DOE/EA-1562

Environmental Assessment

Construction and Operation of a Physical Sciences Facility at the Pacific Northwest National Laboratory, Richland, Washington

U.S. Department of Energy
Pacific Northwest Site Office
Richland, Washington 99352

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Summary

Introduction. This Environmental Assessment (EA) provides information and analyses of proposed U.S. Department of Energy (DOE) activities associated with constructing and operating a new Physical Sciences Facility (PSF) complex on DOE property located in Benton County, north of Richland, Washington. The proposed PSF would replace a number of existing research laboratories in the Hanford Site 300 Area that are currently occupied by Pacific Northwest National Laboratory (PNNL) and that are scheduled for removal as part of the Hanford Site cleanup. Information contained in this EA will be used by the DOE Office of Science (DOE-SC) to determine if the proposed action is a major federal action significantly affecting the quality of the human environment.

Purpose and Need. To meet long-term federal agency mission needs, DOE needs to provide replacement laboratory space and associated infrastructure for some PNNL research and development capabilities currently located in 300 Area facilities scheduled for demolition. To accomplish its scientific mission, PNNL requires a variety of facilities and equipment, including radiological and other specialized laboratories, advanced computational facilities, and office space. Replacements for those capabilities are needed for PNNL to continue to meet its program mission objectives in energy production, carbon sequestration, national security, and environmental management.

Proposed Action. The DOE Office of Science proposes to construct and operate the PSF using funding provided by DOE-SC, the DOE National Nuclear Security Administration, and the Department of Homeland Security. The PSF construction site consists of approximately 20 hectares (50 acres) within a vacant 38-hectare (103-acre) parcel of land, located north of the Richland, Washington, city limits. The property is bounded by Stevens Drive on the west, Horn Rapids Road on the south, and George Washington Way to the north and east. DOE also plans to maintain additional property to the north and east of the proposed construction site as a buffer area for the facilities. If DOE eventually requires restriction of public access to the entire buffer area, it may be necessary to close George Washington Way north of Horn Rapids Road, as well as the bike path that runs parallel to George Washington Way north of Horn Rapids Road. The combined construction site and buffer area would include about 130 hectares (320 acres), extending from Stevens Drive on the west to the Columbia River on the east, and from Horn Rapids Road on the south to a line running east-west approximately 1,100 meters (3,500 feet) north of Horn Rapids Road.

The PSF is planned as a modular facility to be constructed in two or more phases over a period of up to 20 years. The facility would house a number of research capabilities that utilize radiological materials, including materials science and technology, radiation detection, ultra trace detection technology, subsurface science, certification and dosimetry, shielded operations, and chemistry and processing. Additional support functions, such as a central utility plant, maintenance and fabrication support, and a waste management area may be constructed within, or adjacent to, the PSF. If all of the technical capabilities are ultimately relocated, the PSF could occupy approximately 31,000 square meters (332,000 square feet) and house about 480 scientific and support staff. A paved surface area, designated a "Radiation Detection Track," for experimental capabilities to detect radiological materials in vehicles and containers is also planned as part of the proposed action. Construction of the initial phase is planned to begin in late 2007 or early 2008, with initial occupancy and startup of portions of the facility scheduled for late 2010 or early 2011.

Phased Approach. The initial phase of PSF construction would consist of up to 22,000 square meters (240,000 square feet) and would accommodate the Ultra-trace, Radiation Detection, and Materials Science and Technology research capabilities. Additional support structures, including the central utility plant and the Radiation Detection Track, would be constructed to enable facility operations and support research missions. During the initial phase, several serviceable buildings in the Hanford Site 300 Area would be retained by PNNL and could remain in use for up to 20 years, or until any subsequent construction phases are scheduled and funded.

Later follow-on phases may include expansion of the PSF to incorporate modules for the Shielded Operations, Chemistry and Processing, Subsurface Science, and Certification and Dosimetry capabilities that are currently expected to remain in the retained 300 Area facilities. Although these proposed follow-on modules are not currently scheduled or funded for construction, they were evaluated in the EA to provide a bounding analysis of environmental impacts, and to maintain flexibility in long-term planning. Therefore, the environmental impacts of constructing and operating the PSF were based on the larger facility as described in the proposed action. That facility would accommodate all of these PNNL capabilities, whether they are relocated in the near term or over a longer period in a phased approach.

Affected Environment. The affected environment for the proposed action consists of the construction site north of Horn Rapids Road and the surrounding region. The proposed PSF construction site is on a relatively level parcel of vacant property, much of which has been previously disturbed. The site is located in Benton County and is within the City of Richland urban growth area. Land use has been designated as a mix of Business/Research Park (similar to the adjacent PNNL facilities), Commercial, and Low Density Residential. The existing PNNL facilities and the DOE Hanford Site, as well as a mix of light industrial, agricultural, business, school, and residential areas, are located in the vicinity of the proposed construction site. According to the 2000 Census, the population residing within 80 kilometers (50 miles) of the site was about 349,000, and the region contained some concentrations of minority and low-income populations. No prime farm land, scarce geological resources, surface water bodies, floodplains, or wetlands are within the proposed construction site. Biological resources at the site consist of a mix of desert-adapted shrubs and grasses as well as a variety of mammals and birds that inhabit those environments. During recent biological surveys, no federal or state threatened or endangered species, species proposed for listing, or critical habitats were observed. Cultural and historic resources have been identified within some portions of the proposed construction site and the buffer area, and appropriate measures for their management have been established. Investigation of potential hazardous materials at the site did not identify any contaminants present in surface soil or groundwater that would require remedial action.

Environmental Impacts of Proposed Action. Construction of the proposed PSF would be compatible with existing land-use designations established by DOE, Benton County, and the City of Richland, and environmental impacts associated with construction are expected to be similar to those for any commercial facility of comparable size. Temporary impacts on air quality would be anticipated, but would be within regulatory standards for criteria pollutants and particulates. Construction activities may likewise have short-term impacts on local traffic and noise levels. Resources required for construction consist of commonly available materials and fuels that are not unique or in short supply, and the labor required represents a small fraction of the local market. The proposed PSF construction site is not known to contain sensitive biological resources or critical habitats that would be affected by construction. Management of known cultural and historic resources, as well as any discovered during the construction

process, would be in accordance with regulatory requirements and agreements among DOE and other responsible agencies or parties. Effluents and wastes generated during construction would be minimized to the extent practicable and would be managed using existing facilities. Health and safety risks to workers and members of the public from construction activities are projected to be small.

Because operations at the proposed PSF would consist of activities to be relocated from laboratories in the nearby 300 Area, the environmental impacts associated with operation of the facility are expected to be similar to, or lower than, those from the existing facilities. Routine radiological, chemical, and other operational effluents are not expected to result in human health impacts. The anticipated PSF inventories of radiological and other hazardous materials are lower than those in existing facilities and would not present a substantial safety risk to workers or members of the public. The generation of radioactive and hazardous wastes would be similar to, or lower than, current rates, and they would be accommodated using current waste management practices. The workforce would remain at about current levels, resulting in little, if any, incremental impact on community infrastructure, socioeconomic, or transportation resources. Because the impacts from facility operations are projected to be small in all cases, there would be no opportunity for both high and disproportionate adverse impacts on minority or low-income populations, nor would noticeable cumulative impacts with other ongoing operations in the region be expected.

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Glossary

Acronyms and Abbreviations

ac	acre(s)
ac-ft	acre-feet
ALARA	As Low As Reasonably Achievable
ASIL	Acceptable Source Impact Level
Btu	British thermal unit
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
Ci	curie(s)
cm	centimeter(s)
dBA	A-weighted decibel(s)
DHS	U.S. Department of Homeland Security
DHUD	U.S. Department of Housing and Urban Development
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOE-ORP	U.S. Department of Energy, Office of River Protection
DOE-PNSO	U.S. Department of Energy, Pacific Northwest Site Office
DOE-RL	U.S. Department of Energy, Richland Operations Office
DOE-SC	U.S. Department of Energy, Office of Science
EA	Environmental Assessment
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
EMSL	(William R. Wiley) Environmental Molecular Sciences Laboratory
EPA	U.S. Environmental Protection Agency
EPHA	Emergency Preparedness Hazards Assessment
FMEF	Fuels and Materials Examination Facility
FONSI	Finding of No Significant Impact
FR	Federal Register
ft	foot/feet
ft^2	square feet
ft^3	cubic feet
g	gram(s)
gal	gallon(s)
gpd	gallons per day
gpm	gallons per minute
gsf	gross square feet

H-3	tritium
H-3E	tritium equivalent
HEPA	High Efficiency Particulate Air (filter)
ha	hectare(s)
in.	inch(es)
ISC	(EPA) Industrial Source Complex (model)
ISCORS	Interagency Steering Committee on Radiation Standards
km	kilometer(s)
L	liter(s)
LA	Limited Area
LCF	latent cancer fatality
LEED™	Leadership in Energy and Environmental Design
LIGO	Laser Interferometer Gravitational-Wave Observatory
L/m	liters per minute
LLW	low-level (radioactive) waste
m	meter(s)
m^2	square meter(s)
m^3	cubic meter(s)
MEI	maximally exposed individual
mi	mile(s)
mi^2	square mile(s)
MLLW	mixed low-level (radioactive and hazardous) waste
mrem	millirem
MW	megawatt(s)
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NIH	National Institutes of Health
NNSA	(DOE) National Nuclear Security Administration
NOx	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
Pa	Pascals
PNNL	Pacific Northwest National Laboratory
PNSO	(DOE) Pacific Northwest Site Office
POTW	Publicly Owned Treatment Works
PPA	Property Protection Area
ppm	parts per million
PSF	Physical Sciences Facility
psia	pounds per square inch, absolute
Pu-239	plutonium-239
Pu-239E	plutonium-239 equivalent

R&D	Research and Development
RCRA	Resource Conservation and Recovery Act of 1976
ROD	Record of Decision
RPL	Radiochemical Processing Laboratory
SHPO	State Historic Preservation Officer
SOx	Sulfur Oxides
TEDE	Total Effective Dose Equivalent
tpy	tons per year
TWRS	Tank Waste Remediation System
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WSU	Washington State University
yd^3	cubic yard(s)

Definition of Terms

As Low as Reasonably Achievable (ALARA). An approach to radiation protection to manage and control worker and public exposures (both individual and collective) and releases of radioactive material to the environment to as far below applicable limits as social, technical, economic, practical, and public policy considerations permit. ALARA is not a dose limit but a process for minimizing doses to as far below regulatory limits as is practicable.

Background radiation. Radiation from (1) cosmic sources, (2) naturally occurring radioactive materials, including radon (except as a decay product of source or special nuclear material), and (3) global fallout as it exists in the environment (e.g., from the testing of nuclear explosive devices).

Buffer Area. DOE-owned property to the north and east of the current PNNL Site that would be assigned to DOE-SC as a restricted access area around the proposed Physical Sciences Facility (PSF). The portion of the expanded PNNL Site north of Horn Rapids Road, including the buffer area, would extend from Stevens Drive on the west to the Columbia River on the east, and from Horn Rapids Road on the south to a line approximately 1100 m (3500 ft) north of Horn Rapids Road.

Collective dose. The sum of the total effective dose equivalent values for all individuals in a specified population. Collective dose is expressed in units of person-rem.

Construction site (proposed PSF construction site). A portion of the current PNNL Site that would be occupied by the proposed PSF. The construction site is located within the portion of the PNNL Site north of Horn Rapids Road between Stevens Drive and George Washington Way (also known as the Horn Rapids Triangle).

Corrosive. A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact.

curie (Ci). A unit of radioactivity equal to 37 billion disintegrations per second; also a quantity of any radionuclide or mixture of radionuclides having 1 curie of radioactivity.

Fissionable material. A radionuclide capable of sustaining a neutron-induced chain reaction (e.g., uranium-233, uranium-235, plutonium-238, plutonium-239, plutonium-241, neptunium-237, americium-241, and curium-244).

Flammable gas. A gas that is flammable in a mixture of 13% or less (by volume) with air, or the flammable range with air is wider than 12% regardless of the lower limit, at atmospheric temperature and pressure.

Flammable liquid. A liquid having a flashpoint below 37.8°C (100°F) and having a vapor pressure not exceeding 276 kPa (40 psia) at 37.8°C (100°F) is known as a Class I flammable liquid. Class I flammable liquids are further divided into sub-classes depending on the boiling point and flash point.

Flammable solid. A solid substance, other than one that is defined as a blasting agent or explosive, that is liable to cause fire through friction or as a result of retained heat from manufacture, which has an ignition

temperature below 100°C (212°F), or which burns so vigorously or persistently when ignited that it creates a serious hazard. Flammable solids include finely divided solid materials which, when dispersed in air as a cloud, could be ignited and cause an explosion.

Hazardous chemical. Any chemical that is a physical or health hazard.

Physical hazard – any chemical for which there is scientifically valid evidence that it is a

- flammable or combustible liquid
- compressed gas
- explosive
- flammable solid
- oxidizer
- peroxide
- pyrophoric
- unstable (reactive) or water-reactive substance.

Health hazard – any material for which there is statistically significant evidence that acute or chronic health effects may occur in exposed individuals. Such materials include

- carcinogens
- mutagens
- teratogens
- toxic or acutely toxic agents
- reproductive or developmental toxins
- irritants
- corrosives
- sensitizers
- liver, kidney, and nervous system toxins
- agents that act on the blood-forming systems
- agents that damage the lungs, skin, eyes, or mucous membranes.

Hazardous waste. Waste that contains chemically hazardous constituents regulated under Subtitle C of the Resource Conservation and Recovery Act (RCRA), as amended (40 CFR 261) and regulated as a hazardous waste and/or mixed waste by the EPA.

Highly toxic. To be classified as "highly toxic," a chemical must meet the following criteria: oral LD-50 in white rats equal to or less than 50 mg/kg; dermal LD-50 in white rabbits equal to or less than 200 mg/kg; or inhalation LC-50 in white rats equal to or less than 200 ppm (for gases or vapors) or 2 mg/L (for dusts, fumes, or mists).

Horn Rapids Triangle. A 38-ha (103-ac) parcel of vacant DOE-owned property in Benton County, Washington, bounded by Horn Rapids Road on the south, Stevens Drive on the west, and George Washington Way to the north and east. This property was assigned to the DOE Office of Science in 2004 and is part of the current PNNL Site. Construction of the proposed PSF would occur within this property, which is referred to throughout this document as the "(proposed PSF) construction site."

Latent cancer fatality (LCF). Death from cancer as a result of, and occurring some time after, exposure to ionizing radiation or other carcinogens.

Limited Area (LA). Security area designated for the protection of classified matter and certain types of special nuclear material.

Low-level (radioactive) waste (LLW). Radioactive waste that is not high-level waste, spent nuclear fuel, transuranic waste, byproduct material (as defined in section 11e[2] of the Atomic Energy Act of 1954, as amended), or naturally occurring radioactive material.

Maximally exposed individual. A hypothetical member of the public residing near the PNNL Site who, by virtue of location and living habits, could receive the highest possible radiation dose from radioactive effluents released from the PNNL Site.

millirem. A unit of radiation dose equivalent that is equal to 1/1,000 of a rem.

Mixed low-level waste (MLLW). Low-level waste determined to contain both source, special nuclear, or byproduct material subject to the Atomic Energy Act of 1954, as amended, and a hazardous component subject to the Resource Conservation and Recovery Act (RCRA), as amended, or Washington State Dangerous Waste Regulations.

module. A structural component of the PSF, housing one of the PNNL technical capabilities that would be relocated from the Hanford 300 Area facilities scheduled for closure. Each of the PSF modules may be constructed either as a separate facility, or as a segregated portion within a larger facility consisting of two or more modules and their associated support functions.

Nuclear Hazard Category. DOE Hazard Categories for nuclear facilities are defined in DOE-STD-1027-92 (DOE 1997). Nuclear facilities are further designated as Nuclear Hazard Category 1, 2, or 3, depending on the level of risk associated with facility operations and the quantities of radioactive materials in the facility. Table A.1 in Attachment 1 of the standard specifies the threshold quantities of radioactive materials for Nuclear Hazard Category 2 and 3 facilities.

- **Nuclear Hazard Category 1** facilities include those where the hazard analysis indicates the potential for significant offsite consequences. Those facilities typically include larger reactors (designated as Category A reactors, or those that operate at a steady-state thermal power greater than 20 MW) and other facilities identified by DOE as having the potential for more severe accidents.

- **Nuclear Hazard Category 2** facilities include those where the hazard analysis indicates the potential for significant onsite consequences from accidents (including the potential for criticality) or other events, and which require onsite emergency planning.

- **Nuclear Hazard Category 3** facilities include those where the hazard analysis indicates the potential for only significant localized consequences. Hazard Category 3 nuclear facilities contain quantities of hazardous radioactive materials that meet or exceed Hazard Category 3 threshold values as identified in DOE-STD-1027, Table A.1, but are less than Hazard Category 2 threshold values.

The maximum inventories for Category 3 facilities were established to exclude facilities that would be likely to have a significant radiological impact outside the facility.

Note: Radiological facilities include those containing quantities of radioactive materials that do not meet or exceed the thresholds defined for Category 3 facilities in DOE-STD-1027. Radiological facilities are associated with the lowest risks to workers or members of the public and typically house activities involving small quantities of dispersible radioactive materials.

Oxidizer. A chemical that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

Person-rem. A unit of collective or population dose that is based on the sum of the total effective dose equivalent values for all individuals in a specified population.

Physical Sciences Facility. A modular complex of one or more buildings on the PNNL Site that would provide office space as well as laboratories for the following technical capabilities: Shielded Operations, Ultra-Trace, Radiation Detection, Chemistry and Processing, Materials Science and Technology, Subsurface Science, and Certification and Dosimetry. The PSF may also include space for support functions such as waste management, central utilities, maintenance, and fabrication.

PM_{10}. Particles having an aerodynamic diameter less than or equal to a nominal 10 micrometers.

$PM_{2.5}$. Particles having an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.

PNNL Site. DOE-owned property within Benton County and the City of Richland, Washington, assigned to the U.S. Department of Energy Office of Science. The PNNL Site currently consists of property occupied by the William R. Wiley Environmental Molecular Sciences Laboratory (EMSL) south of Horn Rapids Road, as well as vacant property north of Horn Rapids Road between Stevens Drive and George Washington Way (also known as the Horn Rapids Triangle). As discussed in this document, DOE is in the process of reassigning additional DOE property to the north and east of the current PNNL Site to PNSO. The expanded PNNL Site north of Horn Rapids Road would extend from Stevens Drive on the west to the Columbia River on the east, and from Horn Rapids Road on the south to a line approximately 1,100 m (3,500 ft) north of Horn Rapids Road.

Pollution Prevention. The use of materials, processes, and practices that reduce or eliminate the generation and release of pollutants, contaminants, hazardous substances, and waste into land, water, and air. For the Department of Energy, this includes recycling activities.

Property Protection Area (PPA). Access-controlled facilities established to protect government-owned property against damage, destruction, or theft.

Pyrophoric. Materials that spontaneously ignite in air at or below a temperature of 54.5°C (130°F).

rem. A unit of radiation total effective dose equivalent (TEDE) based on the potential for impact on human cells.

Risk. The product of the probability of occurrence of an event or activity and the consequences resulting from that event or activity. For example, an accident that is expected to occur once in 100 years and result in a 1 in 1,000 probability of latent cancer fatality (LCF) in the affected population would be associated with a risk of $(0.01\ y^{-1}) \times (0.001\ LCF) = 0.00001$ LCF/y, or a risk of LCF equal to 1 in 100,000 per year of operation.

Total effective dose equivalent (TEDE). The sum of the effective dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures). TEDE is expressed in units of rem.

Toxic. To be classified as "toxic," a chemical must meet the following criteria: oral LD-50 in white rats greater than 50 mg/kg but less than 500 mg/kg; dermal LD-50 in white rabbits greater than 200 mg/kg but less than 1,000 mg/kg; or inhalation LC-50 in white rats greater than 200 ppm but less than 2,000 ppm (for gases or vapors) or greater than 2 mg/L but less than 20 mg/L (for dusts, fumes, or mists). Chemicals that have a higher LD-50 or LC-50 are considered to be nontoxic for the purposes of monitoring.

Toxic air pollutant. Any State of Washington Class A or Class B toxic air pollutant listed in WAC 173-460-150 and 173-460-160. The term "toxic air pollutant" may include particulate matter and volatile organic compounds if an individual substance or a group of substances within either of these classes is listed in WAC 173-460-150 and/or 173-460-160. The term "toxic air pollutant" does not include particulate matter and volatile organic compounds as generic classes of compounds.

Transuranic waste. Radioactive waste containing more than 100 nanocuries (3,700 becquerels) of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years, except for the following:

- high-level radioactive waste
- waste that the Secretary of Energy has determined, with the concurrence of the Administrator of the EPA, does not need the degree of isolation required by the 40 CFR Part 191 disposal regulations
- waste that the Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR 61.

Unstable/Reactive. A chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shock, pressure, or temperature.

Water Reactive. A chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

Metric Conversion Chart

Into metric units **Out of metric units**

If you know	Multiply by	To get	If you know	Multiply by	To get
Length			**Length**		
inches	25.40	Millimeters	Millimeters	0.03937	inches
inches	2.54	Centimeters	Centimeters	0.393701	inches
feet	0.3048	Meters	Meters	3.28084	feet
yards	0.9144	Meters	Meters	1.0936	yards
miles (statute)	1.60934	Kilometers	Kilometers	0.62137	miles (statute)
Area			**Area**		
square inches	6.4516	square centimeters	square centimeters	0.155	square inches
square feet	0.09290304	square meters	square meters	10.7639	square feet
square yards	0.8361274	square meters	square meters	1.19599	square yards
square miles	2.59	square kilometers	square kilometers	0.386102	square miles
acres	0.404687	Hectares	Hectares	2.47104	acres
Mass (weight)			**Mass (weight)**		
ounces (avoir.)	28.34952	Grams	Grams	0.035274	ounces (avoir.)
pounds (avoir.)	0.45359237	Kilograms	Kilograms	2.204623	pounds (avoir.)
tons (short)	0.9071847	tons (metric)	tons (metric)	1.1023	tons (short)
Volume			**Volume**		
ounces (U.S., liquid)	29.57353	Milliliters	Milliliters	0.033814	ounces (U.S., liquid)
quarts (U.S., liquid)	0.9463529	Liters	Liters	1.0567	quarts (U.S., liquid)
gallons (U.S., liquid)	3.7854	Liters	Liters	0.26417	gallons (U.S., liquid)
cubic feet	0.02831685	cubic meters	cubic meters	35.3147	cubic feet
cubic yards	0.7645549	cubic meters	cubic meters	1.308	cubic yards
Temperature			**Temperature**		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit
Energy			**Energy**		
kilowatt hour	3,412	British thermal unit	British thermal unit	0.000293	kilowatt hour
kilowatt	0.94782	British thermal unit per second	British thermal unit per second	1.055	kilowatt
Force/Pressure			**Force/Pressure**		
pounds (force) per square inch	6.894757	Kilopascals	Kilopascals	0.14504	pounds per square inch
torr	133.32	Pascals	Pascals	0.0075	torr

06/2001

Source: *Engineering Unit Conversions*, M. R. Lindeburg, PE, Third Ed., 1993, Professional Publications, Inc., Belmont, California.

Scientific Notation Conversion Chart

Numbers that are very small or very large are often expressed in scientific or exponential notation as a matter of convenience. For example, the number 0.000034 may be expressed as 3.4×10^{-5} or 3.4E-05, and 65,000 may be expressed as 6.5×10^{4} or 6.5E+04. In this document, numerical values less than 0.001 or greater than 9999 are generally expressed in exponential notation, or 1.0E-03 and 9.9E+03, respectively.

Multiples or sub-multiples of the basic units are also used. A partial list of prefixes that denote multiples and sub-multiples follows, with the equivalent multiplier values expressed in scientific and exponential notation:

Name	Symbol	Value Multiplied by:		
pico	p	0.000000000001	or 1×10^{-12}	or 1E-12
nano	n	0.000000001	or 1×10^{-9}	or 1E-09
micro	μ	0.000001	or 1×10^{-6}	or 1E-06
milli	m	0.001	or 1×10^{-3}	or 1E-03
centi	c	0.01	or 1×10^{-2}	or 1E-02
deci	d	0.1	or 1×10^{-1}	or 1E-01
--	--	1	or 1×10^{0}	or 1E+00
deka	Da	10	or 1×10^{1}	or 1E+01
hecto	H	100	or 1×10^{2}	or 1E+02
kilo	K	1,000	or 1×10^{3}	or 1E+03
mega	M	1,000,000	or 1×10^{6}	or 1E+06
giga	G	1,000,000,000	or 1×10^{9}	or 1E+09
tera	T	1,000,000,000,000	or 1×10^{12}	or 1E+12

The following symbols are occasionally used in conjunction with numerical expressions.

Symbol	Indicates the preceding value is:
<	less than
≤	less than or equal to
>	greater than
≥	greater than or equal to

In some cases, numerical values in this document have been rounded to an appropriate number of significant figures to reflect the accuracy of data being presented. For example, the numbers 0.021, 21, 2,100, and 2,100,000 all contain 2 significant figures. In some cases, where several values are summed to obtain a total, the rounded total may not exactly equal the sum of its rounded component values.

1.0 Introduction and Background

This Environmental Assessment (EA) provides information and analysis of proposed U.S. Department of Energy (DOE) activities associated with constructing and operating a new Physical Sciences Facility (PSF) in Benton County, north of Richland, Washington. The proposed PSF would replace a number of existing research laboratories in the Hanford Site 300 Area that are currently occupied by Pacific Northwest National Laboratory (PNNL) and that are scheduled for closure under the DOE River Corridor Closure Project. Several serviceable buildings in the Hanford Site 300 Area will be retained and used by PNNL until replacement facility construction phases are scheduled and budgeted.

Information contained in this EA will be used by the DOE Office of Science (DOE-SC) to determine if the proposed action is a major federal action significantly affecting the quality of the human environment. If the proposed action is determined to be a major action with potentially significant environmental impacts, an Environmental Impact Statement (EIS) would be required. If the proposed action is not determined to be a major action that could result in significant environmental impacts, a Finding of No Significant Impact (FONSI) will be issued, and the action may proceed. This EA is prepared in compliance with the *National Environmental Policy Act of 1969* (NEPA), as amended (42 USC 4321 *et seq.*); the *Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA* (Title 40, Code of Federal Regulations, Parts 1500–1508); and the DOE *National Environmental Policy Act Implementing Procedures* (Title 10, Code of Federal Regulations, Part 1021).

1.1 River Corridor Closure Project and Cleanup of the 300 Area

DOE has developed a cleanup strategy for the Hanford Site that includes activities necessary to restore the Columbia River Corridor (DOE-RL and DOE-ORP 2002). The DOE Richland Operations Office (DOE-RL) has primary responsibility for waste management operations in the 200 Areas on the Hanford Site Central Plateau, as well as cleanup of facilities along the Columbia River Corridor, including the former plutonium production reactors and selected 300 Area facilities. As part of the river corridor restoration, buildings in the Hanford Site 300 Area are scheduled to be decontaminated and demolished. Cleanup activities are currently underway as part of the DOE River Corridor Closure Project, and this work is planned to be largely completed by 2012.

1.2 DOE Office of Science and PNNL Research Activities in the 300 Area

DOE-SC promotes discoveries and development of scientific tools that transform the understanding of energy and matter and advance the national, economic, and energy security of the United States. DOE-SC is the single largest supporter of basic research in the physical sciences in the United States, providing more than 40% of total funding for this area of national importance. It oversees, and is the principal federal funding agency of, the nation's research programs in materials and chemical sciences, high-energy physics, nuclear physics, and fusion energy sciences. DOE-SC also manages fundamental research programs in basic energy sciences, environmental and life sciences, computational science, climate change, geophysics, genomics, and science education.

DOE-SC accomplishes this mission through investments in the nation's scientific enterprise, including 10 national laboratories. The proposed action as described in this EA directly supports DOE-SC activities and would provide infrastructure, scientific tools, and technical staff to address DOE and other federal agency science and technology needs.

PNNL is a DOE-SC multi-program national laboratory, providing scientific research capabilities and advanced scientific knowledge to support DOE and national strategic goals. Primary clients for PNNL capabilities include DOE-SC and other DOE organizations, the National Nuclear Security Administration (NNSA), the U.S. Department of Homeland Security (DHS), the National Institutes of Health (NIH), the U.S. Department of Defense (DoD), the U.S. Nuclear Regulatory Commission (NRC), and the U.S. Environmental Protection Agency (EPA).

PNNL staff, including those in the 300 Area, support the nation's strategic goals with research and development (R&D) capabilities in science, national security, energy, and environment. In *science*, PNNL conducts research in biological and environmental sciences and maintains programs in chemistry, chemical physics, materials science, nuclear science and technology, and computer and information science. For *national security*, PNNL provides nuclear science and technology and information analytics capabilities to help prevent the proliferation of weapons of mass destruction, to maintain compliance with international arms control treaties, and to protect the nation's critical infrastructure. For *energy*, PNNL provides the materials sciences and chemical sciences capabilities to develop technology for the energy systems of the future; and for *environment*, PNNL provides science and technology for understanding complex environmental systems and cleanup of contaminated sites. These PNNL capabilities contribute to solving some of the nation's pressing problems in a number of areas, including energy production, carbon sequestration, national security, and environmental management in support of cleanup.

2.0 Purpose and Need for Agency Action

To meet long-term DOE and other federal agency (NNSA, DHS) mission needs, DOE needs to provide replacement laboratory space and associated infrastructure for some PNNL R&D activities currently located in 300-Area facilities that are scheduled to be removed in support of accelerated cleanup.

To accomplish its mission of scientific research, PNNL requires a variety of facilities and equipment, including radiological and other specialized laboratories, advanced computational facilities, and office space. As of mid-2006, approximately 4,200 PNNL staff members supported research activities in 79 buildings occupying nearly 190,000 m^2 (2,000,000 ft^2) in north Richland and other locations. About one-third of that space, or 60,000 m^2 (650,000 ft^2), is located in selected 300 Area facilities targeted by the DOE River Corridor Closure Project for removal. Those facilities represent about 45% of PNNL's general laboratory space, nearly all of its shielded radiological laboratory space, and other unique capabilities. Replacements for those capabilities are needed for PNNL to continue to meet its program mission objectives, as defined by DOE, in energy production, carbon sequestration, national security, and environmental management. Figure 2.1 shows the location of PNNL relative to the Hanford Site 300 Area, the Hanford Reach National Monument, and north Richland.

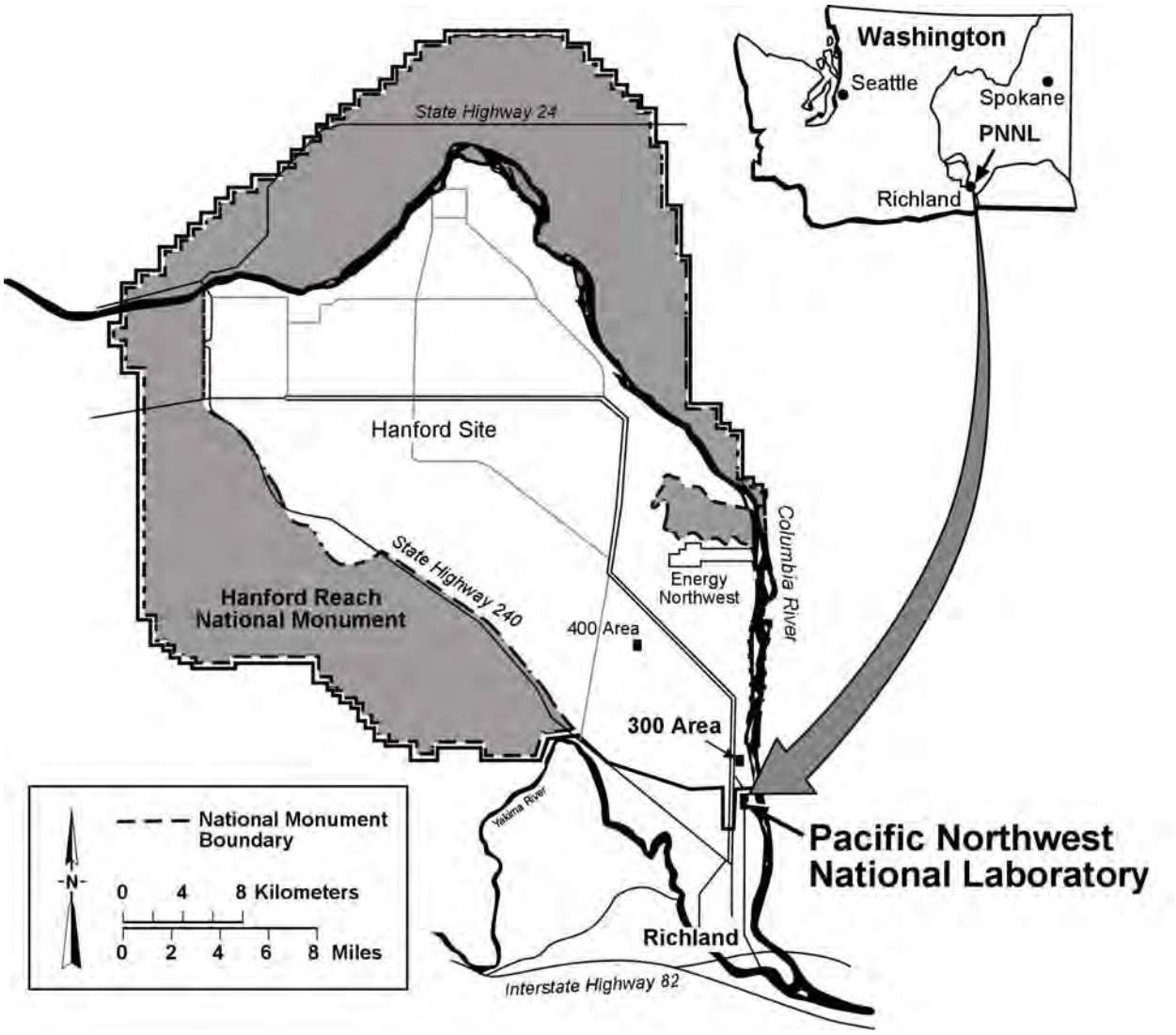

Figure 2.1. Location of PNNL Relative to the Hanford Site 300 Area, the Hanford Reach National Monument, and North Richland

3.0 Description of the Proposed Action and Alternatives

This section describes the DOE-SC proposed action and alternatives to the proposed action, including the No-Action Alternative. It should be noted that facility design and construction details described for the proposed action are based on conceptual plans. The final design and schedule as ultimately approved for construction may differ from that discussed within this EA. However, the nature, scope, and environmental impacts of the proposed action described in this document are expected to substantially reflect and bound those associated with actual construction and operation of the facility.

