4	1.38	0.45	0.99	1.97
3	Kestrel Crater N	4	1.65	0.83	0.47	2.25
3	U-3ax/bl S	4	4.21	4.43	0.00	10.39
5	DoD	4	0.25	0.28	0.00	0.51
5	RWMS 5 Lagoons	4	1.09	0.59	0.57	1.70
5	Sugar Bunker N	1	-3.30	---	-3.30	-3.30
6	Yucca ^(a)	12	0.78	2.98	-2.97	6.33
9	Bunker 9-300	12	11.54	9.62	0.00	33.09
10	Gate 700 S ^(a)	12	1.54	4.54	-9.87	7.57
10	Sedan N	12	5.51	3.49	0.00	10.52
16	3545 Substation ^(a)	12	2.70	2.82	-1.14	8.60
18	Little Feller 2 N	12	2.51	3.29	-2.35	7.85
20	Gate 20-2P	4	1.55	1.09	0.00	2.56
20	Schooner ^(a)	12	3.07	2.39	0.00	6.66
23	Mercury Track ^(a)	12	0.61	2.91	-6.06	4.90
25	Gate 510 ^(a)	12	1.53	3.44	-3.81	9.13
27	ABLE Site	12	2.43	2.94	-2.29	8.16
All Environmental Locations^(b)		192	2.71	4.42	-9.87	33.09

CL = 2100×10^{-18} $\mu\text{Ci/mL}$

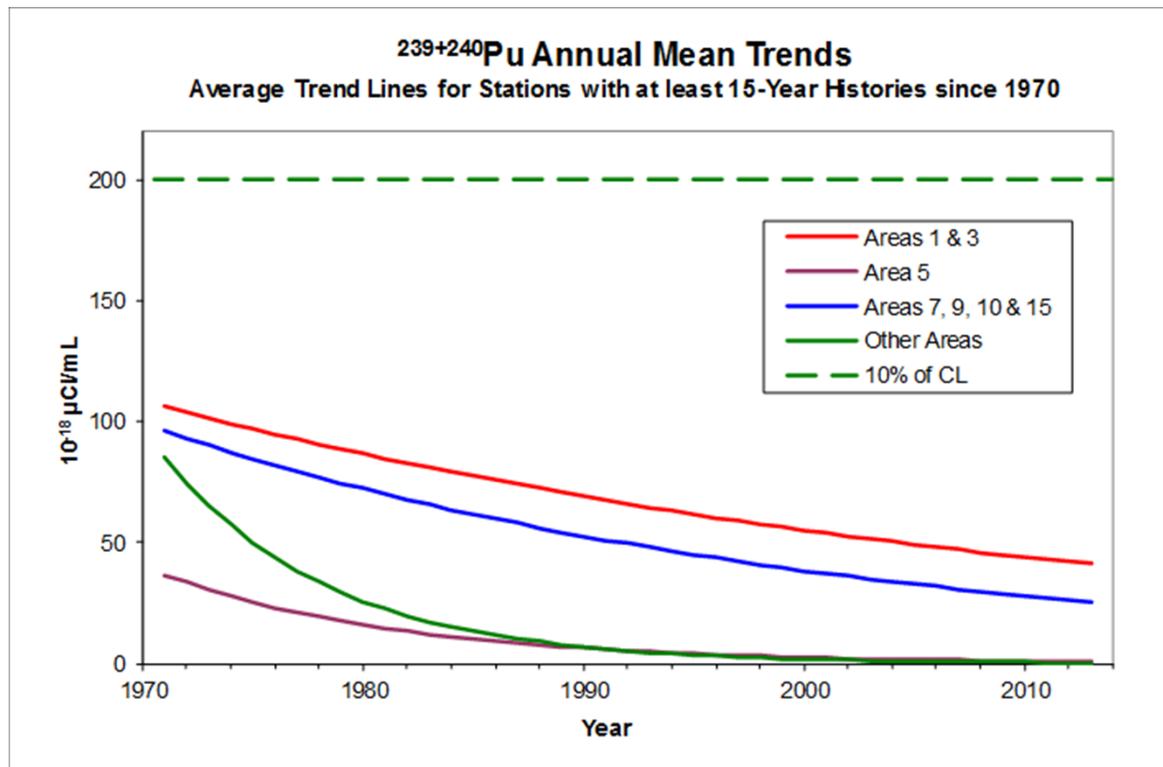
- Summary tables show annual results from all 20 stations for each radionuclide monitored: americium, cesium, plutonium, uranium, tritium, gross alpha, and gross beta



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Data Presentation in Chapter 4 (cont.)



