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EDUCATION:	- M.S., Geology, Southern Illinois University, 1977 - B.A., Geology, Indiana University, 1975 - B.A., Education, Indiana University, 1975
TECHNICAL EXPERIENCE:	Seventeen years of experience. Current responsibilities include serving as Program Manager for the Defense Waste Processing Facility, which

	involves approving contractor program plans, documentation, and technical analyses.
EIS RESPONSIBILITY:	Document Manager. Principal DOE-SR Reviewer for Draft Supplemental EIS.

NAME:	ANDREW F. McCLURE, JR.
AFFILIATION:	Halliburton NUS Corporation
EDUCATION:	- B.S., Chemical Engineering, Carnegie Mellon University, 1966
TECHNICAL EXPERIENCE:	Forty years in the water/wastewater field, with an emphasis on wastewater treatment activities, including permit implementation and monitoring/reporting.
EIS RESPONSIBILITY:	Prepared surface water portions of water resources of Chapters 3 and 4.

NAME:	JAMES L. OLIVER
AFFILIATION:	Halliburton NUS Corporation
EDUCATION:	- B.S., Biology (Fisheries), Murray State University, 1971
TECHNICAL EXPERIENCE:	More than 20 years in research and impact assessment projects for the U.S. Department of Interior and the DOE. As Deputy Director of the Office of Environmental Services, provides reviews of environmental and natural resource management issues, and performs strategic planning for National Environmental Policy Act documentation for DOE.
EIS RESPONSIBILITY:	Management Reviewer.

NAME:	KAREN K. PATTERSON
AFFILIATION:	Halliburton NUS Corporation
EDUCATION:	- M.A., Biology, Wake Forest University, 1977 - B.A., Biology, Randolph-Macon Woman's College, 1973
TECHNICAL EXPERIENCE:	Twenty-one years in technical and management roles in multidisciplinary environmental programs.
EIS RESPONSIBILITY:	Chapter 3 Lead. Prepared ecological resource sections of Chapters 3 and 4.

NAME:	RONALD J. SMITH, CHP
AFFILIATION:	Halliburton NUS Corporation

EDUCATION:
- M.S., Health Physics, University of Florida, 1987
- B.S., Physics, University of South Florida, 1985

TECHNICAL EXPERIENCE: Eight years in environmental and occupational health physics programs at commercial nuclear reactor sites.

EIS RESPONSIBILITY: Prepared traffic and transportation section of Chapter 4. Assisted in preparation of traffic and transportation sections of Chapter 3.

NAME: G. THOMAS ST. CLAIR

AFFILIATION: Halliburton NUS Corporation

EDUCATION:
- Ph.D., Environmental Policy, Michigan State University, 1990
- M.S., Environmental Sciences, University of Michigan, 1972
- B.S., Biology, Adrian College, 1968

TECHNICAL EXPERIENCE: More than 20 years managing environmental and regulatory projects and programs including technical management and direction as Director of Office of Environmental Services. Experience also includes solid and hazardous waste management; regulatory compliance oversight; environmental assessment and planning, and audits and appraisals; preparation of permit applications; and coordination of public involvement programs.

EIS RESPONSIBILITY: Prepared unavoidable adverse impacts and irreversible or irretrievable commitment of resources section of Chapter 4.

NAME: TOM J. TEMPLES

AFFILIATION: DOE-SR

EDUCATION:
- M.S., Geology, University of Georgia, 1978
- B.S., Geology, Clemson University, 1976

TECHNICAL EXPERIENCE: Fifteen years of experience as a petroleum exploration geologist and geophysicist. Recent experience includes coordinating NEPA document preparation and managing the geoscience and groundwater program for DOE-SR.

EIS RESPONSIBILITY: Task Manager. Reviewer, Draft EIS.

NAME: WILLIAM T. THORNTON, CHP

AFFILIATION: Halliburton NUS Corporation

EDUCATION:
- M.S., Physics, Vanderbilt University, 1960
- B.S., Physics, Wheaton College, 1957

TECHNICAL EXPERIENCE: Thirty years in radiological health protection,

including operation and facilities covering the nuclear fuel cycle.

EIS RESPONSIBILITY: Prepared worker radiological health and decontamination and decommissioning portions of Chapters 3 and 4.

NAME: TIMOTHY A. WASHBURN

AFFILIATION: Halliburton NUS Corporation

EDUCATION:
- M.S., Biology, University of Richmond, 1979
- B.S., Biology, University of Richmond, 1977

TECHNICAL EXPERIENCE: Eighteen years experience in environmental and occupational health physics at commercial and government nuclear facilities.

EIS RESPONSIBILITY: Prepared traffic and transportation section of Chapter 3. Assisted in preparation of traffic and transportation section of Chapter 4.

NAME: PHILIP L. YOUNG

AFFILIATION: Halliburton NUS Corporation

EDUCATION:
- M.S., Health Physics, Georgia Institute of Technology, 1989
- B.S., Radiation Health (Health Physics), Oregon State University, 1988

TECHNICAL EXPERIENCE: More than six years in environmental health physics and nuclear engineering, with emphasis on radiological effluent monitoring, environmental surveillance, environmental dosimetry, radiological risk assessment, and radioactive waste management.

EIS RESPONSIBILITY: Technical Lead for SEIS. Prepared Forward and Summary. Chapter 4 Lead. Assisted in preparation of Chapter 2. Prepared cumulative impacts and mitigation sections of Chapter 4.

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United States Senate

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United States Senate

The Honorable Sam Nunn
United States Senate

The Honorable Strom Thurmond
United States Senate

A.2 United States Senate Committees

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Ranking Minority Member
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Committee on Energy and Natural Resources

The Honorable J. Bennett Johnston
Chairman
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The Honorable Trent Lott
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Committee on Armed Services

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Ranking Minority Member
Committee on Governmental Affairs

The Honorable Malcolm Wallop
Ranking Minority Member
Committee on Energy and Natural Resources

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U.S. House of Representatives

The Honorable Don Johnson
U.S. House of Representatives

The Honorable Jack Kingston
U.S. House of Representatives

The Honorable Cynthia McKinney
U.S. House of Representatives

The Honorable Arthur Ravenel, Jr.
U.S. House of Representatives

The Honorable Floyd Spence
U.S. House of Representatives

The Honorable John M. Spratt, Jr.
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A.4 United States House of Representatives Committees

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Committee on Government Operations

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Military Application of Nuclear Energy Panel
Committee on Armed Services

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Mr. Ken Clark
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C. STATE OF SOUTH CAROLINA

C.1 Statewide Offices and Legislature

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Lieutenant Governor of South Carolina

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C.2 State Agencies

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South Carolina Department of Archives and History

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South Carolina Department of Health and Environmental Control

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Bureau of Solid and Hazardous Waste Management
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Beaufort-Jasper (SC) Water and Sewer Authority

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Barnwell County (SC) Economic Development Commission

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Hilton Head (SC) Town Council

Mr. James O. Brown
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D. STATE OF GEORGIA

D.1 Statewide Offices and Legislature

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Governor of Georgia

The Honorable Pierre Howard
Lieutenant Governor of Georgia

The Honorable Michael Bowers
Attorney General

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Chairman
Committee on Natural Resources
Georgia Senate

Chairman
Committee on Natural Resources & Environment
Georgia House of Representatives

D.2 State Agencies

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Georgia Department of Natural Resources

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Commissioner
Georgia Department of Natural Resources

Director
Georgia Department of Natural Resources

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Environmental Protection Division
Georgia Department of Natural Resources
Environmental Radiation Programs

Mr. J. L. Setser
Program Coordination Branch
Environmental Radiation Programs
Environmental Protection Division
Georgia Department of Natural Resources

Program Manager
Surface Water Supply
Georgia Department of Natural Resources

Administrator
Georgia State Clearinghouse
Office of Planning and Budget

D.3 Local Agencies and Units of Government

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Metropolitan Planning Commission
Savannah, GA

E. NATIVE AMERICAN GROUPS

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Chairman
Catawba Indian Nation

The Honorable Bill S. Fife
Principle Chief
Muscogee (Creek) Nation

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Tribal Town Center Organization

Project Director
Yuchi Tribal Organization, Inc.

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City of Savannah

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Richmond County Board of
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G. ENVIRONMENTAL AND PUBLIC INTEREST GROUPS

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Washington, D.C.

Council for a Livable World
Washington, D.C.

Defenders of Wildlife
Washington, D.C.

Environmental Defense Fund, Inc.
National Headquarters (New York, NY)

Environmental Defense Fund, Inc.
Washington, D.C.

Mr. David Albright
Federation of American Scientists
Washington, D.C.

Mr. James E. Beard
Friends of the Earth
Washington, D.C.

Mr. Tom Clements
Greenpeace
Washington, D.C.

Ms. Peg Stevenson
Greenpeace
Washington, D.C.
League of Women Voters
Washington, D.C.

National Environmental Policy Institute
Washington, D.C.

National Wildlife Federation

Washington, D.C.

Mr. Jim Launib
Natural Resources Defense Council
New York, NY

Natural Resources Defense Council, Inc.
San Francisco Office

Natural Resources Defense Council, Inc.
Washington, D.C.

Andrew Caputo
Natural Resources Defense Council
Washington, D.C

Mr. Steven Dolley
Research Director
Nuclear Control Institute
Washington, D.C.

Mr. Paul Leventhal
President
Nuclear Control Institute
Washington, D.C.

Mr. Michael Mariotte
Nuclear Information Resource Service
Washington, D.C.

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Physicians for Social Responsibility
Washington, D.C.

The Sierra Club
National Headquarters (San Francisco, CA)

The Sierra Club
Washington, D.C.

Mr. Robert Deegan
Sierra Club Nuclear Waste
Virginia Beach, VA

G.2 State and Local

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Citizens for Environmental Justice

Dr. Mildred McClain
Citizens for Environmental Justice
Savannah, GA
Sister Nasrah
Citizens for Environmental Justice
Savannah, GA

Mr. Brian Costner
Energy Research Foundation
Columbia, SC

Ms. Amanda W. Everette
Greenpeace U.S.A., Inc
Savannah, GA

Ms. Debra K. Hasan
Citizens for Environmental Justice
Savannah, GA

Mr. Timothy Kulik
Georgians Against Nuclear Energy (GANE)
Stone Mountain, GA

Ms. Charlotte Marsala
Resident Home Owners Coalition

Vivian A Miller
League of Women Voters
Hilton Head, SC

Dr. Mary T. Kelly
League of Women Voters of South Carolina
Columbia, SC

Dr. Zoe G. Tsagos
League of Women Voters of Northern
Beaufort
Beaufort, SC

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Initiative
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South Carolina Council of Catholic Women

Executive Director
The South Carolina Wildlife Federation
Columbia, SC

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The South Carolina Wildlife Federation
Columbia, SC

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20/20 Vision LUV - Others
Santee, GA

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Stanford University

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WSRC-EPD/NEPA

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Augusta Chronicle

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Freedom of Information Public Document Room
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ACRONYMS, ABBREVIATIONS, AND USE OF SCIENTIFIC NOTATION

Acronyms and abbreviations used in the Supplemental EIS

CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DWPF	Defense Waste Processing Facility
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ERPG	Emergency Response Planning Guidelines
FR	Federal Register
HEPA	high-efficiency particulate air
ITP	In-Tank Precipitation Facility
MEI	Maximally Exposed Individual
NEPA	National Environmental Policy Act
PM10	Particulate matter less than or equal to 10 microns in diameter
SCDHEC	South Carolina Department of Health and Environmental Control
SRS	Savannah River Site
WSRC	Westinghouse Savannah River Company

Abbreviations for measurement units used in the Supplemental EIS

cfm	cubic feet per minute
cfs	cubic feet per second
g	percentage of gravity (seismology)
g/L	grams per liter
gpm	gallons per minute
L	liter
lb	pound
mg	milligram
u	micron
uCi	microcurie
ug	microgram
C	degrees Celsius
F	degrees Fahrenheit

Abbreviations for measurements used in the Supplemental EIS

Very small and very large numbers are sometimes written in this Supplemental EIS using "scientific notation" or "E-notation" rather than as decimals or fractions. Both types of notation use superscripted exponents to indicate the power of ten as a multiplier (i.e., 10^n, or the number 10 multiplied by itself "n" times).

For example: 10^3 = 10 x 10 x 10 = 1,000
10^-2 = 1/(10 x 10) = 0.01

In scientific notation, large numbers are written as a decimal between 1 and 10 multiplied by the appropriate power of 10:

4,900 is written 4.9 x 10^3 = 4.9 x 10 x 10 x 10 = 4.9 x 1,000 = 4,900
0.049 is written 4.9 x 10^-2
1,490,000 or 1.49 million is written 1.49 x 10^6

A positive exponent indicates a number larger than or equal to one; a negative exponent indicates numbers less than one.

In some cases, a slightly different notation ("E-notation") is used, where "-10" is replaced by "E" and the exponent is not superscripted. Using the above examples

4,900 = 4.9 x 10^3 = 4.9E+03
0.049 = 4.9 x 10^-2 = 4.9E-02
1,490,000 = 1.49 x 10^6 = 14.9E+06

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GLOSSARY

adsorption
The adhesion of a substance to the surface of a solid or solid particles.

air dispersion coefficients
The standard deviation of the distribution of air pollutants represented by a normal distribution function.

air quality
A measure of the levels of pollutants in the air.

air quality standards
The prescribed level of pollutants in the outside air that cannot be exceeded legally during a specified time in a specified area.

air sampling
The collection and analysis of air samples for detection or measurement of radioactive substances.

alpha particle
A positively charged particle consisting of two protons and two neutrons that is emitted from the nucleus of certain nuclides during radioactive decay. It is the least penetrating of the three common types of radiation (alpha, beta, and gamma).

amalgamation
Combining mercury with another metal to form an alloy.

ambient air
The surrounding atmosphere, usually the outside air, as it exists around people, plants, and structures. It is not the air in immediate proximity to emission sources.

annulus
Space in between the two walls of a double-wall tank.

aquifer
A geologic formation that contains sufficient saturated permeable material to conduct groundwater and to yield economically worthwhile quantities of groundwater to wells and springs.

atmosphere
The layer of air surrounding the earth.

Atomic Energy Commission (AEC)
A five-member commission established after World War II to supervise the use of nuclear energy. The AEC was dissolved in 1975 and its functions transferred to the Nuclear Regulatory Commission (NRC) and the Energy Research and Development Administration (ERDA), which became the Department of Energy (DOE).

attainment
A measure of through-put capacity of the facility expressed as a percentage.

background exposure
See exposure to radiation.

background radiation
Normal radiation present in the lower atmosphere from cosmic rays and earth sources. Background radiation varies somewhat with location.

benthic region
The bottom of a body of water. This region supports the benthos, a type of life that not only lives on but contributes to the character of the bottom.

benzene
A clear, flammable, hazardous organic compound (C6H6).

beta particle
An elementary particle emitted from a nucleus during radioactive decay. It is negatively charged, is identical to an electron, and is easily stopped by a thin sheet of metal.

biological dose
The radiation dose, measured in rem, absorbed in biological material.

biota
The plant and animal life of a region.

blackwater
Water in coastal plains, creeks, swamps, and/or rivers that has been imparted a dark or black coloration due to dissolution of naturally occurring organic matter from soils and decaying vegetation.

borosilicate glass
A chemically resistant glass made primarily of silica and boron. As a waste form, high-level waste is incorporated into the glass to form a leach-resistant nondispersible (immobilized) material.

bounded
Would have greater consequences or risk than other accidents.

C
Degree Celsius. C = 5/9 x (F - 32).

calcareous sands
Sands containing calcium carbonate.

cancer
The name given to a group of diseases that are characterized by uncontrolled cellular growth.

canister
A metal (stainless steel) container into which immobilized radioactive waste is sealed.

canyon building
A heavily shielded building used in the chemical processing of radioactive materials. Operation and maintenance are by remote control.

capable
Whether or not a geological fault has moved at or near the ground surface within the past 35,000 years.

carcinogen
An agent capable of producing or inducing cancer.

carcinogenic
Capable of producing or inducing cancer.

Carolina bay

Wetland area found on the Southeastern Atlantic Coastal Plain. A shallow depression.

close-in worker
An individual located within the facility where an accidental release occurs.

collocated worker
An individual located 100 meters (328 feet) from where an accidental release occurs.

community (environmental justice definition)
A group of people or a site within a given area exposed to risks that potentially threaten health, ecology, or land values.

condensate
Liquid obtained by cooling vapor.

constituents
Parts or components of a chemical system.

cumulative effects
Additive environmental, health, and socioeconomic effects that result from a number of similar activities in an area.

curie (Ci)
A unit of measure of radioactivity equal to 3.7 - 10^10 disintegrations per second.

decay product
A nuclide formed by the radioactive decay of another nuclide, which is called the parent.

decay, radioactive
The spontaneous transformation of one nuclide into a different nuclide or into a different energy state of the same nuclide. The process results in the emission of nuclear radiation (alpha, beta, or gamma radiation).

decommissioning
Decommissioning operations remove facilities such as processing plants, waste tanks, and burial grounds from service and reduce or stabilize radioactive contamination.

defense waste
Nuclear waste generated by government defense programs as distinguished from waste generated by commercial and medical facilities.

derived concentration guide (DCG)
The concentration of a radionuclide in air or water that, under conditions of continuous exposure for one year by one exposure mode (i.e., ingestion of water, submersion in air, or inhalation), would result in an effective dose equivalent of 100 mrem (0.1 rem = 1 mSv).

disassociate
Separation of chemicals into their elemental or ionic state.

dose
The energy imparted to matter by ionizing radiation. The unit of absorbed dose is the rad, equal to 0.01 joules per kilogram of irradiated material in any medium.

dose conversion factor
Factor used to calculate the cancer risk for a radiation dose.

dose equivalent
A term used to express the amount of effective radiation when modifying factors have been considered. It is the product of absorbed dose (rads) multiplied by a quality factor and other modifying factors. It is measured in rem (Roentgen equivalent man).

dose rate
The radiation dose delivered per unit time (e.g., rem per year).

ecology
The science dealing with the relationship of all living things with each other and with the environment.

ecosystem
A complex of the community of living things and the environment forming a functioning whole in nature.

effective dose equivalent
Organ doses weighted for biological effect to yield equivalent whole-body doses.

effluent
A liquid waste, discharged into the environment, usually into surface streams.

eluation
The process of removing absorbed material from an ion-exchange resin.

emergency response planning guidelines (ERPG) values
These values, which are specific for each chemical, are established for three general severity levels: exposure to concentrations greater than ERPG-1 values for a period of time greater than 1 hour results in an unacceptable likelihood that a person would experience mild transient adverse health effects, or perception of a clearly defined objectional odor; exposure to concentrations greater than ERPG-2 values for a period of time greater than 1 hour results in an unacceptable likelihood that a person would experience or develop irreversible or other serious health effects, or symptoms that could impair one's ability to take protective action; exposure to concentrations greater than ERPG-3 values for a period of time greater than 1 hour results in an unacceptable likelihood that a person would experience or develop life-threatening health effects.

emission standards
Legally enforceable limits on the quantities and/or kinds of air contaminants that may be emitted into the atmosphere.

endangered species
Plants and animals in an area that are threatened with either extinction or serious depletion of a species.

environment
The sum of all external conditions and influences affecting the life, development, and ultimately, the survival of an organism.

Environmental Impact Statement (EIS)
A legal document required by the National Environmental Policy Act (NEPA) of 1969, as amended, to assess the environmental impacts of major Federal actions.

environmental justice
The fair treatment of people of all races, cultures, incomes, and educational levels with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no population of people should be forced to shoulder a disproportionate share of the negative environmental impacts of pollution

or environmental hazards due to a lack of political or economic strength.

environmental transport
The movement through the environment of a substance; it includes the physical, chemical, and biological interact ions undergone by the substance.

erosion
The process in which soil is carried away by the action of wind or water.

exceedence
A value that goes over a prescribed limit.

exposure to radiation
The incidence of radiation on living or inanimate material by accident or intent. Background exposure is the exposure to natural background ionizing radiation. Occupational exposure is that exposure to ionizing radiation which takes place during a person's working hours. Population exposure is the exposure to a number of persons who inhabit an area.

F
Degree Fahrenheit. $F = C \times 9/5 + 32$.

fallout
The descent to earth and deposition on the ground of particulate matter (which may be radioactive) from the atmosphere.

fault
A fracture or a zone of fractures within a rock formation along which vertical, horizontal, or transverse slippage has occurred in the past.

fecal coliform
Type of bacterial count used to show fecal contamination levels in water.

floodplain
Valley floor constructed by an active river and periodically covered with floodwater from that river during intervals of overbank flow.

frit
Finely ground glass.

frit slurry
Watery mixture of finely ground glass.

gamma rays
High-energy, short wavelength electromagnetic radiation accompanying fission and emitted from the nucleus of an atom. Gamma rays are very penetrating and require dense materials (e.g., lead) for shielding.

geology
The science that deals with the earth: the materials, processes, environments, and history of the planet.

groundwater
The supply of fresh water under the earth's surface in an aquifer.

half-life (radiological)
The time in which half the atoms of a radioactive substance disintegrate to another nuclear form. Half-lives vary from millionths of a second to billions of years.

heavy metals
Metallic elements of high molecular weight, such as mercury, chromium, cadmium, lead, and arsenic, that are toxic to plants and animals at known concentrations.

high efficiency particulate air (HEPA)
A type of filter designed to remove 99.95 percent of the particles down to 0.3 mm in diameter from a flowing air stream.

high-level waste
The highly radioactive wastes that result from processing of spent reactor fuel and target assemblies.

historic resources
The sites, districts, structures, and objects considered limited and nonrenewable because of their association with historic events, persons, or social or historic movements.

hydrolysis
Chemical reaction with water.

hydrostratigraphy
Names used to identify the water-bearing properties of rocks.

immobilization
Conversion of a material into a form that will be resistant to environmental

inhibited water
Water containing sodium hydroxide.

intensity (earthquake)
A numerical rating used to describe the effects of earthquake ground motion on people, structures, and the earth's surface. The numerical rating is based on an earthquake intensity scale such as the Modified Mercalli Intensity Scale commonly used in the United States.

insoluble sludge
A thick, insoluble layer of various heavy metals and long-lived radionuclides that separate out of the waste over time and settle to the bottom of the waste tank.

ion
An atom or molecule that has gained or lost one or more electrons and has become electrically charged.

ion exchange
Process in which a solution containing soluble ions to be removed is passed through a column of material that removes the soluble ions by exchanging them with ions from the ion exchange material in the column. The process is reversible so that the trapped ions can be collected (eluted) and the column regenerated.

ion exchange media
A substance (e.g., a resin) that allows cesium to be pulled from a solution.

ionization
The process that creates ions. Nuclear radiation, x-rays, high temperatures, and electric discharges can cause ionization.

ionizing radiation
Radiation capable of displacing electrons from atoms or molecules to produce ions.

irradiation
Exposure to radiation.

isotope

An atom of a chemical element with a specific atomic number and atomic weight. Isotopes of the same element have the same number of protons but different numbers of neutrons.

latent cancer fatalities
The major ill-health effect used to show the consequences of environmental and occupational radiation exposure. The effect may take years to appear.

leachate
Liquid that has percolated through solid waste or other media and contains dissolved or suspended contaminants extracted from these materials.

leaching
The process in which a soluble component of a solid or mixture of solids is extracted as a result of percolation of water around and through the solid.

lithosphere
The solid part of the earth composed predominantly of rock.

lithostratigraphy
Geological formations based on the physical characteristics of rocks.

loam
Soil that consists mostly of sand, clay, silt, and decayed plant matter.

low-income communities
A community where 25 percent or more of the population is identified as living in poverty.

long-lived radionuclides
Radioactive isotopes with half-lives greater than about 30 years.

low-level waste
Radioactive waste not classified as high-level waste spent fuel, transuranic waste, or byproduct waste.

maximally exposed individual
A hypothetical member of the public assumed to permanently reside at the location of highest calculated dose.

maximum contaminant levels (MCLs)
The maximum permissible level of a contaminant in water that is delivered to a user of a public water system.

migration
The natural travel of a material through the air, soil, or groundwater.

Modified Mercalli Intensity Scale
A scale of measure used in the U.S. to show earthquake intensity.

mothball
To place and maintain facilities in a condition practical to restart, conducting only those activities necessary for routine maintenance or to protect human health and the environment.

nano
Prefix indicating one thousandth of a micro unit; 1 nanocurie = 10^-9 curie.

National Environmental Policy Act of 1969 (NEPA)
Law that requires that Federal agencies assess the environmental consequences associated with their actions.

National Register of Historic Places

A list maintained by the National Park Service of architectural, historical, archaeological, and cultural sites of local, state, or national importance.

natural radiation or natural radioactivity
Background radiation. Some elements are naturally radioactive whereas others are induced to become radioactive by bombardment in a reactor or accelerator. Naturally occurring radiation is indistinguishable from induced radiation.

nuclear energy
The energy liberated by a nuclear reactor (fission or fusion) or by radioactive decay.

nuclear radiation
Radiation, usually alpha, beta, or gamma, which emanates from an unstable atomic nucleus.

Nuclear Regulatory Commission (NRC)
The independent Federal commission that licenses and regulates nuclear facilities.

offsite population
The offsite population is defined as the collective sum of individuals located within an 80-kilometer (50-mile) radius of the accident location.

organic compounds
Chemical compound containing carbon.

outfall
Place where liquid effluents enter the environment and are monitored.

particulates
Solid particles small enough to become airborne.

pH
A measure of the hydrogen ion concentration in aqueous solution. Acidic solutions have a pH from 0 to 7, basic solutions have a pH from 7 to 14.

people of color communities
A population that is classified by the U.S. Bureau of the Census as Black, Hispanic, Asian and Pacific Islander, American Indian, Eskimo, Aleut, and other non-white persons whose composition is at least equal to or greater than the state minority average of a defined area or jurisdiction.

permeability
Ability of rock, groundwater, soil, or other substance to be flowed through.

person-rem
The radiation dose commitment to a given population; the sum of the individual doses received by a population segment.

physiographic
Geographic regions based on geologic setting.

pollution
The addition of any undesirable agent to an ecosystem.

precipitate
An insoluble solid that can be separated from liquid by filtration (used as a noun).

precipitation

The process of forming a precipitate from a solution.

prevention of significant deterioration (PSD)
This standard establishes the acceptable amount of deterioration in air quality. When the air quality of an area meets the standards for a specific pollutant, the area is declared to be in attainment for that pollutant. When the air quality of an area does not meet the standard for a specific pollutant, the area is said to be in nonattainment for that pollutant. PSD requirements allow maximum allowable increases (increments) in ambient air pollutant concentration (sulfur dioxide, particulate, nitrogen oxide) for construction or modification of facilities which by definition do not "significantly deteriorate" the existing baseline air quality.

rad
Acronym for radiation absorbed dose; it is the basic unit of absorbed dose equal to the absorption of 0.01 joules per kilogram of absorbing material.

radiation
The emitted particles and/or photons from the nuclei of radioactive atoms. A shortened term for ionizing radiation or nuclear radiation as distinguished from nonionizing radiation (i.e., microwaves, ultra-violet rays, etc.).

radiation shielding
Reduction of radiation by interposing a shield of absorbing material between a radioactive source and a person, laboratory area, or radiation-sensitive device.

radioactivity
The spontaneous decay or disintegration of unstable atomic nuclei, accompanied by the emission of radiation.

radioisotopes
Radioactive isotopes.

radiolysis
Radiation-induced decomposition of a substance.

rem
The unit of dose for biological absorption. It is equal to the product of the absorbed dose in rads and a quality factor and a distribution factor.

repository
A place in which immobilized high-level waste is to be disposed in isolation from the environment until it has decayed to harmless levels.

Richter scale
A scale by which earthquakes are measured with graded steps from 1 through 10. Each step is approximately 60 times greater than the preceding step and is adjusted for different regions of the earth.

risk
Quantitative expression of possible impact that considers both the probability that a hazard causes harm and the consequences of that event (e.g., for cancer risk, the product of the annual frequency of occurrence multiplied by the number of latent cancer fatalities).

runoff
The portion of rainfall, melted snow, or irrigation water that flows across the ground surface and eventually is returned to streams. Runoff can carry pollutants into receiving waters.

saltcake

Concentrated waste in the form of crystallized salts resulting from the evaporation of liquid high-level waste.

saltstone
Low radioactivity fraction of high-level waste from ITP mixed with cement, flyash, and slag to form a grout (concrete-like) block.

sanitary landfill
A solid waste disposal facility on land constructed in a manner that protects the environment; waste is spread in thin layers, compacted to the smallest practical volume, and covered with soil at the end of each working day.

scrubber
Engineered equipment used to remove constituents from a gas stream by absorption or chemical reaction.

sedimentation
The settling of excess soil and mineral solids of small particle size contained in water.

seismic load
The force due to earthquakes.

seismicity
The tendency for earthquakes to occur.

shield
An engineered body of absorbing material used to protect personnel from radiation.

sludge
The precipitated solids (primarily oxides and hydroxides) that settle to the bottom of the storage tanks containing liquid high-level waste.

slurry
A suspension of solid particles (sludge) in water.

storage
Retention of material in a manner permitting retrieval.

supernatant
The radioactive layer of highly-mobile liquid containing soluble salts that remains above the saltcake and/or insoluble sludge in a waste tank.

surface water
All water on the Earth's surface, as distinguished from groundwater.

tank farm
An installation of interconnected underground tanks for the storage of high-level radioactive liquid wastes.

toxicity
The quality or degree of being poisonous or harmful to plant or animal life.

transuranic waste
Radioactive waste containing more than a specified concentration of alpha-emitting transuranic radionuclides with half-lives greater than 20 years (presently, more than 100 nanocuries per gram of waste).

vault
A reinforced concrete structure for storage.

vitrification
Immobilization by incorporating into glass.

volatile organic compounds
An organic compound with a vapor pressure greater than 0.44 pounds per square inch at standard temperature and pressure.

volatilized
Cause to pass off as a vapor.

water quality standard
Provisions of state or Federal law that consist of a designated use or uses for the waters of the United States and water quality criteria for such waters based upon those uses. Water quality standards are used to protect the public health or welfare, enhance the quality of water, and serve the purposes of the Act.

