PNNL-27000

Pacific Northwest
NATIONAL LABORATORY

Proudly Operated by Battelle Since 1965

Mitigation for Remediation and Demolition of the RTL Research Technology Laboratory (RTL) Complex, Pacific Northwest National Laboratory, Richland, Washington:

A Historic Context of RTL's Contributions to the Atomic Energy Commission's (AEC) mid-1960's Economic Diversification Program

April 2018

DW Harvey
EP Kennedy
MR Sackschewsky

U.S. DEPARTMENT OF ENERGY

Prepared for the U.S. Department of Energy
under Contract DE-AC05-76RL01830

DISCLAIMER

PACIFIC NORTHWEST NATIONAL LABORATORY
operated by
BATTELLE
for the
UNITED STATES DEPARTMENT OF ENERGY
under Contract DE-AC05-76RL01830

Printed in the United States of America

Available to DOE and DOE contractors from the
Office of Scientific and Technical Information,
P.O. Box 62, Oak Ridge, TN 37831-0062;
ph: (865) 576-8401
fax: (865) 576-5728
email: reports@adonis.osti.gov

Available to the public from the National Technical Information Service
5301 Shawnee Rd., Alexandria, VA 22312
ph: (800) 553-NTIS (6847)
email: orders@ntis.gov <http://www.ntis.gov/about/form.aspx>
Online ordering: http://www.ntis.gov

This document was printed on recycled paper.
(8/2010)

PNNL-27000

Mitigation for Remediation and Demolition of the RTL Research Technology Laboratory (RTL) Complex, Pacific Northwest National Laboratory, Richland, Washington:

A Historic Context of RTL's Contributions to the Atomic Energy Commission's (AEC) mid-1960's Economic Diversification Program

DW Harvey
MR Sackschewsky
EP Kennedy

April 2018

Prepared for
the U.S. Department of Energy
under Contract DE-AC05-76RL01830

Pacific Northwest National Laboratory
Richland, Washington 99352

Contents

Figures

Tables

1.0 Introduction

The purpose of this document is to present documentation required by Stipulation A.2 of the *Memorandum of Agreement between the Department of Energy and the Washington State Historic Preservation Officer Regarding the Research Technology Laboratory Complex Deactivation, Decontamination, Decommissioning and Demolition*. The Memorandum of Agreement (MOA) was executed between the Department of Energy Pacific Northwest Site Office (DOE-PNSO), and the Washington State Historic Preservation Officer (SHPO) on March 23, 2017 to resolve the adverse effect of DOE-PNSO's undertaking to remediate and demolish National Register of Historic Places (National Register)-eligible Research Technology Laboratory (RTL) Buildings 520 and 530. Specifically, Stipulation A.2 (DOE-PNSO 2017) directs DOE-PNSO to produce a historical context document on the Atomic Energy Commission's (AEC) mid-1960's economic diversification program and the role and contribution of RTL to the program.

2.0 Background on RTL 520 and RTL 530

RTL 520 (Research Technology Laboratory) and 530 (RTL Radioactive Storage) are located in North Richland, Washington on the DOE Pacific Northwest National Laboratory's (PNNL's) Richland Campus. Currently owned and operated by Battelle Memorial Institute (Battelle) for the DOE-PNSO, PNNL's RTL Buildings 520 and 530 are two of eight buildings that comprise the RTL complex (see Table 1; Figures 1 - 5). The rest of the complex consists of warehouse, storage, and other secondary support facilities that were constructed after RTL 520 was built in 1966 (Harvey et al. 2015). Table 1. RTL Complex Buildings and Construction Dates

The

Building Number	Building Name	Construction Date
RTL510	Chemical and Flammable Storage	1977-1978
RTL520	Research Technology Laboratory	1966
RTL530	RTL Radioactive Storage	Unknown
RTL550	RTL Technical Services	Unknown
RTL560	RTL Utility Building	1966
RTL570	RTL Autoclave Center	Unknown
RTL580	RTL Crafts Shop	Unknown
RTL590	RTL Warehouse	1978-1979

RTL complex is situated in the former 3000 Area of the Hanford Site, which was owned and operated in the 1960s by the Atomic Energy Commission (AEC) (the U.S. Department of Energy's predecessor). The Douglas Aircraft Company constructed RTL Building 520, initially called Donald W. Douglas Laboratories, in 1966 (Figure 6). During the early 1960s, the Douglas Aircraft Company, Inc. and United Nuclear Corporation (UNC) established a joint venture called Douglas United Nuclear (DUN) to bid on work at the Hanford Site in Richland, Washington. In April 1965, the AEC awarded DUN a contract to operate the Hanford Site's reactor complex and fuel fabrication facilities, and to design and construct a commercial plutonium fuel fabrication plant. The contract also required DUN to form a small business investment corporation to assist and encourage the growth of small business enterprises in the Tri-Cities (Tri-City Herald 1966).

