

Sampling Prioritization

Environmental/Radiological Assistance Directory (ERAD) Presentation
December 9, 2015

Ron Warren
Ecological & Environmental Monitoring Department

This work was done by National Security Technologies, LLC,
under Contract No. DE-AC52-06NA25946 with the U.S. Department of Energy



Nevada National Security Site

Managed and Operated by National Security Technologies, LLC

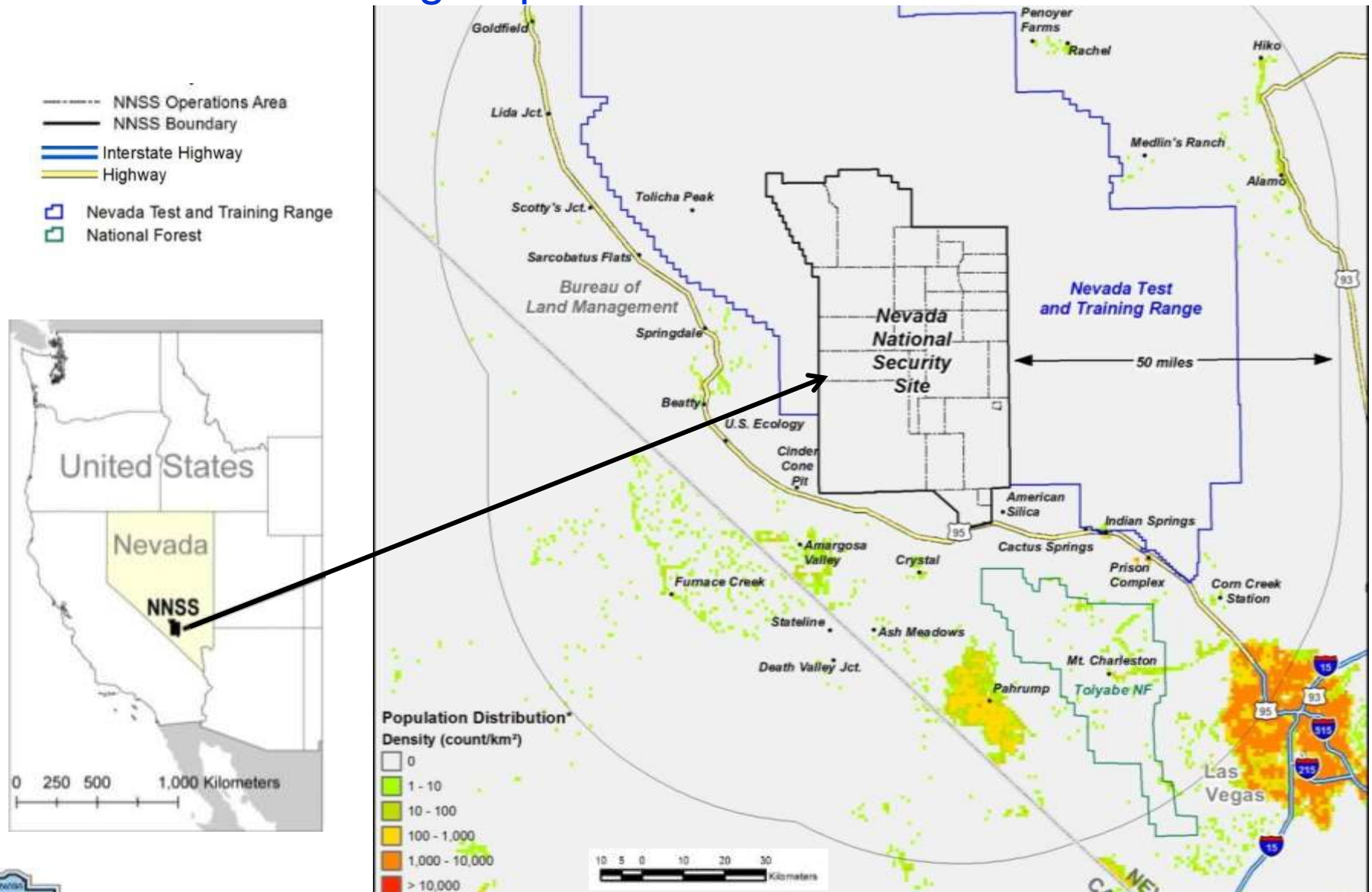


OBJECTIVES

- Pathway overview and current resource allocation
- Potential dose from each pathway
- Discuss ideas of how to align monitoring efforts with relative risk from each pathway
- Looking for feedback, especially specific experiences, on other sites' efforts to quantify the risk from each pathway and how that may have changed monitoring efforts.