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APPENDIX A

SUPPLEMENTAL TECHNICAL DATA

APPENDIX A
SUPPLEMENTAL TECHNICAL DATA

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Table A-1. Typical chemical composition of SRS liquid high-level radioactive waste.^a

Component	Sludge^b, weight percent	Supernatant^c, weight percent
NaNO3	2.8	48.8
NaNO2	-	12.2
NaOH	3.3	13.3
Na2CO3	-	5.2
NaAl(OH)4	-	11.1
Na2SO4	-	6.0
NaF	-	0.2
NaCl	-	0.4
Na2SiO3	-	0.1
Na2CrO4	-	0.2
Ni(OH)2	1.9	-
HgO	1.6	-
UO2(OH)2	3.4	-

Iron oxide	30.1	-
Aluminum oxide	32.9	-
Manganese oxide	0.5	-
Silicon oxide	5.9	-
Zeolite	3.7	-

a. Source: WSRC (1994a).
b. Analysis of insoluble solids (dry basis).
c. Analysis of soluble solids (dry basis).

Table A-2. Typical radionuclide content of combined supernatant, saltcake, and sludge in all tanks in the F- and H-Area Tank Farms (curies per liter).^a

	F-Area tanks			H-Area tanks	
Radionuclide	Composite	High	Low	Composite	High
^3H	-	-	-	0.00108	-
^89Sr	0.0232	0.291	-	0.0 248	5.02
^90Sr	0.951	47.6	1.45E-03	1.54	9.25
^90Y	0.951	47.6	1.45E-03	1.53	9.25
^91Y	0.0396	0.502	-	0.0449	0.925
^95Zr	0.0608	0.766	-	0.0766	1.51
^95Nb	0.135	1.66	-	0.166	3.17
^106Ru	0.0254	0.206	2.51E-06	0.0925	1.35
^106Rh	0.0254	0.206	2.51E-06	0.0925	1.35
^137Cs	1.03	3.43	0.0661	1.51	3.43
^137Ba	0.951	3.17	0.0608	1.40	3.17
^144Ce	0.370	2.91	-	1.14	1.93
^144Pr	0.370	2.91	-	1.14	1.93
^147Pm	0.262	1.72	4.76E-04	0.978	10.30
^235U	2.22E-08	1.61E-07	1.48E-09	8.72E-09	9.78E-08
^238U	8.72E-07	7.66E-06	1.66E-08	5.55E-08	1.03E-06
^238Pu	4.49E-05	6.08E-04	-	0.0243	0.106
^239Pu	2.59E-04	2.03E-03	4.23E-06	2.32E-04	7.66E-04
^240Pu	7.93E-05	5.55E-04	8.98E-07	-	-
^241Pu	-	-	-	0.0251	-

^241Am	-	-	-	3.17E-06	-
^244Cm	2.25E-03	2.48E-03	-	2.22E-05	2.54E-04

----

a. Source: WSRC (1994a).

Table A-3. F- and H-Area high-level waste tank features.^a

Tank Type	Construction date	Capacity of each tank	Key design features	Percent of total waste stored in this tank type	r co i
I	1951-1953	2.8 million liters (740,000 gallons)	1.5 meter (5-foot) high secondary containment pans Active waste cooling systems	12	
II	1955-1956	4 million liters (1,030,000 gallons)	1.5 meter (5-foot) high secondary containment pans Active waste cooling systems	4	
III	1967-1981	4.9 million liters (1.3 million gallons)	Full height secondary containment Active waste cooling system	77	
IV	1958-1963	4.9 million liters (1.3 million gallons)	Single steel tank, no secondary containment No active waste cooling systems	7	

----

a. Sources: C. T. Main (1991), Wells (1994).

Figure A-1.

Figure A-1. High-level waste tank status.

Table A-4. High-level waste tank leakage and spill history.

Tank Number	Tank Type	Date	Occurrence
1-9	I	--	Leakage from primary t secondary containment

			release to the environ
8	I	1961	Fill-line encasement l approximately 5,700 li gallons), causing soil contamination and pote groundwater contaminat
16	II	1972	Leakage of approximate tens of gallons from s containment to the env
13	II	1983	Spill of approximately (100 gallons)^d
37	III	1989	Transfer line leaked a 225 kilograms (500 pou concentrated (after vo reduction in evaporato

----

a. Source: C. T. Main (1991).
b. Source: Odum (1976).
c. Source: Poe (1974).
d. Source: Boore et al. (1986).
e. Source: WSRC (1992a).

Note: These leak sites have been cleaned up or stabilized to prevent the further spread of contamination and are monitored by groundwater monitoring wells established under SRS's extensive Groundwater Monitoring Program. Remediation and environmental restoration of contaminated sites at the F- and H-Area Tank Farms will be undertaken when waste removal plans for the tanks are completed and surplus facility deactivation and decommissioning plans are developed.

Table A-5. Estimated annual material consumption attributable to the proposed action.^a,b

Material	Proposed action (kilograms)	Proposed action (pounds)
Nitrogen	6,803,000	15,000,000
Carbon dioxide	113,000	250,000
Sodium hydroxide	1,490,000	3,290,000
Nitric acid	148,000	326,000
Formic acid	66,000	146,000
Glass frit	680,000	1,500,000
Copper formate	1,700	3,750
Sodium titanate	15,000	33,100
Sodium nitrite	194,000	428,000
Boric acid	200	440
Potassium nitrate	200	440

Oxalic acid	170,100	375,000
Sodium tetraphenylborate	245,000	540,000
Cement	7,892,000	17,400,000
Flyash	35,516,000	78,300,000
Slag	35,516,000	78,300,000

----

a. Sources: WSRC (1991); Cauthen (1994a); McGuire (1994); Rutland (1994); Uzochukwu (1994a,b).
b. Based on 75 percent attainment.

Table A-6. Summary of permitted nonradiological air emissions.^a

Pollutant	Proposed action with ITP pre-treatment (kilograms per hour)	Proposed action with ITP pre-treatment (pounds per hour)	No-action alternative (kilograms per hour)	No-action alternative (pounds per hour
	Peak Emissions			
Benzene	25.25	55.66	N/R^c	N/R
Mercury	0.01	0.03	6.68E-05	1.47E-0
Formic acid	0.08	0.18	N/R	N/R
Volatile organics	2.40	5.29	2.40	5.29
Particulates	3.23	7.13	0.65	1.43
Carbon monoxide	21.16	46.65	5.20	11.47
Nitrogen oxides	284.23	626.62	9.04	19.93
Sulfur dioxide	8.43	18.59	1.06	2.34
N-Paraffin	0.13	0.29	0.13	0.29
Tributylphosphate	0.05	0.12	0.05	0.12
	(MTPY)^d	(TPY)^e	(MTPY)	(TPY)
	Annual Average Emissions			
Benzene	47.23	52.06	N/R	N/R
Mercury	0.08	0.09	5.98E-04	6.59E-0
Formic acid	1.44	1.59	N/R	N/R
Volatile organics	14.21	15.67	14.21	15.67
Particulates	5.00	5.51	4.43	4.88
Carbon monoxide	74.78	82.43	1.30	1.43
Nitrogen oxides	75.42	83.14	2.26	2.49
Sulfur dioxide	2.11	2.32	0.27	0.29
N-Paraffin	1.14	1.26	1.14	1.26
Tributylphosphate	0.46	0.51	0.46	0.51

----

a. Sources: SCDHEC (1993a), SCDHEC (1993b), SCDHEC (1994a), SCDHEC (1994b), SCDHEC
b. Emissions for ion exchange are assumed the same as proposed action without benze
c. N/R = Not reported.
d. MTPY = Metric tons per year.
e. TPY = Tons per year.

Table A-7. Estimated airborne radiological emissions from vitrification, ITP, Extended Sludge

Processing, and saltstone (curies per year) - proposed action.^a,b

Isotope	Vitrification Facility	Salt F	LPDrain	Vault	Tank 48	Tank 49	Tank 50	Ta
H-3	5.84	0.460	0.371	10.0	1.70	1.70	2.15	1.
C-14	0.0212	N/R^c	N/R	N/R	N/R	N/R	N/R	N/
Sr-90	1.40E-05	6.04E-09	9.55E-11	N/R	7.18E-06	7.18E-06	6.51E-08	3.
Y-90	1.45E-05	6.04E-09	9.55E-11	N/R	7.42E-06	7.42E-06	6.72E-08	3.
Cs-137	3.29E-03	1.72E-07	2.72E-09	N/R	6.48E-04	6.48E-04	2.35E-08	6.
Ba-137M	3.15E-03	1.72E-07	2.72E-09	N/R	6.19E-04	6.19E-04	2.25E-08	6.
Ce-144	2.99E-06	N/R	N/R	N/R	9.20E-11	9.20E-11	1.40E-10	9.
Pr-144	3.00E-06	N/R	N/R	N/R	9.23E-11	9.23E-11	8.37E-11	9.
Pm-147	7.33E-06	3.44E-08	5.46E-10	N/R	1.18E-07	1.18E-07	1.07E-07	1.

a. Sources: DOE (1987), WSRC (1990).
b. Vitrification Facility = Vitrification processes including Stack 291-S (S-Area).
Salt F = Saltstone Manufacturing and Disposal (Z-Area).
LP Drain = Saltstone low point drain tank (Z-Area).
Vault = Saltstone vault (Z-Area).
Tanks 48, 49, 50, and 22= In-Tank Precipitation processing tanks (H-Area).
ITP-Strip = ITP Filter/Stripper including Filtrate Hold Tank (In-Tank Precipitat
Tanks 40, 42, and 51 = Extended Sludge Processing (H-Area).
Pump Pit = Low Point Pump Pit (S-Area).
Late Wash = Late Wash (S-Area).
c. N/R = Not reported.

Table A-8. In-Tank Precipitation air emissions permit limits.^a

Pollutant	Hourly maximum (kilograms per hour)	Hourly maximum (pounds per hour)	Annual avera (metric tons per year)
Benzene	2.30	5.07	20.15
Mercury	2.5x10^-4	5.4x10^-4	2.2x10^-3

a. Source: SCDHEC (1994a).

Table A-9. Saltstone Manufacturing and Disposal air emissions permit limits.^a

Pollutant	Hourly maximum (kilograms per hour)	Hourly maximum (pounds per hour)	Annual (metric tons per ye
Benzene	0.09	0.20	0.57

Nitrogen oxides	9.04	19.93	2.26
Carbon monoxide	5.20	11.47	1.30
Sulfur dioxide	1.06	2.34	0.27
Particulates	0.65	1.43	4.43
Volatile organics	2.40	5.29	14.21

a. Source: SCDHEC (1993a).

Table A-10. Vitrification Facility air emissions permit limits.^a

Pollutant	Hourly maximum (kilograms per hour)	(pounds per hour)	Annual a (metric tons per y
Benzene	15.19	33.49	25.17
Mercury	0.01	0.03	0.08
Formic acid	0.08	0.18	1.44
Nitrogen oxides	275.19	606.69	73.16
Carbon monoxide	15.96	35.18	73.48
Sulfur dioxide	7.37	16.25	1.84
Particulates	2.59	5.70	0.57

a. Source: SCDHEC (1993b); SCDHEC (1994c).

Table A-11. Waste generation forecast for the proposed action, the no-action alternative, and the phased and immediate replacement ion exchange alternatives (cubic meters).^a,b

Year	Low-level waste	DWPF Organic waste^c	Mixed waste	Hazardous waste	Construction Debris on average per year^d
Proposed Action					
1995	1,500	45	30	2	190
1996	2,200	150	30	2	20
1997	2,200	150	30	2	210
1998	2,200	150	30	2	
1999	2,200	150	30	2	250
2000	2,200	150	30	2	60
2001	2,200	150	30	2	190^f,g
2002 to 2018	2,200	150	30	2	
Totals	52,100	3,495	720	48	2,630
No Action					
1995	790	0	2	1	190^h
1996	79 0	0	2	1	

1997	790	0	2	1	
1998	790	0	2	1	
1999	790	0	2	1	
2000 to 2024	790	0	2	1	1 90^h
Totals	23,700	0	60	30	380
Phased Replacement					
1995	1,500	45	30	2	190
1996	2,200	150	30	2	20
1997	2,200	150	30	2	210
1998	2,200	150	30	2	
1999	2,200	150	30	2	250
2000	2,200	150	30	2	60
2001	2,200	150	30	2	190
2002	2,200	150	30	2	
2003	2,200	150	30	2	190
2004	2,200	150	30	2	
2005	2,200	150	30	2	230
2006	2,200	150	30	2	40
2007	2,200	150	30	2	230
2008	2,200	150	30	2	40
2009	2,200	150	30	2	230
2010	2,200	0	30	2	
2011 to 2018	2,200	0	30	2	190^f,i
Totals	52,100	2,145	720	48	2, 830
Immediate Replacement					
1995	790	0	2	1	190
1996	790	0	2	1	20
1997	790	0	2	1	210
1998	790	0	2	1	
1999	790	0	2	1	280
2000	790	0	2	1	90
2001	790	0	2	1	220
2002	790	0	2	1	30
2003	790	0	2	1	220
2004	790	0	2	1	30
2005 to 2028	2,200	0	32	2	190^f,j
Totals	60,700	0	788	58	2,810

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a. Sources: Bignell (1994), Cauthen (1994b), Dawsey (1994), Hagenbarth (1994), Reeves (1994), Stevens (1994), WSRC (1994b).
b. Entries rounded off from source data.
c. Based on 75 percent attainment.
d. Construction debris is nonhazardous, nonradioactive solid waste such as tree stumps and concrete.
e. Sanitary waste is nonhazardous, nonradioactive solid waste.
f. Zero in alternate years.
g. In 2019, construction debris goes to zero.
h. In 2008, construction debris goes to zero.
i. In 2019, construction debris goes to zero.
j. In 2020, construction debris goes to zero.

Note 1: The waste generation forecast tabulated above does not include melters and, other possibly highly radioactive failed equipment, that would be placed in interim storage in the Failed Equipment Storage Vaults, and thus not affect other SRS waste management infrastructure. One failed melter having a volume of approximately 310 cubic meters (11,000 cubic feet) may be generated

every 2 years, and an unknown volume of other failed equipment is estimated to be generated over the assumed 24-year operational life of DWPF under the proposed action or either ion exchange alternative (Glenn 1994).

Note 2. The waste generation forecast tabulated above does not include waste from Late Wash because no estimates were available from the 30-year forecast data. The microfilters to be used at Late Wash are expected to be identical to the ITP filter and when spent would yield 16.3 cubic meters of waste. However, at this time DOE cannot forecast the rate at which the filters would be spent nor the classification (i.e., mixed or low-level waste).

Note 3: The waste generation forecast is based heavily on assumptions, historical data, and anticipated operations of each facility. Assumptions and uncertainties applicable to waste generation forecast are listed below.

Assumptions:

- Assume an effective facility waste minimization program that does not include implementation of radical technological developments that would result in a substantial decrease of waste generated.
- Assume current regulatory and DOE requirements, available technologies, and waste certification requirements.
- Low-level radioactive waste generation volumes do not reflect compaction prior to disposal.

Uncertainties:

- The effect future waste certification and treatment requirements will have on waste generation.
- The effect of higher waste generation due to more rigid compliance, operations, etc. than in the past.
- The effect of delays in funding, facility shutdowns, transitions, decontamination and decommissioning, and remediation.
- The effect of using contractors rather than SRS forces.
- The effect of future changes to the SRS mission.
- The effect of changing regulatory and legal requirements.

Table A-12. Estimated chemical composition of sludge feed.^a,b

Soluble solids				Insolu	
Radioactive (from computation)		Nonradioactive (from analysis)		Radioactive (from computation)	
Species	Weight percent	Species	Weight percent	Species	Weight percent
Group A^c	8.26E-4	NaNO3	28.9	Group A^c	0.343
Group B^d	2.3E-4	NaNO 2	11.7	Group B^d	1.12
Na2PuO2(O4)	1.61E-6	NaAlO3	16.1	PuO2	0.0456
UO2(OH)2	6.79E-6	NaOH	31.6	SrCO3	0.131
Na2RuO4	3.23E -3	Na2CO3	4.89	Y2(CO3)3	0.0865
Na2RhO4	3.31E-4	Na2SO4	6.55	RuO2	0.0826
CsNO3	6.18E-3	NaCl	0.198	RhO2	0.0175
Ba(NO3)2	1.0 4E-5	NaF	0.0128	CsNO3	0.0132
Sr(NO3)2	9.28E-6	Na[HgO(OH)]	0.0397	B a(SO4)2	0.187
Y(NO3)3	6.59E-6			UO2(OH)2	0.238
NaI	1.86E-5			N aI	0.0131

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a. Source: WSRC (1992b).
b. Based on a theoretical blend of existing tank sludges.
c. Tc, Se, Te, Rb, Mo.
d. Ag, Cd, Cr, Pd, Tl, La, Ce, Pr, Pm, Nd, Sm, Tb, Sn, Sb, Co, Zr, Nb, Eu, Np, Am, Cm.

Table A-13. Estimated radionuclide composition of sludge feed.^a,b

Nuclide	Activity curies/ liter	Activity curies/ gallon	Nuclide	Activity curies/ liter	Activity curies/ gallon
H-3	5.10E-06	1.93E-05	Sb-126	4.76E-06	1.80E-05
C-14	8.48E-06	3.21E-08	Sb-126m	3.38E-05	1.28E-04
Cr-51	2.18E-20	8.24E-20	Te-125m	6.76E-02	2.56E-01
Co-60	3.96E-02	1.50E-01	Te-127	2.96E-05	1.12E-04
Ni-59	5.50E-06	2.08E-05	Te-127m	3.01E-05	1.14E-04
Ni-63	6.82E-04	2.58E-03	Te-129	7.50E-16	2.84E-15
Se-79	4.17E-05	1.58E-04	Te-129m	1.17E-15	4.44E-15
Rb-87	1.47E-10	5.55E-10	I-129	3.46E-09	1.31E-08
Sr-89	9.83E-09	3.72E-08	Cs-134	3.73E-02	1.41E-01
Sr-90	1.07E+01	4.05E+01	Cs-135	6.53E-07	2.47E-06
Y-90	1.10E+01	4.16E+01	Cs-136	1.13E-43	4.26E-43
Y-91	1.74E-07	6.57E-07	Cs-137	3.54E-01	1.34E+00
Zr-93	2.62E-04	9.90E-04	Ba-136m	1.99E-42	7.52E-42
Zr-95	2.35E-06	8.90E-06	Ba-137m	3.38E-01	1.28E+00
Nb-94	2.22E-08	8.39E-08	Ba-140	2.36E-40	8.95E-40
Nb-95	4.99E-06	1.89E-05	La-140	1.01E-40	3.83E-40
Nb-95m	2.91E-08	1.10E-07	Ce-141	8.40E-15	3.18E-14
Tc-99	7.34E-04	2.78E-03	Ce-142	2.23E-09	8.45E-09
Ru-103	3.96E-12	1.50E-11	Ce-144	2.31E+00	8.74E+00
Ru-106	5.28E-01	2.00E+00	Pr-143	2.80E-38	1.06E-37
Rh-103m	3.86E-12	1.46E-11	Pr-144	2.31E+00	8.74E+00
Rh-106	5.31E-01	2.01E+00	Pr-144m	2.75E-02	1.04E-01
Pd-107	3.36E-06	1.27E-05	Nd-144	1.13E-13	4.27E-13
Ag-109	0.00E+00	0.00E+00	Nd-147	2.96E-48	1.12E-47
Ag-110m	2.91E-05	1.10E-04	Pm-147	5.65E+00	2.14E+01
Cd-113	1.23E-17	4.64E-17	Pm-148	1.63E-14	6.16E-14
Cd-115m	2.99E-13	1.13E-12	Pm-148m	2.36E-13	8.93E-13
Sn-121m	6.71E-06	2.54E-05	Sm-147	4.57E-10	1.73E-09
Sn-123	5.97E-05	2.26E-04	Sm-148	1.33E-15	5.02E-15
Sn-126	3.41E-05	1.29E-04	Sm-149	4.10E-16	1.55E-15
Sb-124	1.67E-11	6.31E-11	Sm-151	5.71E-02	2.16E-01
Sb-125	1.94E-01	7.34E-01	Eu-152	8.61E-04	3.26E-03

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a. Source: Kalinich (1994).
b. Based on a theoretical blend of existing tank sludges.

Table A-14. Typical chemical and radionuclide composition of low-level radioactivity salt solution.^a

Chemical components	Molar concentration^b High	Average
Na^+	6	5.2
OH^-	3	1.5
NO3^-	4	1.9
NO2^-	2	0.8
A1O2^-	1.5	0.3
CO3^2-	0.3	0.2
SO4^2-	0.4	0.2
Tetraphenylborate	0.007	0.0018
C1^-	0.05	0.03
F^-	0.07	0.02
Oxalate	0.02	0.02
PO4^3-	0.05	0.01
SiO3^2-	-	0.005
HCOO^-	-	0.004
CrO4^2-	0.08	0.004
MoO4^-	-	0.006
Hg	1E-05	9E-06
Methanol (average by batch)	9E-05	9E-06
Isopropanol	8E-04	8E-05
Benzene	3E-05	2E-06
Radionuclide components	**Concentration (microcuries per liter)**	
Cs-137	20	2.5
Cs-134	0.3	0.025
Sr-90	40	12
Tc-99	800	100
Ru-106	6,000	30
Sb-125	-	10
I-129	0.3	0.1
H-3	-	10
Gross alpha	20	-

a. Source: WSRC (1993a).
b. Molar concentration = The number of grams of component equal to its molecular weight in a liter of solution [e.g., for NO3^-, molecular weight 14 (for N) + 3 - 16 (for O3) = 62 grams per liter of solution = 62 molar].

Table A-15. Typical chemical and radionuclide composition of washed precipitate slurry (10 percent by weight).

Dissolved components^a	Average molar concentration (in liquid phase)^b High	Average	Low
Na^+	0.4	0.25	0.20
OH^-	0.08	0.001	1E-05
NO3-	0.005	0.0012	0.0001
NO2^-	0.12	0. 08	0.02
A1O2^-	0.01	0.003	0.001
CO3^2-	0.01	0.002	0.001
SO4^2-	0.004	0.002	0.0005
CI^-	0.01	0.0003	0.0002

F^-	0.0006	0.0002	4E-05
K^+	0.06	0.04	0.03
PO4^3-	0.0003	0. 0001	5E-05
CrO4^2-	0.0001	4E-05	1E-05
NH4^+	0.003	0.002	0
C6H6	0.08	0.04	0.01
CH5 OH	0.05	0.04	0.03
B(OH)2O^-	0.03	0.02	0.01
Radionuclide components^c		**Concentration (curies per liter)**	
Cs-137		12	
Cs-134		0.04	
Sr-90		0.01	
Tc-99		1 .8E-05	
Ru-106		8.3E-06	
Sb-125			
I-129		4E-11	
H-3			
Gross alpha		2.4E-05	
Precipitate solids^a		**Concentration (grams per liter)**	
Potassium tetraphenylborate	95	82	44
Cesium tetraphenylborate	1.2	0.8	0.6
Ammonia tetraphenylborate	7	3.4	0
Sodium titanate	4	2	1
Diphenyl mercury	3	0.9	0.5
Bi phenyl	3	2.5	2
Phenylboronic acid	3	2.7	2

a. Source: WSRC (1993a).
b. Molar concentration = The number of grams of component equal to its molecular weight in a liter of solution. [e.g., for NO3-, molecular weight 14 (for N) + 3 x 16 (for O3)=62 grams per liter of solution = 62 molar].
c. Source: Kalinich (1994).

Table A-16. Approximate chemical composition of salt solution feed to Saltstone Manufacturing and Disposal.^a

	Weight percent		
Component	ITP	Effluent Treatment Facility	Nominal blend
H2O	71.8	69.9	71.6
NaNO3	13.3	21.9	14.3
NaNO2	4.1	0.02	3.6
NaOH	4.2	4.4	4.2
Na2CO3	1.4	1.4	1.4
NaAl(OH)4	2.9	0.06	2.6
Na2SO4	1.6	0.22	1.4
NaF	0.05	0.017	0.05
NaCl	0.11	0.08	0.1
Na2SiO3	0.04	0.2	0.06

Na2CrO4	0.04	9 x 10^-4	0.04 (Cr-114 ppm)
NaHgO (OH)	4.2 x 10^-6	5 x 10^-4	6 x 10^-5 (Hg-0.5 ppm)
NaAg (OH)2	1.3 x 10^-7	-	1.2 x 10^-7 (Ag-0.0008 ppm)
Na2MoO4	0.007	-	0.006
KNO3	7.8 x 10^-6	0.02	0.002
CaSO4	2.3 x 10^-4	0.3	0.034
Na2C2O4	0.16	0.05	0.15
Na3PO4	0.11	0.02	0.10
NH4NO3	6.1 x 10^-6	0.6	0.07
NaB(C6H5)4	0.07	-	0.06
Other salts^b	0.007	0.7	0.08
Total organics	0.10	-	0.09

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a. Source: WSRC (1992c).

b. Other salts include:

As	3 x 10^-8	-	3 x 10^-8	(0.0003 ppm)
Ba	1.9 x 10^-8	3 - 10^-4	3 x 10^-5	(0.3 ppm)
Cd	5 x 10^-6	7 - 10^-5	1 x 10^-5	(0.12 ppm)
Se	8 x 10^-5	-	7 x 10^-5	(0.7 ppm)
Pb	2 x 10^-12	0.0011	1 x 10^-4	(1.3 ppm)

Table A-17. Approximate radionuclide composition of salt solution feed to Saltstone Manufacturing.^a

		Nanocuries per gram	
Radionuclide	Half-life (years)	DWPF	Effluent Treatment Facility
^3H	12.33	10	60
^14C	5730	0.009	-
^59Ni	80,000	0.0002	-
^60Co	5.27	0.2	0.12
^63Ni	100	0.02	-
^79Se	6.5 - 10^4	0.3	-
^90Sr	29	0.4	0.3
^90Y	3.1 hr^b	0.4	0.3
^99Tc	2.1 - 10^5	60	-
^106Ru	1.0	30	4
^106Rh	2.18 hr^b	30	4
^125Sb	2.73	9	0.05
^125mTe	58 da^b	0.2	0.05
^126Sn	10^5	0.2	-
^126Sb	12.5 da^b	0.02	-
^126mSb	19 min^c	0.2	-
^129I	1.7 - 10^7	0.035	0.015
^137Cs	30.2	10	4.9
^137mBa	2.5 min^b	9.2	4.5
^147Pm	2.62	4	0.4
^151Sm	93	2	-
^154Eu	8.2	1	-
^155Eu	4.76	0.3	-
^238Pu	87.7	0.7	0.03
^239Pu	24,000	0.007	0.01
Other beta, gammas^d		-	9
Total alpha emitters		0.9	0.17

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a. Source: WSRC (1992c).

b. Daughter of preceding isotope.

c. Daughter of ^126Sn.
d. Miscellaneous short-lived radionuclides.

Table A-18. Estimated chemical composition of radioactive glass waste form.^a

Chemical components	Weight percent
Al2O3	3.66
B2O3	10.33
BaCl2	3.24E-03
BaO	0.0407
Ca3(PO4)2	0.16
CaO	1.17
CoO	9.03E-03
Cr2O3	0.12
Cs2O	0.0742
Cu2O	0.0358
Fe2O3	6.66
Fe3O4	3.18
La2O3	0.36
Li2O	4.05
MgO	1.58
MnO	1.83
Na2O	16.4
NiO	0.68
PbO	0.0454
PuO2	0.0164
RhO2	6.02E-03
RuO2	0.0289
SiO2	44.52
SrO	0.0325
ThO2	0.25
TiO2	0.71
UO2	1.32
Y2O3	0.0193
Zeolite	1.61
ZnO	0.10
ZrO2	0.35
Other solids	0.0999

a. Source: WSRC (1992b).