- Graphs show average trends through time



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Data Presentation in Chapter 4 (cont.)

Radionuclide	Total Quantity (Ci)	Half-Life ^(a)
³ H	42	12.3 years (yr)
⁷ Be	0.0006	53.2 days (d)
¹¹ C	51	20.4 minutes (min)
¹³ N	1808	10.0 min
¹⁵ O	2866	122.2 seconds
³⁷ Ar	100	35.0 d
³⁸ Cl	2	37.2 min
³⁹ Cl	22	55.6 min
⁴¹ Ar	177	109.6 min
^{99m} Tc	0.02	6.0 hours
¹²⁷ Xe	100	36.4 d
¹⁴⁰ La	1	1.7 d
¹⁹⁸ Au	1	2.7 d
²³⁸ Pu	0.050	87.7 yr
²³⁹⁺²⁴⁰ Pu	0.29	24,110 yr
²⁴¹ Am	0.047	432.2 yr

- Table shows total curies of all radionuclides emitted during the year



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Why Monitor Water? (Chapter 5)

Ensure that onsite drinking water wells meet drinking water quality standards

Determine if radionuclides from underground nuclear testing are present in wells off of the NNS

Ensure that NNSA/NFO complies with wastewater discharge permit limits at permitted facilities

Collect data to build models needed to design long-term monitoring networks for historical underground test areas

Protect the public from exposure to groundwater contaminated by past underground nuclear testing

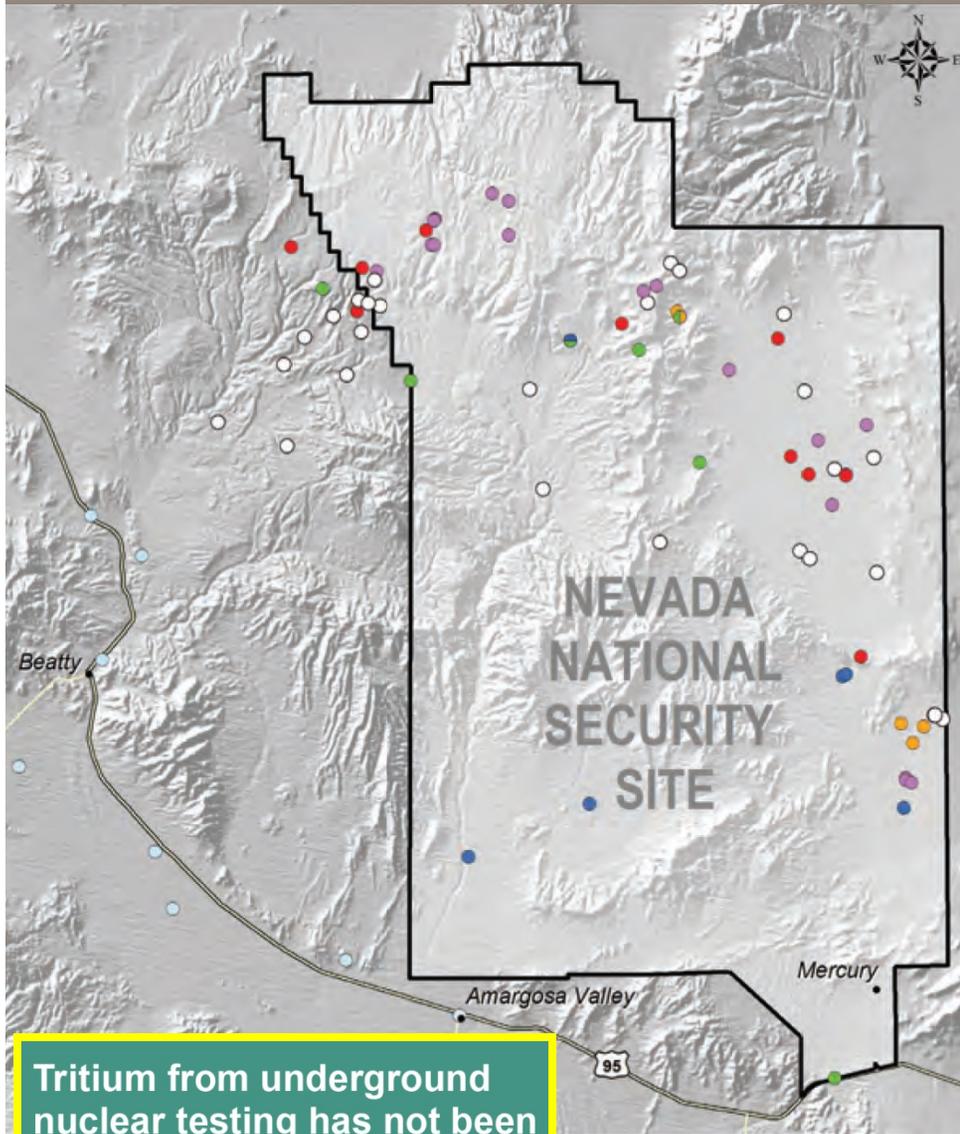
Estimate the radiation dose from NNSA/NFO contaminated groundwater to the general public