A provision of the agreement called for the Douglas Aircraft Company to establish a new facility to bring additional business activity to the Tri-Cities. Accordingly, the Douglas Aircraft Company constructed the Donald W. Douglas Laboratories in 1966 as part of the Douglas Missile & Space Systems Division. The scientists in the Laboratories initially conducted research and development (R&D) of nonmilitary applications of nuclear power for space exploration and energy application systems (Harvey et al. 2015), expanding the Douglas Aircraft Company's capability in these fields (Douglas Aircraft Company 1966).

DOE-PNSO and the Washington SHPO have determined that RTL Building 520 is individually eligible for listing in the National Register under Criterion A for being one of the AEC's four innovative, economic diversification programs undertaken in Richland during the mid-1960s. The AEC's contract award to DUN was part of the AEC's commitment to economic diversification of Hanford and the Tri-Cities economy. RTL Building 520 is also eligible under Criterion C as an intact example of Mid-20th Century Commercial Modern architecture found in research and corporate office parks/campuses across the country. RTL Building 530 is also eligible for listing in the National Register as a contributing component to Building 520 in support of radiological research conducted in Building 520 and throughout the RTL complex (Griffith 2015).

Figure 1. RTL Complex, Buildings 520 and 530, in Center of Aerial (Harvey et al. 2015)

Figure 2. RTL 520 South (Front) Elevation (Harvey et al. 2015)

Figure 3. RTL 520 South (Front) Elevation (Harvey et al. 2015)

Figure 4. RTL 520 Northwest Corner (Harvey et al. 2015)

Figure 5. RTL 530 Southwest Corner (Harvey et al. 2015)

Figure 6. RTL 520, North and East Elevations (circa late 1960s)

3.0 Historical Context of the AEC's Mid-1960s Economic Diversification Program

3.1 Establishment of the Hanford Site

In early 1943, the Manhattan Engineer District (MED) of the U.S. Army Corps of Engineers selected Hanford, Washington in southeast Washington as the site for the United States' secret World War II plutonium production facilities. E. I. du Pont de Nemours & Company in Wilmington, Delaware was hired to construct and operate the industrial facilities, identified as the Hanford Engineer Works, as well as to create a new village in Richland to house their operational employees. Hanford's primary mission was to manufacture nuclear material (plutonium) for the nation's first atomic bombs that essentially ended World War II. The Hanford Site produced approximately two-thirds of the nation's plutonium for its nuclear arsenal during the Cold War era.

The MED had established three plutonium production areas at Hanford. The 300 Area manufactured the fuel rods that were shipped to one or more of Hanford's nine nuclear reactors in the 100 Area along the Columbia River to be irradiated. Once irradiated, the fuel rods were then transported to one of the site's chemical separation plants in the 200 Area, where the plutonium was separated from the fuel rods. After 1949, the plutonium was shaped into "buttons" at Hanford's Plutonium Finishing Plant before shipment to the AEC's/DOE's Pantex Plant in Texas or the Los Alamos National Laboratory in New Mexico to be inserted into nuclear weapons.

3.2 Hanford Site, North Richland, and the Donald W. Douglas Laboratories

During the Manhattan Project and the early years of the Cold War period, the AEC's/DOE's 1100 and 3000 Areas of the Hanford Site were located in North Richland. The 1100 Area consisted of site support services such as shipping, receiving, transportation, maintenance, and contractor offices. The 3000 Area, established during the Manhattan Project, was originally the site of the 3000 Area Camp that temporarily housed Hanford Site construction personnel and military police. From 1944 through 1955, the 3000 Area Camp expanded into a semi-permanent town, known as the North Richland Construction Camp, which housed the growing civilian work force that supported the postwar construction boom at Hanford (Nowokowski 1955).

By the mid-1950s, most the post-war expansion construction at Hanford had been completed. The surplus land and facilities of the North Richland Construction Camp were transferred to the U.S. Army and converted into their headquarters/command center for the military and civilian personnel who operated the Army's 19 anti-aircraft artillery (AAA) sites and four Nike Bases on the Hanford Site that provided air defense of Hanford's nuclear reactor complex. Known as Camp Hanford, with its administrative and command center in North Richland and the air defense forward systems on the Hanford Site, the Army base lasted a mere decade, from 1951 to 1961, as rapidly changing missile technologies and defense systems made the AAA sites and Nike Bases obsolete. In 1960, the Camp and its defense systems were deactivated, and the facility officially closed in March 1961 (Harvey 2000).