3.1 Proposed Action

DOE-SC proposes to construct and operate the PSF within the PNNL Site, directly north of existing PNNL facilities. Funding would be jointly provided by DOE-SC, the NNSA, and DHS. The proposed facility would provide replacement laboratories and infrastructure to continue mission-critical research capabilities, including space for laboratories, shielded radiological operations, semi-clean rooms, offices, and support and storage areas. The PSF could provide office space, laboratories, and support services for technical capabilities that currently occupy facilities in the 300 Area. These research capabilities all utilize radiological materials, and locating them in close proximity to each other could facilitate use of common resources and simplify radiological material control. Additional support functions, for example, a central utility plant, maintenance and fabrication support, and a waste management area, may be constructed within, or adjacent to, the PSF. The PSF is planned as a modular complex that could occupy a total of approximately 31,000 m^2 (332,000 gsf[(1)]), to be constructed in a phased manner over a period of up to 20 years. In addition, a paved surface area, designated a "Radiation Detection Track," for experimental capabilities to detect radiological materials in vehicles and containers is planned as part of the proposed action. The PSF would house about 460 research staff, and an overall total of about 480 scientific and support staff would occupy the proposed facility. Construction of the PSF is planned to begin in late 2007 or early 2008, with initial occupancy and startup of portions of the facility scheduled for late 2010 or early 2011.

The proposed PSF would be constructed on approximately 20-ha (50-ac) within the PNNL Site, north of the Richland, Washington, city limits and Horn Rapids Road. The construction site is within a 38-ha (103-ac) parcel of land (also known as the Horn Rapids Triangle) bounded by Stevens Drive on the west, Horn Rapids Road on the south, and George Washington Way to the north and east. The property is owned by DOE and was reassigned in 2004 from the DOE Office of Environmental Management Hanford Site, to DOE-SC, which oversees PNNL operations through its Pacific Northwest Site Office (PNSO).

In addition, DOE-RL is in the process of reassigning property to the north and east of the current PNNL Site to DOE-SC. That area would serve as a restricted access buffer for the proposed facilities. No construction is currently planned for the buffer area, other than installation and maintenance of fencing at the boundary as necessary to control public access. The roads within the buffer area that connect George Washington Way to Stevens Drive and to the 300 Area, as well as the bike path north of Horn Rapids

(1) Gross square footage includes all the building space, including wall thickness, hallways, and all other common space.

Road, could also be closed to public access. The haul road that crosses the buffer area between the Port of Benton barge facility and Stevens Drive would continue to operate as needed. In addition to the area south of Horn Rapids Road that houses the William R. Wiley Environmental Molecular Sciences Laboratory (EMSL), the expanded PNNL Site north of Horn Rapids Road would include approximately 130 ha (320 ac), extending from Stevens Drive on the west to the Columbia River on the east, and from Horn Rapids Road on the south to a line running east-west approximately 1,100 m (3,500 ft) north of Horn Rapids Road. The property north of Horn Rapids Road is located in Benton County, and it is being considered for annexation to the City of Richland as part of the city's urban growth area. Figure 3.1 shows the existing PNNL facilities and the location of the proposed PSF construction site.

Phased Approach. DOE proposes to construct the PSF in phases over a period of up to 20 years, as required to support research capabilities displaced by remediation of the 300 Area, and depending on availability of funding. The initial phase of PSF construction would consist of up to 22,000 square meters (240,000 square feet) and would accommodate the Ultra-trace, Radiation Detection, and Materials Science and Technology research capabilities. The initial phase is scheduled to be completed by late 2010 or early 2011.

Later phases may include expansion of the PSF to incorporate modules for the Shielded Operations, Chemistry and Processing, Subsurface Science, and Certification and Dosimetry capabilities. These capabilities could remain in existing 300 Area facilities for up to 20 years, and they would be relocated if DOE decides to construct additional PSF modules in the future. Although these modules are not currently scheduled or funded for construction, they are included in this EA to provide a bounding analysis of environmental impacts, and to maintain flexibility in long-term planning. Therefore, the environmental impacts of constructing and operating the PSF are based on the larger facility as described in the previous section and as shown in Figure 3.2. That facility would accommodate all of these PNNL capabilities, whether they are relocated in the near term or over a longer period in a phased approach. Following the initial phase, and prior to construction of additional modules, DOE would evaluate the NEPA documentation to confirm that the environmental review is still applicable, and if necessary, conduct a supplemental review.

DOE Nuclear Hazard Categories

DOE Hazard Category 1, 2, and 3 facilities, as defined in DOE-STD-1027 (DOE 1997), are normally referred to as "nuclear facilities."

Hazard Category 1 facilities consist of those assigned the highest relative hazard levels, such as larger nuclear reactors. Category 1 facilities are associated with potential accidents that could produce significant consequences beyond the site boundary.

Hazard Category 2 facilities may involve work with significant quantities of dispersible radioactive materials. Category 2 facilities are associated with potential accidents that could produce significant consequences only within the site boundary.

Hazard Category 3 facilities involve work with smaller quantities of dispersible radioactive materials relative to those associated with Hazard Category 2 facilities. Category 3 facilities are associated with potential accidents that could only produce significant localized consequences.

Radiological facilities contain less than Hazard Category 3 quantities of radioactive materials. Radiological facilities typically house activities involving small quantities of dispersible radiological materials.

Physical Sciences Facility

The PSF is planned as a modular facility, with discrete space for each of the PNNL technical capabilities that would be relocated from the 300 Area. The Shielded Operations module, which may be constructed in a later phase, would be operated as a DOE Nuclear Hazard Category 3 facility, and the other modules would be managed as radiological facilities (see accompanying text box). The PSF would incorporate features that

meet Leadership in Energy and Environmental Design (LEED™) certification requirements to reduce environmental impacts associated with construction and operation, provide a healthy work place, and promote energy efficiency.

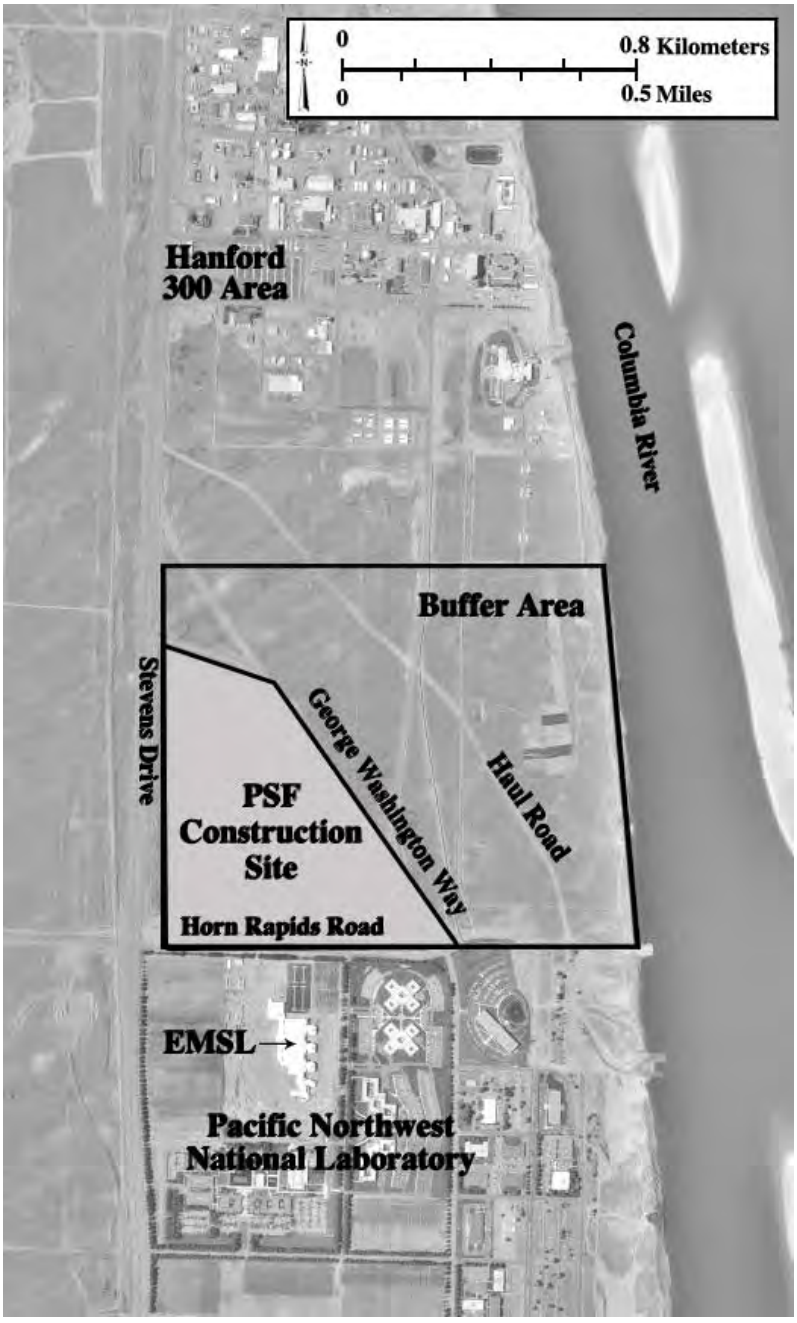

Figure 3.1. Aerial View of the Proposed PSF Construction Site, Buffer Area, and Existing PNNL Facilities (Base photo courtesy of TerraServer and U.S. Geological Survey)

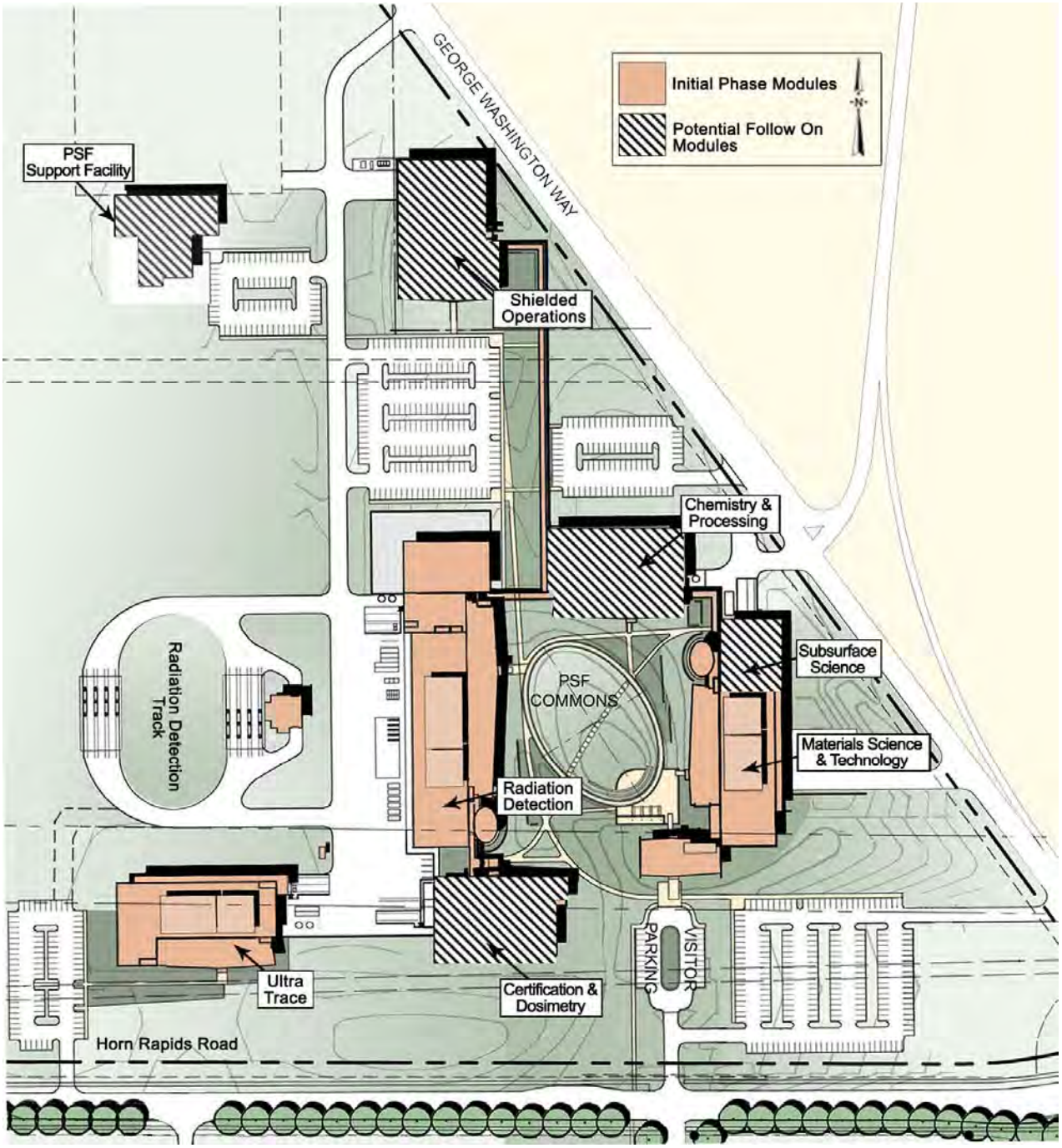

Figure 3.2. Conceptual Layout of the Proposed Physical Sciences Facility

The modular PSF layout would be designed to facilitate cooperation among the technical capabilities while establishing discrete work environments to meet specific program needs (Figure 3.2). As ultimately constructed, it may consist of one or more separate buildings, depending on safety and other operational requirements. For example, the Shielded Operations module is currently planned to be separate from the

other modules because of facility safety considerations. The Ultra-trace module would also be isolated either physically or by operational controls to prevent the introduction of contamination from outside sources. For purposes of analysis in this EA, the environmental impacts of constructing and operating the PSF were based on gross square footage that would eventually be required to accommodate all of the relocated technical capabilities. However, the environmental impacts of constructing and operating the PSF are expected to be similar for any configuration that provides comparable space for those activities.

Initial-Phase Modules

Modules for the Ultra-trace, Radiation Detection, and Materials Science and Technology capabilities would be included in the initial phase of PSF construction. Activities and research programs associated with these capabilities are described in the following section.

The **Ultra-trace** module would provide a combination of specialized laboratories, instrumentation, and technical staff focused on developing and applying state-of-the-art analytical methodology in support of national needs, such as international treaty verification and related actions to prevent the proliferation of nuclear weapons, chemical weapons, and fissile materials. This capability includes highly sensitive analytical systems, such as mass spectrometers, optical microscopes, and electron microscopes, to detect trace quantities of ionic, inorganic, and organic constituents in complex physical and chemical matrices. This module is distinguished by the capacity to determine the composition and concentration of actinide isotopes at ultra-trace levels in environmental sample matrices, unique particle analysis techniques, and the capability to perform ultra-trace level (parts per trillion) analysis of organic compounds in complex environmental matrices.

Primary users of this capability are expected to include national security programs within DOE, NNSA, DoD, and DHS. Other government agencies and laboratories that utilize existing PNNL facilities would benefit as well, and the staff involved in these programs collaborate extensively with universities and international organizations as part of their research activities.

The **Radiation Detection** module would house capabilities for state-of-the-art analytical chemistry, radiation physics, light detection, particle detection, chromatography, scintillation materials development, sorbents, and nuclear forensics instrumentation. Applications for these capabilities range from fundamental science, such as neutrino mass detection, to applied systems for prevention of nuclear proliferation and radiation portal monitoring at U.S. borders. The Radiation Detection Track, a paved outdoor area that supports this capability, would contain experimental facilities to detect radiological materials (as sealed sources) in vehicles and shipping containers. That capability supports national security programs to help prevent illegal transport of these materials into this country as well as internationally. The radiation detection capabilities also support various national security programs for DHS, DoD, NNSA and other DOE organizations.

The **Materials Science and Technology** module would include laboratories for receipt and processing of radioactive material samples to evaluate their performance in high-radiation and high-temperature environments, in addition to capabilities for modeling materials behavior in these extreme environments. Research within this module would consist of studies to evaluate 1) the aging and degradation of materials in nuclear systems, 2) the development of radiation-resistant structural materials for advanced

fission and fusion reactors, 3) stress-corrosion cracking in nuclear reactor environments, and 4) radiation-induced materials degradation. Those studies support DOE programs in basic energy sciences, nuclear energy, and fusion, as well as programs for NRC.

Follow-on Modules

Modules for the Shielded Operations, Chemistry and Processing, Subsurface Science, and Certification and Dosimetry capabilities would be included in follow-on phases of PSF construction, should DOE decide to complete them. These capabilities would remain in existing 300 Area facilities for a period of up to 20 years. Activities and research programs associated with these capabilities are described in the following section.

The **Shielded Operations** module would contain shielded hot cells, hoods, and glove boxes that provide the capability to work with Nuclear Hazard Category 3 quantities of dispersible radioactive materials. Consistent with DOE nuclear safety requirements (10 CFR 830, Subpart B; DOE 2005a), and commensurate with the operational risks, the facility would be constructed to incorporate engineered safety systems such as filters and effluent monitoring systems, as well as principles for keeping worker exposures to radioactive and hazardous materials "As Low As Reasonably Achievable" (ALARA). The Shielded Operations module would provide the capability for receipt and initial processing of a wide variety of radioactive liquids and solids, after which the processing of smaller quantities could be performed in radiological laboratories (for example, the Chemistry and Processing or Materials Science and Technology modules). This module would also support the preparation, modification, and repair of sealed radiation sources that are used for R&D work by other PNNL organizations.

Primary users of this capability are expected to include various DOE and NNSA programs related to fusion energy, tritium production, instrumentation for use in high-radiation environments, the production of medical isotopes, the analysis of spent nuclear fuel, and the management of specialized nuclear wastes. An assessment conducted in 2005 concluded that a Nuclear Hazard Category 3 facility would be sufficient to support projects utilizing the Shielded Operations module (DOE-PNSO 2005). Most of those projects would be relocated from the existing PNNL Radiochemical Processing Laboratory (RPL) in the 300 Area, which is a Nuclear Hazard Category 2 facility. The projects that would relocate from the RPL and other 300 Area laboratories are expected to require a smaller total inventory of radioactive materials than is currently present in the RPL; therefore, the Shielded Operations module could operate as a Nuclear Hazard Category 3 facility.

The **Chemistry and Processing** module would provide diverse capabilities for evaluating material surface and bulk properties. Radiochemical laboratories would be equipped with hoods, glove boxes, shielded facilities, and their support infrastructure. Instrumentation in the facility would include optical, electron, and atomic force microscopes; radiation counting equipment; nuclear magnetic resonance instruments for radioactive sample analysis; calorimeters; X-ray diffraction systems; and X-ray photoelectron, raman, optical, and mass spectrometers. These capabilities would enable fundamental research in radionuclide chemistry, particularly actinide chemistry, for DOE-SC, and they would also provide extensive support for the other laboratory modules. Additional programs expected to utilize this capability include DOE and NNSA programs in nuclear nonproliferation, nuclear energy, isotope production, and nuclear waste management.

The **Subsurface Science** module would support fundamental research on the mobility and degradation of compounds in the subsurface environment and on interactions of various waste forms with engineered materials and geologic environments. This research includes the evaluation of thermochemical properties of actinides and other trace elements and of mineral weathering, oxidation-reduction reactions, and related phenomena to obtain fundamental data to use in predicting the geochemical behavior of such elements in complex geologic systems. This research benefits DOE programs in environmental management, geochemistry of radioactive materials, and civilian nuclear waste management.

The **Certification and Dosimetry** module would provide capabilities to certify the performance of radiation detection instruments to American National Standards Institute requirements, including the evaluation of the mechanical, electrical, radiological, and environmental specifications of the instruments. The facility would also be accredited by the National Institute of Standards and Technology to perform gamma, beta, and neutron irradiations for performance testing of other accredited dosimeter processors in the United States. External dosimetry capabilities also support research in radiation measurement and medical physics. In addition, the laboratory would provide accredited external and internal dosimetry services and expertise to other PNNL and Hanford Site organizations, as well as numerous national and international agencies and commercial operations.

PSF Radiological and Chemical Inventory

The types and forms of radioactive and hazardous materials proposed for use in the PSF are expected to be similar to those presently in use at PNNL-occupied research laboratories located in the 300 Area. Although the types and forms of materials are expected to be similar, the total quantities of radioactive and hazardous materials are expected to be reduced in the PSF compared to those in use at existing 300 Area laboratories occupied by PNNL. Materials not relocated from the 300 Area would either be transferred to other PNNL or Hanford Site projects, or they would be disposed of as waste when the facilities are decommissioned during the 300 Area cleanup. Because the PSF is planned as a research facility to accommodate a variety of different activities, inventories of radiological and chemically hazardous materials may change, prior to occupancy and during operation, as the mix of programs and projects evolves. However, the environmental impact analyses in Section 5 of this EA are expected to bound activities conducted in the PSF. PNNL will be required to manage radioactive material inventories in the PSF modules to quantities lower than applicable radioactive material inventory limits, such as Nuclear Hazard Category thresholds, Air Permit limits, and Emergency Planning limits. Chemical inventory limits would be established for each laboratory facility or module on the basis of facility design and operational needs. These chemical limits are based, in part, on criteria provided in consensus standards, such as those of the National Fire Protection Association and the International Code Council for the design of facilities containing hazardous materials.

Radiological Materials. DOE standards for nuclear facilities define the maximum quantities of radioactive materials that may be present according to the nuclear hazard category assigned to each facility (DOE 1997). DOE Nuclear Hazard Category 3 facilities and radiological facilities are currently limited to specified maximum quantities of any radionuclide in dispersible form, as defined in the standard. The Shielded Operations module would be designed to accommodate the maximum allowable inventory for any radionuclide, or any combination of radionuclides for which the sum of fractions of the maximum Nuclear Hazard Category 3 inventories is less than 1. The other modules would each be designed to accommodate the maximum allowable radiological facility inventory for any radionuclide, or

any combination of radionuclides for which the sum of fractions of the maximum radiological facility inventories is less than 1. However, operational restrictions on facility radionuclide inventories would be in place to ensure that dose consequences at the site boundary from hypothetical accidents remain within applicable guidelines and to provide a reasonable margin of flexibility for receipt and use of materials. Radionuclides that could be present in the PSF include a wide variety of radioactive isotopes such as tritium, fission products (such as strontium-90), and activation products (such as cobalt-60), as well as limited quantities of special nuclear materials (largely isotopes of uranium and plutonium) and transuranic radionuclides.

Table 3.1 contains a representative inventory of radioactive materials by module, normalized to plutonium-239 equivalent (Pu-239E) or tritium equivalent (H-3E) curies (Ci),[(2)] based on materials currently in use, or anticipated for use, by projects that may ultimately relocate to the PSF from 300 Area laboratories. Those inventories are not intended to represent the maximum quantities that may eventually be present in the facilities; however, operational controls based on facility safety requirements would ensure that radiological inventories in the facility remain below the applicable quantities listed in the DOE (1997) standard. For example, Nuclear Hazard Category 3 facilities are limited to less than 56 Ci of plutonium-239 (Pu-239) or less than 300,000 Ci of tritium (H-3); Radiological facilities are limited to less than 0.52 Ci Pu-239 or less than 16,000 Ci H-3. Because not all radiological materials currently existing in the 300 Area facilities would be relocated to the PSF, the Shielded Operations Module would operate as a DOE Nuclear Hazard Category 3 facility, and the other modules would be managed as radiological facilities.

Table 3.1 contains a listing of inventories for radiological materials in dispersible form separately from those in sealed sources. In some cases, the DOE (1997) standard permits facilities to exempt materials from the allowable inventories established for nuclear hazard classification purposes if the material is in a physical form, or is stored in a containment system, that meets specified standards. Radioactive materials in non-dispersible forms, materials contained within sealed sources, and materials stored in containers designed to prevent their release are not expected to contribute substantially to the risk associated with facility operations because their potential for release to the environment would be negligible under all but the most improbable accident conditions. Fissionable materials would be managed according to DOE (2005a) requirements related to criticality safety. However, the forms and quantities of fissionable materials permitted in the PSF would be managed to preclude the potential for criticality accidents.

(2) Plutonium-239 equivalent (Pu-239E) is the activity in Ci of a given non-volatile isotope or combination of non-volatile radionuclides that would produce the same total effective dose equivalent as 1 Ci of Pu-239 if released to the environment under accident conditions. Tritium equivalent (H-3E) is the activity in Ci of a given volatile isotope or combination of volatile isotopes that would produce the same total effective dose equivalent as 1 Ci of H-3 if released to the environment under accident conditions. This method of normalizing dose equivalence is used in accident analyses to allow consequences to be evaluated in terms of a single radionuclide for each physical form. Use of the Pu-239 and H-3 equivalence in Table 3.1 also provides a perspective on the relative distribution of materials among the various PSF modules.

Table 3.1. Representative PSF Radioactive Material Inventory by Module (Inventory values in Ci Pu-239E or H-3E)

PSF Module	Sealed Source Pu-239E Ci	Dispersible Pu-239E Ci	Dispersible H-3E Ci
Shielded Operations	15	10.4	36,000
Chemistry and Processing	1.66E-03	0.0158	1.15E-03
Materials Science & Technology	0.0	0.0937	162
Subsurface Science	0.0	0.266	0.0161
Radiation Detection	70.9	0.388	3.33
Certification and Dosimetry	51.1	0.225	27.7
Ultra-trace	0.0	0.204	1.55
Total	**137**	**11.6**	**36,200**

Chemicals. A listing of hazardous chemical inventories has been prepared for DOE and other agency projects in 300 Area laboratories occupied by PNNL. The listing was limited to chemicals associated with current programs and projects that may transition to the PSF or which are consistent with the planned capability and mission of the PSF. The review identified a broad variety of chemicals that may be used in PSF laboratory operations, although typical quantities in use or present in an individual laboratory at any given time are anticipated to be relatively small based on current usage and laboratory practices. As noted previously, the types and quantities of chemicals present in the facility and their usage rates are expected to vary over time according to programmatic needs. However, the quantities of hazardous chemicals present in the PSF would be managed within applicable limits specified by the applicable International Building Code (for example, ICC 2006 or current standard).

As an indicator of hazardous chemical use by current PNNL programs that would relocate to the PSF, Table 3.2 contains a listing of the chemical inventory as of February 2006 by major hazard group, which is expected to be representative of the types of chemicals used in the PSF (see Glossary for definitions of hazardous chemical classes). There are some chemical hazard classifications that are not included in the inventory, which indicates there are no chemicals in those hazard classifications that are currently in use. However, if new projects were to introduce those types of materials, they would be managed and controlled in accordance with established processes for evaluating new work and managing chemical hazards within PNNL facilities and projects.

Support Functions

The PSF would also include support functions that are necessary to operate the laboratories and offices. These functions could either be constructed as part of the laboratory complex or as separate facilities. The maintenance and fabrication support function would potentially include fabrication shops; measurement laboratory; paint shop; welding shop; crane system; and secure, covered exterior equipment storage. The central utility plant would be located within or near the PSF. At this conceptual stage, the central utility plant is sized only to serve the PSF, although it may be designed to allow expansion to accommodate additional load from other PNNL buildings, should it be needed in the future. Space for temporary storage and management of radioactive and hazardous waste would also be provided within the complex. Management of radioactive and hazardous wastes would be in accordance with any permits required by regulation, as listed in Section 6, and would be subject to applicable radiological and hazardous material inventory limitations discussed in the previous section.

Table 3.2. Recent Hazardous Chemical Inventory for Capabilities and Programs that Would Be Relocated to the PSF(1)

Chemical Hazard Group	Estimated Inventory
Flammable	
Gases (e.g., hydrogen)	160 m^3 (5,690 ft^3)
Solids (e.g., sodium sulfide)	220 kg (490 lb)
Liquids (e.g., alcohols)	3,500 L (928 gal)
Liquefied Gas (e.g., propane)	1,060 L (280 gal)
Oxidizing	
Gases (e.g., oxygen)	120 m^3 (4,260 ft^3)
Solids (e.g., nitrates)	290 kg (1,320 lb)
Liquids (e.g., hydrogen peroxide)	8,600 L (2,260 gal)
Corrosive	
Gases (e.g., ammonia)	2.6 m^3 (91 ft^3)
Solids (e.g., silver nitrate)	850 kg (1,880 lb)
Liquids (e.g., acids)	2,160 L (570 gal)
Unstable (Reactive)	
Gases (e.g., acetylene)	9.6 m^3 (340 ft^3)
Solids (e.g., calcium hypochlorite)	68 kg (150 lb)
Liquids (e.g., styrene)	2,500 L (650 gal)
Water Reactive	
Solids (e.g., sodium)	610 kg (1,350 lb)
Liquids (e.g., trichlorosilane)	6,660 L (1,760 gal)
Toxic	
Gases (e.g., nitric oxide)	1.5 m^3 (54 ft^3)
Solids (e.g., arsenic)	670 kg (1,470 lb)
Liquids (e.g., bromine)	4,900 L (1,300 gal)
Highly Toxic	
Solids (e.g., sodium cyanide)	25 kg (56 lb)
Liquids (e.g., parathion)	220 L (57 gal)
Pyrophoric	
Solids (e.g., lithium)	2.2 kg (4.90 lb)
Liquids (e.g., methyldichlorophosphine)	0.38 L (0.10 gal)
Explosives or Blasting Agents (e.g., black powder)	0.27 kg (0.60 lb)
Organic-Peroxide	
Solids (e.g., benzoyl peroxide)	0.06 kg (0.14 lb)
Liquids (e.g., acrylic resins)	1.7 L (0.44 gal)

(1) Inventory quantities are totals for each hazard group, based on data in the PNNL Chemical Management System database as of February 2006. Specific chemicals listed are examples of the types of chemicals included in each group.

Parking

The PSF parking area would be sized to provide one parking space per employee, and additional visitor parking would amount to approximately 10% of the total employee parking. Parking spaces for disabled individuals would be provided as required in both the visitor and employee parking lots.

Service Access and Design

Service access roads and loading docks would be located away from main roadways to minimize traffic hazards. Any support functions would be located in the same general vicinity as the main service courtyard area because of the similar functional requirements for truck access and storage requirements. The Radiation Detection Track would also be located in the vicinity of the service areas to potentially share the same access road and utility infrastructure.

Site Preparation

Typical site preparation would consist of clearing and grubbing surface vegetation, installing soil erosion controls, and removing superficial fill materials. Backfill materials would consist of crushed stone and structural fill, dense-graded aggregate, or other materials placed and compacted to levels recommended by the geotechnical engineer. Excavated soils would be stockpiled adjacent to the building site and would be reused onsite to the maximum extent practical.

Utilities

The City of Richland is planning to install a utility trunk loop, designed to support future development within the PNNL Site. The State of Washington has provided funds for expansion of utilities to the PNNL Site through a grant to the City of Richland from the Washington Department of Community, Trade, and Economic Development (Washington Legislature 2005). Connections would be made to existing utilities (e.g., sewage lift stations and natural gas mains). The City of Richland and Pacific Power currently maintain utility easements that run parallel to Horn Rapids Road within the PNNL Site. It is anticipated that additional easements, or an extension to the existing easement, would be established for installation of the utility trunk loop.

Utility improvements would include:

- Potable water distribution system
- Irrigation system
- Sewers, including a new sewage lift station
- Natural gas service, including mains and distribution system
- Electrical service, including conduits, duct banks, vaults, switches, and services
- Ductwork to provide fiber optic, telephone, and other communications connections.

The PSF would also include standby diesel-fueled generators to provide emergency backup power.

Water Runoff and Spill Management

Water runoff from the proposed buildings and parking areas may be collected and distributed onsite using a combination of surface swales and underground percolation beds. The swales would capture the first-flush pollutants from buildings and parking lots to percolate low-flow storm runoff. High-runoff volumes would overflow the swales into the percolation beds.

Spill containment would be provided at the laboratory facility loading dock areas. Each area would have a dry trench for spill containment and a separate storm drainage trench for rainwater. The dry trench would be a closed trench system (no piped outlet), requiring that trapped liquids be pumped into an appropriate containment vessel. Overfill prevention systems and spill containment would also be provided at the fueling area for the diesel standby generator(s).

Pollution Prevention and Waste Minimization

Consistent with the requirements and guidance of regulations and executive orders, including the *Pollution Prevention Act of 1990* (42 USC 13101), DOE incorporates pollution prevention and waste minimization practices in construction and operation of all facilities. Pollution prevention is defined as the use of materials, processes, and practices that reduce or eliminate the generation and release of pollutants, contaminants, hazardous substances, and wastes into land, water, and air. Pollution prevention includes practices that reduce the use of hazardous materials, energy, water, and other resources along with practices that protect natural resources through conservation or more efficient use. Within DOE, pollution prevention includes all aspects of source reduction as defined by the EPA and incorporates waste minimization by expanding beyond the EPA definition of pollution prevention to include recycling. Pollution prevention is applied to all DOE pollution-generating activities, including laboratory research, development, and demonstration projects.

Pollution prevention in construction and operation of the proposed PSF would be achieved through:

- Equipment or technology selection or modification, process or procedure modification, reformulation or redesign of products, substitution of raw material, waste segregation, and improvements in housekeeping, maintenance, training, and inventory control

- Efficiency in the use of raw materials, energy, water, or other resources

- Recycling to reduce the amount of waste and pollutants destined for release, treatment, storage, and disposal.

Emergency Preparedness

DOE Order 151.1C, *Comprehensive Emergency Management System* (DOE 2005b), provides the framework for development, coordination, control, and directions of all emergency planning, preparedness, readiness assurance, response, and recovery actions. In implementing the applicable portions of that Order, PNNL prepares facility-specific emergency plans in accordance with state and federal regulations to protect workers, public health and safety, and the environment in the event of an emergency affecting PNNL. PNNL staff members participate in regularly scheduled exercises to train emergency personnel who would respond to potential accidents and other events. Emergency services for

PNNL-occupied facilities located in the Hanford Site 300 Area, as well as the PNNL Site north of Horn Rapids Road, are provided by the Benton County Sheriff and the Hanford Fire Department. Emergency services for the PNNL facilities located south of Horn Rapids Road are provided by the City of Richland. The City of Richland would also serve the PNNL Site north of Horn Rapids Road, including the PSF, if the property is annexed to the city. In the interim, DOE-SC would arrange for emergency services either from the city or from Benton County and the Hanford Site.

Provisions in the facility emergency plans would require that a hazards survey be performed for all facilities. Results of the hazards survey would be used to identify which facilities require preparation of an Emergency Preparedness Hazards Assessment (EPHA). The EPHA would describe the hazards associated with operations and materials in the facility and evaluate the consequences of events that might present a risk to health and safety of workers or members of the public. Events considered in the EPHA would include internal accidents or process upsets, external events, natural phenomena, and other events, such as sabotage or intentional destructive acts. In addition, building emergency procedures would address actions that would be taken to evaluate the severity of an actual or potential emergency and the steps necessary to notify other agencies and coordinate the response. The EPHA would also provide for the establishment of Emergency Planning Zones, where warranted, and specify Emergency Action Levels at which the hazard to workers and the public is of sufficient concern that protective action should be taken.