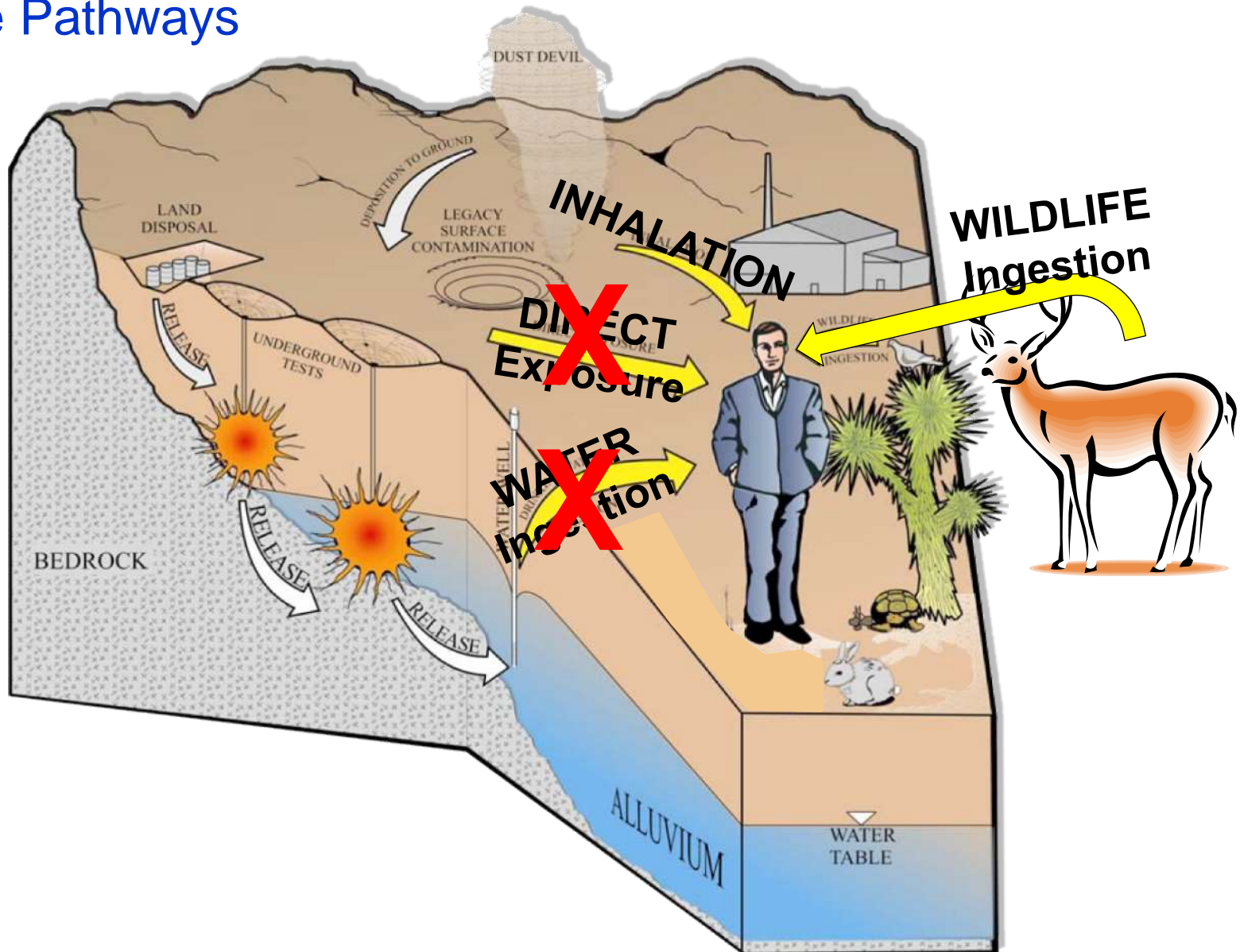
NNSS & Surrounding Populations