After Camp Hanford closed in 1961, the U.S. Army demolished most of its North Richland buildings and transferred the land back to the AEC. The AEC declared the land to be surplus property, and gave the property to the City of Richland to be used for economic development. In 1966, as part of AEC's

economic diversification program at the Hanford Site, the AEC contracted with the Douglas Aircraft Company to construct the Donald W. Douglas Laboratories in this area of North Richland.

During this period the AEC also awarded a contract to Battelle to operate the newly established Pacific National Laboratory (PNL), which since 1995 has been known as the PNNL. Battelle constructed its original 230 acre core campus in Richland north of the RTL complex.

3.3 Economic Diversification

Prior to the transfer of Camp Hanford property in North Richland to the City of Richland, local business and political leaders as early as the mid-1950s began to pressure the AEC and Congress for diversification of the region's economy.

Confident that nuclear power plants were the wave of the future, the local business and political leaders lobbied the federal government to authorize construction of a ninth nuclear reactor at Hanford, one that would produce both plutonium for nuclear weapons and kilowatts for the BPA power grid. Senator Henry Jackson introduced a bill to this effect in 1956, and ten years later the dual purpose N Reactor was completed at Hanford (Center for the Study of the Pacific Northwest 1992, Page 2). The local business and political leaders initially viewed the N Reactor as a positive step towards diversifying the region's economy. But even before N Reactor was completed, the same leaders were beginning to question this policy. While N Reactor was a dual purpose facility that produced plutonium for atomic weapons and electricity for nonmilitary uses, Hanford and the Tri-Cities' economy was still primarily dependent on the production of plutonium for the nation's nuclear arsenal.

Community and business leaders saw that the region's one-dimensional economy was at risk of severe disruption due to potential nuclear technological obsolescence, the unpredictable nature of international relations and domestic politics, and arms reduction agreements (Findlay and Hevly 2011). Seeing this, local business and community leaders gave serious consideration to the need for broad-based economic diversification less dependent on the AEC and Hanford's nuclear related technologies (Findlay and Hevly 2011).

By the early 1960s, the AEC was well aware of the economic problems facing the "atomic" communities it had created. The AEC was cognizant that its postwar mission of supplying nuclear materials and weapons for nation's arms race with the Soviet Union could very well lead to serious economic issues for the very atomic communities producing these materials. In response, the AEC began considering economic diversification measures to mitigate the consequences for the communities heavily reliant on AEC funding and employment. Of all the atomic communities, Richland received the most attention. Thus, in June 1962 the AEC held hearings on the subject in Richland (Findlay and Hevly 2011).

As a result of the AEC-led hearings, the agency offered to provide its atomic communities with economic development assistance. W. H. Slaton, head of the AEC committee conducting the hearings, issued the 'Slaton Report" that concluded while the AEC is not legally bound to economically assist its atomic communities, it would "reasonably assist" their economic diversification efforts (The Center for the Study of the Pacific Northwest 1992; Gerber 1993). The AEC had a vested interest in sustaining healthy economies in its communities, as they might be needed for future national defense initiatives and production uses. However, critics claimed that the Slaton Report did not offer much in "real" assistance. Community and business leaders in Richland claimed that their community lacked a strong commercial core, with limited civilian industries to produce a substantial broadening of their economy without AEC financial subsidies. Local business leaders were concerned that real estate investments in Richland would be adversely affected if economic trends continued without considerable AEC assistance (Gerber 1963).

The AEC, however was not providing a "blank check" for economic diversification initiatives. The AEC entered into negotiations with atomic communities only if local governments and business and community leaders took the initiative in economic diversification efforts.

Richland's sense of urgency was heightened when the Department of Defense issued a report (in 1963) that estimated that approximately 80% of jobs in the Tri-Cities were dependent directly or indirectly on Hanford (Findlay and Hevly 2011). The report reconfirmed the need for more broad-based economic diversification in the Tri-Cities. This became even more apparent with President Lyndon Johnson's announcement in January 1964 of the planned shutdown of Hanford's nuclear reactors (except for N Reactor) by the end of the decade. All the reactors except N Reactor (which stayed opened until 1986) were to be deactivated by 1971, as the nation's nuclear arsenal was no longer in need of additional supplies of weapons-grade plutonium. Hanford was targeted because its reactors were smaller and older compared to the newer and larger plutonium production reactors built at the AEC's Savannah River site in South Carolina (Findlay and Hevly 2011).