Table A-19. Estimated radionuclide composition of radioactive glass waste form.^a

Nuclide	Activity curies per pound	Nuclide	Activity curies per pound	Nuclide
H-3	0.00E+00	Sb-126m	1.19E-04	Eu-156
C-14	0.00E+00	Te-125m	7.44E-02	Tb-160
Cr-51	2.51E-20	Te-127	3.24E-05	Tl-208
Co-60	4.58E-02	Te-127m	3.31E-05	U-232
Ni-59	6.46E-06	Te-129	8.23E-16	U-233
Ni-63	8.02E-04	Te-129m	1.28E-15	U-234
Se-79	4.58E-05	I-129	0.00E+00	U-235
Rb-87	2.35E-10	Cs-134	9.09E-02	U-236
Sr-89	1.15E-08	Cs-135	2.68E-05	U-238
Sr-90	1.26E+01	Cs-136	2.11E-43	Np-236

Y-90	1.29E+01	Cs-137	1.49E+01	Np-237
Y-91	2.04E-07	Ba-136m	2.32E-42	Pu-236
Zr-93	3.01E-04	Ba-137m	1.12E+01	Pu-237
Zr-95	2.71E-06	Ba-140	2.76E-40	Pu-238
Nb-94	2.60E-08	La-140	1.16E-40	Pu-239
Nb-95	5.70E-06	Ce-141	9.68E-15	Pu-240
Nb-95m	3.36E-08	Ce-142	2.59E-09	Pu-241
Tc-99	8.30E-04	Ce-144	2.66E+00	Pu-242
Ru-103	4.54E-12	Pr-143	3.23E-38	Am-241
Ru-106	6.07E-01	Pr-144	2.66E+00	Am-242
Rh-103m	4.41E-12	Pr-144m	3.20E-02	Am-242m
Rh-106	6.09E-01	Nd-144	1.31E-13	Am-243
Pd-107	3.97E-06	Nd-147	3.40E-48	Cm-242
Ag-109	0.00E+00	Pm-147	6.52E+00	Cm-243
Ag-110m	3.39E-05	Pm-148	1.88E-14	Cm-244
Cd-113	1.35E-17	Pm-148m	2.72E-13	Cm-245
Cd-115m	3.27E-13	Sm-147	5.39E-10	Cm-246
Sn-121m	2.13E-05	Sm-148	1.56E-15	Cm-247
Sn-123	6.87E-05	Sm-149	4.80E-16	Cm-248
Sn-126	1.19E-04	Sm-151	6.68E-02	
Sb-124	1.92E-11	Eu-152	9.94E-04	Total
Sb-125	2.29E-01	Eu-154	1.67E-01	
Sb-126	1.66E-05	Eu-155	1.28E-01	

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a. Source: Kalinich (1994).

Table A-20. Permit limits and monitoring results for National Pollutant Discharge Elimination System Outfalls DW-003 and DW-004 for 1993.

Parameter^a	Units	Permit limits^a DW-003	Monitoring results DW-003^b
pH	Standard Units	6.0-9.0	6.7-8.6
BOD5^c	mg/L^d	30-60	<1-12.2
TSS^e	mg/L	30-60	2-53
Fecal Coliform	Colonies/ 100 milliliters	200-400	<2-33
TRC^g	mg/L	NA	--
Oil and Grease	mg/L	NA	--

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a. Source: SCDHEC (1984).
b. Source: Arnett (1994).
c. BOD5 = 5-day biochemical oxygen demand.
d. mg/L = milligrams per liter.
e. TSS = Total suspended solids.
f. NA = Not applicable.
g. TRC = Total residual chlorine.
h. RR = Monitor and record results.

Table A-21. Monitoring results for National Pollutant Discharge Elimination System Outfall DW-005.^a

		Results^b	
Parameters	Units	July 22, 1992	December 14, 1993
Temperature	Degrees Celsius	29.0	7.4
pH	Std. Units	6.1	6.6
Total suspended solids	mg/L^c	26.0	5.0
COD^d	mg/L	12.0	11.5
Dissolved oxygen	mg/L	6.8	1.10
Nitrite/nitrate	mg/L	1.15	5.41
TOC ^e	mg/L	4.58	3.9
BOD5^f	mg/L	4.8	<1.0
TKN^g	mg/L	0.70	<0.2
Chlorine	mg/L	<0.1	--
Sulfate	mg/L	NA^h	15.9
Oil and grease	mg/L	NA	<1.0
Phenol	mg/L	NA	<0.002
Ammonia-nitrogen	mg/L	NA	0.05
Boron	mg/L	NA	<0.03
Chromium	mg/L	NA	<0.02
Copper	mg/L	NA	<0.01
Mercury	mg/L	NA	<0.0001
Lead	mg/L	NA	0.011
Zinc	mg/L	NA	0.133
Benzene	mg/L	NA	<0.0008
Phosphate-P	mg/L	2.65	0.667

a. Source: WSRC (1993b).
b. Westinghouse Savannah River Company (grab samples).
c. mg/L = milligrams per liter.
d. COD = Chemical oxygen demand.
e. TOC = Total organic carbon.
f. BOD5 = 5-day biochemical oxygen demand.
g. TKN = Total Kjeldahl nitrogen.
h. NA = Not available.

Table A-22. Estimated DWPF employment with proposed action, the no-action alternat alternatives.^a

	Proposed action^b		No-action alternative	
Year	Construction Labor	Operations Labor	Construction Labor	Operations Labor
1994	235	1335	200	1335
1995	235	1240	200	1095
1996	115	1228	75	855
1997	115	1197	60	615
1998	115	1180	60	375
1999	270	1064	60	135
2000	270	1061	60	135
2001	60	1061	60	135
2002	60	1061	60	135
2003	60	1061	60	135
2004	60	1061	60	135
2005	60	1061	60	135
2006	60	1061	60	135
2007	60	1061	60	135
2008	60	1061	60	135
2009	60	1061	60	135

a. Source: Bignell (1994).
b. DWPF proposed action construction and operations manpower forecast includes ITP, Storage Vaults, new Glass Waste Storage Building, and Saltstone Disposal Vaults. analyses discussed in Sections 4.1.7, 4.2.7, and 4.3.7.
c. Assumes that for DWPF Ion Exchange phased replacement, construction begins in 20
d. Assumes that for DWPF Ion Exchange immediate replacement, construction begins in 2004.

Figure A-2.
Figure A-2. Projected SRS employment by alternative compared to baseline Site employment.

Table A-23. Estimated annual material consumption associated with ion exchange operation.^a

Material	Usage (kilograms)	Usage (pounds)

Sodium nitrate	21,000	46,000
Sodium hydroxide	146,000	322,000
Sodium titanate	5,000	11,000
Nitric acid	67,000	148,000
Ion exchange resin	11,000	24,000

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a. Source: Scott (1993).

APPENDIX A

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ACCIDENT ANALYSES

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APPENDIX B. ACCIDENT ANALYSIS

B.1 Introduction

The purpose of this appendix is to provide technical information and discussion to support the accident analysis results presented in Sections 4.1.12, 4.2.12, and 4.3.12 of the Defense Waste Processing Facility (DWPF) Supplemental Environmental Impact Statement (Supplemental EIS). The scope of this appendix is limited to "maximum reasonably foreseeable" radiological accidents and chemical hazards over a wide range of frequencies to bound the potential impacts of the proposed action and its alternatives.

B.2 Recent Melter Incident

An incident occurred on April 3, 1993 (WSRC 1993a) during nonradiological

operational testing of the melter off-gas system. An excessive vacuum was generated in the melter when the primary off-gas exhaust fan was operated at maximum speed with the purge and pressure control air turned off. As a result, approximately 4,788 liters (1,265 gallons) of cooling water were inadvertently drawn into the melter. To prevent recurrence of this event, which would have a much higher impact if it were to occur during radioactive operations, mechanical vacuum protection was installed for the melter seal pot and for both condensate tanks. Additional alarms, interlocks, and controls were also installed to help ensure that this type of event would not occur during radioactive operations. The facility equipment incurred mechanical damage, but no one was injured and the environment was not impacted.

B.3 Methodology for Determining and Evaluating Maximum Reasonably Foreseeable Radiological Accidents

This section describes the methodology used to determine and evaluate the radiological accident scenarios that present the greatest consequences (i.e., dose and health detriments) and risks (i.e., dose and latent fatal cancers) under each alternative. Subsections B.3.1 through B.3.3 describe the methodology used to identify the various types of potential accident scenarios requiring consideration in this Supplemental EIS, the methodology used to determine which of the various radiological accident scenarios present the greatest consequences and risks (referred to as "maximum reasonably foreseeable accidents"), and the methodology used to further evaluate the maximum reasonably foreseeable radiological accidents.

B.3.1 IDENTIFICATION OF POTENTIAL RADIOLOGICAL EVENTS AND ACCIDENTS

Facilities and operations are analyzed to identify all hazards and potential accidents associated with the facility and the process systems, components, equipment, or structures and to establish design and operational means to mitigate these hazards and potential accidents. The results of these analyses are documented in safety analysis reports, which must be approved by DOE. A major portion of the safety analysis report is the safety analysis, the documented process to provide systematic identification of hazards within a nuclear operation; to describe and analyze the adequacy of measures taken to eliminate, control, or mitigate identified hazards; and to analyze and evaluate potential accidents and their associated risks to workers, the public, the environment, and the facility.

For each facility that has been designed and constructed, DOE has developed safety analysis reports as well as several other types of safety analysis documentation (e.g., process hazards reviews, hazards analysis documents, and justifications for continued operations). For those facilities included in the proposed action and the no-action alternatives, preliminary safety analysis documentation has been developed that estimates the maximum potential consequences and risks that would be associated with their operation. An extensive review of these documents was performed to identify the various types of accidents and their causes or initiating events ("initiators") that could occur at the different facilities. Based on this review, a large number of potential accident scenarios were identified as having the capability to release radionuclides within a facility or to the environment. Section B.3.2 discusses how the large number of accidents was evaluated to determine the maximum reasonably foreseeable accidents.

The estimated frequency of occurrence, or likelihood, for an accident is typically presented in terms of "accidents per year." For example, if an accident is only expected to occur once in a million years, the estimated frequency for this accident would be presented as one accident divided by one million years (1/1,000,000), which is 1 - 10^-6 per year or 1.0E-06 per year. Initiating events that can lead to an accident can be defined in three broad categories: external initiators, internal initiators, and natural phenomena

initiators. External initiators (e.g., aircraft crashes and nearby explosions or fires) originate outside the facility and can affect the ability of the facility to maintain confinement of radioactive or hazardous material. Internal initiators originate within a facility (e.g., equipment failures or human error) and are usually the result of the facility's operation. Natural phenomena initiators include weather-related (e.g., floods and tornadoes) and seismic events. Sabotage and terrorist activities (i.e., intentional human initiators) might be either external or internal initiators. For the purpose of this analysis, initiators are defined in terms of events that may cause, either directly or indirectly, a release of radioactive or hazardous material within a facility or to the environment by failure or bypass of confinement.

Accidents are usually put into one of four categories -- anticipated accidents, unlikely accidents, extremely unlikely accidents, and not reasonably foreseeable accidents -- based on their estimated "likelihood" or frequency of occurrence. Table B-1 presents these accident categories and their frequency ranges as defined by DOE (1994a).

Table B-1. Accident frequency categories.^a

Frequency category	Accident frequency range (accidents per year)
Anticipated accidents	1 per year > frequency > 1E-02 per year
Unlikely accidents	1E-02^ per year > frequency > 1E-04^ per ye
Extremely unlikely accidents	1E-04^ per year > frequency > 1E-06^ per ye
Not reasonably foreseeable accidents	1E-06^ per year > frequency > 1E-07^ per ye

a. Frequency categories as defined in draft DOE (1994a).

Some of the safety analysis report accidents use accident scenarios (or sequences). For example, the frequency of a design basis earthquake at SRS is 2.0E-04^ per year, but the Vitrification Facility earthquake scenario is followed by other events, such as detonations, that enable releases of radioactive material. The frequency of this entire sequence is 5.17E-05^ per year.

B.3.2 METHODOLOGY/ASSUMPTIONS

Several general assumptions were made concerning exposed individual groups and full radiological operations.

B.3.2.1 Exposed Individuals

To discuss the exposed individual groups, the analysis used the following definitions:

- Close-in Worker. The close-in worker is defined as the maximally exposed individual located closer than 100 meters (328 feet) from where the accidental release occurs.

- Collocated Worker. The collocated worker (as used in this supplemental EIS) is defined as an individual located at a distance of 100 meters

(328 feet) from where the accidental release occurs.

- Maximally Exposed Offsite Individual (MEI). The MEI is defined as the hypothetical member of the public who is located at the nearest site boundary from where the release occurs (DOE 1994a).

- Offsite Population. The offsite population is defined as the collective sum of individuals located within an 80-kilometer (50-mile) radius of the accident location.

South Carolina state route 125, which is accessible to the public, traverses the SRS on the western side. DOE does not require that roads that traverse the Site and are accessible to the public be considered as locations for computing MEI dose if DOE can control access to the roads in emergencies (DOE 1994a). During emergencies, DOE can restrict public access to this road with manned barricades at each end. Following an event, the portion of route 125 inside the Site boundaries would be patrolled to escort members of the public to the nearest Site boundary. It is assumed that it could take up to 2 hours to implement the access controls to route 125 and relocate members of the public. Since the dose received by the MEI following an accident is expected to be greater than that received by an individual assumed to be stranded on route 125 for 2 hours, the dose to an individual on route 125 was not calculated.

Numerical results from calculational models for predicting potential latent health effects become difficult to quantify as the distance from exposed individuals to the point of radiological release diminishes below 100 meters (328 feet). This difficulty is primarily due to the fact that actual configuration of the worker to the source cannot be meaningfully defined. This state-of-the-art constraint is accepted by DOE and explained in detail by DOE (1994a). In addition to latent health effects, the worker could also be acutely injured by the event itself. For this reason, the potential radiological effects to close-in workers are discussed qualitatively in Sections 4.1.12.2 and 4.2.12.1.

B.3.2.2 Full Scale Radiological Operations of the Vitrification Facility

Because of the complexity of the Vitrification Facility and its interactions with its supporting facilities, three proposed phases of radiological operation occur for final testing of the Vitrification Facility and initiating full radiological operations. These three phases of operation are referred to as Operating Modes A, B, and C.

Operating Mode A involves mixing radioactive sludge received from Extended Sludge Processing with a nonradioactive chemical simulant in the Chemical Process Cell to attain a glass-forming feed for the melter. The nonradioactive chemical simulant is substituted for the radioactive precipitate hydrolysis aqueous feed that would normally be received from hydrolysis of radioactive precipitate in the Salt Process Cell. It would contain only nonhazardous chemicals that are not reactive, volatile, or flammable. As a result, many of the hazards, such as benzene and hydrogen generation and radioactivity in the precipitate hydrolysis aqueous feed that would be associated with full radiological operations, would not exist in this mode of operation (Bignell 1994a).

Operating Mode B also involves processing radioactive sludge, but would replace the nonreactive chemical simulant used in Operating Mode A with a nonradioactive chemical precipitate slurry intended to simulate as closely as possible the feed that would eventually be received from ITP and Late Wash. This mode simulates all aspects of the eventual radioactive feed except for the radioactivity. All of the hazards associated with full radioactive operations except for radiation-related accidents would be present.

Operating Mode C involves full radiological operations, including both sludge

received from Extended Sludge Processing and radioactive salt solutions received from the ITP and Late Wash.

Detailed safety analyses are being developed to analyze full radioactive operations of the Vitrification Facility. Existing safety analyses, such as those documented in the draft Vitrification Facility safety analysis report (WSRC 1993b), have been developed only for Operating Mode B. Full-scale testing has not been completed for ITP and Late Wash, so estimated curie balances for Operating Mode C (i.e., source term inventories) were compared to estimated curie balances for Operating Mode B to determine a conservative "scaling" or "adjustment" factor. This factor was used to establish bounding consequences and risk estimates for full radioactive operation, instead of attempting to generate specific analyses addressing full radiological operations (i.e., Operating Mode C), which could involve substantial margins of error or uncertainties (Bignell 1994a). As a result of this comparison (Kalinich 1994), only two accident scenarios were determined to require adjustment (i.e., increases in consequences) due to full radiological operations. For the explosion scenario in the Sludge Receipt and Adjustment Tank and the earthquake scenario (i.e., Accidents 7 and 12, respectively, on Table B-2), the consequences were determined to increase by one percent. The change in the melter spill accident dose on Tables B-2 and B-3 were not due to Mode C operations, but rather due to a reevaluation of the accident source term (Kalinich 1994).

B.3.2.3 Not Reasonably Foreseeable Accidents

Accidents in the not reasonably foreseeable accident frequency range (less than 1.0E-06 event per year) are not addressed in this Supplemental EIS because their risk (frequency times consequences) is not expected to be greater than accidents analyzed under the other frequency ranges. For example, the not reasonably foreseeable accident frequency range includes accidents such as an aircraft crash or an accident at Saltstone Manufacturing and Disposal. An aircraft crash into the Vitrification Facility is of concern because it could result in a radioactive release of materials from the facilities. Based on the types of aircraft that could potentially fly over or near SRS, it was determined that the estimated frequency (or likelihood) of an aircraft crash into any of the facilities considered in this Supplemental EIS is less than 1.0E-07 event per year. Therefore, in accordance with NEPA guidance (DOE 1993), aircraft crashes into SRS facilities were not analyzed further in this Supplemental EIS.

Another not reasonably foreseeable accident scenario that was not further analyzed in this Supplemental EIS involves an unmitigated radionuclide release from Saltstone Manufacturing and Disposal. According to the Saltstone Justification for Continued Operation (WSRC 1992a), a conservative unmitigated accident scenario was analyzed in an early safety analysis report draft (WSRC 1992b), but no identified credible event could be postulated to initiate the accident. Therefore, further consideration was not given to analyzing this accident in the Supplemental EIS.

B.3.3 SELECTION OF MAXIMUM REASONABLY FORESEEABLE RADIOLOGICAL EVENTS AND ACCIDENTS

To determine the maximum reasonably foreseeable radiological vitrification-related facility accidents under the proposed action, the various potential accident scenarios identified in Table B-2 were partitioned into their appropriate frequency range based on their estimated frequency of occurrence, as shown in Figure B-1. The vertical dotted lines in Figure B-1 represent the boundaries for each accident category frequency range. Within each of the frequency ranges illustrated in Figure B-1, the accident that presents the greatest consequences (i.e., dose) to a maximally exposed (offsite) individual (MEI) is identified as a maximum reasonably foreseeable accident to be

further analyzed in the Supplemental EIS. Additionally, the accident within each frequency range that presents the greatest risk (i.e., frequency x consequence) to the MEI was identified as a maximum reasonably foreseeable accident. As a result, all other postulated accident scenarios, such as those described in Tables B-2 and B-5 were screened from further consideration in the Supplemental EIS because the consequences and risks associated with these accidents would be lower than -- or are "bounded" by -- the consequences and risks associated with the maximum reasonably foreseeable accidents.

Table B-2. Vitrification-related radiological process accidents considered for further evaluation.^a

			Dose (rem)		Adjusted dose (rem)	
	Accident^b	Frequency	MEI	Collocated worker	MEI^c	Colloc worker
1	Leaks-MFT	3.7E+00	3.70E-07	3.20E-06	3.70E-07	3.20E-
2	Overflow-MFT	8.5E-02	3.70E-06	3.20E-05	3.70E-06	3.20E-
3	Uncon. reaction-SRAT	4.5E-02	1.70E-04	1.50E-03	1.70E-04	1.50E-
4	Overflow-LPPP-ST	1.8E-02	1.00E-05	6.40E-3	1.00E-05	6.40E-
5	Leaks-LPPP-ST	1.0E-02	1.10E-05	7.10E-3	1.10E-05	7.10E-
6	Melter Spill^h	9.3E-03	2.20E-06	1.90E-05	3.40E-02	2.94E-
7	Explosion-SRAT	1.1E-03	3.20E-02	2.80E-01	3.23E-02	2.83E-
8	Fire-Deflag. - FHT	4.3E-03	5.50E-04	3.40E-01	i	i
9	Filtration Cell Deflag.	4.0E-03	3.20E-03	2.00E+00	i	i
10	Canister Rupture	1.3E-04	7.90E-06	6.90E-05	7.90E-06	6.90E-
11	Solids Fire - NIT	1.2E-04	2.00E-02	1.20E+01	i	i
12	Earthquake	5.2E-05^j	6.70E+00	4.00E+03	6.77E+00	4.04E+
13	Large Liquid Spill/Fire	4.3E-06	6.80E-02	4.20E+01	i	i
14	Filter Cell Fire	3.0E-06	4.60E-03	2.80E+00	i	i
15	Fire/Annulus	1.1E-06	8.30E-02	5.20E+01	i	i

a. WSRC (1993b), Shapiro (1994), and Huang and Hang (1993).
b. In-Tank Precipitation accidents are numbered 8, 9, 11, 13, 14, and 15; all other Facility.

c. Maximally exposed individual (MEI) adjusted dose = MEI dose - scaling factor. S earthquake and explosion in SRAT; 1.00 for all others, Kalinich (1994). See Sec of scaling factor.
d. Worker adjusted dose = worker dose - scaling factor.
e. Since the dose was adjusted up, the risk had to be adjusted (calculated). Adjus frequency.
f. MEI potential fatal cancers = adjusted MEI dose in rem - (5.0 E-04 cancer per re
g. Worker potential fatal cancers = adjusted worker dose in rem - (4.0 E-04 cancer
h. Adjusted dose = MEI dose - 1.5454 E+04; worker dose - 15,454 (Kalinich 1994). N a reevaluation of the accident source term.
i. In-Tank Precipitation accidents do not require adjustments.
j. This is the frequency due to the postulated sequence of events; it is based on e events per year.
k. NA = not applicable. The number of latent fatal cancers is not calculated becau would result in death within a few days.

Note: MFT = Melter Feed Tank. ST = Sludge Tank.
SRAT = Sludge Receipt and Adjustment Tank. FHT = Filtrate Hold Tank.
LPPP = Low Point Pump Pit. NIT = Non-inerted Tank.

Table B-3. Bounding radiological accidents for proposed action.^a

			Adjusted dose (rem)		Dose (person-rem)	Pot
	Accident^b	Frequency per year	MEI	Collocated worker	Offsite population	MEI^c
1	Unc. react	4.50E-02	1.70E-04	1.50E-3	2.50E+00	8.50E-08
2	Melter spill^i	9.30E-03	3.40E-02	2.94E-01	4.90E+02	1.70E-05
3	Earthquake^j	5.20E-05^k	6.77E+00	4.04E+03	7.60E+04	3.38E-03

a. Source: WSRC (1993c), Bignell (1994c), and Huang and Hang (1993).
b. Accident Descriptions:
   1. Uncontrolled reaction - Sludge Receipt and Adjustment Tank (Vitrification Fac
   2. Melter spill (Vitrification Facility).
   3. Earthquake (Vitrification Facility).
c. MEI potential fatal cancers = (MEI adjusted dose in rem) - (5.0E-04 cancer per r
d. Worker potential fatal cancers = (Worker adjusted dose in rem) - (4.0E-04 cancer
e. Population potential fatal cancers = (population adjusted dose in person-rem) - person-rem).
f. MEI latent fatal cancer per year = (MEI adjusted dose in rem) - (5.0E-04^4 cance per year).
g. Worker latent fatal cancer per year = (Worker adjusted dose in rem) - (4.0E-04 c (frequency per year).
h. Population latent fatal cancer per year = (Population adjusted dose in person-re person-rem) - (frequency per year).
i. The stated Safety Analysis Report doses were multiplied by 15,454, Kalinich (199 to a reevaluation of the accident source term.
j. The stated Safety Analysis Report doses were multiplied by 1.01 to adjust for fu operations, Kalinich (1994).
k. This is the frequency due to the postulated sequence of events; it is based on e 2.0E-04 events per year.
l. NA = not applicable. The number of latent fatal cancers is not calculated becau would result in death within few days.

Figure B-1.

Figure B-1. Vitrification accident selection.

It should be noted that for all the accidents considered in this section, except for a severe earthquake induced release of radionuclides to the environment, the impacts from the accidents are independent of each other. In other words, it is assumed that the accidents are not caused by a common initiator; therefore, their consequences and risks are not additive. However, a severe earthquake is considered a common-cause initiator because it is expected to cause the simultaneous release of radioactive materials from the Vitrification Facility, ITP, and the F- and H-Area Tank Farms. Therefore, to determine the actual consequences to workers and members of the public from a design basis earthquake, the consequences of the materials released from each area as a result of a design basis earthquake must be added together. Table B-4 presents the postulated consequence (dose) to the MEI from a design basis earthquake-induced release of radioactive materials. The total dose in rem is essentially due to the dose from the Vitrification Facility alone.

Table B-4. Postulated MEI doses from the design basis earthquake releases.^a

	Dose (rem) MEI
Vitrification Facility	6.77E+00
ITP	b
F-Tank Farm	3.38E-05
H-Tank Farm	3.41E-03
Total	6.77E+00

a. A design basis earthquake has an estimated frequency of 2.00E-04 per year and involves a horizontal peak ground acceleration equal to 0.2 times that of gravity (i.e., 0.2g).
b. ITP is expected to withstand a 0.2g earthquake.

A number of studies have investigated the ways in which radioactivity reaches humans, how the body absorbs and retains it, and the resulting health effects. The International Commission on Radiological Protection (ICRP) has made specific recommendations for these health effects (ICRP 1991). This organization is the recognized body for establishing standards for the protection of workers and the public from the effects of radiation exposure. Health effects include acute damage (up to and including death) and latent effects, including cancers and genetic damage. Tables B-2 and B-3 present the estimated maximum number of latent fatal cancers expected from each maximum reasonably foreseeable accident. The number of potential latent fatal cancers is calculated by multiplying consequences (i.e., dose) and the appropriate International Commission on Radiological Protection Publication 60 conversion factor (i.e., 4.0E-04 death per rem or person-rem for workers and 5.0E-04 death per rem or person-rem for members of the public) (DOE 1993). Table B-3 summarizes the three maximum reasonably foreseeable radiological accidents identified under the proposed action, as well as the estimated health detriments (i.e., latent fatal cancers) expected from each accident.

Table B-5. Tank farm accidents under the no-action alternative considered for further evaluation.^a

Dose (rem)	Ris

	Accident	Frequency	MEI	Collocated worker^b	MEI
1	Accidental bypass of waste tank filter - H-Area	5.00E-01	7.30E-06	1.13E-03	3.68E-0
2	Waste tank overflow	9.00E-02	2.00E-05	e	1.80E-0
3	Tank leak - H-Area	3.00E-02	1.76E-08	e	5.29E-1
4	Waste tank filter fire - H-Area	2.50E-02	3.68E-03	5.65E-01	9.21E-0
5	Waste tank filter fire - F-Area	2.50E-02	6.39E-04	2.85E-01	1.60E-0
6	Hydrogen fire/waste tank - H-Area	5.00E-03	7.37E-04	1.13E-01	3.86E-0
7	Organic fire waste tank - H-Area	5.00E-03	1.35E-03	2.07E-01	6.76E-0
8	Organic fire waste tank - F-Area	5.00E-03	2.34E-04	1.05E-01	1.17E-0
9	Earthquake - H-Area	2.00E-04	3.41E-03	e	6.82E-0
10	Hydrogen exp. pump tank - H-Area	2.00E-05	1.16E-02	1.72E+00	2.30E-0
11	Hydrogen exp. pump tank - F-Area	2.00E-05	8.35E-03	3.48E+00	1.67E-0

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a. Source: WSRC (1994), and Mangiante (1994).
b. Maximum onsite individual at 100 meters and 99.5 percent meteorology (Mangiante
c. MEI potential fatal cancers = MEI in rem - (5.0E-04 cancer per rem).
d. Worker potential fatal cancers = worker dose in rem - (4.0E-04 cancer per rem).
e. Not available in Tank Farm Justification for Continued Operation (WSRC 1994).

The same methodology used to identify the maximum reasonably foreseeable radiological accidents under the proposed action as described above was used to select the maximum reasonably foreseeable radiological accidents under the no-action alternative. Table B-5 summarizes the various accidents considered under the no-action alternative. Figure B-2 illustrates these accidents according to their estimated frequency of occurrence. Table B-6 summarizes the maximum reasonably foreseeable radiological accidents identified as a result of screening the accidents considered under the no-action alternative, as well as the estimated health detriments expected from each accident.

For clarification, it should be noted that certain accidents represent both the accident with the largest potential consequences and the greatest potential risk within a given frequency range. In these instances, only one maximum reasonably foreseeable accident was identified because it would bound both the consequences and risks of other accidents within the same frequency range.

B.4 Maximum Reasonably Foreseeable Radiological Accident Scenario Descriptions for the Proposed Action

For each maximum reasonably foreseeable accident, Table B-3 presents the following information for the maximally exposed worker and member of the public:

- Radiological consequence presented as dose measured in units of rem to exposed individuals and presented as dose measured in person-rem to the offsite population

- Number of potential fatal cancers (measured in terms of total latent fatal cancers calculated by multiplying radiological consequences by the appropriate International Commission on Radiological Protection conversion factor)

- Potential for contracting a latent fatal cancer (measured in terms of latent fatal cancers per year, calculated by multiplying radiological consequences, estimated accident frequency, and the appropriate International Commission on Radiological Protection conversion factor)

Figure B-2.

Figure B-2. Tank farm accident selection.