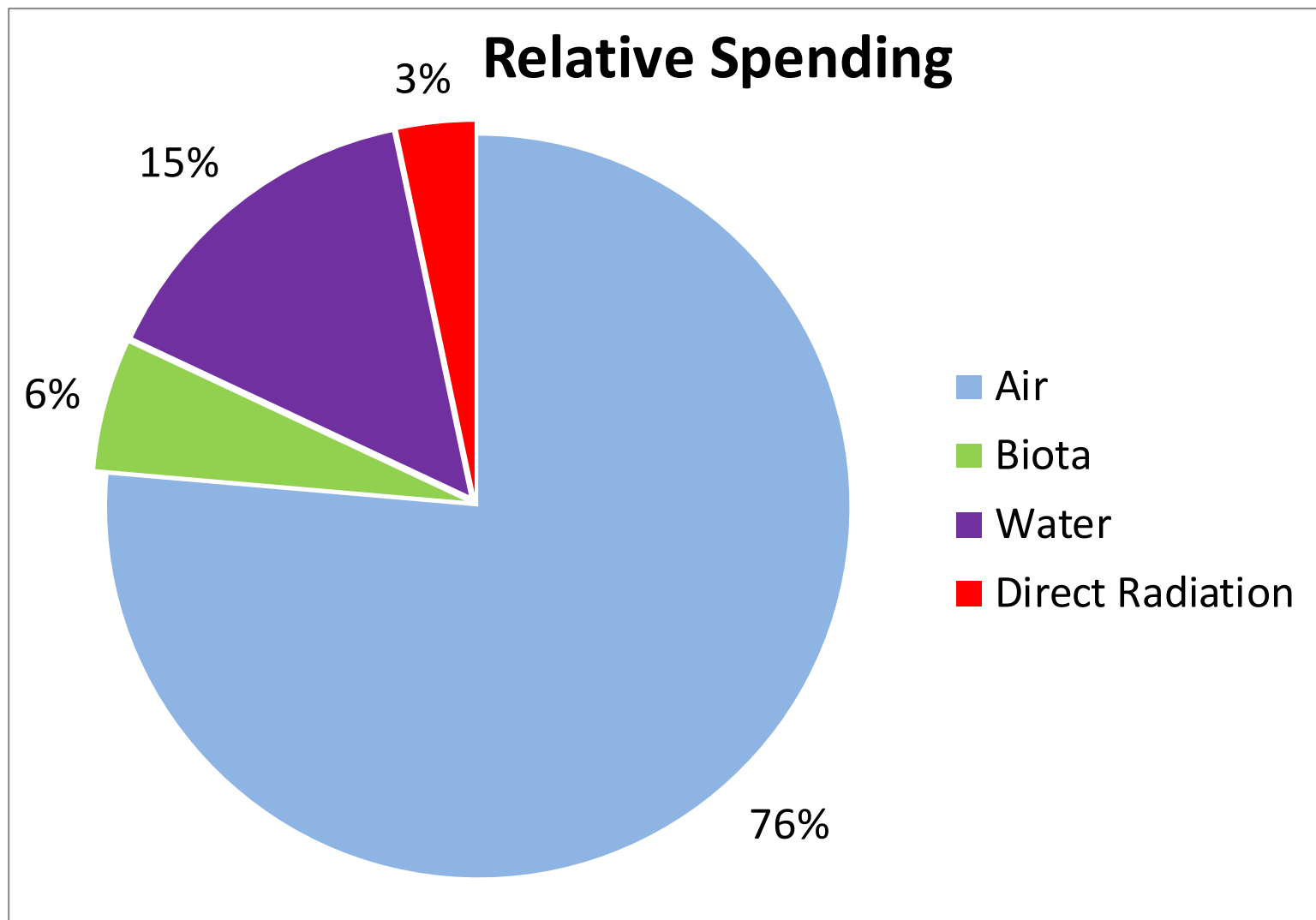


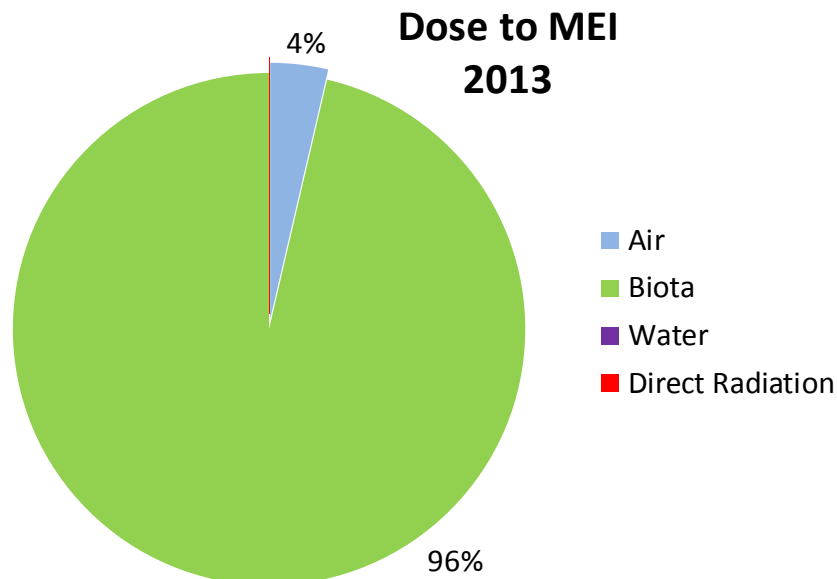
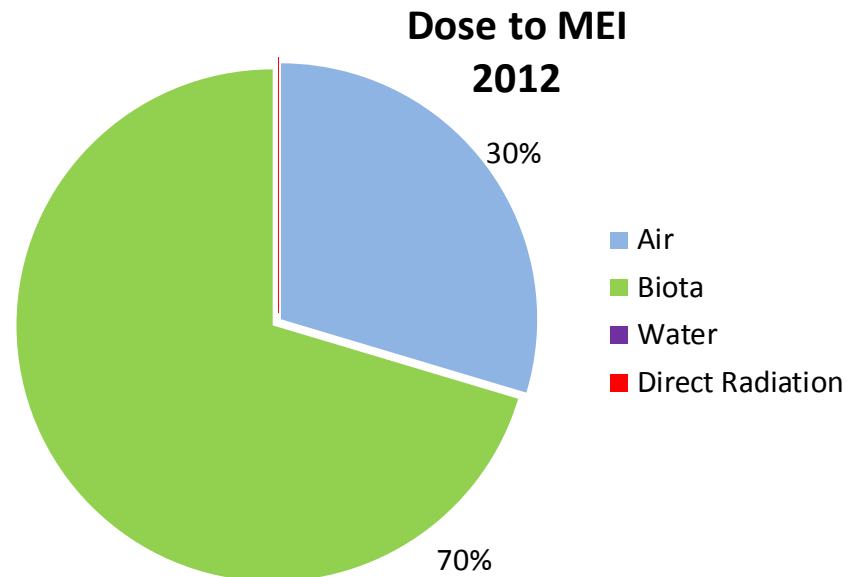
