

RISKY BUSINESS AT PERMA-FIX NORTHWEST

*The Inside Story on Hanford's Off-Site
Radioactive Treatment Facility*

By Robert Alvarez and Hanford Challenge



Image from [Tri-City Herald](#)

(Last updated: December 4, 2020)

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I. Executive Summary

Nuclear wastes at the Hanford Nuclear Site should be treated onsite. The practice of treating Hanford's low-level and plutonium-containing wastes at Perma-Fix Northwest, a commercial facility in Richland, WA, should end.

Perma-Fix Northwest is a commercial Low-Level Waste (LLW) and Mixed Low-Level Radioactive Waste (MLLW) treatment and storage facility approved, permitted or licensed for operation by the Environmental Protection Agency (EPA) Region 10, the Washington State Department of Ecology, and the Washington State Department of Health under their respective authorities. Perma-Fix Northwest is located on 35 acres in an urban area in the City of Richland and near the Department of Energy's (DOE) Hanford Nuclear Site.

Perma-Fix Northwest is currently incinerating, compacting, and transporting millions of cubic feet of radiochemical and mixed waste (waste that is both hazardous and radioactive) per year; much of that waste coming from the Hanford Nuclear Site. As of 2009, Hanford and other DOE facilities provided Perma-Fix Northwest with about 95% of all of its mixed low-level wastes and about 70% of its volume of low-level radioactive wastes.

Continued offsite shipping, storage and treatment of plutonium-containing nuclear wastes from Hanford to surrounding residential communities creates avoidable health, safety and security risks. According to the EPA, in 2010 over 32,000 people lived within 5 miles of Perma-Fix Northwest.

Richland residents are at risk from the radioactive and hazardous materials transported over public roads between Hanford and Perma-Fix Northwest. According to the State of Washington and federal regulators, Perma-Fix Northwest in Richland exceeded onsite soil contamination limits, improperly stored radioactive and other hazardous wastes, handled wastes resulting in leakage of plutonium and significant workplace contamination, failed to notify regulators of known violations, and exposed several employees to radiation. Perma-Fix Northwest was also fined a total of \$551,891 from 2008 to 2019 by the U.S. Environmental Protection Agency and the Washington Department of Ecology for hazardous waste violations.

Hanford Challenge's investigation uncovered a disturbing history of accidents, violations, findings, and non-compliances that raise serious questions about whether Perma-Fix should be allowed to continue treating dangerous Hanford waste. Cost-savings is only one aspect to consider when deciding where and how to clean up Hanford's dangerous waste, but cost savings should never be the sole consideration. Hanford Challenge has concluded that it would be safer to expand the treatment capacity at the Hanford Site instead of sending waste for treatment at Perma-Fix Northwest. Treatment of waste on the Hanford Site provides the best environment for compliance with safety standards, clear and coordinated regulatory oversight, transparency, and accountability.

Hanford Challenge recommends that the Department of Energy revitalize its internal capacity at Hanford to perform the waste treatment functions that it is currently sending to Perma-Fix

Northwest. There are many reasons why Hanford should treat its own waste onsite rather than at Perma-Fix Northwest. Hanford is a more suitable location for treatment due to a higher level of transparency and accountability, remote location further away from populated areas, further from the groundwater, ability to avoid the risky practice of transporting thousands of cubic meters of dangerous waste on public roadways, and a workforce that is highly trained, qualified, and certified.

Hanford Challenge recommends that DOE, EPA and the State of Washington:

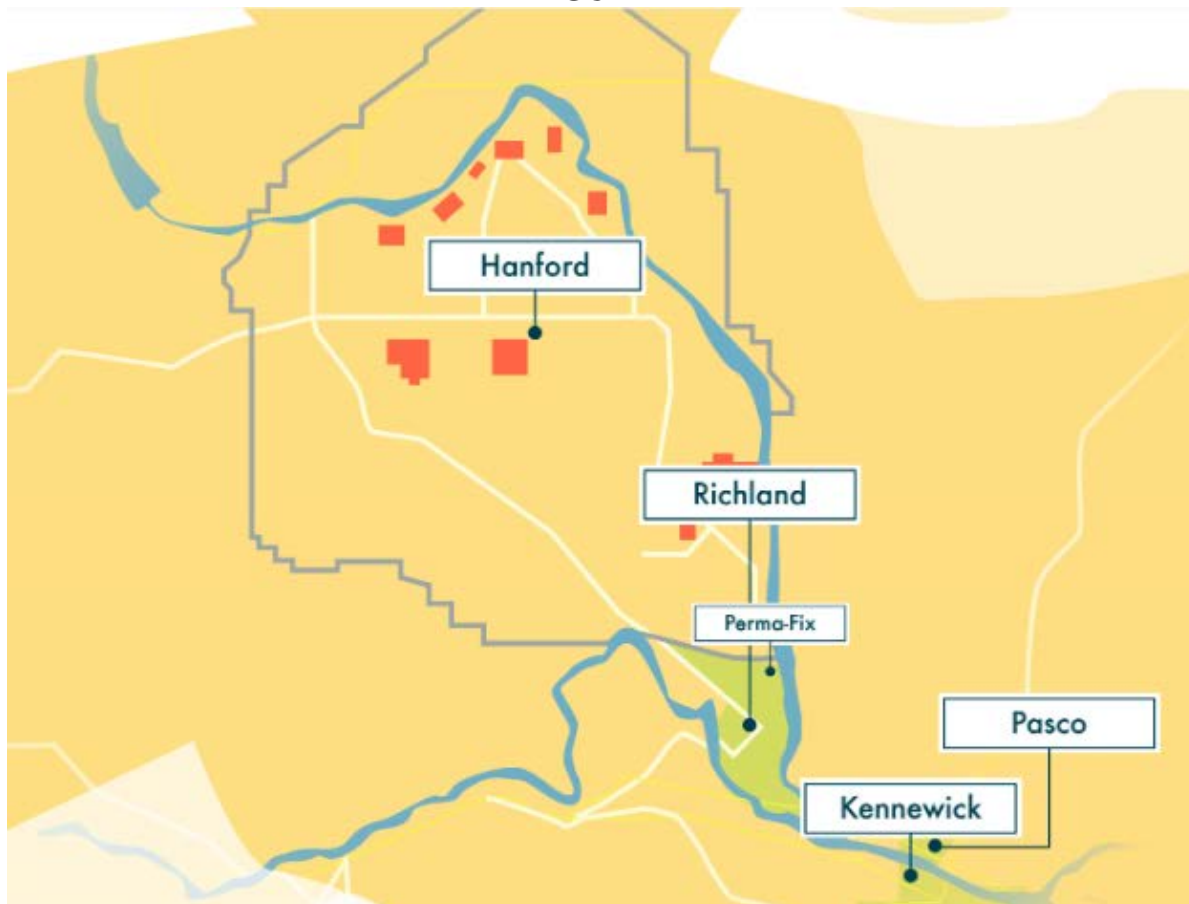
- 1. Increase Safety by Bringing This Work Onsite**
- 2. Abandon Proposals for Perma-Fix Northwest to Treat Hanford's Tank Waste**
- 3. Increase Regulatory Oversight and Coordination**
- 4. Evaluate Perma-Fix Northwest Emissions for Air Operating Permit**
- 5. Posting of Regulatory Information on Hanford's Administrative Record**
- 6. Enable WA State Department of Health to Impose Fines and Penalties for Violations of Atomic Energy Act Licensing Requirements**
- 7. Increase Department of Energy Oversight of Perma-Fix Northwest**

II. Introduction

The mission of Hanford Challenge is to create a future for the Hanford Nuclear Site that secures human health and safety, advances accountability, and promotes a sustainable environmental legacy. As part of fulfilling this mission, Hanford Challenge pays close attention to current Hanford cleanup efforts and new cleanup proposals. In this report, Hanford Challenge lays out why the Hanford Nuclear Site should stop sending nuclear waste to Perma-Fix Northwest for treatment and instead treat its nuclear waste onsite.¹

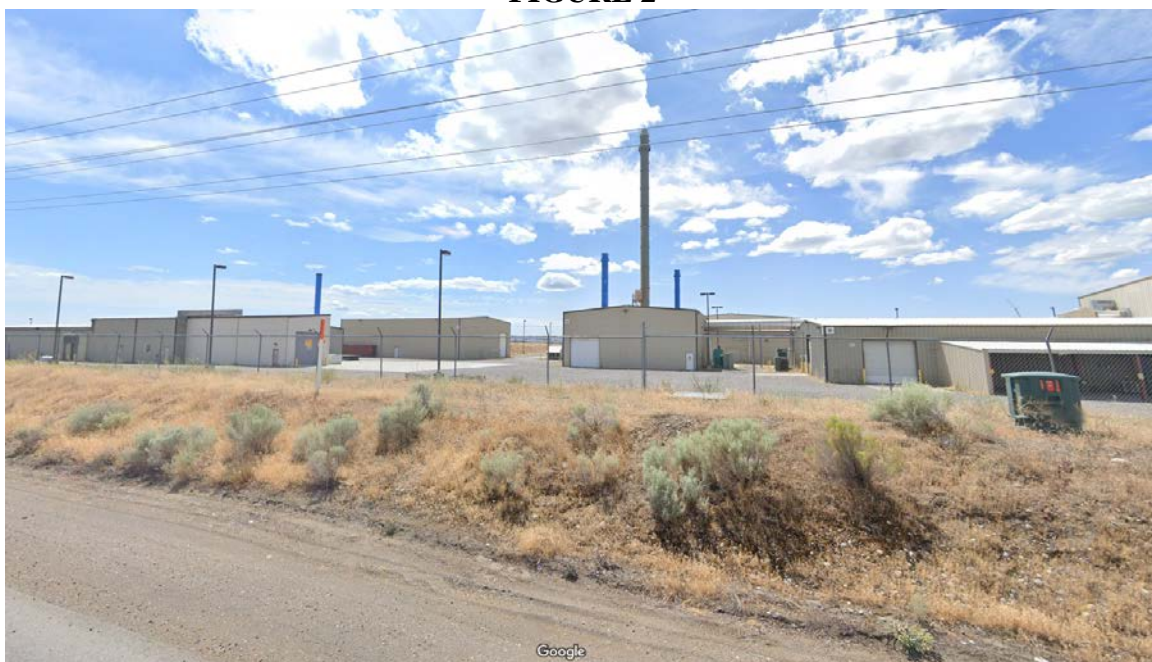
Perma-Fix Northwest is a commercial facility located in Richland, Washington, that mainly provides off-site treatment for some of Hanford's low-level waste, mixed low-level waste, and transuranic waste; and provides treatment for some non-Hanford wastes.

¹ The focus of this report is primarily on the treatment of Hanford Nuclear Site waste at Perma-Fix Northwest. This offsite commercial facility is currently owned and operated by Perma-Fix Northwest. However, it is important to note that Perma-Fix Northwest acquired the facility from Pecos on June 13, 2007. The events or incidents prior to June 13, 2007 occurred under Pecos ownership. We refer to the facility throughout this report as Perma-Fix Northwest for ease of reading.

FIGURE 1

*Map, showing location of Perma-Fix Northwest in relation to the Hanford Site and the Tri-Cities.
(Source: Courtesy of Lucy Woodworth Design).*

In 2018, the United States Department of Energy (DOE) proposed treating 500,000 gallons of Hanford's pre-treated high-level radioactive tank waste at an offsite nuclear waste processing facility located in the city of Richland, WA called Perma-Fix Northwest. Upon hearing about this new proposal, Hanford Challenge started reviewing information and talking with experts which led to a full investigation into the treatment of Hanford's waste at Perma-Fix Northwest. Our review of Perma-Fix Northwest's history, operations, proximity to a residential community, regulatory posture, and overall treatment capacity led us to the conclusion that treating Hanford's waste onsite would be more protective of the workers and the community, reduce unnecessary risks due to transportation of these materials on public roads, and increase transparency and regulatory predictability.

FIGURE 2

Street View of Perma-Fix Northwest from Battelle Blvd. (Source: GoogleMaps)

Hanford Challenge relied on documents obtained through Freedom of Information Act requests, WA Public Records Act requests, online resources, and library research to support the findings in this report. Our investigation of Perma-Fix Northwest was challenged by the lack of transparency by federal and state agencies on plant operations, licenses, accidents, and incidents. For example, the Department of Energy conducts periodic audits of Perma-Fix Northwest, but does not publicize or otherwise make those audits available. Our requests to see the audits were rebuffed, and Washington state agencies claimed not to have copies. The WA State Department of Ecology was very responsive to our requests for information, but it took months for us to untangle the myriad of functions, licenses, permits, inspections, and compliance information provided in the thousands of records that were produced through the Public Records Act. The lack of transparency and difficulty accessing information concerning a facility that treats Hanford nuclear waste on the border of a residential community is an issue that must be addressed.

Our investigation uncovered compliance issues that call into question the safety of treating Hanford's waste at Perma-Fix Northwest. Perma-Fix Northwest has a checkered and worrisome history of environmental noncompliance. Perma-Fix Northwest has even made the EPA's "Significant Non-Complier" list in the past.² Significant Non-Compliers "are those violators that have caused actual exposure or a substantial likelihood of exposure to hazardous waste or hazardous waste constituents; are chronic or recalcitrant violators; or deviate substantially from the terms of a permit, order, agreement or from RCRA statutory or regulatory requirements."³

² EPA, Detailed Facility Report, Perma-Fix Northwest, available at <https://echo.epa.gov/detailed-facility-report?fid=110008062452>

³ EPA, HAZARDOUS WASTE CIVIL ENFORCEMENT RESPONSE POLICY, December 2003, available at <https://www.epa.gov/sites/production/files/documents/finalerp1203.pdf>

According to regulators, Perma-Fix Northwest exceeded onsite soil contamination limits, improperly stored radioactive and other hazardous wastes, handled wastes resulting in leakage of plutonium and significant workplace contamination, failed to notify regulators of known violations, and exposed several employees to radiation. Perma-Fix Northwest was also fined a total of \$551,891 from 2008 to 2019 by the U.S. Environmental Protection Agency and the Washington Department of Ecology for hazardous waste violations.

Oddly, Perma-Fix Northwest continues to operate on a hazardous waste permit that expired more than a decade ago in 2009. Instead of a new permit, Perma-Fix Northwest operates on an “expired but continued” permit that is updated through permit modifications, similar to Hanford’s RCRA Site-Wide permit. The entire permit needs to be reissued to reflect significant changes in the operating environment around Perma-Fix Northwest. Old assumptions about Perma-Fix Northwest that informed the original permit no longer reflect reality, as our investigation uncovered. Perma-Fix Northwest has dramatically increased its throughput of plutonium and transuranic wastes and the permit needs to be updated to reflect that change. Hanford Challenge is concerned that out-of-date assumptions in the permit, put the nearby community at an even greater risk. According to a March 10, 2019 Tri-City Herald article announcing a new environmental impact study of Perma-Fix Northwest by the WA State Department of Ecology: “Since the city of Richland did a similar environmental study in 1998, much has changed, said John Price, the Washington State Department of Ecology’s Tri-Party Agreement section manager.”⁴ The article also states that “the findings from the 1998 study used to issue this permit are now out of date. North Richland is more developed now, with new buildings at Pacific Northwest National Laboratory, new businesses and new apartments and townhouses in the area. The work done at Perma-Fix Northwest also has changed in 21 years.”

There were two fires at Perma-Fix Northwest in 2019; both went unreported in the press. One was deemed “a near catastrophe” by an Ecology inspector, partly because the fire alarm system was not working at the time of the fire, and the person supposed to be doing the hourly check-in of the area failed to do so. Another fire in December 2019 was a Depleted Uranium fire, involving 50 cubic feet of grout embedded with uranium metal scraps, which easily ignite upon exposure to air. Since the 1950s, there is a long and well-documented history at DOE sites of fires due to grouted uranium chips (including at Hanford), which raise uncomfortable questions about the conduct of the grouting operation at Perma-Fix, which allowed pyrophoric uranium to come in contact with combustible materials.

Why do fires and potential releases matter? According to the EPA, in 2010 over 32,000 people lived within 5 miles of Perma-Fix Northwest, with over 25% under the age of 18. In the past ten years, those numbers have likely increased and will continue to increase. For example, there is a new apartment complex with 288 units that will be completed next fall located less than 1.5 miles from Perma-Fix Northwest.⁵ A daycare center is located less than a mile away from Perma-Fix Northwest (Figure 3). Even as the community around the facility has grown and

⁴ Cary, A., *Tri-City Herald*, “State is taking a new look at this Richland radioactive waste plant,” March 10, 2019, <https://www.tri-cityherald.com/news/local/hanford/article227254174.html>

⁵ Stormo, Allison, *Tri-City Herald*, “Sweeping \$48 million Richland apartment project aims to cut Hanford commute,” August 31, 2020, <https://www.tri-cityherald.com/homes/article245267760.html>

inched closer, Perma-Fix Northwest has continued to ramp up its waste treatment. The most concerning increased treatment at Perma-Fix Northwest is the large amounts of plutonium and transuranic wastes, which are harmful in tiny quantities.

FIGURE 3



Distance between Perma-Fix Northwest and North Richland KinderCare (Source: GoogleEarth)

Although Perma-Fix Northwest is a privately-owned facility, it is functionally an extension of the U.S. Department of Energy, whose funding, in turn, comes from taxpayers. As of 2009, Hanford and other DOE facilities provided Perma-Fix Northwest with about 95% of all of its mixed low-level wastes and about 70% of its volume of low-level radioactive wastes. For the past decade, these wastes have mostly been plutonium and americium-contaminated waste (referred to as transuranic or TRU) at levels that far exceed what Perma-Fix Northwest has handled in the past. For example, in October 2018, Perma-Fix Northwest informed the Washington State Department of Ecology, that “in the near future, Perma-Fix Northwest will be treating up to 1000 cubic meters of higher activity TRU waste containing greater than 200 grams of Plutonium and installing the ability to remotely handle these wastes.” This represents a significant increase in the level of potential hazard to workers and the public. Plutonium is known to cause cancer in microscopic doses.

Workers at the Perma-Fix Northwest facility have suffered exposures that would have been preventable if there had been better worker training and safety systems in place. In 2006, (the facility was under the management of Pacific Ecosolutions) three workers⁶ were seriously over-exposed to radiation, with one of them suffering an exposure over 10,000 times higher than the dose received by the highest exposed worker at the Hanford Site during the same time period. Investigators blamed the facility for “failure to adhere to procedures and plans set forth for the project, and inadequate training,” and found a pattern in which “the actual cause of the event does not appear to be a single cause, but rather compounding mistakes, errors in judgment and complacency for the seriousness of this type material.” Just three years later, in 2009, yet another

⁶ Perma-Fix Northwest formally took over operations of the facility in June 2007 from Pacific EcoSolutions.

serious over-exposure occurred, with the worker receiving a committed internal dose equivalent⁷ of 120 REM – 2.4 times the regulatory limit. These are lessons not learned.

Perma-Fix Northwest is pursuing a particularly worrisome proposal at Hanford that would send waste to Perma-Fix Northwest for treatment. The Test Bed Initiative (TBI) would send up to 500,000 gallons of Hanford tank waste (after most of the cesium has been removed) for grouting at Perma-Fix Northwest. The scope and scale of the TBI operation has yet to be explained, but among the issues are potential high levels of ammonia, mercury, and other contaminants that could cause trouble in the grouting operation. The DOE has withdrawn the Test Bed Initiative permit application for now, but internal correspondence reveals an aggressive campaign by Perma-Fix Northwest to revive the plan in the near future, potentially without public comment.

Bulk vitrification, a process to immobilize tank waste, has been explored and abandoned many times by the Department of Energy at Hanford. In 2009, DOE walked away from bulk vitrification at Hanford in large part due to costs and safety uncertainties. Of concern were the potential for fires and explosions. In 2018, Perma-Fix Northwest teamed up with another company, Veolia,⁸ to pilot GeoMelt, a bulk vitrification technology to immobilize radioactive waste. The Washington State Department of Ecology allowed the GeoMelt process to operate without public comment or permit review by calling it a “treatability study”.⁹ In May 2019 a fire occurred at the GeoMelt operation as a result of multiple safety violations. Despite the near catastrophic fire, GeoMelt was allowed to continue operating. It is unclear what corrective actions were taken to identify and resolve the issues involved in the May 2019 fire.

Hanford Challenge recommends that the Department of Energy revitalize its internal capacity at Hanford to perform the waste treatment functions that it is currently sending to Perma-Fix Northwest. There are many reasons why Hanford should treat its own waste onsite rather than at Perma-Fix Northwest. Hanford is a more suitable location for treatment due to a higher level of transparency and accountability, remote location further away from populated areas, further from the groundwater, ability to avoid the risky practice of transporting thousands of cubic meters of dangerous waste on public roadways, and a workforce that is highly trained, qualified, and certified. The DOE has signaled that the main reason it uses Perma-Fix Northwest is for cost-savings purposes. However, DOE still has to pay to treat waste at Perma-Fix Northwest, and they

⁷ The committed dose in radiological protection is a measure of the health risk due to an intake of radioactive material into the human body, such as the probability of cancer induction and genetic damage, due to low levels of radiation.

⁸ <https://finance.yahoo.com/news/perma-fix-partners-veolia-nuclear-135139216.html>

⁹ See Ecology Publication No. 20-05-015, located at

<https://fortress.wa.gov/ecy/publications/documents/2005015.pdf>. Ecology stated:

“The use of the GeoMelt technology at Perma-Fix has all occurred as a treatability study as defined by WAC 173-303-040. As detailed in the definition of treatability study, the facility also needs to comply with the requirements in WAC 173-303-071(r) and (s). Any future use of the GeoMelt technology would again have to meet the definition of a treatability study, or the permittees would have to submit a permit modification request to add this treatment unit as a new Dangerous Waste Management Unit to the Perma-Fix Northwest Dangerous Waste Permit. If PFNW submits a permit modification request to add the GeoMelt technology as a new DWMU to their Dangerous Waste permit, they would need to follow the permit modification requirements detailed in WAC 173-303-830(4). Ecology would review the permit modification request for completeness and ensure all of the necessary technical details are included prior to making a final permitting decision as detailed in WAC 173-303-830(4) and -840(1).”

are displacing risks related to treating this waste from Hanford into the nearby residential communities. Treating waste at Hanford would remove numerous unacceptable risks from a facility with a troubling operational history located in a residential community and transfer jobs to a more isolated site.

III. Background

Perma-Fix Northwest is a commercial Low-Level Waste (LLW) and Mixed Low-Level Radioactive Waste (MLLW) treatment and storage facility approved, permitted or licensed for operation by the Environmental Protection Agency (EPA) Region 10, the Washington State Department of Ecology, and the Washington State Department of Health under their respective authorities. Perma-Fix Northwest is located on 35 acres in an urban area in the City of Richland and near the Department of Energy's (DOE) Hanford Nuclear Site. Perma-Fix Northwest is currently incinerating, compacting, and transporting millions of cubic feet of radiochemical and radioactive toxic waste per year; much of that waste coming from the Hanford Nuclear Site.

