

## ACCELERATING CLEANUP ALONG THE HANFORD REACH OF THE COLUMBIA RIVER

H. E. (Beth) Bilson

D.C. (Chris) Smith

U.S. Department of Energy, Richland Operations Office, Environmental Restoration & Waste Management

Robert F. Potter

Owen T. Goodman

Bechtel Hanford, Inc., Environmental Restoration Contractor

### ABSTRACT

From the beginning of the Environmental Restoration (ER) Program at the Hanford Nuclear Reservation (the Hanford Site), there have been strong stakeholder, regulatory, and political interests in focusing the cleanup effort on protecting the Columbia River from the legacy of more than 40 years of nuclear materials production at the Hanford Site.

In 1994, the three participating government agencies involved in the *Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement)*, which include the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Washington State Department of Ecology (Ecology), acknowledged that one of the strongest messages voiced by the public was to focus cleanup efforts along the Columbia River. In response to the public's desire, the three parties entered into an *Agreement in Principle* on July 18, 1994, agreeing "that it is appropriate to refocus the environmental restoration program to achieve earlier remediation and to focus on remediation of sites along the Columbia River." (1)

In 1996, additional attention was focused on the portion of the Columbia River that flows through the Hanford Site when the National Park Service (Department of Interior) issued a Record of Decision (ROD) based on the *Final Hanford Reach of the Columbia River Comprehensive River Conservation Study and Environmental Impact Statement* (FEIS). The ROD recommended that the Hanford Reach portion of the Columbia River be designated as a "recreational river" (as defined by the *National Wild and Scenic River Act of 1968*) and that a National Wildlife Refuge be established on the Wahluke Slope of the Hanford Site. (2) The management of the Hanford Reach and the National Wildlife Refuge was determined in June 2000 when President Clinton proclaimed the Hanford Reach a national monument, and designated the U.S. Department of Interior Fish and Wildlife Service (FWS) to manage the monument. (3) Since some of the Hanford Site lands along the shoreline of the Columbia River are included in the boundaries of the monument, and these areas continue to be the responsibility of the DOE for cleanup and alternative use, ongoing cooperation between DOE and FWS will be required.

Consistent with this ongoing interest in prioritizing cleaning up of the Hanford Site along the Columbia River, the DOE, Richland Operations Office (RL) has established a long-range vision for the Hanford Site that includes a major focus on "Restoring the River Corridor." In August 2000, RL unveiled a plan to accelerate the cleanup of the River Corridor ("*Hanford 2012 – Accelerating Cleanup and Shrinking the Site.*") This plan outlines an approach to **accelerate** cleanup along the river and **shrink** the Hanford Site from 1,450 km<sup>2</sup> (560 mi<sup>2</sup>) to about 194 km<sup>2</sup> (75 mi<sup>2</sup>) **by 2012**. In a report to Congress in November 2000, the DOE described this plan as a phased approach "to reduce risk to the Columbia River, accelerate visible cleanup progress, and reduce costs." In submitting the report to Congress, the DOE described its follow-on plan to make Hanford land along the river corridor available for alternative use. As the cleanup of distinct areas of the river corridor are complete, the DOE will petition the EPA to remove those areas from the Superfund *National Priorities List* (NPL). After being removed from the NPL, these areas will become available for other uses as determined in consultation with the FWS, Tribal Nations, and stakeholders. (4)

### INTRODUCTION

The Hanford Site was established by the U.S. government in 1943 as the Hanford Engineer Works, as part of the Manhattan Engineering District of the U.S. Army Corps of Engineers. The 1,450-km<sup>2</sup> (560-mi<sup>2</sup>) site, which is located in southeastern Washington state (Fig. 1), was selected to be the world's first plutonium production facility because it was remote from any major populated areas; it had ample electrical power from the Grand Coulee Dam; it offered convenient access to railroads and highways; and, there was an abundant water supply to cool the reactors from the Columbia River, which bisects the site. (5)