The AEC had anticipated President Johnson's announcement of the closure of Hanford's plutonium production reactors, and was in consultation with local community leaders and Congress concerning the diversification of the Tri-Cities economy. In response, the Tri-Cities Nuclear Industrial Council (TCNIC) was organized in 1963 to promote economic diversification at Hanford and in the Tri-Cities region (Gerber 1993). TCNIC evolved into the current Tri-Cities Development Council.

The TCNIC brought together local business leaders, community boosters, news media, Washington State's Congressional delegation, and the AEC to devise an economic diversification plan for the Tri-Cities. This collaboration eventually resulted in a plan whose centerpiece was the segmentation of Hanford's work to replace the single contractor, General Electric (GE), with multiple contractors.

During and following the 1950s, Washington States' Congressional delegation, headed by Senators Henry Jackson and Warren Magnuson, had been ardent supporters of nuclear power and military preparedness, and had effectively channeled government funding to the Hanford Site's nuclear program. Jackson and Magnuson did see the need for some sort of diversification of the Tri-Cities/Hanford economy. Congress, along with local political and business leaders, initially appealed to the AEC to dispose of some of Hanford's buffer/security zones for local economic development. Equally important, community leaders in conjunction with the TCNIC advocated for a program by which corporations, as part of their bids on government contracts to operate at Hanford, would be required to invest millions of dollars to help diversify the local economy (Urbanologist n.d.). The TCNIC encouraged the AEC to require new Hanford contractors to create "spin-off" small businesses as a condition for doing work at Hanford (Gerber 1993).

TCNIC's initial mission was to promote the economic prosperity of Benton and Franklin Counties by pursuing new-federal initiatives and programs to support stability in federally-funded operations at Hanford. The TCNIC was committed to move the Tri-Cities towards more non-military, commercial uses of nuclear power, space and missile development, and identify and attract new businesses by publicizing the resources and amenities of the Tri-Cities. TCNIC proved to be successful as it had beneficial connections with the local media. The Tri-City Herald publicized the economic diversification views of the TCNIC on the front pages of its daily paper. The Herald acted as a conduit to galvanize public support for TCNIC efforts, and to cultivate important contacts with Senators Jackson and Magnuson in Washington D. C.

As noted, this collaboration between Glenn Lee (Tri-City Herald publisher and TCNIC Secretary-Treasurer), Robert Phillip (President of the Tri-City Herald and TCNIC President), Sam Vollenpest (local banker, community booster and TCNIC vice president), Senators Jackson and Magnuson, and the AEC resulted in the replacement of Hanford's single contractor system with multiple contractors that were

required to invest in the diversification of the local economy as the price to pay for a slice of the lucrative AEC work, also known as "nuclear pork."

The promotion of economic diversification efforts by local community boosters and business leaders would not have been successful without the assistance of Senators Jackson and Magnuson. Their support was vital in the diversification effort at Hanford. As in the past, the two Congressmen were successful in getting the AEC to listen to the local business community. During the early Cold War era, the AEC and the Tri-Cities had effectively relied on Senators Jackson and Magnuson to gain Congressional approval for funding Hanford's plutonium production mission. With the reduction of Hanford's nuclear mission, the AEC and the Tri-Cities were once again able to secure Jackson and Magnuson's support; this time, for Congressional funding for economic diversification measures at the Hanford site.

"No other AEC site received such intense support from the AEC in their economic diversification efforts" (Findlay and Hevly 2011, p. 176) as Hanford did. This support resulted in the construction of a new federal building in Richland. Nothing symbolized more the successful collaboration between the AEC, the state's Congressional delegation, and local business and community leaders than the quick approval and construction of the new federal building. As was the case during the diversification process, Senators Jackson and Magnuson were instrumental in securing Congressional funding for construction of the new facility. The federal building showed that the U.S. government was serious in their commitment of diversifying the region's economy and promoting a sound business environment. The federal building provided a sense of permanence for the Tri-Cities, proving that Hanford was "staying in business" and that the federal government was not going to abandon the community (Findlay and Hevly 2011).

Completion of the new federal building coincided with commencement of the economic diversification program at Hanford. The AEC, GE, and local community leaders devised an innovative segmentation program to diversify the work at Hanford (Battelle Pacific Northwest Laboratories n.d.), replacing Hanford's single major contractor with multiple contractors, each responsible for a specific segment of work at Hanford, and each required to invest in the development of small businesses in the community (Findlay and Hevly 2011).