Emergency procedures for individual PNNL facilities would be reviewed annually and updated as needed when changes to operations could affect the level of risk associated with the facility. The building emergency procedures would describe types of hazards and operations associated with the facility as well as any administrative controls or engineered systems in place to mitigate the consequences of accidents or other off-normal events. Those controls would be commensurate with the level of risk associated with facility operations.

Safeguards and Security

In accordance with requirements in DOE Order 470.4, *Safeguards and Security Program* (DOE 2005c), and implementing guidance, PNNL currently maintains a comprehensive safeguards and security program approved by DOE and validated by external experts. PNNL employs a graded physical protection program that is systematically planned, executed, evaluated, and documented as described in a Safeguards and Security Plan. Under this approved program, DOE assets are appropriately protected from malevolent acts such as theft, diversion, and sabotage, as well as events such as natural disasters and civil disorder, by considering site and regional threats, protection planning strategies, and protection measures. Public access to the perimeter of the PNNL Site and buffer area would be limited through the installation of a fence, wall, or other barrier that meets safeguards, security, and facility safety requirements.

Based on threat assessments and protection planning strategies, the PSF would be designed to provide the appropriate level of physical protection required by DOE for Property Protection Areas (PPAs) and Limited Areas (LAs). PPAs would be established where required to protect government-owned property against damage, theft, or intentional destructive acts. LAs are security areas designated for the protection of classified matter and certain types of special nuclear material. Specific physical protection requirements for these security areas are provided as follows:

Property Protection Areas

- General Requirements. PPAs must be configured to protect Government-owned property and equipment against damage, destruction, or theft and must provide a means to control public access.

- Access Control. Some form of access control shall be implemented to protect employees, property, and facilities. PNNL employs automated access control systems, i.e., proximity card readers and/or lock systems.

- Signs Prohibiting Trespassing. Signs prohibiting trespassing must be posted around the perimeter and at each entrance to the PPA.

- Physical Barriers. Physical barriers such as fences, walls, and doors may be used to identify the boundary of the PPA. PNNL's protection strategy for PPAs relies on the building perimeter (i.e., walls) as the physical barrier and legal demarcation for the PPA boundary.

Limited Areas

- General Requirements. LAs are defined by physical barriers encompassing the designated space and access controls to ensure that only authorized personnel are allowed to enter and exit the area. A means must be provided to detect unauthorized entry into the LA. The PNNL protection strategy recognizes that "signs of forced entry" and the "audit" feature of automated access control systems are acceptable means of detection.

- Personnel and Vehicle Access Control. The identity and access authorization of each person seeking entry must be validated by appropriate authorized personnel, automated systems, or other means documented in the safeguards and security plan. The current protection strategy employed at PNNL consists of proximity cards or other lock systems with a personal identification number. Vehicles are not authorized in PNNL LAs.

- Physical Barriers. Physical barriers, such as fences, walls, and doors, may be used to identify the boundary of the LA. PNNL protection strategy for LAs typically consists of exterior and/or interior walls of commercial-grade construction, with the only criteria that the interior walls extend from the "true" floor to the "true" ceiling. General Services Administration-approved security containers are currently used to store classified matter and some special nuclear materials. If additional protection is required, intrusion detection systems may be installed within in LAs.

A plan is currently in place at PNNL to implement special security measures when warranted by an increased threat of intentional destructive acts or other events. The types and frequency of measures implemented would depend on the declared threat level and would employ a graded approach that involves actions by staff, onsite security personnel, and community emergency response agencies as applicable.

Future Development

Although future research needs cannot be predicted at this time, portions of the PNNL Site and buffer area may eventually be developed to meet DOE-SC programmatic needs unrelated to the proposed action discussed in this EA. Any such development would be in accordance with existing or future agreements among DOE, tribal, and regulatory agencies. Appropriate NEPA reviews would be conducted at that time to evaluate any future proposals.

3.2 Alternatives Considered but Not Evaluated in Detail

Relocating research activities from the 300 Area would involve replacing up to 17 identified technical and support capabilities that currently exist at PNNL, and DOE-SC has evaluated a number of alternatives for housing the capabilities that are expected to continue or expand as part of ongoing programs. DOE considered the need for each identified mission scope and issued a Final Mission Needs Validation Report in Support of the PNNL Capability Replacement Laboratories Project (DOE-PNSO 2005). As part of that evaluation, DOE considered replacing all, part, or none of the capabilities that will be displaced by closure of 300 Area facilities occupied by PNNL. The report identified capabilities considered critical to DOE and other federal agency strategic missions as the programmatic basis for the PSF conceptual design. Failure to provide those research capabilities would result in the agencies' inability to carry out their essential functions and programs. Based on the needs of ongoing DOE, NNSA, and DHS missions, DOE-SC established a requirement that replacement facilities must be acquired at PNNL to accommodate critical capabilities that will be displaced by closure of the 300 Area laboratories.

Criteria used to evaluate alternatives for replacement facilities included values such as community impact, workplace quality, safety, expandability, collaboration, connectivity, flexibility, energy efficiency, sustainable design, compatibility with DOE-SC and PNNL real estate strategy, and the ability to benefit multiple programs via opportunities for discovery and utilization of unique capabilities. The DOE-SC preferred approach to meeting facility needs for the technical capabilities identified as part of the proposed action is discussed in Section 3.1. The alternatives analysis (PNNL 2005) considered the proposed action, which was identified as "Construct new facilities using a mixed financing approach," in addition to three other viable alternatives:

1. Utilize existing federally owned facilities at or near PNNL
2. Utilize existing privately owned facilities at or near PNNL
3. Construct new facilities on DOE property using line item funding.

The proposed action was selected from among the alternatives on the basis of life-cycle cost and operational efficiency. Alternatives to the proposed action are discussed in the following sections. Their environmental impacts, as well as other logistical and programmatic considerations, are evaluated qualitatively relative to those for the proposed action.

Alternative 1. Utilize existing federally owned facilities at or near PNNL

The option to relocate PNNL technical capabilities from the 300 Area to other existing DOE-owned facilities on the Hanford Site was explored in detail. Because of the extensive scope of the Hanford closure plan, many existing DOE facilities are scheduled for removal and represent significant cleanup mortgages, similar to the 300 Area facilities currently occupied by PNNL. At present, only the Fuels and

Materials Evaluation Facility (FMEF), located in the Hanford Site 400 Area, would have the available capacity to warrant consideration. That facility was designed for testing and examining nuclear fuels from the Fast Flux Test Facility, which has been deactivated. The FMEF was never occupied and would require extensive modification to support research being conducted at PNNL. This alternative was estimated to meet the relocation schedule; however, the requirement for expansion of FMEF or acquisition of leased space added substantial cost. In addition, this alternative would not result in optimum co-location of technical capabilities to promote collaboration and efficient use of unique or common resources needed by different programs, resulting in fragmentation of the laboratory and isolation of research staff from other resources in existing PNNL facilities. The use or expansion of existing DOE facilities was not considered a reasonable alternative to meet the purpose and need for action, as described in Section 2, because of the limited availability of suitable existing facilities, substantial cost to retrofit any other facilities that may be candidates, and detrimental impacts on laboratory operations from moving the 300 Area capabilities to a location remote from existing PNNL facilities. The use of existing facilities at other DOE sites was also evaluated, but was not considered reasonable because of similar limitations.

Alternative 2. Utilize existing privately owned facilities at or near PNNL

The second alternative evaluated was relocation of PNNL technical capabilities from the 300 Area to other non-DOE owned facilities that already exist in the vicinity. Because of the space and unique facility requirements for relocated technical capabilities, the likelihood of finding available space within a reasonable distance of the existing PNNL facilities was judged to be remote. Facilities currently occupied by PNNL are not capable of accommodating the needs of the relocated technical capabilities through assimilation or displacement because existing space is expected to be fully utilized with equally critical work supporting DOE and other federal missions. Privately owned laboratory facilities in the vicinity are also fully occupied by PNNL under lease agreements. A recent rental market survey (PNNL 2005, Attachment 1) indicated that there was no available laboratory space and insufficient office space to accommodate the relocated capabilities within 10 miles of PNNL. Leasing facilities more remote from PNNL could potentially meet the relocation schedule; however, that option was associated with considerable uncertainty because of the number of leased facilities required to accommodate space needs. This alternative also would not result in optimum co-location of technical capabilities to promote collaboration and efficient use of unique or common resources needed by different programs because it would result in fragmentation of the laboratory and isolation of research staff from other resources in existing PNNL facilities. For reasons similar to those discussed relative to Alternative 1, the use of existing private facilities was not considered a reasonable alternative to meet the purpose and need for action as described in Section 2.

Alternative 3. Construct new facilities on DOE property using line item funding

This alternative considered construction of all required facilities on government-owned land using line-item funding, which would have the advantage of consolidating all relocated technical capabilities in a single location or in close proximity. It would also rely on only one major funding source and reduce the requirement for budgetary coordination among different agencies. One disadvantage associated with this alternative is that it would not provide for optimum operational efficiency that would result from integrating relocated capabilities with similar synergistic capabilities currently located in existing PNNL facilities. In addition, it would not take advantage of multiple capital funding sources, resulting in the

highest initial cost to the government. This alternative could potentially meet the relocation schedule; however, it would not provide the optimum opportunity for collaboration among technical capabilities because of the requirement to build line item-funded facilities on government property. It would limit flexibility to locate some capabilities near existing PNNL facilities that occupy both privately owned and government-owned property. Construction of a new facility using DOE line item funding was not considered a reasonable alternative to meet the purpose and need for action, as described in Section 2, because of the high initial cost and detrimental impacts on laboratory operations from duplicating or separating capabilities that require common equipment, staff, and resources.

Environmental Impacts of Alternatives

Using existing facilities as described for Alternatives 1 and 2 could result in some reduction of resources needed for initial construction. However, the availability of suitable facilities is limited, and it would likely be impractical to retrofit existing facilities to meet the requirements for some capabilities, such as shielded operations, or other activities where materials or information security is required. Using existing facilities could also result in higher resource use and costs for operation over the long term, particularly for older, less efficient, buildings.

Relocating the technical capabilities from the 300 Area to existing facilities at another DOE site would require transporting existing equipment and materials to the alternate facility, as well as transferring or replacing key technical staff. Additional transportation impacts would occur if the capabilities were relocated to a DOE site distant from the 300 Area, and that alternative would entail higher costs for moving or replacing essential staff, equipment, and materials. It would also result in substantial disruption of the affected programs as staff relocated to a new community, or their replacements were trained.

In general, resources needed to construct the proposed laboratory complex under Alternative 3 would be similar to the proposed action wherever the facilities were located. However, some types of environmental impacts associated with this alternative would depend on the specific site selected. In particular, the potential for impacts on cultural and biological resources would be unique to each site, as would some impacts on surrounding residential and commercial areas.

3.3 No-Action Alternative

Under the No-Action Alternative, DOE-SC would not obtain replacement facilities or provide new facilities for PNNL staff and existing research missions. Ongoing work in the 300 Area would continue until PNNL is required to vacate the facilities to allow completion of 300 Area cleanup. At that point, the research underway would cease. Environmental impacts of the No-Action Alternative are discussed in Section 5.2.

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4.0 Affected Environment

The planned location for construction of the PSF is within the PNNL Site, located directly north of Horn Rapids Road (Figure 3.1). Aspects of the site and its environs that might be affected by the construction and operation of the PSF are described in this section.(3)

4.1 Land Use

The proposed PSF construction site within the PNNL Site is vacant DOE-owned property that was reassigned in 2004 to DOE-SC from the Hanford Site. The site is a relatively level parcel of land covered with a mix of desert-adapted shrubs and grasses. The DOE property to the north and east of the current PNNL Site is also vacant and is currently being reassigned to DOE-SC for use as a controlled- access buffer area. Most of the property within the proposed PSF construction site and buffer area was designated as Industrial in a 1999 DOE Record of Decision (ROD) for the *Final Hanford Comprehensive Land-Use Plan EIS* (64 FR 61615). The exception was a section in the eastern part of the buffer area along the Columbia River, which was designated as Preservation in the 1999 ROD to protect sensitive Tribal cultural sites. The PNNL Site and buffer area are designated as Business/Research Park in Benton County's Comprehensive Plan. They are also within the City of Richland urban growth area and are designated as a mix of Business/Research Park (similar to the adjacent PNNL facilities), Commercial, and Low Density Residential land uses.

Land use in nearby areas includes:

- Existing PNNL facilities, directly south of Horn Rapids Road, including the EMSL as well as other research laboratories and support buildings.
- Businesses located east of George Washington Way and south of Horn Rapids Road.
- The Columbia River, located due east, which can support a diverse mix of recreational and subsistence-fishing uses.
- A planned condominium community currently being constructed along the Columbia River south of Horn Rapids Road.
- A barge-docking facility, located to the southeast, that is used for transferring reactor components and other materials destined for the Hanford Site. A haul road connecting the barge facility to Stevens Drive traverses the buffer area from southeast to northwest.

(3) Because the proposed construction site and buffer area have historically been part of the Hanford Site, information in this section is based on the *Hanford Site National Environmental Policy Act (NEPA) Characterization* report (Neitzel 2005) unless indicated otherwise. Although the property has been, or is in the process of being, reassigned to DOE-SC, the descriptions in that document apply to the corresponding areas as discussed in this EA.

- The Washington State University (WSU)-Tri-Cities branch campus, Hanford High School, and Richland residential area are located to the south-southeast.

- Occupied and unoccupied Hanford Site land is adjacent to the west and north.

- Industrially and agriculturally developed land that lies to the southwest (all zoned industrial by the City of Richland).

4.2 Air Quality

Air quality within the region is generally good with occasional exceptions caused by blowing dust. Atmospheric dispersion is relatively good with infrequent periods of stagnation occurring mostly during winter months. Air quality within Benton County, including the PNNL Site, has been designated as being in attainment with all EPA and State of Washington non-radiological air quality standards.

Federal and State of Washington requirements specify that routine radioactive air emissions may not exceed a quantity that results in an annual dose of 10 mrem to a maximally exposed member of the public. Doses due to airborne effluents released from 300 Area facilities have been evaluated annually for a maximally exposed individual (MEI)[4] and for the collective population within 80 km (50 mi) of the site (Poston et al. 2002, 2003, 2004, 2005, 2006). Emissions from PNNL-occupied facilities account for essentially all of the airborne effluents released from the 300 Area, and for purposes of analysis, doses reported for the 300 Area were considered to reflect those from ongoing PNNL activities. During the years 2001 to 2005, air emissions from 300 Area stacks resulted in doses to the MEI ranging from 0.0073 to 0.021 mrem per year, depending on the types and quantities of radionuclides in various facility effluents. Collective doses[5] from 300 Area airborne effluents to the population within 80 km (50 mi) ranged from 0.085 to 0.33 person-rem during that same period. For perspective, the population within 80 km (50 mi) of the 300 Area received about 100,000 person-rem in 2005 from background sources of radiation.

4.3 Geological Resources

Geological resources in the vicinity of the PNNL Site consist principally of Rupert Sand and Burbank Loamy Sand overlying Pleistocene (1.8 to 0.01 million years ago) Ice Age Flood sediments, Pliocene (5.3 to 1.8 million years ago) ancestral Columbia River and Snake River sediments, and Miocene (24 to 5.3 million years ago) Columbia Plateau Basalt Flows. Like much of the region, the Ice Age Flood sediments and surface soils are characterized by high infiltration rates, low-water-holding capacities, and very low clay and organic matter content.

(4) The location of the Hanford Site MEI can vary from year to year depending on the nature of onsite activities and their relative contributions to radioactive emissions. During the past 5 years, the MEI has twice been located in the Riverview area across the Columbia River from Richland and three times in the Sagemoor area across the river from the 300 Area.

(5) The collective dose is the sum of the dose received by all individuals in a population and is expressed in units of person-rem. For example, a dose of 1 rem to each of 10 individuals would result in a collective dose of 10 person-rem.

4.4 Water Resources

There are no naturally occurring surface water bodies, wetlands, or designated floodplains on the PNNL Site. The Columbia River is located directly to the east, and the Yakima River is located about 4.8 km (3 mi) to the southwest of the site.

Groundwater beneath the PNNL Site generally originates as natural recharge from local rain and snowmelt at higher elevations to the west and eventually discharges to the Columbia River. The unconfined water table under the site is generally 9 to 19 m (30 to 62 ft) below the ground surface. Fluctuations in the Columbia River flow affect the groundwater levels at the site.

4.5 Cultural and Historical Resources

Cultural and historical resource assessments of the proposed construction site identified trash scatters of cans and glass and ceramic fragments that might be of possible historic interest (Appendix A). In addition, the site includes a segment of Lateral #4 of the Richland Irrigation Canal, built by the Lower Yakima Irrigation Company (1908 to 1909) to promote agricultural development around the town of Richland (Figure 4.1). The canal was apparently prone to leakage, and a portion was lined with cement in 1922. Isolated portions of the canal still possess an intact cement liner, and an inscription is present on one segment. On December 8, 1994, the State of Washington Historic Preservation Officer (SHPO) concurred that Lateral #4 is eligible for the National Register of Historic Places because of its contribution to early farm settlement in the region between 1900 and 1943.

Figure 4.1. Schematic Showing a Segment of Lateral #4 of the Richland Irrigation Canal

In 1994, excavation in the eastern portion of the buffer area identified a site of cultural significance to regional Tribes. As a result of this cultural resource concern, DOE committed to protect the area from future disturbances and established a perimeter fence around the area. In addition, two prehistoric sites are located in the eastern portion of the buffer area near the shore of the Columbia River. These sites are listed on the Washington State Heritage Register as part of the Hanford South Archaeological District. The sites are within the Preservation(6) designated area established by the DOE ROD for the Final Hanford Comprehensive Land-Use Plan EIS (64 FR 61615). The sites are monitored annually to confirm that they remain undisturbed and that existing protective measures are effective.

4.6 Biological Resources

A list of federally threatened and endangered plant and animal species of potential interest at the PNNL Site were identified through the U.S. Fish and Wildlife Service (USFWS) Threatened and Endangered Species System (USFWS 2006). Biological surveys of the proposed construction site have been conducted each spring from 2003 to 2006 (Sackschewsky 2003, 2004, 2005, Appendix B). However, no federal or state threatened or endangered species, species proposed for listing, or critical habitat were observed during any of these surveys. The 2006 survey report is provided in Appendix B and includes a complete list of all plants and wildlife (including genus and species names) observed during these surveys. The following discussion includes both species observed onsite and those that might occur at the site based on habitat affinities.

The southern portion of the construction site consists of approximately 14 ha (35 ac) located immediately north of Horn Rapids Road and south of the Richland Irrigation Canal. This area has been previously disturbed and supports vegetation dominated by cheatgrass, Russian thistle, and Sandberg's bluegrass. Shrubs are sparse over most of this area where big sagebrush, bitterbrush, gray rabbitbrush, and snow buckwheat each contribute approximately 1% cover. Large native bunchgrasses, especially Indian ricegrass, sand dropseed, and needle-and-thread grass, provide a total of 2 to 3% cover.

The northern portion of the construction site consists of approximately 26 ha (64 ac) located north of the Richland Irrigation Canal. This area consists of a mature stand of shrub-steppe dominated by big sagebrush, cheatgrass, and Sandberg's bluegrass. Bitterbrush is noticeable but is much less prevalent than big sagebrush. The total shrub cover is over 20%. The larger bunchgrasses noted above in the southern portion of the site are less prevalent in the northern portion.

Ground-nesting birds observed in 2006 include Western meadowlarks, California quail, and burrowing owls (federal species of concern, state candidate species). Meadowlarks nest in a wide variety of shrub-steppe habitat, and thus likely nest in the vicinity. California quail could nest on the site because food and water are available in the adjacent lawn areas south of the site. One burrowing owl was observed in February 2006 at a burrow in the northern tip of the site. However, during the April 2006 survey, no owls were observed, and the burrow appeared to have since been filled in with soil excavated by rodents. Although burrowing owls are not nesting in the site, they could potentially nest there. Long-billed curlews were observed in the 2006 survey west of Stevens Drive outside the PNNL Site. Curlews typically nest on the ground in open areas within shrub-steppe. Thus, although curlews have not been

(6) An area managed for the preservation of archeological, cultural, ecological, and natural resources.

observed nesting in the PNNL Site, they could potentially nest there. The horned lark is a ground-nesting species that was not observed during the surveys, but they are relatively abundant and commonly nest in a wide variety of shrub-steppe habitats.

No shrub-nesting birds were observed in 2006. The lark sparrow is a shrub-nesting species that was observed most recently in the 2004 survey and could potentially nest onsite. Other shrub-nesting birds, such as sage sparrows (state candidate species) and loggerhead shrikes (federal species of concern, state candidate species), were not observed during any of the surveys but could potentially nest on the site. Because detection of nests would require a much more intensive field survey, the lack of observed nests does not preclude the possibility that these species nest in the PNNL Site.

Several additional bird species were commonly observed during the surveys, but are not expected to nest in this habitat, including white-crowned sparrows, black-billed magpies, European starlings, mourning doves, and ring-necked pheasants.

Mammals observed, or their sign, include the northern pocket gopher, badger, coyote, and mule deer. Northern pocket gopher excavations were extensive. Badger excavations were observed throughout the site, but none appeared to be active. Coyote excavations (presumably for hunting rodents) were observed throughout the site. Mule deer sign was observed infrequently. Signs of black-tailed jackrabbit, also potentially present in this shrub-steppe habitat, were not observed.

4.7 Status of Groundwater and Surface Contamination

The portion of the PNNL Site located north of Horn Rapids Road is included in two *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA; 42 USC 9601 et seq.) operable units. One operable unit (300-FF-5) addresses groundwater contamination, and the other (300-FF-2) addresses surface-area contamination. The operable units are part of the "Hanford 300 Area" National Priorities List per 40 CFR Part 300, listed on November 3, 1989. Under the Hanford Site Tri-Party Agreement (Ecology et al. 1989), waste sites were grouped into "operable units" based on geographic proximity or similarity of waste-disposal history.

Groundwater under the northern part of the site is part of the Hanford 300-FF-5 operable unit. The Hanford groundwater monitoring report (Hartman et al. 2006) indicates that four contaminants (uranium, tritium, cis-1,2,-dichloroethene, and nitrate) are found at levels that exceed drinking water standards in parts of the operable unit. Beneath the PSF construction site, those contaminants were either not detectable or were present in concentrations well below drinking water standards, except for nitrate, which exceeded drinking water standards. The nitrate plume underlying much of north Richland originates from offsite activities and is not identified as a contaminant of concern for the 300-FF-5 operable unit. The selected remedy in the 300-FF-5 interim ROD (EPA 1996) includes requirements for monitoring groundwater concentrations of uranium, tritium, and cis-1,2-dichloroethene, and requires that DOE maintain institutional controls to restrict groundwater use and minimize potential impacts on public health or safety.

The portion of the PNNL Site located north of Horn Rapids Road is also a small part of the Hanford 300-FF-2 surface operable unit. Two waste sites located within this unit have been investigated as part of the CERCLA process. A CERCLA interim ROD (EPA 2001) concluded that there was no significant regulated waste at either waste site, and no further remedial action was required.

Although not required for the construction of PSF, DOE-PNSO is working with the EPA and the Washington State Department of Ecology (Ecology) to remove the portion of the PNNL Site located north of Horn Rapids Road from the National Priorities List. Documentation will be submitted to the EPA for consideration, and if acceptable, the site will be a partial deletion from the National Priorities List.

4.8 Socioeconomics/Demographics

Activities on the Hanford Site and at PNNL play a substantial role in the socioeconomics of the Tri-Cities and other parts of Benton and Franklin counties. Since the 1970s, DOE and its contractors have been one of three primary contributors to the local economy (the other two are Energy Northwest and the agricultural community). Increasingly, a growing cluster of technology-based businesses, many with roots in PNNL and the Hanford Site, are playing a role in the expansion and diversification of the local private business sector. Together, PNNL and PNSO had a total of about 4,320 employees in June 2006. In addition, the Hanford Site (DOE-RL, DOE-ORP, and their contractors) employed about 7,490 workers in June 2006.(7) It is expected that as the Hanford Site cleanup workforce decreases over the next several decades, the PNNL workforce will contribute a larger share to the Tri-Cities economy.

According to the 2000 Census, population totals for Benton and Franklin counties were 142,475 and 49,347, respectively (Elliott et al. 2004). Both Benton and Franklin County grew at a faster rate than Washington state as a whole during the 1990s. The population demographics of Benton and Franklin counties are quite similar to those found within Washington, although the population of Benton and Franklin counties is somewhat younger than that of Washington as a whole. Additional information, including a detailed breakdown of minority and low-income populations in the vicinity, can be found in Elliott et al. (2004).

In 2000, the population within an 80-km (50-mi) radius of the 300 Area meteorological tower(8) was about 349,000 and included about 37% minority persons(9) (in order of percentage contribution, Hispanic and Latino, Native American, Asian and Pacific Islanders, and African-American). The Hispanic population resides predominantly in Franklin, Yakima, Grant, and Adams counties. Native Americans within the 80-km area reside primarily on the Yakama Reservation and along the Columbia River near the town of Beverly, Washington (Figure 4.2).

In 2000, the population within an 80-km (50-mi) radius of the 300 Area meteorological tower included 16% low-income(10) residents. The majority of these households were located to the southwest and northwest (in Yakima and Grant counties) and in the cities of Kennewick and Pasco (Figure 4.3).

(7) Personal communication, Cindy L. Oliver, DOE-RL Contractor Industrial Relations team.
(8) The 300 Area meteorological tower was selected as the center point because it is the reference point at which census data have historically been evaluated, and it adequately represents the population distribution surrounding both the 300 Area and the proposed PSF.
(9) The minorities designation in the census data counts both racial minorities Alaska Native, African-American, Native American, Pacific Islander, and either mixed race or "other" race, and Hispanics and Latinos (Elliot et al. 2004).
(10) Low-income persons are defined as living in households that report an annual income less than the United |States' official poverty level ($17,761 for a family of four in 2000), as reported by the Census Bureau.

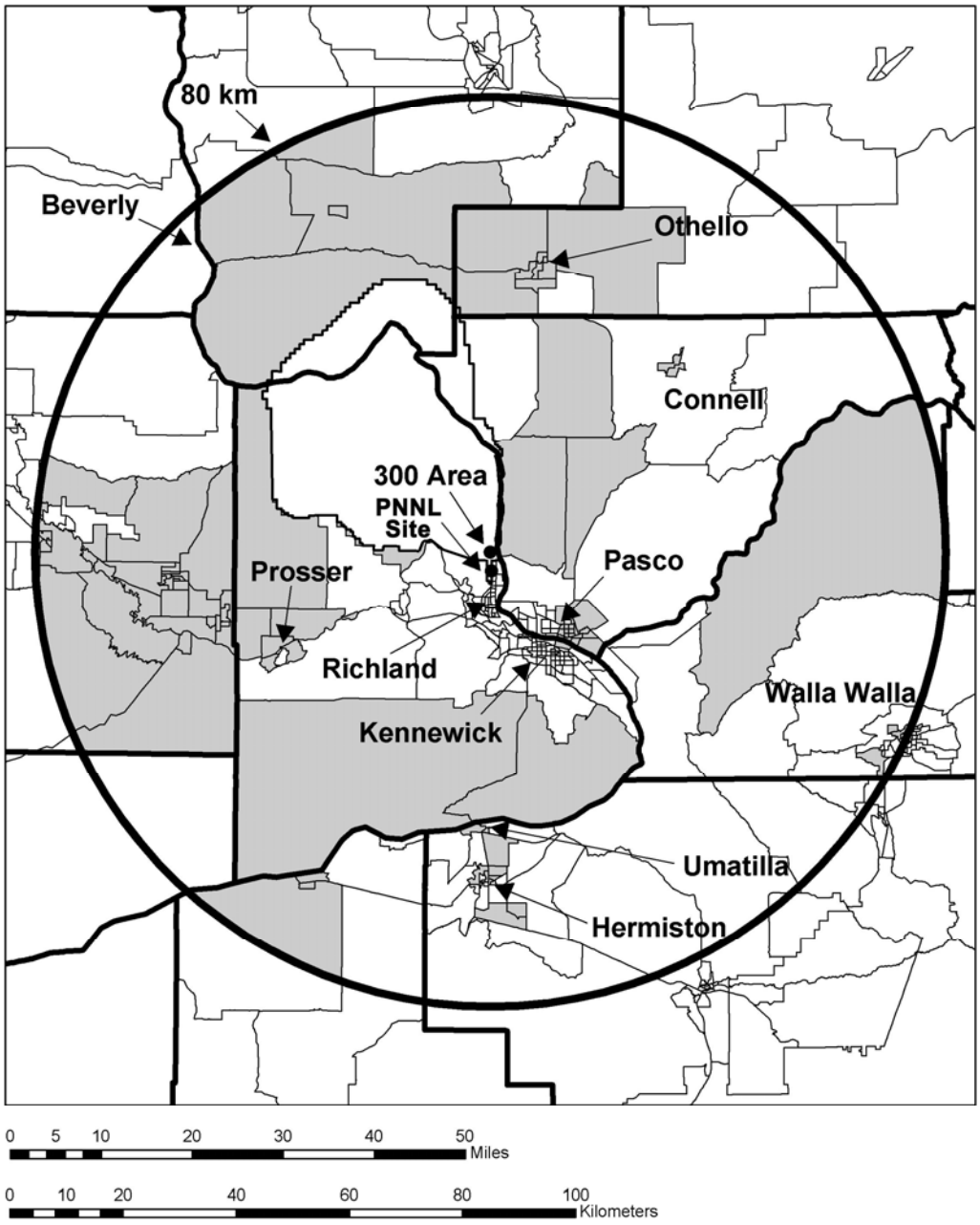

Figure 4.2. Location of Minority Populations near the PNNL Site

(Shaded areas indicate regions that have a majority of residents who are members of a minority group or for which the percentage of minority population is 20 percentage points greater than the statewide average.)

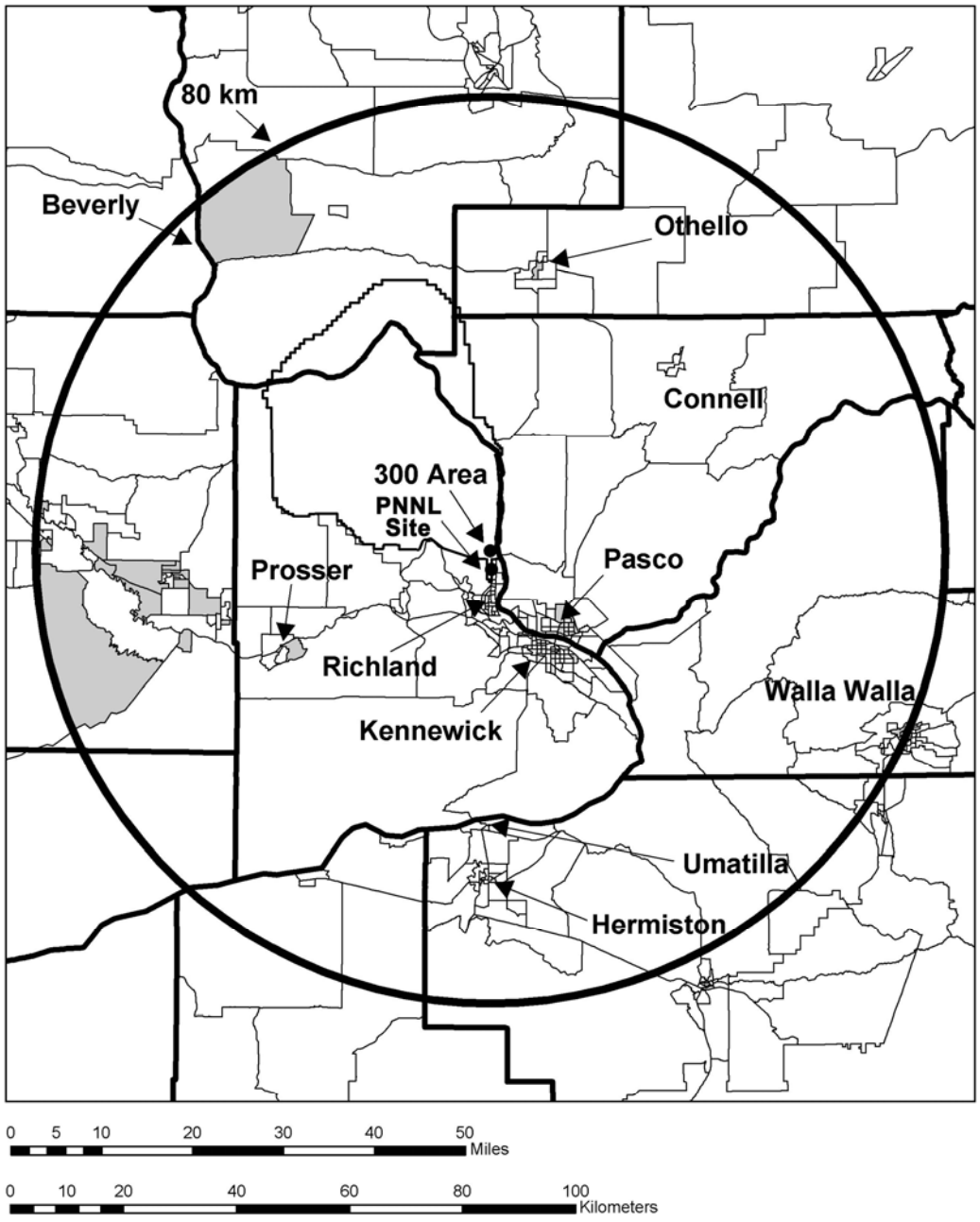

Figure 4.3. Location of Low-Income Populations near the PNNL Site

(Shaded areas indicate regions that have a majority of low-income residents or for which the percentage of low-income residents is 20 percentage points greater than the statewide average.)

4.9 Transportation

The Tri-Cities serves as a regional transportation and distribution center with major air, rail, highway, and river connections. Daily air passenger and freight services connect the area with most major cities through the Tri-Cities Airport, located in Pasco. Passenger rail service is provided by Amtrak, which has a station in Pasco. Freight rail service adjacent to the PNNL Site is maintained and operated by the Tri-City and Olympia Railroad Company. The regional highway network in the vicinity consists of several main routes: a DOE-maintained road network within the Hanford Site; State Route 240, a 6-lane highway that feeds to Stevens Drive in Richland; George Washington Way, a principal 4-lane north-south arterial through Richland; and State Route 224 (Van Giesen Street), which is used by commuters from West Richland and Benton City. The main arteries that feed to the PNNL Site are Stevens Drive and George Washington Way. In 2004, the City of Richland found that Stevens Drive (north of Horn Rapids Road) had an average weekday traffic count of 6,089 and George Washington Way (north of Horn Rapids Road) had an average weekday traffic count of 1,719 (City of Richland 2006a). At peak periods, commuter traffic is often heavy on all primary routes to and from the Hanford Site and PNNL. The Washington State Department of Transportation is in the process of widening State Route 240 between Richland and Kennewick and revising traffic flow to relieve congestion.

