

Draft Site-Wide Environmental Impact Statement for the Oak Ridge Y-12 Plant

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Volume II

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Abstract: The U.S. Department of Energy (DOE) is responsible for providing the Nation with nuclear weapons and ensuring that those nuclear weapons remain safe, secure, and reliable. As one of the DOE major production facilities, the Oak Ridge Y-12 Plant has been DOE's primary site for enriched uranium processing and storage, and one of the manufacturing facilities for maintaining the U.S. nuclear weapons stockpile. In response to the end of the Cold War and changes in the world's political regimes, the emphasis of the U.S. weapons program has shifted dramatically over the past few years from developing and producing new weapons to dismantlement and maintenance of a smaller, enduring stockpile. The *Stockpile Stewardship and Management Programmatic Environmental Impact Statement* [SSM PEIS], DOE/EIS-0236, issued in September 1996, evaluated alternatives for maintaining the safety and reliability of the nuclear weapons stockpile without underground nuclear testing or production of new-design weapons.

In the SSM PEIS Record of Decision (ROD), DOE decided to maintain the national security missions at the Y-12 Plant, but to downsize the Plant consistent with reduced requirements. These national security missions include (1) maintaining the capability and capacity to fabricate secondaries, limited life components, and case parts for nuclear response; (2) evaluating components and subsystems returned from the stockpile; (3) storing enriched uranium that is designated for national security purposes; (4) storing depleted uranium and lithium parts; (5) dismantling nuclear weapons secondaries returned from the stockpile; (6) processing uranium and lithium (which includes chemical recovery, purification, and conversion of enriched uranium and lithium to a form suitable for long-term storage and/or further use); and (7) providing support to weapons laboratories.

During the same time period as the SSM PEIS, DOE also prepared the *Storage and Disposition of Weapons-Usable Fissile Materials Programmatic Environmental Impact Statement* [S&D PEIS], DOE/EIS-0229, which was issued in December 1996. This S&D PEIS evaluated alternatives for the long-term storage of fissile material. In the S&D PEIS ROD, DOE decided that Y-12 would also store surplus enriched uranium pending disposition.

This Site-Wide Environmental Impact Statement (SWEIS) analyzes impacts for the overall Oak Ridge Y-12 Plant mission (No Action - Status Quo and No Action - Planning Basis Operations), and the proposed construction of new facilities for two of Y-12's mission components (i.e., Highly Enriched Uranium [HEU] Storage Mission and the Special Materials Mission). Options considered for storage include a new HEU Materials Facility at one of two candidate sites, and expansion of Building 9215. Three candidate sites are analyzed for a new Special Materials Complex for the Special Materials Mission at Y-12. DOE's preferred alternative (Alternative 4) is to construct and operate a new HEU Materials Facility and a new Special Materials Complex at Y-12. DOE has not yet identified a preferred site for these new facilities.

Included in the SWEIS is an evaluation of impacts on land uses, transportation, socioeconomic, geology and soils, hydrology, biological resources, air quality/noise, site facilities and support activities, waste management, and cultural resources. In addition, environmental justice, and radiological and hazardous chemical impacts during normal operations, and accidents to workers and the public are included in the assessment.

Public Comments: In preparing the Draft SWEIS, DOE considered comments received by mail or fax, submitted at scoping meetings, and transmitted via the Internet. The public comment period on the Draft SWEIS extends through October 30, 2000.