The replacement of the single contractor with multiple contractors at Hanford accomplished several of AEC's diversification goals. The AEC was determined to dispel the image of a single, powerful contractor that discouraged other companies from investing and establishing small businesses at Hanford. The AEC's goal was to divide GE's Hanford work among six different firms, and hopefully stimulate sizeable investments in smaller, new industries. The AEC was also interested in contracting with firms who specialized in developing industries based on the peaceful uses of the atom, which had not been part of GE's Hanford contract. The non-plutonium production uses of nuclear power, an earlier component of the Eisenhower's administration's "Atoms for Peace" program, was one of the AEC's economic diversification goals (Findlay and Hevly 2011).

Besides funding the development of small businesses to assist the AEC's ongoing production mission, contractors were also encouraged to develop R&D enterprises at Hanford (Findlay and Hevly 2011). This was one of the key elements of the segmentation process and led to the establishment of a national laboratory (PNNL) at Hanford.

During 1964–65, the AEC began the segmentation process at Hanford by funding the establishment of the U.S. Testing Company's research laboratory on property leased from the Port of Benton in North Richland southwest of the PNNL Richland Campus (Tri-City Herald 1964) (The U.S. Testing Company and its research laboratory are no longer in Tri-Cities).

The following year, AEC continued the segmentation process to divide up Hanford's mission among several smaller firms, requesting proposals from contractors to operate the "Hanford Laboratories." In addition, there were three other economic diversification projects:

1. Waste separation, with a diversification commitment to build a new hotel complex and a cattle feeding business.
2. Nuclear fuel fabrication and reactor operations, with a diversification commitment to build a high technology product development business and a zirconium tubing factory.
3. Security, transportation, and support services, with a diversification commitment to develop a metal products fabrication business (Battelle Pacific Northwest Laboratories n.d.).

In 1965, the AEC issued a contract to Battelle to operate the Hanford Laboratories, which established the Pacific Northwest Laboratory (later known as PNNL). Battelle purchased 230 acres of surplus land in North Richland from the City of Richland and constructed research and administrative facilities that formed the original PNNL core campus (Harvey et al. 2015).

The following year (1966), the AEC awarded a segmentation contract to Douglas United Nuclear, or DUN, to operate the Hanford nuclear reactors, fuel fabrication facilities, and the following year to construct a commercial plutonium fuel fabrication plant in Hanford's 300 Area (Tri-City Herald 1966). However, in 1967, DUN and the AEC agreed on contractual revisions that expanded DUN's reactor operations in lieu of constructing a new fuel fabrication facility at Hanford (USACE 1967)

A provision of the segmentation contract called for the Douglas Aircraft Company to build a scientific research laboratory approximately 60,000 square feet in size on 117 acres south of the Battelle's original core campus (Tri-City Herald 1964; Douglas Aircraft Company 1966). Known as the Donald W. Douglas Laboratories (today the Research and Technology Laboratory or the RTL), the facility was an important aspect of the Douglas Aircraft Company's mission at Hanford, supporting DUN's research functions, and plutonium production operations at the Hanford reactors (Tri-City Herald 1966). The initial staff numbered approximately 70 scientists and administrative personnel. The Douglas Aircraft Company used the laboratory to conduct nuclear fuel fabrication and reactor operations research as well as space vehicle exploration and energy development studies for potential use in manned interplanetary missions and applications to power plants for orbiting space stations (Douglas Aircraft Company 1966), in conjunction with their Missile and Space Systems Division in Huntington Beach, California (Harvey et al. 2015).

Two laboratories within the facility were the Nuclear and Energy Conversion labs. Their specific functions were to develop ". . . research and development in nuclear technology, develop capabilities for the fabrication of nuclear components, and develop applications to support the company's work in nuclear propulsion stage systems" (Douglas Aircraft Company 1966). The two labs contained metallurgical laboratory equipment, special glove boxes for handling radioactive materials, machine and welding shops, melting and vacuum furnaces, and optical measurement equipment (Douglas Aircraft Company 1966).

As noted, the AEC's economic diversification strategy required Hanford contractors to invest in the development of small, "spin-off" businesses in the Tri-Cities. Each firm agreed to undertake projects that would bring new businesses to the local area. The goal of the UNC was to gain a greater share in the growing nuclear-related market (UNC 1968).

> The company intended to serve both government and commercial customers. It expected to work on research and development, reactor system design, manufacture of nuclear fuel materials, reactor

and core fabrications, fuel management, cold scrap processing, isotopes, and hot radiation energy sources (UNC 1968, p. 1).

The UNC was also active in acquiring uranium mines and production facilities. By the early 1960s, the UNC was producing nuclear fuel materials and reactor cores at plants and laboratories in Connecticut, Missouri, and New York (UNC 1968, p. 1). In 1965, it joined with Douglas Aircraft in forming DUN to operate the AEC's reactor and fuel fabrication facilities at Hanford. "The facilities included five plutonium production reactors and a fuel fabrication area that prepared fuel for use in the reactors" (UNC 1968, p. 1).