4.10 Occupational Health and Safety

Over a 5-year period from 2001 to 2005, the total recordable cases[(11)] of injuries and illnesses at PNNL averaged 1.4 cases per 200,000 worker hours (DOE 2006a). This rate is lower than the average incidence rate for DOE sites (1.9 cases per 200,000 worker hours). For comparative purposes, the DOE average incidence rates were well below the Bureau of Labor Statistics rates for U.S. private industry of 5.4 cases per 200,000 worker hours during the 5-year period from 2000 to 2004 (most recent data available) (DOE 2006a).

The DOE Office of Environment, Safety and Health reports occupational radiation exposure data for monitored DOE and contractor employees. In 2005, 726 PNNL workers were monitored for occupational radiation exposure. Of that number, 118 workers had a measurable Total Effective Dose Equivalent (TEDE).[(12)] The average measurable TEDE was 115 mrem, and the maximum dose received by any worker was less than 1000 mrem. The PNNL collective dose, which is an indicator of the overall workforce radiation exposure, was about 13 person-rem (DOE 2006b). For perspective, these 726 individuals would have received about 220 person-rem from background radiation sources during 2005.

(11) Total recordable cases are the total number of work-related injuries or illnesses that resulted in death, days away from work, job transfer or restriction or other recordable cases, consistent with U.S. Occupational Safety and Health Administration definitions.

(12) The Total Effective Dose Equivalent is defined as the sum of the dose from radiation sources internal and external to the body, reported in units of rem or mrem. Collective dose is the sum of doses to all individuals in a population and is reported in units of person-rem. For example, a dose of 1 rem to each of 10 workers would result in a collective dose of 10 person-rem TEDE.

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5.0 Impacts of Proposed Action and the No-Action Alternative

DOE proposes to construct and operate the PSF to accommodate existing PNNL research activities that will be displaced by cleanup of the Hanford Site 300 Area. Because the impacts described in this section would result principally from relocation of existing activities that have had minimal environmental impacts over the past 40 years, or from ceasing those activities, the incremental impacts of the proposed action or the No-Action Alternative are generally expected to be minimal. Potential impacts in the environs of the PNNL Site as a result of implementing the proposed action or the No-Action Alternative are described in the following sections.

5.1 Environmental Impacts of the Proposed Action

As described in Section 3, options are being considered to construct the PSF in phases over a period of approximately 20 years. However, environmental impacts are presented in this section as though construction of the entire PSF were completed within a period of about 2 years, and PNNL research operations were transferred from the 300 Area to the PSF at that time. As a consequence, time-dependent construction impacts, such as those on traffic and air quality, may be overstated in the analysis that follows. Therefore, this approach is expected to bound the environmental impacts of PSF construction for whatever schedule is ultimately selected.

In a phased implementation, some of the potential impacts from PSF operations would be delayed until the full facility is completed. However, because the proposed action involves replacement of facilities for existing PNNL research capabilities in the 300 Area, operational impacts from activities that are not immediately relocated to the PSF would continue in the 300 Area facilities. For most environmental consequences associated with research operations, the impacts would be similar wherever those activities occurred.

Potential environmental impacts as a result of implementing the proposed action are described in the following sections.

5.1.1 Land Use

As discussed in Section 3.1 and illustrated in Figure 3.1, implementing the proposed action would involve construction and operation of the PSF for conducting R&D activities on the PNNL Site. For the most part, R&D activities proposed for relocation to the PSF are currently conducted in PNNL-occupied facilities located in the 300 Area of the Hanford Site, which is in the process of remediation leading to closure.

The current PNNL Site includes EMSL, which is located due south of Horn Rapids Road, as well as vacant property north of Horn Rapids Road between Stevens Drive and George Washington Way. The proposed PSF, including parking lots and landscaping, would occupy about 31,000 m^2 (~3 ha), or 332,000 ft^2 (~8 ac), of a plot of about 20 ha (50 ac) within the current PNNL Site north of Horn Rapids Road. An additional adjacent area of up to 12 ha (32 ac) would likely be disturbed during construction for access roads and construction materials laydown.

The land where the PSF is proposed to be constructed is owned by DOE and was reassigned from the Hanford Site to DOE-SC in 2004. Prior to that time, the site was classified as Industrial in a DOE ROD for the *Final Hanford Comprehensive Land-Use Plan EIS* (64 FR 61615). Although the PNNL Site is no longer within the Hanford Site, establishing R&D operations at the proposed site would be consistent with the intent of the Industrial designation for that land, as provided for in the earlier DOE ROD.

The PNNL Site is within the City of Richland's planned Urban Growth Area Boundary. Both the PNNL Site and existing PNNL facilities within the Richland city limits are designated as "Business/Research Park" under Richland's Comprehensive Plan Land-Use Designation (City of Richland 2005a). The proposed site is also identified as an Urban Growth Area by Benton County and is designated as Business/Research Park in Benton County's Comprehensive Plan (Benton County Planning Department 2005). Although the federal government is not subject to local planning authority, the activities within the proposed site for construction and operation of the PSF would be consistent with adjacent land uses planned by the City of Richland and Benton County; therefore, no incompatibility issues would be anticipated.

DOE is also in the process of reassigning property to the north and east of the current PNNL Site from the Hanford Site to DOE-SC. This property would serve as a restricted-access buffer area for the proposed facility. The expanded PNNL Site north of Horn Rapids Road, including the buffer area, would extend from Stevens Drive on the west to the Columbia River on the east, and from Horn Rapids Road on the south to an east-west line approximately 1,100 m (3,500 ft) north of Horn Rapids Road. If DOE ultimately constructs PSF modules for all the of technical capabilities that have been identified for relocation, existing roads through the buffer area that connect George Washington Way to Stevens Drive and the 300 Area, as well as the bike path north of Horn Rapids Road, could be closed to public access.

The fenced area within the eastern portion of the buffer area was assigned Preservation status in the DOE (1999) EIS. The haul road that crosses the buffer area from the Port of Benton barge facility to Stevens Drive would be maintained for future use.

5.1.2 Air Quality

Potential impacts on air quality from release of SO_2, NO_2, and other criteria pollutants are described in this section. Details of calculations are provided in Appendix C. Impacts from the release of other chemicals and radionuclides are described in Section 5.1.12, Human Health and Safety.

Construction

Construction of the PSF is anticipated to begin in late 2007 or early 2008, and for purposes of this analysis is estimated to take approximately 2 years. In a phased construction, the impacts as described in this section would be similar, but would occur over a longer period of time. During that time, the operation of diesel-powered construction equipment would be expected to introduce quantities of SO_2, NO_2, particulates, and other pollutants to the atmosphere, typical of similar-sized construction projects. These releases would not be expected to cause any air-quality standards to be exceeded. Regardless, dust generated during earthmoving activities and vehicle movement over unpaved areas would be minimized by frequent watering or other dust-control measures. No substantial air-quality impacts associated with implementing the construction phase of the proposed action would be expected.

Operations

Natural gas (or propane)-fired boilers would be considered for space heating, humidification, or process steam needs (diesel fuel may be considered as a backup fuel). A closed-loop air-conditioning system would also be considered for heating and cooling. All boilers would employ state-of-the-art, clean-burning technology and therefore would not be expected to require supplemental emission controls. Diesel-fueled generators would provide electricity in the event of the loss of utility power. These generators would be required to employ Best Available Control Technology for emissions, including the use of low-sulfur fuel. Emissions of criteria pollutants from the PSF were estimated based on a comparison with the EMSL, a 19,000-m^2 (200,000-ft^2) laboratory facility similar in size and function to the PSF, which began operations in 1997. Based on a ratio of areas occupied by the two facilities, PSF space heating and backup generator maintenance and operation could be expected to release criteria pollutants at levels up to about 1.7 times those of the EMSL. Table 5.1 contains estimates of criteria pollutant release rates during operation of the PSF.

Table 5.1. Estimated Release Rates of Criteria Pollutants from the PSF

Criteria Pollutant[(a)]	Release in tons per year[(b)]
NO_2	1.7
CO	2.1
SO_2	0.015
THC (total hydrocarbons/VOC)[(c)]	0.57
Particulates (total)	0.14
PM_{10}	8.7E-04
Pb[(d)]	1.0E-05

(a) NO_2 = nitrogen dioxide; CO = carbon monoxide; SO_2 = sulfur dioxide; VOC = volatile organic compounds; PM_{10} = particulate matter less than 10 micrometers diameter; Pb = lead.
(b) To convert to tonnes multiply by 0.91.
(c) Includes 0.35 tpy VOC from laboratories. VOC are managed by application of best available technology rather than to a specific limit.
(d) Includes 3.4E-06 tpy of lead from laboratories.

Short-term increases in ambient air concentrations would be expected to result from fluctuations in the demand for boiler use for space heating, the use or testing of diesel-powered emergency electrical power generators, the use of diesel fuel in the boilers during an interruption in the natural gas supply, and changing meteorological conditions.

Table 5.2 shows the modeled air concentrations, reflecting both annual average and short-term air concentrations, and compares them to their respective National Ambient Air-Quality Standards (NAAQS). The calculations conservatively assume that the highest short-term emissions occur simultaneously with the worst-case meteorological conditions.

Table 5.2. Estimated Maximum Incremental Concentrations of Criteria Pollutants and Their Relation to National Ambient Air-Quality Standards

Criteria Pollutant[(a)]	Standard, µg/m^3	Averaging Times	Concentration in µg/m^3	Percent of Standard
CO	10000	8-hour	400	4
	40000	1-hour	1200	3
Pb	1.5	Quarterly	0.000003	0.0002
NO_2	100	Annual	0.06	0.06
PM_{10}	50	Annual	0.00003	0.0001
	150	24-hour	5.8	4
$PM_{2.5}$[(b)]	15	Annual	0.00003	0.0002
	65	24-hour	5.8	9
Sulfur Oxides	78	Annual	0.0005	0.001
	364	24-hour	4.4	1.2

(a) CO = carbon monoxide; NO_2 = nitrogen dioxide; PM_{10} = particulate matter less than 10 micrometers diameter; $PM_{2.5}$ = particulate matter less than 2.5 micrometers diameter; Pb = lead.
(b) Assumes release is same as for PM_{10}.

With the exception of volatile organic compounds (VOC) and lead, emissions of criteria pollutants from research activities would be expected to result in less than 4% of those from space heating and generator operation (Table 5.2). The laboratory emissions of VOCs and lead are incorporated into the results in Table 5.1 and the results from lead are shown in Table 5.2 (there are no quantitative National Air Quality Standards for VOC emissions). Based on these projections, releases of criteria pollutants from the PSF would not cause air-quality standards to be approached, and the area would continue to be in attainment with National Ambient Air-Quality Standards. The emissions of other laboratory chemicals are described in Section 5.1.12.2.

5.1.3 Water Quality

Potential impacts on surface and groundwater as a result of implementing the proposed action are described briefly as follows.

Surface Water

As noted in Section 4.4, there are no occurrences of surface water on the PNNL Site. Stormwater at the PSF would be collected and distributed in a series of infiltration trenches, drains, and catch basins (regulated as injection wells under the Washington Administrative Code, WAC 173-218), and no permanent impoundments would be expected. If required, the storm water management system would be registered with the Washington State Department of Ecology, and would incorporate Best Management Practices as specified by Ecology for commercial facilities of comparable size. Sanitary and process wastewater would be disposed of to the City of Richland sanitary sewer system under a City of Richland Industrial Wastewater Discharge Permit and would be similar to discharges from other PNNL facilities. Further discussion of liquid wastes is presented in Section 5.1.11, Waste Generation and Disposition.

Groundwater

Use of groundwater to heat and cool the PSF is being considered. The required flows, effectiveness, and cost of such a system would be evaluated during detailed design of the facility. In one possible configuration, the system would pump groundwater through a closed-loop heat exchanger, in which case only heat would be added to groundwater. Since there are no down-gradient uses of groundwater, either ongoing or planned, there would be minimal impact from using this heating/cooling configuration. In another possible configuration, the system would pump groundwater through a heat exchanger and return it to groundwater. The concentration of nitrate in groundwater beneath the PSF construction site currently exceeds drinking water limits; however, the return of water would be regulated to avoid increasing that concentration; thus, there would be minimal incremental impact on groundwater from the heating/cooling system. No releases of process water that would cause impacts to groundwater quality are planned or expected.

As noted above, stormwater would be collected and distributed to a series of infiltration drains, trenches, and catch basins and would constitute the only discharge potentially reaching groundwater. Water consumption and evapo-transpiration by foliage and vegetation used in landscaping would be expected to closely balance natural recharge and seasonal irrigation with no adverse consequences for groundwater.

Based on the above information, impacts on water quality from implementing the proposed action would be expected to be minimal.

5.1.4 Geological Resources

No impacts would be expected on geological resources, which consist principally of Rupert Sand and Burbank Loamy Sand, underlain by Ice Age Flood gravels, which are locally abundant. These soils are not considered “prime farmland” in this semi-arid climate. Although they might be suitable for some crops if irrigated, no water rights are in place that would permit agricultural use on the PNNL Site. It is anticipated that soil removed during excavations for footings, foundations, and basements would be used in landscaping.

5.1.5 Cultural and Historical Resources

As described in Section 4.5, a historic segment of an early 20th century irrigation canal liner and minor trash litters were identified on the PNNL Site. No other resources of possible cultural or historical interest were found.

With respect to the historic canal liner segment, PNSO entered into an agreement with the SHPO in 2005 to address protective requirements as follows (see Appendix A):

- PNSO will prepare thorough documentation of the canal (Site H3-21) prior to project implementation.
- PNSO shall work with a local historical organization to prepare interpretive materials on the Canal in consultation with the SHPO.
- PNSO will attempt to retain in place Canal Segment 1 and incorporate it into the general landscaping until such time as the area is needed for other purposes.

The fenced area within the eastern portion of the buffer area is of cultural significance to regional Tribes and aside from maintenance of fencing, the area would remain undisturbed. The opportunities for Tribal access to that area would remain unchanged.

There would be no constraints resulting from construction and operation of the PSF on fishing rights, or on the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land, as secured for the Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, and the Nez Perce Tribe in their respective 1855 treaties with the United States.

As a protective measure for unknown cultural resources, archaeologists would monitor excavations as appropriate, and site construction workers would be instructed to watch for artifacts. If artifacts of potential significance were found, work would stop, and the designated archaeological monitor would be notified (Appendix A).

5.1.6 Biological Resources

Potential impacts of PSF construction on habitats and species within the PNNL Site, as described in Section 4.6 and Appendix B, are summarized in this section. Construction of the PSF, including equipment staging and laydown areas, access roads, and subsequent landscaping to reduce the threat of wildfire, would disturb the majority of the natural vegetative cover within the PNNL Site. Any remaining natural habitat would be of limited utility to many of the biota that currently occupy the site (see Section 4) because of its greatly reduced size and separation from similar areas.

Construction in the portion of the site south of the Richland Irrigation Canal would disturb habitat occupied primarily by alien annual weedy plant species. Construction in the portion of the site north of the Richland Irrigation Canal would disturb primarily mature shrub-steppe habitat. Shrub-steppe is considered a priority habitat in the state of Washington (WDFW 2004) because of its relative scarcity in the state and its value for many wildlife species. If the entire PNNL Site north of Horn Rapids Road were developed, it would result in the loss of approximately 26 ha (64 ac) of mature shrub-steppe, mostly in the area north of the Richland Irrigation Canal. Construction would likely destroy wildlife with limited mobility, such as small mammals, while other more mobile animals, such as large mammals and birds, would likely be displaced into areas to the west, north, and east of the construction site.

Because of uncertainty concerning the presence of some species of birds, DOE would not initiate construction activities on an undisturbed site during the nesting season (March 1 through July 31), which could destroy nests of ground- and shrub-nesting bird species described in Section 4. These might include species protected under the *Migratory Bird Treaty Act* (16 USC 703-712) and could possibly include federal species of concern and Washington State candidate species, such as burrowing owls (*Athene cunicularia*), sage sparrows (*Amphispiza belli*), and loggerhead shrikes (*Lanius ludovicianus*).

5.1.7 Impacts on Floodplains and/or Wetlands

The PNNL Site is above the elevation for the probable maximum flood (DOE 1999, page 4-33); hence, it is not in a floodplain within the meaning of Executive Order No. 11988 (42 FR 26951), nor is it a wetland. As a consequence, there would be no impacts on floodplains or wetlands associated with implementing the proposed action.

5.1.8 Traffic and Transportation

Potential impacts on traffic and transportation associated with construction and operation of the proposed PSF are described in the following sections:

Construction

For purposes of this analysis, it was estimated that there would be an average of about 250 construction workers employed over a 2-year period and that there would be a peak force of about 450 workers. In a phased construction, the overall impacts as described in this section would be similar, but the peak work force may be somewhat smaller and the activities would occur over a longer period of time. The materials to be used in construction were estimated at about 11,000 m^3 (15,000 yds^3) of concrete, 1,000 tonnes (1,100 tons) of structural steel, 20,000 L (5,200 gal) of gasoline, and about 4,500 L (1,200 gal) of diesel fuel.

Peak hourly traffic rates on George Washington Way and Stevens Drive, as measured at Horn Rapids Road, are 340 and 1,600 vehicles, respectively (City of Richland 2006a). Currently traffic on the two-lane Horn Rapids Road is minimal. At the height of construction, there might be as many as 450 additional vehicles going to the PSF construction site. Assuming the construction traffic would be distributed between those two major routes as above, the traffic counts could increase to approximately 420 and 1970, respectively. This increase would not substantially impact traffic on the major 4- to 6-lane routes.

Accident impacts were estimated for transporting construction materials to the PSF construction site using state-specific accident statistics. Accidents, injuries, and fatalities from traffic accidents involving construction materials were estimated using heavy-combination truck accident statistics presented in Saricks and Tompkins (1999). In that document, the composite accident, injury, and fatality rates for all road types in the State of Washington were 2.05E-07 accidents/truck-km, 1.4E-07 injuries/truck-km, and 5.3E-09 fatalities/truck-km. It was assumed that concrete is transported from local offsite suppliers. The transport distance was assumed to be no more than 48 km (30 mi) one-way, which would encompass most potential suppliers in the Tri-Cities region. Structural steel was also assumed to be transported from an offsite vendor. Since the specific vendor has not been identified, it was conservatively assumed that the steel would be transported about 1,000 km (600 mi) one-way to the PSF construction site, which would encompass most potential steel suppliers in the northwestern region of the United States. Typical shipments carry about 10 tons of steel per truckload. Gasoline and diesel requirements are less than one truck shipment over the 2-year period. Although the origins for gasoline and diesel fuel shipments are also unknown at this time, it was assumed that the farthest potential vendor would be in the Seattle area, and a one-way shipping distance of 400 km (250 mi) was assumed. The estimated traffic accident impacts for construction materials are shown in Table 5.3.

As shown in the table, no traffic accidents, injuries, or fatalities would be expected from transporting construction materials to the PSF construction site.

Table 5.3. Impacts Associated with Transport of PSF Construction Materials

Material	Total Material	Shipment Capacity	Total Ship-ments	One-way Distance, km	Total Distance, km	Accidents	Injuries	Fatalities
Steel (MT)	1,100	10 MT	110	1,000	2.2E+05	0 (4.5E-02)	0 (3.1E-02)	0 (1.2E-03)
Concrete (1000 m^3)	15	10 m^3	1,500	48	1.4E+05	0 (3.0E-02)	0 (2.0E-02)	0 (7.6E-04)
Diesel (gal)	1,200	>1200	1	400	8.0E+02	0 (1.6E-04)	0 (1.1E-04)	0 (4.2E-06)
Gasoline (gal)	5,200	>5200	1	400	8.0E+02	0 (1.6E-04)	0 (1.1E-04)	0 (4.2E-06)
Total					3.6E+05	0 (7.5E-02)	0 (5.1E-02)	0 (1.9E-03)

The impacts of traffic accidents involving workers traveling to and from the PSF construction site were calculated using traffic-accident statistics for the South-Central Region of Washington State compiled by the Washington State Department of Transportation (2006). This document gives the accident, injury, and fatality rates for all roads in this region to be 5.7E-07 accident/km, 2.0E-07 injuries/km, and 7.5E-09 fatalities/km, respectively. It was assumed that 250 workers per day would travel an average distance of 20 km (12 mi) one-way to the PSF construction site. This distance encompasses most of the Tri-Cities region, and it accounts for the fact that most of the workers would travel a shorter distance and that many are likely to car-pool. Assuming each worker makes the trip 250 days per year for 2 years, the total distance traveled would be about 5 million km (3 million mi). The impacts in terms of accidents, injuries, and fatalities are shown in Table 5.4.

Table 5.4. Impacts Associated with PSF Construction Traffic

No. of Workers	Trips/day	Avg. Distance km	Days/yr	No of Years	Total distance km	Accidents	Injuries	Fatalities
250	2	20	250	2	5.0E+06	3 (2.8E+00)	1 (9.9E-01)	0 (3.7E-02)

As shown in the table, there may be 2 to 3 traffic accidents involving workers commuting to the PSF construction site during the construction period, involving perhaps 1 injury and no expected fatalities.

Operations

At such time as the Shielded Operations module becomes operational, George Washington Way would be closed to through traffic north of Horn Rapids Road. The majority of the present peak hourly rate of 340 northbound vehicles on George Washington Way was assumed to carry 300 Area PNNL workers who would work at the PSF when completed. As a result, a small number of vehicles representing current through traffic to the 300 Area and beyond would be rerouted on to Stevens Drive at Horn Rapids Road, or alternatively, on another existing cross street connecting George Washington Way and Stevens Drive.

The number of workers and supplies needed to conduct physical research and the amount of waste to be transported would not likely be substantially different whether the research is conducted in the 300 Area or in the proposed PSF. Present 300 Area activities associated with PNNL research and development are not a substantial part of overall traffic or transportation on Stevens Drive or George Washington Way. Using the same assumptions as for the commute of construction workers, about 2 accidents involving 1 injury and no fatalities might be expected per year among the 480 PSF workers. Thus, implementation of the proposed action would be expected to have minimal impacts on traffic and transportation accidents.

Materials to be transported to the PSF and waste from DOE and other government agency projects to be transported from the PSF would be less than the materials and waste being transported from R&D activities moving to and from the 300 Area at present.

It is concluded that impacts from transport of personnel, materials, and waste associated with the construction and operation of the PSF would be minimal.

5.1.9 Socioeconomics

Anticipated impacts on socioeconomics associated with construction and operation from implementing the proposed action are described as follows:

Construction

For purposes of this analysis, it was assumed that about 250 construction workers would be needed over a 24-month period, with a peak force of about 450 workers. In a phased construction, the overall impacts as described in this section would be similar, but the peak work force may be somewhat smaller and the activities would occur over a longer period of time. Even if the peak workforce were recruited from other areas, the increase in the DOE and contractor workforce consisting of about 14,000 members (2004 data) would amount to about 3%. Total non-agricultural employment in Benton and Franklin Counties is over 100,000 people (Schau 2006), so even if construction creates additional service sector jobs, the total increase in employment likely would be well under 1% of the current employment level. Increases of less than 5% of an existing labor force have been determined to have little effect on an existing community (DHUD 1976).

Operations

As noted for transportation impacts during operations, the number of workers needed for R&D activities in the PSF is expected to be similar to that for research currently conducted in the 300 Area, because the PSF would be constructed to relocate existing PNNL staff. As a consequence, no impacts on socioeconomics or community infrastructure would be expected from operations associated with implementing the proposed action.

5.1.10 Resource Commitments

Construction

The quantities of concrete, steel, diesel fuel, gasoline, and propane committed to implementation of the proposed action would be typical of that required for a 31,000-m^2 (332,000-ft^2) facility and associated landscaping. Preliminary estimates include about 11,000 m^3 (15,000 yd^3) of concrete, 1,100 tonnes

(1,000 tons) of structural steel, 20,000 L (5,200 gal) of gasoline, and about 4,500 L (1,200 gal) of diesel fuel. None of these resources are unique or regionally in short supply. Minimal impact would be expected as a result of commitment of these resources for the PSF.

Operations

Power requirements for the PSF operations have been estimated at 5 megawatts (MW), whereas power requirements for the 300 Area from 1998 to 2007 were estimated to be about 12 MW (DynCorp 1997). The City of Richland has 316 MW electrical-power capacity of which about 139 MW is not used (City of Richland 2005b). Electrical requirements for the PSF would represent about 4% of the unused power capacity, and would have minimal impact on electrical power supply.

An average of about 640 L per year (230 gal per year) of diesel fuel would be used for boilers and emergency electrical power generators. About 770,000 m^3 per year (27 million ft^3 per year) of natural gas at standard temperature and pressure (STP) would be consumed for humidification and supply of process steam needs, and for boilers used in space heating in the event that a closed-loop air conditioning system were not employed. Minimal impact would be expected as a result of commitment of these resources for the PSF. (U.S. production of natural gas is about 20,000,000 million ft^3 per year.)

Potable water consumption for the PSF is estimated as 3.8E-04 ML/d (100 gpd) per person (EPA 2004) for 480 people, or 0.18ML/d (4.8E+04 gpd), and 0.12ML/d (3.2E+04 gpd) of process water, for a total of about 0.3 ML/d (0.08 Mgpd). The current average production of the Richland Municipal Water Plant is about 72 ML/d (19 Mgpd), and the capacity is about 140 ML/d (36 Mgpd). Thus, PSF requirements would amount to about 0.5% of the difference between current demand and design capacity, which would have minimal impacts on the local supply of potable water (City of Richland 2005b).

Irrigation of the PSF landscaping would require about 3.5 ac-ft/ac-yr of water, with a peak of about 0.9 ac-ft/ac-mo during July (after USDA 1997, *WA Irrigation Guide, Appendix A*, turf). The present estimated area requiring irrigation is 13 ha (36 ac) for which the annual water requirement would be about 150,000 m^3 (125 ac-ft) and peak monthly usage (during July) would amount to 40,000 m^3 (32 ac-ft). The source for this water has not been identified, but if purchased from the City of Richland, the peak demand on the water plant would be about 4 ML/d (1 Mgpd). That quantity represents about 6% of the difference between current demand and the plant design capacity, from which it is concluded that impacts from use of City of Richland water would be minimal.

5.1.11 Waste Generation and Disposition

DOE is implementing Executive Order 13123 (64 FR 30851), *Greening the Government Through Efficient Energy Management*, Executive Order 13148 (65 FR 24595) *Greening the Government Through Leadership in Environmental Management,* and associated DOE Orders or guidelines, by reducing toxic chemical use and encouraging the development and use of clean and energy-efficient technologies. Program components include waste minimization, recycling, source reduction, energy-efficient building construction, and buying practices that give preference to products made from recycled materials. Waste management activities associated with the construction and operation of the PSF would be conducted in accordance with this program. Implementation of the pollution prevention and waste minimization programs would also minimize the generation of secondary wastes.

Most construction wastes would be recycled; however, about 800 m^3 (1,000 yd^3) might be disposed of in the City of Richland sanitary landfill. The City of Richland notes that with its 46-ha (114-ac) landfill, it has the capacity to accommodate municipal wastes for the next 50 years (City of Richland 2004a). That area, with a nominal trench depth of 15 m (50 ft), amounts to about 7,000,000 m^3 (8,000,000 yd^3). Based on the available capacity, it is concluded that PSF construction wastes would have minimal impact on municipal disposal facilities.

Quantities of wastes generated in support of R&D operations at the PSF would be similar to, but unlikely to exceed, those from ongoing PNNL R&D activities in the 300 Area. Based on past experience, the types of waste would include low-level radioactive waste, transuranic waste, mixed (hazardous and radioactive) low-level waste, and hazardous (non-radioactive) waste, in addition to the non-hazardous solid wastes typically associated with operation of any industrial or laboratory facility. Based on the 2005 experience, the amounts of those wastes to be produced annually by operations in the PSF were forecasted to be approximately 160 m^3 (210 yd^3) of low-level radioactive waste, 7 m^3 (9 yd^3) of transuranic waste, 7 m^3 (9 yd^3) of mixed low-level waste, and 13 m^3 (17 yd^3) of hazardous (non-radioactive) waste. The forecasted amounts of low-level radioactive waste (non-compacted) from PSF operations would amount to about 8% of the forecasted total Hanford Site generation rate (from Hanford Site and other government agency wastes) over the assumed 30 years of operation. Similarly, PSF transuranic waste would amount to about 2%, and PSF mixed low-level waste would amount to about 1%, of the corresponding Hanford Site totals. Hazardous non-radioactive waste would be sent to a permitted commercial disposal facility. Because these quantities are comparable to the wastes currently being generated at 300 Area laboratory facilities occupied by PNNL, it is expected that low-level and mixed wastes could be managed within the capacity of existing Hanford Site disposal facilities. Transuranic waste would ultimately be disposed of at the Waste Isolation Pilot Plant in New Mexico.

Liquid wastes would consist of waste process water and sanitary sewage. Both of these wastes would be sent to the City of Richland's Publicly Owned Treatment Works (POTW) for processing. Process water generated as a part of facility operations would be monitored to verify compliance with permitted pollutant concentrations as shown in Table 5.5.

Table 5.5. Local Limits for the City of Richland Publicly Owned Treatment Works (from the City of Richland 2004b; Pretreatment Program, Title 17.30, Exhibit A, October 5, 2004)

Constituent	Limit
pH	>5.0 - < 10
Arsenic	0.10 mg/L
Cadmium	0.32 mg/L
Chromium	1.74 mg/L
Copper	1.30 mg/L
Cyanide	0.22 mg/L
Lead	0.37 mg/L
Mercury	0.02 mg/L
Molybdenum	0.07 mg/L
Nickel	2.32 mg/L
Selenium	0.04 mg/L
Silver	0.20 mg/L
Zinc	10.4 mg/L
Polar/nonpolar fats, oil, and grease	100 mg/L

The volumes of these wastes would be about 0.12 ML/d (3.2E+04 gpd) for process water and 3.8E-04 ML/d (100 gpd) per person for 480 people, or 0.18 ML/d (4.8E+04 gpd), for sanitary sewage, assuming it to be equal to the potable water consumption by PSF staff (EPA 2004). The total to the POTW would amount to about 0.3 ML/d (0.08 Mgpd). The average flow of the POTW is 34 ML/d (8.9 Mgpd) with a design flow of 43 ML/d (11.4 Mgpd), and it can accommodate a peak flow of 92 ML/d (24 Mgpd). The estimated PSF requirement represents about 3% of the difference between average flow and design flow, and would be expected to have minimal impact on POTW operations (City of Richland 2006b).

5.1.12 Human Health and Safety

Impacts on health and safety from construction and operation of the proposed PSF are presented in this section. Impacts related to radiological exposures, chemical exposures, and workplace activities are discussed in Sections 5.1.12.1, 5.1.12.2 and 5.1.12.3, respectively.

5.1.12.1 Radiological Impacts

Anticipated impacts on health and safety of both workers and the public from exposure to radiation and radioactive materials for routine operations and accident conditions at the PSF are discussed in this section.

Routine Operations

Anticipated impacts of routine operations at the PSF on the health and safety of both workers and the public for radiological exposures and for routine activities are discussed in the following section.

Radiological impacts are based on historical experience with the 300 Area laboratories at the Hanford Site where PNNL conducts R&D activities that would be transferred to the PSF. That experience is expected to bound estimates of impacts that might result from operating the PSF because the 300 Area laboratory operations include the RPL, which is a Nuclear Hazard Category 2 facility (DOE 1997) with a larger permitted threshold of radioactive material than the Hazard Category 3 Shielded Operations module of the PSF. Because work in the PSF would involve smaller quantities of radioactive materials than activities currently being conducted in 300 Area laboratories occupied by PNNL, worker exposure to radiation and other hazardous materials would be expected to be similar to, or lower than, recent exposure levels based on handling of existing inventories. The PSF would be located about 1.6 km (1 mi) south of the 300 Area where prevailing winds would be essentially the same as at the 300 Area meteorology station.

Estimates of human health consequences following exposure to ionizing radiation are expressed in terms of probability of latent cancer fatality (LCF) for individuals or number of LCFs for populations, and are based on a dose-to-LCF factor of 0.0006 LCF per person-rem for both workers and the public (ISCORS 2002). Consequences for populations are also expressed as risk of LCF in the population, accounting for the estimated frequency of an event that results in exposure of the population to radiation. In estimating the risk from accidents, the frequency of an event is usually designated by a range and is characterized as either Anticipated (frequency ranging from 1 in 100 to 1.0 per year), Unlikely (frequency ranging from 1 in 10,000 to 1 in 100 per year), or Extremely Unlikely (frequency ranging from 1 in 1,000,000 to 1 in 10,000 per year). Events expected to occur with a frequency lower than 1 in 1,000,000 per year are not

considered for purposes of safety analysis. For routine activities or exposure of populations to background radiation, the estimated frequency of the exposure is assumed to be 1.0.

Workers − Radiological impacts on worker health and safety from PSF operations were estimated to be bounded based on 5 years of recent experience from PNNL R&D activities, which are representative of activities that would be conducted in the PSF. Worker doses over the 5-year period from 2001 to 2005 are presented in Table 5.6 (DOE 2006b).

Table 5.6. Worker Doses from PNNL Research and Development Activities

	Number of workers with measured doses by category, mrem							Total Worker
Year	Not Measurable	Less than 100	100 to 250	250 to 500	500 to 750	750 to 1000	1000 to 2000	Collective Dose, person-rem
2001	544	116	16	8	2	0	0	11
2002	527	125	12	11	2	2	0	12
2003	546	106	18	6	5	4	0	15
2004	563	90	21	7	4	0	0	11
2005	608	87	16	9	4	2	0	13

At the dose levels presented in Table 5.6, the inferred probability of an LCF for the maximally exposed worker over a 30-year career (at 1 rem/yr) would be 0.02, with no (0.3) inferred LCFs for the worker population as a whole. For perspective, 4 LCFs would be inferred to occur among this work force from naturally occurring sources of radiation during this same period.

Public − Based on results calculated from releases of radioactive materials to air from 300 Area facilities, as presented in the Hanford Site Environmental Report for 2005 (Poston et al. 2006) and prior years, the dose (exclusive of background) to the maximally exposed individual in the public would be expected to be less than 0.021 mrem/yr, which represents the maximum from PNNL operations in the 300 Area over the past 15 years (Poston et al. 2006). If an individual were to be exposed for 30 years at that level, the total dose would amount to about 0.6 mrem, from which the probability of LCF would be 4E-07. For perspective, that individual would have received 9,000 mrem from background radiation, from which the probability of LCF would be about 0.005.

The collective dose to the population out to 80 km (50 mi) based on the average annual population dose for the 5-year period 2001 to 2005 (Poston et al. 2006) would amount to about 0.19 person-rem per year. Moving the source from the 300 Area to the PSF about 1.6 km (1 mi) to the south would increase the population dose by about 50%, or to about 0.29 person-rem per year.[13] Assuming a 30-year period of operation and a constant population, the total collective dose would be about 9 person-rem, for which no LCFs (0.005) would be expected.