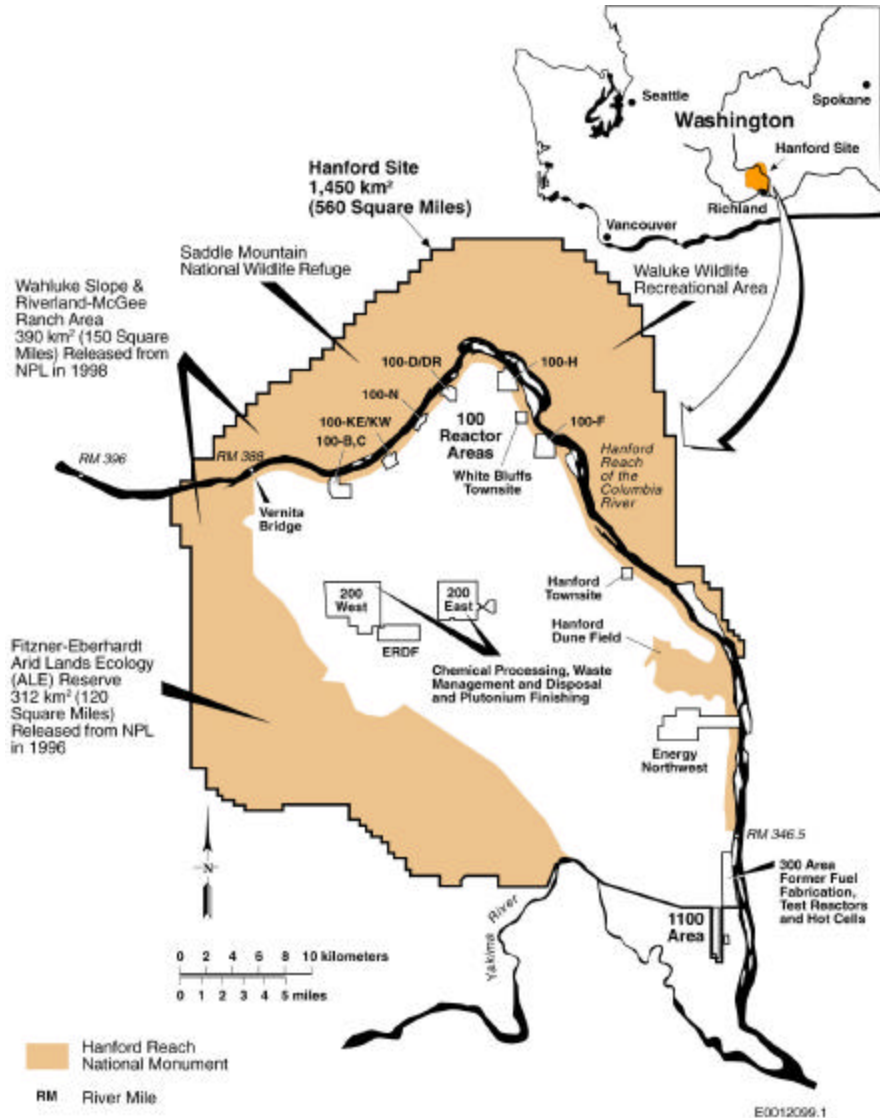


Fig. 1. The U.S. Department of Energy Hanford Site

For more than 40 years, Hanford's primary mission involved the production of nuclear materials for national defense purposes. Site operations during those years were conducted in numerically designated areas. In the 100 Areas, there are six non-contiguous areas adjacent to the northern portion of the Columbia River: 100-B/C, 100-KE/KW, 100-N, 100-D/DR, 100-H and 100-F. These areas provided the location for nine plutonium production reactors. The 300 Area, which is also adjacent to the Columbia River in the southeastern portion of the site, housed reactor fuel manufacturing facilities, research and development laboratories, test reactors, and hot cell examination facilities. The 200 Area, located on the Central Plateau of the site, was used for chemical processing, plutonium finishing operations, and waste management and disposal activities. The 1100 Area provided administrative support facilities. Those open areas of the site located between the operating areas were designated as the 600 Area.

In the late 1980s the primary mission of the Hanford Site changed from weapons material production to the cleanup of the radioactive and hazardous waste from a legacy of more than four decades of defense production. This new Hanford Site cleanup mission has two primary regulatory drivers:

- The EPA Superfund *National Priorities List* (NPL)
- The *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement).

## WM'01 Conference, February 25-March 1, 2001, Tucson, AZ

On November 3, 1989, the Hanford Site was included in the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) NPL by the EPA. The Hanford 100, 200, 300, and 1100 Areas were designated as aggregate areas for the Hanford Site's NPL listing, and cleanup of these areas is now being conducted under the CERCLA regulatory process. (6)

Since the EPA's 1989 NPL listing action, significant progress has been made in deleting portions of the Hanford Site from the NPL. The 1100 Area Superfund Site, and two operable units in the 100 Area Superfund Site, have been cleaned up and deleted from the NPL by the EPA. The 310-km<sup>2</sup> (120-mi<sup>2</sup>) 1100 Area Superfund Site, which included the Fitzner/Eberhardt Arid Lands Ecology (ALE) Reserve on the western portion of the site, was deleted from the NPL in 1996. The two operable units in the 100 Area Superfund Site, the Riverland-McGee Ranch Area (100-IU-1) and the Wahluke Slope (100-IU-3) (approximately 388 km<sup>2</sup> [150 mi<sup>2</sup>]), were also deleted from the NPL in 1998. (7,8) The ALE Reserve, the Riverland-McGee Ranch, and the Wahluke Slope Areas are managed by the FWS under an agreement with DOE. To date, nearly one-half of the Hanford Site has been deleted from the NPL.

The *Tri-Party Agreement* was implemented in May 1989 by the DOE, the EPA, and Ecology. The milestones in the *Tri-Party Agreement* are used to maintain a life cycle long-range plan for Hanford Site cleanup. The long-range plan integrates the technical scope, cost estimates, and detailed schedules with prioritization logic to identify the funding levels necessary to complete *Tri-Party Agreement* cleanup milestones. The current ER Long-Range Plan baseline cost estimate and schedule for the cleanup of the Hanford Site is \$15.8 billion, with a projected completion date of 2046. (9)

### FOCUSING HANFORD CLEANUP ALONG THE COLUMBIA RIVER CORRIDOR AND THE HANFORD REACH

In early 2000, RL unveiled a long-range vision for the Hanford Site that included three elements:

- ***Restoring the Columbia River Corridor***, which will make 546 km<sup>2</sup> (210 mi<sup>2</sup>) of the Hanford Site available for alternative use, provide opportunities for public access to key recreational areas, protect cultural resources, and reduce the foot print of the Hanford cleanup operation to approximately 194 km<sup>2</sup> (75 mi<sup>2</sup>) of the Central Plateau.
- ***Completing the transition of the Central Plateau*** to long-term waste management.
- ***Preparing for potential multiple future uses of the Hanford Site***, including long-term resource stewardship, science and technology, and other DOE and non-DOE federal missions. (4)

RL has designated the Columbia River Corridor as that portion of the Hanford Site adjacent to the shoreline of the Columbia River, beginning at the Vernita Bridge at river mile 388, and progressing downstream approximately 72.4 km (45 mi) past the 100 Reactor Areas to the Hanford 300 Area at river mile 343. This area encompasses approximately 546 km<sup>2</sup> (210 mi<sup>2</sup>), which extend from the shoreline of the Columbia River inland to the Central Plateau in the middle of the Hanford Site, and also includes the 100 Areas, the 300 Area, and the 600 Areas, as shown in Fig. 2. (10)

This River Corridor portion of the Hanford Site (along the Columbia River shoreline) is also included in that section of the Columbia River designated as the Hanford Reach, which is the last free-flowing, non-tidal segment of the Columbia River in the United States. The Hanford Reach is that section of the Columbia River that flows from river mile 396, approximately 1.6 km (1 mi) below Priest Rapids Dam, downstream approximately 81.6 km (51 mi) to river marker 345, north of the city of Richland, Washington. The lateral boundaries of the Reach include approximately 0.4 km (0.25 mi) on the south side of the river, the river itself and the islands therein, and the approximately 364 km<sup>2</sup> (140 mi<sup>2</sup>) of the Wahluke Slope area, which is the northern-most extent of the Hanford Site that includes the Saddle Mountain National Wildlife Refuge and the Wahluke Wildlife Recreation Area.

For the last 50 years, the natural environment of the Hanford Reach has remained relatively untouched because most of its has been part of the restricted area of the Hanford Site. However, with the end of the Cold War, there were no longer any national security reasons to restrict public access to the Reach. Recognizing this change, along with a growing concern for the future of the Hanford Reach, Congress passed the November 1988 Public Law 100-605, known as the *Comprehensive River Conservation Study Act*. The act required the Secretary of Interior, in consultation with the Secretary of Energy, to prepare a study that would evaluate the outstanding features for the Reach and its immediate environment, while examining alternatives for preserving those values .