FIGURE 4



Satellite Image of Perma-Fix Northwest (Source: Google Maps)

A major challenge for the Hanford Nuclear Site is dealing with its large inventory of transuranic waste or TRU. Most of this waste is destined for disposal in a deep, geological repository because of the long-lived nature of the radionuclides. The TRU waste must be properly repackaged for transportation and disposal purposes. The DOE built an onsite facility called the

Waste Receiving and Processing Facility (the WRAP facility) in Hanford's 200 West Area to process drums and boxes of low-level waste and transuranic waste for permanent disposal.¹⁰ In 2008, the DOE decided "that the least costly option was to send an estimated 9,000 cubic meters of transuranic waste (TRU) and other contaminated waste over a period of several years to Perma-Fix Northwest for processing. Perma-Fix Northwest began receiving Mixed Low-Level waste containing transuranics (i.e. Pu-239, Am-241) from facilities undergoing dismantlement at Hanford. This included contaminated glove boxes from the Plutonium Finishing Plant (PFP)."¹¹ Sending plutonium-contaminated waste to Perma-Fix Northwest resulted in a large upscaling of the volumes of plutonium and americium it was handling and challenged Perma-Fix Northwest's Annual Possession Quantities (APQ) limits for these radionuclides. As described below, this also created controversy with the Washington State Department of Ecology, some of which gained public notice and even resulted in EPA opening (but then closing) a Criminal Investigation.

According to the U.S. Department of Energy (DOE), Perma-Fix Northwest was originally scoped to accept and process no more than 25% of its total waste throughputs from U.S. DOE sites.¹² Despite this scoping declaration in 1998 that only a quarter of its work would come from DOE, Perma-Fix Northwest primarily processed the radioactive and other hazardous wastes from the adjacent U.S. DOE Hanford Site. In fact, up to 95% of Perma-Fix Northwest's waste treatment inventory came from Hanford.¹³ Hanford contains the largest inventory of military radioactive wastes in the country, resulting from 45 years of plutonium production for nuclear weapons and several nuclear research and development projects.¹⁴

As of 2009, Hanford and other DOE sites (including Los Alamos National Laboratory in New Mexico, the Idaho National Engineering site, and the Oak Ridge nuclear reservation in Tennessee) provided the Perma-Fix Northwest facility with about 95% of all of its mixed low-level wastes and about 70% of the volume of low-level radioactive wastes.¹⁵ This volume of waste from Department of Energy sites is much higher than its original scoping claim to have 25% of its waste come from DOE. Perma-Fix Northwest annual environmental reports indicate that between 2013 and 2019, Perma-Fix Northwest was predominantly a transuranic waste processing facility for DOE.¹⁶

¹⁰ <https://www.hanford.gov/page.cfm/WRAP>

¹¹ U.S. Department of Energy, *The Successful Utilization of Commercial Treatment Capabilities to Disposition Hanford's No-Path-Forward, Suspect Transuranic Wastes*, CH2MHILL Plateau Remediation Company, January 2012, p.1. <https://www.osti.gov/servlets/purl/1034779>

¹² Washington Department of Ecology, Expanded Scoping for Perma-Fix Northwest SEPA EIS Public Comment Period Notification, March 2019. http://listserv.ecology.wa.gov/scripts/wa-ECOLOGY.exe?A3=1903&L=ECY-COMMERCIAL-MIXED-RAD-WASTE&E=quoted-printable&P=5710&B=--000_81ce7f77f42c4d72bdd029753f46c249ECYWAGOV_&T=text%2Fhtml;%20charset=us-ascii

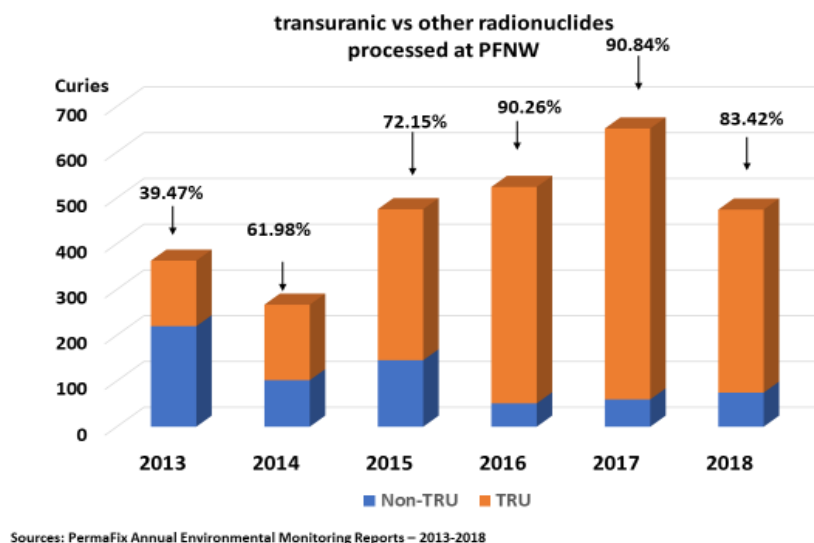
¹³ U.S. Department of Energy Consolidated Audit Program, *Continuing Qualification Audit of Perma-Fix Environmental Services Northwest-Richland, WA*, Audit ID: 090514-PFN, May 2009. [U.S. Department of Energy Consolidated Audit Program, *Continuing Qualification Audit of Perma-Fix Environmental Services Northwest-Richland, WA*, Audit ID: 090514-PFN, May 2009.](https://www.energy.gov/sites/default/files/2010/05/09/090514-PFN-Perma-Fix-Environmental-Services-Northwest-Richland-WA-Audit-Report.pdf)

¹⁴ Robert Alvarez, "Plutonium Wastes from the U.S. Nuclear Weapons Complex," *Science & Global Security*, 19, no. 1, (2011): 15-27. <http://scienceandglobalsecurity.org/archive/sgs19alvarez.pdf>

¹⁵ U.S. Department of Energy Consolidated Audit Program, *Continuing Qualification Audit of Perma-Fix Environmental Services Northwest-Richland, WA*, Audit ID: 090514-PFN, May 2009.

¹⁶ [Perma-Fix Northwest Annual Environmental Monitoring Reports – 2013-2019.](https://www.hanford.gov/page.cfm/Annual-Environmental-Monitoring-Reports)

FIGURE 5



Increases in the Amount of Plutonium Processed at Perma-Fix Northwest (Source: Perma-Fix Northwest's Annual Environmental Monitoring Reports, 2015-2018)

a. Perma-Fix Northwest's Role in Waste Treatment and Processing

The Perma-Fix Northwest facility began operation, under different ownership, in October 1998¹⁷ to process radioactive wastes generated at Hanford and has a stated capacity to annually process more than 60 million pounds of waste. The waste Perma-Fix can process includes low-level radioactive waste, transuranic (TRU) waste, low-level radioactive waste mixed with non-radioactive hazardous substances, and several kinds of toxic chemicals. Perma-Fix can also commercially store and process for disposal wastes containing polychlorinated biphenyls subject to requirements of the Toxic Substances Control Act (TSCA). Perma-Fix Northwest took over operations in 2007. Perma-Fix Northwest is a wholly owned subsidiary of Perma-Fix Environmental Services, based in Atlanta, Georgia.¹⁸ Perma-Fix Northwest has been treating around 29 million pounds of waste annually.

In 2009, Hanford contractor CH2M Hill Plateau Remediation Company (CHPRC) received substantial funding under the American Reinvestment and Recovery Act (ARRA) to help deal with a backlog of nuclear waste, including TRU wastes whose radioactive constituents consist largely of plutonium and americium isotopes.¹⁹ The waste was originally slated for treatment at a

¹⁷ Michael Hytha, *ATG buys bankrupt bargain, expands radioactive waste business*, San Francisco Business Times, December 6, 1998. <https://www.bizjournals.com/eastbay/stories/1998/12/07/story2.html>

¹⁸ <http://perma-fix.com/Company.aspx>

¹⁹ Moak, D., Triner, G., West, L., and Grondin, R., Conference Paper, *Managing Waste Inventory and License Limits at the Perma-Fix Northwest Facility to Meet CH2M HILL Plateau Remediation Company (CHPRC) American*

facility on the Hanford Site, but for “cost avoidance” reasons, Perma-Fix Northwest was selected to treat the large inventory of waste.²⁰ Much of this waste was generated from the demolition of the Plutonium Finishing Plant at Hanford, and contained large quantities of both plutonium and americium isotopes.

Perma-Fix Northwest processes waste from federal, commercial, and international sites and is regulated mainly by three separate entities. Washington State regulates the site through its Department of Ecology and Department of Health. The United States Environmental Protection Agency (EPA) regulates the site through its Region 10 office. Perma-Fix Northwest must maintain and update a Resource Conservation and Recovery Act (RCRA) permit through the WA State Department of Ecology (which also regulates Perma-Fix Northwest under Washington’s Hazardous Waste Act), and a commercial nuclear license through the Washington State Department of Health²¹ in order to maintain compliant operations. Additionally, the EPA regulates polychlorinated biphenyls (PCBs) at Perma-Fix Northwest through an approval issued under the Toxic Substances Control Act. The lead regulatory agency for a given waste-processing activity at Perma-Fix Northwest is determined by the type of waste being processed.

FIGURE 6



*Hanford waste being removed from a burial ground, to be sent to Perma-Fix Northwest.
Photo from WA Department of Ecology report.²²*

Recovery and Reinvestment Act (ARRA) Deliverables – 12335, WN2012 Conference, Feb 26-March 1, 2012, available at <https://xcdsystem.com/wmsym/archives//2012/papers/12335.pdf>

²⁰ Ibid.

²¹ The Nuclear Regulatory Commission license is administered under a delegation agreement with the Washington State Department of Health.

²² <https://www.scribd.com/presentation/149998055/WasteDesignationTransportationHanfordPFNWLongVersion>

Waste is treated at Perma-Fix Northwest in different processing areas. One processing area treats Low-Level wastes (LLW), and the other treats Mixed Low-Level wastes (MLLW) generated by the U.S. Department of Energy (DOE) that contain radioactive and non-radioactive hazardous substances and dangerous waste components. Washington State Department of Ecology uses the state dangerous waste regulations, which operate in lieu of federal regulations under the federal statute known as RCRA (Resource Conservation and Recovery Act) to regulate Perma-Fix Northwest's treatment of MLLW, which contains both radiological and chemical hazard components. MLLW is also subject to oversight under WA State law requirements. The U.S. Environmental Protection Agency has jurisdiction over Perma-Fix Northwest under the Toxic Substances Control Act (TSCA), and maintains a support and oversight role with Ecology's dangerous waste program.

b. Perma-Fix Northwest's Low-Level Waste Operation

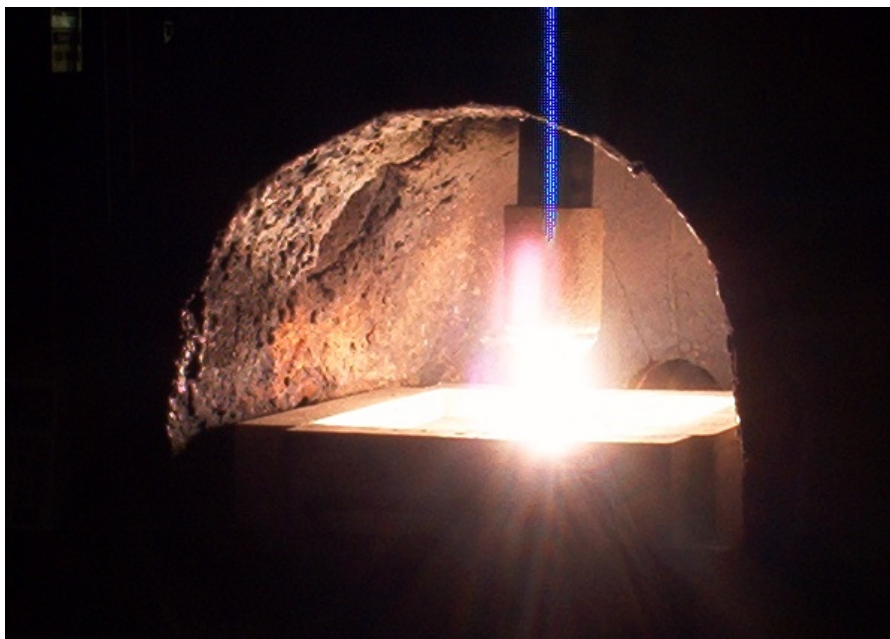
The Perma-Fix Northwest LLW operation occupies more than 70,000 square feet and treats wastes from DOE and other government agencies across the country, including Oak Ridge, Tennessee and Lawrence Livermore Lab in California. Perma-Fix Northwest also treats waste from commercial entities such as hospitals, nuclear power reactor operators, and foreign sources. It has a capacity to treat about 8 million pounds of solid, liquid, and wet LLW per year. LLW regulatory oversight occurs under a Nuclear Regulatory Commission (NRC) license administered under a delegation agreement by the WA State Department of Health. LLW waste containing PCBs is regulated for disposal under TSCA, pursuant to oversight by the EPA.

The Low-Level Waste processes Perma-Fix Northwest is capable of handling include:

- Thermal treatment (incineration facilities) utilizing two high temperature (1,800 F) refractory-lined furnaces;
- Super compaction;
- Volume reduction
- Sorting and treating;
- Incineration of ethylenediaminetetraacetic acid (EDTA) solutions contaminated with radionuclides. Between 1999 and 2005, the facility had treated approximately 501,000 gallons of radiologically contaminated EDTA solutions,²³ and
- Grouting operations, which means mixing waste with cement.

FIGURE 7

²³ B. Denne, *Thermal Treatment of EDTA Solutions*, WM'06 Conference, Pacific EcoSolutions, Inc., March 2, 2006. <https://xcdsystem.com/wmsym/archives//2006/pdfs/6047.pdf>



A refractory oven/furnace at the Perma-Fix Northwest Facility (Source: Perma-Fix Northwest. <http://www.perma-fix.com/pfnw.aspx>)

Perma-Fix Northwest uses a variety of equipment in its work to treat and package Low-Level Waste (LLW). One treatment process for low-level waste at Perma-Fix Northwest is their “Bulk Process Units”²⁴ such as the refractory oven described on its website:

“Bulk Process Units (BPU) are used “for thermal processing of both liquid and solid low-level wastes. The BPU is a large, refractory lined oven that is heated to 1800°F. This temperature is sufficient to thermally break down all organic material in the waste resulting in a stable residue suitable for disposal.

One unit is a batch process that is typically utilized to treat LLW solids. This batch process is unique as it allows for complete separability of generator wastes by utilizing a stainless steel burn box for each waste stream. The other unit is continuous feed most typically used for LLW liquids.”²⁵

These Bulk Processing Units are *de facto* radioactive waste incinerators as defined by the International Atomic Energy Agency. According to the IAEA:

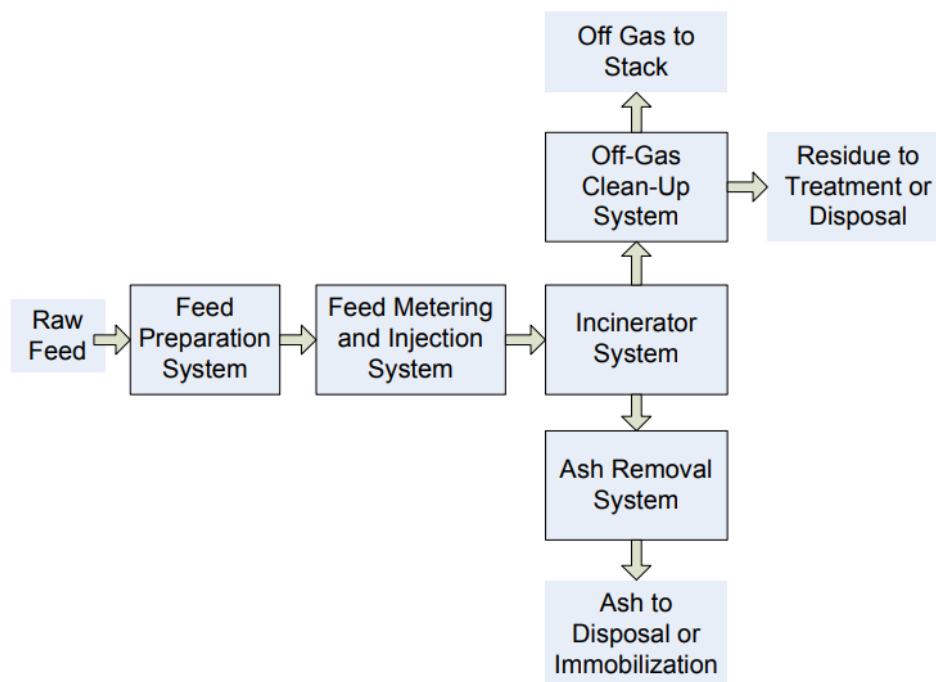
“a generic ‘incineration’ system consists in its entirety of the ‘incinerator’ itself (a combustion system comprising of one or more combustion chambers, completed with auxiliary equipment, instrumentation and process controls) the waste feed

²⁴ PermaFix Northwest, Radioactive and Mixed Waste Treatment Facility. <http://www.perma-fix.com/pfnw.aspx>

²⁵ Ibid.

preparation and loading (metering) system, the ash removal system and the off-gas treatment system.”²⁶

FIGURE 8



Radioactive Waste Incineration System (Source: IAEA -TECDOC-1527)
https://www-pub.iaea.org/MTCD/Publications/PDF/te_1527_web.pdf

The incineration of radioactive and hazardous waste in the midst of a growing community poses risks to nearby vulnerable populations. These risks can be avoided by conducting these operations in the more remote area of the Hanford Site.

c. Perma-Fix Northwest’s Mixed Low-Level Waste Operation

The Mixed Low-Level Waste (MLLW) facility occupies about 80,000 square ft. and operates under a permit for highly regulated waste treatment under the state Hazardous Waste Management Act (HWMA) administered by the Washington State Department of Ecology. The MLLW facility has the capacity to treat approximately 21 million pounds per year. According to Perma-Fix Northwest, “Maximum mixed waste storage at the facility will be 171,886 ft³ and the maximum TSCA-regulated waste quantity will be 103,600 ft³.”²⁷ Perma-Fix Northwest’s permit was recently updated in an April 2020 permit modification by the Washington State Department of Ecology and EPA to include the In-Container Mixer, based on the issue of Publication 20-05-

²⁶ International Atomic Energy Agency, *Application of Thermal Technologies for Processing of Radioactive Waste*, IAEA-TECDOC-1527, December 2006, p.20. https://www-pub.iaea.org/MTCD/Publications/PDF/te_1527_web.pdf

²⁷ [Perma-Fix Northwest, Mixed Waste Facility RCRA/TSCA Permit Application, Section 9, Closure Plan and Financial Assurance, Revision 2, June 2012. Att. 9-1, App. 9-B-13.](#)

015 Response to Comments.²⁸ The In-Container mixer could be used to grout tank waste or brine or evaporator bottoms, since the Ecology permit is the mixed waste permit.

The Mixed Low Level Waste (MLLW) processes Perma-Fix Northwest is capable of include:

- Macroencapsulation;
- Microencapsulation (grout)
- Neutralization and stabilization;
- Bulk, In-Container, Vittrification (through its GeoMelt facility), currently operating as a treatability study.

Between 2008 and 2018, Perma-Fix Northwest processed 587,159 pounds of wastes containing dioxin, hexachlorobenzene, lead and PCBs subject to reporting under EPA's Toxic Release Inventory (TRI).²⁹ The quantities of radioactive wastes allowed are based on the total amount of radioactivity processed and stored in the facility, which is limited by quantities defined by the Nuclear Regulatory Commission (NRC) and enforced by the Washington State Department of Health.³⁰ These limits are defined in the Perma-Fix Northwest license as Annual Possession Quantities (APQ).

IV. Scattered and Fragmented Oversight of Perma-Fix Northwest

Washington State regulates Perma-Fix Northwest through its Department of Ecology and Department of Health and the Environmental Protection Agency (EPA) regulates the site through its Region 10 office. Perma-Fix Northwest must maintain and update a Resource Conservation and Recovery Act (RCRA) permit through the WA State Department of Ecology, and a commercial nuclear license through the Washington State Department of Health (and the Nuclear Regulatory Commission) in order to maintain compliant operations. Additionally, the US EPA regulates PCBs at Perma-Fix Northwest under the Toxic Substances Control Act. The lead regulatory agency for a given activity is determined by the waste being processed.

A review of several dozen regulatory documents spanning 27 years by the Washington Departments of Ecology and Health, the U.S. Environmental Protection Agency, the Nuclear Regulatory Commission, and the U.S. Department of Energy raise a number of questions and conclusions regarding the Perma-Fix Northwest facility. (See Appendix III). For instance:

1. Documentation of non-compliances is spotty and incomplete particularly by the Washington State Department of Health (DOH). Letters of direction and notices have no

²⁸ Washington State Department of Ecology, Response to Comments Perma-Fix Northwest In-Container Mixer Unit Permit Modification, January 24 to March 24, 2020, *Summary of a public comment period and responses to comments*, April 2020 Publication no. 20-05-015, available at

<https://fortress.wa.gov/ecy/publications/SummaryPages/2005015.html>

²⁹ <https://echo.epa.gov/detailed-facility-report?fid=110008062452>

³⁰ U.S. Nuclear Regulatory Commission, Agreement State Program, <https://www.nrc.gov/about-nrc/state-tribal/agreement-states.html>

letter numbers. Some notices lack the formality and are just emails. Documentation of variance numbers is handwritten on letters and is inconsistent. The lack of formality, and proper documentation indicates DOH should undergo a quality assurance review of its regulatory performance, particularly in terms of conformance with standards delegated to the state by the U.S. Nuclear Regulatory Commission.