Table B-6. Bounding radiological accidents for the no-action alternative.^a

			Dose (rem)		Dose (person-rem)	Potenti	
	Accident^b	Frequency per year	MEI^c	Collocated worker^d	Offsite population	MEI^e	Col wor
1	Waste Tank filter fire - H-Area	2.50E-02	3.68E-03	5.65E-01	2.20E+01	1.84E-06	2.2
2	Organic fire Waste Tank - H-Area	5.00E-03	1.35E-03	2.07E-01	8.40E+00	6.75E-07	8.2
3	Earthquake - H-Area	2.00E-04	3.41E-03	5.11E-01^k	1.00E+01	1.71E-06	2.0
4	Hydrogen Exp. Pump Tank - H-Area	2.00E-05	1.16E-02	1.72E+00	6.20E+01	5.80E-06	6.8

a. Source: WSRC (1994), Bignell (1994b), and Mangiante (1994).
b. Accident descriptions:
   1. Waste tank filter fire in H-Area.
   2. Organic fire in waste tank in H-Area.
   3. Earthquake in H-Area.
   4. Hydrogen explosion in a pump tank - H-Area.
c. MEI - maximally exposed individual, offsite.
d. Maximally exposed onsite individual at 100 meters and 99.5 percent meteorology (
e. MEI potential fatal cancers = (MEI dose in rem) x (5.0E-04 cancers per rem).
f. Worker potential fatal cancers = (Worker dose in rem) x (4.0E-04 cancers per rem
g. Population potential fatal cancers per year = (Population dose in person-rem) x
h. MEI latent fatal cancers per year = (MEI dose in rem) x (5.0E-04 cancers per rem
i. Worker latent fatal cancers per year = (Worker dose in rem) x (4.0E-04 cancers p

j. Population latent fatal cancers per year = (Population dose in person-rem) x (5. per year).
k. Not available in WSRC (1994); estimated by multiplying MEI dose by a factor of 1 dose for other accidents in this table.

Chapter 9 of the DWPF Safety Analysis Report contains further details and discussions for Accidents 1, 2, and 3 (WSRC 1993b). This document contains additional information, such as release fraction, source terms, and other assumptions used in the accident analyses. A brief description of each accident is provided in the following subsections. As noted earlier, the safety analysis is continuing and modifications would be implemented to reduce the risk below the values presented here (see Section 2.2.9, DWPF Safety Evaluation and Control).

B.4.1 ACCIDENT 1: UNCONTROLLED CHEMICAL REACTION IN THE VITRIFICATION FACILITY SLUDGE RECEIPT AND ADJUSTMENT TANK

Implementation of the accident screening methodology discussed in Section B.3 identified an uncontrolled chemical reaction in the Sludge Receipt and Adjustment Tank and the resulting release of radionuclides within the facility and to the environment as a maximum reasonably foreseeable event scenario. Uncontrolled reactions are the most rapid means of losing control of large volumes of highly contaminated materials. Uncontrolled reactions are defined as eructations (i.e., sudden loss of part of the contents of a vessel), foaming, boilover, gassing, or undesirably high temperatures that cause material decomposition and the evolution of hazardous vapors. The estimated frequency for this event scenario (including initiators and event progression leading to an inadvertent release) is 4.5E-02 event per year (WSRC 1993b). This accident scenario represents the accident with the greatest consequence and risk to the maximally exposed offsite individual within the anticipated accident frequency range defined in Table B-1.

B.4.2 ACCIDENT 2: ACCIDENTAL SPILL OF CONTENTS FROM VITRIFICATION FACILITY MELTER

An accidental spill of contents from the Vitrification Facility melter and the resulting release of radionuclides within the facility and to the environment is a maximum reasonably foreseeable event scenario. This accident scenario involves the release of molten glass to the melt cell. The molten glass is collected into a spill pan located below the melter and designed to contain one full melter load. A fraction of the radioactive material in the spilled molten glass is assumed to become airborne, and radionuclides are assumed to be released through the melter off-gas system as a result of the spill. Both sources are subsequently released to the environment through the sand filter and Zone 1 exhaust stack. The estimated frequency for this accident scenario (including initiators and event progression leading to the inadvertent release) is 9.3E-03 event per year (WSRC 1993b). This accident scenario represents the accident with the greatest consequence and risk to the maximally exposed offsite individual within the unlikely frequency range.

B.4.3 ACCIDENT 3: EARTHQUAKE-INITIATED RELEASE OF RADIONUCLIDES FROM THE VITRIFICATION FACILITY

An earthquake-induced radionuclide release from the Vitrification Facility is a maximum reasonably foreseeable accident scenario. For this particular accident scenario, a design basis earthquake (i.e., an earthquake resulting in peak horizontal ground accelerations equal to two-tenths of gravity, or 0.2g)

is considered. The estimated frequency for this accident scenario (including the earthquake frequency of 2E-04 events per year and the event progression) is 5.2E-05 event per year (WSRC 1993b). This accident scenario represents the accident with the greatest consequence and risk in the extremely unlikely accidents frequency range.

B.5 Maximum Reasonably Foreseeable Radiological Accident Scenario Descriptions for the No-Action Alternative

Under this alternative, liquid radioactive wastes would continue to be stored in the tank farm facilities, and the vitrification-related facilities would not operate. Table B-6 presents the bounding radiological accidents for the no-action alternative.

B.5.1 ACCIDENT 1: H-AREA WASTE TANK HEPA FILTER FIRE

A waste tank HEPA filter fire in the H-Area is the accident that presents the highest radiological consequences and risk to the offsite population within the anticipated accidents frequency range. The waste tank HEPA filters are the last stage of purifying air drawn from the tank vapor space before it is released to the atmosphere. If combustibles were to collect in the tank HEPA filter, a fire could occur. In the postulated filter fire, it is assumed that the entire filter is destroyed and its contents are completely airborne as respirable particles less than 10 microns in diameter. The frequency is estimated to be 2.5E-02 per year (Du Pont 1988).

B.5.2 ACCIDENT 2: ORGANIC FIRE IN AN H-AREA WASTE TANK

An organic fire in an H-Area waste tank is the maximum reasonably foreseeable accident that would present highest risk to the facility workers or the offsite population within the unlikely accidents frequency range. The organic material is present by virtue of its limited solubility and entrainment in the waste streams from the canyons. Some oxygen in the tank vapor space is contributed by the purge air. Additional oxygen (and hydrogen) would be generated in the tank by the radiolytic breakdown of water. When an ignition source is provided, an organic fire could occur. In this accident scenario, the tank walls and top are assumed to remain intact, and no liquid leaves the tank. The condenser and filter in the ventilation system are assumed to fail through exposure to excessive heat. Airborne particles are assumed to be produced by the supernatant vaporized by the heat of combustion and by the burning organic solution. The estimated frequency for this accident is 5.3E-03 per year (Du Pont 1988).

B.5.3 ACCIDENT 3: H-AREA EARTHQUAKE

An earthquake is the initiator for the maximum reasonably foreseeable accident with the greatest consequence within the extremely unlikely accidents frequency range. The waste tanks and evaporators are expected to withstand the earthquake. Earthquake damage to the tank farm facilities is based on two potential effects, soil liquefaction and pipe breaks. The earthquake analysis assumes that four Type IV (single wall) tanks are partially uncovered, but remain intact, and the transfer line from the H-Area Condensate Transfer System pump tank to the waste tank fails and releases liquid to the ground. The estimated earthquake frequency is 2.0E-04 per year (Du Pont 1988).

B.5.4 ACCIDENT 4: HYDROGEN EXPLOSION IN THE PUMP TANK - H-AREA

In the extremely unlikely frequency range, the greatest risk accident is a hydrogen explosion in an H-Area pump tank. Hydrogen is formed in the pump

tank from radiation, which causes radiolysis, forming hydrogen and oxygen. Since hydrogen is a highly flammable gas, special safety and operating considerations are needed to prevent fires and/or explosions. If the ventilation system for a tank failed and a source of ignition was present, a hydrogen explosion could occur. The estimated frequency is 2.0E-05 per year (Du Pont 1988).

B.6 Impacts from Postulated Chemical Hazards

In order to adequately assess the hazards involved in activities and operations performed to support a complex process such as vitrification, a thorough discussion of nonradiological chemical hazards must accompany the radiological concerns addressed in previous sections of this appendix. The health effects resulting from exposure to different toxic chemicals are more difficult to quantify than those resulting from radiological exposures. Therefore, the consequences of chemical accidents in this Supplemental EIS are presented in terms of airborne concentrations at various exposed individual's locations. These airborne concentration values were then compared to established exposure guidelines to enable the decisionmaker to determine the relative impact for each postulated chemical hazard. This section addresses postulated chemical accident scenarios associated with facilities and operations under the proposed action and no-action alternatives. A qualitative discussion addressing chemical hazards under the ion exchange alternative is provided in Chapter 4, Section 4.3.12.2.

To determine the potential health effects that could result from chemical accident scenarios identified in this section, the resulting airborne concentrations for each accident were compared against Emergency Response Planning Guidelines (ERPG) values (AIHA 1991). These values, which are specific for each chemical, are established for three general severity levels:

- Exposure to concentrations greater than ERPG-1 values for a period of time greater than 1 hour results in an unacceptable likelihood that a person would experience mild transient adverse health effects, or perception of a clearly defined objectional odor.
- Exposure to concentrations greater than ERPG-2 values for a period of time greater than 1 hour results in an unacceptable likelihood that a person would experience or develop irreversible or other serious health effects, or symptoms that could impair one's ability to take protective action.
- Exposure to concentrations greater than ERPG-3 values for a period of time greater than 1 hour results in an unacceptable likelihood that a person would experience or develop life- threatening health effects.

The primary concentration-limit guidelines (ERPG values) were used if values for the chemicals of interest had been published. If primary guidelines were not available, then the hierarchy of alternative concentration-limit parameters (Table B-7) was used, in the order presented, on the basis of availability of parameters for hazardous chemicals (WSRC 1992c). If application of the guideline value to a particular chemical resulted in a value for a lower hazard class that is higher than the value for the next higher hazard class (e.g., ERPG-1-equivalent value greater than ERPG-2-equivalent value), then that value would be adjusted downwards to match that of the next higher hazard class.

Table B-7. Recommended hierarchy of alternative concentration-limit parameters.

Primary guideline	Hierarchy of alternative guidelines	Source of concentration parameter

ERPG-3		AIHA 1991
	EEGL^a (30-min)	NAS 1985
	IDLH^b	NIOSH 1990
ERPG-2		AIHA 1991
	EEGL (60-min)	NAS 1985
	LOC^c	EPA 1987
	PEL-C^d	29 CFR 1910.100
	TLV-C^e	ACGIH 1992
	TLV-TWA^f x 5	ACGIH 1992
ERPG-1		AIHA 1991
	PEL-STEL^g	29 CFR 1910.100
	TLV-STEL^h	ACGIH 1992
	TLV-TWA x 3	ACGIH 1992

a. Emergency Exposure Guidance Level (EEGL): "A concentration of a substance in air (as a gas, vapor, or aerosol) that may be judged by the Department of Defense to be acceptable for the performance of specific tasks during rare emergency conditions lasting for periods of 1 to 24 hours. Exposure at an EEGL might produce reversible effects that do not impair judgment and do not interfere with proper responses to the emergency." The EEGL is "a ceiling guidance level for a single emergency exposure, usually lasting from 1 to 24 hours -- an occurrence expected to be infrequent in the lifetime of a person."

b. Immediately Dangerous to Life or Health: "The maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing (e.g., severe eye irritation) or irreversible health effects."

c. Level of Concern: "The concentration of an extremely hazardous substance in air above which there may be serious irreversible health effects or death as a result of a single exposure for a relatively short period of time."

d. Permissible Exposure Limit - Ceiling: "The employee's exposure which shall not be exceeded during any part of the work day."

e. Threshold Limit Value - Ceiling: "The concentration that should not be exceeded during any part of the working exposure."

f. Threshold Limit Value - Time-Weighted Average: "The time-weighted average concentration for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect."

g. Short-Term Exposure Limit: "The employee's 15-minute time weighted average exposure which shall not be exceeded at any time during a workday unless another time limit is specified...."

h. Threshold Limit Value - Short-Term Exposure Limit: "The concentration to which workers can be exposed continuously for a short period of time without suffering from (1) irritation, (2) chronic or irreversible tissue damage, or (3) narcosis of a sufficient degree to increase the likelihood of accidental injury, impair self-rescue, or materially reduce work efficiency, and provided that the daily TLV-TWA is not exceeded.

The historic mechanical and operational chemical hazard initiators at SRS are leaks, overflows, transfer errors, and uncontrolled reactions. Table B-8 provides the frequencies for these principal chemical hazards based on historic information (Du Pont 1988).

Table B-8. Estimated anticipated chemical accident initiator frequencies.^a

Chemical hazard initiators	Annual frequency
Leaks	2.0E-01

Overflows	2.0E-01
Transfer Errors	1.0E+00
Uncontrolled Reactions	2.0E-01

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a. Source: Du Pont (1988).

Although the frequencies for these release initiators are within the anticipated accident range, the consequences of these types of accidents have been small and limited to localized soil contaminations and personnel in the immediate vicinity of the accident. They have been successfully mitigated through training and implementation of procedures. However, for completeness, other chemical release initiators such as explosions, tornadoes, and earthquakes that have potentially much greater consequences and much lower frequencies were considered in this analysis.

The SRS Emergency Plan (WSRC 1993d) defines appropriate response measures for the management of site emergencies (e.g., chemical release accidents). It incorporates into one document a description of the entire process designed to respond to and mitigate the consequences of a potential chemical accident. For chemical release emergencies, protective actions are designed to keep onsite and offsite exposures as low as possible. Low exposure is accomplished by minimizing the time spent in the vicinity of the hazard, keeping personnel as far from the hazard as possible, and taking advantage of available shelter. In determining the emergency classification for events that involve an actual or potential release of toxic chemicals, ERPG-2 values or appropriate alternative guideline values are used. When the chemical exposure exceeds the ERPG-1 or equivalent value within a facility, decisions regarding habitability and when to evacuate the facility are made based on procedural considerations including:

- Can facility functions performed in the facility be performed at an alternative facility without undue disruption of response/mitigation activities?

- Is the sheltering exposure more acceptable than the potential evacuation exposure?

- Can staff levels be reduced or staff rotated?

As levels approach ERPG-2 or equivalent values, the use of protective clothing/respiratory protection as a requirement for remaining in the affected facility must be considered. After an emergency is declared, protective actions could be implemented for non-essential workers as a precaution when the projected or actual chemical concentration reaches an ERPG-1 or equivalent value. Protective actions are recommended to offsite authorities when the concentration at the site boundary is projected to or does exceed the ERPG-2 level.

Drills and exercises are conducted at SRS to develop, maintain, and test response capabilities, and validate the adequacy of emergency facilities, equipment, communications, procedures, and training.

B.6.1 CHEMICAL HAZARD EVALUATION FOR THE PROPOSED ACTION

A review of the DWPF Safety Analysis Report (WSRC 1993b), the ITP Addendum to the Liquid Waste Handling Facilities Safety Analysis Report (WSRC 1993c), and the Saltstone Justification for Continued Operation (WSRC 1992a) was performed to provide the technical basis for addressing chemical hazards posed by the proposed action. The Vitrification Facility and ITP safety documentation provides quantitative analyses addressing potential chemical accident scenarios, and the Saltstone Manufacturing and Disposal safety documentation

provides a brief qualitative discussion of chemical hazards. Chemical hazard discussions for Extended Sludge Processing and Late Wash are considered to be bounded by those provided in the Vitrification Facility and ITP evaluations and are not provided for in this Supplemental EIS.

Ground-level airborne chemical concentrations were evaluated for individuals at 100 meters (328 feet) and at the Site boundary using ALOHA (Area Locations of Hazardous Atmospheres), a computer code that provides estimates of dispersion of gases from accidental spills. ALOHA employs time-dependent models that treat neutral or heavy gases and a variety of time-dependent sources including evaporating puddles (for spills, leaks, etc.) and instantaneous releases (for splashing, explosions, etc.). Meteorological conditions moderately favorable for atmospheric dispersion and wind speeds of 4.5 meters per second (10 miles per hour) were used to determine the peak 15-minute averaged concentrations for concentration-dependent chemicals (non-carcinogens such as nitric acid, formic acid, etc.) and dose-dependent chemicals (carcinogen or carcinogen-suspect such as benzene).

B.6.1.1 Vitrification Facility

The safety analysis report for the Vitrification Facility provides results for various types of accident analysis that involve the release of toxic chemicals within the facility or to the environment that could result in accidental exposures to workers and members of the public. Generally, the following types of accidental exposures could occur as a result of vitrification operations:

- Inorganic toxic chemical exposures. Accidental inhalation, ingestion, or contact with toxic chemicals can result in adverse effects to personnel. These chemicals, which include certain inorganic acids and caustics stored in the Cold Feed Storage Facility, are pumped to the Vitrification Facility to support operations. Other materials of concern include decontamination solutions that may contain low concentrations of inorganic acids or caustics.

- Organic chemical exposures. Accidental inhalation, ingestion, or contact with certain organic chemicals can result in adverse health effects to personnel. The primary organic chemical of concern is benzene, a suspected carcinogen that is generated during waste treatment operations performed at ITP and processing activities in the Vitrification Facility Salt Process Cell which further treats material received from ITP. Other organic chemicals of concern include miscellaneous organic chemicals contained within the material received from the ITP and organic chemicals stored in the Cold Feed Storage Facility, such as formic acid and oxalic acid.

- Exposures to minerals/metals. Accidental inhalation, ingestion, or contact with certain minerals/metals poses a health concern. A metal of particular concern in the Vitrification Facility is mercury, which is extracted from the waste feed.

Table B-9 identifies the different types of chemical accidents evaluated for the Vitrification Facility. Table B-9 also presents a comparison of the resulting airborne concentrations for exposed individuals at 100 meters (328 feet) and at the site boundary against ERPG-1, -2, and -3 values. Where ERPG values are not available, the assessment substituted other alternative guideline values as defined in Table B-7.

Table B-9. Summary of the Vitrification Facility chemical hazard comparisons (milligrams per cubic meter).

	Airborne concentrations	
	At 100	At Site

Accident	Location	Initiator	Frequency (annual)	m^a,b (mg/m^3)^c	boundary (mg/m^3)
Benzene^e Release	Organic Waste Storage Tank	Explosion	2.7E-04	1.4E+04	5.7E+00
	Organic Waste Storage Tank	Tornado (176kph)^f	1.0E-04	1.0E+04	1.5E+01
Formic Acid Release (90 percent solution)	Cold Feed Area	Tornado (176kph)^f	1.0E-04	1.0E+02	6.0E-02
	Cold Feed Area	Earthquake (0.1g)	2.0E-03	1.0E+02	6.0E-02
	Cold Feed Area	Leaks, transfer errors, overflows, etc.	7.5E-01	1.6E+01	0.0E+00
	Chemical and Industrial Waste Treatment Area	Tornado (176kph)^f	1.0E-04	4.9E+01	3.0E-02
	Chemical and Industrial Waste Treatment Area	Earthquake (0.1g)	2.0E-03	4.9E+01	3.0E-02
Nitric Acid Release (50 percent solution)	Cold Feed Area	Tornado (176kph)^f	1.0E-04	6.3E+01	3.0E-02
	Cold Feed Area	Earthquake (0.1g)	2.0E-03	6.3E+01	5.0E-02
	Cold Feed Area	Leaks, transfer errors, overflows, etc.	7.5E-01	1.8E+01	9.2E-03
	Vitrification Building	Leaks, transfer errors, overflows, etc.	4.8E-02	2.1E-03	2.4E-04

	Chemical and Industrial Waste Treatment Area	Tornado (176kph)^f	1.0E-04	6.2E+01	3.0E-02
	Chemical and Industrial Waste Treatment Area	Earthquake (0.1g)	2.0E-03	6.2E+01	3.0E-02
Mercury Release (Vapor)	Formic Acid Vent Condenser	Loss of cooling	(g)	3.2E-04	3.7E-05
	Melter Offgas	Loss of cooling	(g)	3.7E-03	4.2E-04

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a. To convert to feet, multiply by 3.281.
b. Concentrations provided are peak 15-minute-average airborne concentrations.
c. mg/m^3 = milligrams per cubic meter.
d. Emergency Response Training Guidelines.
e. Suspected human carcinogen. Available epidemiologic studies are conflicting or insufficient to confirm an increased risk of cancer in exposed humans.
f. Kph = Kilometers per hour; maximum wind speed.
g. Because consequences are negligible, frequency is not calculated for mercury releases.

Vitrification Facility Chemical Accident Initiators

Chemical releases are usually the result of high frequency initiators such as leaks, transfer errors, spills, overflows, and uncontrolled reactions, which generally result in small spills of minor consequence. However, other initiators such as a tornado and an earthquake were also considered as release mechanisms for chemical hazards at the Vitrification Facility.

Tornadoes - Occasional tornadoes are expected in the southeastern areas of the United States. Although tornadoes can be very destructive, a typical tornado contacts the ground for only a few minutes and damages a relatively small land area. In addition to generating pressure forces on structures, high winds can move objects, converting them into potentially damaging missiles. The design basis tornado for the Vitrification Facility is defined as having the following characteristics:

- Rotational wind speed: 370 kilometers per hour (230 miles per hour)
- Translational wind speed: 8 to 80 kilometers per hour (5 to 50 miles per hour)
- Rate of pressure drop: 3.4E+03 Pascals/second (0.5 pounds per square inch per second)
- Total pressure drop: 1.0E+04 Pascals (1.5 pounds per square inch)

However, for several of the facilities listed in Table B-9, a tornado with a fastest-mile wind speed of 176 kilometers per hour (110 miles per hour) was identified as the initiating event. The Organic Waste Storage Tank, Cold

Chemical Feed Storage facility, and Chemical and Industrial Waste Treatment Building are designed to withstand wind speeds up to 176 kilometers per hour (110 miles per hour). Exceedance of the design wind speed for the Organic Waste Storage Tank could result in the failure of both the outer and inner tanks, causing a total release of tank inventory. Exceedance of the design wind speed for the other facilities would result in the total collapse of the structure and damage to the components (tanks) in the facilities. The anticipated chronology for a tornado event is as follows:

- Nitric or formic acid storage tank fails catastrophically due to a tornado-generated missile.
- As the acid solution leaves the tank, "splashing" occurs, causing a fraction of the inventory to be dispersed as an aerosol.
- The released acid solution spills into the diked area surrounding the tank. The tornado remains in the vicinity of the pool for one minute. The evaporation rate from the pool is based on a tornado wind speed of 176 kilometers per hour (110 miles per hour).
- Once the tornado is out of the immediate vicinity, evaporation from the pool continues under normal wind conditions of 4.5 meters per second (10 miles per hour) and moderate atmospheric stability for the remainder of the event. These are the conditions that result in the highest 15-minute average concentrations.

Meteorological conditions in which tornadoes are likely to form are well understood and advance notice in the form of a tornado watch followed by a tornado warning is likely. Advance notice of high winds provides the opportunity to reduce risk by suspending exposed operations and possibly sheltering personnel or shielding exposed materials (WSRC 1993d).

Earthquakes - To characterize the potential seismic failure of components in the Vitrification Facility, fragility values have been developed for its appropriate systems and structural components. A fragility value quantifies a relationship that is meant to characterize the conditional probability of failure of a component at any g level for which it is specified. However, the current state of fragility knowledge for the Vitrification Facility is such that the seismic capacity of the facility is probably conservatively estimated. The actual seismic capacity of the facility would be expected to be higher if complete fragility evaluations were performed for all components. Accordingly, while the seismic events with peak ground accelerations of 0.2g (event frequency of 2.0E-04) are defined as design basis events, an earthquake with a peak ground acceleration of 0.1g (event frequency of 2.0E-03) is considered to be conservative in addressing chemical hazards because of the higher frequency of this earthquake (WSRC 1993b).

The anticipated chronology of a seismic event is as follows:

- Nitric or formic acid storage tank fails catastrophically due to the seismic event.
- As the acid solution leaves the tank, "splashing" occurs, causing a fraction of the inventory to be dispersed as an aerosol.
- The dikes surrounding the tanks survive the earthquake, and the spilled acid solution forms a pool in the diked area, which then evaporates under normal wind conditions of 4.5 meters per second (10 miles per hour) and moderate atmospheric stability. These are the conditions that result in the highest 15-minute average concentrations.

B.6.1.2 ITP

The ITP process introduces nonradiological chemical hazards and potential accident scenarios not previously encountered in the Liquid Waste Handling Facilities in the tank farms or considered in the DWPF Final EIS (DOE 1982). The chemical accident scenarios considered in this section are associated with the ITP. Since few chemicals are associated with activities performed at Extended Sludge Processing, and those chemicals are present in substantially lower quantities than at ITP, the accidents summarized in this section bound potential Extended Sludge Processing chemical accidents.

Table B-10 identifies the different types of chemical accidents evaluated for the ITP. Table B-10 also presents a comparison of the resulting airborne concentrations for exposed individuals at 100 meters (328 feet) and at the site boundary against ERPG-1, -2, and -3 values, where available. Where ERPG values were not available, the alternative guideline values described in Table B-7 were used as available.

B.6.1.3 Saltstone Manufacturing and Disposal

The wastewater sent to Saltstone Manufacturing and Disposal, located in Z-Area, contains hazardous substances. However, concentrations of these contaminants are low and do not present meaningful accidental exposure hazards to workers or the public. Sodium hydroxide, the one hazardous constituent that is present at a higher concentration, can be safely handled in accordance with standard industrial practices. Saltstone operations pose no appreciable chemical hazards to either onsite or offsite populations (WSRC 1992a).

B.6.2 CHEMICAL HAZARD EVALUATION FOR THE NO-ACTION ALTERNATIVE

A review of the Liquid Waste Handling Facilities Safety Analysis Report (DuPont 1988) was performed to provide the technical basis for addressing chemical hazards at waste tank farm facilities posed by the no-action alternative. This safety documentation provided a qualitative discussion of chemical processes and hazards.

The waste tank farms use bulk quantities of chemicals to control corrosion and to assist in decontamination processes related to the continued storage of liquid radioactive waste in the existing tank farm facilities. Additionally, several chemicals are present in the radioactive waste streams received from the separations facilities. The hazards associated with various chemical accidents include toxicity, chemical burns, asphyxiation, corrosion, and flammability.

Table B-10. Summary of ITP accident analysis results (milligrams per cubic meter).

Accident	Annual frequency	Chemical	Airborne concentrations: At 100 m^a	Airborne concentrations: At Site boundary
Sodium titanate (ST) tank spill	6.0E-01	Sodium titanate	9.4E+00	1.5E-02
		Methanol	1.3E+01	2.1E-02
		Isopropanol	2.0E+01	3.3E-02

Sodium tetraphenyl-borate (STPB) tank spill	6.0E-01	Sodium tetraphenyl borate	6.9E+01	1.1E-01
		Benzene	4.0E+02	6.4E-01
Oxalic acid tank spill	6.0E-01	Oxalic acid	2.6E+00	4.1E-03
Caustic (sodium hydroxide) tank spill	6.0E-01	Sodium hydroxide	1.1E-01	1.9E-04
Benzene release from stripper operations	3.2E-05	Benzene	8.5E-01	4.3E-02
Benzene release during column cleaning	1.1E-04	Benzene	2.4E+02	1.2E+00
Benzene release due to chemical reaction	5.0E-01	Benzene	5.8E+03	9.3E+00
Nitrogen asphyxiation in stripper building	2.2E-04	Air concentrations are not applicable. Nitrogen i stripping gas to remove benzene from filtrate and Should the nitrogen leak into the building in suff quantities, a worker can be subject to asphyxiatio low oxygen in the air.		

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a. To convert to feet, multiply by 3.281.
b. Emergency Response Planning Guidelines.
c. Guideline values for sodium titanate are unavailable.
d. Guideline values for sodium tetraphenylborate are unavailable.

B.6.2.1 Methodology for Screening Chemical Inventories

The inventory of hazardous chemicals was determined by reviewing a listing of Material Safety Data Sheets for each nonvitrification facility associated with the continued storage of liquid radioactive waste located in the waste tank farm areas. The resulting list of chemicals was screened against the Savannah River Site Tier Two Emergency and Hazardous Chemical Inventory Report (DOE 1994b). A further screening was then conducted to identify which of the remaining chemicals were specified as extremely hazardous substances as designated under the Emergency Planning and Community Right-to-Know Act of 1986. The resulting chemicals selected for further evaluation in this Supplemental EIS are listed in Table B-11, which includes average and maximum daily chemical inventories [based on 1993 data].

Table B-11. Hazardous chemical inventory^a (designated as extremely hazardous substances) for the waste tank farms.

Chemical name	Building	Maximum daily amount^b (kilograms)^c	Average daily amount^b (kilograms)
Sulfuric acid	241-84H	10.9	4.1
	241-84H	3.2	(d)
	280-1F	3,828.8	10.4
	280-1H	3,794.3	1,683.8
Ammonia	241-58H	0.9	0.9
	242-24H	13.6	6.8
Nitric acid	241-61H	42,620.9	22,679.9
	241-84H	3.6	(d)
(60 to 71%)^e	241-84H	0.5	(d)
	241-84H	0.5	(d)
Hydrochloric acid	241-84H	8.2	4.5
(36 to 37%)^e	241-84H	9.1	4.5
(2.0 molar solution)	241-84H	22.7	10.9
Phosphorous pentoxide	241-84H	0.45	0.45

a. Inventories for a specified chemical may be located in more than one facility or may be located in several places in the same facility.
b. Maximum and average daily amounts are based on 1993 data.
c. To convert to pounds, multiply by 2.2046.
d. Average daily amounts not available.
e. Percentage of the chemical in the indicated solution.