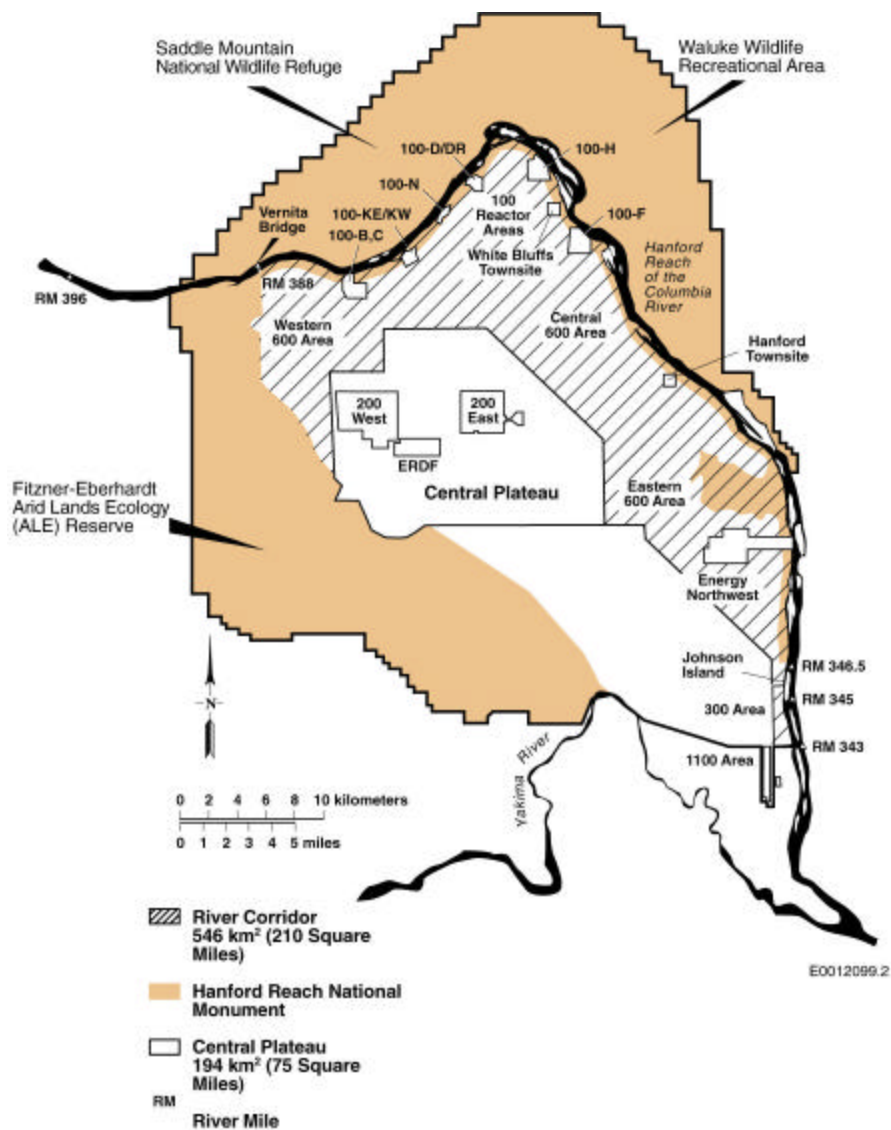


Fig. 2. The River Corridor and the Central Plateau of the Hanford Site

In June 1994 the National Park Service, which was designated by the Secretary of Interior as the lead agency for the study, released the FEIS. In July 1996 the Department of Interior, in accordance with the *National Environmental Policy Act of 1969* (NEPA), issued the Hanford Reach ROD based on the FEIS. The ROD recommended that the Columbia River be designated a “recreational river,” as defined by the *National Wild and Scenic River Act of 1968*, and that a National Wildlife Refuge be established on the Wahluke Slope, to include both the Saddle Mountain National Wildlife Refuge and the Wahluke Wildlife Recreation Area. The National Wild and Scenic River designation would begin at river mile 396 and end at river mile 346.5 (the northern tip of Johnson Island, located in the Columbia River) for a total length of 79.2 km (49.5 mi). The southern river mile boundary of the Hanford Reach designation was modified from 345 to 346.5 in the ROD, in order to exclude the Hanford 300 Area, because of extensive cleanup activities that will be required in the 300 Area. Lateral boundaries of the river were designated as approximately 0.4 km (0.25 mi) on both sides of the river, overlapping the refuge and Hanford Site land. The FWS was designated to manage both the refuge and the river. (2) Considerable public discussion followed the ROD concerning how the Hanford Reach should eventually be managed. Congress considered two different management options: federal management vs. local jurisdictional management. This management issue was decided on June 9, 2000, when President Clinton proclaimed the Hanford Reach a national monument and designated the FWS to manage the monument. (3)

## A PLAN TO ACCELERATE CLEANUP ALONG THE RIVER CORRIDOR AND THE HANFORD REACH

The cleanup of the Wahluke Slope area of the Hanford Reach has been completed, and this area was removed from the NPL in 1998. The cleanup of that portion of the Hanford Reach within the 0.4 km (0.25 mi) area on the south side of the Columbia River, however, remains to be completed, and is in the area defined as the Columbia River Corridor of the Hanford Site. Two studies have been conducted to determine an accelerated approach to completing the cleanup of the Columbia River Corridor: the *100/600 Areas River Corridor Accelerated Restoration Study (the 100/600 Areas Study)*, and the *300 Area Accelerated Closure Project (ACP) Plan (the 300 Area ACP Plan)*. The *100/600 Areas Study* addressed that portion of the Hanford Site adjacent to the southern Columbia River shoreline that is included in the Hanford Reach, specifically from river mile 388 (at the Vernita Bridge) downstream to river mile 346 (at the northern boundary of the 300 Area). The *300 Area ACP Plan* details the accelerated cleanup proposed for the 5.2 km<sup>2</sup> (2 mi<sup>2</sup>) of the 300 Area of the Hanford Site adjacent to the Columbia River between river miles 346 and 343.

The *100/600 Areas Study* outlined a strategy to accelerate those areas along the Columbia River by using a phased “pincer approach,” thereby sequencing the cleanup workscope to progress inward from two directions: east from the Vernita Bridge, and north from the 300 Area. The 100/600 Areas River Corridor cleanup was divided into eight phases (Fig. 3), geographically grouping facilities and areas such that progressive cleanup could be accomplished for each phase, with the entire 100/600 Areas River Corridor completed by the end of 2012. (11)

The scope of work of the 100/600 Areas River Corridor cleanup includes the following:

- **Placing the retired plutonium production reactors in Interim Safe Storage (ISS)** – The preferred alternative in the 1992 *Final Environmental Impact Statement, Decommissioning of Eight Surplus Production Reactors at the Hanford Site* (12) was to place the reactors in ISS for up to 75 years, followed by deferred one-piece removal of the reactor block and transporting the block to a specially prepared burial facility in the Hanford Site Central Plateau.