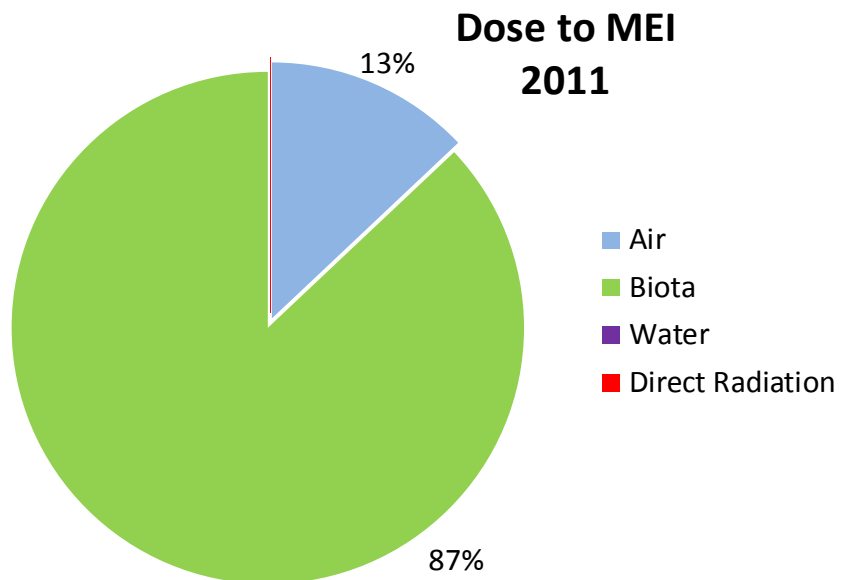
Nevada National Security Site