2. Variances increasing the allowed possession limits of radioactive wastes have been “business as usual,” for decades, short-circuiting the license process that is intended to protect the public and workers. With the growing volume of wastes arriving from Hanford, the Washington State Department of Health granted a large number of “variances” as requested by Perma-Fix Northwest (at least 50 between 2011 and 2013).³¹ In some cases, a DOH variance had a direct impact on the root cause for the severity of an event, by allowing radioactivity to be present in excess of the original license.
3. DOH allows for activities, possession of radioactive waste and emissions not envisioned in the 1998 Environmental Impact Statement (EIS) that serves as the baseline document defining the extent and degree of the Pema-Fix Northwest facility operations. For instance, the Environmental Impact Statement (EIS) did not analyze railcar transfer of low-level radioactive waste, yet DOH allows railcar transfer of this waste per the Low Level Radioactive Waste License.
4. Despite repeated observations by DOH inspectors, Perma-Fix Northwest failed to monitor and measure the concentrations of radioactive contaminants of concern during processing such as Am-241, posing unknown risks to workers and the public. The use of non-conservative models to estimate public doses was also found.
5. Generators have shipped non-conforming waste that has more activity than is manifested. This was not taken into account in the EIS and has resulted in serious worker exposures – far greater than reported at Hanford and other DOE nuclear sites. Apparently, NRC was not informed that the drums involved in the 2006 employee overexposure contained activity that significantly exceeded the manifested amount of radionuclides, including strontium-90, which wasn’t even listed on the manifest. And in February 2009 there was another serious employee over-exposure involving Americium-241 (120 REM). Yet there is no DOH notice of violation, and the February 2009 event was right after yet another variance extension for radionuclides that exceeded its licensed amounts. On both occasions, workers were wearing non-protective respirators. The EIS did not anticipate this scale of non-conforming shipments of waste.
6. An additional problem is Washington State Department of Health’s lack of complete regulatory authority. The Washington State Department of Health (DOH) has delegated

³¹ [Letters granting variances from license possession limits from the Washington Health Department to Perma-Fix Northwest dated: 3/15/2011, 3/17/2011, 3/24/2011, 3/24/2011, 3/24/2011, 4/1/2011, 4/1/2011, 4/1/2011, 4/1/2011, 4/26/2011, 4/26/2011, 4/26/2011, 4/26/2011, 4/26/2011, 4/28/2011, 4/28/2011, 5/9/2011, 5/17/2011, 5/17/2011, 5/18/2011, 5/31/2011, 6/7/2011, 6/7/2011, 6/8/2011, 6/8/2011, 6/17/2011, 6/17/2011, 6/28/2011, 6/28/2011, 6/28/2011, 7/21/2011, 7/25/2011, 8/1/2011, 8/9/2011, 8/23/2011, 9/23/2011, 9/23/2011, 9/19/2011, 2/3/2012, 2/15/2012, 2/15/2012, 2/22/2012, 4/26/2012, 5/14/2012, 5/29/2012, 11/14/2012, 1/27/2013, 1/27/2013.](#)

authority to impose fines and penalties for air emission violations of the Federal Clean Air Act, but has chosen not to exercise it over the past 27 years of the Perma-Fix Northwest operation, despite chronic air emission problems (see Appendix III). However, DOH has delegated authority from the Nuclear Regulatory Commission (NRC) but has no authority to assess fines or monetary penalties for violations of radiation safety requirements. Of the 39 NRC agreement state programs,³² Washington is one of three states that do not impose fines and monetary penalties.³³ The 36 agreement state programs that adopted this authority can issue fines and penalties ranging from \$1,000 to \$32,000 per day.³⁴ Based on past DOE experience, if there are no regulatory consequences or penalties, a facility will push the limits and even exceed them. On several occasions, Washington State Department of Health decided not to implement enforcement actions and often approved variance requests by email, using undocumented, inappropriate agreements for emissions. For example, DOH allows operations to continue or restart when corrective actions are incomplete (See Appendix III, April 7, 2008). DOH uses informal discretion as a substitute for fines, contrary to a safe environment where consequences are swift and known.

a. The Patchwork of Oversight at Perma-Fix Northwest is Ineffective

The multi-player regulatory structure at Perma-Fix Northwest lacks a unified basis. This can lead to problems slipping through the cracks, especially in the seeming lack of coordination between the Washington State Departments of Ecology and Health. Our research found that WA State Department of Ecology has not provided any kind of integrated assessment of the Perma-Fix Northwest operations with the WA Department of Health. Such an assessment would pool the collective knowledge of both agencies to assure that Perma-Fix Northwest's operations are fully considered and covered by the state regulatory regime.

It appears that this lack of authority has led to lax oversight by the WA State Department of Health. Perma-Fix Northwest is routinely granted flexibility that is not extended to other licensees. It appears the state needs to tighten up its oversight to ensure that the facility is not performing essential work outside the scope of its license or accepting waste they are not authorized to handle per the existing permit.

This is especially of concern regarding the shipment, storage, and processing of transuranic wastes. Perma-Fix Northwest appears to be the only commercial facility under an NRC Agreement program processing a large amount of TRU wastes coming from DOE sites, mostly from Hanford.

³² According to the Nuclear Regulatory Commission, "Any State with which the U.S. Nuclear Regulatory Commission (NRC) or the Atomic Energy Commission has entered into an effective agreement under Subsection 274b of the Atomic Energy Act (AEA) of 1954, as amended." <https://www.nrc.gov/about-nrc/governing-laws.html>

³³ U.S. Nuclear Regulatory Commission, Agreement State's Civil Penalty Authority, <https://www.nrc.gov/docs/ML0729/ML072970495.pdf>

³⁴ Ibid.

The Hanford Site is regulated by the WA Department of Ecology under the RCRA Site-Wide Permit, but because Perma-Fix Northwest is not on the Hanford Site, and is operated as a commercial facility, it needs its own separate RCRA permit, issued by the State. These concurrent permits make for a confusing regulatory space when waste is transported between the two sites. Concurrently, Washington State's Department of Ecology must contend with a dual permitting process under Washington's Hazardous Waste Management Act (HWMA) – one for DOE at the Hanford Site and the other for Perma-Fix Northwest, which handles and transports Hanford's mixed low-level and transuranic waste. Hanford's mixed low-level and transuranic waste coming from 20 to 30 buried waste sites at Hanford are shipped to Perma-Fix Northwest as a "single generic waste stream"³⁵ instead of being clearly defined and characterized prior to transport as would be required within the Hanford Site boundary. This makes it difficult, if not impossible, for the state to ensure proper characterization of many thousands of cubic feet of hazardous materials at the point of generation on the Hanford Site before being transported and processed at the Perma-Fix Northwest facility. It leaves the primary responsibility for determining if wastes are non-conforming in the hands of Perma-Fix Northwest, which apparently has rarely, if ever, rejected and sent non-compliant wastes back to the Hanford Site. This lapse in regulation seems to be a factor in some of the spills, leaks and contamination events Hanford Challenge has documented in this report.

The dual regulation of Hanford and Perma-Fix under different permits creates a hard-to-regulate space where the waste is transported between the two sites, allowing the transport of unregulated radioactive and other hazardous materials on an unrestricted public highway to the Perma-Fix Northwest site. Although the DOE requires transportation of hazardous materials to comply with Department of Transportation (DOT) safety regulations for onsite shipments, DOE has suspended these requirements for shipment of radioactive and hazardous materials from Hanford's burial grounds to Perma-Fix Northwest. The transport system has used parade permits from the city of Richland and a system of partial "rolling" road closure while still allowing traffic on unrestricted public highways.

According to the Washington State Department of Ecology in 2012, "prohibited materials are transported on public highway with unrestricted public access in non-compliance with the HMR's [hazardous material regulations] by rolling road closure to Perma-Fix Northwest."³⁶

According to the DOE, "the specific advantage of shipping hazardous materials via road closure is that DOT specific packaging requirements do not apply. Hence a temporary road closure over a relatively short distance with controlled access points can be more cost-effective than expediting resources for approved DOT packaging shipping hazardous material."³⁷

³⁵ State of Washington, Department of Ecology, *Hazardous Waste Designation and Transportation Problems at Hanford and Permafix Northwest*, 2012.

<https://www.scribd.com/presentation/149998055/WasteDesignationTransportationHanfordPFNWLLongVersion>

³⁶ State of Washington, Department of Ecology, *Hazardous Waste Designation and Transportation Problems at Hanford and Permafix Northwest*, 2012.

<https://www.scribd.com/presentation/149998055/WasteDesignationTransportationHanfordPFNWLLongVersion>

³⁷ Ibid.

The shipment route involves transport of hazardous materials by trucks from the Hanford Site over a 12.3 mile stretch of public highway that has unrestricted access.³⁸ “Waste shipment transport vehicle is escorted by front and rear escort vehicles. Rolling road closure moves with the waste transport vehicle and escort vehicles. During rolling road closure, the public has unrestricted access to two lanes in opposite direction of Route 4 south. Public has unrestricted access to roads leading to Energy Northwest Nuclear power plant facility.”³⁹ To facilitate this process, DOE contractors have obtained “Special Event” permits from the city of Richland, normally used for parades and public gatherings. It would involve 197 shipments holding 17,352 55-gallon drums and some oversized boxes (posing additional risks) traveling 20 miles from the Hanford Site to fill the storage capacity for MLLW at the Perma-Fix Northwest site.⁴⁰

In terms of nuclear safety oversight and regulation, it appears that the DOE has a more rigorous and less fragmented set of requirements for its facilities that perform the same kind of work on the Hanford Site, than required by the Washington State Department of Health. By comparison, since 2017, a transuranic waste processing transuranic facility, (TRU Waste Processing Center) responsible for processing a quantity of TRU wastes comparable as that handled by Perma-Fix Northwest⁴¹ has been operated under DOE contract by the North Wind Solutions, LLC on the Oak Ridge National Laboratory site in Tennessee. As such it is under direct regulation by the DOE and subject to oversight by the Defense Nuclear Facilities Safety Board. The North Wind Transuranic Processing Center is designated by the DOE as a “Hazard Category (HC)-2 nuclear facility⁴² which is defined by DOE as having the potential for “significant on-site consequences beyond localized consequences.”⁴³ This model of direct regulation by DOE and oversight by the DNFSB seems more effective and protective. The Washington Departments of Ecology and Health do not require what would otherwise be a nuclear safety assessment requirement, prior to start-up. If the Perma-Fix Northwest facility were on the Hanford Site such safety assessments would be required if DOE were actually processing this waste onsite.

This is an example of another glaring nuclear safety loophole that may save DOE money while externalizing the risk to the public and workers. It is not apparent based on the radiological license granted by the Washington State Department of Health that a hazard analysis similar to that for a DOE facility is requested to account for the increased amount of radioactive wastes processed in excess of the threshold exposure limit.

³⁸ Ibid.

³⁹ Ibid.

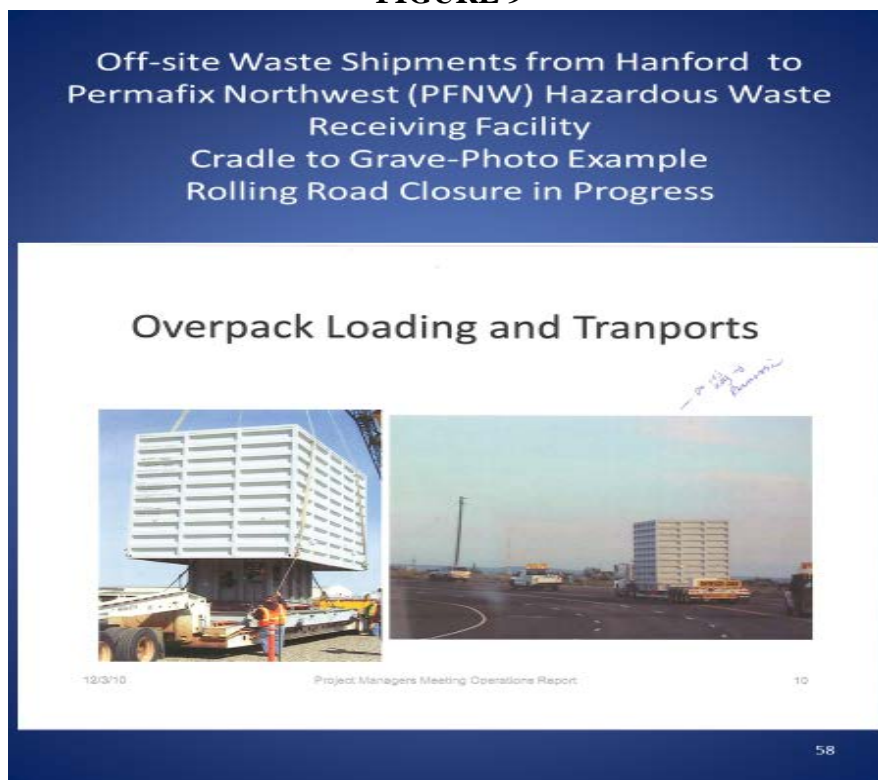
⁴⁰ Perma-Fix Northwest, Mixed Waste Facility RCRA/TSCA Permit Application, Section 9, Closure Plan and Financial Assurance, Revision 2, June 2012. P. Att. 9-1 App. Table 6.0-A. *See supra*, footnote 27.

⁴¹ U.S. Department of Energy, Annual Transuranic Waste Inventory Report-2019, DOE/TRU-19-3425, Rev. O, December 19, 2019, Appendix A. Table 3.8. (Oak Ridge National Laboratory is expected to generate 652 Ci (10,349.20 grams of Pu-239 for disposal at WIPP. Between 2013 and 2019, PFNW handled 406.66 Ci of Pu-239 (6,445 grams) https://wipp.energy.gov/Library/TRUwaste/DOE-TRU-19-3425_R0_FINAL.pdf

⁴² U.S. Department of Energy, Oak Ridge Office, contract DE-EM0003760 Transuranic Waste Processing Center (TWPC0 Contract, conformed copy modification 0028), July 21, 2017. P. 42. <https://www.energy.gov/sites/prod/files/2017/07/f35/DE-EM0003760%20Conformed%20Contract%20%280028%29.pdf>

⁴³ U.S. Department of Energy, DOE STANDARD HAZARD CATEGORIZATION OF DOE NUCLEAR FACILITIES, DOE-STD-1027-2018 November 2018.p.5. https://www.standards.doe.gov/standards-documents/1000/1027-astd-2018/@_images/file

FIGURE 9



(Source: Washington Department of Ecology), *Hazardous Waste Designation and Transportation Problems at Hanford and Permafix Northwest, 2012*

b. The EPA Notice of Violation

The patchwork of oversight has been noted by the Environmental Protection Agency (EPA) and resulted in investigations which led to violations and fines. The more important point is that these violations clearly illustrate that Perma-Fix Northwest did not fulfill its very basic responsibility under the Dangerous Waste rules to designate wastes, and to manage the wastes according to its permit. These are central to Perma-Fix Northwest's ability to safely and compliantly manage these wastes.

For example, following an EPA inspection from May 20-24, 2012, the EPA issued a Notice of Violation to Perma-Fix Northwest,⁴⁴ which found:

- Perma-Fix Northwest had repeatedly failed since 2008 to identify as much as 69 percent of the waste it generated during processing as “dangerous solid wastes.” At the time of the May 2010 inspection, Perma-Fix Northwest had not made a dangerous waste determination for fifteen containers of baghouse ash at the facility.⁴⁵

⁴⁴ [U.S. Environmental Protection Agency, Letter to: Richard Grondin, Vice President/General Manager, Perma-Fix Northwest Richland, Inc., R: NOTICE OF VIOLATION, March 20, 2012.](#)

⁴⁵ Ibid.

- Storage of several mixed hazardous wastes were in an area not authorized in its permit.
- Storage of onsite wastes for greater than a year, contrary to regulation. “At the time of the inspection, the inspectors noted that between the months of July 2007 and May 2010 at least twenty-one containers of mixed waste (baghouse ash) generated by the facility were stored at the facility for greater than one year after the waste was generated.”⁴⁶
- Failure to notify EPA or WA State Department of Ecology of dangerous waste storage in areas not permitted. “Perma-Fix Northwest used Building 15 and the concrete pad outside the southwest side of Building 13 (areas not specified in the Permit) as additional storage units without providing notification to the Department.”⁴⁷

Following the May 20-24, 2012 EPA investigation, the EPA ultimately declined to assess a penalty for the violations, despite an apparent pattern of continued non-compliance that has persisted for years.

V. History of Serious Accidents at Perma-Fix Northwest

This section describes just a few of the accidents at Perma-Fix Northwest in more detail—which to the best of our knowledge were unreported prior to this report. Although accidents do occur at the Hanford Nuclear Site, the accidents at Perma-Fix Northwest are more troublesome for a variety of reasons including: Perma-Fix is located closer to a large population; the follow up after accidents—or ‘lessons learned’ process—is less formal and less clear than Hanford’s process, from the documents found during our investigation; and the accidents at Perma-Fix Northwest have not been as heavily scrutinized or even made known to the public in most instances.

a. The GeoMelt Facility & the May 17, 2019 Fire

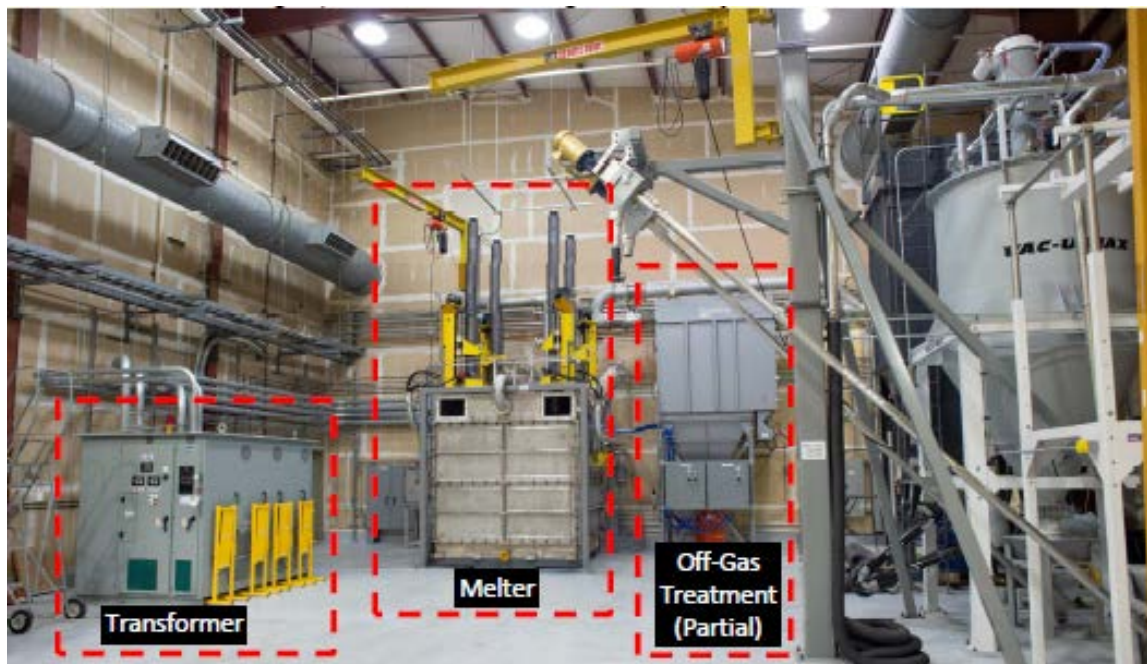
The Hanford Site has long explored technologies to immobilize its tank waste in various forms. Bulk vitrification has been explored and abandoned many times by the Department of Energy. GeoMelt is a bulk vitrification technology that uses a glass form to immobilize radioactive waste.

In early 2019 Perma-Fix Northwest announced it had begun the preliminary deployment of a third thermal treatment process based on the GeoMelt technology, also known as bulk in-box vitrification, that uses high-heat melters to immobilize radioactive wastes into a glass form (See Figure 10). Perma-Fix Northwest is in a joint partnership with the Veolia Corp, based in Richland, WA. The U.S. DOE spent an estimated \$230 million to develop bulk vitrification.⁴⁸

⁴⁶ Ibid.

⁴⁷ Ibid.

⁴⁸ U.S. Government Accountability Office, *DOE Should Reassess Whether the Bulk Vitrification Demonstration Project at Its Hanford Site Is Still Needed to Treat Radioactive Waste*, June 2007, GAO-07-762, p 17. <https://www.gao.gov/assets/270/261926.pdf>

FIGURE 10

GeoMelt® Richland, Installed at Perma-Fix Northwest (Source: Veolia website⁴⁹)

Serious concerns about Hanford's earlier attempt at bulk vitrification were raised by the Energy Department's Defense Nuclear Facility Safety Board in 2005.

"The current design has a number of major vulnerabilities with respect to overall confinement of radioactive and hazardous materials. Contrary to DOE's design requirements to use successive physical barriers for protection against the release of radioactivity,' the current design uses only one barrier to confine material in portions of the plant. The project's confinement strategy also relies on a mix of active and passive safety-significant systems, non-safety-related design features, and administrative controls... As a result of these vulnerabilities, the potential exists for the failure of a single nonsafety-related barrier that could lead to the unfiltered release of radioactive or toxic materials and unacceptable consequences to workers. For example, failure of the integrity of the non-safety related vitrification container could result in an unfiltered and untreated release of radioactive and toxic material."⁵⁰

⁴⁹ Picture available at:

https://www.nuclearsolutions.veolia.com/sites/g/files/dvc2436/files/styles/content_push_teaser/public/image/2019/01/GeoMelt_Perma-Fix%20facility%20layout%20%281%29.jpg?itok=suu0g53I

⁵⁰ U.S. Department of Energy, Defense Nuclear Facility Safety Board, Memorandum for J. K. Fortenberry, Technical Director, from: J.W. Troan, Re: Demonstration Bulk Vitrification Project, Hanford Tank Farms, August 9, 2005. <https://ehss.energy.gov/deprep/2005/FB05S07A.PDF>

In 2009, DOE walked away from bulk vitrification in large part, due to costs and safety uncertainties. Of most concern, were the potential for fires and explosions. According to a safety analysis of bulk vitrification prepared for DOE in 2008, major hazards include:

- “Release of NO_x gases generated during the melt process. The primary hazardous components of the off gas are NO_x. Two of these, nitrogen dioxide (NO₂) and nitrogen oxide (NO), are toxic to humans at relatively low concentrations.
- Release of dried waste product in the form of dust. The hazard is caused by a waste dryer or dry waste product transport equipment confinement failure that creates an airborne dust hazard.
- Leaks and spills during waste transfers within the facility... The caustic waste can cause chemical burns if a worker is wetted by the leak or spill.
- Deflagrations or explosions within process equipment or confinement/containment structures or vessels where grievous injury or death to a facility worker may result from the fragmentation of the process equipment failing or the confinement (or containment) with the facility worker close by. Chemical or thermal burns to a facility worker that could reasonably cover a significant portion of the facility worker's body where self-protective actions are not reasonably available due to the speed of the event or where there may be no reasonable warning to the facility worker of the hazardous condition.
- Exposures to radiological or toxic materials of sufficient magnitude that death or ongoing large-scale medical intervention may reasonably be expected to result. Leaks from process systems where asphyxiation of a facility worker normally present may result.”⁵¹

After approving a “hot commissioning and first demonstration melt” by WA State Department of Health and WA State Department of Ecology, Perma-Fix Northwest proceeded to process radiologically-contaminated sodium metal in 1,400 55-gallon drums from the failed Fermi 1 plutonium “breeder” reactor near Detroit, Michigan.⁵² The Fermi 1 reactor experienced a partial core meltdown in 1966.⁵³ This “demonstration melt” ended in December 2019 after a fire occurred in relation to operation of the GeoMelt facility. Hanford has large inventories of sodium metal⁵⁴ that require treatment. If this sodium metal waste goes to Perma-Fix Northwest for processing, it would pose safety risks of a magnitude that concerns Hanford Challenge. In order for Perma-Fix Northwest to use GeoMelt in the future, Washington State Department of Ecology would have to add GeoMelt to the permit.