Based on the 1993 *Environmental Impact Statement (EIS) ROD*, 7 of the 9 Hanford reactors (C, D, DR, F, H, KE, and KW) are to be placed in ISS as part of the River Corridor cleanup. The scope of the ISS includes the cleanout and demolition of the reactor facilities outside the reactor block shield wall, followed by the installation of a safe storage enclosure roof. The demolition reduces the original footprint of these reactors by more than 80%, while the remaining reactor shield wall structure becomes part of the safe storage enclosure. Current plans are for the B Reactor (the world’s first plutonium production reactor) to become a museum. The ninth reactor, N Reactor, which was an 860 MWe dual-purpose reactor (producing plutonium and steam for electricity generation), was not included in the 1993 ROD. Therefore, completing the regulatory process to determine the final decommissioning alternative for the N Reactor will be required as part of the River Corridor workscope, along with the final disposition of the reactor.

- **Removal of spent nuclear fuel (SNF) from the KE and KW fuel storage basins (FSBs)** – More than 2,100 metric tons (2,315 tons) of SNF are stored under water in the FSBs at the KE and KW reactors. The fuel is to be removed and placed in long-term storage in a dry canister facility on the Central Plateau. Once the fuel is removed, the remaining water, sludge, and debris in the basins will then be removed for disposal prior to proceeding with ISS for these reactors.
- **Decontamination and demolition of the reactor ancillary support facilities in each of the 100 Areas** – Each reactor area has shut down the contaminated facilities that were used to support the operation of each reactor. The contaminants in these facilities will be removed or fixed in place, the structures demolished, and the rubble disposed in the CERCLA -regulated Environmental Restoration Disposal Facility (ERDF), which is located on the Central Plateau.

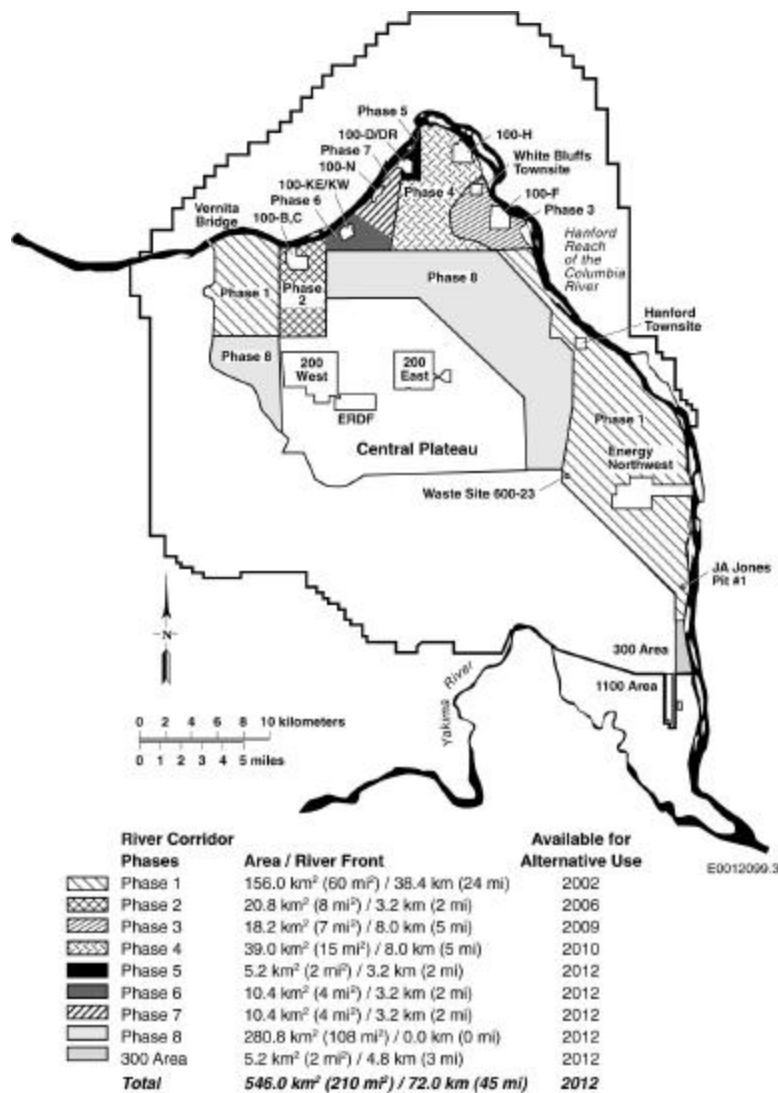


Fig. 3. Phased Cleanup of the River Corridor

- Remediation of liquid waste sites and solid waste burial grounds** – This includes the excavation, transportation, and disposal of contaminated soil and solid waste in the ERDF. During reactor operations, soil was contaminated with radionuclides and chemical contaminants when water was discharged into trenches and underground cribs. Contaminated solid waste was also buried in unlined trenches in each reactor area. Also included in the 100/600 Areas River Corridor are waste sites in the Eastern 600 Area that were part of the 300 Area fuel manufacturing and research and development operations. The 100/600 Area contains more than 400 of these waste sites that require remedial action.
- Mitigation of hazards and well decommissioning** – The 100/600 Areas River Corridor work scope also includes the mitigation of hazards at the old Hanford and White Bluffs townsites that are located along the southern shoreline of the Columbia River. These townsites contain pre-Manhattan Engineering District residential and agricultural contamination, and construction and residential waste that resulted from a 51,000-person Hanford Engineer Works construction camp. These townsites are included as Independent Operable Units (IU-6 and IU-2, respectively) on the Hanford NPL. These townsites are of historical significance and have the potential for public access via bike trails and boat ramps. The decommissioning of abandoned wells in the 600 Areas is also included in the 100/600 Areas River Corridor work scope.

- Groundwater cleanup** – There are several groundwater plumes in the River Corridor. Some of the plumes are associated with the 100 Areas, the 300 Area, and individual solid waste burial grounds, while others are from sources on the Central Plateau. Some plumes currently require no action; others have interim actions being taken as required by interim RODs. Interim pump and treat actions are being taken for 100-D/DR, 100-KE/KW, and 100-H chromium plumes and the 100-N strontium plume. For the 100-B/C and 100-F groundwater NPL operable units, the *Tri-Party Agreement* provides for groundwater monitoring networks. The pump and treat systems are designed to intercept the contaminants before they reach the Columbia River. More permanent groundwater remedies are being investigated and demonstrated. An In-Situ Redox Manipulation (ISRM) barrier is being installed in the 100-D/DR Area. ISRM is a chemical barrier injected into the groundwater that chemically alters the chromium in the plume to significantly reduce risk and possible impacts. If demonstrated as a viable solution, ISRM will also be applied to additional chromium plumes. A similar permanent remediation remedy is being sought for the 100-N strontium plume for installation during the next 10 years. The 100/600 Areas River Corridor work scope includes the installation of final groundwater remediation solutions, similar to the ISRM technology, replacing the pump and treat systems in the 100 Areas by 2012.