Managed and Operated by National Security Technologies, LLC

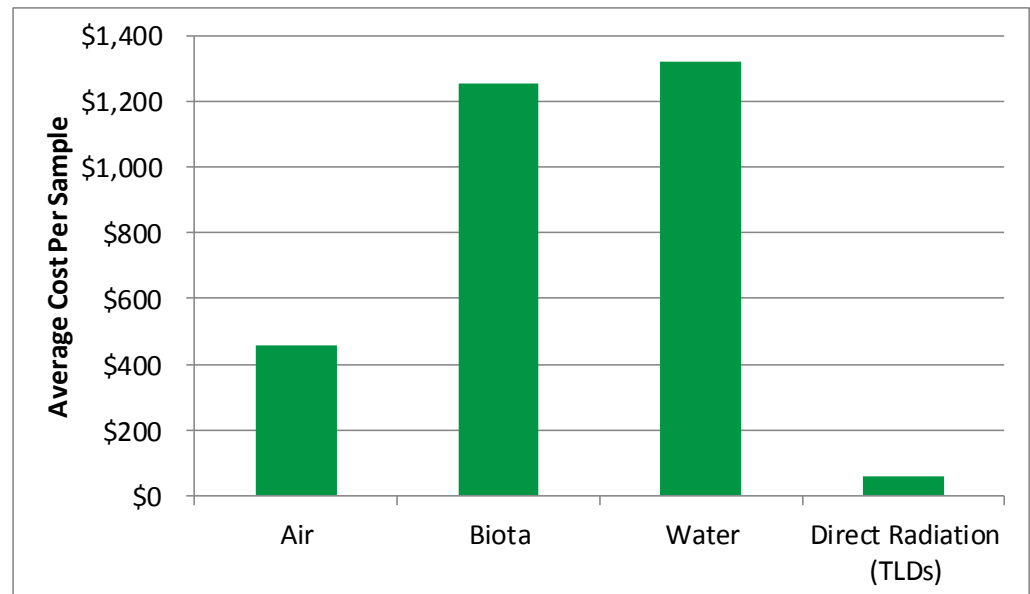
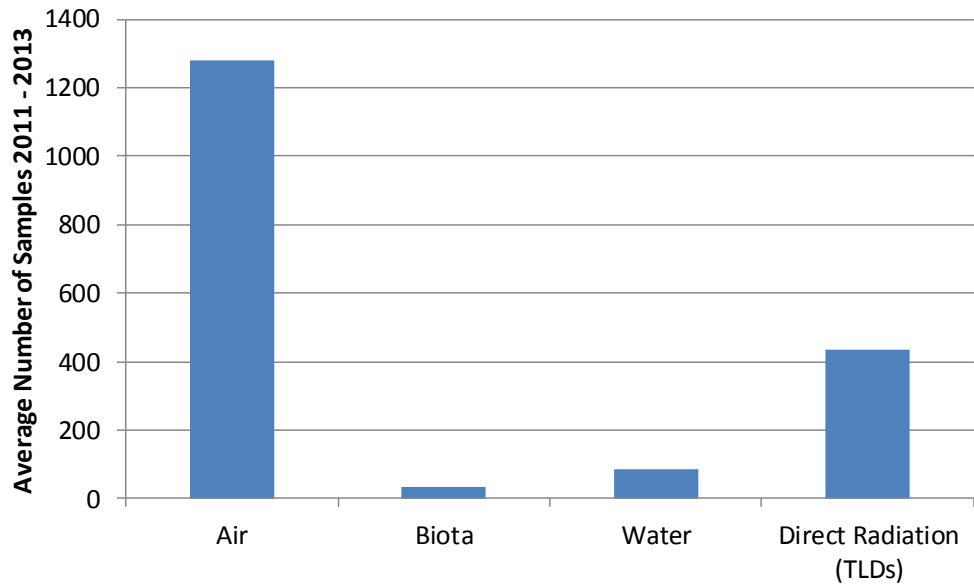
Credible Pathways







Numbers & Cost of Samples



Nevada National Security Site

Managed and Operated by National Security Technologies, LLC

- Our monitoring programs have been developed to address dose or perception concerns.
- Through time, sources of contaminants, land use, and/or perceptions of risk may change.
- All of us (?) have also made adjustments in our programs to address reduced funding.

Have other sites made efforts to align their monitoring efforts with the relative risk by pathway?





