

APPENDIX I

SUMMARY OF NON-DOE FACILITIES

PACIFIC NORTHWEST NATIONAL LABORATORY

Pacific Northwest National Laboratory (PNNL), one of the U.S. Department of Energy (DOE) Office of Science's (SC's) 10 national laboratories, provides innovative science and technology development in the areas of energy and the environment, fundamental and computational science, and national security. DOE's Pacific Northwest Site Office (PNSO), which was established in 2003, is responsible for oversight of PNNL at its campus in Richland, Washington, and at its facilities in Sequim, Seattle, and North Bonneville, Washington, and Corvallis and Portland, Oregon.

In 1964, the federal government issued a request for contractors to bid to operate the Hanford Site laboratories to conduct research and development (R&D) activities related to nuclear energy and the non-destructive use of nuclear materials. In January 1965, Battelle Memorial Institute, a not-for-profit, applied science and technology organization was awarded the Pacific Northwest Laboratory (PNL) contract and, as part of the successful proposal, was able to invest its own funds to construct facilities to conduct non-Hanford Site research to promote R&D around the Pacific Northwest. Battelle bought 93 ha (230 ac) of former Camp Hanford land from the City of Richland to build its facilities. Under the original contract, more than 2200 former General Electric Company employees joined the Battelle workforce.

In the late 1970s, research expanded into energy, health, environmental, and national security endeavors. With the expanded areas of research, PNL contributed to areas such as robotics, environmental monitoring, material coatings, veterinary medicine, and the formation of new plastics. In 1995, PNL was renamed Pacific Northwest National Laboratory. Throughout the ensuing years, PNNL researchers have developed versatile technologies, earning numerous R&D 100 awards, Federal Laboratory Consortium awards, and Innovation awards for their R&D work and contributions.

As of September 2013, PNNL employed 4344 staff members. PNNL's FY 2013 funding totaled \$1.06 billion, with \$936 million in total spending during the fiscal year. A total of 716 undergraduate students, graduate students, post-doctoral students, and faculty participated in post-secondary fellowships and intern programs at PNNL in FY 2013. PNNL's research activities in FY 2013 generated 264 invention disclosures, 60 patent filings, 36 patents granted, and 41 commercial and research license agreements issued. In addition, PNNL researchers had almost 1200 peer-reviewed, published articles (Scott and Niemeyer 2014).

The PNNL Richland campus is located in Benton County in southeastern Washington State, at the northern boundary of the City of Richland and south of the DOE-Richland Operations Office's (DOE-RL's) Hanford Site 300 Area. The PNNL campus covers approximately 247 ha (610 ac), encompassing the DOE-owned PNNL site, adjacent land and facilities owned by Battelle that are under an exclusive-use agreement with DOE, and leased facilities located on private land and the Washington State University Tri-Cities campus (Figure I-1, from Duncan et al. 2014). The area immediately south of the PNNL campus includes public and privately owned land, currently envisioned to be developed with office, laboratory, residential, and retail space as part of the Tri-Cities Research District.