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Chapter 5



Types of Groundwater Sampling Locations

Characterization	Used for groundwater characterization or UGTA CAU model evaluation
Source/Plume	Located within the plume from an underground nuclear test; test-related contamination is currently present
Early Detection	Located downgradient of an underground test; no radioisotopes are detected above standard detection levels
Distal	Located outside the Early Detection area
Community	Located on BLM or private land; used as a water supply source or is near one
NNSS PWS	Potable water supply well that is part of a State-designated non-community public water system (PWS)
Compliance	Monitored to comply with specific regulations or permits

Tritium from underground nuclear testing has not been detected in any onsite or offsite drinking water wells.

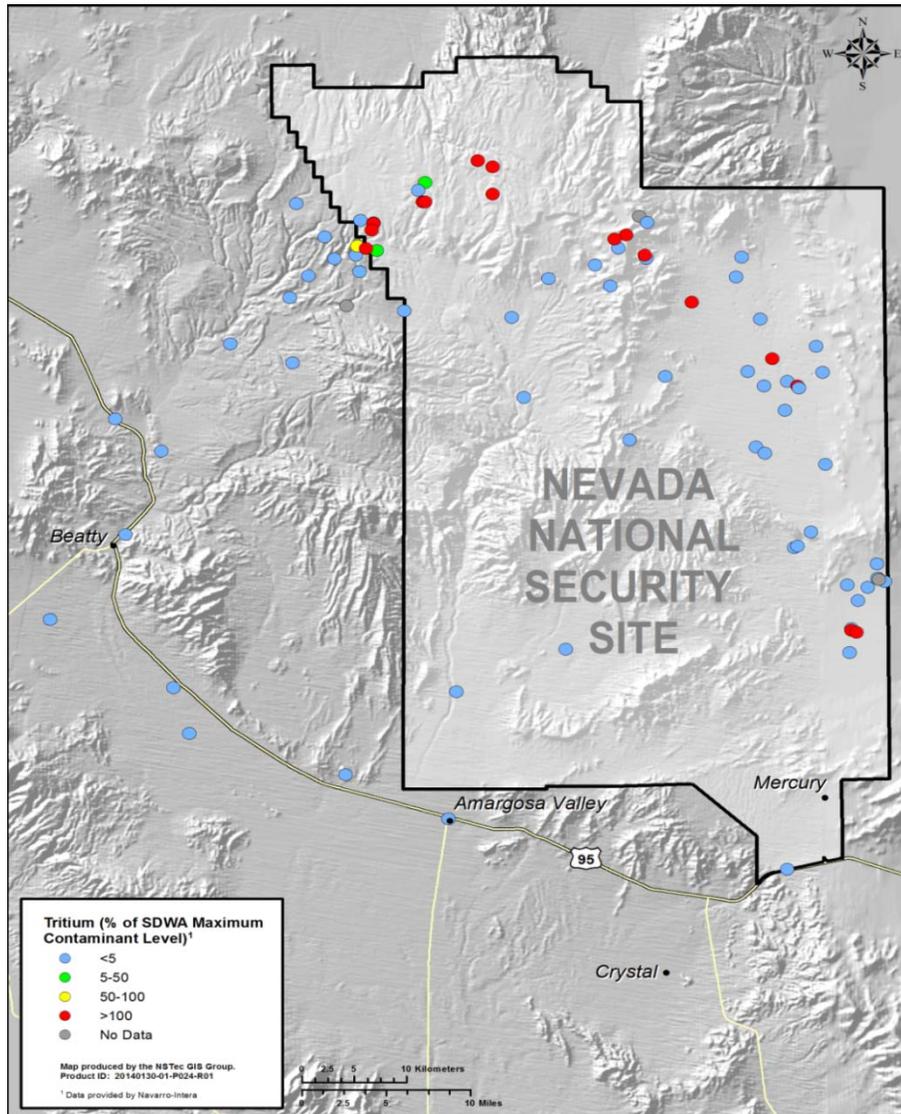


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Data Presentation in Chapter 5