⁵¹ *Safety Analysis of the Demonstration Bulk Vitrification System*, CH2M-36385-FP, Revision 0, 04/08/2008, pp. 15-16. <https://www.osti.gov/biblio/927005-safety-analysis-demonstration-bulk-vitrification-system>

⁵² Steven R. Sherman Collin J. Knight, *Treatment Method for Fermi Barrel Sodium Metal Residues*, Idaho National Laboratory, INL/EXT-05-00421, June 2005. <http://citeseerx.ist.psu.edu/viewdoc/download?jsessionid=3154413D490564A78D69A5E597A21163?doi=10.1.1.52.8.1516&rep=rep1&type=pdf>

⁵³ U.S. Nuclear Regulatory Commission, Fermi Unit 1, <https://www.nrc.gov/info-finder/decommissioning/power-reactor/enrico-fermi-atomic-power-plant-unit-1.html>

⁵⁴ [U.S. Department of Energy, Hanford Site Sodium Disposition Evaluation Report, HNF-33211 Revision 0, May 2007.](#)

The sodium metal from the Fermi 1 reactor is contaminated with radionuclides, including strontium-90. Washington State Department of Health is allowing the GeoMelt unit to discharge 30 percent more radioactivity, such as strontium-90, than its original permit limit.⁵⁵ The Energy Department at Hanford has detailed the extraordinary hazards of sodium:

“Sodium reacts vigorously with water and steam and is extremely reactive, oxidizing rapidly when exposed to air. It melts at about 190 °C (208 °F) to form a silvery liquid. The normal boiling point of sodium is 1,600 °C (1,618 °F). The basic chemical reaction is an exothermic reaction with water that, for excess water, produces a caustic sodium hydroxide solution and the evolution of hydrogen gas.”⁵⁶

Between 2000 and 2015 there were 15 items of non-compliance with Washington State’s environmental, safety and health regulations at the Perma-Fix Northwest operation.⁵⁷ Of significance was a finding that “Perma-Fix Northwest failed to completely inspect areas of the facility in accordance with the International Fire Code, where ignitable or reactive waste are stored.”⁵⁸

On the evening of May 17, 2019, a fire occurred after a thermally hot glass monolith from the GeoMelt process was placed on a wooden pallet. The pallet caught fire and embedded in the radiologically contaminated glass monolith causing it to be scorched. The burnt monolith was the 9th “radiological only”⁵⁹ out of 11 molten glass forms made by the GeoMelt facility - each containing a 55-gallon drum holding an average of about 2.5 pounds of liquid sodium.⁶⁰ (Figures 11 and 12).

⁵⁵ [Letter to Alex Smith, Nuclear Waste Program Manager, Washington State Department of Ecology, October 23, 2019](#). “Its new permit requires only HEPA filtration for abatement and allows up to 534 Curies of Sr-90, for example, to be processed during a year (possession limit). This is in license Number AIR 18-906. The 534 curies exceed the original air permit limit of 380 curies for any radioactive material for atomic numbers 1-83 established in DOH Perma-Fix Air Permits WNI0393- 1 and WN-I0508-1.”

⁵⁶ U.S. Department of Energy, Tank Closure and Waste Management, Final Environmental Impact Statement, (DOE/EIS-0391, December 15, 2012, P. F-207. <https://www.hanford.gov/page.cfm/FinalTCWMEIS>

⁵⁷ [Washington State Department of Ecology \(WDOE\) Nuclear Waste Program Compliance Report, Index Number 19.655, July 11, 2019, p 4.](#)

⁵⁸ Ibid.

⁵⁹ Ibid. at 21

⁶⁰ Steven R. Sherman Collin J. Knight, Treatment Method for Fermi Barrel Sodium Metal Residues, Idaho National Laboratory, INL/EXT-05-00421, June 2005, p.1. <https://inldigitallibrary.inl.gov/sites/sti/sti/3693731.pdf>

FIGURE 11



GeoMelt Monolith in Truck Bay (Source: Washington State Department of Ecology, see footnote 57)

FIGURE 12



Remnants of fire in GeoMelt Room (Source: Washington Ecology Department, see footnote 57))

In early April, one month before the May 17th fire, Perma-Fix Northwest employees reported to Washington State Department of Ecology, “*our fire alarm system in the Mixed Waste Facility is not working. It was operational yesterday and appears to have occurred sometime between the end of the day yesterday and today. Our maintenance group is investigation [sic] the issue, and we will be performing hourly rounds throughout the MWF until the cause can be determined and repairs made.*”⁶¹

⁶¹ Washington State Department of Ecology (WDOE) Nuclear Waste Program Compliance Report, Index Number 19.655, July 11, 2019, *supra*, see footnote 57.

The fire alarm system remained inoperable from April 16th until May 20th, and hourly inspections stopped a day before the fire.⁶² No contingency plan was implemented to address the fire.⁶³ There are no water sprinklers in the area out of concern for the spread of radioactivity, leaving only hand-held fire extinguishers.⁶⁴

The Ecology inspector concluded:

*“The fire at PermaFix Northwest could have been catastrophic [emphasis added], as the fire alarms were not working, and hourly fire inspections (in place of the fire alarms) were not being performed when the fire occurred. Additionally, PermaFix stated there are no fire sprinkler systems installed at the Mixed Waste facility due to potential radiological contamination issues. Since the fire alarms were not working, PermaFix Northwest should have ensured that proper fire inspections were performed by facility staff, especially when thermal treatments are being conducted at the Mixed Waste Facility.”*⁶⁵

After the fire, which was caused by multiple safety failures and was described by a state inspector as potentially “catastrophic,” Perma-Fix Northwest was still permitted to process “over 900 55-gallon drums containing a total of around 3,500 lbs. of sodium with low levels of radioactivity” at the GeoMelt unit.⁶⁶ The amount of sodium processed is roughly 64% greater than the average per-barrel amount estimated previously at the Idaho National Laboratory, where the Fermi drums were stored.⁶⁷

The whole point of a treatability study, which GeoMelt was permitted under, is to gather performance data to either develop a new technology, or to support development of a permit application. It is not clear whether there are any legitimate “study questions” that Perma-Fix Northwest is addressing as part of this treatability study. Further, is processing 900 drums necessary to obtain the needed data, or would processing a smaller number of drums be adequate? If there are not defensible answers to these questions, the treatability study is essentially an excuse to do more work under less restrictive permitting obligations and avoid the full permit application.

b. The 2019 Uranium Turnings Fire

Our research uncovered another fire that calls into question the approach taken by Perma-Fix Northwest to treating pyrophoric radioactive waste, which is inherently reactive to air and water. Hanford Challenge is concerned that a future fire could release radioactive and hazardous

⁶² Ibid., p 20.

⁶³ Ibid., p. 21

⁶⁴ Ibid., p. 26.

⁶⁵ Ibid., p.52.

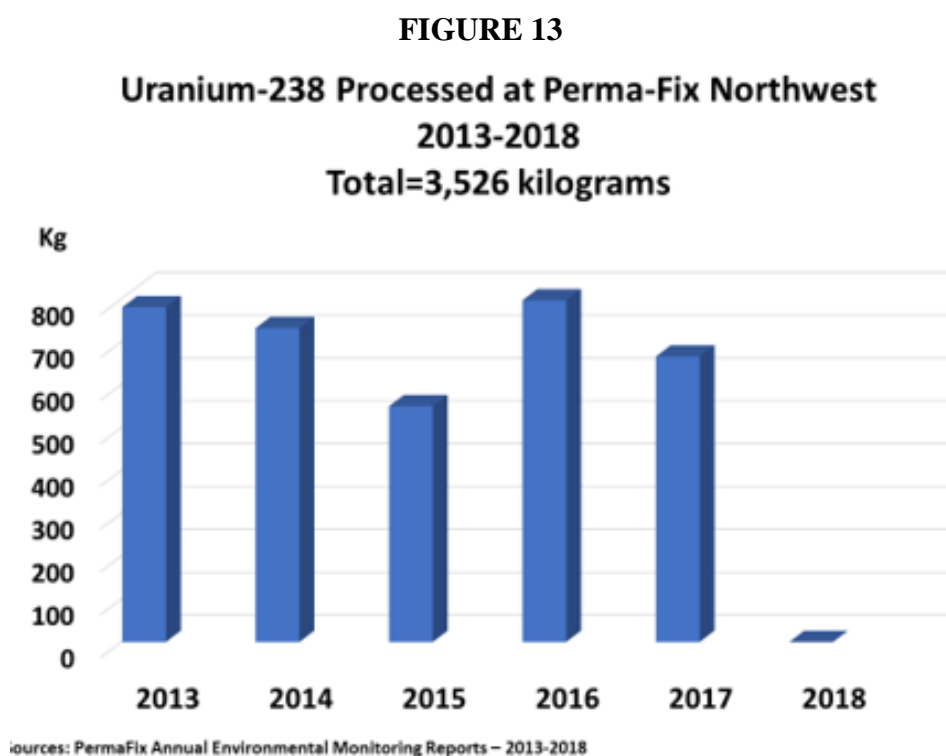
⁶⁶ Ben Garrett, Sadie Butler, Michael J Connolly, Treatment of Problematic Reactive Metal Wastes Using GeoMelt ICV, Idaho National Laboratory, INL/CON-19-56754-Revision-0, March 20, 2020, p.1.

<https://www.osti.gov/biblio/1599756>

⁶⁷ Steven R. Sherman Collin J. Knight, Treatment Method for Fermi Barrel Sodium Metal Residues, Idaho National Laboratory, INL/EXT-05-00421, June 2005, p. 21. <https://inldigitallibrary.inl.gov/sites/sti/sti/3693731.pdf>

materials and be difficult to extinguish as demonstrated in the following references related to the hazards associated with multiple approaches to treating pyrophoric radioactive waste.

Just seven months after the May 2019 GeoMelt fire, Perma-Fix Northwest notified the Environmental Protection Agency on December 16, 2019 that “operations personnel discovered and extinguished a small fire inside a metal box of low-level, non-hazardous depleted uranium waste.”⁶⁸ According to the missive from Perma-Fix Northwest, “The event was associated with a 117 cubic foot metal disposal box of low level, nonhazardous DU turnings.”⁶⁹ The source of the Depleted Uranium was Lawrence Livermore National Laboratory.⁷⁰ The box contained wood and metal bracing, grout and approximately 50 cubic feet of the DU turnings.”⁷¹ Between 2013 and 2019, Perma-Fix Northwest processed about 8,330 pounds (3,778 kg) of uranium-238 for offsite disposal (Figure 13).



(Source: Perma-Fix Northwest Annual Environmental Monitoring Reports, 2013-2018)

“DU turnings” are metal shavings in finely divided forms from machining operations. They are readily ignitable and can spontaneously catch fire in open air in the presence of moisture.⁷²

⁶⁸ [Letter from: Richard Grondin, Vice-President and General Manager, Perma-Fix Northwest Richland, Inc. to J. Temple, Department of Ecology, December 20, 2019.](#)

⁶⁹ “DU turnings” are metal shavings in finely divided forms from machining operations.

⁷⁰ [Washington State, Department of Ecology, Draft, RCRA Site ID: WAR000010355](#)
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⁷¹ Letter from: Richard Grondin, Vice-President and General Manager, Perma-Fix Northwest Richland, Inc. to J. Temple, Department of Ecology, December 20, 2019, *supra*, see footnote 68.

⁷² Richard P. Pohanish, Stanley A. Greene, Wiley Guide to Chemical Incompatibilities, 2nd Edition, p.1216 (2003).
<https://books.google.com/books?id=KDHDDeApHKjgC&pg=PA1216&lpg=PA1216&dq=Wiley+guide+to+incompat>

According to Energy Department research, “solid uranium, either as chips or dust, is a very dangerous fire hazard.”⁷³ Being explosive (i.e. exothermic,) “metal fines or chips ignite spontaneously with a rapid energy release. Hydrogen is generated in the reaction between moisture and uranium metal when insufficient oxygen is present to passivate the metal, and care must be taken to avoid accumulation of hydrogen in closed containers.”⁷⁴

DOE-sponsored research also finds that, “In addition, uranium metal can react violently with chlorine (Cl₂), fluorine (F₂), nitric acid (HNO₃), selenium (Se), sulfur (S), ammonia (NH₃), bromine fluoride (BrF₃), trichlorethylene (TCE), or nitryl fluoride and similar compounds.”⁷⁵

As early as 1954, research by the Atomic Energy Commission found that “thousands of spontaneous fires have been experienced at room temperature during drum storage of lathe turnings or uranium briquettes made from compacted turnings.”⁷⁶ Over the years, there also have been numerous fires from ignition of uranium scrap encapsulated in concrete.⁷⁷ “High ambient temperature and humidity were presumed to be responsible for these ignitions. The runaway ignitions inside drums or concrete cylinders were followed by slow burning similar to a charcoal fire.”⁷⁸

Even the common practice of transporting uranium chips and fines in mineral oil – meant to create an inert barrier – is considered a potential safety hazard by the Nuclear Regulatory Commission. “This method has the distinct safety problem of allowing a pressure buildup of hydrogen gas within the drum,” according to the NRC, “this may cause a personnel hazard upon opening the drum, and a possible explosive release and/or ignition of the hydrogen gas.”⁷⁹

[ible+chemicals+uranium+metal&source=bl&ots=UEutmBnFco&sig=ACfU3U3IO4HbYWomBQ8YutdAoJUcqA1h0w&hl=en&sa=X&ved=2ahUKEwju05CC85rpAhXumHIEHWKJCpYQ6AEwAHoECAoQAQ#v=onepage&q=Wiley%20guide%20to%20incompatible%20chemicals%20uranium%20metal&f=false](https://www.osti.gov/servlets/purl/180025)

⁷³ J. R. Hightower and J. R. Trabalka, *Depleted Uranium Storage and Disposal Trade Study: Summary Report*, Oak Ridge National Laboratory, ORNL/TM-2000/10, pp.7-10.

<https://deq.utah.gov/legacy/businesses/e/energysolutions/depleted-uranium/performance-assessment/compliance-report/docs/2014/07Jul/supinfo/appreferences/ORNL-TM-2000-10.pdf>

⁷⁴ Ibid.

⁷⁵ J. R. Hightower and J. R. Trabalka, *Depleted Uranium Storage and Disposal Trade Study: Summary Report*, Oak Ridge National Laboratory, ORNL/TM-2000/10, pp.7-10.

<https://deq.utah.gov/legacy/businesses/e/energysolutions/depleted-uranium/performance-assessment/compliance-report/docs/2014/07Jul/supinfo/appreferences/ORNL-TM-2000-10.pdf>

⁷⁶ Martin G. Plys, Michael Epstein, and Boro Malinovic, *URANIUM PYROPHORICITY PHENOMENA AND PREDICTION*, Fauske & Associates, Inc., SNF-5373, Fluor Hanford Inc., (2000). <https://efcog.org/wp-content/uploads/Wgs/Waste%20Management%20Working%20Group/Waste%20Classification%20Library/Hanford/Uranium%20Pyrophoricity%20Phenomenon%20and%20Prediction.pdf>

⁷⁷ Matthew Silva, *An Assessment of the Flammability and Explosion Potential of Transuranic Waste*, Environmental Evaluation Group, DOE/AL/58309-48, June 1991, pp.35-39. <https://www.nrc.gov/docs/ML0319/ML031910324.pdf>

⁷⁸ Martin G. Plys, Michael Epstein, and Boro Malinovic, *URANIUM PYROPHORICITY PHENOMENA AND PREDICTION*, Fauske & Associates, Inc., SNF-5373, Fluor Hanford Inc., (2000). <https://efcog.org/wp-content/uploads/Wgs/Waste%20Management%20Working%20Group/Waste%20Classification%20Library/Hanford/Uranium%20Pyrophoricity%20Phenomenon%20and%20Prediction.pdf>

⁷⁹ U.S. Nuclear Regulatory Commission, Information Notice No.80-25 – Transportation of Pyrophoric Uranium. <https://www.nrc.gov/reading-rm/doc-collections/gen-comm/info-notices/1980/in80025.html>

From 1971 until 1982, depleted uranium metal chips and fines were immobilized in concrete at Hanford in 7-gallon steel drums. During this period, ton quantities were shipped to the Feed Materials Production Center in Fernald, Ohio for recovery.⁸⁰ “However, the uranium metal grouted for shipment sometimes ignited and that subsequent testing showed hydrogen gas evolved from the cement,” reports a 2004 study by Pacific Northwest National Laboratory.⁸¹ DOE-sponsored studies note that:

“Two fires subsequently occurred at Hanford during storage of concreted products. In August 1977, six concreted billets burned when at least one of the billets auto ignited in the 304 Building. The concreted products swelled by the burning and heat to burst the steel cans in which they were cast... The swelling was due to reaction of the U-metal to form the more voluminous uranium oxide and to thermal decomposition of the limestone-rich masonry cement. A second autoignition incident occurred in July 1979 in the 3712 Building warehouse. The wooden shipping boxes in which the billets were packed awaiting shipment ignited to damage or destroy 21 concreted billets.”⁸²

In July 1979, a fire occurred involving grouted uranium scrap in metal drums. “Wooden crates were on fire. Firefighters applied water, but only the wood extinguished, the metal can contents continued to burn. The crates pallets were moved out of the warehouse building and met-1-x® fire suppressant and sand were applied to the burning uranium. Several of the metal cans broke open, and then uranium would be propelled outward, energetically burning, and giving the impression of sparklers used on July 4th celebrations. The fires burned for about nine hours.”⁸³

Another fire occurred in March of 1982. “A wooden pallet of uranium concrete billets was found burning. Autoignition of the uranium metal in the concrete had initiated the fire (U.S. DOE UOR (Unusual Occurrence Report), 1982) the fire involved uranium that had been dispersed in concrete.”⁸⁴

In 2008, PNNL continued to call out that “the generation of hydrogen gas through oxidation/corrosion of uranium metal by its reaction with water can potentially create a flammable atmosphere during sludge handling, grouting, or subsequent transport and storage

⁸⁰ G. B. Mellinger et al, *Disposition Options for Hanford Site K-Basin Spent Nuclear Fuel Sludge*, Pacific Northwest National Laboratory, PNNL-14729, January 2004, P.A-1

https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-14729.pdf

⁸¹ C. H. Delegard et al, *Final Report – Gas Generation Testing of Uranium Metal in Simulated K Basin Sludge and in Grouted Sludge Waste Forms*, Pacific Northwest National Laboratory, PNNL-14811, August 2004, P A-9.

https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-14811.pdf

⁸² G. B. Mellinger et al, *Disposition Options for Hanford Site K-Basin Spent Nuclear Fuel Sludge*, Pacific Northwest National Laboratory, PNNL-14729, January 2004, p. A-2.

https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-14729.pdf

⁸³ Lee C. Cadwallader et al, *Summary of Off-Normal Events in US Fuel Cycle Facilities for AFCI Applications*, Idaho National Engineering and Environmental Laboratory, INEEL/EXT-04-02257, September 2005, p. 66.

<https://indigitalibrary.inl.gov/sites/sti/sti/3394921.pdf>

⁸⁴ Matthew Silva, *An Assessment of the Flammability and Explosion Potential of Transuranic Waste*, Environmental Evaluation Group, DOE/AL/58309-48, June 1991.p 37. <https://www.nrc.gov/docs/ML0319/ML031910324.pdf>

operations.⁸⁵ In this report PNNL specifically noted that “tests of the effects of grouting on the rate of hydrogen generation from simulated K Basin sludge described by two independent laboratories showed that the corrosion rate of uranium metal in grout is consistent with the rate observed in water. At best, the rate was decreased by a factor of 2 to 3 as a result of specific grout formulation. Even with this decrease, the corrosion rate results lie within the 95% confidence level of the STP [Sludge Treatment Process] rate law.”⁸⁶ As a result, grouting uranium metal does not render it non-reactive. EPA defines reactive waste as unstable under “normal” conditions. Reactive wastes can cause explosions, toxic fumes, gases, or vapors when heated, compressed, or *mixed with water*. Grouting does not render uranium metal non-reactive.

The potential for ignition of uranium metal embedded in grout from corrosion and hydrogen generation, at Hanford and other sites, remains a largely overlooked and unresolved safety question. Of the nine types of grouting methods tested by PNNL in 2009, “none of the grouts was a powerful enough desiccant to significantly diminish water accessibility from the vapor phase and thus decrease the uranium metal-corrosion reaction rate.”⁸⁷ Testing to determine the potential ignitability from hydrogen generation from uranium grout used by Perma-Fix was not done. “Because no specific information on the grout formulation, and the bases for its selection, was available, Perma-Fix formulations were not tested.”⁸⁸

Subsequent concerns about the ignition hazards of grouted uranium metal were raised in 2017. An experimental study raised, “the potential to form uranium hydride (UH₃)” – a very exothermic compound which also “releases hydrogen gas that may become trapped within the grout.”⁸⁹ Hydrogen gas generation, the study’s authors concluded “may be sufficient to cause grout fracturing and deformation, or rupturing of the container walls, posing a risk to workers and the environment during storage and transport.”⁹⁰

Another major safety issue regards the mixing of organic materials with highly pyrophoric materials in the grouting process at the Perma-Fix Northwest facility. In its December 19, 2019 letter to the EPA, Perma-Fix Northwest states “the immediate cause of the incident has been determined to be a result of using wood inside the container to prevent the DU turnings from ‘floating’ in the grout to within 2 inches of the side of the box. The wood may have acted as a

⁸⁵ C.H. Delegard and A.J. Schmidt, *Uranium Metal Reaction Behavior in Water, Sludge, and Grout Matrices*, PNNL-17815, Rev 0, September 2008, p.iii.

https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-17815.pdf.

⁸⁶ C.H. Delegard and A.J. Schmidt, *Uranium Metal Reaction Behavior in Water, Sludge, and Grout Matrices*, PNNL-17815, Rev 0, September 2008, p.iv.

https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-17815.pdf

⁸⁷ C.H. Delegard and A.J. Schmidt, *Uranium Metal Reaction Behavior in Water, Sludge, and Grout Matrices*, PNNL-17815, Rev 1, May 2009, p.4.4.

https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-17815rev1.pdf

⁸⁸ C. H. Delegard et al, *Final Report – Gas Generation Testing of Uranium Metal in Simulated K Basin Sludge and in Grouted Sludge Waste Forms*, Pacific Northwest National Laboratory, PNNL-14811, August 2004, P A-9.

http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-14811.pdf

⁸⁹ Ibid.

⁹⁰ C. A. Stitt, et al., *In-situ, time resolved monitoring of uranium in BFS:OPC grout. Part 1: Corrosion in water vapour*, *Nature: Scientific Reports*, August 11, 2017. <https://www.nature.com/articles/s41598-017-08601-x>

bridge restricting the grout from flowing fully around the DU turnings, allowing air to ignite the turnings and catch the wood on fire.”⁹¹

This is a demonstration of a second instance in 2019 of the failure to understand the nature of flammable materials and take steps to prevent fires. The fire resulting from the GeoMelt product is another instance of a preventable accident with potential dire consequences for workers and the public.

This failure was underscored by the 2014 drum explosion at the Waste Isolation Pilot Project in which ignitable transuranic waste was mixed with organic kitty litter.⁹² The use of an organic material, such as wood, to come in contact with a well-known and highly pyrophoric material constitutes a failure by management to ensure a safe operation at the Perma-Fix Northwest facility.