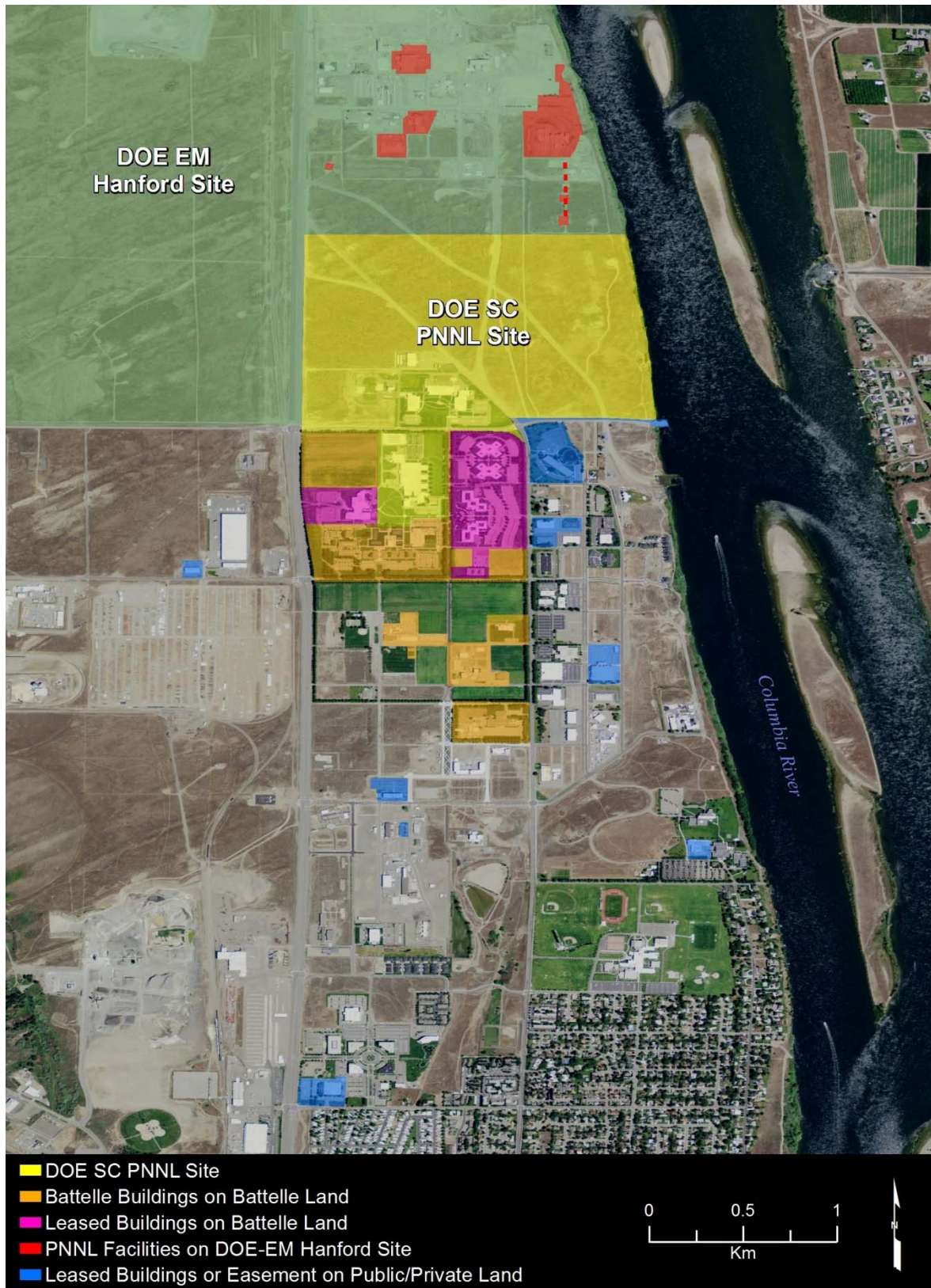


Figure I-1. Pacific Northwest National Laboratory campus and surrounding area.

In May, 2007, DOE-SC and the DOE Office of Environmental Management (EM) signed a memorandum of agreement (DOE 2007) allowing PNNL to continue to occupy four facility complexes in the 300 Area, including supporting utilities/structures solely dedicated to operation of the facilities until DOE-SC no longer needs these facilities. These facilities (shown in Figure I-2) provide core capabilities in applied nuclear science and technology and enable environmental, energy, and national security research involving higher-risk activities. At the end of occupancy of the retained facilities, DOE-SC will release the facilities to DOE-EM for demolition and cleanup pursuant to Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requirements in effect as dictated by the Tri-Party Agreement.