- Figures show:
 - All wells in monitoring network
 - Tritium concentrations for each well as a percentage of the Safe Drinking Water Act (SDWA) limit of 20,000 picocuries per liter (pCi/L)
 - Drinking water wells are all below SDWA limit
- Wells color-coded for easy visual interpretation



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Sampling Locations	Land Management or NNS Operations Area	Sample Year	Maximum Tritium Concentration (pCi/L)
Frenchman Flat			
Characterization Wells			
ER-5-3	Area 5	2001	< 1.5 ^(a)
ER-5-3-3	Area 5	Not yet sampled	NA ^(b)
ER-5-5	Area 5	2013	1.1
ER-11-2	Area 11	2013	< 2.1
Source/Plume Wells			
RNM-1	Area 5	2007	866
RNM-2S	Area 5	2007	104,000
UE-5n	Area 5	2010	186,000
Distal Wells			
UE-5 PW-2 ^(c)	Area 5	2013	< 31
WW-5B ^(d)	Area 5	2013	< 31
Pahute Mesa (Central and Western)			
Characterization Wells			
ER-20-7	Area 20	2010	19,100,000
ER-20-8	Area 20	2011	3,020
ER-20-8-2	Area 20	2009	1,280
ER-20-11	Area 20	2013	191,000
ER-EC-2A	NTR	2010	< 270
ER-EC-5	NTR	2003	< 320
ER-EC-8	NTR	2010	< 340
ER-EC-11	NTR	2009	10,600 ^(e)
ER-EC-12	NTR	2012	4.2
ER-EC-13	NTR	2013	< 2.2
ER-EC-14	NTR	Not yet sampled	NA
ER-EC-15	NTR	2013	< 2.1
Source/Plume Wells			
ER-20-5-1	Area 20	2011	30,100,000
ER-20-5-3	Area 20	2011	96,200
ER-20-6-3	Area 20	1998	1,110

Data Presentation in Chapter 5 (cont.)

- Table shows most recent maximum tritium results for all sampling locations
 - Characterization and Source/Plume wells that exceed the SDWA limit of 20,000 pCi/L are highlighted in yellow
 - Drinking water wells are all below the SDWA limit



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Why Monitor Direct Radiation? (Chapter 6)

Identify the amount of background radiation on the NNSS

Identify the external radiation dose to the public from NNSA/NFO activities

Identify the external radiation dose to NNSS biota from NNSA/NFO activities



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Why Monitor Biota? (Chapter 8)

Estimate the absorbed radiation dose to NNSS plants and animals from NNSA/NFO past and current activities

Determine the potential radiation dose to hunters if they consumed NNSS game animals



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Radiological Dose Assessment Goals (Chapter 9)

(Doses Attributable to NNSA/NFO Activities)