Sumps for Groundwater Monitoring/Characterization



Nevada National Security Site

Managed and Operated by National Security Technologies, LLC

Big Game Animals Using Sumps



Nevada National Security Site

Managed and Operated by National Security Technologies, LLC



Big Game Animals Using Sumps



Nevada National Security Site


Managed and Operated by National Security Technologies, LLC

Radionuclide Concentration in Animals and Dose from Ingestion of Animals

Location	Sample	Year ^a	Amount Consumed (g) (1 animal each)	Tritium		⁹⁰ Sr		¹³⁷ Cs		²³⁸ Pu		²³⁹⁻²⁴⁰ Pu		²⁴¹ Am	TOTAL (mrem)
				(pCi/g wet tissue) ^b	mrem	(pCi/g wet tissue) ^b	mrem	(pCi/g wet tissue) ^b	mrem	(pCi/g wet tissue) ^b	mrem	(pCi/g wet tissue) ^b	mrem	(pCi/g wet tissue) ^b	[mrem if 100 kg ingested]
E Tunnel Ponds	Mourning Doves	2003	30	1.93E+02	4.49E-04	1.80E-02	7.19E-05	6.60E-02	9.74E-05	3.60E-04	1.05E-05	2.85E-03	9.11E-05	3.42E-03	8.10E-04 [2.7]
		2003	30	3.97E+02	9.25E-04	1.50E-02	5.99E-05	1.62E-01	2.39E-04	4.56E-03	1.33E-04	4.02E-02	1.29E-03	1.14E-02	2.94E-03 [9.8]
		2003	30	3.78E+02	8.81E-04	6.60E-02	2.64E-04	0.00E+00	0.00E+00	3.90E-04	1.14E-05	7.95E-03	2.54E-04	3.12E-03	1.49E-03 [5.0]
		2007	30	2.16E+02	5.03E-04	-3.00E-03	-1.20E-05	6.00E-03	8.86E-06	NA	0.00E+00	1.77E-03	5.66E-05	6.00E-05	5.58E-04 [1.9]
		2007	30	2.54E+02	5.92E-04	3.00E-03	1.20E-05	-3.00E-03	-4.43E-06	NA	0.00E+00	0.00E+00	0.00E+00	-1.53E-03	5.59E-04 [1.9]
		2012	30	7.07E+01	1.65E-04	1.50E-02	5.99E-05	0.00E+00	0.00E+00	9.60E-04	2.80E-05	-2.40E-04	-7.67E-06	1.59E-03	2.87E-04 [1.0]
		2012	30	5.29E+01	1.23E-04	1.80E-02	7.19E-05	6.00E-03	8.86E-06	0.00E+00	0.00E+00	2.40E-04	7.67E-06	0.00E+00	2.12E-04 [0.7]
U-19ad PS #1A	Mourning Doves	2005	30	2.53E-01	5.91E-07	NA	NA	-2.40E-02	-3.54E-05	3.03E-03	8.85E-05	1.80E-03	5.75E-05	-1.98E-03	5.88E-05 [0.2]
		2005	30	1.69E+03	3.93E-03	NA	NA	4.77E+00	7.04E-03	-4.80E-04	-1.40E-05	1.41E-03	4.51E-05	1.98E-03	1.11E-02 [37]
		2005	30	5.11E+02	1.19E-03	NA	NA	2.73E-01	4.03E-04	0.00E+00	0.00E+00	3.06E-03	9.78E-05	3.21E-03	1.78E-03 [5.9]
		2005	30	1.13E+03	2.63E-03	NA	NA	2.32E+00	3.43E-03	0.00E+00	0.00E+00	-4.50E-04	-1.44E-05	-2.40E-03	5.98E-03 [20]
UE-20n PS#1DDH	Mourning Doves	2003	30	1.04E+04	2.41E-02	1.80E-02	7.19E-05	1.41E-01	2.08E-04	1.02E-03	2.98E-05	4.02E-03	1.29E-04	2.16E-03	2.46E-02 [82]
		2003	30	1.18E+04	2.74E-02	3.30E-02	1.32E-04	2.94E-01	4.34E-04	-6.60E-04	-1.93E-05	1.68E-03	5.37E-05	6.60E-04	2.80E-02 [93]
UE-20n #1	Mule Deer	2012	41,700	2.98E+02	9.64E-01	NA		NA		NA		NA		NA	9.64E-01 [2.3]

^a Data reported in annual site environmental reports DOE/NV 11718-971 for 2003 (BN, 2004), DOE/NV/25946-007 for 2005 (NSTec, 2006), DOE/NV/25946-543 for 2007 (NSTec, 2008), and DOE/NV/25946-1856 for 2012 (NSTec, 2013).

^b Concentrations may be negative values occasionally due to subtraction of background. Water content of muscle tissue = 70% by weight.

 =Maximum tissue concentration of all locations



Nevada National Security Site

Managed and Operated by National Security Technologies, LLC

Given existing data we know that the dose to the public from all pathways is very low.

How much effort (\$) should we spend trying to determine if we have a very few animals that could, with a low probability, expose a member of the public?

What are the relative risks?