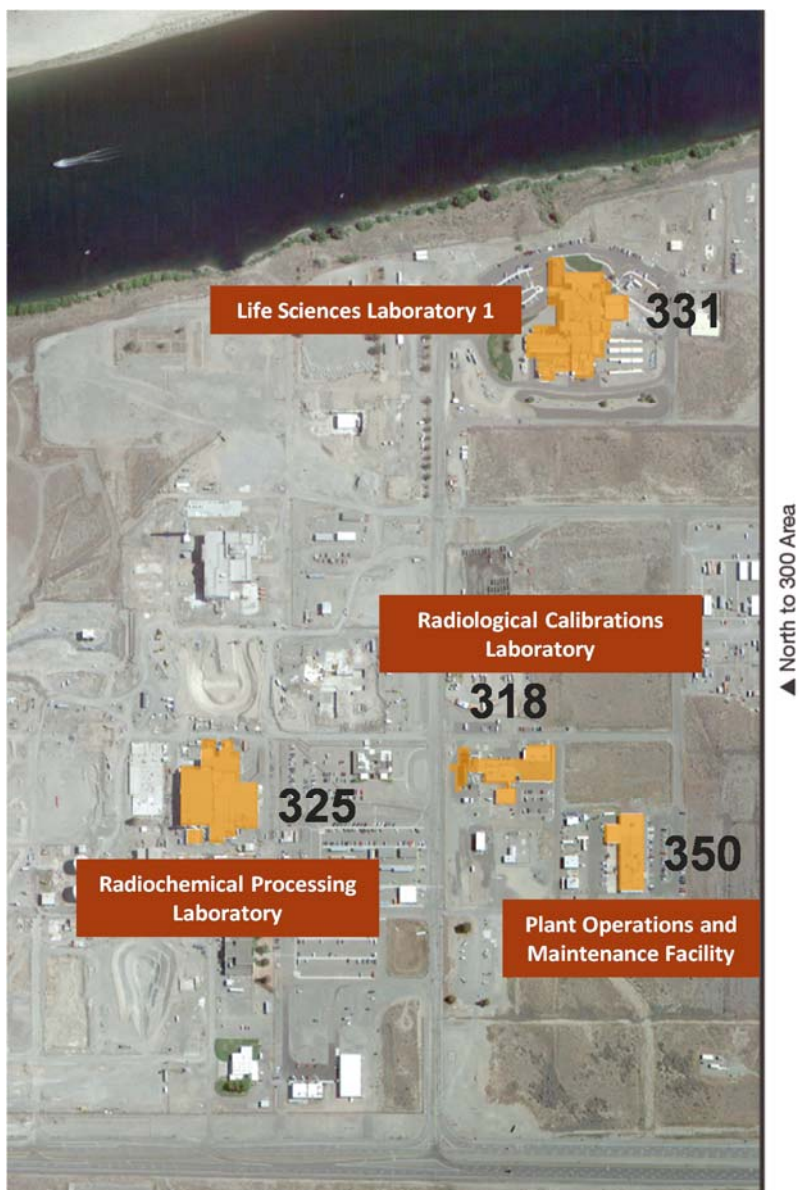


Figure I-2. Pacific Northwest National Laboratory 300 Area facilities.

PNNL's Annual Site Environmental Report for Calendar Year 2013 (Duncan et al. 2014) provides a synopsis of ongoing environmental management performance and compliance activities conducted at PNNL during 2013. It describes the location and background of each facility; addresses compliance with all applicable DOE, federal, state, and local regulations and site-specific permits; documents

environmental monitoring efforts and status; presents potential radiation doses to staff and the public in the surrounding areas; and describes DOE-required data quality assurance methods used for data verification. PNNL is committed to complying with all applicable federal, state, and local laws and regulations and site-specific permits. In 2013, PNNL was in compliance with all applicable requirements.

REFERENCES

DOE. 2007. Memorandum of Agreement between the Office of Science and the Office of Environmental Management dated May 24, 2007, Washington D.C.

Duncan JP, MR Sackschewsky, HT Tilden, JM Barnett, J Su-Coker, MY Ballinger, BG Fritz, II, GA Stoetzel, KM Lowry, TW Moon, JM Becker, KM Mendez, EA Raney, MA Chamness, and KB Larson. September 2014. Pacific Northwest National Laboratory Annual Site Environmental Report for Calendar Year 2013. PNNL-23523, Pacific Northwest National Laboratory, Richland, Washington.

Scott MJ and JM Niemeyer. December 2014. Economic Impact of Pacific Northwest National Laboratory on the State of Washington in Fiscal Year 2013. PNNL-23925, Pacific Northwest National Laboratory, Richland, Washington.

US ECOLOGY

US Ecology, a commercial low-level waste disposal facility also operates within the perimeter of the Hanford and near the Environmental Restoration Disposal Facility (ERDF). The facility is located just south of the tank farms in the 200 East Area on federal land leased to the State of Washington. The facility is operated by US Ecology, Inc. under contract to the State of Washington. The inventory of major radionuclides for the commercial low-level waste disposal facility is summarized in Table I-1 (WDOH 2004).

Table I-1. Inventory at closure.