Limit = 10
mrem/yr

Determine
max dose
to the

Limit = 25
mrem/yr

Determine
max dose
to the
public from

Limit = 100
mrem/yr

Determine
max dose
to the
public

Limits =
<0.1 rad/d
& <1 rad/d

Determine
dose to
terrestrial
plants,
aquatic

Demonstrate Compliance with DOE Limits

EMISSIONS

manage-
ment sites

pathways
combined

terrestrial
animals



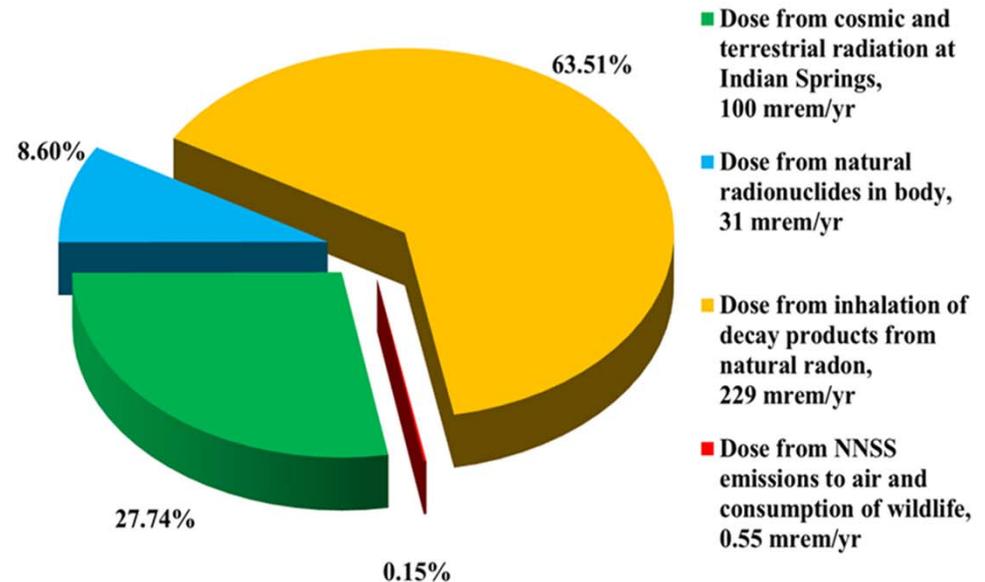
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Data Presentation in Chapter 9

- Table of dose from each possible pathway
- Table of dose from ingestion of various game animals (*not shown*)
- Table of dose to sampled plants and animals (*not shown*)
- Pie chart of dose from NNSA/NFO activities versus background

Pathway	Dose to MEI		Percent of DOE 100 mrem/yr Limit
	(mrem/yr)	(mSv/yr)	
Air ^(a)	0.02	0.0002	0.02
Water ^(b)	0	0	0
Wildlife ^(c)	0.53	0.0053	0.53
Direct ^(d)	0	0	0
All Pathways	0.55	0.0055	0.55



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NSSER Content

Other Environmental Program Chapters

Chapter 10: Waste Management

Chapter 11: Environmental Restoration

Chapter 12: Hazardous Materials Control and Management

Chapter 13: Groundwater Protection

Chapter 14: Historic Preservation and Cultural Resources Management

Chapter 15: Ecological Monitoring

Chapters 16 and 17: Quality Assurance



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Waste Management Goals (Chapter 10)

- Manage and dispose radioactive waste and non-radioactive classified matter
- Manage and store transuranic/mixed transuranic wastes and classified matter
- Manage, store, and ship hazardous wastes to approved treatment/storage/disposal facilities
- Detonate explosive ordnance wastes
- Manage underground storage tanks



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Waste Management Goals (Chapter 10) (cont.)

- Evaluate, design, construct, maintain, and monitor closure covers for radioactive waste disposal units

- Dispose solid/sanitary wastes



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Data Presentation in Chapter 10

- Table of all radioactive waste received and disposed at the Area 5 Radioactive Waste Management Complex

Waste Type	Disposal Cell(s)	Permitted Limit in m ³	Volume Received and Disposed in m ³ (ft ³)
LLW, non-radioactive classified	Cells 12,14,16, 17, 19, 20, 21, Trench 13	NA ^(a)	29,035.5 (1,025,379)
MLLW, non-radioactive classified hazardous	Cell 18	25,485	2,807.5 (99,144); 1,911 tons ^(b)
		Total	31,843 (1,125,523)

- Table of hazardous waste managed at the NNSS

Permitted Unit	Total Waste Treated, Stored, and/or Disposed (tons)
Cell 18	1,911
MWSU	0.46
HWSU	2.96
HWSU – PCB Waste	1.13
SAAAs and HWAAs	0
EODU	0