Not included in the 2012 completion schedule for the 100/600 Areas River Corridor cleanup are waste sites in or adjacent to the 8.3 km<sup>2</sup> (3.2 mi<sup>2</sup>) area in the Eastern 600 Area that Energy Northwest leases from the DOE for the Columbia (Nuclear) Generating Station. Two of those sites, the 618-10 and 618-11 Burial Grounds, contain highly radioactive wastes that will require the use of remote retrieval and processing methods. Included in the 100/600 Areas River Corridor cleanup scope, however, are a number of critical characterization and engineering studies to evaluate the nature of the wastes in these burial grounds, and to develop a sound technical basis for the final remediation of these sites. The final remediation of these sites will be completed after 2012. (4) The accelerated schedule for each phase of the 100/600 Areas River Corridor, and the 300 Area, is shown in Fig. 4.

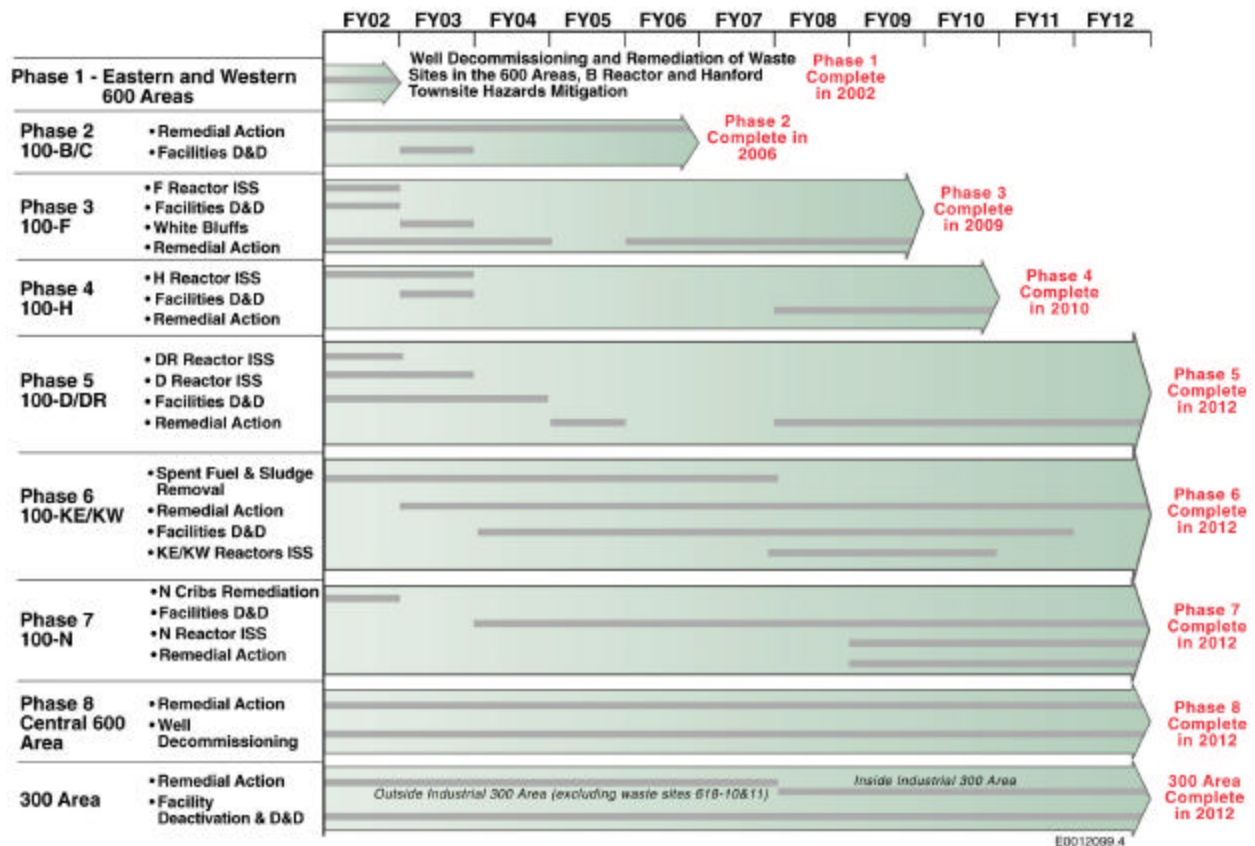


Fig. 4. Accelerated Schedule for the River Corridor Cleanup



## **PROGRESS IN ACCELERATING CLEANUP**

Phase 1 of the 100/600 Areas River Corridor cleanup includes 36.4 km<sup>2</sup> (14 mi<sup>2</sup>), 6.4 km (4 mi) of rivershore in the Western 600 Area, and 119.6 km<sup>2</sup> (46 mi<sup>2</sup>) and 32 km (20 mi) of rivershore of the Eastern 600 Area. The Western 600 Area scope of work includes the decommissioning of abandoned wells and the disposition of a few minor waste sites. The Eastern 600 Area also includes decommissioning of abandoned wells, the remediation of two waste sites (J. A. Jones Pit #1 and Waste Site 600-23), and the remediation of the Hanford townsite. Work has begun on the Western 600 Area, with the work scheduled to be completed in September 2001. The remediation of the J. A. Jones Pit #1 and Waste Site 600-23, and the decommissioning of the wells in the Eastern 600 Area, are also scheduled for completion by September 2001. The remediation of the Hanford townsite is scheduled to be completed by September 2002. The completion of Phase 1 (in 2002) will make an additional 156 km<sup>2</sup> (60 mi<sup>2</sup>) of the Hanford Site available for removal from EPA's NPL, and will make the 156 km<sup>2</sup> (60 mi<sup>2</sup>) and 38.4 km (24 mi) of the Columbia River shoreline in the Hanford Reach available for alternative use.

The C Reactor was selected as the first Hanford reactor to be placed in ISS. The C Reactor ISS project was completed in 1998, 24 months after decommissioning of the reactor began. Using the experience and lessons learned from the C Reactor ISS project, a plan was initiated to accelerate the ISS of the next four Hanford reactors (F, DR, H, and D) by using a single multiple-reactor ISS schedule instead of completing the ISS of each reactor in a series. ISS for each of these reactors is scheduled in the ER Long-Range Plan baseline in fiscal year (FY) 2003, FY 2005, FY 2007, and FY 2009, respectively. (9) By managing these reactors as a single, multiple-reactor ISS project, the ISS of these next four reactors is scheduled to be completed in 2003, which is an acceleration of six years. Through the end of FY 2000, ISS for the F Reactor was 75% complete, with the demolition of the FSB and the design and installation of the safe storage enclosure roof remaining. The DR Reactor was 80% complete, with only the design and installation of the safe storage enclosure roof remaining. The engineering design for both the D and H reactors was complete, and field work began at these areas.

