4.0 Affected Environment

Introduction

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The U.S. Department of Energy (DOE) Hanford Site lies within the semiarid Pasco Basin of the Columbia Plateau in southcentral Washington State (Figure 4.0-1). The Hanford Site occupies an area of about 1517 km^2 (about 586 mi^2) [(a)] north of the confluence of the Yakima River with the Columbia River. The Hanford Site is about 50 km (30 mi) north to south and 40 km (24 mi) east to west. This land, with restricted public access, provides a buffer for the smaller areas currently used for storage of nuclear materials, waste treatment, and waste storage and/or disposal. The Columbia River flows through the northern part of the Hanford Site and, turning south, forms part of the Site's eastern boundary. The Yakima River runs near the southern boundary of the Hanford Site and joins the Columbia River at the city of Richland, which bounds the Hanford Site on the southeast. Rattlesnake Mountain, Yakima Ridge, and Umtanum Ridge form the southwestern and western boundaries. Saddle Mountain forms the northern boundary of the Hanford Site. Two small east-west ridges, Gable Butte and Gable Mountain, rise above the plateau of the central part of the Hanford Site. Adjoining lands to the west, north, and east are principally range and agricultural land. The cities of Kennewick, Pasco, and Richland (the Tri-Cities), and the city of West Richland constitute the nearest population centers and are located south-southeast of the Hanford Site.

The Hanford Site was established in 1943 to produce plutonium for nuclear weapons; it was the first nuclear production facility in the world. The U.S. Army Corps of Engineers selected the Hanford Site because it was remote from major populated areas and had ample electrical power from Grand Coulee Dam, a functional railroad, clean water available from the Columbia River, and plenty of sand and gravel available onsite for construction. The Hanford Site was divided into a number of operational areas (e.g., 100, 200, 300, and 400 Areas) (DOE 1998a, b).

From the early 1940s to the present, most research and development activities were carried out in the 300 Area located just north of Richland. The 300 Area was also the location of nuclear fuel fabrication. Nuclear fuel in the form of pipe-like cylinders (fuel slugs) was fabricated from purified uranium shipped in from offsite production facilities. The fabricated fuel slugs were shipped by rail from the 300 Area to the nuclear reactors in the100 Area, located at the northern portion of the Site on the shore of the Columbia River, where up to nine nuclear reactors were in operation. The first eight reactors were constructed between 1944 and 1955. The ninth reactor, N Reactor, was completed in 1963. The irradiated fuel produced in the 100 Area reactors was transported by rail to the 200 Areas, where the plutonium was recovered.

The 200 East and 200 West Areas are located on a plateau about 11 and 8 km (7 and 5 mi), respectively, south of the Columbia River. These areas housed facilities called separations plants that received and dissolved irradiated fuel and then separated out the plutonium. Wastes were neutralized and stored in large underground tanks. Wastes containing fission products, activation products, and nitrate

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[(a)] This figure is based on the newest geographical information system (GIS) interpolation of the Hanford Site legal boundary. Historically, the Site area was reported as 1450 km^2 (560 mi^2), calculated by the addition of sections and subunits based on surveys from the 1800s. Included in the Site is 36.42 km^2 (14.1 mi^2) of Columbia River surface water and 2.6 km^2 (1 mi^2) of Washington State land (DOE 1999a).