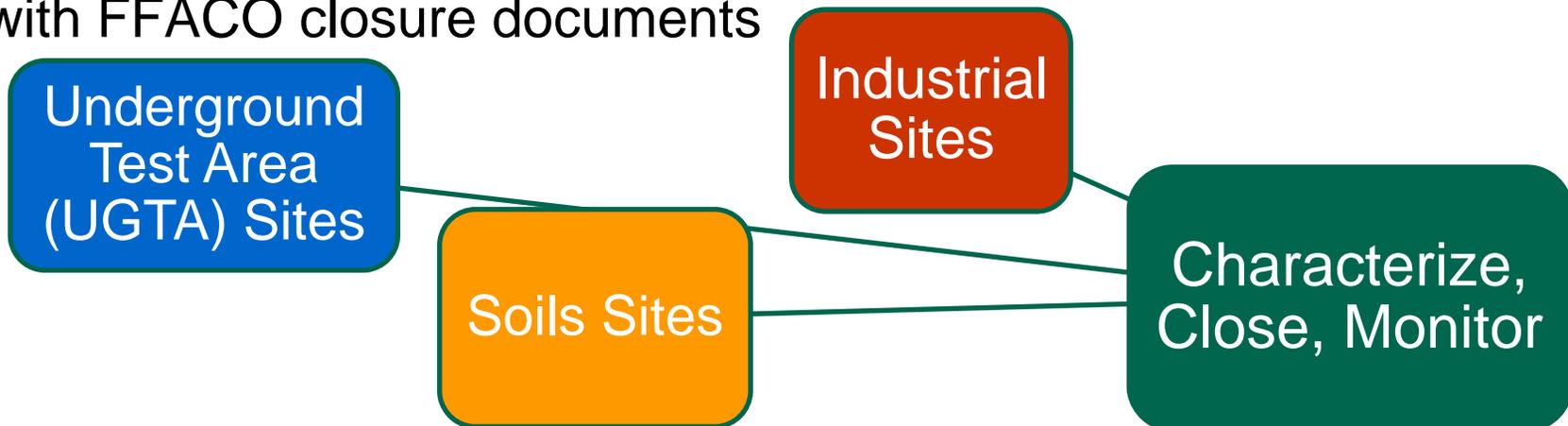


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Environmental Restoration Goals (Chapter 11)

- Characterize sites contaminated by NNSA/NFO historical nuclear testing activities
- Remediate and close contaminated sites in accordance with the State-approved Federal Facility Agreement and Consent Order (FFACO) planning documents
- Conduct post-closure monitoring of historic sites in accordance with FFACO closure documents