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ACRONYMS AND ABBREVIATIONS

| | |
|--------|--|
| ACGIH | American Conference of Governmental Industrial Hygienists |
| ACO | Analytical Chemistry Laboratory |
| AIHA | American Industrial Hygiene Association |
| ALARA | as low as reasonably achievable |
| ASER | Annual Site Environmental Report |
| ATSDR | Agency for Toxic Substances and Disease Registry |
| CAP-88 | <i>Clean Air Act Assessment Package 1988</i> |
| CATV | Cable Television Network |
| CDC | Center for Disease Control |
| CDI | chronic daily intake |
| CEDE | committed effective dose equivalent |
| CEDR | Comprehensive Epidemiologic Data Resource |
| CERCLA | <i>Comprehensive Environmental Response, Compensation, and Liability Act</i> |
| CFR | <i>Code of Federal Regulations</i> |
| CI | confidence interval |
| CIND | Computing, Information, and Networking Division |
| CMTS | Central Mercury Treatment System |
| CSA | criticality safety analysis |
| CSE | criticality safety evaluation |
| CSF | cancer slope factors |
| CSN | Classified Services Network |
| D&D | decontamination and decommissioning |
| DARA | Disposal Area Remedial Action |
| DCG | Derived Concentration Guidelines |
| DOE | U.S. Department of Energy |
| DOT | U.S. Department of Transportation |
| DP | Defense Program |
| DRS | Dosimetry Record System |
| DSWM | Division of Solid Waste Management |
| ECR | excess cancer risk |
| EDE | effective dose equivalent |
| EEMTS | East End Mercury Treatment System |
| EFPC | East Fork Poplar Creek |
| EIS | Environmental Impact Statement |
| EM | Environmental Management |
| EM-60 | DOE Office of Nuclear Material and Facility Stabilization |
| EPA | Environmental Protection Agency |
| ERPG | Emergency Response Planning Guide |
| ES&H | environmental, safety and health |
| ETTP | East Tennessee Technology Park (formerly the Oak Ridge K-25 Site) |
| FDDI | fiber-distributed data interface |
| HAP | hazardous air pollutant |
| HEPA | high-efficiency particulate air |
| HEU | Highly Enriched Uranium |
| HI | hazard index |
| HMIS | Hazardous Material Information System |
| HQ | hazard quotient |

| | |
|------------|---|
| HVAC | heating, ventilation, and air conditioning |
| IAEA | International Atomic Energy Agency |
| ICRP | International Commission Radiological Protection |
| IP | Internet protocol |
| IRIS | Integrated Risk Information System |
| ISC3 | Industrial Source Complex |
| LCF | latent cancer fatality |
| LLNL | Lawrence Livermore National Laboratory |
| LLW | low-level waste |
| LMES | Lockheed Martin Energy Systems |
| LOAEL | lowest observed adverse effect level |
| LOS | level of service |
| MACCS | MELCOR Accident Consequence Code System |
| MAR | material at risk |
| MEI | maximally exposed individual |
| NAAQS | National Ambient Air Quality Standards |
| NDA | nondestructive assay |
| NDT | nondestructive testing |
| NESHAP | National Emission Standards for Hazardous Air Pollutants |
| NEPA | <i>National Environmental Policy Act</i> |
| NIOSH | National Institute for Occupational Safety and Health |
| NN | Nuclear Nonproliferation and National Securities |
| NOAEL | no observed adverse effect level |
| NPDES | National Pollutant Discharge Elimination System |
| NRC | Nuclear Regulatory Commission |
| O&M | operation and maintenance |
| OEL | occupational exposure limit |
| ORFICN | Oak Ridge Federal Integrated Communications Network |
| ORNL | Oak Ridge National Laboratory |
| ORO | Oak Ridge Operations |
| ORR | Oak Ridge Reservation |
| OSHA | Occupational Safety and Health Administration |
| PCB | polychlorinated biphenyls |
| PEL | permissible exposure limits |
| PHA | preliminary hazards analysis |
| PIDAS | Perimeter Intrusion Detection and Assessment System |
| POTW | publicly owned treatment works |
| R&D | research and development |
| Rad-NESHAP | Radionuclide National Emission Standards for Hazardous Air Pollutants |
| RCRA | <i>Resource Conservation and Recovery Act</i> |
| REL | recommended exposure limits |
| RfC | Reference Concentration |
| RfD | Reference Dose |
| S&M | surveillance and maintenance |
| SARA | <i>Superfund Amendments and Reauthorization Act</i> |
| SMR | Standardized Mortality Ratio |
| SNM | special nuclear material |
| SWEIS | Site-Wide Environmental Impact Statement |
| TDEC | Tennessee Department of Environment and Conservation |