In September 1999, the DOE issued the ROD for the *Final Hanford Comprehensive Land-Use Plan (CLUP) EIS*, with a preferred alternative that included the B Reactor becoming a museum, with the surrounding areas available for museum-support facilities. An Engineering Evaluation/Cost Analysis (EE/CA) required by the CERCLA regulatory process will be completed in August 2001 that will evaluate end-point options for the B Reactor, ranging from limited tour route access to full-time public access for the B Reactor museum. The CLUP also designated the area west of the B Reactor in the Western 600 Area for low-intensity recreation, such as a corridor between the high-intensity recreation areas associated with the B Reactor and the Vernita Bridge. (13)

The removal of the SNF in the KE and KW FSBs is scheduled to be completed in FY 2004, and the hardware, debris, sludge, and water removed from the basins in FY 2007. These activities are being performed as part of the Central Plateau work scope, but ISS of the KE and KW reactors is included in the 100/600 Areas River Corridor scope of work. Based on the excellent experience with the current multi-reactor ISS approach being used for the F, DR, H and D reactors, ISS for the KE and KW reactors is being planned as a single, dual-reactor ISS project beginning in FY 2008 and ending in FY 2010. This will accelerate the current baseline schedule for the ISS of these reactors by three years.

The schedule for the completion of the River Corridor cleanup (Fig. 4) shows that the remediation of the liquid waste sites and the solid waste burial grounds represents the critical path for completing the cleanup of each phase. This is due primarily to the magnitude of waste volumes and the cost of remediating the sites. This is also influenced by the need (in many cases) to decontaminate and demolish ancillary facilities before excavation of contaminated soil sites can begin. To date, more than 2.3 metric tons (2.5 million tons) of contaminated material from sites in six River Corridor areas (100-B/C, 100-N, 100-D/DR, 100-H, 100-F, and the Eastern 600 Area) have been removed, transported, and disposed in the ERDF. During FY 2000, an average of more than 2,727 metric tons (3,000 tons) per day of contaminated soils and materials were excavated for disposal in the ERDF.



**THE PATH FORWARD**

There are three programmatic elements required if the restoration of the River Corridor is to be completed by 2012:

- Funding requirements and a contracting strategy
- A regulatory framework to support the accelerated cleanup
- A decision-making process to determine the alternative use and management of the River Corridor after cleanup is complete.

**Funding Requirements and a Contracting Strategy**

The annual funding required to complete the remediation of the River Corridor by the end of 2012 is shown in Table I. Annual funding estimates are based on the current ER Long-Range Plan baseline cost estimates for the phased accelerated schedule shown in Fig. 4. When the \$1,431.6 million funding requirement for the 100/600 Areas River Corridor is combined with the \$742.8 million in funding required to complete the 300 ACP by 2012, the total funding required to complete the entire Columbia River Corridor cleanup by 2012 (excluding the projected \$563.5 million for removal of the SNF from the KE and KW FSBs) (14) is \$2,174.4 million.

Table I. Funding Required for Accelerating River Corridor Cleanup.  
(2000 Dollars, in Millions)

SCOPE		Fiscal Year											
		02	03	04	05	06	07	08	09	10	11	12	Total \$
100/600 Areas River Corridor	Decontamination and Decommissioning	22.3	28.3	26.4	18.9	21.5	18.6	24.2	28.0	23.6	22.7	9.3	243.8
	Remedial Action & Waste Disposal	51.4	50.6	69.1	80.2	81.4	77.8	98.2	87.8	90.8	79.5	50.3	817.1
	Groundwater Management	6.9	7.9	5.2	6.4	6.4	7.4	9.4	9.3	11.7	8.2	8.1	86.9
	Surveillance and Maintenance	2.1	2.1	0.7	0.7	0.6	0.6	0.7	0.3	0.2	0.2	0.2	8.4
	Project Management and Support	22.7	26.4	26.6	27.2	25.9	25.3	26.6	25.8	26.8	22.4	19.7	275.4
	<b>Total for 100/600 Area</b>	<b>105.4</b>	<b>115.3</b>	<b>128.0</b>	<b>133.4</b>	<b>135.8</b>	<b>129.7</b>	<b>159.1</b>	<b>151.2</b>	<b>153.1</b>	<b>133.0</b>	<b>87.6</b>	<b>1,431.6</b>
<b>300 Area River Corridor</b>	<b>52.4</b>	<b>57.3</b>	<b>69.1</b>	<b>82.3</b>	<b>76.5</b>	<b>85.0</b>	<b>78.1</b>	<b>81.7</b>	<b>74.6</b>	<b>49.4</b>	<b>36.4</b>	<b>742.8</b>	
<b>Total River Corridor</b>	<b>157.8</b>	<b>172.6</b>	<b>197.1</b>	<b>215.7</b>	<b>212.3</b>	<b>214.7</b>	<b>237.2</b>	<b>232.9</b>	<b>227.7</b>	<b>182.4</b>	<b>124.0</b>	<b>2,174.4</b>	

E0012098.5

As the mission of the Hanford Site evolved from defense materials production to cleanup, RL redirected its procurement strategy from cost plus fixed-fee management and operations contracting to performance-based cost plus incentive fee contracting. To further increase the emphasis on results-oriented contracting, RL announced an intent to pursue a “closure-type” contract for the Columbia River Corridor. Under this type of contract, the entire scope of work would be contracted to a single entity to complete the work by 2012, with a “target cost” and an appropriate fee. Fee incentives would be included in the contract for completing the work ahead of schedule and/or for less than the target cost. It is expected that this type of contract would provide direct focus and cost efficiencies for completing the restoration of the River Corridor by 2012. (4)

## **A Regulatory Framework to Support the Accelerated Cleanup**

As governed by the *Tri-Party Agreement*, lead regulatory responsibility for the cleanup of the River Corridor is divided between EPA and Ecology. These agencies must be in concurrence with the overall approach to accelerating restoration of the River Corridor, and these agencies must agree to the revision to any existing *Tri-Party Agreement* milestones impacted by the accelerated cleanup.

The regulatory framework is in place for completing the restoration of the River Corridor. The cleanup of the Hanford Site is conducted under the authority of either the EPA's CERCLA process or the *Resource Conservation and Recovery Act of 1976* (RCRA), as implemented by the *Washington Administrative Code* (WAC). The DOE is also responsible for compliance with NEPA requirements. The RODs issued for the cleanup of the Hanford Site integrate the regulatory requirements of CERCLA, RCRA, and NEPA.