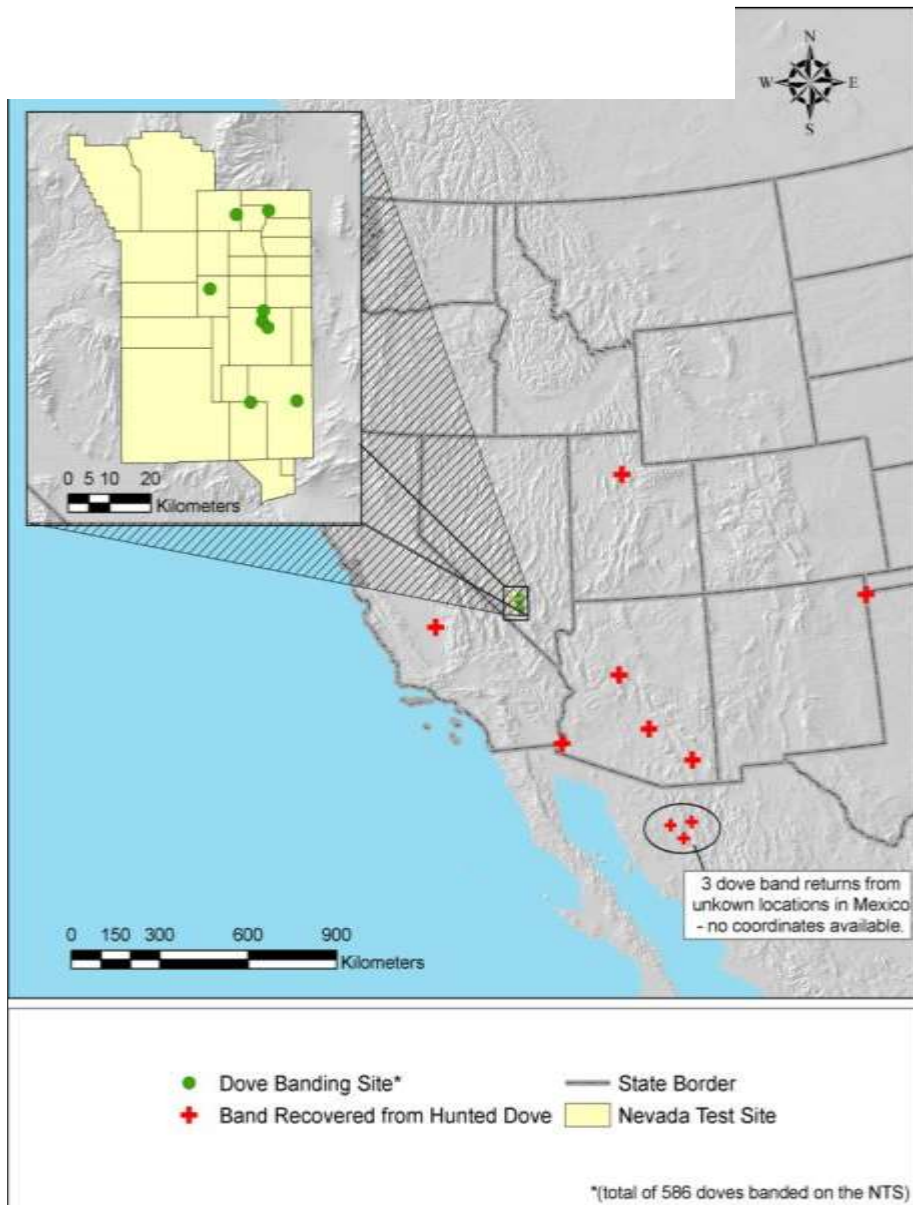
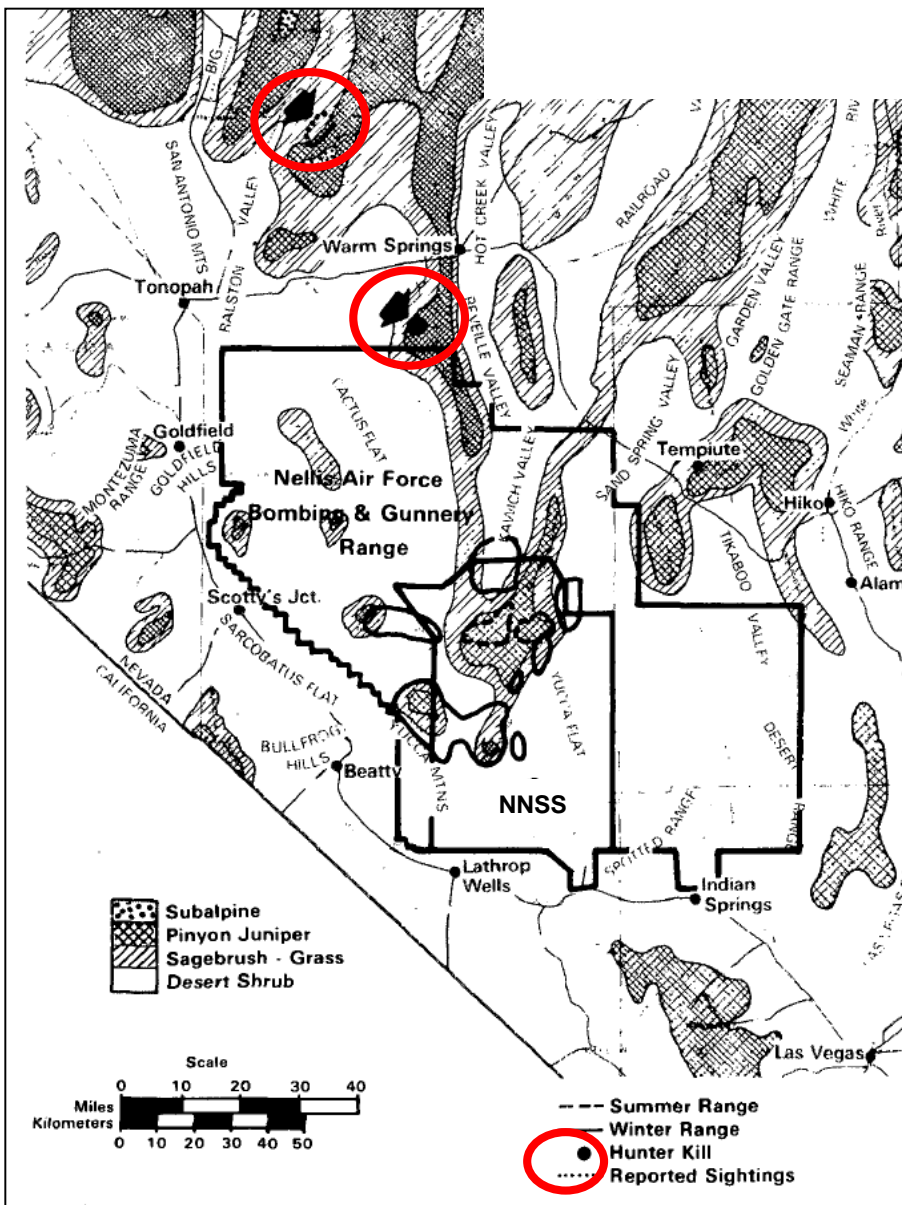