In 2006, Perma-Fix Northwest presented the result of its effort to process and treat pyrophoric uranium metal turnings and chips from Rocky Flats and the Hanford Site. “Between November 6, 2003 and March 4, 2004, Perma-Fix Northwest reported, “478 containers of Hanford DU chips wastes in mineral oil and soil matrices were treated.”⁹³ The authors concluded “A combination of solvent washing, hot water and detergent washing and metals immobilization was employed...making the treated DU chips and turnings compliant with land disposal treatment standards. Soil fines required vacuum thermal desorption after attempts to wash these fine solids proved only partially effective.”⁹⁴

Did the uranium turnings that caught fire contain soil fines grouted in the absence of thermal treatment to remove hazardous wastes contained in Hanford’s barrels of uranium scraps? Perma-Fix Northwest is not permitted to thermally treat MLLW. Without such treatment, by its own analysis, Perma-Fix Northwest cannot effectively remove non-radioactive hazardous wastes in Hanford uranium chips and turnings in order to meet land disposal restrictions. Perma-Fix Environmental Services, Inc. has such a capability at its facility in Kingston, TN some 2,372 miles away.

The documentation Hanford Challenge found for this report does not answer a very important question: did any worker exposures result from the December 16, 2019 uranium fire? If this same fire were to happen on the Hanford Site, this would have been an essential inquiry and would have been documented. Indeed, this was an important issue raised during the 1982 uranium fire at Hanford and similar incidents at other sites, in which “air sample and radiation surveys taken in the area indicated no contamination release to the surrounding area. Yet two fire

⁹¹ Letter from: Richard Grondin, Vice-President and General Manager, Perma-Fix Northwest Richland, Inc, to WA State Dept of Ecology, December 19, 2019, *supra*, footnote 68

⁹² U.S. Department of Energy Office of Environmental Management, Accident Investigation Report, Phase 2 Radiological Release Event at the Waste Isolation Pilot Plant, February 14, 2014, April 2015. https://www.wipp.energy.gov/Special/AIB_WIPP%20Rad_Event%20Report_Phase%20II.pdf

⁹³ B.R. Crocker, R.Grondin, and T.Yarbrough, *Treatment and Stabilization of Potentially Pyrophoric Radioactive Metal Chips and Turnings*, Perma-Fix Environmental Services Inc., Waste Management Conference, February 26-March 2, 2006, Tucson, AZ. <https://www.osti.gov/biblio/21208556-treatment-stabilization-potentially-pyrophoric-radioactive-metal-chips-turnings>

⁹⁴ *Ibid.*

fighters had contamination on their face, hands, and clothes.”⁹⁵ It is possible that the uranium which ignited at Perma-Fix Northwest was recycled, perhaps after previous irradiation in a reactor, which would have added trace amounts of fission products and actinides, such as plutonium to the material that caught fire.⁹⁶

Perma-Fix Northwest has demonstrated a disturbing approach to treating pyrophoric radioactive waste, which is inherently reactive to air and water. The dangers to the nearby community are obvious in that the next fire could release a lot of material and be difficult to put out as demonstrated in the references spanning several decades. These past oversights must be addressed to bring this facility into compliance and increase protections for workers and the surrounding community.

c. The Tritium Contamination Incident

Worker exposure, safety protocols, and adequate training of Perma-Fix Northwest employees come into question in the documentation obtained by Hanford Challenge related to a leak of radioactive tritium liquid.

On April 28, 2008, after a van was opened at the Perma-Fix Northwest facility, it was discovered that radioactive tritium liquid had leaked at a level 2,000 times (20 million dpm/100cm²) greater than the limit set by the U.S. Department of Energy (DOE), requiring the area to be posted as a controlled zone and requiring health physics protection of workers.⁹⁷

With a half-life of 12.3 years, tritium (H-3) – a radioactive form of hydrogen - is a low energy beta emitter. While it is not considered an external danger (its beta particles are unable to penetrate the skin), it can be a radiation hazard when inhaled, ingested, or absorbed through the skin. According to DOE, “Due to the body’s ready adsorption of tritium in the form of tritiated water, exposure to tritiated water in air is on the order of 15,000 to 25,000 times more hazardous than exposure to gaseous tritium.”⁹⁸

On April 17, 2008, the van was backed up to Building 8 to unload drums. Washington State Department of Health inspectors reported that tritium contamination “showed similar elevated counts up to 20 million dpm/100cm²... PFNW believed [tritium contamination] had spread to

⁹⁵ Matthew Silva, *An Assessment of the Flammability and Explosion Potential of Transuranic Waste*, Environmental Evaluation Group, DOE/AL/58309-48, June 1991, p 37. <https://www.nrc.gov/docs/ML0319/ML031910324.pdf>

⁹⁶ U.S. Department of Energy, *Review of Generation and Flow of Review of Generation and Flow of Recycled Uranium at Hanford*, DOE/RL-2000-43, June 30, 2000, Section 6. P11. <https://www.osti.gov/servlets/purl/803918>

⁹⁷ U.S. Department of Energy, Tritium Handling and Safe Storage, DOE-HDBK-1129-2007 March 2007, P. 90. <https://www.standards.doe.gov/standards-documents/1100/1129-bhdbk-2007/@@images/file>. “Appendix D of 10 CFR 835 specifies surface contamination value for use in determining whether a location needs to be posted as a contamination or high-contamination area (Subpart G), and if an item is considered to be contaminated and cannot be released from a contamination or high contamination area to a controlled area (Subpart L). ...10 CFR 835 does not permit unrestricted release of contaminated items. The surface contamination value for removable tritium is 10,000 dpm/100 cm²”

⁹⁸ U.S. Department of Energy, Tritium Handling and Safe Storage, DOE-HDBK-1129-2007 March 2007, P.6. <https://www.standards.doe.gov/standards-documents/1100/1129-bhdbk-2007/@@images/file>

uncontrolled areas.”⁹⁹ A spot on the ground near the truck that experienced the leak showed a high contamination level.¹⁰⁰ DOH inspectors observed that some workers attempting to prevent contamination from spreading from the truck “were wearing shorts and t-shirts, no workers had protective clothing, and no workers were wearing gloves.”¹⁰¹ When asked about the plan or instructions for removal of contaminated soil, the cleanup employees did not know what they were – prompting a DOH inspector to stop the work and to summon the plant managers.¹⁰² Several hours later, “the van was still not staged in an enclosed area, workers had not dug up contaminated soil, nor were the workers given direction as to how to remove the contaminated soil.”

The DOH inspectors reported several concerns to their managers including:

“There was a lack of personnel contamination control during the incident. It would have been appropriate that coveralls and gloves should have been worn while wrapping the truck with plastic. No anti-C clothing was worn. Some workers were wearing shorts and t-shirts.

There was evident lack of management oversight during the incident:

- Inadequate delegation of incident oversight to health physics technician.
- Delegated incident lead unable to provide adequate direction and oversight.
- Radiological assessment of the van and associated work area was not performed prior to allowing work in the area.
- The need for protective clothing was not assessed, and workers were working without gloves.

Also, there were other areas that were not addressed adequately:

- Removing a vehicle that had very high levels of contamination externally and placing unpackaged waste outside.
- All packages placed outside must be in metal shipping containers. The van does not meet the design requirements of a shipping container.
- No authorized user on site.”¹⁰³

It is not clear what, if any, steps were taken by the Washington State Department of Health to correct these serious radiation safety and health deficiencies reported by its inspectors. It is also unclear what changes were made to Perma-Fix Northwest employee nuclear safety training requirements.

⁹⁹ [State of Washington, Department of Health, Incident #: 08-025 Facility: Perma-Fix Northwest Richland, License Number: I0393-1, Date: April 17, 2008.](#)

¹⁰⁰ Ibid

¹⁰¹ Ibid.

¹⁰² Ibid

¹⁰³ Ibid.

d. Worker Overexposures

Based on the documentation reviewed by Hanford Challenge, there are at least two instances, when workers were highly exposed internally to transuranic isotopes, during the processing of wastes at Perma-Fix Northwest.

i. November 1, 2006 Worker Exposure

The first event occurred on November 1, 2006 (a year before Perma-Fix Northwest formally assumed ownership from Pacific Ecosolutions, or PeCos), after the first of 12 waste containers was opened, which included three americium-241 containers from the DuPont Corporation.¹⁰⁴

A supervisor, just outside of the enclosed workspace, was not wearing a respirator and realized that he became contaminated. According to the event report filed with the U.S. Nuclear Regulatory Commission by the Washington State Department of Health:

“A very high contamination level was detected (greater than 2 million dpm/wipe) in the room at about 10:00, and the building was evacuated shortly after that. At about this time, an air sample that was in the area of the workers was counted and determined to have a very high alpha activity.... The supervisor and the workers were taken to a survey area and found to be contaminated on the face. Contamination was detected on the respirators.”¹⁰⁵

The next day it was discovered after being placed in a whole-body counter at a Battelle facility that his lung had absorbed a significant over exposure estimated at 97.5 Rem committed dose equivalent (CDE)¹⁰⁶ from americium-241. Operations were stopped and the two other workers were found to have inhaled significant quantities of Am-241. After in-vivo measurements were taken to determine the dose to two workers who wore respirators, the WA State Department of Health concluded that they “may have exceeded their annual dose limit of 50 Rem to the bone”.¹⁰⁷ The extraordinary measure, only performed on an emergency basis, was taken to inject the three exposed workers with a chelating agent in order to try to flush Am-241 from their bodies.¹⁰⁸

¹⁰⁴ United States District Court Eastern District of Tennessee at Knoxville, Perma-Fix Northwest. Philotechnics, Ltd, Civil Action No. 3:09-CV-472, Filed October 29, 2009. <https://www.plainsite.org/dockets/u9axj3lo/tennessee-eastern-district-court/permafix-northwest-richland-inc-v-philotechnics-ltd-plr2/>

¹⁰⁵ U.S. Nuclear Regulatory Commission, Event Number 4292, Notification Date: 11/08/2006. <https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2006/20061108en.html>

¹⁰⁶ CDE is defined by the United States Nuclear Regulatory Commission in Title 10, Section 20.1003, of the Code of Federal Regulations (10 CFR 20.1003), such that “The Committed dose equivalent, CDE ($H_T, 50$) is the dose to some specific organ or tissue of reference (T) that will be received from an intake of radioactive material by an individual during the 50-year period following the intake”.

¹⁰⁷ U.S. Nuclear Regulatory Commission, Event Number 4292, Notification Date: 02/07/2007. <https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2007/20070207en.html>

¹⁰⁸ U.S. Nuclear Regulatory Commission, Event Number 4292, Notification Date: 11/08/2006. <https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2006/20061108en.html>

The WA State Department of Health's (DOH) investigation concluded “that the root cause of the event was failure to adhere to procedures and plans set forth for the project, and inadequate training.”¹⁰⁹ DOH also found this event demonstrated a pattern in which “the actual cause of the event does not appear to be a single cause, but rather compounding mistakes, errors in judgment and complacency for the seriousness of this type material.”¹¹⁰

That two workers, who wore respirators, were highly exposed requiring chelation therapy, raises concern about the lack of adequate available protection using supplied air. Four months later the contaminated room where the overexposures took place remained inaccessible.¹¹¹

A critical fact revealed over 3 years later, in a lawsuit filed by Perma-Fix Northwest against Philotechnics, Ltd., was that the overexposure also resulted from processing “nonconforming” waste that exceeded Perma-Fix Northwest’s licensed possession limits. “On or about November 1, 2006, a workplace incident occurred at the Facility while processing the DuPont Waste where one or more workers became over-exposed to Americium-241 requiring medical treatment and monitoring. This incident triggered reporting obligations to the Washington State Department of Health and to the United States Nuclear Regulatory Commission.”¹¹²

In particular, Perma-Fix Northwest discovered that the DuPont waste included Am-241 levels higher than reported as well as strontium-90 (Sr-90), an isotope that was nowhere disclosed on waste characterization information including the shipping manifest...” provided by the waste broker.

Perma-Fix Northwest offered to treat the waste for \$1,935,013.50 and asserted in its court filings, “... the continued presence of the nonconforming waste at Perma-Fix Northwest’s facility likely will trigger one or more environmental enforcement actions which could well shut down Perma-Fix Northwest’s operations altogether.”¹¹³

According to the court document, “additional quantities of waste were generated related to the DuPont Waste as a result of the cleanup and remediation effort by Perma-Fix Northwest at the Facility caused by the November 1, 2006, workplace incident. Perma-Fix Northwest “informed Philotechnics [the waste broker that arranged the shipment] that the 12 drums of DuPont Waste had (somehow) grown to 38 drums of waste.. [and] that all but one of these 38 drums derived from the DuPont Waste were characterized as either "Class B" or "Class C" or "Greater Than Class C" ("GTCC") waste... not suitable for ultimate disposition at any commercially available disposal facility.”¹¹⁴

¹⁰⁹ Ibid.

¹¹⁰ U.S. Nuclear Regulatory Commission, Event Number 4292, Notification Date: 02/07/2007. <https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2007/20070207en.html>

¹¹¹ Ibid.

¹¹² United States District Court Eastern District of Tennessee at Knoxville, Perma-Fix Northwest. Philotechnics, Ltd, Civil Action No. 3:09-CV-472, Filed January 10, 2010. <https://www.plainsite.org/dockets/u9axj3lo/tennessee-eastern-district-court/permafix-northwest-richland-inc-v-philotechnics-ltd-plr2/>

¹¹³ United States District Court Eastern District of Tennessee at Knoxville, Perma-Fix Northwest. Philotechnics, Ltd, Civil Action No. 3:09-CV-472, Filed October 29, 2009. <https://www.plainsite.org/dockets/u9axj3lo/tennessee-eastern-district-court/permafix-northwest-richland-inc-v-philotechnics-ltd-plr2/>

¹¹⁴ Ibid.

The WA State Department of Health allowed the highly radioactive, nonconforming waste to remain at the site, untreated, until early 2013 for more than 6 years after the workers overexposures took place.¹¹⁵

The estimated radiation doses to the most seriously exposed was extremely high and in significant violation, by nearly a factor of two, of NRC occupational exposure limits.¹¹⁶ By comparison:

- The worker at what is now the Perma-Fix Northwest facility received a dose that was 10,833 times greater than the average CDE (committed dose equivalent for internal organs) for all 30 workers so exposed that year at the Hanford Site.¹¹⁷
- Compared to 999 workers at the DOE's Y-12 plant in TN, who, in 2006, received over 90% of the collective internal dose in the DOE nuclear complex, the CDE dose to the (PeCos now the Perma-Fix Northwest facility) was 2,378 times greater.
- Moreover, the dose received by the (PeCos) employee was 2,653 times greater than the average internal dose received by 4,954 workers in the entire DOE nuclear complex for the years 2004, 2005 and 2006. No internal doses exceeded the limit for all DOE workers during that same time period.¹¹⁸

ii. February 3, 2009 Worker Exposure

The second overexposure occurred three years later, on February 3, 2009 as workers were processing a glovebox “roughly the size of a small automobile” that was contaminated with americium-241, and plutonium-239, plutonium-240 and plutonium-238.¹¹⁹ The glovebox, used for irradiated fuel processing research in the Hanford Building-308, had numerous points where the contaminants could escape into the air. Because of the potential for exposure, the worker was required to provide nasal, urine and fecal samples for analysis. However, this did not happen within 48 hours after exposure, in non-compliance with state regulations. Also, the exposed worker was allowed to re-enter the radiation area when his dose was not known.

On February 12th, nine days after the worker was exposed, he had an in-vivo body count done by a commercial contractor to Perma-Fix Northwest, which indicated his dose did not exceed regulatory limits. The WA State Department of Health reported to the NRC, on April 12, 2009, “The estimated dose was about 1/3 of the annual limit, or 16 REM CDE (Annual limit 50 REM).

¹¹⁵ [Washington State Department of Health, Letter to Curt Cannon, Radiation Safety Officer, from Sean Murphy, Health Physicist, January 11, 2013.](#)

¹¹⁶ U.S. Nuclear Regulatory Commission, 10 CFR 20.1201 Occupational dose limits for adults.
<https://www.nrc.gov/reading-rm/doc-collections/cfr/part020/part020-1201.html>

¹¹⁷ U.S. Department of Energy, Annual Occupational Radiation Exposure: Annual Report -2006, Exhibit B-4. Internal Dose by Site, 2004-2006. https://www.energy.gov/sites/prod/files/2014/06/f16/2006_DOE_Appendices.pdf

¹¹⁸ U.S. Department of Energy, Annual Occupational Radiation Exposure Report-2006, Exhibit 3-8, P. 3-7.
https://www.energy.gov/sites/prod/files/2014/06/f16/2006_Occupational_Radiation_Exposure_Report.pdf

¹¹⁹ [Washington State Health Department, Incident Report, September 24, 2009.](#)

The worker had previous whole-body exposure, but this added amount did not cause a limit to be exceeded.”¹²⁰

However, after repeated testing, Pacific Northwest National Laboratory performed a reanalysis on March 25, 2009 concluding the worker received committed internal dose equivalent of 120 rem – 2.4 times the regulatory limit. However, Perma-Fix Northwest did not formally notify the WA State Department of Health of the major exceedance until June 22, 2009. The NRC noted that the type of respiratory protection used (Powered Air Purifying Respirator) was use of a filtering respirator instead of supplied air “that may not have provided adequate coverage.”¹²¹ This is a repeat issue as in 2006, where workers were wearing respirators and still received high doses.

Even though this serious overexposure occurred under contract with the U.S. Department of Energy, it appears that no investigation or corrective follow-up was performed by officials at the Hanford Site. If this event took place on the Hanford Site, the severity of the exposure would likely have resulted in an investigation and an enforcement action involving a financial penalty.

Exposures in comparison to that received by the Perma-Fix Northwest employee in Feb 2009 include:

- In 2009, only one worker received an internal dose at the DOE’s Hanford Site of 0.001 rem – 120,000 times less than received by the Perma-Fix Northwest employee.¹²²
- Compared to 1,125 workers at the DOE’s Y-12 plant in TN, who, in 2009, received over 90% of the collective internal dose in the DOE nuclear complex, the Committed Dose Equivalent (CDE) dose to the Perma-Fix Northwest worker was 2,841 times greater.¹²³
- The Perma-Fix Northwest employee received a dose 2,592 times greater than the average CDE dose to 3,748 workers in the DOE nuclear complex for the years 2006-2009.¹²⁴ No internal doses exceeded the limit for all DOE workers during that same time period.¹²⁵

Hanford Challenge is very concerned about the increased risk to worker health and safety at Perma-Fix Northwest due to inadequate training and poor safety controls. When these exposures are compared to Hanford worker exposures, they are thousands of times worse. This is another very good reason for this work to be performed at Hanford, which is unionized, highly-skilled and subject to more robust external regulation from entities such as the Defense Nuclear Facilities Safety Board.

¹²⁰ U.S. Nuclear Regulatory Commission, Event Number: 44986, April 13, 2009. <https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2009/20090417en.html>

¹²¹ U.S. Nuclear Regulatory Commission, Event Number: 44986, July 2, 2009. <https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2009/20090702en.html>

¹²² U.S. Department of Energy, Annual Occupational Radiation Exposure Report -2009, Exhibit B-4. Internal Dose by Site, 2007-2009. https://www.energy.gov/sites/prod/files/2014/06/f16/2009_DOE_Appendices.pdf

¹²³ Ibid

¹²⁴ Ibid.

¹²⁵ U.S. Department of Energy, Annual Occupational Radiation Exposure Report -2009, Exhibit 3-8, P-3-7. https://www.energy.gov/sites/prod/files/2014/06/f16/2009_Occupational_Radiation_Exposure_Report.pdf.

VI. Acceptance of Non-Conforming Waste Leads to Heightened Risks at Perma-Fix Northwest

Because of the potentially harmful nature of hazardous waste regulated under the Resource Conservation and Recovery and Toxic Substances Control Acts, a permitted treatment and disposal facility must document a physical description, chemical composition and properties, and specific constituents of the waste it has in its possession. If the wastes are found to be outside of the regulatory parameters set forth in the permit, otherwise known as non-conforming, the waste must be set aside and if it cannot be rectified, the non-conforming waste is required to be rejected and returned to the generator of the waste.

The dangers of non-conforming waste were underscored on November 17, 2018 after an explosion killed a worker and injured three others at the U.S. Ecology hazardous waste treatment, storage, and disposal facility - approximately 10.5 miles west of Grand View, Idaho. According to an inspection report eight months later by the Occupational Safety and Health Administration (OSHA) “an employee was stabilizing magnesium metal.... During this process hydrogen and oxygen are released. The hydrogen ignited and in the presence of oxygen and created a large explosion. The employee was killed.”¹²⁶

According to WA State Department of Ecology inspection reports, Perma-Fix Northwest has handled non-conforming wastes without rejecting them. Perma-Fix Northwest vigorously denies this is the case. WA State Department of Ecology documents, and in one important instance an admission by Perma-Fix Northwest, detail how this problem has led to significant worker overexposures and contamination of the site. According to an April 19, 2012 inspection report by the WA State Department of Ecology, a Perma-Fix Northwest official “estimated they received about 1,200 drums, [from the Hanford Site] and about 2% were non-conforming due to the contents not matching the profile.”¹²⁷ When asked if Perma-Fix Northwest “ever rejected any non-conforming waste back to the generator,” the company official replied “no, there are no rejected shipments.”¹²⁸ After finding waste drums sent from Hanford containing corrosive sludge and nitric acid, which are defined as non-conforming, the company official “declined to answer” when asked about these packages.¹²⁹

¹²⁶ U.S. Department of Labor, Occupational Health and Safety Administration, Inspection: 1360878.015 - US Ecology Idaho, Inc, Inspection: 1360878.015, January 2019.

https://www.osha.gov/pls/imis/establishment.inspection_detail?id=1360878.015

¹²⁷ Letter, Graber, K., Washington Department of Ecology Hazardous Waste & Toxics Reduction Program, to White, C., Operations Manager, Perma-Fix Northwest, Re: Report of Compliance Inspection for ID: WAR00010355, August 23, 2012, at 3.

¹²⁸ Ibid.

¹²⁹ Washington Department of Ecology, Hazardous Waste & Toxics Reduction Program Compliance Report, Site: Perma-Fix Northwest Richland, WAR00010355, April 19, 2012, p.3.

By April 2017, the U.S. Department of Energy (DOE) was found by WA State Department of Ecology to be shipping non-conforming wastes to Perma-Fix Northwest without proper designation of their high toxicity.¹³⁰

Due to the potential risks from handling non-conforming wastes, this issue needs significant attention to assure that future unacceptable risks do not recur. Perma-Fix Northwest's history of accepting non-conforming wastes, along with some of the potential consequences detailed above, spotlight the kind of risks inherent in exporting these wastes for treatment at Perma-Fix Northwest. As we conclude in our investigation, the problem of non-conforming wastes would be solved by DOE building the treatment capacity to handle this waste on the Hanford Site.

a. The Leaking Drum Incident

According to Washington State Department of Ecology inspectors, on March 23, 2012, a drum of waste retrieved from a Hanford burial trench nearly six years earlier was shipped to Perma-Fix Northwest.¹³¹ While processing the waste at Hanford before shipment to Perma-Fix Northwest, the drum leaked liquid onto the floor of the Hanford Waste Receiving & Processing Facility (WRAP) Building. In February 2011, after nitric acid was allegedly "dried out" in the open air at the WRAP facility – a potentially significant safety violation that could result in widespread airborne contamination – the drum was declared liquid free.¹³² By April 2011, liquid was found leaking from the same drum prompting an evacuation of the WRAP facility, and the use of jackhammers to remove the contaminated concrete flooring. The building was designated as a Radiation Control area and quarantined for a month.^{133 134}

¹³⁰ State of Washington, Department of Ecology, Letter to Mr. Doug S. Shoop, Manager Richland Operations Office and Mr. Ty Blackford, President and CEO, CH2M HILL Plateau Remediation Company, April 12, 2017.