The UNC constructed a zirconium tube plant in 1966–1967 in nearby Kennewick. Zirconium alloy tubing is an important component of commercial reactor fuel used for encasing pellets of uranium oxide. The UNC joined with Sandvik Steel Works of Sweden to establish the Sandvik Special Metal (SSM) Company (UNC 1968). SSM manufactures seamless titanium, titanium alloy, and zirconium alloy tubing for use in aerospace parts, the oil and gas industry, nuclear power plants, and medical applications (Sandvik n.d.). SSM tubing has been used in the construction of over 100 commercial nuclear power plants worldwide (Sandvik n.d.).

DUN, along with the Atlantic Richfield Company (ARCHO) provided financial assistance in the form $100,000 annually for five years to the University of Washington to develop the Joint Center for Graduate Study at an 84-acre site in North Richland. Initially operated by the University of Washington, Washington State University, and Oregon State University, the higher education facility ultimately became Washington State University's Tri-Cities campus (Richland History 1968).

In February 1965, the AEC selected Isochem, Inc., a joint venture of Martin Marietta and U.S. Rubber, to conduct chemical separations processing at Hanford (Findlay and Hevly 2011; Richland History 1968). Isochem proposed to construct a plant to recycle Hanford radioactive waste and recover isotopes for a variety of uses (Findley and Hevly 2011). However, within a year of starting work at Hanford, Isochem determined that the market for these radioisotopes was insufficient and cancelled plans for the plant. Isochem was then replaced by ARCHO who was contracted in 1969 to construct the "state-of-the-art" Hanford House, a hotel-convention-resort complex (replacing the World War II-era Desert Inn) in central Richland, and a cattle feeding business and beef packing plant near Wallula, Washington (Kiel 1972; Paulus 2010; Findley and Hevly 2011; Richland History 1968). Both the Hanford House and the beef packing plant are still in operation. Tyson Fresh Meats operates the beef packing plant, and is currently one of the largest employers in the Tri-Cities Area outside of Hanford (Tri-City Development Council 2017). The Red Lion Corporation currently operates the Hanford House.

While the AEC promoted Hanford's public-private partnership as a successful model for diversifying single-industry communities in the U.S., critics pointed out that the original plans were not totally realized. Diversification was not meant to include cattle feed operations, a beef packing plant, and construction of a hotel/resort (Findlay and Hevly 2011). Nevertheless, the AEC estimated that the economic diversification program was responsible for over $40 million of private capital invested in the Tri-Cities economy (Findlay and Hevly 2011).

Economic diversification resulted in the multiple contractor system that is still in use at Hanford today. The Tri-Cities has evolved and grown significantly since the initial economic diversification efforts during the 1960s. The Tri-Cities area is one of the fasting growing regions in the State of Washington, with a population nearly 300,000 people. A major outcome of economic diversification, besides the multiple contractor system, was the establishment of the PNNL, a premier DOE national laboratory operated by Battelle since 1965. The local economy is much more diversified and less dependent on Hanford than during the 1960's. Washington State University campus in Richland has evolved into a four

year school with an expanded curriculum and student body. The clean-up of the Cold War legacy of nuclear wastes and other toxic byproducts has been a significant economic driver at Hanford since the establishment of the Tri-Party Agreement during the late 1980s. The legally-bounded agreement between the DOE, Washington State Department of Ecology, and the U.S. Environmental Protection Agency regulates clean-up efforts at Hanford, requiring the DOE meet clean-up milestones at Hanford within mandated deadlines.

3.4 Atoms for Peace

While the economic diversification program was aimed at broadening the local economy and moving it away from sole reliance on military applications of nuclear energy, the program was also tied to the development of the peaceful uses of the atom. The nonmilitary use of atomic power had its beginnings during the Eisenhower administration. Inspired by President Eisenhower's "Atoms for Peace" speech during the mid-1950's, the AEC and Lawrence Livermore National Laboratory scientists called for an "Operations Plowshare" program to harness the power of the atom for peaceful uses, such as the excavation and construction of roads, harbors, and canals. Glenn Seaborg, chairman of the AEC under Presidents Kennedy and Johnson, promoted the program as a means to adapt nuclear explosives for peaceful purposes in natural resources development and scientific excavation projects. He wrote:

> Explosives have always been used for constructive purposes as well as for military purposes and there is good evidence that the powerful force of nuclear explosions can be put to constructive use… (USACE 1967, p. 147).