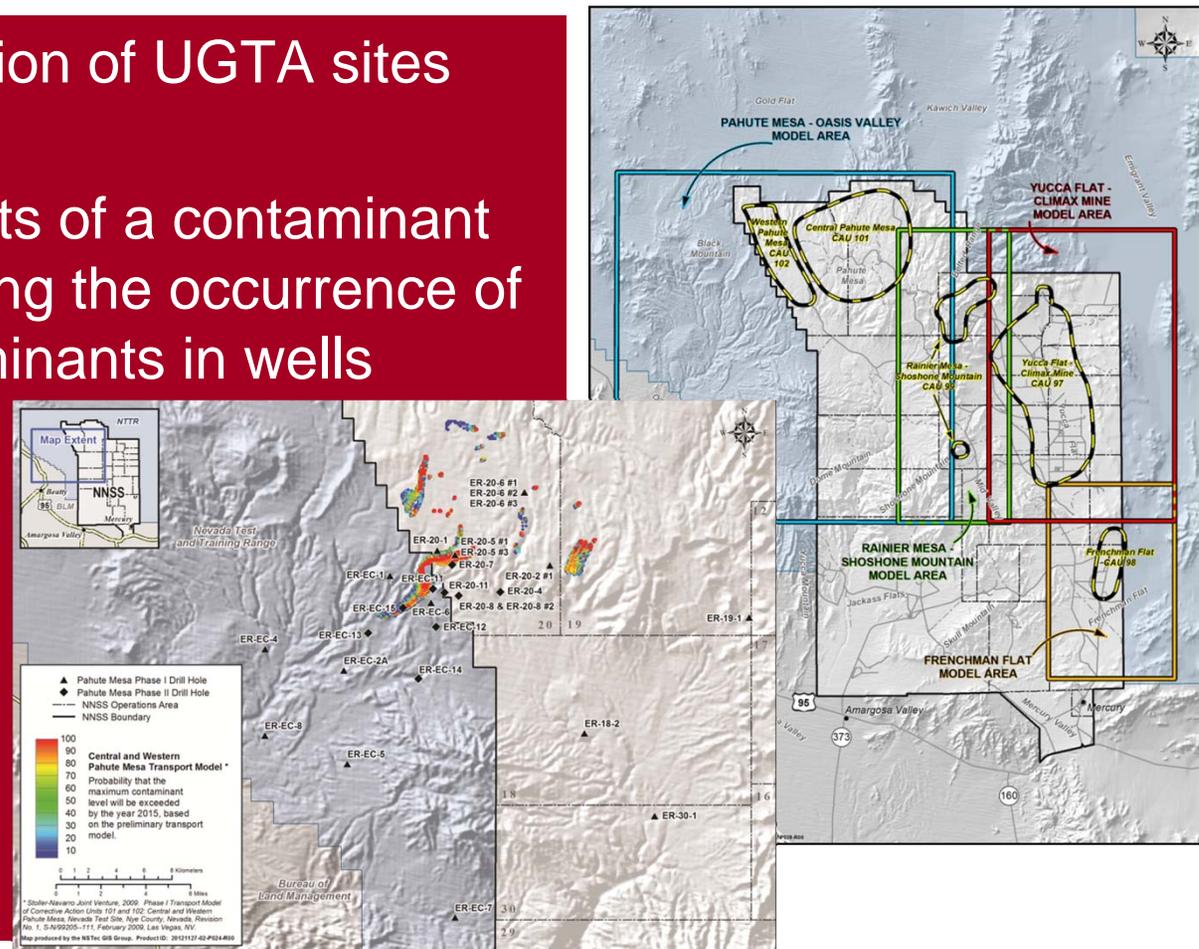


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Data Presentation in Chapter 11

- Figure shows location of UGTA sites and model areas
- Figure shows results of a contaminant flow model predicting the occurrence of radiological contaminants in wells downgradient from Pahute Mesa model areas
- Tables listing Soils/Industrial Sites worked on or closed

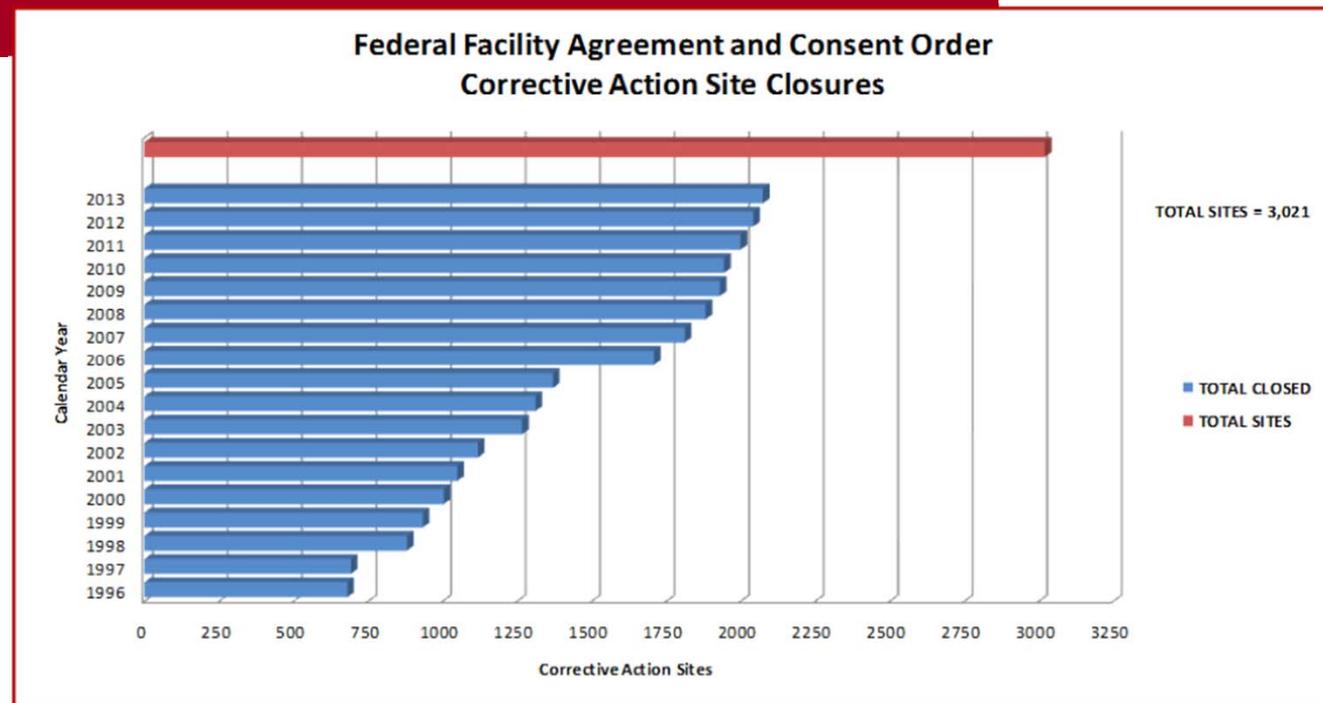


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Data Presentation in Chapter 11

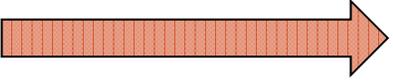
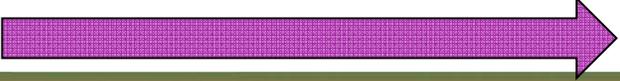
- List of post-closure sites monitored (*not shown*)
- Summary chart of site closure progress



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Why Read the NNSER?