¹³¹ [Jerry French, Joannette Biebesheimer, Kerry Graber, State of Washington, Department of Ecology, PowerPoint, Hazardous Waste Designation and Transportation Problems at Hanford and Permafex Northwest, 2012](#), Slide 62.

¹³² Ibid., Slide 65.

¹³³ Ibid., 2012 Slide 67.

¹³⁴ State of Washington, Department of Ecology, Email- From: Collins, Michael S., DOE Richland Office, Sent: Monday, April 30, 2012, To: Conaway, Kathy (ECY), Subject: Requested Information. "With respect to the two other waste packages that were shipped to PFNW at the time we shipped the above waste package to PFNW:

Waste Package 0059937 (aka: 4B Drum):

Subject waste package is a 85-gal overpack containing TRUM retrieved waste package M7W4BT7-0113. M7W4BT7-0113 was retrieved from the 4B burial ground on 8/12/2011 and immediately overpacked in to the 85-gal drum at the time of retrieval due to container integrity issues (heavy rusting). The overpacked drum was placed on the asphalt 4B processing pad to await transfer to the CWC. On 9/11/2011, drops of liquid were noted coming from the bottom of the waste package during transfer of it from the pad to a pallet in preparation for shipment to the CWC. The liquid was radioactive and had a pH of approximately 4 based on field information reported at the time of the contamination event. The 85-gal waste package was placed in to a 110-gal overpack (PIN 036493-7) along with poly-liner and acid neutralizing absorbent/pads to absorb/neutralize any additional free liquids that may drip out of the 85-gal overpack. The 110-gal overpack was then transferred over to the CWC on 9/27/2012 and placed in to storage unit FS15. On 3/19/2012, this package was then overpacked again, along with waste package 036493-9, into a 8'x4'x4' type-A metal box and shipped to PFNW on 3/22/2012 (ref: shipment # TC090. PFNW is performing processing (neutralization and liquid absorption as required) and repackaging in to a WIPP certifiable waste

It was subsequently determined that the drum held approximately 40.6 grams of radionuclides, principally plutonium-239, plutonium-240, plutonium-241 and americium-241.¹³⁵ The drum still held acids and corrosive chemicals. Even though the drum held these dangerous materials capable of escaping into the environment, it was shipped to Perma-Fix Northwest in 2012 as part of a three-drum over pack on a public highway under a different less precautionary and less stringent transportation waste code (U.S. Department of Transportation requirements versus DOE requirements). Perma-Fix Northwest did not verify the waste codes on the shipping manifest.¹³⁶

Even though Perma-Fix Northwest identified the drums as containing non-conforming wastes, it did not reject them and proceeded to open and process them.¹³⁷ Upon opening and treating the waste in the first drum, Perma-Fix Northwest violated a safety standard by allowing the contents of the first drum containing plutonium nitrate to dry out in the open air - creating the potential for airborne contamination.¹³⁸ As far as we can tell, this is the same thing that appeared to have happened at the WRAP facility at Hanford, with the same drum of waste.

Subsequently, all three drums holding non-conforming plutonium wastes were opened at Perma-Fix Northwest. One released acids and other liquids into the working environment. Perma-Fix Northwest workers then proceeded to jackhammer the floor.¹³⁹ Perma-Fix Northwest notified the Washington State Department of Health several days later. Although these wastes were mixed low-level wastes, the WA State Department of Ecology was not notified. The WA State Department of Ecology learned about some of the details of the spill after Perma-Fix Northwest

package. This process/repackaged TRUM waste is scheduled to be returned back to Hanford on 5/15/2012 (ref: shipment TR1203).

Waste Package 0062081 (aka: 12B Drum):

Subject waste package is a 85-gal overpack containing retrieved TRUM waste package 2E12B17-1161. 2E12B17-1161 was retrieved from the 12B burial ground on 7/28/2011. When it was retrieved, liquid drips (ph ≈2) and radioactive contamination were noted coming from the waste package; it was immediately placed in to a 20-mil poly bag along with acid resistant absorbing pads and then placed in to the 85-gal overpack. NDE was performed on this waste package at the 12B Operations area on 9/13/2011 and it was determined that the package contained approximately 400-ml of liquid inside the 55-gal drum. To ship this package to the CWC, the shipping documentation required the packaged to be placed in to a 110-gal overpack (PIN 036493-9) along with additional acid neutralizing absorbing pads. The 110-gal overpack was then transferred over to the CWC on 9/27/2012 and placed in to storage unit 2402WE. On 3/19/2012, this package was then overpacked again, along with waste package 036493-7, into a 8'x4'x4' type-A metal box and shipped to PFNW on 3/22/2012 (ref: shipment # TC090. PFNW is performing processing (neutralization and liquid absorption as required) and repackaging in to a WIPP certifiable waste package. This process/repackaged TRUM waste is scheduled to be returned back to Hanford on 5/15/2012 (ref: shipment TR1203).

¹³⁵ Jerry French, Joannette Biebesheimer, Kerry Graber, State of Washington, Department of Ecology, PowerPoint, *Hazardous Waste Designation and Transportation Problems at Hanford and Permafix Northwest*, 2012, Slide 68, *supra* at Footnote 131.

¹³⁶ *Ibid.*, Slide 70.

¹³⁷ *Ibid.*, Slide 71

¹³⁸ *Ibid.*, Slide 72.

¹³⁹ *Ibid.*, Slide 74.

notified the WA State Department of Health several days after the event.¹⁴⁰ DOH health inspectors found evidence of plutonium contamination from a leaking package outside on the Perma-Fix Northwest facility grounds.¹⁴¹

Correspondence¹⁴² from Perma-Fix Northwest stated that WA State Department of Ecology inspectors filed complaints with the EPA's Criminal Investigation Division regarding this incident. The EPA apparently did not pursue any charges. Nevertheless, that Ecology inspectors would contact the EPA CID office shows the depth of the concern related to this incident.¹⁴³

During an inspection of the Hanford Central Waste Complex several days before the non-conforming wastes were shipped to Perma-Fix Northwest in March 2012, WA State Department of Ecology inspectors discovered transuranic waste and PCB liquids leaking inside an 80,000 lb. concrete box. The box was planned to be transported from Hanford to Perma-Fix Northwest by rolling road closure. Perma-Fix Northwest planned to drill a hole in the box and identify unknown contents with a camera and then characterize the waste. DOE ceased doing certification of these wastes in 2011 and allowed Perma-Fix Northwest to operate as a "waste designation and repackaging facility for Hanford buried wastes."¹⁴⁴ Perma-Fix Northwest categorically denied the illegal leaks occurred.¹⁴⁵

The documents reviewed by Hanford Challenge identify a disturbing pattern related to Perma-Fix Northwest not rejecting non-conforming wastes and subsequently having the non-conforming wastes pose undefined risks and potential human health and environmental consequences. The acceptance of non-conforming waste by Perma-Fix Northwest poses a serious health and safety risk to employees and the surrounding community that needs to be addressed.

b. Wastewater Treatment Plant Sludge Contaminated with Technetium-99 from Oak Ridge, TN.

Between 2014 and 2016, 90,000 -100,000 gallons of sludge contaminated with technetium-99 (Tc-99) were shipped to Perma-Fix Northwest for treatment from the Rarity Ridge Wastewater Treatment Plant serving the city of Oak Ridge, Tennessee (Figure 14). Perma-Fix received a contract from UCOR, the consortium responsible for the decontamination and decommissioning of the K-25 uranium gaseous diffusion plant "valued at \$597,000 with the potential value of up to \$1.2 million" to transport and treat the heavily contaminated sludge.¹⁴⁶

¹⁴⁰ Ibid., Slide 74.

¹⁴¹ [The State of Washington, Department of Ecology, Inspection Notes, April 27, 2012.](#)

¹⁴² [Letter, R. Grondin, VP and General Manager, Perma-Fix Northwest, to Hedges, J., Program Manager, Nuclear Waste Program, Washington State Department of Ecology, August 12, 2013.](#)

¹⁴³ This lack of confidence may be well-founded. Internal memos from Ecology show that Ecology management was not supporting its inspectors on this issue, despite careful documentation by the inspectors.

¹⁴⁴ Jerry French, Joannette Biebesheimer, Kerry Graber, State of Washington, Department of Ecology, PowerPoint, *Hazardous Waste Designation and Transportation Problems at Hanford and Permafix Northwest*, 2012, Slide 78. See Footnote 131, *supra*.

¹⁴⁵ Letter, R. Grondin, VP and General Manager, Perma-Fix Northwest, to Hedges, J., Program Manager, Nuclear Waste Program, Washington State Department of Ecology, August 12, 2013, *supra*, at footnote 143

¹⁴⁶ Nuclear Engineering International, Perma-Fix wins several radwaste contracts, May 15, 2014. <https://www.neimagazine.com/news/newsperma-fix-wins-several-radwaste-contracts-4268065>

“The sanitary sewer lines reportedly ran parallel to the demolition site and hooked up to a line that runs underneath the Clinch River and connects to the city’s Rarity Ridge treatment facility,” reported the Knoxville News Sentinel.¹⁴⁷ Around the time that the water treatment plant was contaminated, the East Tennessee Materials and Energy Corp., a wholly-owned subsidiary of Perma-Fix Environmental Services, Inc. was operating a low-level radioactive and mixed-waste treatment facility, which it constructed in Building K-1200 and a portion of Building K-1023 of the K-25 gaseous diffusion plant, undergoing decontamination and demolition.¹⁴⁸ The M&EC Corp. sewage discharges were sent to the Rarity Ridge Water Treatment plant.¹⁴⁹ During the course of its waste processing contract with the DOE, M&EC/ Perma-Fix received, stored, and treated over 25,000,000 pounds of low-level and mixed low-level radioactive waste¹⁵⁰ including significant quantities of Tc-99, which Perma-Fix sent for disposal at the DOE’s Nevada National Security Site.¹⁵¹

The waste-water treatment sludge from the Rarity treatment plant is used on farms in Tennessee as a plant fertilizer.¹⁵² Although no federal standards exist for radioactivity in biosolids,¹⁵³ the Rarity plant digester sludge contained very large amounts of technetium-99 with activities from 522,000 pCi/L in February to 904,000 pCi/L in April 2014.¹⁵⁴ Technetium-99 contaminated runoff from the demolition of the Oak Ridge gaseous diffusion plant (GDP) entered the sewage treatment system.¹⁵⁵ According to the Tennessee Department of Conservation, “it was discovered that the [treatment plant] sludge had elevated radionuclide concentrations nearing 90-95% of the recommended radionuclide loading. It was discovered that the percent total solids (TS) was three times greater than anticipated.”¹⁵⁶

¹⁴⁷ Frank Munger, *K-25’s hot stuff ends up at sewage plant*, Knoxville News Sentinel, April 11, 2014, <http://knoxblogs.com/atomiccity/2014/04/11/k-25s-hot-stuff-ends-sewage-plant/>

¹⁴⁸ S.L. Gawarecki, *Reuse of East Tennessee Technology Park (Former K-25 Site) on the Oak Ridge Reservation: Progress, Problems, and Prospects* – 9346, WM2009 Conference, March 1-5, 2009, Phoenix, AZ. <https://xcdsystem.com/wmsym/archives/2009/pdfs/9346.pdf>

¹⁴⁹ Ibid.

¹⁵⁰ The Energy, Technology and Environmental Business Association (ETEBA), Quarterly Newsletter, Summer 2019. https://mail.rcn.com/service/home/~/-/eteba-summer-newsletter-2019.pdf?auth=co&loc=en_US&id=1174845&part=2

¹⁵¹ Dawn Reed et al, *UNREVIEWED DISPOSAL QUESTION EVALUATION: Disposal of the Perma-Fix Environmental Services Classified Stabilized Low-Level Waste at the Area 5 Radioactive Waste Management Site*, Nevada National Security Site, Nye County, Nevada, U.S. Department of Energy, April 2019. <https://www.osti.gov/servlets/purl/1529132>

¹⁵² U.S. Department of Energy Oak Ridge Office, Finding of No Significant Impact and Environmental Assessment Proposed Changes to the Sanitary Biosolids Land Application Program on the Oak Ridge Reservation, Oak Ridge, Tennessee, DOE/EA-1779, p E-38. https://www.energy.gov/sites/prod/files/EA-1779-FEA-FONSI-2012_0.pdf

¹⁵³ U.S. Department of Energy Oak Ridge Office, Finding of No Significant Impact and Environmental Assessment Proposed Changes to the Sanitary Biosolids Land Application Program on the Oak Ridge Reservation, Oak Ridge, Tennessee, DOE/EA-1779, p. 9 https://www.energy.gov/sites/prod/files/EA-1779-FEA-FONSI-2012_0.pdf

¹⁵⁴ 2015 Remediation Effectiveness Report for the U.S. Department of Energy Oak Ridge Reservation Oak Ridge, Tennessee Data and Evaluations, DOE/OR/01-2675&D2, 8/25/15, p. *-100. <https://www.nrc.gov/docs/ML1801/ML1801A928.pdf>

¹⁵⁵ Frank Munger, *Radioactivity levels drop at Oak Ridge sewage plant*, Knoxville News Sentinel, May 30, 2016. <https://www.knoxnews.com/story/news/local/2016/05/30/radioactivity-levels-drop-at-oak-ridge-sewage-plant/90996070/>

¹⁵⁶ Tennessee Department of Environment and Conservation, Division of Water Resources, City of Oak Ridge, Public Works Department, April 24, 2018.

One of the highest risks associated with decontamination and decommissioning of the Oak Ridge GDP was removal of equipment which accumulated very large amounts of technetium-99. The build-up of Tc-99 in the facility was due to the enrichment of previously irradiated uranium containing fission product contaminants from DOE plutonium production reactors at Hanford and the Savannah River Plant in South Carolina. In 2001, DOE estimated that between 660 and 1,318 kgs of Tc-99 were sent to Oak Ridge in recycled uranium from the Hanford Site.¹⁵⁷ Approximately, 145kg of Tc-99 was estimated to be retained in the Oak Ridge GDP process equipment.¹⁵⁸

With a half-life of 211,000 years, Tc-99 is highly mobile in the environment and is considered among the most significant radionuclides in radioactive waste. By 2016, 18 trucks each containing 5,000 gallons of sludge contaminated with Tc-99 traveled 2,372 miles to the Perma-Fix Northwest facility where they were dried out and converted to an ash using its high temperature (1,800 F) refractory-lined furnaces. The radioactive ash was reported to have been sent to the Energy Solutions disposal site in Clive, Utah.¹⁵⁹ It appears that additional shipments took place after that.¹⁶⁰

Beta decay emissions from Tc-99 from the Oak Ridge city water treatment plant sludge are about 500 to 1,000 times the total beta maximum contaminant level (MCL) set by the U.S. EPA.¹⁶¹ After 90,000 gallons of sludge were removed, sludge concentrations at the water treatment plant were found to be 100 times the EPA's MCL.¹⁶²

¹⁵⁷ U.S. Department of Energy, Review of Generation and Flow of Recycled Uranium at Hanford, DOE/RL-2000-43, June 30, 2000, Section 6. P11. <https://www.osti.gov/servlets/purl/803918>

¹⁵⁸ U.S. Department of Energy, A PRELIMINARY REVIEW OF THE FLOW AND CHARACTERISTICS OF RECYCLED URANIUM THROUGHOUT THE DOE COMPLEX 1952 – 1999, March 2000, Vol 6, Part 5, Figure 5.1-5.

¹⁵⁹ Frank Munger, *K-25's hot stuff ends up at sewage plant*, Knoxville News Sentinel, April 11, 2014, <http://knoxblogs.com/atomiccity/2014/04/11/k-25s-hot-stuff-ends-sewage-plant/>

¹⁶⁰ Frank Munger, *Radioactivity levels drop at Oak Ridge sewage plant*, Knoxville News Sentinel, May 30, 2016. <https://www.knoxnews.com/story/news/local/2016/05/30/radioactivity-levels-drop-at-oak-ridge-sewage-plant/90996070/>

¹⁶¹ U.S. Environmental Protection Agency, Facts About Technetium-99, July 2002. <https://semspub.epa.gov/work/HQ/175252.pdf>

¹⁶² John Huotari, *Radionuclide levels dropping at Rarity Ridge Treatment Plant, but sludge shipments continue for now*, <https://oakridgetoday.com/2016/01/14/radionuclide-levels-dropping-at-rarity-ridge-treatment-plant-but-sludge-shipments-continue-for-now/>

FIGURE 14



*A tanker truck is pictured that's used to transport radioactive sludge from the city of Oak Ridge wastewater treatment plant to a Perma-Fix Northwest treatment facility in Richland, Wash.
(Source: UCOR/SPECIAL TO THE KNOXVILLE NEWS SENTINEL)*

Technetium 99 is considered to be a primary contaminant of concern and is widespread at Hanford.¹⁶³ An estimated 728 Ci (42.8kg) of Tc-99 was discharged as liquids to the ground and spread in high concentrations to groundwater at Hanford mainly from leaking HLW tanks in the 200-area of the site.¹⁶⁴

In terms of the transport and uptake of Tc-99 from soils to edible plants, research sponsored by the U.S. Nuclear Regulatory Commission finds that:

“soil-to-plant concentration ratios can be very high - up to factors of several hundred, depending on the plant/soil combination. Concentration ratios of this magnitude result in the near-total transfer of radionuclide from soil into food

¹⁶³ Washington Department of Ecology, *Monitoring Hanford's groundwater and protecting the Columbia River*, <https://ecology.wa.gov/Waste-Toxics/Nuclear-waste/Hanford-cleanup/Protecting-air-water/Groundwater-monitoring>

¹⁶⁴ U.S. Department of Energy, CH2M, *Hanford Soil Inventory Model (SIM-v2) Calculated Radionuclide Inventory of Direct Liquid Discharges to Soil in the Hanford Site's 200 Areas*, ECF-HANFORD-17-0079 Revision 0, May 2018, p.17.
[https://www.emcbc.doe.gov/SEB/CPCC/Documents/Document%20Library/092718/Other/Hanford%20Soil%20Inventory%20Model%20\(SIM-v2\)%20Direct%20Liquid%20Discharges%20to%20Soil%20in%20Hanford%20-%20200%20Areas%20-%20ECF-HANFORD-17-0079,%20Rev.%200.pdf](https://www.emcbc.doe.gov/SEB/CPCC/Documents/Document%20Library/092718/Other/Hanford%20Soil%20Inventory%20Model%20(SIM-v2)%20Direct%20Liquid%20Discharges%20to%20Soil%20in%20Hanford%20-%20200%20Areas%20-%20ECF-HANFORD-17-0079,%20Rev.%200.pdf)

crops in a period of only a few years for a single application, and in continuing equilibrium transfers for scenarios of continuous application.”¹⁶⁵

There are several important questions surrounding the processing of the Oak Ridge sludge at the Perma-Fix Northwest facility.

- Did the runoff of Tc-99 that contaminated the Rarity Ridge Wastewater treatment plant contaminate the waste treatment facility operated by M&EC?
- Since the waste stream from the demolition of the K-25 gaseous diffusion plant was directly tied to the municipal sewage treatment plant there is a possibility that other non-radioactive hazardous substances might have been co-mingled with the Tc-99 effluent. Were any of these wastes analyzed for substances that fall under the Washington State Dangerous Waste regulation as MLLW?
- Was there onsite and offsite radiological environmental monitoring of soil for Tc-99 processed at the Perma-Fix Northwest site? There is no indication that this happened based on the Perma-Fix Northwest environmental monitoring reports for 2013 to 2018.
- Why was at least 90,000 gallons of contaminated water treatment sludge trucked for 2,372 miles involving at least 18 shipments to Perma-Fix Northwest in Richland, WA, when Perma-Fix Environmental Services, Inc. has a facility that could process these wastes at its facility 40 miles away from Oak Ridge, TN?

VII. Perma-Fix Northwest Continues to Treat Hanford Waste Despite Accidents, Violations, Poor Location, and Patchwork Oversight

The disturbing regulatory history of Perma-Fix Northwest means potential risks for the future. There is no doubt that Perma-Fix Northwest will attempt to continue to expand the volume and concentrations of waste to be treated, primarily from Hanford, but from other sources as well.

a. Increasing Amount of Plutonium Processed by Perma-Fix Northwest¹⁶⁶

¹⁶⁵ B.A. Napier, R.J. Fellows, K.M. Krupka, *Soil-to-Plant Concentration Ratios for Assessing Food-Chain Pathways in Biosphere Models*, NUREG/CR-6941 PNNL-16741, U.S. Nuclear Regulatory Commission Office of Nuclear Regulatory Research, August 2007, p. 4-4. <https://www.nrc.gov/docs/ML0727/ML072780220.pdf>

¹⁶⁶ U.S. Department of Energy, Argonne National Laboratory, Radiological and Chemical Fact Sheets to Support Health Risk Analyses for Contaminated Areas. March 2007. https://www.remm.nlm.gov/ANL_ContaminantFactSheets_All_070418.pdf

Hanford Challenge is concerned with the increasing amount of plutonium being processed by Perma-Fix Northwest. The handling of plutonium-239 (half-life of 24,000 years) and other transuranic elements at Perma-Fix Northwest is of high concern. Transuranic elements of concern include isotopes of plutonium, americium, curium, and neptunium. With a specific activity about 200,000 times greater than uranium-238 (half-life=4.4 billion years), plutonium-239 emits alpha particles as its principal form of radiation. Over time, americium-241 (half-life=432.2 years), a decay product of plutonium-241, builds up and increases the hazardous external penetrating gamma-ray radiation from TRU waste.