To date, all but one ROD (the ROD for decommissioning of the N Reactor) have been issued or scheduled to complete the cleanup of the River Corridor. A ROD has been issued for the decommissioning of 8 of the 9 surplus production reactors. RODs have been issued for interim remedial actions for the contaminated liquid waste sites and solid waste burial grounds in the 100 Areas, and for the 300 Area 300-FF-1 Operable Unit. The 100 Area groundwater remediation RODs are in place for the chromium and strontium groundwater plumes. The ROD for the 300 Area 300-FF-2 Operable Unit is expected to be signed in early 2001. Following the issuance of the 300-FF-2 ROD, only the regulatory decision for the decommissioning of the N Reactor is needed to complete the regulatory documentation for the cleanup of the River Corridor. Since the N Reactor was not included in the 1993 ROD for the other eight plutonium production reactors, an amendment to that ROD, a separate EIS, or a Remedial Investigation/Feasibility Study (RI/FS) under CERCLA must be prepared before ISS or final decommissioning of the N Reactor can proceed. Because of the size and complexity of the N Reactor, an engineering study (scheduled for FY 2002) will evaluate the cost effectiveness of placing N Reactor in ISS versus proceeding directly to final decommissioning. This study will also determine the appropriate regulatory (ROD, EIS, or RI/FS) path forward for the N Reactor, and for the final decision-making documentation required to complete the cleanup of the River Corridor.

Once the cleanup of the distinct phases of the River Corridor is completed, it will be possible to propose deletion of those areas of the Hanford Site from the EPA's NPL. It is anticipated that, prior to proceeding with the deletion process for a given area, an appropriate amount of time (perhaps a period of two years) may need to be allowed to ensure that the permanent groundwater remediation technologies, such as ISRM, are effective. The deletion process specified in 40 *Code of Federal Regulations* [CFR] 300.425(e) involves a review by the EPA to ensure that the cleanup standards for removing the area from the NPL are met, and concurrence by the State of Washington that the deletion will be in accordance with applicable state cleanup programs. Following the solicitation of public comments and the preparation of official responses, the final deletion documentation will be published in the Federal Register to complete the deletion process. (4)

## **Alternative Use and Management of the River Corridor After Cleanup is Complete**

On June 9, 2000, President Clinton created the Hanford Reach National Monument. Management of the monument was assigned to the FWS, including the authority to manage lands under DOE jurisdiction that are within the monument boundaries (under mutual agreement between the agencies). The boundaries of the monument, as shown in Fig. 1, include the Saddle Mountain National Wildlife Refuge on the Wahluke Slope of the Hanford Site, the Riverlands-McGee Ranch Area, and the ALE Reserve. The balance of the area proclaimed to be part of the monument includes the 0.4 km (0.25 mi) strip of rivershore land adjacent to the south side of the Columbia River, between the Vernita Bridge at river mile 388 and river mile 346.5, and the Hanford Dune Field along the rivershore in the southeastern portion of the Hanford Site. (3)

In a related June 9, 2000, memorandum from the President to the Secretary of Energy, the Secretary was directed to protect the natural habitat and any objects of scientific and historical interest found in Hanford areas not included in the national monument while cleanup and restoration are being completed, and to consult with the Secretary of Interior to determine a means of permanent protection, including the possibility of adding lands to the monument as they are remediated. (15)

## **WM'01 Conference, February 25-March 1, 2001, Tucson, AZ**

The Saddle Mountain National Wildlife Refuge, the Riverlands-McGee Ranch Area, and the ALE Reserve have already been deleted from the NPL and are currently being managed by the FWS under an existing agreement with the DOE. In a July 26, 2000, management guide memorandum, the Secretary of the Interior directed the FWS to manage these areas in accordance with those agreements and the *National Wildlife Refuge System Administration Act*, and directed that these areas be considered units of the National Wildlife Refuge System. The memorandum also directed that, as the DOE and FWS determine that lands within the monument currently managed by DOE are suitable for FWS management, the FWS will assume management by entering into additional management agreements with the DOE. However, the FWS must be assured that the areas have been cleaned up to acceptable standards, that injured natural resources are appropriately restored, and the FWS shall not incur liability associated with past, ongoing, and potential future releases of hazardous wastes associated with DOE activities. The FWS was instructed to develop a process for evaluating and determining when hazardous waste has been appropriately addressed through cleanup and restoration. The memorandum further directed the FWS to proceed with the following planning activities: (a) develop a management plan for the DOE lands within the monument that the FWS can currently manage under agreement; (b) form an advisory committee under the *Federal Advisory Committee Act* (FACA) to provide advice on the development of the management plan; (c) review existing management plans for lands included in the monument to ensure consistency with the President's proclamation; (d) pursue a new agreement with the DOE to include all areas currently managed by the FWS and those areas suitable to become units of the National Wildlife Refuge System; (e) develop a process with the DOE to determine the suitability of lands for transferring management responsibility to the FWS; and (f) work with the DOE to implement the President's June 9, 2000, memorandum to the Secretary of Energy. The FWS was directed to complete this planning within two years. (16) To implement the Secretary of Interior's directives, the FWS has opened and staffed a Hanford Reach National Monument office in Richland, Washington.

The DOE is also addressing the issue of alternative uses for the Hanford Site after cleanup along the River Corridor is complete. RL has identified a working group to develop the administrative protocols to determine alternative uses for those areas of the Hanford Site when cleanup is complete. In developing the protocols the working group will be incorporating the regulatory process for deleting portions of the Hanford Site from the NPL, complying with the ROD for the Final Hanford CLUP, collaborating with regulators, stakeholders, and Tribal Nations, and coordinating with the FWS to meet the intent of the President's Hanford Reach National Monument Proclamation and his memorandum to the Secretary of Energy.

### **CONCLUSION AND SUMMARY**

Accelerating cleanup along the Hanford Reach of the Columbia River, and making more than 546 km<sup>2</sup> (210 mi<sup>2</sup>) of the Hanford Site available for alternative use by 2012, is an attainable goal.

In 2000, RL implemented a long-range vision for the Hanford Site that includes a plan and a path forward that are focused on "Restoring the Columbia River Corridor" along the Hanford Reach by 2012.

The plan includes the following work scope for the River Corridor area:

- The ISS of 8 of 9 retired plutonium production reactors in the 100 Area, and the dismantling of all adjacent support facilities (it is planned that the world's first plutonium production reactor, B Reactor, will become a museum).
- The decontamination and/or demolition of more than 150 excess and aging facilities in the 300 Area, including two complex hot cell facilities.
- The removal of more than 2,100 metric tons (2,310 tons) of SNF away from the Columbia River.
- The removal and disposal of contaminated soil and debris from 900 waste sites.
- Remediation of several groundwater plumes.