Constituent	Inventory at Closure
C-14	18.4 Ci
Cs (ag)	137 kCi
H-3	1004 kCi
Ni (ag)	883 kCi
Sr-90	65.7 kCi
Tc-99	<0.07 kCi
U (ag)	1.8 Ci
Fe-55	278 kCi
Pu (ag)	14.5 kCi
Sb-125	4.2 kCi

ag = aggregated total of isotopes.

In contrast to the multi-layer double liner system employed at ERDF, the commercial low-level waste facility stores wastes in unlined trenches. When the commercial facility ceases accepting wastes, a final cover will be installed that is similar to the cover proposed for ERDF, except the earthen layers above the composite barrier will be approximately one-half the thickness used for the final cover at ERDF.

Reference

WDOH (2004), Final Environmental Impact Statement, Commercial Low-Level Radioactive Waste Disposal Site, Richland, Washington, DOH Publication 320-031, State Of Washington Department Of Health.

VOLPENTEST HAZARDOUS MATERIALS MANAGEMENT AND EMERGENCY RESPONSE (HAMMER) FEDERAL TRAINING CENTER

The Volpentest HAMMER Federal Training Center is a safety and emergency response training center. HAMMER provides premier worker safety training. The Hanford Site originated through the WWII Manhattan Project and today is the largest and most complex nuclear cleanup site in the country. HAMMER offers the most realistic and comprehensive safety and emergency response training for those who need it most—nuclear waste cleanup workers and emergency response personnel. These workers benefit through expert instruction and from the most expansive selection of training props in the country.

HAMMER is located at the DOE Hanford Site in southeastern Washington State, and is owned by DOE and operated by Mission Support Alliance. HAMMER was dedicated in 1997 with the primary mission to train DOE Hanford workers and emergency responders on hazardous materials handling; environmental, health, and safety courses; and emergency response.

The concept of HAMMER began with a goal of having one Hanford Site central training facility that provided improved training for emergency responders and cleanup workers at Hanford. In a partnership that has become a model around the nation, management joined forces with organized labor to build the 88 acre campus that provides a state-of-the-art, hands-on training facility. An aerial view of the HAMMER campus is provided below. HAMMER is composed of modern classrooms, specialty-training areas, and numerous life-size training props that can be configured to create a variety of situations for industrial hazards: worksite scenarios, emergency response or incident command, and hazardous materials training.



Figure I-3. Aerial view of the Hammer campus.

HAMMER staff manages nationally recognized training and safety programs, including:

- Construction Worker Safety Training

- Worker-Trainer Program
- National Training Center Safety and Health Courses
- Energy Infrastructure Protection and Emergency Response Program
- Domestic and International Border Security Training
- Military Training

HAMMER is available to DOE and DOE-affiliated entities as well as the military, other authorized federal and state agencies, and local law enforcement and security personnel.

COLUMBIA GENERATING STATION (CGS)

The CGS is a single-unit nuclear power plant operated by Energy Northwest that began commercial operation in December 1984. The CGS site boundary encloses approximately 1089 ac (441 ha) leased to Energy Northwest by DOE. The most conspicuous structures on the CGS site include the reactor containment building, the turbine building, six cooling towers, and various buildings that house equipment and staff that support the operation of the reactor (NRC 2012).

CGS produces approximately 1170 megawatts of electricity, equivalent to about 10% of Washington's power and 4% of all the electric power used in the Pacific Northwest. All electrical energy produced at CGS is delivered to electrical distribution facilities owned and operated by Bonneville Power Administration (BPA) as part of the Federal Columbia River Power System (NRC 2012). Since initiating operation, CGS has moved approximately 531 metric tons of spent fuel into the fuel storage basins on the site (Alvarez 2011). CGS has spent fuel containing 134 million curies of radioactivity stored in the Independent Spent Fuel Storage Installation on site and an additional 134 million curies in the spent fuel pool (personal communication with Jeff Waddell, Energy Northwest; email received November 20, 2014).

CGS is located on the Hanford Site approximately 10 mi (19 km) northwest of Richland. The CGS site is bounded on the east by the Columbia River. Groundwater from deeper and/or uncontaminated portions of the aquifer system is withdrawn for backup fire and sanitary water supply at CGS (DOE-RL-2009-85, Rev 1). The 618-11 Burial Ground is just west of the CGS boundary. Figure I-4 shows the facility location and the relationship of the facility to the Columbia River, nearby waste sites, roads, and other facilities. (NRC 2012).