Alpha particle emissions from plutonium and other transuranic elements are considered to be about 20 times more carcinogenic than x-rays.¹⁶⁷ As they lodge in the respiratory system, especially the deep lung, plutonium emits energetic ionizing radiation (5 MeV) that can damage cells of sensitive internal tissues. Alpha particles lose energy quickly within living tissue and create a dense trail of broken molecules. Particles less than a few microns in diameter can penetrate deep in the lungs and lymph nodes, and also can be deposited from the bloodstream in the liver, bone surface, and other organs. High doses from inhalation of transuranic waste (TRU) can cause lung damage, fibrosis, and even death. Tens of micrograms if inhaled can lead to cancer.¹⁶⁸ Over the past several years, a significantly raised incidence of cancer has been reported among workers following exposure to plutonium.¹⁶⁹

According to the DOE Handbook of Airborne Release Fractions and Respirable for Non-Reactor Facilities (Table 7-1), if about 1 to 5 percent (11.3 grams to 56.3 grams) of the plutonium processed in 2019¹⁷⁰ at Perma-Fix Northwest escaped into the air all at once, it could result in unmitigated doses to the public at the site boundary of 25 rems and 100 rems respectively.¹⁷¹ These doses are 1,000 to 4,000 times greater than permitted annually at DOE waste disposal sites.¹⁷²

¹⁶⁷ Recommendations of the International Commission on Radiological Protection. (1990) ICRP Publication 60. Ann. ICRP 21 (1-3). <http://icrp.org/publication.asp?id=icrp%20publication%2060>

¹⁶⁸ National Research Council, *Management and Disposition of Excess Plutonium* (Washington, D.C: National Academy Press, 1995), 333, available at <https://www.nap.edu/read/2345/chapter/1>

¹⁶⁹ Department of Health and Human Services, Agency for Toxic Substances and Disease Registry, U.S. "Toxicological Profile for Plutonium," November 2010, available at <https://www.atsdr.cdc.gov/ToxProfiles/tp.asp?id=648&tid=119>

¹⁷⁰ [Perma-Fix Northwest, Richland, Annual Monitoring Report for 2019, Table 2.1.](#) (Sample Calculation: 71 curies/specific activity for Pu-239 (0.063 Ci/g) = 1,126.98 grams).

¹⁷¹ U.S. Department of Energy, Airborne Release Fractions and Respirable Fractions for Nonreactor Facilities, Volume I - DOE-HDBK-3010-94 December 1994 Reaffirmed 2013. Table 7-1. "The dose measures used in the calculation are as presented in Table 7-1 below. At 2 km, the values of \dot{Q}_y and \dot{Q}_z are ~ 63 and 19 respectively for limiting F at 1 m/sec windspeed 3 conditions, and a conservative breathing rate is 3.3E-4 m/sec. Using these values indicates, for example, that a source term of 0.9 Ci of Pu-239, or ~ 14.5 g, produces a dose of 25 rem to a maximally exposed person at the site boundary (i.e., individual there for duration of plume passage with no protection). Use of one of the Gaussian plume model computer codes currently in use in the DOE complex provided an estimate of 1 Ci release to obtain a dose of 25 rem, thus confirming the general appropriateness of the hand calculation. This code also indicated that if particulate deposition was accounted for, using a typical velocity of 1 m/sec, the release needed to achieve a 25 rem dose at the site boundary increased by a factor of 5."

https://www.standards.doe.gov/standards-documents/3000/3010-bhdbk-1994-v1/@_@images/file

¹⁷² U.S. Department of Energy, Office of Environmental Management, Performance Objectives and Public Dose Limits for Radioactive Waste Disposal Facilities, June 2019.

<https://www.energy.gov/sites/prod/files/2019/06/f63/Performance-Objectives-and-Public-Dose-Limits-for-Radioactive-Waste-Disposal-Facilities-June-2019.pdf>

The facility operates under two types of limits on the amounts of plutonium and other radionuclides it is allowed to possess. The first limit is the maximum quantity a licensee may possess at any one time.¹⁷³ This limit is set to prevent initiation of a nuclear chain reaction by limiting the amount of fissile material being handled in one place in a given time.¹⁷⁴ Three to five kilograms of plutonium-239 are more than enough to fuel sizable nuclear weapons.¹⁷⁵

The second limit is an Annual Possession Quantity (APQ) set to determine compliance with Federal Clean Air Act standards to protect members of the public. The APQ is set so that 'no member of the public would receive an effective dose equivalent over 0.1 mSv (10 mrem) in a yr.'¹⁷⁶ The EPA has set a recommended Annual Possession Quantity for Plutonium-239 of 2.5 Ci (39 grams).¹⁷⁷

However, in July 2011, the Washington State Department of Health approved a request by Perma-Fix Northwest to allow the Annual Possession Quantity for plutonium-239 for its non-thermal radioactive waste processing to 50 Ci (793 grams).¹⁷⁸ The Washington State Department of Health also set the same for limits on transuranic elements such as Am-241. These levels for the Annual Possession Quantities (APQ) for TRU in 2011, were granted days before DOE started to send 835 cubic meters of wastes containing larger quantities of plutonium-bearing waste to the Perma-Fix Northwest facility. This hasty decision was made in order to prevent the return of \$350 million in unexpended funds by the end of the fiscal year from the American Recovery and Reinvestment Act (ARRA). Thus, a large amount of unscheduled wastes containing levels of plutonium in violation of DOE's contract with Perma-Fix Northwest, which specified processing wastes below a fixed level of special nuclear material, were shipped between early July 2011 and the end of September 2011 to the Perma-Fix Northwest facility. This situation is described in some detail by Perma-Fix Northwest officials in 2012.

"...two events occurred at nearly the same time that pressured the system and required change. First, the Plutonium Finishing Plant (PFP) ARRA goals came into jeopardy due to the time required to size reduce and package removed glove boxes on site. Insufficient personnel or time were available and increased output was required without loss of schedule or increased cost. These glove boxes were

¹⁷³ Washington State Department of Health, Radioactive Materials License, License Number WN-IO393-1, Perma-Fix Northwest Richland, Inc., https://www.doh.wa.gov/Portals/1/Documents/4100/I-0393-1_Amd46_2020.pdf

¹⁷⁴ U.S. Nuclear Regulatory Commission, 10 CFR 150.11 Critical Mass, <https://www.nrc.gov/reading-rm/doc-collections/cfr/part150/part150-0011.html>

¹⁷⁵ Institute for Energy and Environmental Research, Physical, Nuclear, and Chemical Properties of Plutonium, <https://ieer.org/resource/factsheets/plutonium-factsheet/>

¹⁷⁶ U.S. Nuclear Regulatory Commission, NRC INFORMATION NOTICE 97-04: IMPLEMENTATION OF A NEW CONSTRAINT ON RADIOACTIVE AIR EFFLUENTS, February 24, 1997 <https://www.nrc.gov/reading-rm/doc-collections/gen-comm/info-notices/1997/in97004.html>

¹⁷⁷ U.S. Environmental Protection Agency, A GUIDE FOR DETERMINING COMPLIANCE WITH THE CLEAN AIR ACT STANDARDS FOR RADIONUCLIDE EMISSIONS FROM NRC-LICENSED AND NON-DOE FEDERAL FACILITIES, (Revision 2), EPA 520/1-89-002, Table 3-1. September 2015. <https://www.epa.gov/sites/production/files/2015-05/documents/520-1-89-002.pdf>

¹⁷⁸ Washington State Department of Health, Radioactive Air Emissions License (RAEL) for Perma-Fix Northwest Richland, Inc. (License Number RAEL-012), Emission Unit ID: 1325, July 7, 2011. See p.38/46 of the linked .pdf (Sample Calculation: 50 curies/0.063 Ci/g=793.65grams of Pu-239).

higher quantity SNM with some nearly as high as 30 grams. PFNW became the obvious choice to fill the gap and provide an alternative outlet for the scope. Second, the decommissioning work in the Hanford 300 areas also generated a series of glove boxes from the old laboratory facilities that were also high in SNM quantity.”¹⁷⁹

The amount of plutonium-contaminated wastes “exceeded both the contractual limits as well as the facility RML [Radioactive Material License] limits for SNM [Special Nuclear Material] during the first months of project execution which necessitated that PFNW negotiate with the State for exemptions to their RML [Radioactive Material License].”¹⁸⁰ Furthermore, “this included an additional 475 m3 [cubic meters] of large package suspect TRU and RH [Remote Handled] MLLW, nearly 300 m3 of additional point of generation wastes from the Waste Retrieval Project, 10 high gram glove boxes from the 300 area laboratories, and 20 glove boxes from the PFP decommissioning project.”¹⁸¹

In the rush to process this waste, between July 27, 2011 and September 19, 2011, according to data collected by Perma-Fix Northwest, about 5,000 grams of special nuclear material, mostly plutonium-239, was shipped to the site.¹⁸² This is more than 6 times the Annual Possession Quantity granted by the Washington State Department of Health on July 7, 2011 and about 126 times the Annual Possession Quantity (2.5 Ci = 39 grams) recommended by the EPA.¹⁸³

The 2018 Mixed Waste Thermal Treatment and GeoMelt System radioactive air emissions license granted by the Washington State Department of Health (DOH) currently increases Perma-Fix Northwest’s Annual Possession Quantity limit for plutonium-239 to 38.8 Ci (615 grams).¹⁸⁴

Between 2013 and 2019, Perma-Fix Northwest processed at least 6,300 grams of plutonium-239.¹⁸⁵ (Figure 15) In 2011, Perma-Fix Northwest processed at least 5,000 grams, bringing the total amount of plutonium shipped to Perma-Fix Northwest between 2011 and 2019 to over 11,000 grams, or enough for several modern nuclear weapons. If one gram of waste contains as little as 1.5 micrograms of plutonium, DOE is required under federal standards¹⁸⁶ to safely store this type of waste to geologically isolate it from the environment for at least 10,000 years.¹⁸⁷

¹⁷⁹ Don J Moak, Glen C. Triner, Lori D. West, and Richard L. Grondin, Managing Waste Inventory and License Limits at the Perma-Fix Northwest Facility to Meet CH2M HILL Plateau Remediation Company (CHPRC) American Recovery and Reinvestment Act (ARRA) Deliverables – 12335, WM2012 Conference, February 26-March 1, 2012, Phoenix, AZ. <https://xcdsystem.com/wmsym/archives/2012/papers/12335.pdf>

¹⁸⁰ Ibid.

¹⁸¹ Ibid.

¹⁸² Ibid. p.5

¹⁸³ Op Cit Ref 10.

¹⁸⁴ [Washington State Department of Health NOC 1335 for EU 1531: Mixed Waste Thermal Treatment and GeoMeltSystem, September 12, 2018](#). (calculation uses specific activity for Pu-239 of 0.063)

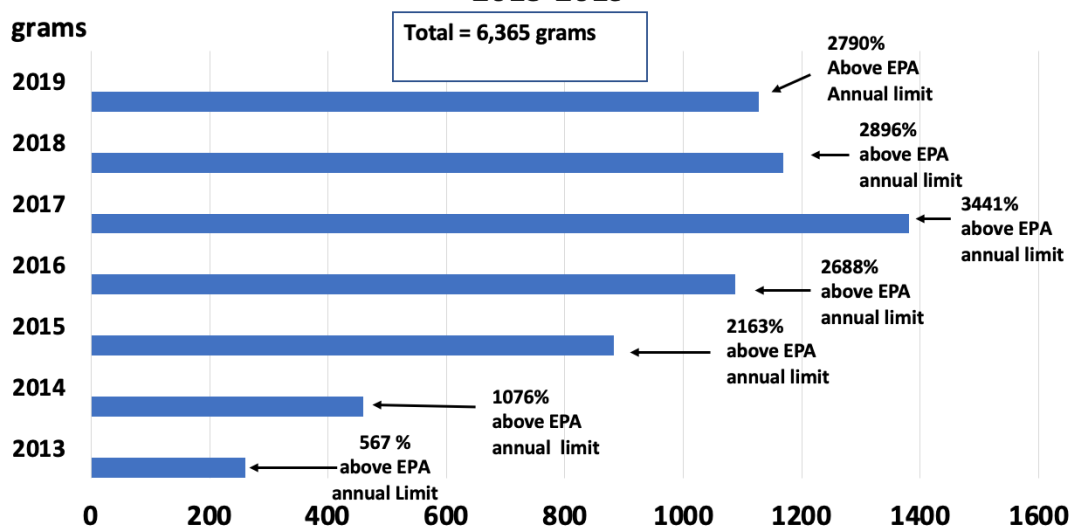
¹⁸⁵ [Perma-Fix Northwest, Richland, Annual Monitoring Reports for 2013-2019, see Table 2.1 in each report](#).

¹⁸⁶ U.S. Environmental Protection Agency, 40 CFR Part 191 Environmental Radiation Protection: ‘Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes; Final Rule, December 20, 1993. <https://www.epa.gov/sites/production/files/2015-08/documents/191.pdf>

¹⁸⁷ U.S. Environmental Protection Agency, Criteria for the Certification and Recertification of the Waste Isolation Pilot Plant’s Compliance with the 40 CFR Part 191 Disposal Regulations (40 CFR Part 194).

Another way to think about this waste volume is that over the course of six years, Perma-Fix Northwest processed more plutonium than the combined total of 33 out of 52 Hanford contact handled plutonium waste streams scheduled for geological disposal at DOE's Waste Isolation Pilot Project (WIPP) in New Mexico.¹⁸⁸ It's more than 60 percent of the contact handled plutonium waste bound for disposal at WIPP from the Oak Ridge National Laboratory.¹⁸⁹ Pu-239 is responsible for largest percentage of plutonium by weight and by activity scheduled for geological disposal at WIPP.¹⁹⁰

FIGURE 15
Plutonium-239 Processed at Perma-Fix Northwest
2013-2019



Sources: Perma-Fix Annual Environmental Monitoring Reports – 2013-2019

U.S. EPA 2015, <https://www.epa.gov/sites/production/files/2015-05/documents/520-1-89-002.pdf>

(Sources: U.S. EPA 520/1-89-002, Table 3-1. September 2015, Perma-Fix Northwest Annual Environmental Reports 2013-19, see Table 2-1 in each report.)

In October 2018, Perma-Fix Northwest informed the Washington State Department of Ecology, that “in the near future, Perma-Fix Northwest will be treating up to 1000 cubic meters of higher activity TRU waste with each package containing greater than 200 grams of Plutonium per package and installing the ability to remotely handle these wastes.”¹⁹¹ This represents a significant increase in the level of potential hazard to workers and the public. If this increased

<https://www.epa.gov/radiation/criteria-certification-and-recertification-waste-isolation-pilot-plants-compliance-40-cfr>

¹⁸⁸ U.S. Department of Energy, Annual Transuranic Waste Inventory Report-2019, DOE/TRU-19-3425, Rev. O, December 19, 2019, Appendix A. https://wipp.energy.gov/library/TRUwaste/DOE-TRU-19-3425_R0_FINAL.pdf

¹⁸⁹ Ibid.

¹⁹⁰ J.A. Schramke, E.F.U. Santillan, and R.T. Peake, Plutonium Oxidation States in the Waste Isolation Pilot Plant Repository, Appl Geochem. 2020 May; 116: 10.1016/j.apgeochem.2020.104561.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7266098/>

¹⁹¹ Letter from John B. Price SEPA Responsible Official, Washington Department of Ecology, to Richard Grondin, Vice President and General Manager Perma-Fix Northwest Richland, Incorporated, November 2018.

level of plutonium and associated radioactivity were to be processed on a DOE site, the facility is required to operate as a “Hazard Category 2 nuclear facility”¹⁹² with a “potential for significant onsite consequences,”¹⁹³ which include “the most significant nonreactor nuclear facilities within the DOE complex.”

The leeway given to Perma-Fix Northwest’s Radioactive Materials License by the Washington State Department of Health is disturbing. If other commercially regulated facilities holding NRC licenses in the United States wanted to exceed their maximum quantity of radioactive material, especially for significant increases for plutonium or alter the chemical and physical form, they would have to file a license amendment. To amend its license, Perma-Fix Northwest should be required to amend the documents referred to in the license.

b. Grouting Liquids from Hanford Radioactive Waste Tanks and the Test Bed Initiative

Perma-Fix Northwest is at the center of the Department of Energy’s “Test Bed Initiative,” a proposal launched in 2016 to explore the feasibility of treating liquids from Hanford’s underground high-level waste (HLW) tanks by mixing the liquid tank waste with grout for offsite disposal. After initial in-tank pretreatment (cesium-ion exchange and filtration) the liquids would be classified by DOE as low activity wastes (LAW) which the U.S. Nuclear Regulatory Commission (NRC) says may be highly radioactive and contain long-lived radionuclides. According to the NRC, this waste (LAW feed), which constitutes about 80% of the total volume in Hanford’s HLW tanks:

“has high radiation levels requiring handling within shielded structures. Three envelopes of LAW have been defined: Envelope A is standard, Envelope B contains higher levels of cesium, and Envelope C contains higher levels of strontium and TRU LAW would come from the liquid phases of the DSTs and from solids washing operations.... LAW is still HLW and DOE identifies the solid phases as HLW, defined as Envelope D Envelope D contains cesium, strontium, and TRUs as the radionuclides. Metal oxides, hydroxides, nitrates, phosphates, and aluminates constitute the bulk of the chemical species.”¹⁹⁴

The Test Bed Initiative is DOE’s plan to pretreat low-activity waste (LAW) liquid wastes, known as supernate, from its double-shell waste tanks, send the pre-treated liquid waste to Perma-Fix Northwest to be mixed with cement (grout) and dispose the grouted waste offsite at a commercial low-level radioactive disposal site. In 2017, Phase 1 of this initiative was

¹⁹² U.S. DEPARTMENT OF ENERGY, OAK RIDGE OFFICE, CONTRACT DE-EM0003760, TRANSURANIC WASTE PROCESSING CENTER (TWPC) CONTRACT, CONFORMED COPY (MODIFICATION 0028) JULY 21, 2017. P 32. <https://www.energy.gov/sites/prod/files/2017/07/f35/DE-EM0003760%20Conformed%20Contract%20%280028%29.pdf>

¹⁹³ U.S. Department of Energy, DOE Standard, DOE-STD-1027-92, Change Notice No. 1, September 1997, P. 17. <https://www.nrc.gov/docs/ML1028/ML102850107.pdf>

¹⁹⁴ U.S. Nuclear Regulatory Commission, *Overview and Summary of NRC Involvement with DOE in the Tank Waste Remediation System-Privatization (TWRS-P) Program* June 29, 2001 NUREG 1747, p. 1. Table 2, pp. 1–3, <https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1747/>

demonstrated.¹⁹⁵ It involved a composite of approximately 3 gallons of wastes from six of Hanford's high-level waste tanks. The waste was pretreated, mixed with grout at the Perma-Fix Northwest facility and then shipped to the Waste Control Specialists (WCS) disposal site in Andrews, Texas. WCS has less restrictive waste acceptance criteria as compared to what is expected for onsite landfill disposal at other sites.¹⁹⁶ Neither Waste Control Specialists, nor Hanford has analyzed whether grouted waste from pretreated high-level waste tanks meets the Waste Acceptance Criteria for disposal at Waste Control Specialists.

Phase 2 of the Test Bed Initiative is planned to use in-tank filters and ion-exchange to remove cesium-137 from about 2,000 gallons of tank waste from Tank SY-101. The pretreated tank liquids are supposed to be transported in 6 special containers called "totes" to the Perma-Fix Northwest facility where it is to be mixed with cement into approximately 65 drums to be shipped to the Waste Control and Storage Services (WCS) commercial disposal site in Texas.¹⁹⁷

Phase 3 would expand to production scale to grout 300,000 to 500,000 gallons of soluble radioactive tank wastes over an 18-month period.¹⁹⁸ At DOE's proposed production scale, the Perma-Fix Northwest facility would generate as many as 16,364 55-gallon drums at a rate of about one drum filled every 45 minutes. In 2018, Perma-Fix Northwest proposed a similar plan.

According to DOE-sponsored research, grouting would multiply the volume of Hanford's soluble tank wastes by 1.8 times.¹⁹⁹

A review done in 2018 by federal and contractor experts at Hanford, questioned "whether Perma-Fix has the physical capacity and personnel required to handle the volume of waste which will be generated."²⁰⁰ It would "require a 55 gallon drum to be produced roughly every 45 minutes."²⁰¹ After the drums are filled nearly 1,000 would have to remain in lag storage each month at the site for about 30 days, so that the grout can be cured to ensure its compressive

¹⁹⁵ U.S. Department of Energy, Hanford site, Test Bed Initiative,, July 2018.

<https://www.energy.gov/sites/prod/files/2018/07/f53/Hanford%20Test%20Bed%20Initiative%20Fact%20Sheet%207-12-18.pdf>

¹⁹⁶ U.S. Department of Energy, Savannah River National Laboratory, *Report of Analysis of Approaches to Supplemental Treatment of Low-Activity Waste at the Hanford Nuclear Reservation*, SRNL-RP-2018-00687 October 10, 2019.p. 45.

<https://www.nationalacademies.org/documents/embed/link/LF2255DA3DD1C41C0A42D3BEF0989ACAECE3053A6A9B/file/D5103F716F7BE9B50A8749F6FAD7382E42825D4BFC3E>

¹⁹⁷ U.S. Department of Energy, Office of River Protection, *Hanford Tank Waste Strategy, Test Bed Initiative-Phase II, For the Hanford Advisory Board, Tank Waste Committee, January 9, 2019.*

¹⁹⁸ U.S. Department of Energy, *Hanford Test Bed Initiative presentation*, Hanford Advisory Board, August 2018. <https://www.energy.gov/sites/prod/files/2018/07/f53/Hanford%20Test%20Bed%20Initiative%20Fact%20Sheet%207-12-18.pdf>

¹⁹⁹ U.S. Department of Energy, Savannah River National Laboratory, *Report of Analysis of Approaches to Supplemental Treatment of Low-Activity Waste at the Hanford Nuclear Reservation*, SRNL-RP-2018-00687 October 10, 2019.p. 45. <https://www.nationalacademies.org/documents/embed/link/LF2255DA3DD1C41C0A42D3BEF0989ACAECE3053A6A9B/file/D5103F716F7BE9B50A8749F6FAD7382E42825D4BFC3E>

²⁰⁰ U.S. Department of Energy, Richland Operations Office, OA Database entry 37276, *Chief Engineer/TPD/TOD/MIO/ECD review of DFLAW Readiness, Downstream Treatment & Disposal (LERF, ETF, Off-Site Treatment of MLLW, SALDS, TEDF, IDF) April 19, 2018 p. 8.*

²⁰¹ Ibid.

strength before transport.²⁰² The transportation logistics for a waste volume this large have not been worked out. It's quite possible that the large waste volumes of about 1,000 drums per month, could create a transportation bottleneck resulting in a large backlog of stored grouted waste drums sitting at the Perma-Fix Northwest site.

Tank SY-101 is estimated to contain 892,000 gallons of supernate liquids and 223,000 gallons of salt cake.²⁰³ As of 2013 it was estimated to contain about 705,000 curies of radioactivity, of which about 75% is from Cs-137.²⁰⁴ The salt cake in this tank contains retained hydrogen gas, which poses a hazard if released as a result of the addition of water to dissolve the salt.²⁰⁵

In 2007, a report by Pacific Northwest National Laboratory (PNNL) describes the history of this tank as follows:

“From 1990 through 1993, SY-101's flammable gas troubles were acknowledged as the highest priority safety issue in the entire DOE complex. Uncontrolled crust growth demanded another high-priority remedial effort from 1998 through April 2000. The direct cost of the bubbles, toils, and troubles was high. Overall, the price of dealing with the real and imagined hazards in SY-101 may have reached \$250 million. The indirect cost was also high.”²⁰⁶

Removing radioactive cesium elements is not enough to guarantee the integrity of the grout. There are also several chemicals in the SY-101 tank liquids that can cause deterioration of the cement used in grout. According to the Portland Cement Association, “chlorides and nitrates of ammonium, magnesium, aluminum, and iron all cause concrete deterioration, with those of ammonium producing the most damage.”²⁰⁷ All of these elements are present in Hanford's tank waste²⁰⁸ and it raises an important question as to whether Perma-Fix Northwest will have to control them to ensure the integrity of its grout.