Quickly packaged and not very well conceived, some of the projects proposed the use of nuclear weapons for land excavation projects on a mostly unaware public. Operation Plowshare supporters failed to consider the concerns of local citizens, especially indigenous populations, downplaying the potential adverse effects of the projects on fragile fishing grounds and other cultural and environmentally sensitive areas. The promoters soon ran into opposition from wary political leaders, a growing and vocal anti-nuclear citizenry, and lack of government funding, which led to full cancellation of the program by 1977 (Kaufman 2012).

In the State of Washington, the Plowshare program led to the construction (and completion in 1978) of the Fast Flux Test Facility (FFTF) in the 400 Area of the Hanford Site. A thermal liquid sodium cooled test reactor, FFTF operated as a research facility for commercial reactor design and operation, including the testing of commercial fuels for breeder reactors. The Plowshare program also led to the beginnings of the Washington Public Power Supply System (WPPSS) with plans for construction of three commercial reactors at Hanford and two commercial reactors in western Washington. The failure of its promoters to foresee the glut of electrical power statewide, massive costs overruns, and bond defaults led to the completion of only one of the planned commercial power plants. Named the Columbia Generating Station, it is the only commercial nuclear reactor in Washington State (Kaufman 2012). The reactor is owned and operated by Energy Northwest (formerly WPPSS), a public power joint operating agency headquartered in Richland, Washington, with a membership of 28 public power utilities, including 23 of the state's 24 public utility districts.

3.5 Summary and Conclusion

In 1965, the AEC contracted with DUN to operate Hanford's reactors and fuel fabrication facilities; DUN assumed control over all of GE's reactor operations by 1967. A provision of DUN's contract with the AEC led to Douglas Aircraft Company's construction and operation of the Donald W. Douglas Laboratories, completed in 1966. During 1966–1971, the company conducted nuclear fuel fabrication

and reactor operations research at the facility for the AEC. RTL Building 520, where PNNL scientists conducted energy and waste cleanup research and other national and international research priority projects, was the first building (along with Building 560) constructed. The other buildings in the RTL complex were secondary support facilities consisting of warehouses, storage facilities, utilities, and craft shops that were constructed over the next 10 to 15 years (Harvey et al. 2015).

While Douglas Aircraft sold Building 520 and the entire RTL complex to Exxon Nuclear in 1971, DUN continued to operate Hanford's production reactors (mainly N Reactor after 1971) during the 1970s and 80's. In 1973, DUN changed its name to United Nuclear Industries, Inc. Battelle purchased the Donald W. Douglas Laboratories from Exxon in 1982 (Tilden 2012).

Douglas Aircraft Company's construction of the Donald W. Douglas Laboratories in 1966 played a vital role in the economic diversification at Hanford. The facility was used for a wide range of R&D work in non-nuclear and nuclear fields, including energy applications, and the development of technologies for the cleanup of Hanford's legacy of 40 years of plutonium production. The AEC's award to DUN to operate Hanford's reactors, fuel fabrication facilities, and the Douglas Aircraft Company's construction of the Donald W. Douglas Laboratories signaled the beginning of the successful collaboration between the AEC, Congress, and Tri-Cities community leaders to carry out the economic diversification program at Hanford. The legacy of this effort led to the permanent use of multiple contractors at Hanford, the establishment of PNNL, and development of numerous "spin-off" R&D businesses at Hanford and in the Tri-Cities.

The R&D activities conducted at the Donald W. Douglas Laboratory/RTL established the research precedent for PNNL after their acquisition of the complex in 1982. The diverse scientific activities conducted at RTL addressed a wide range of challenges to improve the "management of natural resources and energy, and to solve challenging environmental problems, specifically carbon management and legacy waste management" (DOE-PNSO 2012. p. 2). Between 2000 and 2016, PNNL's Energy and Environment Directorate resided in the RTL. The Directorate's three divisions and seven technical groups addressed a wide range of national and international challenges, including providing solutions that protect the health of people who must work in hazardous environments, streamlining industrial processes for improved productivity and effectiveness, delivering new approaches for environmental cleanup, and developing innovative synthetic approaches for the fabrication of new materials.

4.0 References Cited

Battelle Pacific Northwest Laboratories
n.d. *Battelle in the Northwest: A Visionary Government-Industry Research Partnership - A Report on the ERDA-Battelle Consolidated Laboratory and Use Permit*. Richland, Washington.