B.6.2.2 Hazardous Chemical Assessments

Released hazardous chemicals have the potential for the concentration of vapors (or fumes from leaked chemicals that caused a chemical reaction) in the immediate area of a release. However, the waste tank farm safety analysis report (Du Pont 1988) addresses chemical hazards in a purely qualitative manner without discussing potential chemical accident scenarios. For the purposes of this Supplemental EIS, hypothetical bounding hazardous chemical release scenarios were assessed to provide the decisionmaker a quantified frame of reference when comparing alternatives. For each chemical identified as an extremely hazardous substance at the tank farm facilities, a bounding chemical accident release scenario was analyzed using the maximum daily chemical inventory presented in Table B-11. Since maximum daily amounts of a chemical are the largest daily inventory limits for a facility, these values are, by definition, bounding values. Due to their large inventories, the nitric acid and sulfuric acid release scenarios were modeled as liquid spills

from large tanks experiencing catastrophic ruptures resulting in the total release of the contents. These liquid spills were conservatively assumed to occur at ground level and allowed to spread to a puddle depth of 1 centimeter. The phosphorus pentoxide, ammonia, and hydrochloric acid release scenarios were modeled as short-term releases from multiple container spills resulting in the release of the total inventory into a facility. The chemical airborne release fractions (i.e., fraction of material assumed to be released to the environment as an airborne vapor) resulting from short-term releases were determined to be 1.0E-03, with the exception of phosphorous pentoxide with an airborne release fraction of 5.0E-01 (DOE 1992a,b). The amount of chemical released to the atmosphere is calculated by multiplying the release fraction by the quantity of material spilled. For modeling purposes, the release height was assumed to be 10 meters (32.8 feet) with a release duration of 7.5 minutes, which simulates the effects of the ventilation exhaust systems drawing the chemical into the atmosphere. This model did not account for settling of the phosphorous pentoxide, which is the only chemical which occurs in the facilities as a powder rather than a liquid, or mitigation by facility filtration systems.

Ground-level airborne chemical concentrations were evaluated for individuals at 100 meters (328 feet) and the site boundary using EPI (Emergency Prediction Information) Code, a computer code that provides estimates of dispersion of gas from accidental spills and releases. Meteorological conditions of moderate atmospheric stability and wind speeds of 4.5 meters per second (10 miles per hour) were used.

Because the airborne concentrations at the site boundary (i.e., location of the MEI) presented in Table B-12 do not exceed the established ERPG-2 values, assuming a total unmitigated release of the chemicals considered, a specific accident scenario (i.e., accident initiator and resulting accident progression resulting in the release of the chemical to the environment) was not developed, nor was a specific accident frequency identified. A more realistic accident scenario and associated frequency are not considered necessary because the bounding release from the unmitigated release of the inventory, however improbable, is within established guidelines for the public.

To demonstrate the potential health effects resulting from the chemical concentrations expected for each chemical release analyzed, Table B-12 also presents Emergency Response Planning Guidelines values, where available for comparison. Where Emergency Response Planning Guidelines values were not available, alternative guideline values as described in Table B-7 were used.

From the results provided in Table B-12, none of the accidental chemical releases analyzed would be expected to have an adverse effect on members of the public. It is assumed that the wind will blow the airborne concentrations continually downwind, thereby minimizing the total exposure to an individual. As a result, the effects on the offsite population would range from negligible irritation to moderate hazards causing irritation to the skin, eyes, and mucous membranes. Due to the short duration of exposure, only hypersensitive individuals would be expected to be at greater risk.

Table B-12. Summary of hazardous chemical assessment accident analysis results for the waste tank farms (milligrams per cubic meter).

		Airborne concentrations		
Chemical released	Maximum daily amount (kilograms)^a	At 100m^b	At Site boundary	ERPG 1^c

Nitric acid (Bldg. 241-61H)	42,620.9	8.3E+02	2.0E+00	5.2E+00
Phosphorous pentoxide (Bldg. 241-84H)	0.45	7.5E-02	3.1E-04	5.0E+00
Ammonia (Bldg. 242-24H)	13.6	4.5E-03	2.4E-05	1.7E+01
Hydrochloric acid [2.0 M Solution] (Bldg. 280-1H)	22.7	7.6E-03	3.9E-05	4.5E+00
Sulfuric acid (Bldg. 280-1F)	3,828.8	3.7E-06	3.2E-09	2.0E+00

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a. To convert kilograms to pounds, multiply by 2.2046.
b. To convert meters to feet, multiply by 3.281.
c. Emergency Response Planning Guidelines.

From the results provided in Table B-12, only the nitric acid accident scenario could be expected to have an adverse effect on the collocated worker at 100 meters (328 feet). The airborne concentration resulting from a hypothetical nitric acid tank spill with conservative assumptions was calculated to be 830 milligrams per cubic meter. This airborne concentration exceeds the listed ERPG-3 value by an order of magnitude. As a result, severe injury or death could be considered possible for this accident scenario. Consequently, as discussed in Section B.6, the SRS maintains an emergency plan designed to respond to and mitigate the potential consequences of such an accident.

Additionally, the closer the exposed individual is to any chemical accident location the higher the release concentrations in the air. The maximum concentrations that close-in workers may encounter could greatly exceed the ERPG-3 values. While perhaps not instantly lethal, even short exposures to the chemicals in Table B-12 can be dangerous.

APPENDIX B

REFERENCES

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APPENDIX C

PUBLIC COMMENTS AND DOE RESPONSES

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APPENDIX C. PUBLIC COMMENTS AND DOE RESPONSES

C.1. Introduction

DOE completed the Draft Supplemental EIS for DWPF in August 1994, and on August 26, 1994, DOE and EPA published Notices of Availability for the document in the Federal Register (59 FR 44137 and 59 FR 44143, respectively). EPA's notice officially started the public comment period on the Draft Supplemental EIS, which extended through October 11, 1994. This Appendix presents the comments received from government agencies and the public during this public comment period and DOE's responses to those comments.

Comments were received by letter, telephone (voice mail), and in formal statements made at 10 public hearings. The hearings, which included the opportunity for informal discussions with SRS personnel involved with DWPF, were held in Aiken, South Carolina on September 13 (2 sessions); Hilton Head, South Carolina, on September 14; Beaufort and Hardeeville, South Carolina, and Savannah, Georgia (first session) on September 15; Savannah, Georgia (second session) on September 16; and Allendale, Barnwell, and Columbia, South Carolina on September 20, 1994. DOE received comments from a total of 40 individuals, government agencies, or other organizations. Nineteen persons made formal statements at the hearing sessions. Twenty one letters were received, including two from persons who made formal statements at the hearings. Two persons submitted comments by voice mail. The statements made at the hearings

and comments received by voice mail were documented in official transcripts. Each of these comment sources was assigned number codes as follows for reference in this Final Supplemental EIS:

Letters	L1 through L21
Voice Mail	V1 through V2
Hearings	H1 through H10

Individual commentors at hearing sessions and specific comments by each commentor were numbered sequentially (i.e., 01, 02, etc.) to provide unique identifiers. A list of individuals, government agencies, and other organizations that submitted comments and their unique identifiers is provided in Table C-1.

Comments received by DOE reflect a range of concerns and opinions about topics addressed in this Supplemental EIS. The topics most frequently addressed by commentors include DWPF safety and reliability, public participation, the need to begin DWPF operation, potential impacts on human health and natural resources, and NEPA compliance. Comments received by government agencies consisted primarily of statements of no conflict or requests for clarification. EPA endorsed the proposed action in their response and gave the Draft Supplemental EIS a rating of EC-2. This rating indicates that the agency has environmental concerns and needs additional information to fully assess environmental impacts, particularly with regard to potential cumulative environmental impacts when considering actions DOE is evaluating in other EISs.

DOE also received numerous comments that addressed topics outside the scope of this Supplemental EIS, many of which address DOE actions that are being evaluated in other NEPA documentation. The latter concerns are being forwarded to the DOE organizations responsible for these NEPA evaluations.

DOE considered those comments it received during the public comment period in the preparation of this Final Supplemental EIS. Individual comments received and DOE's responses, identified by the numbering system described above, are provided in Parts 1, 2, and 3 of this Appendix. Where appropriate, DOE revised the Supplemental EIS in response to these comments. In such cases, the revision is indicated in the margin of the page with a change bar and the comment number that prompted the revision.

Table C-1. Public Comments on Draft Supplemental Environmental Impact Statement.

Statements Made at the Public Hearings

Comment Source No.	Commentor	Page No.
H3	Hilton Head, SC, September 14, 1994	C-7
H3-1	Holly Cork Senator, State of South Carolina	C-7
H3-2	George Keosian	C-10
H3-3	Charlotte Marsala	C-11
H3-4	Laura Keenan	C-16
H3-5	George M. Minot	C-18
H3-6	Pat Tousignant	C-20
H-4	Beaufort, SC, September 15, 1994	C-23
H4-1	Zoe G. Tsagos	C-23

Voice Mail Statements

Correspondence Received from Government Agencies and the Public

C.2 Statements Made at the Public Hearings for the Draft Supplemental Environmenta for the Defense Waste Processing Facility held on September 13, 14, 15, 16 and 20,

DOCUMENT H3
HILTON HEAD, SOUTH CAROLINA, SEPTEMBER 14, 1994

Transcript STATEMENT OF HOLLY CORK (Commentor H3-1)

Response to Comment H3-1-01
As noted in Section 1.2.2, DOE concurs with the need to immobilize SRS high-level waste to reduce risk to human health and the environment and considers vitrification to be the method of choice to achieve this goal. DOE has undertaken the development of the DWPF Supplemental EIS as part of the process to decide whether and how to start up DWPF in light of changes made since the 1982 EIS was prepared. The proposed action remains DOE's preferred alternative (Section 2.2). The final decision by DOE will be documented in the Record of Decision.

Response to Comment H3-1-02
Section 2.2.9 discusses the safety features of the facilities and structures under the proposed action, including the Glass Waste Storage Building. The safety and long-term confinement of the radioactive glass waste canisters stored in the Glass Waste Storage Building have been analyzed and documented in SRS safety analysis reports (i.e., the DWPF Safety Analysis Report). The environmental impacts of accidents under the proposed action presented in Section 4.1.12, which are based on the DWPF Safety Analysis Report, include postulated accidents associated with the Glass Waste Storage Building. The safety of this type of facility will be reexamined as part of DOE's design activities for the planned future Glass Waste Storage Buildings.

Response to Comment H3-1-03
The Federal repository is outside the scope of this Supplemental EIS. Under the Nuclear Waste Policy Act of 1982 (P.L. 97-245), as amended, DOE is responsible for siting, constructing, and operating a geologic repository for the disposal of high-level nuclear waste. DOE does recognize the need for a Federal repository and is currently performing suitability studies at the Yucca Mountain, Nevada, site as a Federal repository for high-level waste and spent nuclear fuel. Under the proposed action and the ion exchange pre-tre

atment alternative, the vitrified glass product from DWPF would be stored in Glass Waste Storage Buildings located in S-Area until a Federal repository becomes available.

Response to Comment H3-1-04
DOE's activities involving the receipt of spent nuclear fuel for storage at SRS are outside the scope of this Supplemental EIS. As noted in Section 1.4, these issues are being addressed in the context of other NEPA documentation, specifically the Urgent-Relief Acceptance of Foreign Research Reactor Spent Nuclear Fuel Environmental Assessment, the Proposed Policy for the Acceptance of United States Origin Foreign Research Reactor Spent Nuclear Fuel EIS, and the Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs EIS. DOE acknowledges that alternatives being considered in these EISs include processing of spent nuclear fuel at SRS which could result in high-level waste that might be immobilized at DWPF (Sections 1.4 and 2.2.1). DOE will closely coordinate these NEPA actions to ensure that the environmental impacts of these actions are evaluated in accordance with the letter and spirit of NEPA. DOE will forward this comment to the DOE organization responsible for NEPA evaluations involving spent nuclear fuel for their information.

Response to Comment H3-1-05
See response to comment H3-1-03 regarding DOE activities associated with the selection of a Federal repository.

Response to Comment H3-1-06
See response to comment H3-1-01 regarding DOE's preferred alternative.

Transcript STATEMENT OF GEORGE KEOSIAN (Commentor H3-2)

Response to Comment H3-2-01
See response to comments H3-1-01 through 06.

Response to Comment H3-2-02
Neither the proposed action nor the ion exchange pre-treatment alternative action considered in this Supplemental EIS are expected to result in radiological liquid discharges to the Savannah River. Section 4.1.3.2 discusses the impacts of nonradiological liquid discharges to surface water as a result of the proposed action. These discharges would comply with state and Federal regulations. As discussed in Section 4.1.3.1, projected releases of contaminants into groundwater from normal operations would be within drinking water standards. As noted in Section 4.1.12, impacts on water quality (including the Savannah River and its users) are not projected to occur under any of the postulated accidents.

Transcript STATEMENT OF CHARLOTTE MARSALA (Commentor H3-3) page 1
Transcript STATEMENT OF CHARLOTTE MARSALA (Commentor H3-3) page 2

Response to Comment H3-3-01
The Department of Energy (DOE) Savannah River Operations Office fully supports a strong public participation program in which the public is provided with opportunities for early and meaningful participation and accurate, complete, and timely information. DOE Savannah River Operations Office continually tries to improve its public participation programs and has begun to conduct more informal and interactive public meetings, workshops, and hearings. Unlike previous formal hearings, the hearings conducted for the DWPF Draft Supplemental EIS provided the opportunity for informal discussions between citizens and site personnel and for DOE Savannah River Operations Office to receive formal comments on the Draft Supplemental EIS. DOE Savannah River Operations Office will continue to try to conduct its public participation activities in a way that promotes two-way communication and meets the needs of the public. Additionally, DOE Savannah River Operations Office is trying to

make the information it presents more understandable and reader-friendly by simplifying the technical language as much as possible without being inaccurate, by using more visual aids such as graphs, charts, and pictures, and by reducing the size of the document by eliminating unnecessary information. DOE Savannah River Operations Office also uses other forms of communication such as videos, displays, and models where possible. To encourage public participation, DOE Savannah River Operations Office is working with local universities, colleges, and high schools to critique or, in the case of the DWPF Final Supplemental EIS Non-Technical Summary, write documents in a less technical, more reader-friendly manner. DOE Savannah River Operations Office welcomes suggestions on how it can further improve its public participation program.

Response to Comment H3-3-02
The potential for earthquakes to cause existing pollutants in shallow aquifers at SRS to contaminate deep aquifers is beyond the scope of this Supplemental EIS. This information is currently unavailable. Contamination of groundwater resources at SRS from past site operations is presented in this Supplemental EIS for purposes of describing the current status of environmental resources potentially impacted by DWPF or its alternatives. These impacts are described in Sections 4.1.3, 4.2.3, and 4.3.3 for normal operations and in Sections 4.1.12, 4.2.12, 4.3.12, and Appendix B for accidents. As noted in Section 2.2.9, the DWPF Vitrification Facility and key associated structures are designed to withstand the effects of earthquakes producing up to 0.2g ground acceleration. Past studies by DOE indicate that the high-level waste tanks would also maintain their structural integrity during an earthquake of this magnitude, although this conclusion is currently being re-evaluated. As noted in Section 4.2.12, an earthquake at the high-level waste tank farm could result in leakage of some high-level waste to the ground from pipe breaks and could potentially result in some groundwater contamination.

Floods are not expected to result in contamination of surface or groundwater from DWPF facilities due to their design and their location above the 100-year floodplain as shown in Figure 3.3-3. The potential for an accident caused by an airplane crash at DWPF was examined in Appendix B, where it is noted as a "beyond reasonably foreseeable" event.

Response to Comment H3-3-03
The radiation dose limit for members of the public from SRS operations is 0.1 rem per year from all releases and 0.01 rem per year from airborne releases of radioactivity. When working with and around radiation and radioactive material, some radiation exposure to personnel is unavoidable. The DOE radiation dose limit for workers is 5 rem per year, as noted in Section 3.11.2.3. For added protection of all workers, SRS has adopted a more stringent limit, called the administrative exposure guideline, of 1.5 rem per year. Section 3.11.2.3 has been revised to more explicitly define these limits.

Response to Comment H3-3-04
When working with and around radiation and radioactive material, some radiation exposure to personnel is unavoidable. A fundamental principle underlying the DOE radiation protection program is that "[t]here should not be any occupational exposure of workers to ionizing radiation without the expectation of an overall benefit from the activity causing the exposure." While a portion of the 263 person-rem received by 5,157 SRS workers in 1993 (i.e., an average of approximately 50 millirem per worker) may be attributable to mechanical malfunctions, much of this dose is an expected part of normal operations. SRS has programs in place to measure and control worker radiation exposure and to maintain these exposures as far below regulatory limits as is reasonably achievable. SRS is also required to report abnormal radiation exposures, such as individual exposures that exceed 10 percent of limits. As noted in Table 3.11-4, radiation exposures to SRS workers have steadily declined since 1988, and this decline is expected to continue in the future. DOE releases annual reports to the media that present worker radiation

exposure levels. An example of such a report is the Health Protection Department 1992 Annual Report (cited as Petty 1993 in Chapter 5), which is available in the Public Reading Room.

Response to Comment H3-3-05
DOE's activities involving the receipt of spent nuclear fuel at SRS are outside the scope of this Supplemental EIS. However, Section 1.0 of the document referenced by the commentor, the Urgent-Relief Acceptance of Foreign Research Reactor Spent Nuclear Fuel Environmental Assessment, describes the need to accept foreign research reactor fuel. DOE will forward this comment to the DOE organization responsible for NEPA evaluations involving spent nuclear fuel for their information. (Also see response to Comment H3-1-04.)

Response to Comment H3-3-06
Selection and evaluation of alternatives for managing the F-Canyon plutonium solutions are outside the scope of this Supplemental EIS and are being evaluated in the F-Canyon Plutonium Solutions EIS referenced by the commentor. DOE indicates in that EIS that extensive studies and facility modifications would be required to process these solutions at DWPF. DOE also acknowledges in Section 1.4 of this Supplemental EIS that the processing alternatives being examined would result in high-level waste that would be transferred to the high-level waste tanks for vitrification at DWPF. DOE will forward this comment to the DOE organization responsible for the F-Canyon plutonium solutions NEPA evaluations for their information.

Response to Comment H3-3-07
DOE's present arrangements and future plans regarding onsite domestic water sources are beyond the scope of this EIS. However, DOE is committed to complying with all applicable laws and regulations for discharges of wastewater to onsite streams and the Savannah River. A description of DOE discharges to surface water and water quality monitoring results is provided in SRS annual environmental reports and annual environmental data reports that are readily available to the public. Potential effects on surface water quality from DWPF operations are examined in Sections 4.1.3, 4.2.3, and 4.3.3 of this Supplemental EIS.

Transcript ADDITIONAL STATEMENT OF CHARLOTTE MARSALA (Commentor (H3-3)

Response to Comment H3-3-08
Comments regarding DOE's acceptance at SRS of spent nuclear fuel from foreign research reactors are outside the scope of this Supplemental EIS. As noted in Section 1.4, these issues are being addressed in other NEPA documentation, specifically the Urgent-Relief Acceptance of Foreign Research Reactor Spent Nuclear Fuel Environmental Assessment and the Proposed Policy for the Acceptance of United States Origin Foreign Research Reactor Spent Nuclear Fuel EIS. This comment is being forwarded to the DOE organization responsible for these NEPA documents for their information. As noted in Section 2.5 of this Supplemental EIS, DOE has made considerable efforts to exchange technological information on the vitrification process with many countries and has applied the knowledge gained in the design and operation of DWPF.

Response to Comment H3-3-09
To determine the effects (if any) of past radioactive and chemical releases from SRS, DOE is funding a study called the Savannah River Site Dose Reconstruction Project, which is being administered by the Centers for Disease Control and Prevention (CDC). Phase I, currently being performed by the Radiological Assessments Corporation under contract with CDC, is intended to find and review records from SRS and other sources that can be used in the dose reconstruction process. Phase II of the project involves estimating the amounts of radioactive materials and chemical that have been released since SRS began operations; estimating or reconstructing the doses that the public has received from these materials; and estimating the possible health effects

from the reconstructed does (risk assessment).

In Phase III, the CDC will use the reconstructed doses and the estimates of health effects to decide whether it is possible to design a study (called an epidemiological study) to detect actual health effects in the population living in the vicinity of the site. Funding for this project remains at the original level.

The Savannah River Region Health Information System is a project being performed by the Medical University of South Carolina under funding by the DOE Office of Epidemiology and Health Surveillance. This project consists of creation of a cancer registry and a birth defects registry. In 1994, because of DOE budget cutbacks, the funding for the Office of Epidemiology and Health Surveillance was cut by 20 percent. However, work on these cancer and birth defects registries is continuing.

Transcript STATEMENT OF LAURA KEENAN (Commentor H3-4)

Response to Comment H3-4-01
As noted in Section 1.2.2, DOE and others in the scientific and technical community believe that immobilization of high-level waste for disposal is the best way to ensure protection of human health and the environment and that the vitrification of high-level waste into borosilicate glass is an appropriate technology for the immobilization of such waste. As discussed in Section 2.5, vitrification technology has been successfully proven in other countries such as France, Germany, and the United Kingdom. In addition, the Environmental Protection Agency has specified vitrification as the appropriate technology for treatment of high-level waste. DOE considers the proposed action (to continue construction and begin operation of DWPF as currently designed) to be its preferred alternative. The Record of Decision will document DOE's selection of alternatives.

Response to Comment H3-4-02
The environmental impacts of earthquakes (as well as other accidents) on the facilities associated with the proposed action and its alternatives are described in Sections 4.1.12, 4.2.12, and 4.3.12. In addition, planned modifications to the Vitrification Facility and associated processes to ensure containment of radioactive material and benzene following a severe earthquake are described in Section 2.2.9. DOE is evaluating the details of these modifications which would be implemented before the facility is operated with radioactive waste.

The environmental impacts of earthquakes during plutonium processing are outside the scope of this Supplemental EIS. This comment has been forwarded to the DOE organization responsible for the F-Canyon Plutonium Solutions EIS and the Interim Management of Nuclear Materials EIS for their information.

Response to Comment H3-4-03
DWPF is designed to vitrify the high-level waste generated by SRS activities. This comment is outside the scope of this Supplemental EIS and has been forwarded to the organization responsible for the Programmatic Spent Nuclear Fuel and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs EIS for their information. DOE discusses in Section 1.4 of this Supplemental EIS other EISs that consider activities involving shipping spent nuclear fuel to SRS. Options for managing spent nuclear fuel shipped to SRS could include processing that would result in high-level waste that could be vitrified at DWPF.

Transcript STATEMENT OF GEORGE MINOT (Commentor H3-5)

Response to Comment H3-5-01
DOE Savannah River Operations Office is trying to make the information it presents more understandable by simplifying the technical language as much as possible without being inaccurate, by using more visual aids such as graphs, charts, and pictures, and by reducing the size of the document by eliminating unnecessary information. Section 2.6, Comparison of Alternatives, Chapter 4.0, Environmental Consequences, and Appendix B, Accident Analysis, provide the reader a full account of the potential impacts of completing and starting the DWPF as currently designed. DOE Savannah River Operations Office welcomes suggestions on how it can further improve its documents.

Response to Comment H3-5-02
As noted in Section 2.5, DOE has incorporated current, state-of-the-art technology, including technology in use or planned for use in other countries, into the DWPF vitrification process. Some characteristics of SRS high-level waste have necessitated specialized processes at DWPF to produce a suitable waste form. Pre-treatment of SRS's high-level waste, rather than the vitrification process itself, is a major factor determining production rate of the DWPF process. As indicated in Section 2.2.2, Extended Sludge Processing requires about 22 months to provide about 2.4 years of feed to the Vitrification Facility. DOE is currently evaluating ways to increase the processing rate of DWPF.

Response to Comment H3-5-03
DOE is in the process of conducting an exhaustive review of all classified materials to identify those that can be declassified and made available to the public. The Secretary of Energy has participated in public meetings held at DOE Savannah River Operations Office to solicit the public's ideas and input on the types of materials they feel should be declassified. This ongoing program has already resulted in the declassification of many documents at DOE Savannah River Operations Office. See responses to comments H3-3-01 and H3-05-01 regarding DOE's public participation efforts.

Response to Comment H3-5-04
DOE is committed to follow the letter and spirit of NEPA, including full compliance with NEPA requirements for public participation. In the case of this Supplemental EIS, DOE provided for a public scoping period from April 6 through May 31, 1994, to obtain input from the public on the scope of this document, even though Council on Environmental Quality regulations do not require that scoping be conducted for a Supplemental EIS. DOE also held workshops during this scoping period to inform the public about DWPF prior to formal hearings. DOE provided for the 45-day period required by NEPA regulations to receive public comments on the draft Supplemental EIS. DOE also held 10 separate hearings in 8 different locations in South Carolina and Georgia during the public comment period to receive public comments on the Supplemental EIS. The hearings included opportunities for informal discussions with SRS personnel.

Transcript STATEMENT OF PAT TOUSIGNANT (Commentor H3-6) page 1
Transcript STATEMENT OF PAT TOUSIGNANT (Commentor H3-6) page 2

Response to Comment H3-6-01
The impact of the proposed action on water and air resources is discussed in Sections 4.1.3 and 4.1.4, respectively. The impact of the proposed action on the health of workers is discussed in Sections 4.1.11.2 and 4.1.11.3. The environmental impacts of accidents on the facilities associated with the proposed action and its alternatives are described in Sections 4.1.12, 4.2.12, and 4.3.12. Operation of DWPF would also generate solid wastes as discussed in Sections 4.1.13, 4.1.16, 4.2.13, and 4.3.13. Environmental impacts of treating these wastes are being evaluated in the SRS Waste Management EIS currently being prepared.

Response to Comment H3-6-02

Dioxins, which consist partly of chlorine, are created in a combustion process when chlorine and organic compounds combine. Incineration of benzene waste by itself would not produce dioxin emissions. Chlorine must be available to combine with other compounds in the combustion and offgas treatment systems of an incinerator in order to produce dioxins. Since DWPF organic waste is not expected to contain chlorine, the incineration of this waste stream by itself cannot produce dioxin emissions.

Concerns regarding Consolidated Incineration Facility emissions in general are outside the scope of this Supplemental EIS. Dioxins would be expected to be generated in the Consolidated Incineration Facility when waste containing chlorine is incinerated. Due to the complex mechanisms by which dioxins are produced in a combustion process and removed by an air pollution control system, a calculation method of dioxin emissions is not currently available. However, measured dioxin emissions from existing facilities with design, operating, and waste feed characteristics similar to those at the Consolidated Incineration Facility have been used to estimate Consolidated Incineration Facility dioxin emissions. Based on these comparisons, dioxin emissions from the Consolidated Incineration Facility are expected to be far below the Environmental Protection Agency's current guidelines for maximum combustion facility dioxin emissions of 30 nanograms per dry standard cubic meter (ng/dscm). SRS will ensure compliance with EPA dioxin emission limits by conducting dioxin emission testing as part of the Consolidated Incineration Facility trial burn. Potential emissions from the Consolidated Incineration Facility are being addressed in the SRS Waste Management EIS currently being prepared. This comment is being forwarded to the DOE organization responsible for that EIS.

Response to Comment H3-6-03
To determine the effects (if any) of past radioactive and chemical releases from SRS, DOE is funding a study called the Savannah River Site Dose Reconstruction Project, which is being administered by the Centers for Disease Control and Prevention (CDC), referred to in the comment as Dr. Till's study. Phase I, currently being performed by the Radiological Assessments Corporation under contract with CDC, is intended to find and review records from SRS and other sources that can be used in the dose reconstruction process. Phase II of the project involves estimating the amounts of radioactive materials and chemicals that have been released since SRS began operations; estimating or reconstructing the doses that the public has received from these materials; and estimating the possible health effects from the reconstructed doses (risk assessment). In Phase III, the CDC will use the reconstructed doses and the estimates of health effects to decide whether it is possible to design a study (called an epidemiological study) to detect actual health effects in the population living in the vicinity of the site. Funding for this project remains at the original level.

The Savannah River Region Health Information System is a project being performed by the Medical University of South Carolina under funding by the DOE Office of Epidemiology and Health Surveillance. This project consists of creation of a cancer registry and a birth defects registry. In 1994, because of DOE budget cutbacks, funding for the Office of Epidemiolo
gy and Health Surveillance was cut by 20 percent. However, work on these cancer and birth defects registries is continuing.

Response to Comment H3-6-04
Issues about state-wide land use and the SRS mission as expressed in this comment are outside the scope of this Supplemental EIS. However, DOE is committed to follow the letter and spirit of NEPA, including full compliance with NEPA requirements for public participation. DOE intends to carry out its NEPA responsibilities in a manner that provides accurate, complete, and timely information about DOE's activities and potential impacts and to provide the public with ample opportunities for input to DOE's decisions.

DOCUMENT H4
BEAUFORT, SOUTH CAROLINA, SEPTEMBER 15, 1994

Transcript STATEMENT OF ZOE TSAGOS (Commentor H4-1) page 1
Transcript STATEMENT OF ZOE TSAGOS (Commentor H4-1) page 2

Response to Comment H4-1-01
DOE presumes this comment addresses the issue of DOE's acceptance at SRS of spent nuclear fuel from foreign research reactors, which is beyond the scope of this Supplemental EIS. As noted in Section 1.4, these issues are being addressed in other NEPA documentation, specifically the Urgent-Relief Acceptance of Foreign Research Reactor Spent Nuclear Fuel Environmental Assessment and the Proposed Policy for the Acceptance of United States Origin Foreign Research Reactor Spent Nuclear Fuel EIS. This comment is being forwarded to the DOE organization responsible for these NEPA documents for their information.

Response to Comment H4-1-02
Table A-4 in Appendix A provides historical information on releases of high-level waste at SRS. As noted in the table, relatively small amounts of high-level waste have been released to the environment from four tanks or associated transfer lines, resulting in contamination of soil and, in one instance, possibly groundwater. DOE has stabilized and is monitoring these contaminated sites and will remediate the sites as part of facility deactivation, decommissioning, and environmental restoration activities.