(13) For this analysis, the population distribution was assumed to be moved 1.6 km (1 mi) north, and the resulting population dose was calculated for a unit release of Pu-239. The ratio of that dose to the population dose for unit release from the 300 Area was 1.5.

Accident Conditions

Operations. The boundary (point of unrestricted public access) for the PNNL Site and buffer area would be at least 400 m from possible points of release of radionuclides in the PSF Shielded Operations module (Figure 5.1). As discussed in Section 3.1, radioactive material inventories within the PSF Shielded Operations module would be maintained within DOE (1997) Nuclear Hazard Category 3 limits, and the inventories of dispersible materials actually present in the facility are expected to be well below those limits, as evidenced by the representative inventories listed in Table 3.1.

To examine potential impacts of accidents occurring at the PSF on workers and the public, the consequences of a hypothetical accident involving the PSF Shielded Operations module were determined for a combination of Pu-239 equivalent and H-3 equivalent involved in an explosion or fire. Assuming that all protective barriers were breached, an explosion or fire involving dispersible material at the Shielded Operations module yielded the largest consequences from among postulated accidents considered for the PSF.

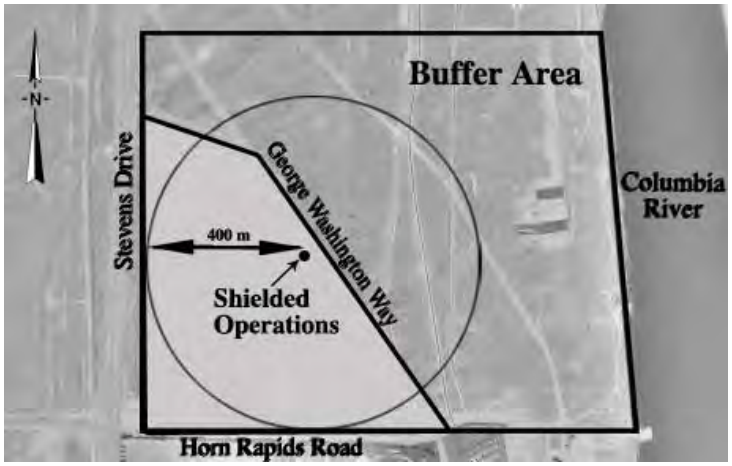

Figure 5.1. Approximate Location of Shielded Operations Within the Proposed Construction Site

As an example, Table 5.7 lists the combined inventories of Pu-239 equivalent and H-3 equivalent that would result in a maximum potential dose of 1 rem to a hypothetical member of the public at the site boundary following a fire or explosion at the Shielded Operations module. Based on airborne release fractions in DOE (1994), an event involving 43 Ci Pu-239 equivalent in the facility would result in a release to the environment of about 0.086 Ci Pu-239 equivalent at a height of 10 m (33 ft). For combined releases of Pu-239 equivalent and H-3 equivalent, 100% of the facility H-3 inventory was assumed to be released in the event. The frequency of such an event was estimated as between 1 in 10,000 to 1 in 1,000,000 per year, and would be considered Extremely Unlikely. The consequences of the postulated event would be expected to be essentially the same whether they result from a process accident or from some other initiator, such as a seismic event or an intentional destructive act.

Table 5.7. Combined Inventories of Pu-239 Equivalent and H-3 Equivalent in the Shielded Operations Module that Would Result in a Maximum Potential Dose of 1 Rem at the PNNL Site Boundary Following a Fire or Explosion

Plutonium-239 Equivalent (Pu-239E) Inventory, Ci	Tritium Equivalent (H-3E) Inventory, Ci
43	0
33	12,000
23	24,000
13	36,000
3	48,000

Workers. The fire or explosion could be fatal for the involved workers in the room where the event began, and serious injuries might occur among nearby workers in other parts of the building. The non-involved worker was postulated to be located 100 m (~300 ft) distant and was calculated to receive 5 rem, which would not be expected to have any acute physical impacts, but for which the probability of developing an LCF would be 0.003.

Public. As noted previously, the dose from the accident to an individual at the nearest point of public access (400 m distant from possible release points) would not exceed 1 rem based on an inventory of 43 Ci Pu-239 equivalent in the Shielded Operations module. The probability of developing an LCF would be about 0.0006 from such a dose.

The point of maximum potential dose for a residential area is about 1.2 km (0.8 mi) distant, at which location, the lifetime dose to a resident would be about 0.4 rem. The corresponding probability of LCF would be about 0.0002 for a member of the public. The lifetime dose to an individual in the vicinity of WSU-TC and Hanford High School, about 3 km (1.8 mi) from the PSF, would be about 0.2 rem, resulting in a 0.0001 probability of LCF. For perspective, the average annual dose from naturally occurring radiation sources is about 0.3 rem.

The collective dose as calculated using the GENII code[14] (Napier et al. 1988) would amount to about 1,500 person-rem for the population sector with the highest consequences following plume passage (using 95th percentile meteorological conditions), namely, the 22.5-degree sector centered due south of the PSF out to 80 km (50 mi), which encompasses a population of 69,342 (Elliott et al. 2004).[15] One LCF might be inferred as a result of the accident, if it occurred. Accounting for the estimated event frequency and a 30-year operating life for the facility, the risk from that accident would range from about 0.00003 to 0.003 LCFs. For perspective, about 400 LCFs would be estimated for the same population and time period from background radiation sources.

(14) As adjusted, using ICRP 72 (ICRP 1995) inhalation dose factors versus ICRP 30 (ICRP 1979-1988) inhalation dose factors.

(15) This sector includes a large portion of the City of Richland and the area surrounding Umatilla and Hermiston, Oregon.

Another accident was considered that involved a spill of dispersible radioactive material. Based on airborne release fractions in DOE (1994), that event would release about 0.026 Ci Pu-239 equivalent. The probability of that event was estimated as 1 in 100 to 1 in 10,000 per year, placing it in the Unlikely category. The collective dose from this spill would be about 450 person-rem and the 30-year LCF risk would range from about 0.0008 to 0.08 LCFs. Thus, although the release of radioactive material from the spill would be smaller than that from the fire or explosion, the LCF risk over 30 years of operation would be greater because of the higher estimated frequency of the spill event. However, neither acute effects nor LCFs would be expected from either event for 30 years of PSF operation.

5.1.12.2 Chemical Impacts

Anticipated impacts on health and safety of both workers and the public from exposure to non-radioactive hazardous chemicals for routine operations and accident conditions at the PSF are considered in this section. Appendix C contains a listing of inventories for the most frequently used chemicals, as well as information supporting the chemical impact analyses.

Chemical use in the PSF would be similar to existing uses in the 300 Area facilities occupied by PNNL, and relatively small quantities would be released to the environment (Woodruff et al. 2000). Work is performed in laboratories designed for safe use of chemicals, including equipment such as ventilation-controlled fume hoods and worker protective clothing. The Washington State Department of Ecology regulates the emissions of 580 chemicals under WAC 173-460 Controls for New Sources of Toxic Air Pollutants. The anticipated emissions of those chemicals from the PSF were estimated, and their concentrations were calculated for the points of nearest potential public exposure using the EPA Industrial Source Complex dispersion model. The results are presented in Table 5.8, which shows the annual average and 24-hour average ambient air concentration for the 20 toxic air pollutants that were the highest percent of their respective health-risk based Acceptable Source Impact Levels (ASILs) as listed in that regulation. Based on the small percentages of ASILs estimated, and the fact that the sum of fractions for all the air toxic pollutants to be used in PSF is less than one, it is concluded that impacts on public health from the release of chemicals from routine operations would be minimal.

There is insufficient evidence for accidental exposure of workers or members of the public to hazardous chemicals at PNNL laboratory facilities over the last 10 years of operations to form a quantitative basis for estimating impacts from accidents involving hazardous chemicals at the PSF.[16] However, the lack of reportable events within all of PNNL over a recent 10-year period indicates that the potential impacts from use of hazardous chemicals would be minimal for those activities that would be relocated to the PSF.

(16) A single case of injury to one worker was found in which a flexible tubing line for transfer of hazardous/radioactive waste failed, spraying two workers; one worker experienced first-degree chemical burns on his face and arms as a result.

Table 5.8. Estimated Concentrations of PSF Laboratory Toxic Air Pollutant Emissions

Chemical	Ambient Air Concentrations		
	Annual Average, µg/m^3	24-Hour Average, µg/m^3	Percent of Acceptable Source Impact Level (ASIL)
Hydrogen Chloride	2.4E-04	1.0E-01	1.42
Chlorodifluoromethane	2.1E-02	8.7E+00	0.73
Lead Compounds	6.8E-06	2.9E-03	0.58
Diborane	4.4E-06	1.9E-03	0.50
Polyaromatic Hydrocarbons	2.7E-09	1.1E-06	0.24
Chloroform	7.8E-05	3.3E-02	0.18
Phosphine	5.4E-06	2.3E-03	0.18
Nitrogen Trifluoride	4.0E-04	1.7E-01	0.17
Ammonia	3.7E-04	1.5E-01	0.15
Acrylic Acid	7.2E-07	3.0E-04	0.10
Methylene Chloride	5.3E-04	2.2E-01	0.10
Boron Trifluoride	1.7E-05	7.1E-03	0.08
1,2-Epoxybutane	2.5E-05	1.1E-02	0.05
Toluene	4.4E-04	1.9E-01	0.05
Vinyl Chloride	4.3E-06	1.8E-03	0.04
Trichloroethylene	1.9E-04	8.1E-02	0.03
Chromium	2.2E-08	9.3E-06	0.03
Nitric Acid	1.0E-05	4.3E-03	0.03
Carbon Tetrachloride	1.7E-05	7.1E-03	0.03
Hexafluoroacetone	1.3E-06	5.3E-04	0.02

5.1.12.3 Physical Impacts

Construction. Construction of the PSF would require about 1,000,000 labor-hours, and the total labor requirement is expected to be similar whether the facility is constructed as a single project or in phases over a longer period. Based on DOE contractor/subcontractor construction experience of 1.8 cases of injury/illness per 200,000 labor-hours during 2002 to 2005 (DOE 2006a), about 9 cases of injury/illness might occur during construction of the PSF.

Operations. Based on a 480-person work force, working 8 hours per day and 250 days per year, the annual labor for PSF operations would amount to 960,000 labor-hours. With the PNNL average incidence of 1.4 cases of injury/illness per 200,000 labor-hours (Section 4.10), about 7 such cases might be expected per year.

5.1.13 Noise Impacts

Construction activities would generate noise typical of using heavy equipment (modeled here as simultaneous use of two 300-HP diesel-fueled bulldozers) and transport of materials. Noise impacts are assessed by establishing regions of influence for residential, commercial, and industrial receptors and are presented briefly as follows.

The nearest residential area to the construction site would be the WillowPointe housing development (under construction) located about 0.8 km (0.5 mi) southeast. The Washington State Noise regulation (WAC 173-60) limits daytime noise to 60 dBA for residential locations. WillowPointe housing would be well outside the "residential region of influence," which extends to 0.32 km (0.2 mi) from the construction site.

The "commercial region of influence" limit of 65 dBA would apply to facilities within 210 m (700 ft) of the construction site, including PNNL's EMSL and Information Sciences Building-I. Attenuation of noise by the buildings' walls and windows would reduce inside noise levels, although episodic noise events or associated ground vibrations might disturb the occupants.

All industrial receptors would be located well beyond the 130-m (400-ft) "industrial region of influence," in which noise levels are limited to 70 dBA.

Ground vibrations from using heavy equipment might have some impact on operation of the Laser Interferometer Gravitational-Wave Observatory (LIGO), located about 15 km (~9 mi) northwest of the PNNL Site. Notice to the LIGO operators of periods of heavy equipment usage would be considered so that operators could take the extraneous ground vibrations from construction into account.

After construction is completed, routine operations at the PSF would not be expected to increase noise levels over current ambient external background levels.

5.1.14 Environmental Justice

Operational impacts of the PSF are expected to be similar to, or lower than, those from ongoing PNNL R&D activities in the 300 Area. Currently, there are no impacts associated with 300 Area PNNL operations that could be reasonably determined to affect any member of the public; therefore, PSF operations would not have the potential for high and disproportionate adverse impacts on minority or low-income groups as defined in Section 4.8.

5.1.15 Cumulative Impacts

Cumulative impacts that might be associated with implementing the proposed construction and operation of the PSF are summarized in this section.

In 40 CFR 1508.7, the Council on Environmental Quality (CEQ) defines cumulative impact as:

> …the impact on the environment from the incremental impact of the action when added to other past, present, and reasonably future actions regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

However, CEQ cautioned that, "The continuing challenge of cumulative effects analysis is to focus on important cumulative issues…" (CEQ 1997).

Based on the results of analyses presented in the previous sections, impacts in all resource areas were projected to be minimal. Historically, potential radiological impacts on human health and safety have been the environmental impact of most interest to the public, and thus they are considered in terms of

cumulative impacts. The area of most probable influence associated with operation of the PSF would consist principally of the northern portion of the City of Richland and the rural area of Franklin County in an easterly direction across the Columbia River from the PSF.

The past Hanford Site activities that had the largest impact on the area of interest were the operation of the fuel fabrication facilities, production reactors, separations and product finishing plants, and R&D facilities employed on the site in support of national defense programs. Environmental impacts manifested themselves principally as a result of the release of radioactive material to air, water, and ground that occurred during production of nuclear materials for national defense during World War II and the following Cold War era.

Ongoing or planned actions that might also have a radiological or non-radiological impact on the same area of interest would include those associated with the following operations:

- CERCLA remediation projects, including cleanup of the 618-10 and 618-11 burial ground sites and the 300 Area, and remediation of the river corridor in the southeastern portion of the Hanford Site
- ongoing waste management and cleanup of the Hanford Site in general
- the Columbia Generating Station, a nuclear power plant located north of the 300 Area and operated by Energy Northwest.

The following ongoing operations located west to southwest of the proposed construction site might also have an impact on the area of interest:

- a nuclear fuel fabrication plant operated by AREVA (radiological)
- AMEC Geo Melt Test Site (pilot tests of bulk waste vitrification)
- Cold Test Facility (non-radiological testing of vitrification processes)
- Pacific EcoSolutions (a waste management company – formerly Allied Technology Group) (radiological)
- Ferguson Distribution Center (commodity distribution)
- International Hearth Melting (titanium-zirconium processing center)
- Meyer Plastics (industrial plastics producer).

Other activities in progress or presently planned in the neighborhood of the PSF (whether radiological or not) include:

- operation of the Bioproducts, Sciences, and Engineering Laboratory (under construction), a joint WSU and PNNL project located on the WSU-Tri-Cities campus

- construction and operation of a proposed Biological Science Facility, a privately funded facility to be leased by PNNL for biological and nuclear magnetic resonance research

- construction and operation of a proposed Computational Sciences Facility, a privately funded facility to be leased by PNNL

- construction and operation of a proposed Life Sciences Building, a Battelle-owned facility to support analytical and vivarium capabilities.

As indicated earlier, the historical 15-year maximum annual dose to the maximally exposed individual from 300 Area operations would be about 0.021 mrem (Poston et al. 2006). In 2005, the cumulative annual contribution to radiation dose from the above-named nearby sites of potential releases yielded a combined total of 0.067 mrem to such an individual (Poston et al. 2006). Routine PSF operations as a result of implementing the proposed action would result in a cumulative total annual dose of about 0.09 mrem.(17) It may be noted, however, that the dose associated with the PSF would likely be lower than that from current PNNL R&D operations in the 300 Area and may result in a small net decrease in cumulative impacts as presently experienced.

Table 5.9 shows a broader view of cumulative radiological impacts on human health and safety within the affected population, including the projected contribution from PSF.

Based on the dose estimates in Table 5.9, whether PNNL R&D activities are carried out in the PSF, the 300 Area facilities, or not at all, there would be no appreciable difference in cumulative impacts on human radiological health and safety.

Other types of impacts from operation of the PSF were found to be small and would generally be similar to those from current PNNL activities in the nearby 300 Area that are scheduled for relocation to the proposed facility. Therefore, operation of the PSF would result in minimal net change to cumulative impacts on the surrounding environment.

Impacts from constructing the proposed facility, such as additional traffic and construction emissions, would be temporary and similar to those associated with any other commercial building of comparable size. Construction is not expected to affect resources that are unique, in short supply, or otherwise sensitive; therefore, cumulative impacts on such resources would be negligible.

(17) For perspective, the average dose to an individual in the Richland area from naturally occurring sources is about 300 mrem/yr.

Table 5.9. Estimated Past, Present, and Reasonably Foreseeable Cumulative Population Dose and Health Effects in the Hanford Environs from Release of Radioactive Material to the Atmosphere[a]

Source of Impacts	Dose (person-rem)	Inferred Latent Cancer Fatalities[b]
Hanford Production Operations 1944–1988 (DOE 1995)	100,000	60
Hanford Post-production Operations 1989–2005[c]	9	0
Ongoing (2005) and Proposed Operations		
PSF R&D (30-yr projection, 2010–2040)[d]	5	0
Hanford Operations (35-yr projection, 2005–2040) (after Poston et al. 2006)[e]	9	0
Columbia Generating Station, US Ecology Commercial Low-Level Waste Disposal, and other Non-DOE Commercial Sources (30-yr projection: 2010–2040) (Poston et al. 2006)	40	0
Reasonably Foreseeable Operations[f]		
Plutonium Finishing Plant Stabilization (DOE 1996a)	100	0
K Basin Fuel Treatment and Storage (DOE 1996b)	100	0
TWRS Phased Implementation Alternative (DOE and Ecology 1996)	400	0
Cumulative Totals		
Hanford Production Operations (1944–1988)	100,000	60
Post-production, All Sources (1989–2040)	<700	0
Perspective		
30-yr Cumulative Background Dose	3,000,000	2,000

(a) Assumes constant population of about 380,000. All doses given to one significant figure.
(b) Based on 0.0006 inferred LCFs per person-rem. Values rounding to less than 0.5 are considered to be zero.
(c) Based on Hanford Site Environmental Reports for calendar years 1989 through 2005.
(d) Based on 300 Area contribution to population dose over the past 5 years, but projected to occur at the PSF. over a 30-year facility lifetime.
(e) Estimate based on 2001 to 2005 population dose (5 years with 300 Area releases and 30 years without).
(f) Based on earlier NEPA documents.

5.2 Environmental Impacts of the No-Action Alternative

In the No-Action Alternative, the PSF would not be constructed, and PNNL R&D activities ongoing in the 300 Area, as described in Section 3, would be discontinued after about 2010. The impacts from such action would be largely programmatic and socioeconomic rather than environmental, resulting in loss of employment and delay or disruption of affected DOE and other agency research programs. For the immediate future, the environmental impacts of this alternative would be similar to those from current PNNL operations in the 300 Area, which are described in Section 4 and Section 5.1 of this document. The impacts would cease if and when those activities were ultimately shut down.

Adverse Impacts

PNNL's support of the nation's strategic goals in science, national security, energy, and the environment for DOE, NNSA, DHS, NIH, DoD, NRC, and EPA would be substantially reduced.

This alternative could result in potential dismissal of about 480 PNNL scientific and support staff for lack of programmatic support and funding. Such a decrease in the DOE and contractor workforce consisting of about 14,000 members (2004 data) would amount to about 3%. Changes of less than 5% in an existing labor force have been determined to have little effect on an existing community (DHUD 1976); thus, the socioeconomic impact would be minimal.

Scientific apparatus that would have been moved to the PSF would need to be transferred to other laboratories, excessed for commercial recycling, or disposed of at commercial facilities or on the Hanford Site.

Impacts associated with PNNL R&D operations in the 300 Area would continue at essentially the present level until operations cease. These impacts would be minimal as extrapolated from the Hanford Site Environmental Report for Calendar Year 2005 (Poston et al. 2006).

Beneficial Impacts

The shrub-steppe and other habitat within the PNNL Site would be undisturbed over the short term, the historic canal segment would remain undisturbed in place, and emissions and noise from construction of the PSF would not occur. Emissions and traffic from operation of existing 300 Area facilities would cease after they are eventually vacated.

6.0 Environmental Permits and Regulatory Requirements

It is the policy of DOE to carry out its operations in compliance with all federal, state, and local laws and regulations; Presidential Executive Orders; DOE Orders; and procedures. Environmental regulatory authority over the DOE Office of Science and its laboratories is vested in both federal and state agencies.

Both federal and state laws apply to construction and operation of the proposed facility. The environmental regulatory framework includes requirements regarding planning for facilities to protect air and water quality, human health, and the environment. Based on the research capabilities that would be transferred to the proposed facility, it is anticipated that the following environmental permits would be required for construction and operation of the PSF on the PNNL Site.

- **Industrial Wastewater Pretreatment Permit**. The City of Richland Pretreatment Program sets forth uniform requirements for users of the Publicly Owned Treatment Works for the City of Richland and enables the city to comply with all applicable state and federal laws, including the *Clean Water Act* (33 USC 1251 et seq.) and the General Pretreatment Regulations (40 CFR Part 403). The regulatory driver is the City of Richland's Pretreatment Program, Exhibit A to Title 17.30, dated October 5, 2004 (City of Richland 2004b). The responsible agency is the City of Richland.

- **Stormwater/Underground Injection Control Program**. The regulatory driver is the Washington Administrative Code 173-218, *Underground Injection Control Program*. The responsible agency is the Washington Department of Ecology. The purpose of the Underground Injection Control Program is to:
  - maintain the highest possible standards to prevent the injection of fluids that may endanger groundwaters
  - require the use of all known, available, and reasonable methods to prevent and control the discharge of fluids and waste fluids into the waters of the state
  - protect public health and welfare by preserving and protecting the quality of the state's groundwaters.

- **Construction Stormwater General Permit**. In 1987, Congress changed the federal *Clean Water Act* by declaring the discharge of stormwater (traditionally considered a non-point source) from certain industries and municipalities to be a point source of pollution requiring National Pollutant Discharge Elimination System (NPDES) permits or water quality discharge permits. The State of Washington is delegated authority by EPA to implement the water quality permit. The regulatory drivers are Washington groundwater quality standards (WAC 173-200) and the *Clean Water Act* (33 USC 1251 et seq.). The responsible agency is the Washington Department of Ecology.

- **Radioactive Air Emissions Permit**. A Notice of Construction application would be required that provides details about the proposed radioactive materials inventory, emission control systems, and dose modeling for the facility. The primary regulatory drivers are WAC 246-247, *Radiation Protection—Air Emissions*; WAC 173-480, *Ambient Air Quality Standards and Emission Limits for*

Radionuclides; and 40 CFR 61, *National Emission Standards for Hazardous Air Pollutants,* Subparts A and H and Appendix B, Method 114. The responsible agency is the Washington Department of Health.

- **Non-Radiological Air Pollutant Notice of Construction Approval Order**. These regulations require the submission of a Notice of Construction application to the Benton Clean Air Authority and its review and approval before a new emission source may be constructed. The application must demonstrate that installed equipment uses the Best Available Control Technology for non-radioactive air emissions. The regulatory drivers are WAC 173-400, *General Regulations for Air Pollution Sources*; WAC 173-401, *Operating Permit Regulations*; and WAC 173-460, *Controls for New Sources of Toxic Air Pollutants*, and Benton Clean Air Authority Regulation 1 (Benton Clean Air Authority 2005). The responsible agency is the Benton Clean Air Authority.

- ***Resource Conservation and Recovery Act* (RCRA; 42 USC 6901 et seq.) Hazardous Waste Facility Permit**. The RCRA permit is required for the storage and limited treatment of hazardous and/or mixed waste. The regulatory drivers are WAC 173-303, *Dangerous Waste Regulations*, and 40 CFR Part 270, *EPA Administered Permit Programs: the Hazardous Waste Permit Program*. The responsible agency is the Washington State Department of Ecology.

- **Protection of Plant and Animal Species**. The *Endangered Species Act* (16 USC 1531 et seq.), *Bald and Golden Eagle Protection Act* (16 USC 668 et seq.), and *Migratory Bird Treaty Act* (16 USC 703-712) all identify requirements that must be met to protect native plant and animal species and the ecosystems upon which they depend. The *Endangered Species Act* is the law most applicable to the proposed action. If a federal action may affect a threatened or endangered species or designated critical habitat, the agency must consult with the U.S. Fish and Wildlife Service or National Marine Fisheries Service to ensure the action is not likely to jeopardize the continued existence of these species.

- **Cultural and Historic Resource Protection**. Federal agencies must preserve and protect cultural resources in a spirit of stewardship to the extent feasible given the agency's mission. DOE responsibilities are defined by a number of regulations and policies, including the *National Historic Preservation Act* (16 USC 470 et seq.), the *Archaeological Resources Protection Act of 1979* (16 USC 470aa et seq.), the *Native American Graves Protection and Repatriation Act* (25 USC 3001 et seq.), and the *DOE Native American Indian & Alaska Native Tribal Government Policy (DOE 1992, 2006c)*. The *National Historic Preservation Act* is the law most applicable to the proposed action; it requires that agencies consider the effect of their actions on properties included in or eligible for inclusion in the National Register of Historic Places.

7.0 Notice to Tribal and Government Agencies

Advance notice of DOE's intent to prepare this EA and briefings as requested were provided to the following agencies and Tribal governments. The draft EA was also provided to these agencies and Tribal governments for review and comment.

- Nez Perce Tribe
- Confederated Tribes of the Umatilla Indian Reservation
- Yakama Nation
- Confederated Tribes of the Colville Reservation
- Wanapum
- U.S. Environmental Protection Agency - Region 10
- U.S. Fish and Wildlife Service
- Federal and Washington State Congressional Representatives
- Washington State Department of Ecology
- Washington State Department of Health
- Washington State Department of Fish and Wildlife
- Washington State Historic Preservation Office
- Oregon Department of Energy
- Benton and Franklin Counties
- Port of Benton
- Cities of Richland, Pasco, Kennewick, and West Richland.

Availability of the draft EA for public review and comment was announced in local news media. During the public comment period, the draft EA was provided upon request to interested individuals. It was also made available in the DOE Public Reading Room (Consolidated Information Center at Washington State University-Tri-Cities) and through the DOE Pacific Northwest Site Office Website (http://pnso.oro.doe.gov/).

The EA was revised in response to comments received during the public review period, and the final EA was prepared. Comments received on the draft EA and the DOE responses are listed in Appendix D of this final EA. The final EA is available at the WSU-Tri-Cities DOE Public Reading Room and on the PNSO Website (http://pnso.oro.doe.gov/).

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64 FR 61615. November 12, 1999. "Record of Decision: Hanford Comprehensive Land-Use Environmental Impact Statement." *Federal Register* (November 12, 1999). Online at http://www.gpoaccess.gov/fr/index.html

65 FR 24595. "Executive Order 13148 of April 21, 2000: Greening the Government through Leadership in Environmental Management." *Federal Register* (April 26, 2000). Online at http://www.gpoaccess.gov/fr/index.html

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16 USC 470 et seq. *National Historic Preservation Act of 1966.* Public Law 102-575, as amended.

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16 USC 1531 et seq. *Endangered Species Act of 1973*. Public Law 100-478, as amended.

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Environmental Assessment

Construction and Operation of a Physical Sciences Facility at the Pacific Northwest National Laboratory, Richland, Washington

U.S. Department of Energy
Pacific Northwest Site Office
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Appendix A

Cultural Resource Review

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Appendix A
Cultural Resource Review

Pacific Northwest
National Laboratory
Operated by Battelle for the
U.S. Department of Energy

December 1, 2004

Mr. Roger Christensen, Director
Operations Division
U. S. Department of Energy, Pacific Northwest Site Office
MSIN K8-50
Richland, Washington 99352

Dear Mr. Christensen,

SUBJECT: CULTURAL RESOURCES REVIEW OF PNNL CAPABILITY REPLACEMENT LABORATORIES CONSTRUCTION SITE (HCRC #2003-300-013)

In compliance with 36 CFR 800, the following National Historic Preservation Act (NHPA), Section 106 assessment of the subject project has been completed for the U. S. Department of Energy Pacific Northwest Site Office (PNSO).

Project Description
A request for cultural and ecological resources review was received by the Pacific Northwest National Laboratory (PNNL) Cultural Resources Project (CRP) regarding a DOE/PNSO undertaking located south of the 300 Area of the Hanford Site (Figure 1). DOE/PNSO plans to build replacement laboratories in a triangular parcel north of Horn Rapids Road approximately 100 acres in size (Figure 2). These laboratories will replace existing facilities in the 300 Area of the Hanford Site that PNNL must vacate over the next several years. This cultural resources review covers all work related to pre-construction activities including planning and site analysis as well as construction of the facilities.

Notifications and Tribal Involvement
Pursuant to 36 CFR 800, on March 6, 2003, the cultural resources review process was initiated and the Washington State Historic Preservation Office (SHPO) and 5 affected tribes were notified of the request and definition of Area of Potential Effect (APE). The current APE is confined to the triangular parcel north of Horn Rapids Road depicted in Figure 2.

On March 17, 2004, a DOE/PNSO representative gave a presentation on project at the U. S. Department of Energy Richland Operations Office (DOE-RL) Cultural and Historic Resources Program tribal issues meeting. No comments were received.

Identification of Historic Properties
A preliminary records and literature review conducted by CRP during the week March 6, 2003 revealed the following:

- Portions of the APE have been surveyed previously (HCRC #s 93-300-063, 89-300-023, and 89-300-027).

- Seven historic archaeological sites (H3-440, H3-439, H3-442, H3-438, H3-443, H3-444, and H3-21). Six of the seven sites consist of historic trash scatters such as cans, glass fragments,

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ceramics, etc. H3-21 is a remnant segment of the Richland Irrigation Canal and was determined eligible for the National Register of Historic Places in 1994 (Figure 3 and Attachment 1). Subsequent documentation of portions of the canal approximately 1 mile southwest of the project area was documented in 1997 during the 1100 Area transfer project (HCRC# 97-1100-003). With the exception of H3-21, the remaining six sites were determined not eligible by DOE-RL and SHPO concurrence was obtained on December 8, 1994.

- One pre-contact isolate (45BN511) has also been located. The pre-contact isolate is a single cryptocrystalline silicate lithic flake.
- The current EMSL building located immediately south of the APE was surveyed and shovel tested for cultural resources prior to construction (HCRC #94-300-002); a ground penetrating radar survey was also conducted. No archaeological deposits were found. The proximity of this subsurface data to the project area suggests that there is low potential for the presence of subsurface archaeological deposits to be located in the APE.
- A few sites have been located within ½ mile of the APE. These include 45BN644, located south of the project area noted as an isolated short-term pre-contact activity area, consisting of a possible hearth, basalt anvil stone, and basalt cobble tools; two pre-contact archaeological sites have been located on the lower river terrace (45BN106 and 45BN162), approximately 1 kilometer from the eastern extent of the APE and a Native American cemetery is located within 150 meters of the APE.

Field Activities

- On March 13, 2003, CRP and tribal cultural resources staff surveyed the unsurveyed portions of the APE; nothing was found.
- On March 2, 2004, reconnaissance of the Richland Irrigation Canal was conducted by the CRP with project personnel. During reconnaissance, one new historic archaeological site consisting of domestic refuse scatter, not previously recorded was observed. CRP staff recorded the site as HT-2004-002.

Findings

The CRP recommends that this undertaking will have no affect to H3-440, H3-439, H3-442, H3-438, H3-443, H3-444, and 45BN511 because these sites are not historic properties. The CRP also recommends that HT-2004-002 is not eligible for listing in the National Register of Historic Places and will not be affected by this undertaking. A determination of eligibility report recommending the site's ineligibility is attached (Attachment 2).

There is no surface indication that the EMSL cemetery, located approximately 150 meters from the APE, extends into the APE. As a protective measure, pre-construction activities in the eastern portion of the project area will be monitored by an archaeologist. Should any human remains be uncovered, work will stop and procedures will be followed as mandated by the Native American Graves Protection and Repatriation Act (NAGPRA). No visual impact of the completed facilities is expected on the cemetery or ceremonies held there because the maximum height of the new facilities is planned at two stories.

The entire segment of H3-21 within the project boundaries will be destroyed constituting an adverse affect to this National Register-eligible property. The CRP recommends that a Memorandum of Agreement (MOA) be developed between DOE/PNSO and Washington SHPO to address this adverse effect. The MOA should incorporate the following stipulations to mitigate the adverse affect to H3-21.

1. The portion of H3-21 in the project area has been fully documented (Attachment 1).
2. The construction manager will make an effort to retain pieces of the concrete canal liner or make plaster or pliable casts of the canal section with interpretive value.

3. The project will provide interpretive information about the Richland Canal, for example through onsite displays and preparation of interpretive materials.

Based upon this information, the CRP recommends that the only adverse effect to historic properties caused by pre-construction and construction activities will be to the Richland Canal, and that mitigation be determined in a Memorandum of Agreement to be signed before any damage to the canal occurs. DOE/PNSO will submit an official letter of documentation to the SHPO, Tribes and interested parties of our findings. **Pursuant to 36CFR Section 800, SHPO, tribes and interested parties have 30 days to respond in receipt of this letter. No project activities should begin until the SHPO has concurred with the findings stated above and an MOA has been signed.**

All workers should be directed to watch for cultural materials (e.g. bones, artifacts) during all work activities. If any are encountered, work in the vicinity of the discovery must stop until an archaeologist has been notified, assessed the significance of the find, and, if necessary arranged for mitigation of the impacts to the find. The SHPO must be notified if any changes to project location or scope are anticipated. If you have any questions, please call me at 376-4626.

Very truly yours,

Ellen Prendergast-Kennedy

Ellen Prendergast-Kennedy, M. A.
Research Scientist/Anthropologist
Cultural Resources Project

Concurrence:
D. C. Stapp, Project Manager
Cultural Resources Project

EPK:mgm

cc: File/LB
T. Aldridge K8-50
RS Weeks K3-75
D. Trader K8-50

Figure 1. Project location in relation to Hanford Site.