| | |
|-----------|--|
| TDHE | Tennessee Department of Health and Environment |
| TEDE | total effective dose equivalent |
| TEEL | temporary emergency exposure limit |
| TEV | threshold emission value |
| TI | Transport Index |
| TLV | threshold limit value |
| TSCA | <i>Toxic Substances Control Act</i> |
| TVA | Tennessee Valley Authority |
| TWA | time-weighted average |
| UEFPC | Upper East Fork Poplar Creek |
| UTM | Universal Transverse Mercator |
| VAC | alternating current volt |
| VOC | volatile organic compounds |
| WETF | West End Treatment Facility |
| Y-12 | The Oak Ridge Y-12 Plant |
| Y-12DPNet | Y-12 Defense Programs Network |

CHEMICALS AND UNITS OF MEASURE

| | |
|--------------------|---|
| Bq | Becquerel |
| C | Celsius |
| Ci | curie |
| CCl ₄ | carbon tetrachloride |
| cm | centimeter |
| CFC | chlorofluorocarbons |
| CO | carbon monoxide |
| dB | decibel |
| dBA | decibel A-weighted |
| DCE | 1, 2-dichloroethylene |
| F | Fahrenheit |
| ft | feet |
| ft ² | square feet |
| ft ³ | cubic feet |
| ft ³ /s | cubic feet per second |
| g | gram |
| G | acceleration due to gravity |
| gal | gallons |
| GPD | gallons per day |
| gpm | gallons per minute |
| GPY | gallons per year |
| ha | hectares |
| HCl | hydrochloric acid |
| HF | hydrogen fluoride |
| hr | hour |
| in. | inch |
| kg | kilogram |
| km | kilometer |
| km ² | square kilometer |
| KOH | potassium hydroxide |
| kV | kilovolt |
| kVA | kilovolt-ampere |
| kW | kilowatt |
| kWh | kilowatt hour |
| L | liter |
| lb | pound |
| Li | lithium |
| LiD | lithium deuteride |
| LiH | lithium hydride |
| LiO | lithium oxide |
| m | meter |
| m ² | square meter |
| m ³ | cubic meter |
| m/s | meters per second |
| Mbps | million bits per second |
| Mbtu | million British thermal unit |
| mCi | millicuries (one-thousandth of a curie) |

| | |
|------------------|---|
| mCi/mL | millicuries per milliliter |
| mg | milligram (one-thousandth of a gram) |
| mg/L | milligrams per liter |
| MGD | million gallons per day |
| MGY | million gallons per year |
| mi | mile |
| mi ² | square mile |
| MLD | million liters per day |
| MLY | million liters per year |
| mph | miles per hour |
| mrem | millirem (one-thousandth of a rem) |
| Mscf | million standard cubic feet |
| MVA | megavolt-ampere |
| MW | megawatt |
| MWe | megawatt electric |
| MWh | megawatt hour |
| MWt | megawatt thermal |
| NaK | sodium potassium |
| NaOCl | sodium hypochlorite |
| NaOH | sodium hydroxide |
| nCi | nanocurie (one-billionth of a curie) |
| nCi/g | nanocuries per gram |
| NO ₂ | nitrogen dioxide |
| NOX | nitrogen oxide |
| Np | neptunium |
| O ₃ | ozone |
| Pa | protactinium |
| PAH | polycyclic aromatic hydrocarbon |
| Pb | lead |
| PCB | polychlorinated biphenyl |
| pCi | picocurie (one-trillionth of a curie) |
| pCi/L | picocuries per liter |
| PM ₁₀ | particulate matter (less than 10 microns in diameter) |
| ppb | parts per billion |
| ppm | parts per million |
| psig | pounds per square inch gage |
| Ra | radium |
| rem | roentgen equivalent man |
| s | second |
| scf | standard cubic feet |
| scfd | standard cubic feet per day |
| scfm | standard cubic feet per minute |
| SO ₂ | sulfur dioxide |
| Sv | sievert |
| t | metric ton |
| TATB | triaminotinitrobenzene |
| Tc | technetium |
| TCA | 1, 1, 1-trichloroethane |
| TCE | trichloroethylene |

