



SHINE ER

Radiological Health Impacts

November 29, 2012



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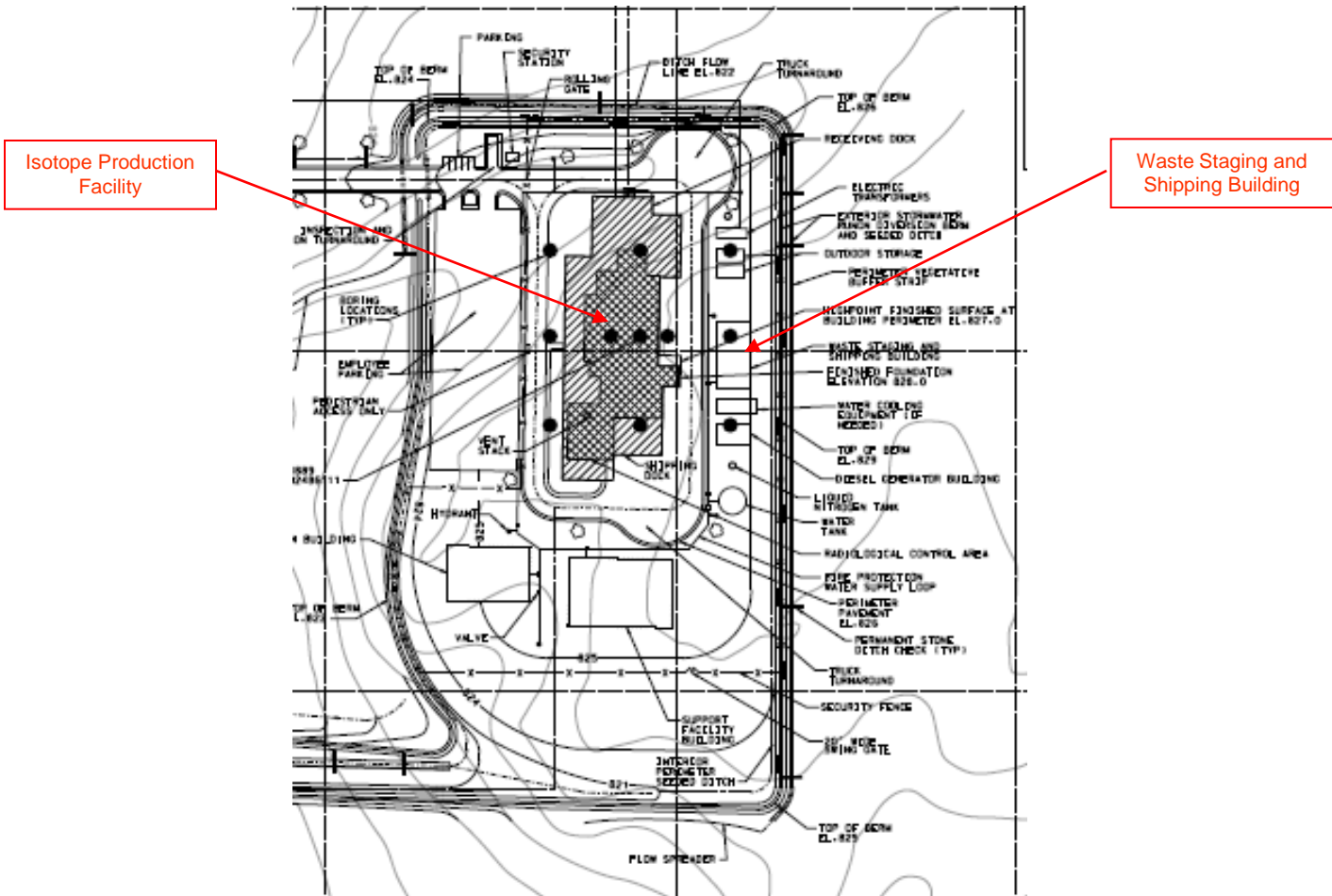
Introduction

- ISG Section 19.4.8.2 Radiological Impacts
 - Describes the public and occupational health impacts from radioactive material
- Site layout and location of radioactive material
- Radiation sources and radioactive effluents
- Baseline radiation levels
- Calculated offsite concentrations and doses to the public and workers
- Exposure mitigation measures

Location of Radioactive Material

- Isotope production facility (inside RCA)
 - Receiving area
 - Uranyl sulfate preparation area
 - Hot cells (TSV and process)
 - Health physics facility
 - Hot lab
 - Radwaste packaging
- Waste staging and shipping building

Location of Radioactive Material



Radiation Sources and Radioactive Effluents

- Gaseous sources of radiation
 - Offgas from the TSV (Xe, Kr, I)
 - Process Vessel Vent System (PVVS)
 - All gaseous activity released through single vent stack
 - Iodine is removed using silver zeolite or charcoal filters
 - Noble gas is captured in a cryotrap and held up to allow for decay
- Liquid sources of radiation
 - No effluent pathways
 - All liquid wastes are recycled or solidified and disposed of as solid waste
- Fixed sources of radiation
 - Production facility (TSV, separation processes, etc.)
 - Waste staging and shipping building

Baseline Radiation Levels

- There are no radiation sources on-site or within the vicinity of the SHINE site that would cause radiation levels to be higher than the identified background radiation level.
- The expected annual background dose due to terrestrial and cosmic radiation is 279 mrem/yr.

Offsite Airborne Activity Concentrations

- Receptor locations
 - Maximally exposed individual (MEI) located on site boundary
 - Nearest full time resident
- Calculation methodology
 - Releases based on TSV generation rate with credit for holdup and iodine removal by silver zeolite or charcoal filters
 - Atmospheric dispersion (χ/Q) using XOQDOQ and annual average meteorology
 - Actual nuclide mix at time of release is used

Offsite Waterborne Activity Concentrations

- No significant quantity of treated liquid wastes are generated at the SHINE facility, so there are no liquid effluent pathways
- Annual average waterborne concentration is not expected to be greater than the baseline background concentration

Offsite Annual Radiation Exposure

- Receptor locations are the MEI and nearest resident
- Calculation methodology
 - Annual average concentrations used for each nuclide
 - Total Effective Dose Equivalent (TEDE) is the sum of the Effective Dose Equivalent (EDE) and Committed Effective Dose Equivalents (CEDE)
 - Dose conversion factors from FGR 11 and 12 (ICRP 30)
- Acceptance Criterion
 - 10 mrem/yr (10% of the 10 CFR 20.1301 limit)

Offsite Exposure - Results

Annual Total Effective Dose Equivalent to the Public at Bounding Dose Receptors		
Dose Receptor	Annual TEDE (rem)	Annual TEDE Limit (rem) ^(a)
MEI	7.9×10^{-3}	1.0×10^{-2}
Nearest Full-Time Resident	5.7×10^{-4}	
(a) Limit based on 10 CFR 20.1101(d)		

Mitigating Strategies

- Engineering controls (design)
 - Radiation source identification
 - Shielding around radiation sources
 - Ventilation control
 - Access control to known radiation areas
 - Contamination control
 - Remote operation
 - Waste minimization
- Administrative controls (written procedures, training)
 - General environmental activities
 - General environmental hazards regarding the facility
 - Waste minimization requirements, goals, accomplishments
 - Specific environmental issues
 - Responsibilities for environmental stewardship
 - Employee recognition for efforts to improve environmental conditions