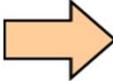
- What is the history of the NNS?  Summary
- What is the hydrogeologic setting of the NNS?  Attachment A
- What sensitive or federally listed species occur on the NNS?  Attachment A
- What wells on and around the NNS are monitored for radiological contamination and are they contaminated?  Chapter 5
- Are all the historically contaminated industrial and soils sites on the NNS cleaned up?  Chapter 11
- Does living near the borders of the NNS increase my annual radiation dose?  Chapter 9



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Why Read the NNSSER?

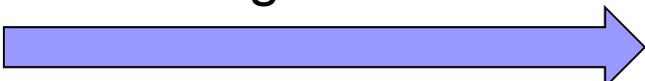
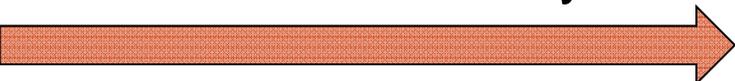
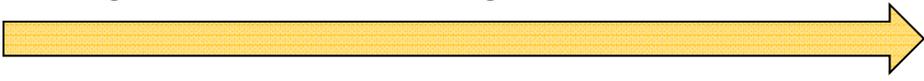
- How much radioactive waste is buried at the NNS?  Summary, Chapter 10
- Were there any environmental violations on the NNS?  Chapter 2
- Were there any accidental spills or environmental issues at the NNS that had to be reported to the State?  Chapter 2
- Is NNSA/NFO doing anything to conserve energy or water?  Chapter 3
- What is the natural background radiation dose on and in communities surrounding the NNS?  Chapters 6 and 7



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Why Read the NNSSER?

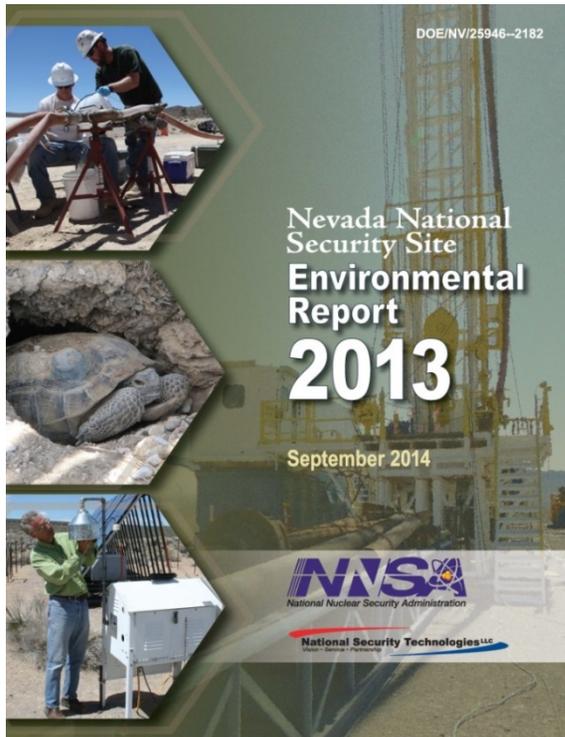
- Are plants and animals on the NNSS exposed to dangerous doses of radiation?  Chapter 8
- Are cultural resources of historical significance protected on the NNSS?  Chapter 14
- How are Native Americans active in consultations with the NNSA/NFO?  Chapter 14
- Were any threatened desert tortoises killed by NNSA/NFO activities?  Chapter 15
- What kinds of ecological monitoring is conducted on the NNSS?  Chapter 15
- What is done to ensure that data collected from monitoring is of good quality?  Chapters 16 and 17



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Questions?



- Submit questions to:
NNSA/NFO Office of Public Affairs
E-mail: nevada@nnsa.doe.gov
Phone: (702) 295-0154
- The NNSSER is posted at:

<http://www.nv.energy.gov/library/publications/aser.aspx>



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