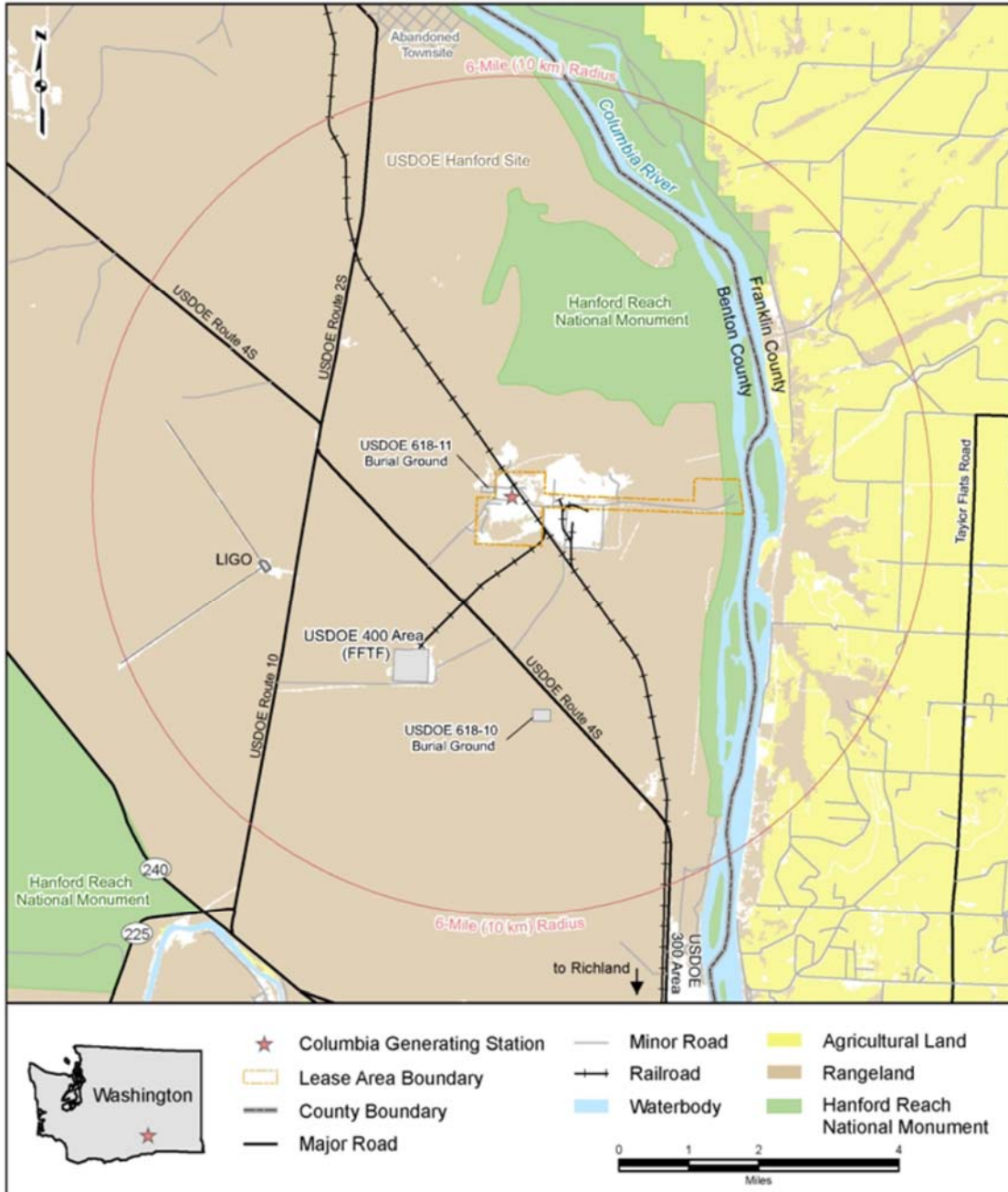


Figure I-4. Columbia Generating Station location.

REFERENCES

Alvarez, R. 2011. Spent Nuclear Fuel Pools in the U.S.: Reducing the Deadly Risks of Storage. Institute for Policy Studies. Washington, D.C.

DOE/RL-2009-85 Revision 1 2012. Remedial Investigation Report for the 200-PO-1 Groundwater Operable Unit. U.S. Department of Energy, Richland, Washington.