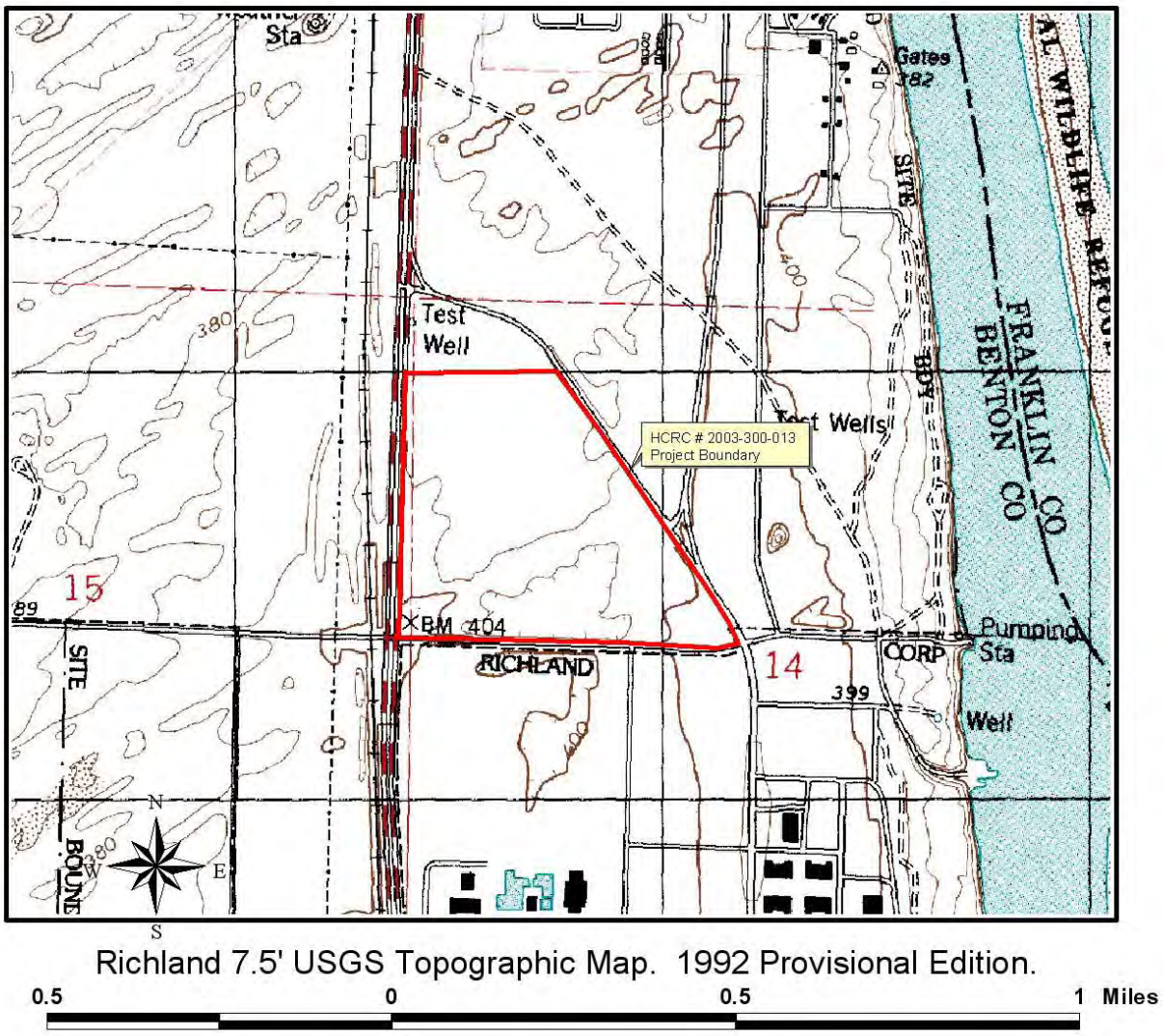

Figure 2. Area of Potential Effect on USGS Topographic map.

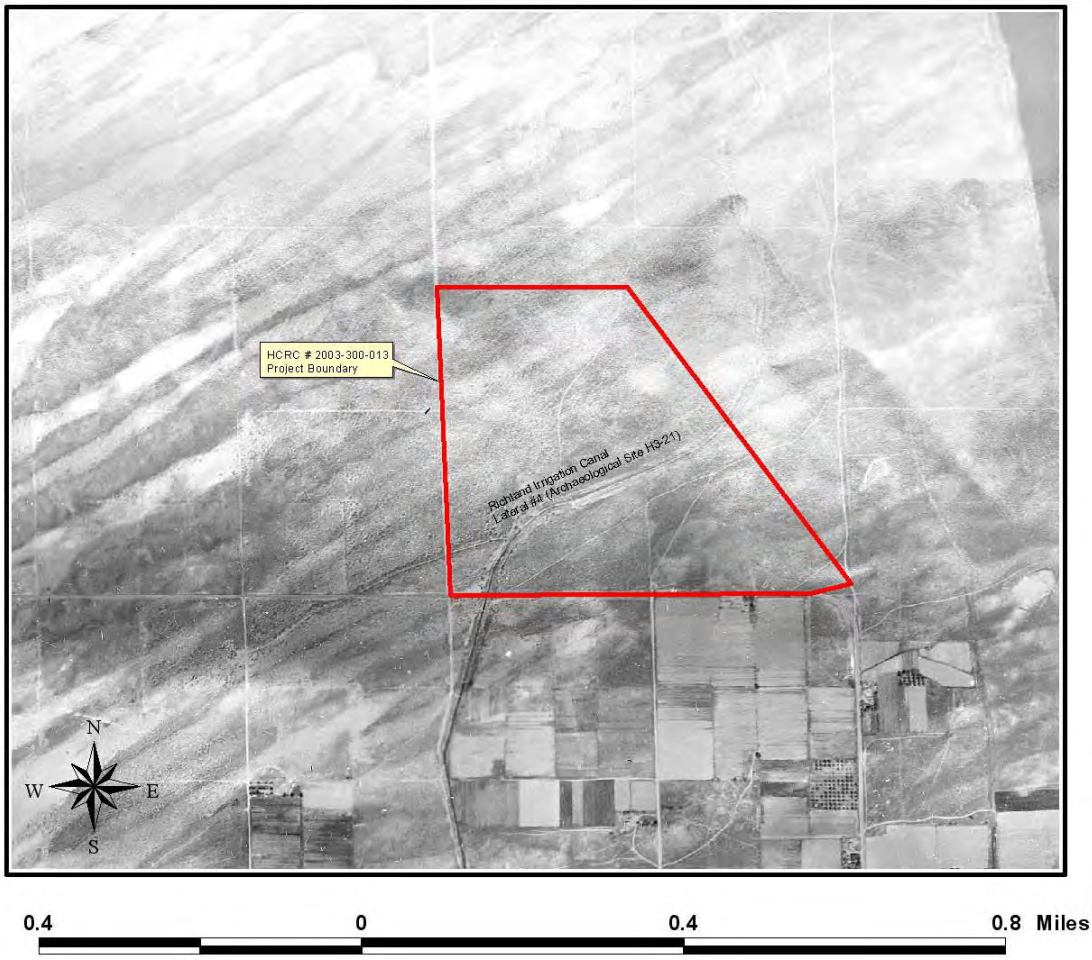

Figure 3. Richland Irrigation Canal on a 1941 aerial photograph in relation to Area of Potential Effect.

Department of Energy
Pacific Northwest Site Office
P.O. Box 350, K8-50
Richland, Washington 99352

05-OD-0028

DEC 1 6 2004

Dr. Allyson Brooks
State Historic Preservation Officer
Office of Archaeology and Historic Preservation
Washington Department of Community,
Trade and Economic Development
P.O. Box 48343
Olympia, Washington 98504

Dear Ms. Brooks:

CULTURAL RESOURCES REVIEW OF CAPABILITY REPLACEMENT FACILITIES CONSTRUCTION SITE – (HCRC #2003-300-013)

Enclosed is a cultural resources review completed by the U.S. Department of Energy (DOE), Pacific Northwest Site Office (PNSO) on December 1, 2004, for the subject project located in Richland, Washington. The results of the records and literature review conducted by staff at the Pacific Northwest National Laboratory (PNNL) Cultural Resource Project are described in the enclosed cultural resources review. The results indicate that this undertaking will not have an adverse effect on historic properties, with the exception of one resource: the Richland Irrigation Canal (H3-21). Before any activities occur that will impact H3-21, a Memorandum of Agreement will be developed to address the adverse effects. Additionally, PNSO finds that HT-2004-002 is not eligible for the National Register of Historic Places. Pursuant to 36CFR 800.2 (4), we are providing documentation to support these findings and to involve your office as a consulting party in the National Historic Preservation Act of 1966 Section 106 Review process. Upon your concurrence, we intend to perform some investigatory/site characterization activities away from H3-21.

Please note that this review is sent to you from the DOE PNSO instead of the DOE Richland Operations Office (RL). This is because DOE recently transferred administrative oversight of PNNL and the subject property from RL to PNSO. PNSO has been designated a DOE field office with responsibility for a PNNL Site that has been separated from the rest of the Hanford Site. As a result, PNSO will be interacting with you in the future on PNSO-funded activities.

Dr. Allyson Brooks -2- DEC 1 6 2004
05-OD-0028

We look forward to working with you regarding the protection of important cultural resources located on the PNNL Site. If you have any questions or require additional information, please contact Theresa Aldridge, Operations Division, on (509) 372-4508.

Sincerely,

Paul W. Kruger
Manager

OD:TLA

Enclosure

cc: A. Fyall, HRP&MP, w/encl.
W. Grisham, WBHF, w/encl.
C. Hulse, EBCHS, w/encl.
G. Leth, CREST Museum, w/encl.
E. L. Prendergast-Kennedy,
PNNL, w/o encl.
A, Rodriguez, RL, w/encl.
J. Sonderman, FCHS, w/encl.

02/08/05 TUE 16:21 FAX 509 372 4037 STO 002

STATE OF WASHINGTON

Office of Archaeology and Historic Preservation

1063 S. Capitol Way, Suite 106 • Olympia, Washington 98501
(Mailing Address) PO Box 48343 • Olympia, Washington 98504-8343
(360) 586-3065 Fax Number (360) 586-3067

January 24, 2005

Mr. Paul W. Kruger
Department of Energy
Pacific Northwest Site Office
P.O. Box 350, K8-50
Richland, Washington 99352

In future correspondence please refer to:
Log: 012405-01-DOE
Property: Richland Irrigation Canal, Horn Rapids Road, 300 Area, Hanford Site
Re: Cultural Resources Review of PNNL Capability Replacement Laboratories Site

Dear Mr. Kruger:

Thank you for contacting the Washington State Office of Archaeology and Historic Preservation (OAHP). The above referenced project has been reviewed on behalf of the State Historic Preservation Officer (SHPO) under provisions of Section 106 of the National Historic Preservation Act of 1966 (as amended) and 36 CFR Part 800. From your letter, I understand that the Pacific Northwest Site Office (PNSO) will construct a replacement for existing laboratories on a triangular parcel north of Horn Rapids Road. My review is based upon documentation contained in your communication.

In response, I concur that the current project as proposed will have an "ADVERSE EFFECT" on the National Register of Historic Places eligible archaeological site H3-021 (Richland Irrigation Canal). This site was previously determined eligible in 1994 and it is my understanding that the proposed replacement project will result in the removal of the remains of this site. In view of the apparent adverse effect, I recommend that a memorandum of agreement (MOA) be developed for execution amongst the SHPO, the Department of Energy (DOE), the Advisory Council on Historic Preservation (ACHP) (if participating), and any other interested/affected parties. The MOA should identify specific measures to mitigate the adverse effects of the action on the National Register eligible resource. Please forward a draft MOA to SHPO for review and comment. Also, I recommend that alternatives be explored that would preserve in place portions of the canal as part of the project and/or landscape design.

Again, thank you for the opportunity to review and comment on this proposal. Please note that OAHP requires that all historic property inventory forms submitted to our office be submitted in an electronic version using the new Microsoft Access database. If you have not registered for a copy of the database please log on to our website at www.oahp.wa.gov for further instruction. Should you have any questions, please feel free to contact me at 360-586-3073 or gregg@cted.wa.gov.

Sincerely,

Gregory Griffith
Deputy State Historic Preservation Officer

RECEIVED
JAN 3 1 2005
DOE-PNSO-CC

ADMINISTERED BY DEPARTMENT OF COMMUNITY, TRADE & ECONOMIC DEVELOPMENT

STATE OF WASHINGTON
Department of Archaeology and Historic Preservation
1063 S. Capitol Way, Suite 106 • PO Box 48343 • Olympia, Washington 98504-8343

360) 586-3065 • Fax Number (360) 586-3067

July 23, 2005

Mr. Paul W. Kruger
Department of Energy
Pacific Northwest Site Office
P. O. Box 350, K8-50
Richland, Washington 99352

In future correspondence please refer to:
Log: 012405-01-DOE
Re: MOA, Richland Irrigation Canal, Horn Rapids Road, 300 Area

Dear Mr. Kruger:

Enclosed please find the original copy of the Memorandum of Agreement (MOA) pertaining to the above referenced action in the 300 Area at the Hanford Site (HCRC 2003-300-013). The MOA has been signed by State Historic Preservation Officer (SHPO) Allyson Brooks. I am retaining a copy of the executed document in our files for future reference.

On behalf of the SHPO and DAHP staff, I want to thank you and your staff for your assistance in this effort. As you work to implement the stipulations called for in the MOA, please be sure to contact our office should any questions arise about the various tasks or should any archaeological resources be uncovered during construction. I may be reached at 360-586-3073 or greg.griffith@dahp.wa.gov.

Sincerely,

Gregory Griffith
Deputy State Historic Preservation Officer

Enclosure

DEPARTMENT OF ARCHAEOLOGY & HISTORIC PRESERVATION
Protect the Past, Shape the Future

RECEIVED
JUL 25 2005
DOE-PNSO-CC

MEMORANDUM OF AGREEMENT

BETWEEN THE U.S. DEPARTMENT OF ENERGY, PACIFIC NORTHWEST SITE OFFICE

AND THE WASHINGTON STATE HISTORIC PRESERVATION OFFICER

REGARDING

THE ADVERSE EFFECT TO THE RICHLAND IRRIGATION CANAL (ARCHAEOLOGICAL SITE #H3-21)

WHEREAS the U.S. Department of Energy (DOE), Pacific Northwest Site Office (PNSO) proposes to conduct the Pacific Northwest National Laboratory Capabilities Replacement Laboratories Project ("Project"), to replace laboratory facilities in the 300 Area of the Hanford Site, which has been targeted for aggressive remediation by the DOE Office of Environmental Management to reduce costs and speed cleanup of the Hanford Site; and

WHEREAS PNSO has established the Project's area of potential effects (APE), as defined at 36 CFR 800.16(d), to be the DOE Office of Science triangular land parcel bounded by George Washington Way on the east and north, Stevens Blvd., on the west, and Horn Rapids Road on the south (HCRC#2003-300-013); and

WHEREAS PNSO has determined that the Project will have an adverse effect on the Richland Irrigation Canal (Archaeological Site H3-21) as described in the Cultural Resource Review letter dated December 1, 2004 (attached as Appendix A); and

WHEREAS PNSO has consulted with the Washington State Historic Preservation Officer (SHPO), Wanapum, Confederated Tribes of the Umatilla Indian Reservation, Yakama Nation, the Confederated Tribes of the Colville Reservation, Benton County, Hanford-White Bluffs Foundation, East Benton County Historical Society, Franklin County Historical Society, and the Columbia River Exhibition of History, Science, and Technology in accordance with Section 106 of the National Historic Preservation Act, 16 U.S.C. § 470 (NHPA), and its implementing regulations (36 CFR 800.6(b)(1)) to resolve the adverse effects of the Project on historic properties; and

NOW, THEREFORE, PNSO and the Washington SHPO agree that prior to PNSO's initiation of ground disturbance PNSO shall assure that the following stipulations are implemented in order to take into account the effects of the Project on historic properties, and that these stipulations shall remain in effect until this MOA expires, is amended or is terminated.

STIPULATIONS

PNSO shall ensure that the following stipulations are implemented:

I. Prior to project implementation, PNSO will prepare thorough documentation of Site H3-21. PNSO shall consult with the SHPO to determine the appropriate mitigation and documentation standard for this effort. Said documentation shall be prepared by a cultural resource professional meeting National Park Service Professional Qualifications as published in 36 CFR 61. An original of the documentation shall be provided to the SHPO with copies provided to other appropriate local and/or regional repositories as designated by the SHPO.

II. PNSO shall work with a local historical organization to prepare interpretive materials of the history and significance of the Richland Irrigation Canal in consultation with the SHPO. If any objects or artifacts are recovered for interpretive use prior to or during construction, that will be done at the discretion of the partnering organization and become their property. PNSO will retain responsibility for the interpretive materials for one year following their production. Long-term telling of the Richland Irrigation Canal ultimately will then become the responsibility of local historical organizations.

III. During Project design and facility construction, PNSO will attempt to retain in place a portion of the H3-21 Richland Irrigation Canal Segment I and incorporate it into the general landscaping of the facility until such time that the area is needed for other purposes. Failure to preserve any portion of the canal will not effect any other sections of this agreement.

IV. **DURATION**

If this agreement or amendments thereto, remains in effect as of February 28, 2009, this agreement shall be automatically terminated. If the parties agree that a new agreement is necessary to the accomplishment of the Project, the parties may re-initiate review of the Project in accordance with 36 CFR 800.

V. **MONITORING AND REPORTING**

On or before March 31 of each year, beginning in March 2006, until PNSO and SHPO agree in writing that the terms of this agreement have been fulfilled or is automatically terminated, PNSO shall prepare and provide an annual report to the SHPO addressing the following topics:

a. Progress in completing interpretive materials for the Richland Irrigation Canal;

b. Any changes that PNSO believes should be made in implementation of this agreement.

VI. DISPUTE RESOLUTION

Should any party to this agreement object at any time to any actions proposed or the manner in which the terms of this MOA are implemented, PNSO shall consult with the objecting party(ies) to resolve the objection. If PNSO determines, within 30 days, that such objection(s) cannot be resolved, PNSO will;

A. Forward all documentation relevant to the dispute to the Advisory Council on Historic Preservation (Council) in accordance with 36 CFR 800.2(b)(2). Upon receipt of adequate documentation, the Council shall review and advise PNSO on the resolution of the objection within 30 days. Any comment provided by the Council, and all comments from the parties to the MOA, will be taken into account by PNSO in reaching a final decision regarding the dispute.

B. If the Council does not provide comments regarding the dispute within 30 days after receipt of adequate documentation, PNSO may render a decision regarding the dispute. In reaching its decision, PNSO will take into account all comments regarding the dispute from the parties to the MOA.

C. PNSO's responsibility to carry out all other actions subject to the terms of this MOA that are not the subject of the dispute remain unchanged. PNSO will notify all parties of its decision in writing before implementing that portion of the Undertaking subject to dispute under this stipulation. PNSO's decision will be final.

VII. AMENDMENTS AND NONCOMPLIANCE

If any signatory to this MOA, including any invited signatory, determines that its terms will not or cannot be carried out or that the amendment to its terms must be made, that party shall immediately consult with the other parties to develop an amendment to this MOA pursuant to 36 CFR 800.6(c)(7) and 800.6(c)(8). The amendment will be effective on the date a copy signed by all of the original signatories is filed with the Council. If the signatories cannot agree to appropriate terms to amend the MOA, any signatory may terminate the agreement in accordance with Stipulation VIII, below.

VIII. TERMINATION

The parties to this agreement may determine whether or not this agreement shall continue in effect, be amended, or be terminated. Either party may terminate this agreement for good cause. If this agreement remains in effect as of February 28, 2009, this agreement shall be automatically terminated.

Execution of this MOA by PNSO and the Washington SHPO, and its submission to the Council in accordance with 36 CFR 800.6(b)(1)(iv), shall, pursuant to 36 CFR 800.6(c), be considered to be an agreement with the Council for the purposes of Section 110(l) of NHPA. Execution and submission of this MOA, and implementation of its terms provides

evidence that PNSO has afforded the Council a reasonable opportunity to comment on the Project and its effects on historic properties.

PACIFIC NORTHWEST SITE OFFICE

U.S. Department of Energy

By:_____ Date: 6/14/05

WASHINGTON STATE HISTORIC PRESERVATION OFFICER

By:_____ Date: 6/22/05

Attachment: Appendix A

Department of Energy
Pacific Northwest Site Office
P.O. Box 350, K8-50
Richland, Washington 99352

05-OD-0033

DEC 1 6 2004

Ms. Camille Pleasants
Tribal Historic Preservation
Officer
Confederated Tribes of
the Colville Reservation
P.O. Box 150
Nespelem, Washington 99155

Dear Ms. Pleasants:

CULTURAL RESOURCES REVIEW OF CAPABILITY REPLACEMENT FACILITIES CONSTRUCTION SITE – (HCRC #2003-300-013)

Enclosed is a cultural resources review completed by the U.S. Department of Energy (DOE), Pacific Northwest Site Office (PNSO) on December 1, 2004, for the subject project located in Richland, Washington. The results of the records and literature review conducted by staff at the Pacific Northwest National Laboratory (PNNL) Cultural Resource Project are described in the enclosed cultural resources review. The results indicate that this undertaking will not have an adverse effect on historic properties, with the exception of one resource: the Richland Irrigation Canal (H3-21). Before any activities occur that will impact H3-21, a Memorandum of Agreement will be developed to address the adverse effects. Additionally, PNSO finds that HT-2004-002 is not eligible for the National Register of Historic Places. Pursuant to 36CFR 800.2 (4), we are providing documentation to support these findings and to involve your office as a consulting party in the National Historic Preservation Act of 1966 Section 106 Review process. Upon your concurrence, we intend to perform some investigatory/site characterization activities away from H3-21.

Please note that this review is sent to you from DOE PNSO instead of the DOE Richland Operations Office (RL). This is because DOE recently transferred administrative oversight of PNNL and the subject property from RL to PNSO. PNSO has been designated a DOE field office with responsibility for a PNNL Site that has been separated from the rest of the Hanford Site. As a result, PNSO will be interacting with you in the future on PNSO-funded activities.

Ms. Camille Pleasants -2- DEC 16 2004
05-OD-0033

We look forward to working with you regarding the protection of important cultural resources located on the PNNL Site. If you have any questions or require additional information, please contact Theresa Aldridge, Operations Division, on (509) 372-4508.

Sincerely,

Paul W. Kruger
Manager

OD:TLA

Enclosure

cc w/o encl:
E. L. Prendergast-Kennedy, PNNL

Department of Energy
Pacific Northwest Site Office
P.O. Box 350, K8-50
Richland, Washington 99352

05-OD-0030

DEC 1 6 2004

Mr. Patrick Sobotta, Director
Environmental Restoration/
Waste Management Program
Nez-Perce Tribe
P.O. Box 365
Lapwai, Idaho 83540

Dear Mr. Sobotta:

CULTURAL RESOURCES REVIEW OF CAPABILITY REPLACEMENT FACILITIES CONSTRUCTION SITE – (HCRC #2003-300-013)

As I indicated to you in previous correspondence, the U.S. Department of Energy's (DOE) Pacific Northwest Site Office (PNSO) is working with the Pacific Northwest National Laboratory (PNNL) to design the appropriate approach to replace important research facilities that will be decommissioned by DOE in the 300 Area of the Hanford Site. In the spirit of our desire to actively include the Nez Perce Tribe in the planning of this project, enclosed is a cultural resources review completed by PNSO on December 1, 2004, for the subject project located in Richland, Washington.

The results of the records and literature review conducted by staff at the PNNL Cultural Resource Project are described in the enclosed cultural resources review. The results indicate that this undertaking will not have an adverse effect on historic properties, with the exception of one resource: the Richland Irrigation Canal (H3-21). Before any activities occur that will impact H3-21, a Memorandum of Agreement will be developed to address the adverse effects. Additionally, PNSO finds that HT-2004-002 is not eligible for the National Register of Historic Places. Pursuant to 36CFR 800.2 (4), we are providing documentation to support these findings and to involve your office as a consulting party in the National Historic Preservation Act of 1966 Section 106 Review process. Upon your concurrence, we intend to perform some investigatory/site characterization activities away from H3-21.

Mr. Patrick Sobotta -2- DEC 16 2004
05-OD-0030

We look forward to working with you regarding the protection of important cultural resources located on the PNNL Site. If you have any questions or require additional information, please contact Theresa Aldridge, Operations Division, on (509) 372-4508.

Sincerely,

Paul W. Kruger
Manager

OD:TLA

Enclosure

cc w/o encl:
E. L. Prendergast-Kennedy, PNNL
M. Sobotta, NPT
V. Sonneck, NPT

Department of Energy
Pacific Northwest Site Office
P.O. Box 350, K8-50
Richland, Washington 99352

05-OD-0031

DEC 16 2004

Ms. Teara Farrow, Acting Manager
Cultural Resource Protection Program
Confederated Tribes of the
Umatilla Indian Reservation
P.O. Box 638
Pendleton, Oregon 97801

Dear Ms. Farrow:

CULTURAL RESOURCES REVIEW OF CAPABILITY REPLACEMENT FACILITIES CONSTRUCTION SITE – (HCRC #2003-300-013)

The U.S. Department of Energy's (DOE) Pacific Northwest Site Office (PNSO) is working with the Pacific Northwest National Laboratory (PNNL) to design the appropriate approach to replace important research facilities that will be decommissioned by DOE in the 300 Area of the Hanford Site. In the spirit of our desire to actively include the Confederated Tribes of the Umatilla Indian Reservation in the planning of this project, enclosed is a cultural resources review completed by PNSO on December 1, 2004, for the subject project located in Richland, Washington.

The results of the records and literature review conducted by staff at the PNNL Cultural Resource Project are described in the enclosed cultural resources review. The results indicate that this undertaking will not have an adverse effect on historic properties, with the exception of one resource: the Richland Irrigation Canal (H3-21). Before any activities occur that will impact H3-21, a Memorandum of Agreement will be developed to address the adverse effects. Additionally, PNSO finds that HT-2004-002 is not eligible for the National Register of Historic Places. Pursuant to 36CFR 800.2 (4), we are providing documentation to support these findings and to involve your office as a consulting party in the National Historic Preservation Act of 1966 Section 106 Review process. Upon your concurrence, we intend to perform some investigatory/site characterization activities away from H3-21.

Ms. Teara Farrow -2- DEC 16 2004
05-OD-0031

We look forward to working with you regarding the protection of important cultural resources located on the PNNL Site. If you have any questions or require additional information, please contact Theresa Aldridge, Operations Division, on (509) 372-4508.

Sincerely,

Paul W. Kruger
Manager

OD:TLA

Enclosure

cc w/o encl:
J. Longenecker, CTUIR (Richland Office)
S. Harris, CTUIR
E. L. Prendergast-Kennedy, PNNL

Department of Energy
Pacific Northwest Site Office
P.O. Box 350, K8-50
Richland, Washington 99352

05-OD-0032

DEC 16 2004

Ms. Lenora Seelatsee
Wanapum
Grant County P.U.D.
P.O. Box 878
Ephrata, Washington 98823

Dear Ms. Seelatsee:

CULTURAL RESOURCES REVIEW OF CAPABILITY REPLACEMENT FACILITIES CONSTRUCTION SITE – (HCRC #2003-300-013)

As I indicated to you in previous correspondence, the U.S. Department of Energy's (DOE) Pacific Northwest Site Office (PNSO) is working with the Pacific Northwest National Laboratory (PNNL) to design the appropriate approach to replace important research facilities that will be decommissioned by DOE in the 300 Area of the Hanford Site. In the spirit of our desire to actively include the Wanapum in the planning of this project, enclosed is a cultural resources review completed by PNSO on December 1, 2004, for the subject project located in Richland, Washington.

The results of the records and literature review conducted by staff at the PNNL Cultural Resource Project are described in the enclosed cultural resources review. The results indicate that this undertaking will not have an adverse effect on historic properties, with the exception of one resource: the Richland Irrigation Canal (H3-21). Before any activities occur that will impact H3-21, a Memorandum of Agreement will be developed to address the adverse effects. Additionally, PNSO finds that HT-2004-002 is not eligible for the National Register of Historic Places. Pursuant to 36CFR 800.2 (4), we are providing documentation to support these findings and to involve your office as a consulting party in the National Historic Preservation Act of 1966 Section 106 Review process. Upon your concurrence, we intend to perform some investigatory/site characterization activities away from H3-21.

Ms. Lenora Seelatsee
05-OD-0032

-2-

DEC 1 6 2004

We look forward to working with you regarding the protection of important cultural resources located on the PNNL Site. If you have any questions or require additional information, please contact Theresa Aldridge, Operations Division, on (509) 372-4508.

Sincerely,

Paul W. Kruger
Manager

OD:TLA

Enclosure

cc w/o encl:
R. Buck, Jr., Wanapum
E. L. Prendergast-Kennedy, PNNL

Department of Energy
Pacific Northwest Site Office
P.O. Box 350, K8-50
Richland, Washington 99352

05-OD-0029

DEC 16 2004

Mr. Russell Jim, Manager
Environmental Restoration/
Waste Management Program
Yakama Nation
2808 Main Street
Union Gap, Washington 98903

Dear Mr. Jim:

CULTURAL RESOURCES REVIEW OF CAPABILITY REPLACEMENT FACILITIES CONSTRUCTION SITE – (HCRC #2003-300-013)

As I indicated to you in previous correspondence, the U.S. Department of Energy's (DOE) Pacific Northwest Site Office (PNSO) is working with the Pacific Northwest National Laboratory (PNNL) to design the appropriate approach to replace important research facilities that will be decommissioned by DOE in the 300 Area of the Hanford Site. In the spirit of our desire to actively include the Yakama Nation in the planning of this project, enclosed is a cultural resources review completed by PNSO on December 1, 2004, for the subject project located in Richland, Washington.

The results of the records and literature review conducted by staff at the PNNL Cultural Resource Project are described in the enclosed cultural resources review. The results indicate that this undertaking will not have an adverse effect on historic properties, with the exception of one resource: the Richland Irrigation Canal (H3-21). Before any activities occur that will impact H3-21, a Memorandum of Agreement will be developed to address the adverse effects. Additionally, PNSO finds that HT-2004-002 is not eligible for the National Register of Historic Places. Pursuant to 36CFR 800.2 (4), we are providing documentation to support these findings and to involve your office as a consulting party in the National Historic Preservation Act of 1966 Section 106 Review process. Upon your concurrence, we intend to perform some investigatory/site characterization activities away from H3-21.

Mr. Russell Jim, Manager -2- DEC 16 2004
05-OD-0029

We look forward to working with you regarding the protection of important cultural resources located on the PNNL Site. If you have any questions or require additional information, please contact Theresa Aldridge, Operations Division, on (509) 372-4508.

Sincerely,

Paul W. Kruger
Manager

OD:TLA

Enclosure

cc w/o encl:
L. Aleck, YN
G. Cleveland, YN
E. L. Prendergast-Kennedy, PNNL

01/27/05 THU 17:15 FAX 509 372 4037 STO ☑001
01/27/05 THU 16:41 FAX 509 376 1466 DOE OTR ☑001

COPY

Confederated Tribes and Bands
of the Yakama Nation

Established by the
Treaty of June 9, 1855

ltrs from PNSO to Tribes sent 12-16-04

25 January 2005

Mr. Paul W. Kruger
Department of Energy
Pacific Northwest Site Office
P.O. Box 350, K8-50
Richland, Washington 99352

Dear Mr. Kruger,

Re: Historic Preservation Easement proposed as a solution to future management of EMSL Cemetery (HT-2001-017), 45BN28 and associated Restoration Project Area

The Yakama Nation has been solicited to be included in the planning phase of the proposed Capability Replacement Facilities Construction Site (Dec 16 letter from DOE to Russell Jim). In a recent meeting of Tribal representatives responsible for protecting cultural sites at Hanford, the "Capabilities Replacement Facilities Construction Site" cultural resources survey and evaluation was reviewed (HCRC #2003-300-013).

In this ongoing review, a number of proposed alternatives are under consideration that would protect the adjacent Cemetery and would include the fenced restoration area known to Tribes as the EMSL Cemetery and Restoration Area, associated with the fishing area known to archaeologists as 45BN28. In our view, this could and should be accomplished in conjunction with the proposed replacement of the "important research facilities that will be decommissioned by DOE in the 300 Area", the main proposed encroachment project in that area and a harbinger of future development proposals. While no indigenous cultural properties have yet been identified for the lands in question, an important area lies adjacent to this triangle of land, and is the subject of our proposal which arose in this context.

The adjacent area in question, the original preferred alternative site for the EMSL and part of a long recognized cultural property (45BN28) was found to contain Native American burials and was abandoned for the purposes of construction. As you are aware, eventually at the request of Tribal representatives led by Rex Buck of the Wanapam, DOE set the area aside for the purposes of restoration and protection.

Post Office Box 151, Fort Road, Toppenish, WA 98948 (509) 865-5121

01/27/05 THU 17:16 FAX 509 372 4037 STO 002
01/27/05 THU 16:41 FAX 509 376 1466 DOE O/R 002

A preferred option partially scoped by Tribal representatives is to place the EMSL Cemetery and Restoration Project Area along with the remaining damaged portions of 45BN28 within a designated Conservation Easement that would have certain limited and approved access and uses, agreed upon by Tribal authorities compatible with protection and maintenance of the restoration area and protection of the cultural property. Monitoring, ingress and egress, and further restoration activities would be several of the essential topics to be considered.

In our proposed scenario, DOE would lease the EMSL property to PNNL with a provision that PNNL negotiate a Conservation Easement on the parcel with the intent to protect the restoration and cemetery area while allowing compatible access for such activities as walking or bicycling on a designated path. Monitoring and maintenance as a botanical area of restored native plants would be a considered requirement. As herein conceived Tribal representatives would assume a yearly monitoring and reporting role on the status of the easement while conducting compatible cultural uses. While linking these projects may require a more comprehensive planning effort, it this appears to be a "win, win" opportunity. Please contact me at (509) 452-2502.

Sincerely,

Russell Jim, Yakama Nation ER/WM

cc:
LaRena Sohappy, Hazardous Waste Committee/Cultural Committee Chair
Andrea Spencer, Interim Deputy Director, YN DNR
Johnson Meninick, YN Cultural Resources
Rex Buck Wanapam
Lenora Selatsee Wanapam
Lester Umtuch Wanapam
Julie Longenecker CTUIR
Vera Sonneck Nez Perce
Keith Kline DOE-RL
Greg Hughs USFWS
Annabelle Rodriguez DOE-RL
Darby Stapp PNNL

RECEIVED
JAN 27 2005
DOE-RL/RLCC

Post Office Box 151, Fort Road, Toppenish, WA 98948 (509) 865-5121

Appendix B

Biological Resource Review

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Appendix B
Biological Resource Review

Pacific Northwest National Laboratory
Operated by Battelle for the U.S. Department of Energy

19 April 2006

Ms. Regan Weeks
Pacific Northwest National Laboratory
P. O. Box 999, MSIN T4-55
Richland, WA 99352

Dear Ms. Weeks

BIOLOGICAL REVIEW OF THE DOE PACIFIC NORTHWEST SITE OFFICE (PNSO) HORN RAPIDS TRIANGLE, ECR #2003-300-013D.

Project Description:

- PNSO is considering construction of a new PNNL research facility in a portion of the Horn Rapids Triangle which is bounded by Stevens Drive, Horn Rapids Road, and George Washington Way and consists of about 40 ha (100 ac). That facility, referred to as the Physical Sciences Facility (PSF), would house many of the research capabilities currently located in the Hanford 300 Area; the facilities for which are scheduled for decommissioning, demolition, and site restoration. The proposed location for the PSF is the southern half of the Horn Rapids Triangle. Site development would include installation of water, sewer, electrical, and communications services, clearing and grading for the structures and parking areas, and construction of the new facility. It is anticipated that construction activities would commence in fall 2007 and would take about two years to complete.