## WM'01 Conference, February 25-March 1, 2001, Tucson, AZ

Much of this work scope is already underway, and nearly all of it can be completed by 2012, with two major exceptions. The first exception involves cleanup of the 618-10 and 618-11 Burial Grounds, near the Energy Northwest complex. Because of technical complexity and safety issues, the remediation of these sites will not be completed until after 2012. The second exception involves final remediation of groundwater plumes. Decisions on which technologies to use for the final remediation of the contaminated groundwater plumes are planned for implementation during the next 10 years, but the elimination of the groundwater contaminants will not be completed until after 2012. Until final cleanup technologies are implemented, interim pump and treat systems will continue to be used to intercept the groundwater contaminants before they reach the Columbia River.

The path forward to ensure the River Corridor cleanup can be completed by 2012 includes the following elements:

- The *funding requirements* and a *contracting strategy* to complete the River Corridor.
- The *regulatory framework* to support the accelerated cleanup.
- A *decision-making process* to determine the alternative use and management of the River Corridor after cleanup is complete.

The *funding requirement* (\$2,174.4 million) to complete the cleanup of the River Corridor was identified in the 100/600 Areas Study and the 300 Area ACP Plan. The projected funding necessary to accomplish the River Cleanup by 2012 is significantly less than the cost associated with previous approaches to the cleanup of the 100, 600, and 300 Areas of the Hanford Site. The phased “pincer approach” to sequence the cleanup inward from the west (i.e., the Vernita Bridge) and from the south (i.e., the 300 Area) to the northwest will be used to reduce risk to the Columbia River, accelerate visible cleanup progress, and reduce costs. RL’s *contracting strategy* is to contract (with a single entity) a “closure-type” contract for the entire cleanup of the River Corridor, with completion no later than 2012, including a target cost and fee incentives for completing the work ahead of schedule and for less than the target cost. This type of contract will provide the focus and cost efficiencies necessary to ensure the completion of the cleanup of the River Corridor by 2012.

The *regulatory framework* is in place for completing the River Corridor. All RODs issued for the cleanup of the Hanford Site integrate the regulatory requirements of CERCLA, RCRA, and NEPA. To date, all but one ROD (the ROD for the decommissioning of the N Reactor) have been issued or scheduled to complete the cleanup of the River Corridor. The N Reactor was not included in the 1993 ROD for the other eight Hanford plutonium production reactors. Therefore, an engineering study is planned to evaluate the decommissioning alternatives for the N Reactor, and to determine the final regulatory documentation required to complete the cleanup of the River Corridor. With all the regulatory decisions in place, it will be possible to petition the EPA to remove each completed phase of the River Corridor from the Superfund NPL, and make that discrete area of the River Corridor available for alternative use.

The *decision-making process* is being addressed by RL to determining alternative uses of the Hanford Site after cleanup along the River Corridor is complete. A working group is developing administrative protocols to determine alternative uses for each area of the Hanford Site as cleanup is complete. The protocols will incorporate the regulatory process for deleting portions of the Hanford Site from the NPL; complying with the ROD for the Final Hanford CLUP; collaborating with regulators, stakeholders, and Tribal Nations; and coordinating with the FWS to meet the intent of the President Clinton’s June 9, 2000, Hanford Reach National Monument Proclamation and his directive to the Secretary of Energy on implementing the proclamation.

## REFERENCES

1. U.S. Department of Energy, U.S. Environmental Protection Agency, Washington State Department of Ecology, “Agreement In Principle – Hanford Federal Facility Agreement and Consent Order – Negotiation Refocusing and Facility Transition Modifications,” Richland, Washington (1994).
2. National Park Service, “The Final Hanford Reach of the Columbia River Comprehensive Conservation Study and Environmental Impact Study,” Seattle, Washington (1994).

**WM'01 Conference, February 25-March 1, 2001, Tucson, AZ**

3. WILLIAM J. CLINTON, "Proclamation 7319 of June 9, 2000, Establishment of the Hanford Reach National Monument," Federal Register/Vol.65, No. 114/Tuesday, June 13, 2000/Presidential Documents, Washington, D.C.
4. U.S. Department of Energy, "Hanford Site Columbia River Corridor Cleanup – Report to Congress November 2000" (Draft), Richland, Washington (2000).
5. D. W. HARVEY, "History of the Plutonium Production Facilities at the Hanford Site Historic District, 1943-1990, Section 6, Architectural Supplement," DOE/RL-97 (Draft), U.S. Department of Energy, Richland Operations Office (1997).
6. U.S. Department of Energy, U.S. Environmental Protection Agency, Washington State Department of Ecology, "Hanford Federal Facility Agreement and Consent Order, Fourth Amendment, January 1994," Richland, Washington (1994).
7. U.S. Environmental Protection Agency, "EPA Superfund Focus Sheet – USDOE Hanford 1100 Area," Richland, Washington (1996).
8. U.S. Environmental Protection Agency, "EPA Superfund Focus Sheet – USDOE Hanford 100 Area," Richland, Washington (1998).
9. U.S. Department of Energy, "Richland Environmental Restoration Project Baseline, Baseline Cost Summary," DOE/RL-96-105, Vol. 2, Rev. 2, Richland, Washington (1999).
10. U.S. Department of Energy, "Hanford 2012: Accelerating Cleanup and Shrinking the Site," DOE/RL-2000-62, Rev. 2, Richland, Washington (2000).
11. Bechtel Hanford, Inc., "The 100/600 Areas River Corridor Accelerated Restoration Study," BHI-01405 (Decisional Draft), Richland, Washington (2000).
12. U.S. Department of Energy, Final Environmental Impact Statement, Decommissioning of Eight Surplus Production Reactors at the Hanford Site," DOE/EIS-0119F, Richland, Washington (1992).
13. U.S. Department of Energy, "Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement, September 1999," DOE/EIS-0222-F, Richland, Washington (1999).
14. U.S. Department of Energy, Richland Operations Office, "Budget Update Guidance(BUG)-Phase II, Multi-Year Work Plans for FY2002-Lifecycle, BUG Phase II Funding Guidance-Appendix I," Richland, Washington (2000).
15. WILLIAM J. CLINTON, "Memorandum For The Secretary Of Energy, June 9, 2000, Subject: Hanford Reach National Monument," Washington, D.C.
16. BRUCE BABBITT, The Secretary Of The Interior, "Memorandum to Director of U.S. Fish and Wildlife Service, July 26, 2000, Subject: Management of the Hanford Reach National Monument," Washington, D.C.