Response to Comment H4-1-03
DOE's activities involving the receipt of spent nuclear fuel at SRS are outside the scope of this Supplemental EIS. DOE will forward this comment to the DOE organization responsible for NEPA evaluations involving spent nuclear fuel for their information. See response to comment H3-1-04.

Response to Comment H4-1-04
DWPF is an important part of DOE's plans for treating and disposing of high-level radioactive waste in a manner that is protective of human health and the environment. As discussed in Chapter 1 of this Supplemental EIS, DWPF is designed to immobilize high-level waste for eventual disposal in a permanent Federal repository (see response to comment H3-1-03). General plans for the treatment and disposal of other radioactive waste types (e.g., low-level, mixed) are outside the scope of this Supplemental EIS. However, treatment and disposal alternatives for SRS radioactive wastes are being evaluated as part of the SRS Waste Management EIS, which is currently being prepared. DOE will forward this comment to the DOE organization responsible for that EIS for their information.

Response to Comment H4-1-05
DWPF would use a vitrification process similar to that in use or being planned by many other countries, which would result in a true glass form rather than ceramic pellets as suggested in the comment. Specific characteristics of SRS high-level waste have necessitated specialized processes at DWPF to produce a suitable waste form. However, much of the known technology for vitrification is applicable, and DOE has incorporated many features developed in other countries into the DWPF design, as noted in Section 2.5.

Response to Comment H4-1-06
See response to comment H4-1-04 regarding treatment and disposal of other waste types.

Response to Comment H4-1-07
See response to comment H3-1-03 regarding DOE activities associated with the selection of a Federal repository.

Transcript STATEMENT OF DEAN MOSS (Commentor Response H4-2)

Response to Comment H4-2-01
As noted in Section 1.2.2, DOE concurs with the need to immobilize SRS high-level waste to reduce risk to human health and the environment and considers vitrification to be the method of choice to achieve this goal. DOE has undertaken the development of the DWPF Supplemental EIS as part of the process to decide whether and how to start up DWPF in light of changes made since the 1982 EIS was prepared. The proposed action remains DOE's preferred alternative (Section 2.1). DOE's final decision will be documented in the Record of Decision.

Response to Comment H4-2-02
As would be expected with a large complex facility that is the first of its kind, DOE has encountered technical problems at DWPF. Modifications made in the Vitrification Facility Chemical Process Cell as described in Section 2.2.4.2 exemplify problems that have been encountered and overcome. DOE is confident in the DWPF process and SRS's ability to solve problems as they are found during the DWPF startup test program, which is well underway. DOE has developed startup test programs for ITP, Extended Sludge Processing, and the Vitrification Facility (Saltstone Manufacturing and Disposal is already operating to process wastewater treatment concentrate from the F- and H-Area Effluent Treatment Facility). In addition, DOE and its operating contractor conduct operational readiness reviews of these facilities before they can start up. Startup testing for ITP, which included testing of new equipment (e.g., cross-flow filters, benzene stripper columns) with nonradioactive waste simulants, is complete. Startup testing for Extended Sludge Processing and operational readiness reviews for ITP are expected to be complete in late 1994 or early 1995. The Vitrification Facility has undergone the first 3 phases of a 5-phase testing program, including successfully pouring 12 canisters of nonradioactive glass in full-scale tests between June and August of 1994. Remaining tests include pouring 70 to 90 additional canisters of glass before radioactive operation, which is scheduled for December 1995.

Response to Comment H4-2-03
DOE agrees that the immobilization of the high-level waste into a highly stable form is the prudent approach for reducing risk from continued operation of the high-level waste storage tanks (Section 1.2.2). Priorities for emptying tanks are included in the proposed waste removal plan and schedule submitted to EPA and SCDHEC under the Federal Facility Agreement (Section 1.2.3).

Response to Comment H4-2-04
General concerns regarding the management of waste types other than high-level waste at DWPF and DOE's environmental restoration activities at SRS are outside the scope of this Supplemental EIS. SRS environmental restoration activities are being undertaken in accordance with the SRS Federal Facility Agreement with EPA and SCDHEC. Treatment and disposal alternatives for SRS waste streams are being evaluated in the SRS Waste Management EIS, currently in preparation. DOE will forward this comment to the DOE organization responsible for that EIS for their information.

Transcript STATEMENT OF SHANNON O'SHEA (Commentor H4-3)

Response Comment to H4-3-01
See response to comment H3-1-03 regarding DOE activities associated with the selection of a Federal repository.

With the exception of trace quantities of plutonium and uranium, the high-level waste that would be vitrified under the proposed action and is currently

being stored in underground tanks is not suitable for use as fuel for fast reactors. The management and disposition of fissionable materials, like plutonium and uranium at SRS, is outside the scope of this Supplemental EIS. This comment has been forwarded to the DOE organization responsible for the F-Canyon Plutonium Solutions EIS and the Interim Management of Nuclear Materials EIS for their information.

DOCUMENT H6
SAVANNAH, GEORGIA, SEPTEMBER 15, 1994

Transcript STATEMENT OF FRED NADELMAN (Commentor H6-1) page 1
Transcript STATEMENT OF FRED NADELMAN (Commentor H6-1) page 2

Response to Comment H6-1-01
Although the continued existence of the Savannah River Site is beyond the scope of this Supplemental EIS, the ultimate clean-up SRS depends on removing high-level radioactive waste from underground tanks. Operation of DWPF is an important step in reducing the risk to the public and the environment posed by this waste. However, as noted in Section 1.2.1, DOE's present mission emphasizes waste management, environmental restoration, technology development, and decontamination and decommissioning of facilities. Section 1.4 describes several in-process or planned NEPA reviews that could affect the mission at SRS. In addition, DOE is currently planning future activities for SRS and is actively soliciting public participation and input into the future use planning process. DOE has held public meetings to inform interested citizens of the process and to establish a methodology to obtain public input.

Neither the proposed action nor the ion exchange pre-treatment alternative action considered in this Supplemental EIS are expected to result in radiological liquid discharges to the Savannah River. Section 4.1.3.2 discusses the impacts of nonradiological liquid discharges to surface water as a result of the proposed action. These discharges would comply with state and Federal regulations. As discussed in Section 4.1.3.1, projected releases of contaminants into groundwater from normal operations would be within drinking water standards. As noted in Section 4.1.12, impacts on water quality (including the Savannah River and its users) are not projected to occur under any of the postulated accidents.

Response to Comment H6-1-02
General concerns regarding the impacts of nuclear materials production at SRS are outside the scope of this Supplemental EIS. However, as discussed in Section 1.2.2, the purpose of DWPF is to immobilize high-level radioactive waste stored in tanks at SRS to reduce risks to human health and the environment. As such, DWPF is an important measure being taken by DOE to prevent contamination of surface and groundwater as a result of inadvertent releases from the tanks. Potential impacts on water resources from the proposed action and alternatives are discussed in Sections 4.1.3, 4.2.3, and 4.3.4 for normal operations and in Sections 4.1.12, 4.2.12, 4.3.12, and Appendix B for accidents.

Response to Comment H6-1-03
General concerns regarding the impacts of nuclear materials production at SRS are outside the scope of this Supplemental EIS. However, potential impacts on air resources from the proposed action and alternatives are examined in Sections 4.1.4, 4.2.4, and 4.3.4 for normal operations and Sections 4.1.12, 4.2.12, 4.3.12, and Appendix B for accidents. Cumulative impacts of DWPF alternatives and other existing and reasonably foreseeable air pollution sources are examined in Sections 4.1.17, 4.2.16, and 4.3.16.

Response to Comment H6-1-04
The processing and storage of plutonium at SRS is outside the scope of this

Supplemental EIS. This comment has been forwarded to the DOE organizations responsible for the F-Canyon Plutonium Solutions EIS, the Storage and Disposition of Weapons-Usable Fissile Materials Programmatic EIS, and the Interim Management of Nuclear Materials EIS for their information.

Response to Comment H6-1-05
General concerns regarding the impacts of nuclear materials production at SRS are outside the scope of this Supplemental EIS. However, as discussed in Section 1.2.2, the purpose of DWPF is to immobilize high-level radioactive waste stored in tanks at SRS to reduce risks to human health and the environment. The potential impacts on human health from the proposed action and alternatives are examined in Sections 4.1.11, 4.2.11, and 4.3.11 for normal operations and Sections 4.1.12, 4.2.12, 4.3.12, and Appendix B for accidents. Cumulative impacts of DWPF alternatives and other existing and reasonably foreseeable air pollution sources are examined in Sections 4.1.17, 4.2.16, and 4.3.16.

Response to Comment H6-1-06
See response to comment H6-1-01 regarding the continued existence of the Savannah River Site.

Response to Comment H6-1-07
See response to comment H6-1-01 regarding the continued existence of the Savannah River Site.

Response to Comment H6-1-08
See response to comment H6-1-04 regarding processing and storage of plutonium at Savannah River Site.

Response to Comment H6-1-09
See response to comment H6-1-01 regarding the continued existence of the Savannah River Site.

Response to Comment H6-1-10
See response to comment H6-1-01 regarding the continued existence of the Savannah River Site.

DOCUMENT H7
SAVANNAH, GEORGIA, SEPTEMBER 16, 1994

Transcript STATEMENT OF MILDRED McCLAIN (Commentor (H7-1) page 1
Transcript STATEMENT OF MILDRED McCLAIN (Commentor (H7-1) page 2

Response to Comment H7-1-01
The Department of Energy (DOE) Savannah River Operations Office is committed to establishing trust and joining in a meaningful partnership with all stakeholders, including the African-American community in South Carolina and Georgia. DOE Savannah River Operations Office supports educational activities through grants to university consortia such as the South Carolina Universities Research and Education Foundation and the Historically Black College and Universities program. It will continue to consider proposals received through these programs.

However, DOE Savannah River Operations Office recognizes that these measures alone do not meet all the needs of the African-American community. It is working to identify additional avenues to provide educational opportunities for this community. For instance, in the spring of 1994 DOE Savannah River Operations Office provided a grant to the Citizens for Environmental Justice organization in Savannah, Georgia, to conduct educational workshops for the African-American communities in Savannah, Georgia, and in Columbia and Aiken, South Carolina on the DWPF Supplemental EIS and two other EISs under

preparation at the time. Additionally, in recognition of the need to be accessible to the African-American community, DOE Savannah River Operations Office held a public hearing for the DWPF Draft Supplemental EIS in a predominately African-American community.

Additionally, DOE Savannah River Operations Office strives to make the information it presents more understandable and reader-friendly by simplifying the technical language as much as possible without being inaccurate, by using more visual aids such as graphs, charts, and pictures, and by reducing the size of the document by eliminating unnecessary information. Additionally, DOE Savannah River Operations Office is working with a local university to write a more reader-friendly non-technical summary of the Final DWPF Supplemental EIS. DOE Savannah River Operations Office welcomes suggestions on how it can further improve educational opportunities for or activities within the African-American community or other minority or low-income communities.

Response to Comment H7-1-02
Technology exchange on the vitrification process has occurred between DOE representatives and scientists from countries such as France, Germany, Japan, the United Kingdom, and Russia. DOE and agencies of these countries have established cooperative agreements, and DOE scientists have interacted with international colleagues in technology exchanges, onsite assessments, specialists' workshops, and cooperative research projects. These activities have advanced the DOE overall international exchange objectives of providing independent reviews of DOE programs, conserving DOE resources by incorporating foreign technology and by performing joint research, and ensuring consideration of U.S. views and policies when international evaluations are conducted and international standards set. Recent exchanges include: melter design and operation with Germany and Japan, melter sensors with Germany, operations force comparison with the United Kingdom, acceptance process with France, waste product quality with Russia, and material interface interactions tests with various countries. This technology exchange will help ensure that DWPF's design and operation incorporate lessons learned from this foreign technology. This exchange will aid in ensuring that DWPF can be operated in such a manner as to protect the environment and the health and safety of workers and the public. Section 2.5 has been revised to include information on this technology transfer.

Response to Comment H7-1-03
See response to comment H7-1-01 regarding DOE's public participation efforts.

Response to Comment H7-1-04
Potential impacts of treating DWPF organic waste (composed mostly of benzene) at the Consolidated Incineration Facility or at an alternative treatment facility are evaluated in Section 4.1.16.

Response to Comment H7-1-05
The Federal repository is outside the scope of this Supplemental EIS. Under the Nuclear Waste Policy Act of 1982 (P.L. 97-245), as amended, DOE is responsible for siting, constructing, and operating a geologic repository for the disposal of high-level nuclear waste. DOE does recognize the need for a Federal repository and is currently performing suitability studies at the Yucca Mountain, Nevada, site as a Federal repository for high-level waste and spent nuclear fuel. Under the proposed action and the ion exchange pre-treatment alternative, the vitrified glass product from DWPF would be stored in Glass Waste Storage Buildings located in S-Area until a Federal repository becomes available.

Response to Comment H7-1-06
See response to comment H7-1-01 regarding DOE's public participation efforts.

Response to Comment H7-1-07
DOE presumes this comment addresses the issue of DOE's acceptance at SRS of

spent nuclear fuel from foreign research reactors, which is beyond the scope of this Supplemental EIS. As noted in Section 1.4, these issues are being addressed in other NEPA documentation, specifically the Urgent-Relief Acceptance of Foreign Research Reactor Spent Nuclear Fuel Environmental Assessment and the Proposed Policy for the Acceptance of United States Origin Foreign Research Reactor Spent Nuclear Fuel EIS. This comment is being forwarded to the DOE organization responsible for these NEPA documents for their information.

Response to Comment H7-1-08
See response to comment H7-1-01 regarding DOE's public participation efforts.

Response to Comment H7-1-09
See response to comment H7-1-01 regarding DOE's public participation efforts.

Response to Comment H7-1-10
See response to comment H7-1-01 regarding DOE's public participation efforts.

Transcript STATEMENT OF REGINA THOMAS (Commentor H7-2)

Response to Comment H7-2-01
See response to comment H7-1-01 regarding DOE's public participation efforts.

DOCUMENT H9
BARNWELL, SOUTH CAROLINA, SEPTEMBER 20, 1994

Transcript STATEMENT OF RONALD E. KNOTTS (Commentor H9-1) page 1
Transcript STATEMENT OF RONALD E. KNOTTS (Commentor H9-1) page 2

Response to Comment H9-1-01
This Supplemental EIS evaluates the future projected public health impacts of DWPF and reasonable alternatives.

To determine the effects (if any) of past radioactive and chemical releases from SRS, DOE is funding a study called the Savannah River Site Dose Reconstruction Project, which is being administered by the Centers for Disease Control and Prevention (CDC). Phase I, currently being performed by the Radiological Assessments Corporation under contract with CDC, is intended to find and review records from SRS and other sources that can be used in the dose reconstruction process. Phase II of the project involves estimating the amount of radioactive materials and chemicals that have been released since SRS began operations; estimating or reconstructing the doses that the public has received from these materials; and estimating the possible health effects from the reconstructed doses (risk assessment). In Phase III, the CDC will use the reconstructed doses and the estimates of health effects to decide whether it is possible to design a study (called an epidemiological study) to detect actual health effects in the population living in the vicinity of the site.

The Savannah River Region Health Information System is a project being performed by the Medical University of South Carolina under funding by the DOE Headquarters Office of Epidemiology and Health Surveillance. This project consists of creation of a cancer registry and a birth defects registry.

Transcript STATEMENT OF JOSEPH WILDER (Commentor H9-2) page 1
Transcript STATEMENT OF JOSEPH WILDER (Commentor H9-2) page 2

Response to Comment H9-2-01
See response to comment H9-1-01 regarding the ongoing Savannah River Dose Reconstruction Project.

Response to Comment H9-2-02
DOE discusses in Section 3.11.1.1 sources and quantities of background radiation exposure in the vicinity of the SRS. See response to comment H9-2-01 regarding the ongoing Savannah River Dose Reconstruction Project.

Response to Comment H9-2-03
As noted in Section 1.2.2, DOE concurs with the need to immobilize SRS high-level waste to reduce risk to human health and the environment and considers vitrification to be the method of choice to achieve this goal. DOE has undertaken the development of the DWPF Supplemental EIS as part of the process to decide whether and how to start up DWPF in light of changes made since the 1982 EIS was prepared. The proposed action remains DOE's preferred alternative (Section 2.2). The final decision by DOE will be documented in the Record of Decision.

Response to Comment H9-2-04
The management and storage of commercial nuclear waste is beyond the scope of this Supplemental EIS. In Section 1.4, DOE discusses NEPA documents that have been recently completed or are in process or planned that may affect DWPF operation.

Response to Comment H9-2-05
This comment is outside the scope of this Supplemental EIS and has been forwarded to the DOE organization responsible for the Acceptance of United States Origin Foreign Research Reactor Spent Nuclear Fuel EIS and the Urgent-Relief Acceptance or Foreign Research Reactor Spent Nuclear Fuel Environmental Assessment for their information.

Response to Comment H9-2-06
See response to comment H9-2-03.

Transcript STATEMENT OF JULIE ARBOGAST (Commentor H9-3)

Response to Comment H9-3-01
DOE Savannah River Operations Office is committed to making future decisions and conducting its operations openly by considering input from public participation. In addition to the public participation activities conducted in response to environmental laws, such as public hearings for the DWPF Draft Supplemental EIS, DOE Savannah River Operations Office is opening its decisionmaking processes to public participation in critically important areas such as contract reform and future land use planning. Public meetings are being held to obtain the public's input into these future decisions. Additionally, DOE Savannah River Operations Office has an ongoing program entitled "SRS Public Forums." SRS Public Forums or meetings are held at the request of a community in South Carolina and Georgia. DOE Savannah River Operations Office will discuss whatever topics people from the host community wish to discuss. DOE Savannah River Operations Office also provides information about environmental monitoring and contamination on and near SRS in the SRS annual environmental reports, which are readily available to the public. DOE Savannah River Operations Office welcomes suggestions on how it can further improve its public participation program.

Response to Comment H9-3-02
See response to comment H9-3-01 regarding DOE's public participation efforts. Further information concerning contamination of SRS creeks is available in SRS environmental reports.

DOCUMENT H10
COLUMBIA, SOUTH CAROLINA, SEPTEMBER 20, 1994

Transcript STATEMENT OF TOLLY HONEYCUTT (Commentor (H10-1)

Response to Comment H10-1-01
DOE agrees that the immobilization of the high-level waste into a highly stable form is the prudent approach for reducing risk from continued operation of the high-level waste storage tanks (Section 1.2.2). DOE's position is that vitrification continues to be a sound choice for immobilization (Section 2.5) and that the proposed action remains DOE's preferred alternative (Section 2.2). DOE's final decision will be documented in the Record of Decision.

Response to Comment H10-1-02
The generation of DWPF organic waste in relation to the planned startup of the Consolidated Incineration Facility and the impact of incinerating the DWPF organic waste at that facility are described in Sections 2.2.7 and 4.1.16, respectively, of this Supplemental EIS. DOE is evaluating treatment alternatives for SRS waste streams, including incineration at the Consolidated Incineration Facility and the impacts of operating that facility, in the SRS Waste Management EIS. This comment is being forwarded to the DOE organization responsible for the SRS Waste Management EIS for their information.

Transcript STATEMENT OF ANNE WILSON (Commentor H10-2) page 1
Transcript STATEMENT OF ANNE WILSON (Commentor H10-2) page 2

Response to Comment H10-2-01
DOE is committed to cleaning up the environment from past practices and safely handling and dispositioning hazardous wastes in accordance with all applicable laws and regulations. The DWPF Supplemental EIS and the SRS Waste Management EIS (Section 1.4) are part of the process to decide which facilities and processes will be used. Although not within the scope of this Supplemental EIS, it is noted that cleanup at SRS is proceeding under the Federal Facilities Agreement (Section 1.2.3) in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA) requirements. Choices regarding the relative benefits of leaving some contamination in place versus physically disturbing habitats to clean them up are considered in this process with input from the public.

Response to Comment H10-2-02
The issue of DOE's acceptance at SRS of spent nuclear fuel from foreign research reactors is outside the scope of this Supplemental EIS. As noted in Section 1.4, these issues are being addressed in other NEPA documentation, specifically the Urgent-Relief Acceptance of Foreign Research Reactor Spent Nuclear Fuel Environmental Assessment and the Proposed Policy for the Acceptance of United States Origin Foreign Research Reactor Spent Nuclear Fuel EIS. This comment is being forwarded to the DOE organization responsible for these NEPA documents for their information.

Response to Comment H10-2-03
The cleanup of SRS is outside the scope of this Supplemental EIS. However, DOE is required under existing law (CERCLA and RCRA) to clean up its waste sites. See response to comment H10-2-01.

Response to Comment H10-2-04
DOE is committed to cleaning up the environment. The operation of DWPF, DOE's preferred alternative, is an important part of this effort. See response to comment H10-2-01.

Transcript STATEMENT OF SAM MANNING (Commentor H10-3) page 1
Transcript STATEMENT OF SAM MANNING (Commentor H10-3) page 2
Transcript STATEMENT OF SAM MANNING (Commentor H10-3) page 3
Transcript STATEMENT OF SAM MANNING (Commentor H10-3) page 4
Transcript STATEMENT OF SAM MANNING (Commentor H10-3) page 5

Response to Comment H10-3-01
As discussed in Section 1.2.2, the purpose of DWPF is to immobilize high-level radioactive waste stored in tanks at SRS to reduce risks to human health and the environment. Human health risks from the proposed action and alternatives are examined in Sections 4.1.11, 4.2.11, and 4.3.11 for normal operations and Sections 4.1.12, 4.2.12, 4.3.12, and Appendix B for accidents. Cumulative impacts of DWPF alternatives and other existing and reasonably foreseeable facilities and activities are examined in Section 4.1.17, 4.2.16, and 4.3.16. DOE is committed to conducting these evaluations in a manner that provides accurate, complete, and timely information to the public and to providing the public with ample opportunities for input to DOE's decisions.

Response to Comment H10-3-02
Emissions monitoring technologies to be used at the SRS Consolidated Incineration Facility are outside the scope of this Supplemental EIS. DOE is evaluating the impacts of alternative treatment technologies for treating various wastes, including wastes incinerated at the Consolidated Incineration Facility, in the SRS Waste Management EIS, currently being prepared. With respect to the Consolidated Incineration Facility, DOE has limited this Supplemental EIS to an evaluation of potential environmental impacts of options that may be available to treat the liquid organic waste (primarily benzene) from DWPF in the event the Consolidated Incineration Facility is not available (Sections 2.2.7, 4.1.16).

The Savannah River Technology Center is keeping abreast of Fourier transform infrared and laser spark emission spectroscopy technologies and other continuous emission monitoring technologies for various pollutant emissions (e.g., hazardous metals), and is investigating their potential for use to reliably monitoring stack emissions from SRS facilities, including the Consolidated Incineration Facility and DWPF.

Section 2.2.7.2 has been revised to indicate that the Consolidated Incineration Facility design includes use of proven, commercially available continuous stack emission monitors for carbon monoxide, radionuclides, and opacity, and provisions for emissions sampling and analysis at appropriate intervals for other parameters, including pertinent organics and metals, in accordance with permit conditions for the facility. These monitoring requirements are designed to ensure that the Consolidated Incineration Facility emissions remain within required limits, including the requirement to maintain a destruction or removal efficiency of at least 99.99 percent for principal organic hazardous constituents such as benzene. These permits must be periodically renewed. For example, state regulations limit the hazardous waste permit for the Consolidated Incineration Facility to a 5-year period, at which time DOE must submit a detailed application for a permit renewal to the South Carolina Department of Health and Environmental Control. The permit is renewed only after detailed scrutiny by the regulator and opportunity for input from the public. DOE's operation of the Consolidated Incineration Facility would also be subject to close regulatory oversight. For example, Federal regulations require annual inspections of SRS hazardous waste facilities, including the Consolidated Incineration Facility by EPA or the South Carolina Department of Health and Environmental Control. This comment is being forwarded to the DOE organization responsible for preparation of the SRS Waste Management EIS for their information.

Response to Comment H10-3-03

As noted in Section 3.4.2.1, SRS operates 35 sampling stations to monitor radionuclide concentrations in ambient air onsite and in the vicinity of SRS. The stations are designed to surround the site with two concentric rings of samplers to ensure that potential radioactive releases would be detected. The inner ring consists of 14 samplers located along the site perimeter. The outer ring consists of 12 samplers located approximately 40 kilometers (25 miles) from the center of the site. In addition, 5 sampling stations are placed at strategic locations onsite, including one in H-Area, where the Consolidated Incineration Facility is located and near DWPF. Finally, 4 stations are located approximately 160 kilometers (100 miles) from the center of the site at Macon and Savannah, Georgia, and Columbia and Greenville, South Carolina, to determine normal background radioactivity levels from natural sources and worldwide fallout. The SRS Environmental Monitoring Plan (reference WSRC 1993k in Chapter 5) describes details of these and other environmental monitoring efforts by DOE at SRS. See response to comment H10-3-01 regarding emissions monitoring for the Consolidated Incineration Facility.

Response to Comment H10-3-04
See response to comment H10-3-02 regarding the potential use of Fourier transform infrared spectroscopy and laser spark spectroscopy emission monitoring technology at DWPF. Fourier Transform Infrared Spectrometry (FT-IR) technology, although further along in research and development than laser spark spectrography, has not been approved by the EPA for regulatory compliance monitoring applications. EPA has recently completed a draft metal emissions monitor performance standard for laser spark spectroscopy, but its implementation and the Site's use of this type of equipment could be several years away. DOE is committed to monitoring DWPF air emissions using proven technologies in accordance with all appropriate requirements. DWPF air emission sources are monitored for both nonradiological and radiological emissions. For example, Vitrification Facility main stack emissions (Zone 1) monitors would be provided for benzene (infrared technology), mercury (ultraviolet technology), nitrogen oxides (chemiluminescence technology), radioactive particulates (continuous sampler), radioactive iodine (carbon filters), noble gases (Kanne chamber), and high radioactivity levels (continuous Geiger-Mueller detector). ITP filter/stripper building emissions are monitored for benzene and radionuclides. Section 2.2 has been revised to describe air emission monitoring technologies in place or planned for these and other DWPF facilities.

Response to Comment H10-3-05
This comment is outside the scope of this Supplemental EIS and has been forwarded to the organization responsible for the Proposed Policy for the Acceptance of United States Origin Foreign Research Reactor Spent Nuclear Fuel EIS for their information.

Response to Comment H10-3-06
Section 4.1.17 discusses the cumulative impact of the proposed action, existing offsite facilities, and reasonably foreseeable onsite facilities and operations. This section includes discussion of cumulative impacts on air quality, occupational and public health, and waste generation.

Response to Comment H10-3-07
See response to comment H3-6-03 regarding the ongoing Savannah River Dose Reconstruction Project.

The large scale human genetic studies carried out to date have shown no statistically significant increase in genetic effects resulting from increased radiation dose. Extrapolating from research on the genetic effects of exposure to radiation in other animals indicates that the dose-to-risk conversion factor for genetic effects is approximately one fourth of that for latent fatal cancers, or 0.00013 per person-rem. The United Nations Scientific Committee on the Effects of Atomic Radiation states that "[t]he committee wishes to stress that there are still no direct data for humans

regarding the induction by radiation of hereditary diseases."

Radiological releases under the proposed action are predicted to result in 0.00084 cancer in the 620,100 person population residing within 80 kilometers (50 miles) of SRS over the 24 years of DWPF operations. Using the genetic risk factor presented above for latent fatal cancers, the population would experience approximately 0.0002 genetic effects over the 24 years of DWPF operations. Since no adverse public health impacts would be projected for the proposed action or its alternatives, the Supplemental EIS presents estimated effects of radiation only in terms of latent cancer fatalities, which have a higher dose-to-risk conversion factor.

For nonfatal cancers, the weighted dose-to-risk conversion factor is approximately one fifth of that for latent fatal cancers, or 0.0001 per person-rem. Radiological releases under the proposed action are predicted to result in 0.00084 latent fatal cancer in the 620,100 person population residing within 80 kilometers (50 miles) of SRS over the 24 years of DWPF operations. Using the nonfatal cancer risk factor presented above, the population would experience a risk of approximately 0.00017 nonfatal cancers over the 24 years of DWPF operations. Since no adverse public health impacts would be projected for the proposed action or its alternatives, the Supplemental EIS presents estimated effects of radiation only in terms of latent cancer fatalities, which have a higher dose-to-risk conversion factor.

The United Nations Scientific Committee on the Effects of Atomic Radiation has concluded that a dose of 1 rad (approximately equal to 1 rem) delivered over an entire pregnancy would add a probability of adverse health effects (mental retardation, mortality, and the induction of malformations, leukemia, and other malignancies) in the population of live births of less than 0.002. The committee also states that information becoming available suggests that the risk estimate may need substantial revision downward (particularly in the low-dose ranges). Using this dose-to-risk conversion factor (0.002 adverse effect per rem), if all pregnant women in the 620,100 person population residing within 80 kilometers (50 miles) of the Savannah River Site receive the maximum dose of 0.001 rem per year, 0.0005 of these adverse pregnancy effects are calculated for the 24 years of DWPF operation. (This calculation uses the 1990 U.S. average birth rate of 16.7 births per 1,000 persons per year.)

Response to Comment H10-3-08
As described in Section 4.1.11.1, the Supplemental EIS addresses estimated public health impacts from exposure to radiation in terms of latent cancer fatalities. These delayed cancer fatalities are called latent cancer fatalities because the cancer can take many years after the radiation exposure to develop and cause death.