Prior Ecological Evaluations for this Project:

- PNNL conducted a field survey of the proposed project site in the spring of each year from 2003 to 2006. The results of these field surveys are summarized in letter reports #2003-300-013A (2003), #2003-300-013B (2004), #2003-300-013C (2005), and this letter report. This letter report summarizes all pertinent aspects of the 2006 field survey and the three former letter reports.

902 Battelle Boulevard • P.O. Box 999 • Richland, WA 99352

Telephone (509) 376-2554 E-mail: michael.sackschewsky@pnl.gov FAX: (509) 372-3515

Survey Objectives:

- Determine the occurrence in the project area of plant and animal species protected under the Endangered Species Act (ESA), candidates for such protection, and species listed as threatened, endangered, candidate, sensitive, or monitor by the state of Washington, and species protected under the Migratory Bird Treaty Act (MBTA).

- Evaluate and quantify the potential impacts of disturbance on priority habitats and protected plant and animal species identified in the survey.

Survey Methods:

- Pedestrian and visual reconnaissance of the proposed project site was performed by J. M. Becker on 13 April 2006. Pedestrian and visual reconnaissance of the proposed project site was performed in 2003 by M.R. Sackschewsky on 10 April; in 2004 by M.R. Sackschewsky and J.M. Becker on 25 June; and in 2005 by J.M. Becker and M.R. Sackschewsky on 21 April. The percent cover of dominant vegetation was visually estimated.

- Priority habitats and species of concern are documented in: Washington Department of Fish and Wildlife (2006a, 2006b), and Washington State Department of Natural Resources (2006). Lists of animal and plant species considered Endangered, Threatened, Proposed, or Candidate by the U.S. Fish and Wildlife Service are maintained at 50 CFR 17.11 and 50 CFR 17.12; the list of birds protected under the MBTA is maintained at 50 CFR 10.13.

Survey Results:

Vegetation

- The area south of the abandoned irrigation canal (which cuts diagonally through the middle of the site) is dominated by cheatgrass (*Bromus tectorum*), Sandberg's bluegrass (*Poa sandbergii*) and Russian thistle (*Salsola kali*). Over most of this area shrubs are relatively sparse, but sagebrush (*Artemisia tridentata*), gray rabbitbrush (*Chrysothamnus nauseosus*), bitterbrush (*Purshia tridentata*) and snow buckwheat (*Eriogonum niveum*) each contribute approximately one percent cover. Larger native bunchgrasses, especially Indian ricegrass (*Oryzopsis hymenoides*), sand dropseed (*Sporobolus cryptandrus*) and

needle-and-thread grass (*Stipa comata*) provide a total of 2 to 3 percent cover. Approximately 38 plant species were observed south of the irrigation canal.

- The area north of the irrigation canal is a mature stand of shrub steppe dominated by big sagebrush, cheatgrass, and Sandberg's bluegrass. Bitterbrush is noticeable in the northern part of the stand, and the total shrub cover is over 20 percent. Overall, the larger native bunchgrasses are less prevalent north of the canal than they are south of the canal. Approximately 41 plant species were observed on the north side of the canal.

- All plant species observed in the proposed project area from 2003 to 2006 are listed in Attachment A.

Wildlife

- No migratory bird species were observed nesting on the proposed project site from 2003 to 2006. However, detection of nests of the bird species that could potentially nest on the site would require a much more intense field survey effort than that which was undertaken. For project planning and construction scheduling purposes, it was sufficient to identify avian species on and in the vicinity of the project site and determine whether or not they would be likely to nest there based on habitat affinities. The results of these determinations follow.

- Western meadowlarks (*Sturnella neglecta*) and California quail (*Callipepla californica*) (this species is not protected under the MBTA), both ground-nesting species, were observed on the site and may be nesting there. Long-billed curlews (*Numenius americanus*) (a Washington State monitor species and a ground-nesting species) were observed and heard calling west of Stevens Drive, and were thus not nesting on the project site, but could potentially nest there.

- The sage sparrow (*Amphispiza belli*) (a Washington State candidate and sagebrush obligate species) is a shrub-nesting species and was not observed or heard calling in the project area in any of the surveys from 2003 to 2006, but could potentially nest on the project site. The lark sparrow (*Chondestes grammacus*) is also a shrub-nesting species; it was observed in 2004 and could potentially nest on the project site, although it was not detected in the 2006 survey.

- White-crowned sparrows (*Zonotrichia leucophrys*), magpies (*Pica pica = P. hudsonia*), and European starlings (*Sturnus vulgaris*) were observed in the 2006 survey, but are not expected to nest in the habitat that occurs on the project site. Surveys in earlier years

detected mourning doves (*Zenaida macroura*) and ring-necked pheasants (*Phasianus colchicus*); however, these also are not expected to nest in this habitat.

- One burrowing owl (*Athene cunicularia*) (Federal species of concern and Washington State candidate species) was observed in February 2006 (referenced in ecological compliance review letter report #2006-600-010B) at a burrow in the extreme north end of the proposed project site, about 60 meters south of the intersection of Stevens Drive and George Washington Way. However, during this survey no owls were observed and the burrow appeared to have since been filled in by soil excavated by pocket gophers (*Thomomys talpoides*).

- Mammals observed, or their sign, included the northern pocket gopher, mule deer (*Odocoileus hemionus*), and coyote (*Canis latrans*). Signs of black-tailed jackrabbit (*Lepus californicus*) were not observed, but the species would be expected primarily in the area of the project site that is north of the canal, based on the prevalence of shrub steppe habitat. Badger (*Taxidea taxus*) excavations were observed throughout the project site, but none appeared to be active (i.e., currently in use).

- All bird and mammal species observed in the proposed project area from 2003 to 2006 are listed in Attachment A.

Considerations and Recommendations:

- No plant or animal species protected under the ESA, candidates for such protection, or species listed by the Washington state government as threatened or endangered were observed in the vicinity of the proposed project area.

- Development of the entire area north of Horn Rapids Road would result in the loss of approximately 64 acres (26 ha) of mature sagebrush steppe, primarily in the area north of the irrigation canal. If development is confined to the area south of the irrigation canal, the disturbance of mature shrub steppe would be minimal.

- In order to avoid potential impacts to any ground- or shrub-nesting migratory birds that may be nesting on the project site, project activities should not be undertaken during the nesting season, March 1 through July 31.

If you have any questions regarding this ecological review please contact me at 509-376-2554.

Sincerely,

J. M. Becker for M. R. Sackschewsky

Michael R. Sackschewsky
Compliance Assessment Manager
Ecological Monitoring and Compliance Project

LB:jmb

cc: Dan Edwards, PNNL J2-25
Kathleen Rhoads K3-54
Iral Nelson K3-54

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Washington Department of Fish and Wildlife. 2006a. Species of Special Concern in Washington. WDFW web site http://wdfw.wa.gov/wlm/diversty/soc/soc.htm

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Attachment A

Plant, bird, and mammal species observed in the proposed project area from 2003 to 2006.

Common Name	Latin Name
Plants	
alfalfa	*Medicago sativa*
annual mountain dandelion	*Agoseris heterophylla*
asparagus	*Asparagus officinalis*
bastard toadflax	*Comandra umbellata*
big sagebrush	*Artemisia tridentata*
bigseed desertparsley	*Lomatium macrocarpum*
bitterbrush	*Purshia tridentata*
bluebunch wheatgrass	*Agropyron spicatum*
bottlebrush grass	*Sitanion hystrix*
buckwheat milkvetch	*Astragalus caricinus*
bulbous bluegrass	*Poa bulbosa*
bur ragweed	*Ambrosia acanthicarpa*
Carey's balsamroot	*Balsamorhiza careyana*
cheatgrass	*Bromus tectorum*
Columbia cutleaf	*Hymenopappus filiolius*
common groundsel	*Senecio vulgarus*
crested wheatgrass	*Agropyron cristatum*
devil's lettuce	*Amsinckia tessellata*
Douglas' clusterlily	*Brodiaea douglasii*
dune scurfpea	*Psoralea lanceolata*
Fendler's cryptantha	*Cryptantha fendleri*
fiddleneck	*Amsinckia lycopsoides*
gray rabbitbrush	*Chrysothamnus nauseosus*
green rabbitbrush	*Chrysothamnus viscidiflorus*
hoary aster	*Machaeranthera canescens*
horseweed	*Conyza canadensis*
Howell's clusterlily	*Brodiaea howellii*
Indian ricegrass	*Oryzopsis hymenoides*
Indian wheat	*Plantago patigonica*
jagged chickweed	*Holosteum umbellatum*
Jim Hill's tumblemustard	*Sisymbrium altissimum*
kochia	*Kochia scoparia*
longleaf phlox	*Phlox longifolia*
matted cryptantha	*Cryptantha circumsciss*
meadow deathcamas	*Zigadenus venenosus*
Munro's globemallow	*Sphaeralcea munroana*
needle-and-thread grass	*Stipa comata*
pale evening primrose	*Oenothera pallida*

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pink microsteris	*Microsteris gracilis*
prickly lettuce	*Lactuca serriola*
Russian thistle	*Salsola kali*
sand dropseed	*Sporobolus cryptandrus*
Sandberg's bluegrass	*Poa sandbergii*
shy gilia	*Gilia sinuata*
skeletonweed	*Chondrilla juncea*
slender hawksbeard	*Crepis atrabarba*
slender sixweeks	*Festuca octoflora*
snow buckwheat	*Eriogonum niveum*
spring whitlowgrass	*Draba verna*
starvation pricklypear	*Opuntia polyacantha*
stiff wirelettuce	*Stephanomeria panicula*
storksbill	*Erodium cicutarium*
tall willowherb	*Epilobium paniculatum*
thickspike wheatgrass	*Agropyron dasytachyum*
tumble knapweed	*Centaurea diffusa*
Turkestan knapweed	*Centaurea repens*
Birds	
black-billed magpie	*Pica pica*
burrowing owl	*Athene cunicularia*
California quail	*Callipepla californica*
European starling	*Sturnus vulgaris*
lark sparrow	*Chondestes grammacus*
mourning dove	*Zenaida macroura*
ring-necked pheasant	*Phasianus colchicus*
western meadowlark	*Sturnella neglecta*
white-crowned sparrow	*Zonotrichia leucophrys*
Mammals	
badger	*Taxidea taxus*
coyote	*Canis latrans*
mule deer	*Odocoileus hemionus*
northern pocket gopher	*Thomomys talpoides*

Appendix C

Air Emissions and Concentration Calculations

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Appendix C
Air Emissions and Concentration Calculations

This appendix describes how the estimated emissions and ambient air concentrations described in Section 5.1.2, Air Quality, were calculated. It also contains the estimated PSF inventory of chemicals that are regulated as toxic air pollutants by the State of Washington, and describes how the concentrations provided in Table C.3 and Table 5.2 were estimated.

Estimated Releases and Concentrations of Criteria Pollutants

The criteria pollutant annual emission rates in Table 5.1 were calculated based on the assumption that the PSF annual average boiler and generator fuel consumption per gross square foot would be similar to or less than that recorded over the last 5 years at the Environmental Molecular Sciences Laboratory (EMSL), and therefore the PSF emissions per gross square foot would also be similar to, or less than, those calculated for EMSL.

Table C.1 contains the EMSL emission factors and calculated emissions for the recorded 5-year average fuel usage for the EMSL boilers burning natural gas, the boilers burning backup 0.05 wt% sulfur diesel fuel, and the emergency electrical generator burning 0.05 wt% sulfur diesel fuel. The Total EMSL Emissions were then multiplied by 1.7, the ratio of the PSF to EMSL building gross square footage, to estimate the annual average Total PSF Emissions from boiler and generator operations.

Example calculations follow:

Boiler Natural Gas Fuel Emissions:

0.12 lb NOx/MBTU x 1020BTU/scf x 98scf/therms x 162964therms/yr x 1MBTU/10^6BTU x 1ton/2000lb = 0.98 tons per year (tpy)

Boiler Diesel Fuel Emissions:

0.146lb NOx/MBTU x 19300 BTU/lb diesel x 7lb/gal diesel x 70 gal/yr diesel x 1MBTU/10^6 x 1ton/2000lb = 6.9×10^{-4} tpy.

Generator Diesel Fuel Emissions:

18.62 lb NOx/hr x 1hr/58.4 gal diesel x 66 gal/yr x 1ton/2000lb = 0.011 tpy

Table C.1. PSF Criteria Pollutant Annual Emission Estimates

	EMSL Boiler Emissions				EMSL Generator Emissions		EMSL Emissions	PSF Emissions
	Gas Emission Factors	**Gas Emissions**	**Diesel Fuel Emission Factors**	**Diesel Fuel Emissions**	**Generator Emission Factors**	**Generator Emissions**	**Total EMSL Emissions**	**Total PSF Emissions**
	lb/MBtu	tpy	lb/MBtu	tpy	lb/hr	tpy	tpy	tpy
NO_x	0.12	0.98	0.146	7.0E-04	18.62	0.011	0.99	1.7
SO_2	0.001	0.0081	0.0518	2.5E-04	0.41	0.00023	0.0086	0.015
CO	0.15	1.2	0.036	1.7E-04	22.2	0.013	1.2	2.1
PM	0.01	0.081	0.015	7.2E-05	1.04	5.9E-04	0.082	0.14
PM-10	NA		0.00825	3.9E-05	0.85	4.8E-04	5.2E-04	8.8E-04
VOC	0.016	0.13	0.004	1.9E-05	2.61	1.5E-03	0.13	0.57**
Lead	4.90E-07	4.0E-06	NA		NA		4.0E-06	1.0E-05*
	Average Gas Use, Therms	162964	Average Diesel Use, gal/yr	70	Average Diesel Use, gal/yr	66		

NA: no emission factor available
*Includes 0.34 x 10^{-5} tpy from laboratories.
**Includes 0.35 tpy from laboratories.

The annual average emissions of criteria pollutants from the operation of the PSF chemical laboratories and support facilities were calculated based on the estimated usage of criteria pollutants in the 300 Area laboratory and support spaces expected to be moved from existing buildings into the PSF. The estimated usage was based on the most recent 5 years of data contained in the PNNL Chemical Management System database. To estimate the emissions it was assumed that 100% of the gases, 10% of the volatile liquids, 0.1% of the liquids and dispersible solids, and 0.0001% of other solids, would be emitted in the process of being used. It was assumed that no emission controls would be in place, although High Efficiency Particulate Air (HEPA) filtration would be applied to many laboratory exhausts. The resulting emissions were all less than 4% of the emissions from the boilers and generators with the exception of volatile organic compounds and lead which were 160% and 50%, respectively. Therefore, the laboratory emissions for VOCs and lead were added in Table 5.1, and the emissions for lead were incorporated into the model results in Table 5.2.

The maximum expected short-term PSF emission rates were estimated by calculating the emission rates for two EMSL boilers burning natural gas at capacity, the boilers burning backup diesel fuel at capacity, and two generators burning diesel at capacity (shown in Table C.2). The highest emission rate per hour was identified for each pollutant, assuming the generators were operating at the same time the boilers were operating on either fuel. These rates were then scaled up based on the ratio of the PSF to EMSL building square footages (a factor of 1.7) and used as the emission rates for calculating the maximum short-term air concentrations.

Table C.2. PSF Criteria Pollutant Short-Term Emission Estimates

	EMSL							PSF
	Boilers on Diesel		Boilers on Gas		Diesel Generators		Highest Combined	Total Rates
	Rate	Emission	Rate	Emissions	Rate per generator	Emissions, Both Generators	lb/hr	lb/hr
	lb/MBtu	lb/hour	lb/MBtu	lb/hr	lb/hr	lb/hour		
NO_x	0.146	1.46	0.12	1.2	18.62	37	39	66
SO_2	0.0518	0.518	0.0010	0.010	0.41	0.82	1.3	2.3
CO	0.036	0.36	0.15	1.5	22.2	44	46	78.0
PM	0.015	0.15	0.010	0.10	1.04	2.1	2.2	3.8
PM-10	0.00825	0.0825			0.85	1.7	1.8	3.0
Lead	NA		4.90E-07	4.9E-06	NA		4.9E-06	9.1E-06*
	Max Heat Input Rate MBTU/hr	10			Fuel Use, gal/hr	58.4		

NA: no emission factor available.
*Includes 0.78 x 10^{-6} lb/hr from laboratories.

The annual and short-term emission rates in Table C.2 were used with the EPA Industrial Source Complex (ISC) model to estimate the ambient air concentrations shown in Tables 5.2 and C.3 for the nearest residence. Results for the site boundary and agricultural areas were also calculated and were also well below the NAAQS. EPA guidance was used for preparing a meteorological data file, with special parameters for the deposition computation. Hourly meteorological data collected over 5 years was used based on a combination of data from a wind station located about 2 miles north of the PSF site and meteorological surface observations for the Hanford Meteorological Station (HMS) located about 22 miles northwest of the PSF site. Data for the calendar years 1990 to 1994 were selected as the most recent 5-year period with continuous hourly local surface observations at HMS.

Table C.3. Estimated Maximum Concentrations of Criteria Pollutants and Relation to National Ambient Air Quality Standards

Criteria Pollutant	Standard, µg/m^3	Averaging Times	Concentration in µg/m^3	Percent of Standard
Carbon Monoxide	10000	8-hour	397	4
	40000	1-hour	1207	3
Lead	1.5	Quarterly	0.000003	0.0002
Nitrogen Dioxide	100	Annual	0.06	0.06
Particulate Matter (<10 µm)	50	Annual	0.00003	0.0001
	150	24-hour	5.8	4
Particulate Matter (<2.5 µm)[(a)]	15	Annual	0.00003	0.0002
	65	24-hour	5.8	9
Sulfur Oxides	78	Annual	0.0005	0.001
	364	24-hour	4.4	1.2

(a) Assumes release is same as for <10 µm.

Estimated Releases and Concentrations of Washington State Toxic Air Pollutants

The releases and ambient air concentrations of chemicals regulated as toxic air pollutants by the Washington State Department of Ecology were estimated, and the twenty chemicals that were the highest percent of the State Acceptable Source Impact Level are shown in Tables C.4 and 5.8, respectively.

The emissions were estimated from the quantities presented in Table C 4, which are the combined current (June 2006) inventories, plus the combined amounts used over the prior 5 years, for the buildings whose activities are planned to be moved into the PSF. These quantities were obtained from the PNL Chemical Management System database. It was assumed that these quantities would be used in a year, or in 1 month, which is expected to bound the annual and daily PSF usage.

Table C.4. Twenty PSF Chemicals Whose Emissions Would Yield the Highest Percentages of the Washington Acceptable Source Impact Concentrations.

Chemical	Annual Inventory plus usage, kg
Hydrogen Chloride	37
Chlorodifluoromethane	3281
Diborane	0.70
Polyaromatic Hydrocarbons	4.3
Chloroform	124
Phosphine	0.86
Nitrogen Trifluoride	64
Ammonia	58
Acrylic Acid	1.1
Methylene Chloride	842
Boron Trifluoride	2.7
1,2-Epoxybutane	40
Toluene	698
Vinyl Chloride	0.68
Trichloroethylene	304
Chromium	35
Nitric Acid	16
Carbon Tetrachloride	27
Hexafluoroacetone	0.20
Ethylene Oxide	0.34

To estimate the emissions it was assumed that 100% of the gases, 10% of the volatile liquids, 0.1% of the other liquids, and 0.0001% of other solids would be emitted in the process of being used. It was assumed that no emission controls would be in place, although HEPA filtration would be applied to many laboratory exhausts. The EPA ISC dispersion model was used to calculate annual average and 24-hour average air concentrations for a typical laboratory configuration and site boundary distance.

Estimated Emissions of Criteria Pollutants from Construction Equipment

Table C.5 lists the major types, number, sizes, and operating hours for construction equipment expected to be required during construction of the PSF.

Table C.5. Construction Equipment Characteristics

Major Construction Sources	Number in Use	Size, Horsepower	Total Engine hours/yr	CO, tpy	Total Organic Carbon, tpy	SOx, tpy	NOx, tpy	PM-10, tpy
Portable Lighting Units	3	50 -100	900	0.30	0.11	0.09	1.40	0.10
Portable Generators	1	50 -100	2000	0.67	0.25	0.21	3.10	0.22
Backhoe/loader	1	50 -100	2000	0.67	0.25	0.21	3.10	0.22
Fork lift	2	50 -100	4000	1.34	0.49	0.41	6.20	0.44
Asphalt Paver	1	100-175	80	0.05	0.02	0.01	0.22	0.02
Asphalt Roller	1	100-175	80	0.05	0.02	0.01	0.22	0.02
Vibratory Compactor	1	100-175	200	0.12	0.04	0.04	0.54	0.04
Concrete Pumper	1	100-175	100	0.06	0.02	0.02	0.27	0.02
Water Tanker	1	100-175	320	0.19	0.07	0.06	0.87	0.06
Excavator	1	100-175	200	0.12	0.04	0.04	0.54	0.04
Bulldozer	1	175-300	80	0.08	0.03	0.02	0.37	0.03
Motor Grader	1	175-300	200	0.20	0.07	0.06	0.93	0.07
Wheel Loader	1	175-300	80	0.08	0.03	0.02	0.37	0.03
Crane – 35 ton	1	175-300	2000	2.00	0.74	0.62	9.30	0.66
Concrete Truck	1	175-300	100	0.10	0.04	0.03	0.47	0.03
Scraper	2	300-600	160	0.32	0.12	0.10	1.49	0.11
Dump Truck	2	300-600	400	0.80	0.30	0.25	3.72	0.26
Crane – 50 ton	1	300-600	480	0.96	0.36	0.30	4.46	0.32
			Total	8.1	3.0	2.5	38	2.7
EPA AP-42 Emissions Factors, lb/hp-hr.				6.68E-03	2.47E-03	2.05E-03	3.10E-02	2.20E-03
tpy = tons per year.								

The anticipated annual emissions of criteria pollutants were estimated using the EPA AP-42 emission factors for small diesel engines shown in the bottom row of the table. Emissions were calculated using the horsepower at the high end of the typical range for each equipment type as shown in the following example calculation. Therefore it is expected that the actual emissions would be less than shown in the table.

Portable Lighting Units (50-100HP) CO emissions:

6.68×10^{-3} lb of CO/hp-hr x 100HP x 900 hours x 1ton/2000lbs = 0.30 ton/year

Appendix D

Comments on the Draft PSF EA and DOE Responses

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Appendix D
Comments on the Draft PSF EA and DOE Responses

The *Draft Environmental Assessment for Construction and Operation of a Physical Sciences Facility at the Pacific Northwest National Laboratory, Richland, Washington* (PSF EA) was distributed for review and comment on November 13, 2006, and the formal comment period extended through December 13, 2006. The following section lists comments received by the U.S. Department of Energy (DOE) Pacific Northwest Site Office (PNSO) on the draft PSF EA and responses to those comments. Comments were received from the following:

- Jill Douglas Sanchez, Pasco, WA (November 16, 2006)
- Valerie Goodwin, West Richland, WA (December 10, 2006)
- Shirley Olinger and Matt McCormick, Richland, WA (December 11, 2006)
- State of Oregon, Department of Energy, Salem, OR (December 12, 2006)
- Nez Perce Tribe, Hanford Cultural Resources, Lapwai, ID (December 13, 2006)
- Confederated Tribes of the Umatilla Indian Reservation, Department of Science and Engineering, Pendleton, OR (January 5, 2007)

Comments on Draft PSF EA and DOE Responses

Jill Douglas Sanchez, Pasco, WA

Comments received: November 16, 2006

Comment:
I am opposed to locating the Physical Science Facility near the Hanford High School. There is absolutely no reason why it should go next to a school where there are 400 plus students. There are many other ideal locations rather than putting our kids at risk being near a nuclear radiological facility.

Valerie Goodwin, West Richland, WA

Comments received: December 10, 2006

Comment:
As the parent of a Hanford High School student, I am concerned by the news of the new radiological/nuclear research facility being proposed by PNNL and the US Dept. of Energy.

I believe the location chosen on the north side of the current Battelle campus is far too close to both the city limits of the city of Richland and to our young people attending classes at the high school and the Washington State University campuses. It is inconceivable that anyone in this community would deliberately site a nuclear/radiological facility so close to the public and our children. Other land on the already tainted Hanford site area would seem to be a far better choice than possibly contaminating currently unspoiled soil. I understand that the current 200 Area, 300 Area and 400 Area on the Hanford site could easily be considered as much safer alternatives.

Please do not continue to add unnecessarily to the cold war legacy of waste - there appears to be plenty of opportunity to pursue alternatives to the currently selected location. Please keep these "nuclear facilities" out in our existing nuclear areas and a *safe distance* from our young people.

Shirley Olinger and Matt McCormick, Richland, WA

Comments received: December 11, 2006

Comment:
Overall we support Lab activities (including the construction of the subject new facility), and the expansion of the Lab to; improve science and improve our country's research and development to address national issues, and to support economic growth in the Tri City area.

The preferred or proposed action should locate the proposed facility as far from residential areas and schools as practicable. With the whole Hanford Site available, a location far removed from the public is more than reasonable. It is a simple matter of common sense and overall good public policy to locate the proposed facility further away from the public than what is proposed in the EA. Example of such an area

is the 400 area of the Hanford Site. This location would be convenient for scientist to access (less than 10 miles from PNNL) but would provide a much better buffer between the facility and the public if an accident occurred that caused the release of a hazardous material.

The EA does not provide decision makers an analysis of alternative locations of the proposed facility. We believe the EA should better inform the decision makers on alternant (sic) locations of the new facility that would reduce the risk to the public and the environment as compared to the proposed location. The alternative would use the same funding strategy as the proposed action in the EA, but locate the facility in an area farther removed from residential areas and schools (e.g. the 400 area or the 200 area of the Hanford).

DOE Response to comments from Jill Douglas Sanchez, Valerie Goodwin, Shirley Olinger and Matt McCormick:

PNSO thanks you for your review and comments on the PSF EA. The analyses in Section 5.1.12 of the EA evaluate potential health effects on workers and members of the public. The analyses indicate that the proposed facilities pose minimal risk from either normal operations or possible accidents, even if all operations were relocated to the proposed PNNL site. Radiological doses to a hypothetical maximally exposed individual member of the public from routine operations were estimated to be less than 0.2 mrem/year, and collective doses to the population within 80 km (50 mi) were estimated to be less than 0.3 person-rem per year. The new facilities would be approximately 1 mile south of existing operations in the 300 Area, and would be more than 1 mile from WSU-TC and Hanford High School. The distance from the proposed PSF to those locations is approximately the same as the distance from existing 300 Area facilities to the nearest members of the public across the Columbia River, and the risks associated with normal operation of the new facility are expected to be similar to, or lower than, the 0.2 mrem/year associated with current operations in the 300 Area.

Impacts from a potential but extremely unlikely accident at the PSF would be no more than 1 rem to an individual at the site boundary because of limitations on facility inventories of radioactive materials and controlled public access within 400 m of the facility. The potential lifetime dose to an individual at a residential location (WillowPointe development, about 0.8 mi from the proposed facilities), could amount to 0.4 rem (400 mrem). The lifetime radiological dose that might be received by an individual in the vicinity of Hanford High School would be about 200 mrem. Section 5.1.12 has been revised to include the additional information. For perspective, 300 mrem represents the average annual dose received by a resident in this area from background radiation due to naturally occurring radionuclides in air and soil. Based on extensive studies by national and international organizations over the last 60 years, lifetime radiological doses at those levels would not be expected to result in any demonstrable physical effects.

PNSO evaluated alternative locations for the proposed facility, both on and off the Hanford Site, including existing facilities in the Hanford 200 and 400 Areas. The environmental impacts of those alternatives are discussed qualitatively in Section 3.2 of the EA, relative to the impacts presented in Section 5 of the EA for the proposed action. As a result of the alternatives analysis (PNNL 2005), which is also summarized and cited in Section 3.2 of the EA, it was concluded that use of existing facilities, or construction of new facilities in alternate locations, was not reasonable because of cost or operational considerations. Therefore, a more detailed analysis of their environmental impacts did not appear to be required or warranted.

State of Oregon, Department of Energy, Salem OR

Comments received: December 12, 2006

Comment 1:
Section 4.7 of the EA states that DOE is "working with EPA and the Washington State Department of Ecology to remove the portion of the PNNL site located north of Horn Rapids Road from the National Priorities List (NPL)." This statement needs to be made more clear regarding what land is at issue – the existing "PNNL site," the "buffer area," or both. We also have a more fundamental concern with the proposed deletion from the NPL, specifically concerning the timing. Recent communication to Oregon from the U.S. Environmental Protection Agency (e-mail from Larry Gadbois, August 21, 2006) states in part that "EPA has been very clear with DOE that NPL deletion is too far into the future for DOE to spend its time strategizing on how it will do this." Section 4.7 notes that the site does not appear to require any cleanup associated with existing records of decision (RODs) for the 300-FF-2 or 300-FF-5 operating units. While this is true, it bears noting that the cited documents are interim action RODs that did not consider the full suite of contaminants in the 300 Area. Cleanup action could be required (though probably unlikely) under final RODs that will be prepared in the future. It is also important to note that groundwater underlying the PNNL site and most of the buffer area is contaminated with nitrate at concentrations above drinking water standards, and that the area lies down-gradient of an evolving uranium plume northeast of the Horn Rapids Landfill.

DOE Response:
PNSO thanks the Oregon Department of Energy for its review and comments on the PSF EA. The EA provides general information about a proposal to remove the PSF construction site from the National Priorities List. Completion of that action would not be required in order for PNSO to proceed with construction of the proposed facility. It is partly because NPL deletion of the entire 300 Area is far distant in the future that this partial deletion action is being considered. If the buffer area is reassigned to PNSO in the future, it is likely that a partial deletion under the NPL would be pursued for that parcel also, as the buffer area has also been determined to require no further remedial action at this time. Should partial deletion of the proposed construction site and buffer area be completed, that action would not preclude the requirement for cleanup if future conditions warrant (40 CFR 300.425(e)(3)).

As suggested in the comment, Section 4.7 provides information about the extent of contamination at the construction site, including the status of the CERCLA interim Records of Decision, and the fact that groundwater at the site is contaminated with nitrate at concentrations above drinking water standards as well as other contaminants. The text in Section 4.7 of the EA has been revised to clarify these points.

Comment 2:
Perhaps the most critical shortcoming of the EA is its failure to consider continued use of existing buildings in the 300 Area. The "no action alternative" described in Sections 3.3 and 5.2 is unrealistic as it assumes that structures in the 300 Area will be demolished and not replaced. A September 18, 2006 story in the Tri-Cities Herald attributed comments to Megan Barnett of DOE that DOE was reconsidering demolition of all buildings, and might keep as many as four buildings in the 300 Area for use by PNNL. If DOE follows through on this alternative, the need for new space at the PSF would be significantly reduced, perhaps eliminated. Failure to consider all legitimate alternatives (and in this case, perhaps the most likely scenario for the site, at least in the short term) does not lead to informed decision-making. Given the comments from DOE regarding the future of 300 Area buildings, any assessment that fails to fully consider this alternative must be viewed as incomplete.

DOE Response:
PNSO is currently considering continued use of four serviceable facilities in the southern part of the 300 Area for some ongoing PNNL activities, over a period of up to 20 years. Implementing the phased approach as described in the EA would reduce the size of the initial phase PSF to about 70-75% of the full facility, but it would not completely eliminate the need for additional space to accommodate activities relocated from other 300 Area facilities in the near term.

Although impacts of continuing operations at existing 300 Area facilities are not within the scope of the EA, they are discussed in Sections 4 and 5.1 of the document, in addition to those evaluated for the No-Action Alternative in Section 5.2. In most cases, those impacts are presented on the basis of annual operations, which are not expected to change substantially whether the facilities continue to operate for a few additional years, or for up to 20 years. Impacts from existing facility operations were also used to estimate the bounding impacts presented in Section 5 for operating the PSF with all phases implemented, because activities at the new facility would be similar to those currently being carried out in the 300 Area. Therefore, the EA provides sufficient information for DOE to understand the environmental impacts of ongoing and future operations, and to determine whether the proposed action represents a major federal action that could have significant environmental impacts.

Comment 3:
The description of nearby land uses in Section 4.1 omits any mention of the extensive office complex east of the existing PNNL facilities, between George Washington Way and the Columbia River, and north of the WSU campus.

DOE Response:
Section 4.1 of the EA has been revised to include the businesses south of Horn Rapids Road, between George Washington Way and the Columbia River. Impacts to members of the public in the vicinity of the PSF are addressed in Section 5.

Comment 4:
Section 5.1.1 implicitly cites the Hanford Comprehensive Land Use Plan in stating that development of the PNNL site "would be consistent with the intent of the Industrial designation for the land." However, that proposed land use is not consistent with recent land use plan amendments for the City of Richland which call for mixed land use in the 300 Area.

DOE Response:
The reference to the Hanford Comprehensive Land-Use Plan EIS was intended to note that construction of the PSF would be consistent with the DOE Record of Decision (ROD) for the EIS. Under the City of Richland Comprehensive Plan Land Use Designation, as amended December 2005 (City of Richland 2005a), future land use for the PSF construction site was designated as "Business/Research Park," which would be compatible with the proposed action and the Industrial designation in the DOE ROD.

The City of Richland Comprehensive Land Use Plan designated the buffer area as a mix of "Business/Research Park," "Commercial," and "Low Density Residential." Those uses would not be entirely consistent with the DOE ROD, which designated parts of the buffer area as Preservation to protect Tribal cultural and historic sites located within that property. However, DOE intends to maintain ownership and use of the property as described in the EA for the foreseeable future, including the protective designation for Tribal sites within the buffer area. As part of the proposed action, PNSO does

not plan to develop the buffer area, other than possible extension of fencing. Therefore, as long as the area remains vacant, no incompatibility issues with existing local land-use plans are anticipated.

Comment 5:
The EA presumes that storm water will be routed to the soil or to groundwater via injection wells, apparently without treatment. Oil and grease, metals, fertilizer and pesticide residues, etc. typically occur in surface runoff from developed areas. The EA needs to explain how storm water release to the soil would not degrade groundwater on the site.

DOE Response:
If required, the storm water management system would be registered with the Washington State Department of Ecology, and would incorporate Best Management Practices as specified by Ecology for commercial facilities of comparable configuration. Section 5.1.3 of the EA has been revised to include this information. With an average annual precipitation of about 16 cm (6.5 in) there is little potential for degradation of groundwater from storm runoff.

Comment 6:
Section 4.6 and 5.1.6 address a number of habitat issues and acknowledge that construction will result in significant loss (26 hectares) of mature sagebrush-steppe habitat, noted as a priority habitat by the State of Washington. This loss raises several concerns:

Comment 6a. Alternative site development plans were not considered that might have reduced habitat loss. Development of the site as described in the EA seems to be incompatible with the goals of Hanford's Biological Resources Management Plan and Biological Resources Mitigation Strategy (BRMIS). Those plans explicitly call for preventing habitat loss through avoidance and minimization.