| | |
|-------------------|---|
| Th | thorium |
| TNT | trinitrotoluene |
| UF ₄ | uranium tetrafluoride |
| UF ₆ | uranium hexafluoride |
| yd ³ | cubic yard |
| yr | year |
| μCi | microcurie (one-millionth of a curie) |
| $\mu\text{Ci/g}$ | microcuries per gram |
| μg | microgram (one-millionth of a gram) |
| $\mu\text{g/kg}$ | micrograms per kilogram |
| $\mu\text{g/L}$ | micrograms per liter |
| $\mu\text{g/m}_3$ | micrograms per cubic meter |
| μ | micron or micrometer (one-millionth of a meter) |

CONVERSION CHART

| To Convert Into Metric | | | To Convert Into English | | |
|------------------------|--|-------------------|-------------------------|--|----------------|
| If You Know | Multiply By | To Get | If You Know | Multiply By | To Get |
| Length | | | | | |
| inch | 2.54 | centimeter | centimeter | 0.3937 | inch |
| feet | 30.48 | centimeter | centimeter | 0.0328 | feet |
| feet | 0.3048 | meter | meter | 3.281 | feet |
| yard | 0.9144 | meter | meter | 1.0936 | yard |
| mile | 1.60934 | kilometer | kilometer | 0.62414 | mile (Statute) |
| Area | | | | | |
| square inch | 6.4516 | square centimeter | square centimeter | 0.155 | square inch |
| square feet | 0.092903 | square meter | square meter | 10.7639 | square feet |
| square yard | 0.8361 | square meter | square meter | 1.196 | square yard |
| acre | 0.40469 | hectare | hectare | 2.471 | acre |
| square mile | 2.58999 | square kilometer | square kilometer | 0.3861 | square mile |
| Volume | | | | | |
| fluid ounce | 29.574 | milliliter | milliliter | 0.0338 | fluid ounce |
| gallon | 3.7854 | liter | liter | 0.26417 | gallon |
| cubic feet | 0.028317 | cubic meter | cubic meter | 35.315 | cubic feet |
| cubic yard | 0.76455 | cubic meter | cubic meter | 1.308 | cubic yard |
| Weight | | | | | |
| ounce | 28.3495 | gram | gram | 0.03527 | ounce |
| pound | 0.45360 | kilogram | kilogram | 2.2046 | pound |
| short ton | 0.90718 | metric ton | metric ton | 1.1023 | short ton |
| Force | | | | | |
| dyne | 0.00001 | newton | newton | 100,000 | dyne |
| Temperature | | | | | |
| Fahrenheit | Subtract 32 then multiply by 5/9ths | Celsius | Celsius | Multiply by 9/5ths, then add 32 | Fahrenheit |

METRIC PREFIXES

| Prefix | Symbol | Multiplication Factor |
|---------------|---------------|--|
| exa- | E | 1 000 000 000 000 000 000 = 10^{18} |
| peta- | P | 1 000 000 000 000 000 000 = 10^{15} |
| tera- | T | 1 000 000 000 000 = 10^{12} |
| giga- | G | 1 000 000 000 = 10^9 |
| mega- | M | 1 000 000 = 10^6 |
| kilo- | k | 1 000 = 10^3 |
| hecto- | h | 100 = 10^2 |
| deka- | da | 10 = 10^1 |
| deci- | d | 0.1 = 10^{-1} |
| centi- | c | 0.01 = 10^{-2} |
| milli- | m | 0.001 = 10^{-3} |
| micro- | F | 0.000 001 = 10^{-6} |
| nano- | n | 0.000 000 001 = 10^{-9} |
| pico- | p | 0.000 000 000 001 = 10^{-12} |
| femto- | f | 0.000 000 000 000 001 = 10^{-15} |
| atto- | a | 0.000 000 000 000 000 001 = 10^{-18} |