Center for the Study of the Pacific Northwest
1992 "The Impact of the Cold War on Washington; Hanford, 1942 - 1992." Available at http://www.washington.edu/uwired/outreach/cspn/Website/Classroom%20Materials/Pacific%20Northwest%20History/Lessons/Lesson%2024/24.html

DOE-PNSO
2012 *Research Technology Laboratory (RTL-520) Building, RCHN Area (Including RTL-510, 524, 530, & 560)*, Facility Use Agreement, FUA-RTL-520-R7. Pacific Northwest National Laboratory, Richland, Washington.

DOE-PNSO
2017 "Memorandum of Agreement Between the Department of Energy and the Washington State Historic Preservation Officer Regarding the Research Technology Laboratory Complex Deactivation, Decontamination, Decommissioning and Demolition"

Douglas Aircraft Company
1966 "Donald W. Douglas Laboratories, Richland, Washington," *Background Information*. Santa Monica, California, Page 1.

Findlay, J. and B. Hevly
2011 *Atomic Frontier Days: Hanford and the American West*. Center for the Study of the Pacific Northwest, University of Washington Press, Seattle, Washington.

Gerber, M. S.
1993 *The Hanford Site: An Anthology of Early Histories*, Westinghouse Hanford Company, Richland, WHC-MR-0435.

Griffith, Gregory
2015. "Remediation of Radiological Contamination at the Research Technology Laboratory - Determined Eligible," *Letter to Department of Energy, Pacific Northwest Site Office, Richland, Washington*. From the Department of Archaeology and Historic Preservation, Olympia, Washington, September 29, 2015.

Harvey D. W.
2000 *History of the Hanford Site 1943-1990*. Edited by Georganne O'Connor. Prepared for Pacific Northwest National Laboratory, Richland, Washington.

Harvey, David, Doug McFarland, Joy Ferry
2015 *Cultural Resources Review of the Remediation of Radiological Contamination at the Research Technology Laboratory (RTL) Complex at the Pacific Northwest National Laboratory (PNNL), Benton County, Washington (HCRC#2015-PNSO-003)*. Pacific Northwest National Laboratory, Richland, Washington.

Kaufman, Scott
2012 *Project Plowshare*. Cornell University Press, New York.

Kiel, G. R.
1972, “Radioactive Waste Management at Hanford. Atlantic Richfield Hanford Company, Richland, Washington. ARH-SA-113.

Nowokowski, R. F.
1955 “'I Hate Too Leave' Is Theme Song In North Richland As Trailers Pull Out.” *Tri-City Herald*, February 20, 1955. Available at http://news.google.com/newspapers?nid=1951&dat=19550220&id=8BwqAAAAIBAJ&sjid=yoYFAAAAIBAJ&pg=4212,3010274. Retrieved September 27, 2012.

Paulus, Michael J, Jr.
2010 “Port of Walla Walla is established on September 9, 1952”. HistoryLink.Org. Available at: http://www.historylink.org/File/9467. Accessed June 28, 2017.

Richland History - “The Long Road to Self-Government,” *The History of Richland, Washington, 1943 – 1968.* On file, Richland Public Library, Richland, Washington.

Sandvik
n.d. “Sandvik Special Metals USA,” Available at http://smt.sandvik.com/products/tube-pipe-fittings-and-flanges/

Tilden H.T.
2012 Personal Communication with Lori Price, CH2M HILL. Senior Environmental Policy Advisor, Environmental Protection and Regulatory Programs, Pacific Northwest National Laboratory, Richland, Washington. December 14.

Tri-City Development Council
2017 “Major Employers” https://www.tridec.org/major-employers/. Accessed June 28, 2017.Tri-City Herald

Tri-City Herald
1964 “Douglas Buys Richland Site.” Tri-City Herald, October 25, 1964, Volume 60, No. 257, p.1. Available at http://news.google.com/newspapers?nid=1951&dat=19641025&id=8KUoAAAAIBAJ&sjid=fAYGAAAAIBAJ&pg=2880,3955691. Retrieved December 14, 2012.

Tri-City Herald
1966 “Four Phase Program Scheduled.” *Tri-City Herald*, Richland, Washington.

United Nuclear Corporation (UNC)
1968 Annual *Report for 1968.*

United States Army Corps of Engineers (USACE)
1967 “Plowshare - Peaceful Uses of Nuclear Explosives,” *The Nuclear Industry.*

Urbanologist
n.d. “An Atomic History Told in Fine Fashion.” Available at http://theurbanologist.com/post/32745212422/an-atomic-history-told-in-fine-fashion.

Pacific Northwest
NATIONAL LABORATORY

Proudly Operated by **Battelle** *Since 1965*

U.S. DEPARTMENT OF
ENERGY

902 Battelle Boulevard
P.O. Box 999
Richland, WA 99352
1-888-375-PNNL (7665)

www.pnnl.gov