Comment 6b. BRMIS also calls for ensuring no net loss of habitat through mitigation. The mitigation strategy calls for mitigation of sagebrush habitat (at a 3:1 ratio) if habitat loss exceeds 0.5 hectares. The EA makes no mention of mitigation and does not identify a potential site that might be used for mitigation.

DOE Response:
The initial phase of PSF construction would be sited near the Horn Rapids Road, where the habitat has been previously disturbed. Much of the higher quality habitat at the north and west ends of the PNNL Site is expected to remain undisturbed, and any necessary disturbance to that habitat would be minimized to the extent practicable.

The Hanford Biological Resources Management Plan (BRMaP) and Biological Resources Mitigation Strategy (BRMiS) apply to operations on the Hanford Site managed by the DOE Richland Operations Office. Although application of those documents to PNSO activities is not mandatory, they were used as guidance and policy documents in planning construction operations. Various types of protective measures described in the BRMiS would be employed during construction of the PSF where practical for the smaller PNNL Site. For example, habitat removal at the PNNL Site will occur at a time when the bird nesting activities will not be disturbed. Following completion of each phase of the PSF on the PNNL Site, landscaping will include hardy, drought-tolerant native plants suitable to the region.

Comment 6c. Section 4.6 acknowledges failure to assess the presence or use of the site for nesting by sage sparrows (a state candidate species) or loggerhead shrikes (a federal species of concern and a state candidate species). The EA is incomplete without a more careful assessment of habitat losses and impacts for the alternatives.

DOE Response:
The proposed PSF construction site was extensively surveyed by biologists each year during the active bird nesting season for the past 4 years. During those surveys, every attempt was made to identify the presence of nesting bird species. Although DOE cannot definitively say that active nests were not missed during those surveys, they were performed by experienced professional biologists familiar with the site, and they were designed to be sufficient to detect the presence of protected species, if not every individual nesting bird.

Comment 6d. DOE's stated plan to minimize habitat loss is to avoid site destruction during the nesting season. Deferring habitat loss for one growing season does not prevent habitat loss. This approach does nothing to minimize long-term loss.

DOE Response:
Restricting construction to avoid the bird nesting season, as discussed in Section 5.1.6 of the EA, limits direct impacts to nesting birds, including species that are federal species of concern, Washington State candidate species, or that are protected under the Migratory Bird Treaty Act. That restriction was not intended primarily to mitigate habitat loss. However, disturbance of higher quality habitat within the PNNL Site would be minimized to the extent practicable.

Comment 7:
In comments responding to PNSO's October 12 letter to EPA about site transfer, and in discussions with James Rispoli, staff from the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) have identified a number of concerns regarding transfer and development of the PNNL and buffer sites related to cultural resources and management of the lands. Those concerns do not appear to be adequately addressed in the draft EA.

DOE Response:
Comments received from the CTUIR are addressed elsewhere in this appendix. Reassignment of the proposed PSF construction site from the DOE Office of Environmental Management Hanford Site to the DOE Office of Science PNNL Site was completed in 2004. Reassignment of the buffer area is currently in progress. Neither Council on Environmental Quality (CEQ) nor DOE NEPA procedures require a documented NEPA review for property reassignments within DOE where proposed use of the property would not change. Management of culturally significant sites within the buffer area, including provision for Tribal access, is not expected to change as a result of the pending DOE action, other than that coordination would occur through PNSO rather than through the DOE Richland Operations Office. Construction of the PSF as described in the EA would take place outside the buffer area, and would not result in environmental impacts to previously identified Tribal cultural and historic sites.

Nez Perce Tribe, Hanford Cultural Resources, Lapwai, ID

Comments received: December 13, 2006 (draft), December 18, 2006 (final)

Comment: Summary, Purpose and Need
"Long term federal agency mission needs … DOE needs … replacement laboratory/infrastructure for PNL research and development"

- What are these needs?
- Where are they stated?
- What is the scientific mission expressed in this section?

DOE Response:
PNSO thanks the Nez Perce for their review and comments on the PSF EA. Additional information regarding the types of replacement facilities needed and research activities to be performed within those facilities can be found in the main text of the EA (Sections 2 and 3.1, description of the Physical Sciences Facility), as well as in the DOE-PNSO (2005) Mission Needs Validation Report cited in the EA (reference in EA Section 8). Both the EA and supporting reference documents are available at the DOE Richland Public Reading Room, WSU-Tri-Cities, or by request from the PNSO document manager at the address listed in the EA.

Comment: Summary, Affected Environment
"Cultural and historic resources have been identified within some portions of the proposed construction site and buffer zone and appropriate measures for their management have been established."

- This is not true, only a NHPA section 106 review has been done for the area where they will be constructing the new facility not for the area that they have determined to be the buffer area. No appropriate measures have been made with the Tribe to address these concerns.

DOE Response:
Portions of the buffer area were surveyed for cultural resources in conjunction with a previous DOE NEPA review (Environmental Assessment for the Environmental and Molecular Sciences Laboratory at the Hanford Site, Richland, Washington, DOE/EA-0429). PNSO has not initiated an additional NHPA Section 106 review (36 CFR Part 800, Subpart B) for the PNNL buffer area, because there is no proposal to change the existing land use (including current provisions for tribal access). PNSO would follow the applicable cultural resource review and consultation procedures to comply with NHPA Section 106 if any changes to existing land use are proposed in the future.

Comment: Summary, Affected Environment
"Investigations of potential hazardous materials at the site did not identify any contaminants present in surface soil or ground water that would require remedial action"

- Contamination of any new area is not in the best interest of the Nez Perce Tribal Hanford Cultural Resources (HCR)

DOE Response:
The cited text from the EA refers to potential existing contamination at the construction site that may have resulted from past activities in the vicinity. PNSO would construct the PSF to minimize release of contaminants to the environment, and would take appropriate measures during facility operation to prevent release of additional contaminants in the vicinity of the PSF. In Section 3 of the EA, information is provided about water runoff and spill management requirements, and pollution prevention and waste minimization measures that are expected to be implemented at the new facility to reduce the possibility of a release. The impacts of potential accidental releases and waste management activities are addressed in Section 5.

Comment: Summary, Environmental Consequences
"Routine radiological, chemical and other operational effluents are not expected to result in human impacts… Because the impacts from facility operations are projected to be small in all cases, there would be no opportunity for disproportionate and adverse impacts on minority or low-income populations, nor would cumulative impact with other ongoing operations in the region be expected."

- Cumulative effects can not be dismissed because lack of a scoping process. (*refer back to the definition of cumulative impact "40 CFR 1508.7" that is cited in this document*)
- This may be an issue for environmental justice, because every environmental consequence is significant at some scale of time or place and vice-versa, hence cumulative effect.

DOE Response:
PNSO recognizes that any new development within the region could contribute to the loss of natural resources. As noted in Section 5.1.1, construction could disturb up to 32 ha (82 ac) near the southern end of the proposed construction site, much of which has been previously disturbed and which is separated from nearby habitat by major roads. Compared to 586 square miles (152,000 ha) of similar habitat within the adjacent Hanford Site (of which over 90% has remained relatively undisturbed), construction of the PSF was not considered to constitute a significant cumulative impact.

Cumulative impacts were addressed in the EA, consistent with regulatory requirements in 40 CFR 1508.7 and the Council on Environmental Quality's (CEQ) guidance. The CEQ regulations regarding cumulative impacts are intended to identify cases where impacts from several individually minor actions could together result in a significant cumulative impact, which is not the case for the proposed action discussed in the EA. CEQ further advises that

> *"The continuing challenge of cumulative effects analyses is to focus on important cumulative issues, recognizing that a better decision, rather than a perfect cumulative effects analysis, is the goal of NEPA and environmental impact assessment professionals."*

In no case would impacts from the proposed action, when combined with those from other actions taking place concurrently or in the reasonably foreseeable future, be expected to result in significant cumulative effects.

Environmental justice concerns would arise where there was potential for high and disproportionate impacts to members of minority and low income groups. Because impacts resulting from activities proposed in the PSF EA were small in all cases, there would be no opportunity for both high and disproportionate adverse impacts on minority and low income populations.

Comment: Section 3.1
"In addition, DOE-RL is in the process of reassigning property to the north and east of the current PNNL site to DOE-SC. That area would serve as a restricted access buffer … No construction is currently planned … other than installation and maintenance of fencing at the boundary…"

- Any form of effect to the EMSL cemetery (including establishing a fence line), which is eligible for inclusion to the National Register of Historic Places, has to go thru a NHPA section 106 *(36 CFR 800)* to address any potential effects to that site.
    - What type of fence?
    - Is this fence replacing the old one, or will the old fence be incorporated into the fence installation plan?
- It is **not** in the best interests of HCR to have that area established as a buffer area. Establishing it as a buffer area is still an action for utilization and could result in an effect thru a direct, indirect or cumulative.
- Agency Officials should ensure that preparation of an EA and FONSI includes appropriate scoping, identification of historic properties, assessment of effects upon them and consultation leading to the results of any adverse effects. *(36 CFR 800.8 (a) (3))*

DOE Response:
Reassignment of the identified DOE property to PNSO would not change the current use of the property; therefore, this action is not subject to requirements in 36 CFR 800. The property is part of the DOE Hanford Site and has served as a buffer to provide separation between operations in the 300 Area and the Site boundary since the 1940s. As proposed in the EA, the property would continue to serve the same purpose as a buffer between PSF operations and the PNNL Site boundary.

Areas of the property containing Tribal historic and cultural resources were fenced previously to protect the site and to restrict trespass by unauthorized persons. Under current plans, PNSO would continue to maintain the existing fence. The type and extent of additional fencing that may be required in the future depends on safety and security requirements associated with operation of the PSF. If new fencing is installed, PNSO would comply with applicable cultural resource review and consultation procedures and regulations. There are no other plans for development of the buffer area.

Potential impacts on historic and cultural resources were considered by DOE during the internal scoping process for the PSF EA. Public scoping is only required for an environmental impact statement under CEQ and DOE regulations (40 CFR 1501.6-1501.7 and 10 CFR 1021.310, respectively). Known cultural and historic resources potentially affected by the proposed action are described in Section 4.5 of the EA, and potential impacts on those resources are addressed in Section 5.5.

Consultation under 36 CFR 800 was initiated with a cultural resources review of the proposed construction site (Appendix A), and the results of the review were provided to the Nez Perce Tribe via letter dated December 16, 2004. The Nez Perce Tribe was formally notified of PNSO's intent to prepare an EA through a letter dated March 23, 2006, and a copy of the draft EA was provided for comment on November 13, 2006. PNSO concludes that it has met regulatory responsibilities for Tribal notification and review of environmental assessments as specified in 10 CFR 1021.301 (c) and (d).

Comment: Section 3.1
"The property north of the Horn Rapids road is located in Benton County, and it is being considered for annexation to the City of Richland as part of the city's urban growth area.

This is not in the best interest of the HCR; this presumes that DOE may in the future allow privatization from the City of Richland of that area.

DOE Response:
The concern is noted. However, DOE is required by NEPA to evaluate proposed actions for compatibility with land use plans established by local governing agencies. DOE intends to maintain ownership and use of the property as described in the PSF EA for the foreseeable future, including provisions for Tribal access and protection of known cultural sites within the buffer area.

Comment: Section 3.2
Because these alternatives are not evaluated in detail it could sway the decision making process. These alternatives should be expressed in thorough detail to understand the impacts and risk concerns.

DOE Response:
The EA provides sufficient information for PNSO to understand the environmental impacts of operating the PSF, and to determine whether the proposed action represents a major federal action that could have significant environmental impacts.

Because the activities would be similar wherever they are located, the impacts as described in the EA are expected to adequately represent those from alternatives to the proposed action. The environmental impacts of alternatives to the proposed action are discussed qualitatively in Section 3.2 of the EA, relative to the impacts presented in Section 5 of the EA for the proposed action. As a result of a previous cost and feasibility screening (which is also summarized and cited in Section 3.2 of the EA), PNSO concluded that use of existing facilities, or construction of new facilities in alternate locations, was not reasonable because of cost or operational considerations. Therefore, a more detailed analysis of the environmental impacts of those alternatives did not appear to be required or warranted.

Comment: Section 4.5
"In 1994, excavation in the eastern portion of the buffer area identified a site of cultural significance to regional tribes. As a result of this cultural resource, DOE committed to protect the area from future disturbances and established a perimeter fence around the area. In addition, two pre-historic sites are located in the eastern portion of the buffer area near the shore of the Columbia River. These sites are listed in the State of Washington Heritage Register…"

- This site is also eligible for inclusion in the National Register of Historic Places and has a Smithsonian Trinomial number.
- The idea of this area being included for use as a buffer area is not acceptable. It should remain a restricted non-use area protected from any type of development or disturbance. Designating it as a buffer area is an action for utilization although it is expressed within this document that this area will not be utilized.
- What exactly did DOE commit to, is this documented?
- Where is the boundary area defined?

DOE Response:
The property to the north and east of the proposed PSF construction site is part of the DOE Hanford Site and has served as a buffer to provide separation between operations in the 300 Area and the Site boundary since the 1940s. As proposed in the PSF EA, the property would continue to serve the same purpose as a buffer between PSF operations and the PNNL Site boundary. Current plans do not include development of the buffer area, other than possibly installing additional protective fencing.

The potential historic and cultural significance of Tribal sites within the buffer area has been recognized by DOE. In the Record of Decision for the 1999 Hanford Comprehensive Land-Use Plan EIS, DOE designated land use for the site of cultural significance as Preservation. That designation protects unique resources and requires active management practices to preserve existing resources. When the buffer area is reassigned from the Hanford Site to the DOE Office of Science, PNSO intends to abide by the protective designation for Tribal cultural sites within the property. If PNSO proposes future development within parts of the buffer area other than the protected sites, it would comply with applicable procedures and regulatory requirements for consultation and protection of historic and cultural resources. The boundaries of the proposed construction site and buffer area are shown in Figure 3.1 and further defined in Sections 3.1 and 5.1.1 of the EA.

Comment: Section 5.1.1
"An additional adjacent area of up to 12 ha (32 ac) would likely be disturbed during construction for access roads and construction materials laydown."

- Where would this area be located, and has it gone thru a review process. If not perhaps one has to be done. Inclusion of this projected area piggybacking with this EA is a violation of federal regulation and could be anticipated as anticipatory demolition as defined in 36 CFR 110 (k).

DOE Response:
The "adjacent area" refers to property immediately adjacent to the planned PSF structures and is within the proposed construction site referred to in the EA. A cultural resources review has been performed for the site, and appropriate measures have been established with the responsible agencies for management of known resources, or for disposition of potential historic and cultural resources that may be discovered within the site during construction (Appendix A).

Comment: Section 5.1.1
"Even though the federal government is not subject to local planning authority, the activities within the proposed site for construction and operation of the PSF would be consistent with adjacent land uses planned by the City of Richland and Benton County…"

- This may become a concern in the near future.

DOE Response:
The concern is noted. However, DOE is required by NEPA to evaluate proposed actions for compatibility with land use plans established by local governing agencies. DOE intends to maintain ownership and use of the property as described in the PSF EA for the foreseeable future.

Comment: Section 5.1.5
"*No other resources of possible cultural or historical interest were found"*

- This does not include the area east of the proposed facility.
- Most reviews that are done to address cultural resources involve a surface survey only. These types of surveys do not discredit that there will not be any type of cultural resource found or effected. It just states none where found at that time.

DOE Response:
The statement cited refers to the PSF construction site, which has undergone a cultural resources review (Appendix A). The cultural resources review specifies procedures to be used where excavation could potentially disturb sites of cultural or historic interest. Any previously unidentified resources discovered during construction would be managed in accordance with those procedures and applicable regulatory requirements.

There are no plans to develop the buffer area east of the PSF construction site as part of the proposed action. PNSO would continue to maintain the existing fence surrounding a previously identified area of cultural importance to the Tribes. Therefore, no additional surveys for cultural or historic resources within the buffer area are planned or required. If the existing fence is extended in the future, PNSO would comply with applicable procedures and regulations for consultation and cultural resource protection.

Comment: Section 5.1.5
"The fenced area within the eastern portion of the buffer area is of cultural significance to regional Tribes and aside from maintenance of fencing, the area would remain undisturbed. The opportunities for Tribal access to that area would remain unchanged."

- There currently is no document that states PNSO or other future land managers will keep this land undisturbed.
- Again the buffer area is not defined.

DOE Response:
Management of cultural sites within the buffer area was addressed in the 1999 Hanford Comprehensive Land-Use Plan EIS. In the Record of Decision for that document, DOE designated land use for the site of cultural significance as Preservation. That designation protects unique resources and requires active management practices to preserve existing resources.

The boundaries of the proposed construction site and buffer area are shown in Figure 3.1 and further defined in Sections 3.1 and 5.1.1 of the EA.

Comment: Section 5.1.5
"As a protective measure for unknown cultural resources, archeologists would monitor excavations as appropriate, and site construction workers would be instructed to watch for artifacts. If artifacts of potential significance were found, work would stop, and the designated archeologist monitor would be notified."

- These 3 comments are included within this section; however they are not stated within the MOA of 2005 between the DOE and SHPO regarding adverse effect to the Richland Irrigation Canal. The order that they follow the stipulation of the MOA is misleading and should be clarified.
- The Nez Perce Tribe was not party to that MOA.

DOE Response:
The statements are correct. However, the cited text in Section 5.1.5 of the EA refers to procedures established as part of the cultural resources review for the proposed PSF construction site. Those procedures are intended to protect previously unidentified materials that may be discovered during construction. The text of the EA has been revised to clarify.

The 2005 MOA was an agreement between DOE and the SHPO regarding management of the Richland Irrigation Canal; it was not intended to address any other existing or potential sites of cultural and historic interest. The cultural resource review and the MOA are reproduced in Appendix A of the EA. Consultation under 36 CFR 800 was initiated when the results of that review were provided to the SHPO and the Tribes, including the Nez Perce Tribe, via letters dated December 16, 2004.

Comment: Section 5.1.15
"*Based in the results of analyses presented in the previous sections, impacts in <u>most</u> resource areas were projected to be minimal*"

- Please refer to your quote from 40 CFR 1508.7, which defines cumulative impact.

  "the impact on the environment from the incremental impact of the action when added to other past, present, and reasonably future actions regardless of what agency (federal of non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant action taking place over a period of time."
- What about the other areas not mentioned, are they impacted?

DOE Response:
Text in the EA was revised to clarify that impacts in all resource areas were found to be minimal. Consistent with the "sliding scale" approach recommended by CEQ and DOE, cumulative impacts are only discussed for those resource areas that are potentially of more concern, or where a small, but hypothetical, effect could be estimated. In no case would impacts from the proposed action, combined with those from other actions taking place concurrently or in the reasonably foreseeable future, be expected to result in a significant cumulative effect.

Comment: Section 7.0
Nez Perce Tribe was not formally consulted on this Environmental Assessment. (attach copy of NPT ERWM Consultation Process)

DOE Response:
Consultation under 36 CFR 800 was initiated with a cultural resources review for the proposed PSF construction site (Appendix A), which was provided to the Nez Perce Tribe via letter dated December 16, 2004. The Nez Perce Tribe was formally notified of PNSO's intent to prepare an EA through a letter dated March 23, 2006. As additional project information was developed, PNSO participated in regularly scheduled Cultural Issues meetings to provide information about the proposal and to solicit comments

and suggestions. On November 13, 2006, a copy of the draft EA was provided to the Nez Perce Tribe, and comments were solicited via those direct mailings to Tribal contacts as well as through local media. PNSO concluded that it met regulatory responsibilities for Tribal notification and review of environmental assessments as specified in 10 CFR 1021.301 (c) and (d).

Comment: Section 8.0
(Add reference to) DOE Native American Indian Policy

DOE Response:
Section 6 of the EA was revised to cite the DOE American Indian and Alaska Native Tribal Government Policy, and it was added to the reference list in Section 8.

Comment: Appendix A
- This review was conducted only on the parcel of land that would host the PSF. The other areas east of this site are not included in this review. An additional Cultural Resource Review needs to be conducted to address concerns with cultural property effects. "36 CFR 800"

- The Nez Perce Tribe is not a party to the MOA between U.S. DOE and the Washington SHPO regarding the adverse effects to the Richland Irrigation Canal. (Site H3-21) –signed 6/22/05

DOE Response:
Portions of the buffer area were surveyed for cultural resources in conjunction with a previous DOE NEPA review (Environmental Assessment for the Environmental and Molecular Sciences Laboratory at the Hanford Site, Richland, Washington, DOE/EA-0429). Other than maintenance of the existing fence surrounding a Tribal cultural site, DOE plans no disturbance or change to the existing land use within the buffer area. Therefore, it was concluded that additional cultural resources review is not required. If future activities are proposed that would potentially disturb cultural resources or change land use within the PNNL buffer area (including extension of the existing fence), DOE would comply with applicable regulations and requirements for consultation and protection of cultural resources.

The statement regarding the 2005 MOA is correct. However, the MOA was an agreement between DOE and the SHPO regarding management of the Richland Irrigation Canal; it was not intended to address any other sites of cultural and historic interest. Consultation under 36 CFR 800 was initiated when the cultural resource review for the proposed PSF construction site was provided to the SHPO and the Tribes, including the Nez Perce Tribe, via letters dated December 16, 2004 (Appendix A).

Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Department of Science and Engineering, Pendleton, OR

Comments received: January 5, 2007 (Letter dated December 26, 2006)

Because the letter was received after the close of the comment period for the EA, the comments are summarized in this appendix, and the following responses are provided to address major issues raised in the letter. The letter also discussed administrative and legal issues not directly related to NEPA requirements; only issues affecting the EA are addressed in this appendix.

Issue: "The serious natural resource and regulatory issues raised in the EA took more than 30 days to review, and have resulted in a lengthened time to compile our comments. … While we do not think that an entire EIS is required, these issues are too serious to simply be addressed by an EA with a short comment period. For example, we believe that another alternative or alternatives should be required that for example preserves the northern 2/3 of the triangle (which is prime old growth sage habitat), or uses previously disturbed areas by building part of the new facility behind the EMSL building (close to Stevens Bypass), and using the existing 300 Area and buildings for the radiological operations."

DOE Response:
PNSO thanks the CTUIR for their review and comments, and agrees that the impacts as presented in the final PSF EA do not warrant preparation of an EIS. The draft EA was distributed via letter on November 13, 2006, and the comment period extended through December 13, 2006. The 30-day period provided for comments exceeded the regulatory minimum of 14 days. At the request of the CTUIR, PNSO allowed additional time for them to survey the proposed construction site and submit comments after the close of the formal comment period.

PNSO did consider alternatives to the proposed action, which are discussed in Section 3.2 of the EA. As a result of a previous cost and feasibility screening (which is summarized and cited in Section 3.2), it was concluded that use of existing facilities, or construction of new facilities in alternate locations, was not reasonable because of cost or operational considerations. Therefore, a more detailed analysis of the environmental impacts of those alternatives did not appear to be required or warranted.

As part of the phased approach to constructing the PSF, PNSO is currently considering use of four serviceable facilities in the southern part of the 300 Area for some ongoing PNNL activities, over a period of up to 20 years. Implementing the phased approach as described in the EA would reduce the size of the initial phase PSF to about 70-75% of the full facility, but it would not completely eliminate the need for additional space to accommodate activities relocated from other 300 Area facilities in the near term.

The initial phase of new construction for the PSF would be sited near Horn Rapids Road, where the habitat has been previously disturbed. Much of the higher quality habitat at the north and west ends of the PNNL Site is expected to remain undisturbed, and any necessary disturbance to that habitat would be minimized to the extent practicable.

Issue: Relationship of the proposed action under the National Environmental Policy Act (NEPA) to requirements under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA) was not acknowledged in the EA review process. The proposed PSF construction site and buffer area are within a CERCLA operable unit that contains groundwater contamination. The property should not be reassigned to PNSO until it is better characterized for contamination. "We [the CTUIR] do not agree with a blanket dismissal of groundwater with the phrase 'did not identify any contaminants present in surface soil or groundwater that would require remedial action.' We have not seen data proving that this is a true statement."

DOE Response:
The proposed PSF construction site and the buffer area were previously evaluated for both surface and groundwater contaminants as part of the CERCLA process for the 300-FF-5 and 300-FF-2 operable units, and the results are documented in the interim records of decision (RODs) for those units (EPA 1996, 2001).

Nitrate in the groundwater underlying much of north Richland originates from offsite activities and was not identified as a contaminant of concern for the 300-FF-5 operable unit. The selected remedy in the 300-FF-5 interim ROD includes requirements for monitoring groundwater concentrations of uranium, tritium, and cis-1,2-dichloroethene, and requires that DOE maintain institutional controls to restrict groundwater use and minimize potential impacts on public health or safety (EPA 1996).

The portion of the PNNL Site located north of Horn Rapids Road is also a small part of the Hanford 300-FF-2 surface operable unit. Two waste sites located within this unit have been investigated as part of the CERCLA process. A CERCLA interim ROD (EPA 2001) concluded that there was no significant regulated waste at either waste site, and no further remedial action was required.

The EA provides general information about a proposal to remove the PSF construction site from the National Priorities List. Completion of that action would not be required in order for PNSO to proceed with construction of the proposed PSF. Section 4.7 provides information about the extent of contamination at the construction site, including the status of the CERCLA interim Records of Decision, and the fact that groundwater at the site is contaminated with nitrate at concentrations above drinking water standards as well as low levels of other contaminants. The text in Section 4.7 of the EA has been revised to clarify these points. Should partial deletion of the proposed construction site and buffer area be completed, that action would not preclude the requirement for cleanup if future conditions warrant (40 CFR 300.425(e)(3)). The Tribes would have additional opportunities for input when the site is proposed for partial deletion, or as part of the comment process during future CERCLA Five-Year Reviews.

Issue: "This section [5.1.3] is quite vague regarding stormwater and the apparently large footprint of trenches, drains, and catch basins that could be needed. There is no mention of storm water requirements or the non-point source contamination that could result."

DOE Response:
Section 3.1 of the EA provides general information about water runoff and spill management requirements, and pollution prevention and waste minimization measures that are expected to be implemented at the new facility to reduce the possibility of groundwater contamination. If required, the storm water management system would be registered with the Washington State Department of Ecology, and would incorporate Best Management Practices as specified by Ecology for commercial facilities of comparable configuration. Section 5.1.3 of the EA has been revised to include this information. With an average annual precipitation of about 16 cm (6.5 in) there is little potential for degradation of groundwater from storm runoff.

Issue: The proposed PSF construction site and buffer area contain natural resources that are valued by the CTUIR and which would be disturbed if the proposed action is implemented. The EA focuses on resources that are subject to regulatory restrictions (threatened and endangered species or critical habitat) and undervalues other resources that exist on the site. "We [the CTUIR] have not been apprised of any natural resource surveys. In fact, the biological surveys were superficial and incorrect... No ecological survey has been undertaken in the buffer area that seems to be part of this EA."

DOE Response:
The proposed PSF construction site was extensively surveyed by biologists each year for the past 4 years, and the results of those surveys are summarized and cited in the EA. The surveys were performed by experienced professional biologists familiar with the site, and they identified all plants and

animals observed within the area. The most recent review is included in Appendix B, and the other reviews cited in the EA are available at the WSU-TC DOE Public Reading Room, or from the PNSO document manager at the address listed in the EA.

DOE is required to identify threatened or endangered species where they may exist in the region of influence for a proposed action, but that does not imply that impacts on other resources are not noted or considered. Restricting construction to avoid the bird nesting season, as discussed in Section 5.1.6 of the EA, would limit direct impacts to all nesting birds, including species that are federal species of concern, Washington State candidate species, or that are protected under the Migratory Bird Treaty Act. That restriction was not primarily intended to mitigate habitat loss. However, PNSO will minimize disturbance of the higher quality habitat in the northern and western portion of the construction site to the extent practicable.

There are no plans to develop the buffer area east of the PSF construction site as part of the proposed action. Therefore, no additional surveys for biological resources within the buffer area are required or planned. If DOE proposes activities that would disturb the buffer area in the future, it would comply with applicable requirements for consultation and natural resource protection.

Issue: DOE should mitigate construction damage to natural resources according to provisions of the Hanford BRMaP and BRMiS. "The entire 'triangle' must be mitigated even if the square footage of the tangible footprint is somewhat less than this. The ecological footprint is even bigger than the 'triangle' since it effectively breaks the only corridor to the river for many miles."

DOE Response:
The Hanford Biological Resources Management Plan (BRMaP) and Biological Resources Mitigation Strategy (BRMiS) apply to operations on the Hanford Site managed by the DOE Richland Operations Office. Although application of those documents to PNSO activities is not mandatory, they were used as guidance and policy documents in planning construction operations. Various types of protective measures described in the BRMiS would be employed during construction of the PSF where practical for the smaller PNNL Site. For example, habitat removal at the PNNL Site will occur at a time when the bird nesting activities will not be disturbed. Following completion of each phase of the PSF on the PNNL Site, landscaping will include hardy, drought-tolerant native plants suitable to the region.

There is a corridor immediately north of the proposed construction site that is expected to remain undisturbed, and that would provide a route for movement of wildlife (Figure 3.1). If additional fencing is installed in the future, it would not encompass the entire corridor, and therefore would not present a barrier to wildlife movement.

Issue: Reassignment of the proposed buffer area to PNSO should not take place unless requirements for protection of natural resources are implemented and implications for boundaries and oversight are understood. The reassignment "must come with a covenant to preserve the entire rest of the area between George Washington Way and the current surface fence of the 300 Area. It must also come with funding for intensive restoration to be conducted by CTUIR and/or the NRTC [Natural Resources Trustee Council] (not by PNNL)."

DOE Response:
The boundaries of the proposed construction site and buffer area are shown in Figure 3.1 and further defined in Sections 3.1 and 5.1.1 of the EA. Reassignment of the proposed PSF construction site from the DOE Office of Environmental Management to the DOE Office of Science was completed in 2004. Reassignment of the buffer area is currently in progress. Neither Council on Environmental Quality (CEQ) nor DOE NEPA procedures require a documented NEPA review for property reassignments within DOE where proposed use of the property would not change. Use of DOE property within the buffer area, including provisions for Tribal access to culturally significant areas, would not change as a result of activities proposed in the EA. The property is part of the DOE Hanford Site and has served as a buffer to provide separation between operations in the 300 Area and the Site boundary since the 1940s. As proposed in the EA, the property would continue to serve the same purpose as a buffer between PSF operations and the PNNL Site boundary.

Issue: "We absolutely and strenuously object to labeling this parcel as being designated as Business-Research Park and Richland Urban Growth areas. … The importance of natural and cultural resources in this parcel are so great that it is incomprehensible how DOE could make this assertion…"

DOE Response:
The discussion in Section 4.1 of the EA referred to land use designations by the City of Richland, rather than by DOE:

> *"Under the City of Richland Comprehensive Plan Land Use Designation, as amended December 2005 (City of Richland 2005a), future land use for the PSF construction site is designated as "Business/Research Park," and the buffer area is designated as a mix of "Business/Research Park," "Commercial," and "Low Density Residential."*

The concern is noted. However, DOE is required by NEPA to evaluate proposed actions for compatibility with land use plans established by local governing agencies. PNSO intends to maintain ownership and use of the property as described in the EA for the foreseeable future. If DOE proposes to change its use of the area, it would comply with applicable requirements for consultation and protection of natural and cultural resources.

The potential historic and cultural significance of Tribal sites within the buffer area has been recognized by DOE. In the Record of Decision for the 1999 Hanford Comprehensive Land-Use Plan EIS, DOE designated land use for the site of cultural significance as Preservation. That designation protects unique resources and requires active management practices to preserve existing resources. When the buffer area is reassigned from the Hanford Site to the DOE Office of Science, PNSO intends to abide by the protective designation for this site. Section 4.1 has been revised to correct the apparent inconsistency and to clarify that culturally significant sites in the buffer area fall within the designated Preservation area.

Issue: "This section [5.1.10] includes the first mention of 36 acres of landscaping irrigation. … No mention of xeriscaping is made, or the preservation of habitat between buildings."

DOE Response: *Landscaping would use plants suitable to the Mid-Columbia region. The plant selection would include hardy, drought-tolerant plants for ease of maintenance and to minimize the need for pesticide and herbicide applications.*

Issue: Disturbance of natural resources within the PSF construction site and the buffer area would have "adverse and disproportionate impacts on minority populations (us) because our Trust resources would be irreparably lost. … No other demographic or socioeconomic group suffers this loss."

DOE Response:
Environmental justice concerns would arise where there was potential for high and disproportionate impacts to members of minority and low income groups. PNSO recognizes that individuals may place differing values on various resources. However, because impacts resulting from activities proposed in the EA were small in all cases, there would be no opportunity for both high and disproportionate adverse impacts on minority and low income populations.

Issue: Disturbance of natural resources within the PSF construction site constitutes a significant cumulative impact on these resources within the region.

DOE Response:
PNSO recognizes that any new development within the region could contribute to the loss of natural resources. As noted in the EA, Section 5.1.1, construction could disturb up to 32 ha (82 ac) near the southern end of the proposed construction site, much of which has been previously disturbed and which is separated from nearby habitat by major roads. Compared to 586 square miles (152,000 ha) of similar habitat within the adjacent Hanford Site (of which over 90% has remained relatively undisturbed), construction of the PSF was not considered to constitute a significant cumulative impact.

Cumulative impacts were addressed in the EA, consistent with regulatory requirements in 40 CFR 1508.7 and the Council on Environmental Quality's (CEQ) guidance. The CEQ regulations regarding cumulative impacts are intended to identify cases where impacts from several individually minor actions could together result in a significant cumulative impact, which is not the case for the proposed action discussed in the EA. CEQ further advises that:

> *"The continuing challenge of cumulative effects analyses is to focus on important cumulative issues, recognizing that a better decision, rather than a perfect cumulative effects analysis, is the goal of NEPA and environmental impact assessment professionals."*

Consistent with the "sliding scale" approach recommended by CEQ and DOE, cumulative impacts are only discussed for those resource areas that are potentially of more concern, or where a small, but hypothetical, effect could be estimated. In no case would impacts from the proposed action, combined with those from other actions taking place concurrently or in the reasonably foreseeable future, be expected to result in a significant cumulative effect.

Issue: Neither the CTUIR nor the NRTC were consulted regarding the proposed action.

DOE Response:
Consultation under 36 CFR 800 was initiated with a cultural resources review of the proposed construction site (Appendix A), and the results of the review were provided to the CTUIR via letter dated December 16, 2004. The CTUIR was formally notified of PNSO's intent to prepare an EA through a letter dated March 23, 2006. As project information was developed, PNSO participated in regularly scheduled Cultural Issues meetings to provide information about the proposal and to solicit comments and suggestions. Plans for development of the PNNL laboratories have also been provided regularly to local news media. On November 13, 2006, a copy of the draft EA was provided to the CTUIR, and comments were solicited via those direct mailings to Tribal contacts as well as through local media. PNSO concludes that it met regulatory responsibilities for Tribal notification and review of environmental assessments as specified in 10 CFR 1021.301 (c) and (d).