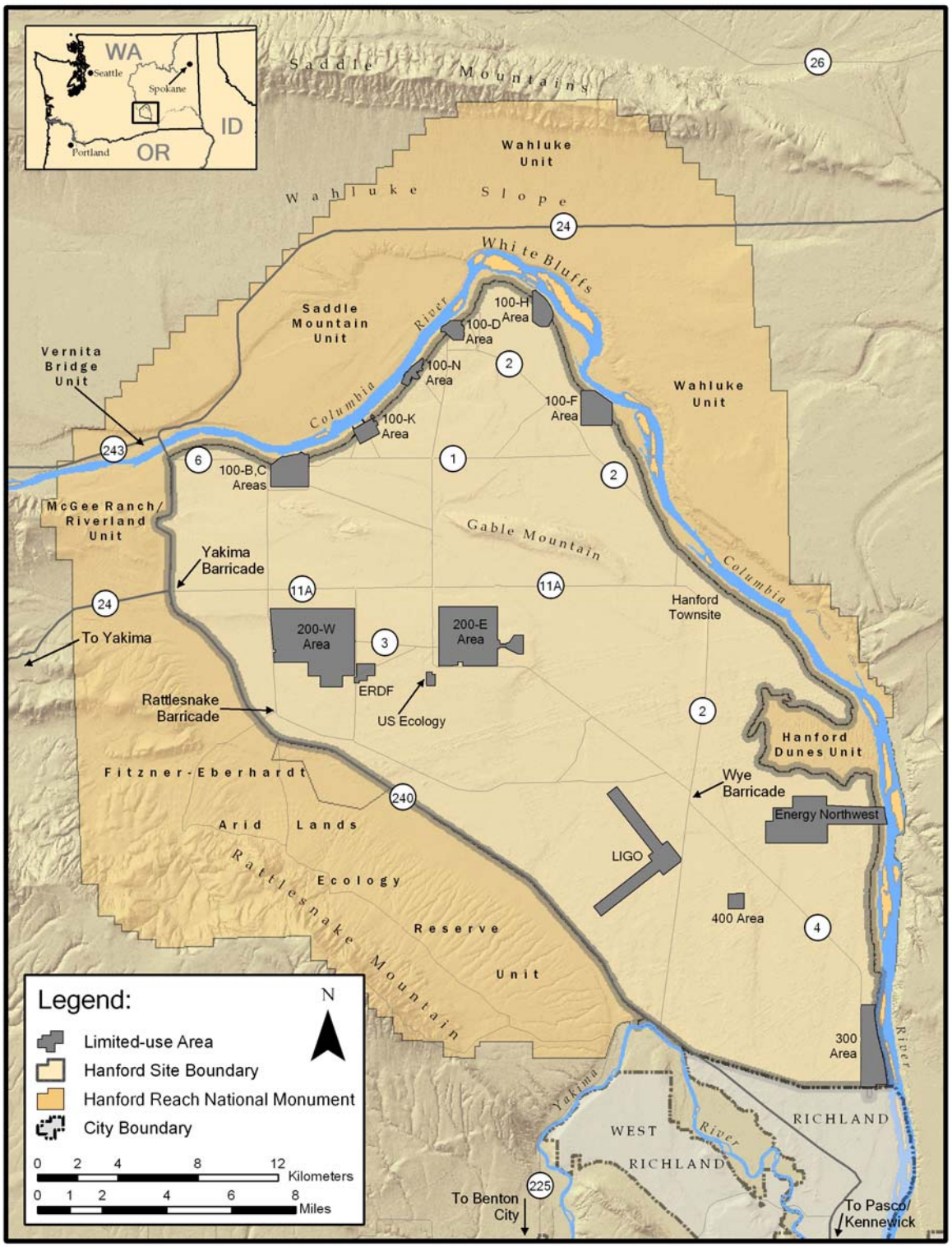

Figure 4.0-1. U.S. Department of Energy's Hanford Site, Washington

were discharged to cribs. Low-level wastes and cooling water from the plants were distributed by open ditch to surface ponds for evaporation and percolation into the ground.

Other areas on the Hanford Site include the 400 and 600 Areas. The Fast Flux Test Facility (FFTF) located in the 400 Area was a special nuclear reactor designed to test various types of nuclear fuel, produce medical and industrial isotopes, and conduct cooperative international research. The facility operated for about ten years and has been shut down since 1993. The 600 Area includes all the land between the designated areas of the Site.

The 700 and 1100 Areas, near north Richland, provided Hanford Site support services. The 700 Area was the original location for administrative activities for the Hanford Site, and was located where the Federal Building is located today (DOE 1997a). The 1100 Area was the location of general stores and transportation maintenance facilities for the Hanford Site. Operations at the transportation maintenance facility resulted in ground contamination from several chemicals, oils, and greases. The 1100 Area was located about 1.8 km (1.1 mi) west of the Columbia River and contiguous to the 600 Area. In September 1996, the 1100 Area was declared remediated and the Environmental Protection Agency issued a delisting from the National Priorities List (DOE 1998a). No radioactive waste was discharged to the ground in the 1100 Area. Most of the 1100 Area has been incorporated into the city of Richland and is no longer a part of the Hanford Site (DOE 2002a).

At the Hanford Site several areas, totaling 665 km (257 mi), have been set aside for special uses. The Fitzner-Eberhardt Arid Lands Ecology Reserve Unit, used for ecological research, was established in 1967 on land between the southern boundary of the Hanford Site and State Route 240. On the north end of the site is the Saddle Mountain National Wildlife Refuge Unit. Operations and activities on the Hanford Site, not under the auspices of DOE include: a commercial power production reactor by Energy Northwest (near the 400 Area); a scientific observatory for measuring gravity waves at extremely tiny levels, called the Laser Interferometer Gravitational Wave Observatory (LIGO) project (near the 400 Area); and a commercial low-level radioactive waste burial ground at a site leased and licensed by the State of Washington and operated by U.S. Ecology (near the 200 Areas). Offsite, but near the southern boundary of the Hanford Site in North Richland, Framatome ANP (an AREVA and Siemens company) operates a commercial nuclear fuel fabrication facility and Pacific EcoSolutions LLC operates a low-level radioactive waste decontamination, super-compaction, and packaging disposal facility.

The Hanford Site encompasses more than 2700 waste management units and groundwater contamination plumes. These waste sites have been grouped into 74 operable units. Each operable unit has complementary characteristics such as geography, waste content, type of facility, and relationship of contaminant plumes. The grouping into operable units allows for economies of scale to reduce the cost and number of characterization investigations and remedial actions required to complete environmental cleanup (WHC 1989). The 74 operable units are located in four areas: 17 in the 100 Area, 51 in the 200 Areas, two in the 300 Area, and four in the former 1100 Area (DOE 2002a). Those persons contemplating National Environmental Policy Act (NEPA)-related activities on the Hanford Site should be aware of the existence and location of the operable units. Detailed information concerning the operable units and current maps showing the locations of the operable units can be obtained from *Hanford Site Waste Management Units Report* (DOE 2002a).

A portion of the Hanford Site was designated the Hanford Reach National Monument (65 FR 37253) during 2000. As established, the Monument totals 792.6 km^2 (306 mi^2) and includes Fitzner-Eberhardt Arid Lands Ecology Reserve Unit, Saddle Mountain Wildlife Refuge Unit, McGee Ranch/Riverlands Unit, and 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. This

designation establishes the protection and management of the lands within the region of the monument. Also, a letter from President Clinton to the Secretary of Energy directs the Secretary of Energy to consult with the Secretary of the Interior regarding the incorporation of additional Hanford Site lands into the Monument as the land is remediated. The U.S. Fish and Wildlife Service (USFWS) is the lead agency in producing a Comprehensive Conservation Plan (CCP) Environmental Impact Statement (EIS) for management of the Hanford Reach National Monument. Knowledge of the objectives within this Plan may be important in the preparation of NEPA documents for activities on the Hanford Site.