Response to Comment H10-3-09
See response to comment H-10-3-07 regarding genetic effects of radiation exposure.

Transcript STATEMENT OF DAVE ALFORD (Commentor H10-4)

Response to Comment H10-4-01
DOE concurs with the need to conduct thorough testing, including initial small-scale tests, and to perform thorough accident analyses for large industrial facilities and processes such as those at DWPF. DOE has made extensive efforts to ensure that DWPF facilities and processes protect workers, the public, and the environment. The DWPF chemical processes have been tested in laboratories at SRS using radioactive wastes from SRS high-level waste storage tanks. These tests included making small amounts of radioactive glass. To gain experience, identify potential process problems and improvements, and refine operating procedures, DOE has operated a pilot scale vitrification plant at SRS since 1984. This pilot plant uses

nonradioactive waste simulants and duplicates all chemical processes planned for the DWPF. Lessons learned from the pilot plant have resulted in several DWPF hardware and process modifications. Both the DWPF and ITP processes also have been tested at full scale (see response to comment H4-2-02).

During the design, construction, and testing of DWPF, a wide range of radiological and chemical accidents were analyzed to determine how they could be prevented or mitigated. Accidents that were analyzed included simple spills, piping failure due to corrosion or high pressure, and explosions resulting from an earthquake. The most desirable response to an accident scenario was to make a hardware or operational change to prevent the accident. Systems are in place (hardware and administrative) to mitigate the effects of anticipated accidents as discussed in Appendix B. These accident analyses and prevention and mitigation processes are common to all DOE facilities and will continue throughout the operational life of DWPF. DOE would analyze proposed changes to DWPF and implement them only if they do not compromise the safety of workers, the public, or the environment. For example, changes are being made to DWPF now as a result of lessons learned from tests at the vitification pilot plant and issues raised during reviews of the DWPF safety analysis.

DOE used its 40 years of experience handling SRS high-level waste to choose materials for DWPF that can survive and function in the radioactive and corrosive environments that would exist. Also, components in DWPF that would be in contact with the highly radioactive waste would be periodically inspected and replaced if required.

Response to Comment H10-4-02
DOE chose DWPF's location mainly because (1) it is near an existing high-level waste tank farm (reducing the need for transfer piping), (2) there was sufficient space at the location, and (3) investigations of the subsurface showed that the site was geologically acceptable. Liquid transfers between the tank farm and DWPF would be through underground pipelines. DWPF includes four stainless steel pipes running between the H-Area high-level waste tank farm and DWPF (one for sludge, one for salt solution, one for DWPF recycle to the tank farm, and one spare). Two larger carbon steel "jackets" are installed, each of which contains two of the stainless steel pipes. The piping and jackets slope so that material in the transfer pipes would drain to tanks at one end after a transfer. If an inner transfer pipe or a jacket leaked, the liquid inside the jacket would flow to one of several "leak detection boxes." The leak detection boxes contain conductivity probes. The probes are designed to alarm if liquid reaches them so that leaks in the transfer pipes or the jackets can be detected. A description of piping has been added to the Supplemental EIS in Section 2.2.5.5.

C.3 Voice Mail Statements for the Draft Supplemental Environmental Impact Statemen for the Defense Waste Processing Facility

DOCUMENT V1
VOICE MAIL STATEMENT

DWIGHT L. WILLIAMS

Voice Document V1

Response to Comment V1-01
See response to comment L7-02 regarding DOE's public participation efforts.

Response to Comment V1-02
The subject of waste in public schools is outside the scope of this Supplemental EIS.

DOCUMENT V2
VOICE MAIL STATEMENT

THOMAS L. LIPPERT

Voice Document V2

Response to Comment V2-01
Global and national resolution of radioactive waste disposal issues are beyond the scope of this Supplemental EIS. However in previous NEPA documentation, DOE examined the possibility of immobilizing high-level waste and packaging it in special flight containers for insertion into a solar orbit. This alternative was found to have a high risk because of potential accidents and was determined to be much more expensive than other alternatives. This and other disposal alternatives are discussed in the 1982 EIS for DWPF.

C.4 Correspondence Received from Government Agencies and the Public for the Draft Supplemental Environmental Impact Statement for the Defense Waste Processing

DOCUMENT L1

SAM BOOHER
RESPONSE TO COMMENT

Letter Document L1 page 1
Letter Document L1 page 2

Response to Comment L1-01
The Carolina bay, called Sun Bay, which was unavoidably destroyed as a result of DWPF construction, had been drained and farmed prior to DWPF construction. Four artificial ponds were created. One of the ponds was dismantled in 1984 to accommodate the expansion of Z-Area. The remaining ponds support some wetland vegetation and breeding amphibians. Findings from continuing studies performed by the Savannah River Ecology Laboratory contribute to research available to improve techniques for wetland construction and restoration. Sections 3.5.2 and 4.1.5.2 were revised to clarify the intent of the mitigation and current status of these ponds.

Response to Comment L1-02
The statement on page 4-78 of the Draft Supplemental EIS referenced in this comment could mislead the reader. The Supplemental EIS states that the "[p]otential for impacts from soil erosion during construction of the ion exchange facility ... is expected to be slightly greater than that projected under the proposed action." Impacts could be greater because the ion exchange facility would require additional construction beyond that called for under the proposed action, resulting in a greater possibility for impacts from erosion as a result of this additional construction. Section 4.3.2 has been revised to clarify this point.

DOE will comply with all applicable requirements for erosion and sedimentation control to preserve the quality of habitats in Upper Three Runs and other streams potentially affected by actions considered in this Supplemental EIS. All construction at SRS must comply with state erosion and sedimentation

control requirements contained in stormwater discharge regulations which became effective in 1992 as part of the Clean Water Act. These regulations and associated permits issued under these regulations require DOE to prepare erosion and sediment control plans for all projects, regardless of the size of the land area disturbed. The U.S. Soil Conservation Service also reviews plans developed by Westinghouse Savannah River Company. For projects disturbing less than 0.8 hectares (2 acres), the Westinghouse Savannah River Company Environmental Protection Department must approve the plan; the plan is then sent to the South Carolina Department of Health and Environmental Control for information purposes. For projects disturbing more than 0.8 hectares (2 acres), approval must be obtained from the South Carolina Department of Health and Environmental Control.

Throughout the life of the project, the South Carolina Department of Health and Environmental Control, Westinghouse Savannah River Company Environmental Protection Department, the U.S. Soil Conservation Service, and the U.S. Forest Service monitor the effectiveness of the erosion control measures; SRS corrects noted deficiencies. In addition, the Savannah River Ecology Laboratory has been monitoring Upper Three Runs and its tributaries near the DWPF since 1982 to assess the impact of DWPF construction activities on these streams and the effectiveness of erosion control measures. DOE would develop erosion and sediment control plans before initiating construction activities undertaken as part of the proposed or alternative actions considered in this Supplemental EIS.

DOE has revised Sections 2.2.1, 3.3.2, 4.1.2, 4.1.3, 4.1.5, and 4.3.3 of the Supplemental EIS to better describe and reference erosion and sedimentation control plans pertinent to DWPF.

Response to Comment L1-03
Other than local accessways on already disturbed industrial areas, future DWPF facilities would not require new roads under the alternatives considered in the Supplemental EIS. As many new facilities as possible are sited within fenced industrial areas. New facilities required by DWPF would be sited outside the fenced areas only if reasons of engineering, safety, or size prevent them from being placed within already developed areas.

DOE recognizes its responsibility to the public to ensure that SRS lands are used in ways that support DOE missions and protect natural resources. Before activities like construction, timber management, or ecological research can be initiated on the SRS, they must be approved through the Site Use process. The project manager completes a Site Use Form describing the project, its expected impacts, and its exact location. The Site Use Form is sent to WSRC-Site Services Division, which distributes it to all appropriate SRS organizations for review and approval. All organizations must agree that the planned activity is acceptable with respect to wetlands, threatened and endangered species or their critical habitats, ecological research projects, utility rights-of-way, or other ongoing or planned activities. If conflict cannot be resolved by the parties involved, the SRS Land Use Committee, composed of DOE-SR representatives, acts as the arbitrator and resolves the conflict.

The Citizen's Advisory Board's charter is to provide informed comment and recommendations to DOE, EPA, and SCDHEC on SRS environmental restoration, waste management, technology development, and related matters, which may include land use issues. However, the board has not expressed an interest in becoming involved in routine site use determinations made through the SRS Site Use process.

DOCUMENT L2

DICK RANSOM
RESPONSE TO COMMENT

Letter Document L2

Response to Comment L2-01
The design life for the DWPF melter is 2 years, not 5 years as stated in the Draft Supplemental EIS. The 2-year minimum life is based on the erosion rate of the refractory (heat-resistant lining) of the melter, which is 30 centimeters (12 inches) thick. The design erosion rate of the refractory is about 10 centimeters (4 inches) over a 2-year period. However, data from tests suggest that the actual corrosion rate is much lower and that the melters may last 3 years or longer. Section 2.2.5.4 has been revised to correct the error.

Response to Comment L2-02
In Section 2.2.5.4 of the Draft Supplemental EIS, DOE acknowledged the generation of highly radioactive failed melters and other equipment from DWPF and indicated that these wastes would be placed in Failed Equipment Storage Vaults for safe interim storage. Although DOE did not expect that this waste would qualify as hazardous (mixed) waste under the Resource Conservation and Recovery Act, DOE indicated in Table 2.2-1 that an application for interim status authorization (which would permit storage of such wastes in the vaults) was pending. Environmental impacts of the vaults were included in analyses presented in Chapter 4 of the Draft Supplemental EIS. However, generation of the waste designated for the vaults was not included in the quantitative analyses presented in the Waste Generation sections (i.e., Sections 4.1.13 and 4.3.13) because the measure of impact used for these analyses was the demand that DWPF waste generation would place on SRS waste management infrastructure in place or planned for sitewide service. This demand was quantified as either (1) the estimated contribution of waste generated by DWPF relative to the amount of similar wastes projected to be generated sitewide and treated, stored or disposed, in facilities designated for sitewide service (e.g., Consolidated Incineration Facility, E-Area Vaults) as projected in the Thirty-Year Solid Waste Generation Forecast for Facilities at SRS or (2) estimated capacity required for DWPF wastes relative to capacity of these treatment or disposal facilities. In addition, considerable uncertainty existed (and still exists) regarding the quantities of this waste that would be generated due to uncertainties in operating life of Vitrification Facility equipment. It is also unclear how much of this failed equipment would qualify as mixed waste.

DOE has revised Sections 2.2.1, 2.2.5.4, 4.1.13, 4.3.13, and Table A-11 to clarify DOE's plans for managing failed equipment from DWPF and associated impacts.

Response to Comment L2-03
DOE agrees that effective DWPF operation depends on a melter that will operate reliably without any in-cell maintenance. The Waste Qualification Runs phase of the DWPF Startup Test Program will demonstrate plant-scale capability to make radioactive glass waste that meets specifications. Approximately 90 canisters would be poured during this phase of the startup test program. Melter performance would be assessed again as part of an Operational Readiness Review conducted after Waste Qualification Runs and before radioactive operations. DOE would ensure that the ability to operate the melter in a "hands off" manner is demonstrated because entry into the melter cell during radioactive operations would not be possible.

DOCUMENT L3

ELIZABETH BROWN
RESPONSE TO COMMENT

Letter Document L3

Response to Comment L3-01
DOE welcomes public interest and participation in the DWPF and other SRS waste management activities and appreciates input from the public on these activities.

DOCUMENT L4

SYNERGISTIC DYNAMICS, INC.
RESPONSE TO COMMENT

Letter Document L4 page 1
Letter Document L4 page 2
Letter Document L4 page 3

Response to Comment L4-01
As indicated in Section 1.1 of this Supplemental EIS, it is DOE policy to follow the letter and spirit of NEPA and to comply fully with Council on Environmental Quality regulations. DOE has prepared this Supplemental EIS to meet NEPA requirements in accordance with this policy.

Response to Comment L4-02
As indicated in Section 2.2.2.2, the decision to replace the ion exchange system proposed in 1982 with In-Tank Precipitation (ITP) was made because ITP was more efficient and economical than ion exchange and could be more readily implemented. DOE again evaluated ion exchange as a replacement for ITP after the Government Accounting Office issued its report in June 1992. DOE's evaluations, which considered technical and cost factors, concluded that ITP was still preferred over ion exchange. The main reasons cited included cost (up to $500 million for ion exchange during a period of potentially reduced availability of funds), time delays required for implementation (which would limit the tank farm's ability to support future site missions due to reduced capacity in the tanks for accepting other wastes), and greater potential for unknown process problems with the ion exchange system. Section 1.2.5 of the Supplemental EIS has been revised to reference these evaluations.

A cost-benefit analysis of these alternatives was not included in this Supplemental EIS. However, costs of implementing an ion exchange system are identified (e.g., Section 2.4). DOE will document the reasons for its decision regarding pre-treatment of the high-level waste in its Record of Decision for this Supplemental EIS.

Response to Comment L4-03
DOE did not intend the term "immediate replacement" to be misleading, but this term (as well as other terms considered) may not be adequately descriptive when used without explanation. Therefore, clear definitions of the term have been provided upon first use in the Summary and in Sections 2.1 and 2.4 of the Supplemental EIS. The alternate terms suggested in this comment could also be misinterpreted.

Response to Comment L4-04
DOE reviewed the information provided in the Draft Supplemental EIS regarding the cost of not operating the Vitrification Facility under the ion exchange immediate replacement alternative and determined that costs were not correctly stated. DOE estimates that costs would decline from existing funding levels ($150 million per year) for 2 years during shutdown, remain at relatively low levels during a 5- to 6-year maintenance/standby period, then rise to levels somewhat higher than present funding levels for a 3-year startup period.

Section 2.4 has been revised to clarify these costs and to show that the $500 million estimate for the ion exchange facility pertains to cost of design, construction, and startup testing as assumed by the commentor.

Response to Comment L4-05
Comment noted. As indicated in Section 2.1, DOE's preferred alternative is the proposed action, which would use ITP rather than ion exchange for pre-treatment. DOE will document its decision regarding waste pre-treatment in the Record of Decision for this Supplemental EIS.

Response to Comment L4-06
As noted in Section 1.2.2 of this Supplemental EIS, the purpose of DWPF, including the Vitrification Facility, is to immobilize high-level waste resulting from processing nuclear fuel and target assemblies at SRS' chemical separations facilities. This high-level waste, which now amounts to approximately 129 million liters (34 million gallons), is stored in the SRS high-level waste tank farms. A small amount of high-level waste continues to be generated as a result of limited production activities (Section 1.2.2) and would be treated at DWPF. DWPF could also be used to process additional waste generated as a result of alternative actions being considered in other DOE NEPA documents (Section 1.4). The only DWPF process being used for purposes other than high-level waste processing is Saltstone Manufacturing and Disposal, which immobilizes wastewater treatment concentrate from the F-and H-Area Effluent Treatment Facility (Section 2.2.3). DOE has made no decisions regarding other continuing uses for DWPF. DOE will document the reasons for its decision about operating DWPF in its Record of Decision for this Supplemental EIS.

Response to Comment L4-07
As noted in the response to Comment L4-06, DWPF could be used to immobilize high-level waste generated as a result of alternative actions being considered in other DOE NEPA documents. These actions include processing of spent fuel rods (referred to as high-level waste in the subject comment) brought to SRS. The development of ion exchange technology apart from its potential for use at DWPF and transfer of technology developed by DOE are outside the scope of this Supplemental EIS. However, DOE is committed to technology development and transfer as part of its mission and is furthering development of ion exchange technology for treating high-level waste at its Hanford, Washington, site.

Response to Comment L4-08
See response to Comment L4-02.

Response to Comment L4-09
Detailed cost estimates are not within the scope of this Supplemental EIS, which is intended to evaluate environmental impacts of reasonable alternatives. However, rough cost approximations for the ion exchange phased replacement and immediate replacement alternatives are provided in Section 2.4 (also see response to Comment L4-04). At present, DOE considers these estimates to be adequate based on the large difference in cost between ion exchange and the use of ITP as proposed.

Response to Comment L4-10
In this Supplemental EIS, DOE presents a schedule for operating the DWPF system that allows a realistic comparative analysis of environmental impacts. As noted in Section 1.2.3, DOE plans to begin ITP and Extended Sludge Processing in early 1995 and to operate the DWPF Vitrification Facility in late 1995 to ensure timely removal of waste from the high-level waste tanks, assuming issuance of a Record of Decision compatible with this schedule. Based on current operating plans and available funding, high-level waste processing would be completed in approximately 24 years under the proposed action (Section 2.2.1). More detailed schedule information for the proposed action is available in the SRS High-Level Waste System Plan [reference WSRC (1994c) in Chapter 5], which is available in DOE Reading Rooms located in the

Forrestal Building, Washington, D.C., and at the University of South Carolina-Aiken Library.

Planned startup dates for ITP, Extended Sludge Processing, and the Vitrification Facility under the ion exchange phased replacement alternative would be identical to those for the proposed action. Under phased replacement, DOE anticipates that on a normal work schedule the ion exchange facility could be developed to replace ITP 14 years after initial startup of ITP and has used this schedule for the analysis (Section 2.4). Under immediate replacement, DOE would not operate ITP and anticipates that development of an ion exchange facility could be accelerated to be operational in approximately 10 years; the Vitrification Facility would either be shut down or operated to process sludge only in the interim 10-year period. Any decision to conduct additional engineering studies necessary to develop more detailed schedules for an ion exchange system will be documented in the Record of Decision for this Supplemental EIS.

Response to Comment L4-11
See responses to Comments L4-02, -04, -09, and -10.

DOCUMENT L5

U.S. GEOLOGICAL SURVEY
RESPONSE TO COMMENT

Letter Document L5

Response to Comment L5-01
Section 3.3.1.1 has been revised to cite the suggested reference.

Response to Comment L5-02
Section 3.3.1.2 has been revised to acknowledge the results of the experiments noted in the reference. DOE recognizes that in case of accidental spills of salt solution (e.g., from transfer pipes in the tank farms) during DWPF operations that the nature of the soils, as discussed in the reference, would help slow the migration of contaminants in the subsurface and would therefore have an overall beneficial effect. The extent of this benefit would depend on the clay content of soils in the immediate vicinity of a spill.

DOCUMENT L6

P. MARK PITTS
RESPONSE TO COMMENT

Letter Document L6

Response to Comment L6-01
As noted in Section 1.2.2, DOE agrees with the need to immobilize SRS high-level waste to reduce risk to human health and the environment and considers vitrification to be the method of choice to achieve this goal. DOE has undertaken the development of the DWPF Supplemental EIS as part of the process to decide whether and how to start up DWPF in light of changes made since the 1982 EIS was prepared. The proposed action is DOE's preferred alternative (Section 2.2). DOE's final decision will be documented in the Record of Decision.

Response to Comment L6-02
Sections 4.1.12.4, 4.2.12.3, and 4.3.12.3 present summaries of the risk trends over time for the proposed action, the no-action alternative, and the ion exchange pre-treatment alternative. Section 2.6 and Figure 2.6-1 present a comparison of risk over time for all alternatives. While the annual accident risk of the proposed action and the ion exchange pre-treatment alternative is higher than that posed by the no-action alternative, this risk exists only for the 24 years of DWPF processing. The immediate replacement alternative would add 10 years of risk from the delay in removal of waste from the tank farms. The risk from the no-action alternative would continue indefinitely. As noted in Section 4.2.12, an earthquake at the tank farm could result in leakage of high-level waste into the ground and potentially into the groundwater. The other accidents considered under the no-action alternative could result in waste being released into the air. The Record of Decision will document DOE's selection of alternatives.

Response to Comment L6-03
See response to comment L6-01 regarding the Supplemental EIS process.

Response to Comment L6-04
DOE agrees and has incorporated numerous safety features in the design of DWPF, as described in Chapter 2. Section 2.2.9 highlights several of the important safety features of DWPF including planned modifications to the Vitrification Facility and associated processes to ensure containment of radioactive material and benzene in the event of an earthquake. DOE will carefully consider risk from normal operation and accidents as analyzed in Chapter 4 in its decision regarding whether and how to operate DWPF and will document the results in its Record of Decision.

Response to Comment L6-05
As noted in Section 1.2.2, DOE recognizes the need to immobilize SRS high-level waste to reduce risk to human health and the environment and considers vitrification to be the method of choice to achieve this goal. Risks from normal operation and accidents associated with operating DWPF using either ITP or an ion exchange system from continuing to store the high-level waste in tanks are analyzed in Chapter 4 (e.g., Sections 4.1.11 and 4.1.12, 4.2.11 and 4.2.12, and 4.3.11 and 4.3.12). DOE compares the risks associated with these alternatives in Section 2.6.

Response to Comment L6-06
See response to comment L6-02 regarding risk of the alternatives considered in the Supplemental EIS.

DOCUMENT L7

BARNWELL COUNTY ECONOMIC DEVELOPMENT COMMISSION
RESPONSE TO COMMENT

Letter Document L7

Response to Comment L7-01
See response to comments L6-02, -05, and -06 regarding risk of the alternatives considered in the Supplemental EIS.

Response to Comment L7-02
DOE Savannah River Operations Office fully supports a strong public participation program in which the public is provided with opportunities for early and meaningful participation and accurate, complete, and timely information. DOE Savannah River Operations Office continually tries to improve its public participation programs and has begun to conduct more informal and interactive public meetings, workshops, and hearings. Unlike

previous formal hearings, the hearings conducted for the DWPF Draft Supplemental EIS provided the opportunity for informal discussions between citizens and site personnel, which provided DOE Savannah River Operations Office with formal comments on the Draft Supplemental EIS. DOE Savannah River Operations Office will continue to try to conduct its public participation activities in a way that promotes two-way communication and meets the needs of the public. Additionally, DOE Savannah River Operations Office is trying to make the information it presents more understandable and reader-friendly by simplifying the technical language as much as possible without being inaccurate, by using more visual aids such as graphs, charts, and pictures, and by reducing the size of the document by eliminating unnecessary information. DOE Savannah River Operations Office also uses other forms of communication such as videos, displays, and models where possible. To encourage public participation, DOE Savannah River Operations Office is working with local universities, colleges, and high schools to critique or, in the case of the DWPF Non-Technical Summary, write documents in a less technical, more reader-friendly manner. DOE Savannah River Operations Office welcomes suggestions on how it can further improve its public participation program.

DOCUMENT L8

U.S. DEPARTMENT OF INTERIOR
OFFICE OF ENVIRONMENTAL POLICY AND COMPLIANCE
RESPONSE TO COMMENT

Letter Document L8

Response to Comment L8-01
DOE's Pollution Prevention Program at SRS includes reduction or elimination of the quantity and toxicity of hazardous waste (Section 2.2.8). As indicated in Section 2.2.8, DOE has reduced the amounts of hazardous and mixed wastes generated at SRS since the pollution prevention program has been implemented. Hazardous waste generation was reduced by 24 percent from 1992 to 1993 and mixed waste generation was reduced by 81 percent from 1992 to 1993. Much of this progress is a result of product substitutions. Moreover, DOE continues to seek improvements to its sitewide and facility-specific programs, including those at DWPF, and considers product substitution a high priority for pollution prevention. Improvements include a chemical commodity management program designed to review chemical procurement requisitions for product substitution opportunities.

DOCUMENT L9

DEBRA HASAN
RESPONSE TO COMMENT

Letter Document L9

Response to Comment L9-01
Based on this comment and questions raised informally by several persons at the workshops/hearings held on the Draft Supplemental EIS, DOE has revised the document throughout to use the term "radioactive glass waste" rather than "glass waste" to clarify that the vitrified high-level waste remains radioactive.

DOCUMENT L10

MILDRED MCCLAIN
RESPONSE TO COMMENT

Letter Document L10

Response to Comment L10-01
Technology exchange on the vitrification process has occurred between DOE representatives and scientists from countries such as France, Germany, Japan, the United Kingdom, and Russia. DOE and agencies of these countries have established cooperative agreements, and DOE scientists have interacted with international colleagues in technology exchanges, onsite assessments, specialists' workshops, and cooperative research projects. These activities have advanced the DOE overall international exchange objectives of providing independent reviews of DOE programs, conserving DOE resources by incorporating foreign technology and by performing joint research, and ensuring consideration of U.S. views and policies when international evaluations are conducted and international standards set. Recent exchanges include: melter design and operation with Germany and Japan, melter sensors with Germany, operations force comparison with the United Kingdom, acceptance process with France, waste product quality with Russia, and material interface interactions tests with various countries. This technology exchange will help ensure that DWPF's design and operation incorporate lessons learned from this foreign technology. This exchange will aid in ensuring that DWPF can be operated in such a manner as to protect the environment and the health and safety of workers and the public. Section 2.5 has been revised to include information on this technology transfer.

DOCUMENT L11

DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION
RESPONSE TO COMMENT

Letter Document L11

Response to Comment L11-01
DOE appreciates the Department of Highways and Public Transportation's review of the Draft Supplemental EIS.

DOCUMENT L12

ROBERT L WILCOX
RESPONSE TO COMMENT

Letter Document L12 page 1
Letter Document L12 page 2

Response to Comment L12-01
The areas of concern raised by this comment, DOE's general protocols and decisionmaking criteria regarding whether EISs are needed and efforts to change Federal policy and legislation in this regard, are out of scope for this Supplemental EIS. As noted in Section 1.1, it is DOE policy to follow the letter and spirit of NEPA and to comply fully with NEPA regulations. DOE's reasons for preparing the Supplemental EIS are detailed in Section 1.3.

Response to Comment L12-02
DOE has revised the Draft Supplemental EIS to respond to public comments and to make editorial and technical changes, including updating data, as explained in the Foreword.

Response to Comment L12-03
DOE agrees that the immobilization of the high-level waste into a highly stable form is the prudent approach for reducing risk from continued storage of high-level waste in the high-level storage tanks (Section 1.2.2). DOE has made considerable efforts to incorporate advances in vitrification technology into the DWPF (Section 2.5). The proposed action remains DOE's preferred alternative (Section 2.2). DOE will document its decision in the Record of Decision.

Response to Comment L12-04
Chapter 4 describes environmental impacts of operating DWPF. Decisions regarding operation of DWPF will be documented in the Record of Decision.

Response to Comment L12-05
DOE discusses the environmental impacts of postulated accidents associated with the no-action alternative, including the "Hydrogen Explosion in a Pump Tank" accident, in Section 4.2.12.1 and indicates that secondary impacts (e.g., impacts on water quality, biota) would be similar to those described for the proposed action. As noted in Section 4.1.12.2, DOE expects that these impacts would be minor.

The analysis in Section 4.2.12 presents impacts of accidents primarily in terms of annual risk to the health of workers and members of the public. Section 4.2.12.3 presents a summary of the risk trend over time for the no-action alternative and assumes that the annual risk remains at the current level for an indefinite period of time. In addition, Section 2.6 and Figure 2.6-1 present a comparison of risk over time for all alternatives. As discussed in Section 2.3, if continued monitoring were to indicate a high potential for tank leakage or failure, alternatives including new tank construction would be assessed at that time. Similarly, DOE would take action to ensure that a competent operational and technical staff is maintained. The Record of Decision will document DOE's selection of alternatives.

Response to Comment L12-06
DOE has undertaken the development of the DWPF Supplemental EIS as part of the process to decide whether and how to startup DWPF in light of changes made since the 1982 EIS was prepared. Decisions regarding operation of DWPF will be documented in the Record of Decision.

DOCUMENT L13

CHARLESTON DISTRICT, CORPS OF ENGINEERS
RESPONSE TO COMMENT

Letter Document L13

Response to Comment L13-01
DOE appreciates the Charleston District, Corps of Engineers' review of the Draft Supplemental EIS.

DOCUMENT L14

W. LEE POE, JR.

RESPONSE TO COMMENT

Letter Document L14

Response to Comment L14-01
DOE Savannah River Operations Office welcomes suggestions on how it can further improve its public participation program (see response to comment L7-02) and will consider expanding the public information video to include DWPF facilities other than the Vitrification Facility.

Response to Comment L14-02
Major changes to the DWPF since 1982 are described in Section 1.2. As noted in Section 1.3, DOE prepared this Supplemental EIS to evaluate environmental impacts of completing and operating the DWPF as currently designed and the environmental effects of reasonable alternatives.

Response to Comment L14-03
Section 4.2.12.3 presents a summary of the risk trend over time for the no-action alternative and assumes that the annual risk remains at the current level for an indefinite period of time. In addition, Section 2.6 and Figure 2.6-1 present a comparison of risk over time for all alternatives. As discussed in Section 2.3, if continued monitoring were to indicate a high potential for tank leakage or failure, alternatives including new tank construction would be assessed at that time and appropriate NEPA documentation prepared. The Record of Decision will document DOE's selection of alternatives.

Response to Comment L14-04
The risks of accidents associated with operation of ITP are discussed in Section 4.1.12 and Appendix B. These sections indicate that accidents associated with the Vitrification Facility provide the bounding radiological risk in all accident frequency ranges evaluated. These sections also discuss nonradiological risk from accidents for the proposed action, including ITP and the Vitrification Facility. The accident risk from tank farm operations is discussed in Section 4.2.12 and Appendix B. The accident risks from the ion exchange pre-treatment alternative are addressed in Section 4.3.12. As noted in that section, implementation of the ion exchange pre-treatment process would eliminate the risk posed by benzene. The Record of Decision will document DOE's selection of alternatives.