NRC. 2012. Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 47, Regarding Columbia Generating Station. Office of Nuclear Reactor Regulation, Washington, D.C., NUREG-1437 Supplement 47, Vol. 1.

LASER INTERFEROMETER GRAVITATIONAL-WAVE OBSERVATORY (LIGO)

The LIGO facility is dedicated to the detection of cosmic gravitational waves and the measurement of these waves for scientific research. It consists of two widely separated installations within the United States, operated in unison as a single observatory. This observatory is available for use by the world scientific community, and is a vital member in a developing global network of gravitational wave observatories.

LIGO's mission is to observe gravitational waves of cosmic origin. LIGO searches for gravitational waves created in the supernova collapse of stellar cores to form neutron stars or black holes, the collisions and coalescences of neutron stars or black holes, the wobbly rotation of neutron stars with deformed crusts and the remnants of gravitational radiation created by the birth of the universe. LIGO is operated by the California Institute of Technology and the Massachusetts Institute of Technology for the National Science Foundation (NSF).

LIGO Observatory facilities in Hanford, WA (see photo below) and Livingston, LA house laser interferometers, consisting of mirrors suspended at each of the corners of a gigantic, L-shaped vacuum system, measuring 4 km (2-1/2 mi) on a side. Precision laser beams in the interferometers will sense small motions of the mirrors that are caused by a gravitational wave. Construction of the facilities was completed in 1999. Initial operation of the detectors began in 2001, with observing runs beginning in 2002. Groundwater from deeper and/or uncontaminated portions of the aquifer system is withdrawn for backup sanitary and potable water supply at LIGO (DOE-RL-2009-85, Rev 1). In 2008, the NSF approved funding Advanced LIGO. The Advanced LIGO program will place upgraded detector subsystems into the existing infrastructures at the sites, generating a ten-fold sensitivity improvement and yielding a thousand-fold increase in the volume of space that LIGO will survey.



Figure I-5. LIGO Observatory Facility.

Reference

DOE/RL-2009-85 Revision 1 2012. *Remedial Investigation Report for the 200-PO-1 Groundwater Operable Unit*. U.S. Department of Energy, Richland, Washington.

HANFORD REACH NATIONAL MONUMENT

The Hanford Reach National Monument, established in 2000 (65 FR 37253), totals 792.6 km² (306 mi²) on lands which primarily served as a security buffer for the Hanford Site. The designation establishes the long-term protection and management of the lands. A separate memorandum allows for the incorporation of additional Hanford Site Lands into the monument as the land is remediated.

Areas within the monument include the Fitzner-Eberhardt Arid Lands Ecology Reserve, Saddle Mountain National Wildlife Refuge, McGee Ranch/Riverlands, Wahluke and Ringold. In addition land 0.40 km (0.25 mi) inland from the mean high-water mark on the south and west shores of the 82 km (51 mi)-long Hanford Reach of the Columbia River. It also includes the federally owned islands in the Hanford Reach > and the sand dune area northwest of the Energy Northwest site.

The U.S. Fish and Wildlife Service manages approximately 67,000 ha (166,000 ac) of monument lands as a unit of the National Wildlife Refuge System under permit from DOE. DOE manages the remainder of the monument. In August 2008, the U.S. Fish and Wildlife Service, as lead agency, issued the Hanford Reach National Monument Comprehensive Conservation Plan and Environmental Impact Statement which further describes management of the Hanford Reach National Monument.

References

65 FR 37253. Establishment of the Hanford Reach National Monument. Federal Register (June 9, 2000). Available at <<http://www.gpoaccess.gov/cfr/index.html>> [20 August 2015].

U.S. Fish & wildlife Service 2015, Hanford Reach National Monument, Washington. Available at: <www.fws.gov/refuge/hanford_reach/> [20 August 2015].

OTHER HANFORD SITE LEASED FACILITIES

In addition to Energy Northwest's CGS, LIGO, HAMMER, the US Ecology commercial low-level waste burial ground, and PNNL, there are a few properties on the Hanford Site that are leased to other entities. These include:

- The Combined Community Communication Facility on Rattlesnake Mountain. This facility is owned by Energy Northwest and provides emergency response communication services.
- A maintenance shop on Rattlesnake that DOE quitclaimed to the U.S. Fish and Wildlife Service.
- Telecommunication towers and electrical utility lines and other utility system facilities that are leased to BPA.