Dust in the Wind



Nevada National Security Site

Managed and Operated by National Security Technologies, LLC



AIR PATHWAY

Potential
Dose
(small)

Probability of
Receiving Dose
(relatively large)

GAME INGESTION PATHWAY

Potential
Dose
(relatively large)

Probability of
Receiving Dose
(small)



Guidance on conducting ALARA assessments helpful:

“It is necessary to comply with the appropriate (individual) dose limit to any member of the public, whatever the cost. [emphasis added]

However, it is the collective dose that is used in the cost-benefit analysis to select a radiation protection system”.

From page 4-10, DOE HANDBOOK
OPTIMIZING RADIATION PROTECTION OF THE PUBLIC AND THE
ENVIRONMENT FOR USE WITH DOE O 458.1, ALARA REQUIREMENTS

DOE-HDBK-1215-2014
October 2014



We know we have a relatively large population that is potentially exposed through the air pathway though our collective dose is still very low (< 1 mrem) so efforts should likely still focus on this.

However, we need more data to understand:

- Maximum potential dose could be through the game pathway
 - More sampling near the source – if the worst case is acceptable, there shouldn't be an issue.
- Population exposed to the game pathway



CONCLUSIONS

- Our monitoring efforts by pathway should be aligned with the risk each pathway presents.
- Guidance on conducting ALARA assessments can be applied to the alignment of monitoring efforts by pathway.
 - We shall comply with the appropriate (individual) dose limit to any member of the public, whatever the cost.
 - However, it is the collective dose that should be used in the cost-benefit analysis to focus monitoring efforts.
- Input on other sites' efforts to align their monitoring with the relative risk by pathway is appreciated.



THE



END



Nevada National Security Site

Managed and Operated by National Security Technologies, LLC