Response to Comment L14-05
The Supplemental EIS identifies five benzene-related accidents associated with the proposed action. As noted in Tables 4.1-13, B-9, and B-10, two of these accidents are associated with the Organic Waste Storage Tank and three accidents are associated with ITP. DOE monitors and controls the potential for benzene-related accidents at the Vitrification Facility, the Organic Waste Storage Tank, and ITP. Methods used include (1) using a nitrogen inerting system in the ITP process tanks, the Organic Waste Storage Tanks, and the Vitrification Facility chemical process cell to dilute flammable vapors to safe concentrations, (2) monitoring and controlling the oxygen concentration in the vapor space of the ITP process tanks and the Organic Waste Storage Tank, (3) monitoring the concentration of other flammable vapors in the Organic Waste Storage Tank and the chemical process cell, and (4) using stripper columns to reduce the amount of benzene transferred to Saltstone Manufacturing and Disposal. These activities are controlled by operational safety requirements which provide operational limits and performance levels for equipment required for normal safe operation of the facility; actions and compensatory measures to take in the event of a failure to meet the limits; and requirements relating to testing, calibration, or inspection of equipment or conditions to ensure that the equipment is maintained to be in compliance with the limits.

DOCUMENT L15

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL POLICY SECTION
RESPONSE TO COMMENT

Letter Document L15

Response to Comment L15-01
DOE appreciates the U.S. Environmental Protection Agency's review of the Draft Supplemental EIS. The need to immobilize SRS high-level waste to reduce risk to human health and the environment is described in Section 1.2. As noted in Section 2.2 of this Final Supplemental EIS, DOE's proposed action remains its preferred alternative.

Response to Comment L15-02
Section 4.1.17, "Cumulative Impacts" has been revised to include information from the Draft F-Canyon Plutonium Solutions EIS and preliminary information from the SRS Interim Management of Nuclear Materials EIS (currently being prepared) that has become available since the draft DWPF Supplemental EIS was issued. This information supplements data from the Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement. With the exception of preliminary land use and socioeconomic data from the SRS Waste Management EIS, information from that EIS and the Proposed Policy for the Acceptance of United States Origin Foreign Research Reactor Spent Nuclear Fuel EIS was not available for inclusion in the final Supplemental EIS.

The bounding alternatives presented in the F-Canyon Plutonium Solutions EIS and preliminary information from the SRS Interim Management of Nuclear Materials EIS would not appreciably increase the volume of waste to be processed by DWPF. The bounding alternative from both of those EISs together would only result in about a 10 percent increase in the number of canisters of radioactive glass produced by DWPF. As discussed in Section 2.2.1, preliminary information from other related NEPA documents indicates that the incremental volume of high-level radioactive waste would be small compared to the existing high-level waste inventory at the Savannah River Site.

DOCUMENT L16

DEPARTMENT OF HEALTH AND HUMAN SERVICES
SPECIAL PROGRAMS GROUP
RESPONSE TO COMMENT

Letter Document L16 page 1
Letter Document L16 page 2

Response to Comment L16-01
In the accident analysis presented in this Supplemental EIS, DOE considered the synergistic effects between radiation and chemical exposures and between exposure to different chemicals. Section 4.1.12.2 states, "DOE is not aware of any synergistic effects resulting from exposures to radiation and a carcinogenic chemical, such as benzene, which are both known to result in an increased incidence of cancer. Indeed, synergistic effects of radiation and other agents have been identified in only a few instances, most notably from the combined effects of radiation exposure and smoking among uranium miners in causing lung cancer." The chemical accident analysis presented in Section 4.1.12.3 did not include the synergistic effects of simultaneous releases from a common chemical accident initiator due to the scarcity of information about the effects of concurrent exposure to various chemical combinations. The

analysis for normal operation presented in the Supplemental EIS does not address synergistic effects between radiation and chemical exposure or exposures to different chemicals because of the lack of information regarding these effects and because the airborne concentrations expected under normal operation are so low that adverse health impacts are not expected.

Response to Comment L16-02
The modifications described in the Supplemental EIS are primarily related to operational changes in the DWPF process, such as the change from ion exchange pre-treatment to ITP and the change from saltcrete disposal in underground engineered trenches to saltstone disposal in concrete vaults. Other modifications were also identified during facility design and pre-operational testing.

Impacts of previous construction of DWPF are outside the scope of this Supplemental EIS. The debris resulting from construction of the Vitrification Facility and Saltstone Manufacturing and Disposal was not radioactive or toxic. These wastes were disposed of in the same manner as other Savannah River Site sanitary waste, as described in Section 3.12.1.5. Construction of new facilities and modification of existing facilities for ITP and Extended Sludge Processing occurred within a pre-existing radiological area. Low-level radioactive waste generated by this construction was disposed of in the same manner as other Savannah River Site low-level waste, as described in Section 3.12.1.1.

Response to Comment L16-03
As discussed in Section 2.2.1, the proposed action in this Supplemental EIS is to continue construction and begin operations of the total DWPF facility, as currently designed, including all modifications. DWPF has undergone major modifications since the 1982 design, and most of these modifications have been constructed. Operation of DWPF without modification (i.e., the 1982 design) would require significant construction, which would not meet the definition of "no-action." For proposed changes to an ongoing activity, the DOE recommendations for preparation of NEPA documents state that "-'no action' can mean continuing with the present course of action with no changes. It can also mean discontinuing the present course of action by phasing-out operations in the near term." To provide a wider range of alternatives for evaluation, and to aid in more fully addressing the question of "whether and how" to proceed with DWPF, DOE chose to define the no-action alternative in this Supplemental EIS as not operating DWPF and storing waste in tanks indefinitely.

Response to Comment L16-04
See response to comment L16-03.

Response to Comment L16-05
Horizontal groundwater velocity has not been measured in aquifers underlying the sites of the DWPF and associated facilities. Estimates of horizontal groundwater velocity in aquifers beneath the nearby F- and H- Areas are reported in the Waste Management Activities for the Groundwater Protection EIS. These estimates range from 2.2 meters (7 feet) per year to 111 meters (364 feet) per year depending on aquifer material (e.g., sand), properties, and other hydrologic factors. The vertical velocity (or percolation rate) in the soil underlying the F- and H- Areas is reported in that EIS to range from 0.9 to 2.1 meters (3 to 7 feet) per year. These numbers agree with field measurements indicating that liquids released to unlined seepage basins in the early 1950s have reached the shallow groundwater beneath these basins in less than 30 years. However, these basins are located in the center of the SRS, and it would take tens of years before any of the constituents released reach the site boundary. In addition, if these constituents were to reach the site boundary, their concentration would be much lower than that which exists under the basins because of several factors including radioactive decay, dilution, and removal. Given the regulatory requirements under which the Vitrification Facility would be operating, DOE anticipates that spills on the ground near

these facilities would be contained and mitigated using best management practices. Therefore, as noted in Section 4.1.3.1, operation of the DWPF and associated facilities is not expected to have an adverse effect on groundwater resources at SRS or the surrounding areas.

Response to Comment L16-06
DOE appreciates the Department of Health and Human Services Centers for Disease Control and Prevention's review of the Draft Supplemental EIS and will ensure that the agency remains on DOE's mailing list.

DOCUMENT L17

UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
HABITAT CONSERVATION DIVISION
RESPONSE TO COMMENT

Letter Document L17 page 1
Letter Document L17 page 2

Response to Comment L17-01
As indicated in Section 1.1 of this Supplemental EIS, it is DOE policy to follow the letter and spirit of NEPA and to comply fully with Council on Environmental Quality regulations. DOE has prepared the Supplemental EIS to meet NEPA requirements in accordance with this policy.

Response to Comment L17-02
As discussed in Sections 4.1.5, 4.2.5, and 4.3.5, the potential for adverse impacts to aquatic resources (including those for which the National Marine Fisheries Service has stewardship responsibility) would be minimal under any of the alternatives considered in this Supplemental EIS. In accordance with DOE policy, modifications of its selected alternative would be subjected to appropriate NEPA review.

Response to Comment L17-03
As noted in Sections 4.1.5, 4.2.5, and 4.3.5, no effects on threatened or endangered species are expected to result from the proposed action or alternatives considered in this Supplemental EIS. However, as discussed in Section 4.1.5.4, an active colony of red-cockaded woodpeckers, an endangered species, exists approximately 6.5 kilometers (4 miles) from a forested area (pine plantation) that would be cleared. DOE conducted a biological assessment of the area, confirming that it is an unsuitable nesting habitat for this species; no evidence was found that threatened or endangered species occupy the area. A report of the assessment was submitted to the U.S. Fish and Wildlife Service, the agency that has jurisdiction for this species under the Endangered Species Act, initiating an informal consultation under Section 7 of that act.

DOCUMENT L18

SAM P. MANNING
ATTORNEY AT LAW
RESPONSE TO COMMENT

Letter Document L18 page 1
Letter Document L18 page 2

Response to Comment L18-01

See response to comment H10-3-07 regarding genetic effects of radiation exposure.

For nonfatal cancers, the weighted dose-to-risk conversion factor is approximately one fifth of that for latent fatal cancers, or 0.0001 per person-rem. Radiological releases under the proposed action are predicted to result in 0.00084 latent fatal cancer in the 620,100 person population residing within 80 kilometers (50 miles) of SRS over the 24 years of DWPF operations. Using the nonfatal cancer risk factor presented above, the population would experience a risk of approximately 0.00017 nonfatal cancers over the 24 years of DWPF operations. Since no adverse public health impacts would be projected for the proposed action or its alternatives, the Supplemental EIS presents estimated effects of radiation only in terms of latent cancer fatalities, which have a higher dose-to-risk conversion factor.

The United Nations Scientific Committee on the Effects of Atomic Radiation has concluded that a dose of 1 rad (approximately equal to 1 rem) delivered over an entire pregnancy would add a probability of adverse health effects (mental retardation, mortality, and the induction of malformations, leukemia, and other malignancies) in the population of live births of less than 0.002. The committee also states that information becoming available suggests that the risk estimate may need substantial revision downward (particularly in the low-dose ranges). Using this dose-to-risk conversion factor (0.002 adverse effect per rem), if all pregnant women in the 620,100 person population residing within 80 kilometers (50 miles) of the Savannah River Site receive the maximum dose of 0.001 millirem per year (as presented in Section 4.1), 0.0005 of these adverse pregnancy effects are calculated for the 24 years of DWPF operation. (This calculation uses the 1990 U.S. average birth rate of 16.7 births per 1,000 persons per year.)

Response to Comment L18-02
See response to comment L18-01.

Response to Comment L18-03
DOE is funding two studies related to the assessment of public health, including cancer and birth defects, in the vicinity of the Savannah River Site, the Savannah River Site Dose Reconstruction Study and the Savannah River Health Information System (See response to comment H3-6-03). DOE is not involved in the funding of the Greenwood Genetic Center.

The processing of high-level waste in DWPF, which is an integral part of the cleanup of the Savannah River Site, is estimated to result in 0.00084 cancer fatality in the 620,100 person population residing within 80 kilometers (50 miles) of the Savannah River Site over the 24 years of DWPF operation. As discussed in the response to comment L18-02, operation of DWPF is not expected to result in adverse health effects in children born in the 620,100 person population residing within 80 kilometers (50 miles) of the Savannah River Site over the 24 years of DWPF operation. After the completion of DWPF processing, the risk posed by the high-level waste at the Savannah River Site would decrease to a relatively low level from storage of radioactive glass in the Glass Waste Storage Building and from residual radioactivity remaining in the high-level waste storage tanks.

Response to Comment L18-04
General concerns regarding the incineration of low-level waste are outside the scope of this Supplemental EIS. However, various alternatives for treatment of low-level waste at SRS, including incineration, are being evaluated in the SRS Waste Management EIS, currently being prepared. This comment has been forwarded to the DOE organization responsible for that EIS for their information.

As discussed in Section 2.2.7, DOE plans to incinerate liquid organic waste from DWPF, a low-level mixed waste, at the Consolidated Incineration Facility, in accordance with the Resource Conservation and Recovery Act land disposal

restriction treatment standards. However, DOE has chosen to examine in this Supplemental EIS other options for treating this waste in the event the Consolidated Incineration Facility is not available. These options include alternatives to conventional incineration for destruction of this waste and treatment to recover organics or use the waste as fuel (Section 2.2.7.2). The potential environmental impacts of these alternative treatments are examined in Section 4.1.16.

Response to Comment L18-05
See responses to Comments H10-3-02 and H10-3-04.

Response to Comment L18-06
See response to Comment H10-3-03.

DOCUMENT L19

ENERGY RESEARCH FOUNDATION
RESPONSE TO COMMENT

Letter Document L19 page 1
Letter Document L19 page 2
Letter Document L19 page 3

Response to Comment L19-01
As indicated in Section 1.1 of this Supplemental EIS, it is DOE policy to follow the letter and spirit of NEPA and to comply fully with Council on Environmental Quality regulations. DOE has prepared the Supplemental EIS to meet NEPA requirements in accordance with this policy. DOE's reasons for preparing this Supplemental EIS are described in the Notice of Intent for this Supplemental EIS (Federal Register, Volume 59, Number 66, April 6, 1994) and are discussed in Section 1.3.

DOE's decision regarding whether and how to proceed with operating DWPF requires consideration of many factors, including resources already invested, potential future costs, regulatory commitments, and potential environmental impacts identified in this Supplemental EIS. These considerations will be documented in DOE's Record of Decision.

Response to Comment L19-02
Section 4.1.18.1, "Safety-Related Modifications to the Vitrification Facility" of the draft Supplemental EIS discussed DOE's plans to address outstanding technical safety issues at DWPF. These outstanding safety issues are the result of reviews performed and concerns raised by the Savannah River Site operating contractor and DOE. The safety upgrades have become part of the proposed action, and information regarding them has been added to Section 2.2.9.

The Defense Nuclear Facilities Safety Board has raised a concern relating to the stability of soils and sediments beneath the Replacement Tritium Facility (not related to the DWPF). DOE has undertaken studies to determine if this concern is applicable to other Savannah River Site facilities, including the high-level radioactive waste tank farms (and ITP and Extended Sludge Processing tanks) and the Vitrification Facility. Preliminary results from S-Area indicate that this concern will not affect the Vitrification Facility. An extensive study is underway for the high-level waste tank farms (Morin et al 1994 in Chapter 5), but conclusions for those facilities are not expected to be available until mid-1995. If the study concludes that soil and sediment stability is inadequate, the risk of continued storage of high-level radioactive waste in tanks would be higher than the risk presented in this Supplemental EIS.

Response to Comment L19-03
The Supplemental EIS evaluates the environmental impact of DWPF as currently designed and constructed, including reasonably foreseeable future activities (e.g., construction of future Glass Waste Storage Buildings or Failed Equipment Storage Vaults). The discussion on page 2-7 of the draft Supplemental EIS was intended to acknowledge that DWPF could undergo future modifications as a result of ongoing startup testing or subsequent operation. DOE is committed to complying with the letter and spirit of NEPA and would evaluate the need for additional NEPA documentation before implementing a modification. If the environmental impacts are estimated to be greater than those presented in this Supplemental EIS, additional NEPA documentation would be developed.

Response to Comment L19-04
See response to comment L19-02 regarding unresolved safety issues at DWPF. In the aftermath of an earthquake at DWPF, the facility would shut itself down without operator action, after which DOE would carefully evaluate the conditions and operability of the facility. DOE would make decisions regarding startup and future operation only after completion of this evaluation. The facility would also undergo appropriate testing and readiness reviews before DOE made the decision to restart.

Response to Comment L19-05
As discussed in Section 1.2, DOE and others in the scientific and technical community have long expressed the view that immobilization of the waste into a highly stable form for disposal is the prudent approach to achieve DOE's objectives to protect people and the environment both now and in the future. DOE believes that the proposed action would achieve this objective. Continued tank storage of high-level waste would present a risk to human health and the environment from normal operations and potential accidents that would continue indefinitely.

Section 2.6 and Figure 2.6-1 present a comparison of risk over time for all alternatives. As Figure 2.6-1 indicates, and as noted in the comment, processing of waste at DWPF does present additional short-term risk to the environment and to the health and safety of workers and the public. DOE is committed to minimizing this risk, as discussed in Section 2.2.9, including making modifications to the Vitrification Facility and associated processes to ensure containment of radioactive material and benzene following a severe earthquake. The risk of the proposed action would only occur for the 24 years of DWPF processing (Section 4.1), whereas risk posed by the no-action alternative would continue indefinitely (Section 4.2). In addition, disposition of the high-level radioactive waste currently stored in underground tanks at SRS is a prerequisite to the ultimate success of SRS decontamination and decommissioning. Operation of the DWPF is the key element in planning for ultimate high-level radioactive waste disposition.

As discussed in Section 2.3 under the no-action alternative, if continued monitoring were to indicate a potential for tank leakage or failure, alternatives including new tank construction would be assessed at that time.

Also, see response to comment L19-11.

Response to Comment L19-06
DOE is preparing this Supplemental EIS and the SRS Waste Management EIS in close coordination with SRS high-level waste system planning efforts to ensure that proposed and alternative actions considered in these NEPA analyses are reasonable and that the analyses are compatible and consistent. As a more broadly scoped programmatic evaluation, the SRS Waste Management EIS will address the potential implications of DWPF operation on high-level waste tank farm operations and management of wastes that would be generated by DWPF. DOE also will evaluate in the SRS Waste Management EIS the cumulative impacts of alternatives addressed in that EIS, which include the environmental impacts

presented in this Supplemental EIS. In its Notices of Intent, DOE discussed the reasons for documenting its NEPA evaluation of DWPF separately from issues being addressed in the SRS Waste Management EIS (Federal Register, Volume 59, Number 66,
April 6, 1994).

Response to Comment L19-07
The vitrification of fissile material at DWPF is outside the scope of this Supplemental EIS. The Supplemental EIS evaluates the environmental impact of DWPF as currently designed and constructed, including all reasonably foreseeable future activities. Vitrification of plutonium or other fissile materials in DWPF (other than trace quantities) would require detailed safety analyses to address concerns related to the potential for criticality. Also, studies on the effect of fissile materials on the vitrification process would be required. With respect to vitrification of the plutonium solutions currently located in F-Canyon, DOE estimates that it would take approximately 6 years to perform the technical studies, training, and qualification efforts necessary to ensure safe operation for transferring and subsequently vitrifying the solutions. The F-Canyon Plutonium Solutions, Interim Management of Nuclear Materials, and Storage and Disposition of Weapons - Usable Fissile Materials EISs are evaluating the potential for vitrifying fissile materials at DWPF.

DOE is committed to implement, and is in the process of negotiating, a waste removal plan and schedule to be approved by the Environmental Protection Agency and the South Carolina Department of Health and Environmental Control. This waste removal plan and schedule, of which operation of DWPF is an integral part, does not consider vitrification of plutonium or other fissile material, other than the trace quantities currently in the high-level waste tanks.

Response to Comment L19-08
A primary reason that DOE is considering ion exchange as an ITP pre-treatment alternative is that it offers the advantage of elimination of benzene. This alternative process would result not only in elimination of routine airborne releases of benzene but would also eliminate accidents associated with benzene, which are described in Section 4.1.12.3.

As discussed in Section 4.1.4, benzene releases under the proposed action would be well within applicable standards. As discussed in Section 4.1.11.1.2, DWPF benzene releases would result in an increased lifetime probability of a fatal cancer of 1.2 in 10 million. If the Environmental Protection Agency were to promulgate more stringent benzene standards in the future, DOE would evaluate the need for additional means to control atmospheric benzene releases at that time.

Response to Comment L19-09
As described in Section 2.2.3, the current Saltstone Manufacturing and Disposal design is itself a modification designed to minimize releases of contaminants from the immobilized low radioactivity salt solution. The proposed 1982 design involved disposal of a waste form called saltcrete into engineered trenches; the current design includes disposal of a different waste matrix called saltstone in concrete vaults. Both of these features, and the engineered closure planned for the vaults, represent substantial measures DOE has taken to reduce potential releases. Although the vaults are designed to fully contain the waste, DOE expects containment effectiveness to diminish over time, leading to slow release of contaminants. As discussed in Section 4.1.3.1, a detailed performance assessment of the vaults indicates that maximum concentrations of contaminants in groundwater 100 meters (328 feet) from the vaults would not occur for over 1,000 years and would not exceed current drinking water standards.

Response to Comment L19-10
Section 2.2.9 discusses the safety features of the facilities and structures

under the proposed action, including the Glass Waste Storage Building. The safety and long-term confinement of the radioactive glass waste canisters stored in the Glass Waste Storage Building have been analyzed and documented in SRS safety analysis reports (i.e., the DWPF Safety Analysis Report). The environmental impacts of accidents under the proposed action presented in Section 4.1.12, which are based on the DWPF Safety Analysis Report, include postulated accidents associated with the Glass Waste Storage Building. The safety of this type of facility will be reexamined as part of DOE's design activities for the planned future Glass Waste Storage Buildings.

Response to Comment L19-11
As stated in Figure 2.6.1, the figure is intended only for comparison of risk profiles over time and is not intended to be used to estimate differences in absolute risk among alternatives. Because the risk profiles combine different sources of risk, such as radiological and chemical risks that cannot be directly compared on a quantitative basis, scales on the figure would not be appropriate. This figure is intended as a visual aid to help the reader compare the risk trends for each alternative. The risk of the proposed action would only occur for the 24 years of DWPF processing, and the risk of the no-action alternative would continue indefinitely. The risk of immediate replacement during processing would be lower than the proposed action because of the elimination of benzene, but the risk associated with tank farm operations would persist for 10 additional years. The risk of operation under the phased replacement alternative would be the same as the proposed action for 14 years then would decrease for the remaining 10 years because of the elimination of benzene.

Response to Comment L19-12
DOE's impact assessment for alternatives to conventional incineration is necessarily speculative given the current state of these technologies but is helpful for identifying potential environmental advantages and disadvantages that could result from their use and thus environmental incentives or disincentives for further development. As noted in Section 2.2.7.2, selection of an optional treatment for DWPF organic waste would be accomplished in the context of other NEPA evaluations.

DOCUMENT L20

STATE CLEARINGHOUSE
STATE OF OHIO - OFFICE OF BUDGET AND MANAGEMENT
RESPONSE TO COMMENT

Letter Document L20

Response to Comment L20-01
DOE appreciates the State of Ohio's review of the Draft Supplemental EIS.

DOCUMENT L21

DIANE FORKEL
RESPONSE TO COMMENT

Letter Document L21 page 1
Letter Document L21 page 2
Letter Document L21 page 3
Letter Document L21 page 4

Response to Comment L21-01
DOE plans to vitrify the high-level radioactive waste at the Hanford, Washington site. However, construction of a vitrification facility at Hanford

would not occur until after DWPF has begun operations. The Hanford vitrification facility would then be able to incorporate lessons learned from DWPF. A vitrification facility at the West Valley, New York site, called the West Valley Demonstration Project, is built and is scheduled to begin operation in January 1996 to vitrify high-level radioactive waste that is the result of reprocessing of commercial spent nuclear fuel. Neither the Hanford facility nor the West Valley facility are alternatives for DWPF.

Response to Comment L21-02
In 1979, DOE prepared an EIS (DOE/EIS-0023) and in 1980 issued a Record of Decision to continue a research and development program to develop technology for removing high-level radioactive waste from the storage tanks and to immobilize the highly radioactive constituents in a form suitable for disposal. In 1982, DOE published an EIS (DOE/EIS-0082) and documented in its Record of Decision that it would design, construct, and operate the DWPF to immobilize high-level radioactive waste in a form suitable for safe storage and transport and ultimate disposal at a permanent geologic respository. This Supplemental EIS supplements that 1982 EIS.

The purpose of this Supplemental EIS is to help DOE determine whether and how to proceed with DWPF by assessing the environmental impacts of completing and operating the DWPF system as currently designed and the environmental effects of reasonable alternatives.

Response to Comment L21-03
Section 4.1.13 addresses the management of wastes generated by the proposed action. The plans for management of the DWPF recycle stream are to transfer the stream back to the F- and H-Area Tank Farms where it will undergo evaporation as part of tank farm operations, the environmental impacts of which are being considered in the SRS Waste Management EIS, currently in preparation. DOE is considering options for reducing the volume of the DWPF recycle stream; these options are discussed in Section 2.2.4.6. These options may be implemented after the startup of DWPF.

Response to Comment L21-04
Concerns regarding the Federal repository are outside the scope of this Supplemental EIS. Under the Nuclear Waste Policy Act of 1982 (P.L. 97-245), as amended, DOE is responsible for siting, constructing, and operating a geologic repository for the disposal of high-level radioactive waste. As stated in the response to comment H3-1-03, DOE does recognize the need for a Federal repository and is currently performing suitability studies at the Yucca Mountain, Nevada site as a Federal repository for high-level radioactive waste and spent nuclear fuel. Under the proposed action and the ion exchange pre-treatment alternative, the vitrified glass product from DWPF would be stored in Glass Waste Storage Buildings located in S-Area until a Federal repository becomes available.

DOE recognized in the early stages of planning that transporting SRS high-level radioactive waste to a remote location would be impractical and would result in undue risk to human health and the environment. DOE chose the specific DWPF location mainly because (1) it is near an existing SRS high-level waste tank farm (reducing the need for transfer piping), (2) there was sufficient space at the location, and (3) investigations of the subsurface showed that the site was geologically acceptable.

Response to Comment L21-05
As discussed in Section 1.4, several NEPA evaluations have been recently completed, are in process, or have been planned that could affect DWPF operations. Many of these NEPA evaluations involve decisions that could result in SRS receiving additional radioactive material or waste. These decisions are outside the scope of this Supplemental EIS; however, DOE is closely coordinating these EISs.

With regard to the long-term disposition of high-level radioactive waste, the

operation of DWPF is a key step in the ultimate disposal of SRS high-level radioactive waste.

Response to Comment L21-06
Waste processing capabilities at other DOE sites and the status of high-level radioactive waste storage tanks at Hanford are outside the scope of this Supplemental EIS. DOE programmatic waste management issues, such as a potential centralized location for immobilization, are being evaluated in the Environmental Restoration and Waste Management Programmatic EIS currently under preparation. This Programmatic EIS will evaluate complex-wide and site-specific alternative strategies and policies to maximize efficiency in DOE's environmental restoration and waste management programs. This comment has been forwarded to the DOE organization responsible for the Environmental Restoration and Waste Management Programmatic EIS for their information.

Response to Comment L21-07
As noted in Section 2.2.1, preliminary information available from the Proposed Policy for the Acceptance of United States Origin Foreign Research Reactor Spent Nuclear Fuel EIS, the Urgent-Relief Acceptance of Foreign Research Reactor Spent Nuclear Fuel Environmental Assessment, the F-Canyon Plutonium Solutions EIS, and the Interim Management of Nuclear Materials EIS indicates that the incremental volume of high-level radioactive waste that could result from these activities and might be processed in DWPF is small compared to the 129 million liters (34 million gallons) of high-level radioactive waste currently stored in the tank farms. Thus, the amount of DWPF processing time would be a small addition to the currently planned 24 years of operation. Information regarding the volume of high-level radioactive waste that could be generated by activities discussed in the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components and the Storage and Disposition of Weapons-Usable Fissile Material EISs is not yet available. Sections 2.2.1 and 4.1.17 have been revised to more explicitly discuss this information.

The length of time DWPF operates would result in additional processing risk. The Supplemental EIS presents accident risks on an annual basis; each additional year of DWPF processing would add an additional year of risk.

Response to Comment L21-08
DOE considered the possibility of releases of radioactive and chemical substances resulting from terrorist actions in the safety analysis report that supports the accident analysis presented in Appendix B (cited as WSRC 1993b in Chapter 5). No terrorism-related accidents were judged to be reasonably foreseeable as defined in that appendix so they were not included in Table B-2. DOE maintains a comprehensive safeguards and security program at SRS to guard against terrorist attacks and sabotage by controlling access to the site. DOE also maintains a security force that is trained in terrorism prevention and response.

Response to Comment L21-09
As noted in the response to comment L21-05, the operation of DWPF is a key step in the ultimate disposal of SRS high-level radioactive waste. See response to comment L21-04 regarding DOE activities associated with the selection of a Federal repository.

Policy decisions that could potentially increase the United States supply of radioactive materials are outside the scope of this Supplemental EIS. However, it should be noted that DOE must consider many factors other than the availability of a Federal repository in making these decisions. For example, DOE is considering concerns related to non-proliferation of nuclear weapons in its decisions regarding the receipt of U.S. origin foreign research reactor spent nuclear fuel. This comment has been forwarded to the DOE organization responsible for the Proposed Policy for the Acceptance of United States Origin Foreign Research Reactor Spent Nuclear Fuel EIS for their information.

Response to Comment L21-10

DOE's policy is to follow the letter and spirit of NEPA and to comply fully with the Council on Environmental Quality regulations. DOE has prepared this Supplemental EIS to meet NEPA requirements in accordance with this policy and is coordinating the preparation of this Supplemental EIS and other closely related NEPA documentation. In its Notices of Intent, DOE discussed the reasons for documenting its NEPA evaluation of DWPF separately from issues being addressed in the SRS Waste Management EIS (Federal Register, Volume 59, Number 66, April 6, 1994).

DOE is performing comprehensive analyses of complex-wide issues in the Environmental Restoration and Waste Management and the Reconfiguration of the Nuclear Weapons Complex Programmatic EISs. This comment has been forwarded to the DOE organizations responsible for those Programmatic EISs for their information.

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