Tank SY-101 has one of the largest Total Organic Carbon (TOC) loads of Hanford's HLW tanks. Nearly 150 volatile organic compounds have been measured in retained gas emanating from the

²⁰² W.L. Elbert and J.L. Jerden Jr., *Test Plan for Formulation and Evaluation of Grouted Waste Forms with SHINE Process Wastes*, U.S. Department of Energy, Argonne National Laboratory, ANL/NE-15/29, September 2015, p. 37. <https://publications.anl.gov/anlpubs/2017/02/133742.pdf>

²⁰³ A.M. Templeton, Waste Tank Summary Report for Month Ending November 30, 2018, p. 20. <https://www.emcbc.doe.gov/SEB/TCC/Documents/Site%20Tours/Waste%20Tank%20Summary%20Report%2011-18.pdf>

²⁰⁴ Tank Waste Inventory Network System, Best Basis Estimate 2013. <https://phoenix.pnnl.gov/phoenix/apps/tanks/index.html>

²⁰⁵ J. S. Rodriguez, J. W. Kelly, D. C. Larsen, *Integrated Waste Feed Delivery Plan Volume 3 – Project Plan* Washington River Protection Solutions, LLC, March 26, 2012. Table D-1. <https://www.hanford.gov/files.cfm/RPP-40149-VOL3 - Rev 02.pdf>

²⁰⁶ Charles W. Stewart, *Hanford's Battle with Nuclear Waste Tank SY-101: Bubbles, Toils, and Troubles*, PNNL-SA-43778, June 2006, <https://www.osti.gov/biblio/892228-hanford-battle-nuclear-waste-tank-sy-bubbles-toils-troubles>

²⁰⁷ Portland Cement Association, *Types and Causes of Concrete Deterioration*, 2002. https://www.cement.org/docs/default-source/fc_concrete_technology/durability/is536-types-and-causes-of-concrete-deterioration.pdf?sfvrsn=4

²⁰⁸ Robert Alvarez, *Reducing the Risks of High-Level Radioactive Wastes at Hanford*, Science and Global Security, 13:43–86, 2005, Table 1, <http://scienceandglobalsecurity.org/archive/sgs13alvarez.pdf>

slurry in this tank.²⁰⁹ At 46,900 kg,²¹⁰ this quantity of organic compounds poses a significant challenge without potentially complex pretreatment prior to grouting in order to comply with RCRA land disposal restrictions.²¹¹

A separate DOE proposal exists to send secondary waste from melter off-gas devices and other waste decontamination technologies from the Waste Treatment vitrification plant to Perma-Fix Northwest for treatment as part of the Direct Feed Low-Activity Waste Program. This waste consists of concentrated brine generated through the Effluent Treatment Facility. This is part of the upcoming campaign to begin vitrifying some tank waste in the Low Activity Waste (LAW) facility of the Waste Treatment Plant.

The Effluent Treatment Facility will accept low-activity liquids and reduce their volume through evaporation, with the left-over waste being called “secondary” waste. This waste contains ammonia as well as radioactive isotopes. The generation of ammonia from grouting large volumes of radioactive wastes at the Perma-Fix Northwest facility creates major safety, public and worker health concerns. High concentrations of ammonia pose a fire and explosion hazard, especially in confined spaces. It can decompose at high temperatures forming flammable hydrogen gas. It is also very toxic causing severe skin burns and eye damage. Ammonia can be fatal if inhaled causing permanent damage to the respiratory organs.²¹² Between May 1995 and June 1997 three out of every four of the 87 tanks releasing vapors exceeded the worker exposure limit for ammonia, by as much as 42 times.²¹³

Also related to the brine waste, “During stabilization of such waste by grouting the pH would rise considerably, leading to the evolution of ammonia gas. Such an ammonia release would require engineering controls to assure worker and environmental safety,” a 2018 DOE-sponsored study concluded. “In addition, flammability issues would have to be addressed and appropriately mitigated. These concerns will need to be addressed in the near term...” because wastes planned for grouting “will result in a significant increase in the volume of high-ammonium waste streams.”²¹⁴

²⁰⁹ L.M. Stock, *Occurrence and Chemistry of Organic Compounds in Hanford Site Waste Tanks*, RPP-21854, Rev. 0, 07/27/2004, Table 3-10. <https://hanfordvapors.com/wp-content/uploads/2016/09/Occurrence-and-Chemistry-of-Organic-Compounds-in-Hanford-Site-Waste-Tanks-RPP-21854-Rev.-0-07-29-2004.pdf>

²¹⁰ Tank Waste Inventory Network System Best Basis Estimate 2013. <https://phoenix.pnnl.gov/phoenix/apps/tanks/index.html>

²¹¹ U.S. Department of Energy, Savannah River National Laboratory, *Report of Analysis of Approaches to Supplemental Treatment of Low-Activity Waste at the Hanford Nuclear Reservation*, SRNL-RP-2018-00687 October 10, 2019, Table 2, p. 28. <https://www.nationalacademies.org/documents/embed/link/LF2255DA3DD1C41C0A42D3BEF0989ACAECE3053A6A9B/file/D5103F716F7BE9B50A8749F6FAD7382E42825D4BFC3E>

²¹² National Institutes of Occupational Safety and Health, Ammonia, May 2018. <https://www.cdc.gov/niosh/topics/ammonia/default.html>

²¹³ Robert Alvarez, *Chronology Regarding Hanford high-level radioactive waste Tank Vapor exposures, December 2015, Prepared for Hanford Challenge*, p.1.

²¹⁴ Reid, Doug. Mon . "Ammonia Remediation in Hanford WTP Liquid Secondary Waste". United States. doi:10.2172/1492308. <https://www.osti.gov/servlets/purl/1492308>.

In 2004, PNNL reported that “Ammonia is very soluble; more than 97% of it is stored in the liquid phase in the tanks.”²¹⁵ Ammonia is corrosive and can eat away process equipment such as off-gas systems. In 2010, DOE reported to the Hanford Advisory Board “the highest concentrations of ammonia were found in the SY-101 feed.”²¹⁶

In August 2018, the Washington State Department of Ecology raised substantive concerns about the ambitious nature of the proposed plan to send the concentrated brine from ETF to Perma-Fix Northwest stating: “This request goes well beyond the existing permitted capabilities of Perma-Fix’s facility, and well beyond the application materials submitted for re-issue of your permit. Additionally, the latest revision of your application has a large number of deficiencies identified by Ecology over 3 years ago, which have yet to be adequately addressed by Perma-Fix.”²¹⁷

In 2018, a Hanford contractor identified several concerns about the concentrations of radioactive and hazardous materials planned to be processed at the Perma-Fix Northwest facility. They found that:

“There is a lot of ammonia in the ETF [effluent treatment facility] feed. Throughout the ETF process, pH is adjusted to 5.0 to keep the ammonia as ammonium and keep it from evolving. Permafix would have to neutralize the brine solution to make grout, which would evolve the ammonia [into a gas]. Permafix has not raised concerns, but there is concern that Permafix may be underestimating the amount of ammonia that will evolve...There are potential vapors issues associated with the predicted ammonia concentration of EMF waste. The ammonia stays in ammonium form throughout the ETF [effluent treatment facility] process due to waste being kept acidic throughout processing, but at Permafix it will evolve [into a gas].”²¹⁸

As seen in the following table provided to potential contract bidders the concentration of ammonia and ammonium expected to be processed at Perma-Fix Northwest is 9.11 milligrams per liter and 54,900 mg. L respectively.²¹⁹ This extrapolates to .0028 metric tons of NH₃ and 17 mt of NH₄ contained in the annual amount of 82,000 gallons of ETF brine waste proposed by Perma-Fix Northwest for processing proposed by DOE. The U.S. Occupational Safety and Health Administration limits airborne exposure for no more than 8 hours in the workplace to 50

²¹⁵ J. L. Huckaby et al, *Overview of Hanford Site High-Level Waste Tank Gas and Vapor Dynamics*, PNNL-14831, August 2004, P 3.4. https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-14831.pdf

²¹⁶ V.L. Wagner et al, *242-A Evaporator: 2010 Facility Operation, Ammonia and Upgrades*, November 18, 2010. https://www.hanford.gov/files.cfm/CAL_242-A_Evaporator_HAB_Presentation_11-16-10.pdf

²¹⁷ [State of Washington, Department of Ecology, Letter to Mr. Richard Grondin, Vice President, PermaFix Northwest, August 29, 2018.](#)

²¹⁸ U.S. Department of Energy, *DFLAW Readiness, Downstream Treatment & Disposal, Final Version*, September 2018, *supra*, at footnote 199.

²¹⁹ Washington River Protection Solutions, *Expression of Interest (EOI) for Providing Transportation, Treatment, and Possibly Disposal of Secondary Liquid or Powder Waste from the Effluent Treatment Facility (ETF) on the Hanford Site*, 2DB00-CJF-19-00, January 15, 2019, Table A-3. https://www.hanford.gov/tocpmm/files.cfm/EOI-Off-site_Treatment_Expression_of_Interest_2019-01-15.pdf

parts per million. A life-time limit should be no more than 25 parts per million during the work-day.²²⁰

Also, the level of radionuclides in wastes planned to be sent to the Perma-Fix Northwest facility is of concern and far exceeds what Perma-Fix Northwest has handled in the past. For instance DOE contractors estimate that these wastes will contain 18,600 pCi/l of Tc-99 (half-life = 211,000 years) and 5,240 pCi/l of Iodine-129 (half-life = 15.7 million years).²²¹ The estimated concentrations for these radionuclides in the ETF brine waste are 20 times and 5,240 times greater than the maximum contaminant levels (MCLs) respectively set by the EPA for drinking water.²²² (Figure 16)

With a half-life of 211,000 years, technetium-99 is predominantly found in the liquid supernatant and salt cake of Hanford's High-Level Radioactive waste tanks.²²³ Its high mobility in the environment makes it one of the most hazardous radionuclides over the long-term. It is proving to be difficult to remove Tc-99 from the wastes for geological disposal. Previous attempts to remove Tc-99 from the Hanford tank wastes were particularly less successful for the tank wastes in tank SY-101²²⁴, the feeder tank for tank liquids planned for processing at the Perma-Fix Northwest facility.

However, these and other issues appear to be unresolved, prompting a panel of the National Academies of Science to recently note that "the future of the second phase of the [Test Bed] Initiative [involving some 2,000 gallons] is now in doubt due to DOE's withdrawal in late May 2019 of the state permit application."²²⁵ In FY years 2018 and 2019, at least \$10,087,293 was allocated for Phase II of the Test Bed Initiative which never happened, at a cost of \$5,042 per gallon of waste.²²⁶

It is clear from Perma-Fix Northwest's history of non-compliance that a myriad of issues need to be resolved, including updating permits, before Perma-Fix Northwest should be allowed to process pre-treated liquids from Hanford's tank SY-101 (Test Bed Initiative) or brine from the Effluent Treatment Facility. Ensuring human and environmental protection in the handling of

²²⁰ U.S. Occupational Safety and Health Administration, How much ammonia is too much?, <https://www.osha.gov/sites/default/files/2019-03/fs4-howmuch2.pdf>

²²¹ Washington River Protection Solutions, *Expression of Interest (EOI) for Providing Transportation, Treatment, and Possibly Disposal of Secondary Liquid or Powder Waste from the Effluent Treatment Facility (ETF) on the Hanford Site*, 2DB00-CJF-19-00, January 15, 2019, Table A-3. https://www.hanford.gov/tocpmm/files.cfm/EOI-Off-site_Treatment_Expression_of_Interest_2019-01-15.pdf

²²² U.S. Environmental Protection Agency, *Radionuclides in Drinking Water: A Small Entity Compliance Guide*, February 2002. <https://www.epa.gov/sites/production/files/2015-06/documents/compliance-radionuclidesindw.pdf>

²²³ Tank Waste Information Network System, Best Basis Estimate, 2013

²²⁴ TG Levitskaia et al, *Spectroscopic Properties of Tc(I) Tricarbonyl Species Relevant to the Hanford Tank Waste*, PNNL-25000, December 2015, p1. https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-25000.pdf

²²⁵ Committee on Supplemental Treatment of Low-Activity Waste at the Hanford Nuclear Reservation. Nuclear and Radiation Studies Board, Division on Earth and Life Studies, *Final Review of the Study on Supplemental Treatment Approaches of Low-Activity Waste at the Hanford Nuclear Reservation: Review #4* (2020), National Academy of Sciences. April 2020, p.8. <https://www.nap.edu/catalog/25710/final-review-of-the-study-on-supplemental-treatment-approaches-of-low-activity-waste-at-the-hanford-nuclear-reservation>

²²⁶ U.S. Department of Energy, Contract Modifications for the Test Bed Initiative, 0536, 0531, 0528. <https://www.hanford.gov/page.cfm/DOE-ORPPPrimeContracts/WRPSContractMods>

this waste needs to be at the forefront of plans, especially given the location of Perma-Fix Northwest in a growing residential community that is vulnerable in case of accidental releases from this facility. As we have concluded in our report, this waste is better suited for treatment on the Hanford Site.

FIGURE 16

Properties							
pH Measurement (unitless) – 5.5							
Density – 1.14 kg/L							
Inorganic Constituents (mg/L)							
Arsenic	1.45E-03		Mercury	1.41E-01		Hydrogen Peroxide	4.33E+02
Barium	8.73E-01		Nickel	1.09E+00	✓	Ammonia	9.11E+00
Beryllium	7.27E-01		Potassium	4.82E+01		Ammonium	5.49E+04
Cadmium	2.18E-01		Selenium	1.45E+00		H ₂ CO ₃	6.06E+00
Calcium	5.90E+04		Silver	7.27E-01		Bicarbonate	4.71E+02
Chlorine	4.59E+02		Sodium	2.33E+03		Carbonate	8.22E-03
Chromium	2.18E+00		Vanadium	7.27E-01		Dissolved CO ₂ (aq)	2.49E+03
Copper	7.01E+00		Zinc	4.15E+00		Water (H ₂ O)	8.61E+05
Fluorine	7.30E+01		Nitrate	4.43E+02		Hydronium (H ⁺)	3.19E-03
Iron	2.92E+01		Nitrite	9.07E+01		Hydroxide (OH ⁻)	5.38E-05
Lead	2.30E+00		Phosphate	1.58E+02		Bisulfate	4.19E+01
Magnesium	4.04E+02		Silica (SiO ₂)	7.25E+01		Sulfate	1.57E+05
Manganese	1.45E+00						
Organic Constituents (mg/L)							
Carbon Tetrachloride	3.63E-01		Chloroform	9.07E-02		Methylene Chloride	5.53E-03
Radionuclides (pCi/L)							
Gross alpha	7.06E+03		Technetium-99	1.86E+04		Neptunium-237	4.47E+02
Gross beta	2.22E+06		Iodine-129	5.24E+03		Plutonium-238	4.72E+02
Tritium	1.51E+06		Cesium-137	2.80E+06		Plutonium-239/240	5.12E+02
Cobalt-60	6.99E+03		Radium-226	6.06E+02		Americium-241	1.69E+02
Strontium-90	2.65E+04						

Table 1 Brine Composition Estimate from Processing Process Condensate at ETF [Effluent Treatment Facility]
(Source: Washington River Protection Solutions 2DB00-CJF-19-00, January 15, 2019, Table A-3.)

c. New National Effort Underway to Push More DOE Work to Private, Offsite Facilities like Perma-Fix Northwest

A DOE proposal was published in the fall of 2020 to replicate the Perma-Fix Northwest off-site commercial waste processing for other DOE sites around the country.²²⁷ Hanford Challenge felt that it was important to share concerns for replicating this model elsewhere in the US. The biggest concern is the volume and degree of radiologically-contaminated and high hazard waste

²²⁷ U.S. Department of Energy, Sources Sought Synopsis/Request for Information, Nationwide Low-Level and Mixed Low-Level Waste Treatment Services, Solicitation Number: 89303320REM000060, available at: https://www.emcbc.doe.gov/seb/waste_treatment_services/Documents/RFI/Waste%20Treatment-RFI.pdf

DOE plans to send to Perma-Fix Northwest over the next 30 years (2020-2050). During this period Perma-Fix Northwest is expected to process 2,258,761 cubic feet (63,961 cubic meters) of radioactive wastes, much of which will be mixed with non-radioactive hazardous substances.²²⁸ This amount is more than half of the total volume of all low-level radioactive wastes currently disposed of in the United States.²²⁹ Nearly 60 percent of the wastes (13,26,842) cubic feet) are planned to be sent from the Hanford Site,²³⁰ with the remainder coming from other DOE sites including the shuttered Paducah, KY gaseous diffusion plant, the Idaho National Engineering Laboratory, the Livermore National Laboratory in CA, the Los Alamos National Laboratory in NM, the closed Nuclear Fuel Services reprocessing plant in NY, and the at the Waste Isolation Pilot Plant in NM.²³¹

A large portion of this waste includes highly radioactive materials such as 25,779 cubic feet of spent resins from ion-exchange of Cs-137 from Hanford high-level tank wastes. The handling of these spent resins require heavy shielding and remote controls to protect against severe worker exposures, which Perma-Fix Northwest lacks. Although, DOE has yet to characterize these dangerous wastes, research into the worker hazards of handling spent resins indicates that prevention of high exposure, even with shielding, is of special concern.²³²

The magnitude of dangerous radioactive and non-radioactive hazardous waste envisioned to be processed by DOE at Perma-Fix Northwest over the next 30 years, if realized, could well exceed the current regulatory capabilities of Washington State and the EPA to ensure safety of workers and the public.

VIII. Conclusion

Hanford Challenge's investigation uncovered a disturbing history of accidents, violations, findings, and non-compliances that raise serious questions about whether this facility should be allowed to continue treating dangerous Hanford waste. The decision to save money by treating Hanford's waste off site is ill-advised. Cost-savings is only one aspect to consider when deciding where and how to clean up Hanford's dangerous waste, but cost savings should never be the sole consideration. Hanford Challenge has concluded that it would be safer to expand the treatment capacity at the Hanford Site instead of sending waste for treatment at Perma-Fix Northwest.

Treatment of waste on the Hanford Site provides the best environment for compliance with safety standards, clear and coordinated regulatory oversight, transparency, and accountability.

²²⁸ U.S. Department of Energy, WIMS: Waste Stream Forecast Report, Waste volumes to be disposed from All Sites to Perma-Fix Northwest (formerly PECOS) for all aeriels in cubic meters (Fiscal Year: 2020-2050).

²²⁸ U.S. Nuclear Regulatory Commission, Low-Level Waste Disposal Statistics. <https://www.nrc.gov/waste/llw-disposal/licensing/statistics.html>

²³⁰ U.S. Department of Energy, WIMS: Waste Stream Forecast Report, Waste volumes to be disposed from All Sites to Perma-Fix Northwest (formerly PECOS) for al aeriels in cubic meters (Fiscal Year: 2020-2050).

²³¹ Ibid.

²³² Jaehoon Byun, Woo Nyun Choi, Hee Reyoung Kim, Radiological safety assessment of lead shielded spent resin treatment facility with the treatment capacity of 1 ton/day, Nuclear Engineering and Technology, June 2020. <https://www.sciencedirect.com/science/article/pii/S1738573320302436>

DOE has unnecessarily dumped those risks onto the communities that have grown up around Richland, and onto a facility with a sketchy history of compliance, accidents, and close calls.

Regulators reported that Perma-Fix Northwest exceeded onsite soil contamination limits, improperly stored radioactive and other hazardous wastes, handled wastes resulting in leakage of plutonium and significant workplace contamination, failed to notify regulators of known violations, and seriously over-exposed several employees to radiation. Perma-Fix Northwest was fined a total of \$551,891 from 2008 to 2019 by the U.S. Environmental Protection Agency and the Washington State Department of Ecology for hazardous waste violations. EPA's designation of Perma-Fix Northwest as a "Significant Non-Complier" is in itself a red flag for Washington State, the Department of Energy, and the people who reside nearby.

This is work that Hanford workers have done well in the past and should be doing now. Hanford has the built-in capacity to handle this waste, and to handle it in a safer, more transparent, and accountable manner. It will take time to build back the on-site treatment capacity at Hanford for the waste it is currently sending to Perma-Fix Northwest. Until Hanford is ready to treat this waste again, we must attempt to avoid further accidents at Perma-Fix Northwest by ensuring regulations are fully enforced, safety protocols are followed, better training is provided, and safety equipment is in good working order.

IX. Recommendations

Hanford Challenge makes the following recommendations:

1. **Increase Safety by Bringing This Work Onsite:** Our key recommendation is that the Department of Energy return waste treatment operations to the Hanford Site and away from Perma-Fix Northwest. Hanford has the onsite capacity to do so with the Waste Receiving and Processing Facility in Hanford's 200 West Area. WRAP was "constructed to process drums and boxes of low-level waste and transuranic waste for permanent disposal. The containers which are sent to WRAP include those which were stored in the 1970's and 1980's in the Low-Level Burial Grounds with the intention to retrieve them at a later date."²³³ Yet WRAP's operations have been suspended for the past several years.²³⁴ Hanford has highly-trained and unionized workers, a better regulatory environment, more transparency and more accountability. Importantly, the WRAP facility is much further away from civilian populations, currently at higher risk from Perma-Fix Northwest's operations.

²³³ <https://www.hanford.gov/page.cfm/WRAP>. Also, "Treatment within CWC-WRAP DWMUs consists of volume reduction, deactivation, extraction technologies, deactivation and recovery of organics (i.e., puncture and decant aerosol cans/cylinders), neutralization, absorption, controlled reaction with water, solidification/stabilization, mercury amalgamation, macroencapsulation, microencapsulation, and sealing." Quoted from, *Dangerous Waste Compliance Inspection on April 16, 2019 at Waste Receiving and Processing Facility and Central Waste Complex (WRAP/CWC) RCRA Site ID: WA7890008967, NWP Compliance Index No.: 19.658 and 19.659*, <https://pdw.hanford.gov/document/AR-02575>

²³⁴ 2019 HANFORD LAND DISPOSAL RESTRICTIONS (LDR) FULL REPORT, DOE/RL-2020-09, REVISION 0, July 28, 2020, "The use of WRAP is dependent on future funding to reestablish operations at the facility. There will be no schedules established until funding is provided." p. 6-15. <https://pdw.hanford.gov/document/AR-03939>

Understanding that the DOE will be using Perma-Fix Northwest at least until the WRAP (or some other) suitable facility is ready to take this work on; future operation of Perma-Fix Northwest should be conducted in a manner that better protects workers and the Tri-Cities communities.

2. **Abandon Proposals for Perma-Fix Northwest to Treat Hanford's Tank Waste:** DOE should not pursue plans to have Perma-Fix Northwest treat Hanford's pre-treated high-level tank waste and other candidate wastes, such as secondary waste from the Direct Feed Low Activity Waste program.
3. **Increase Regulatory Oversight and Coordination:** Washington's Departments of Ecology and Health need to increase their oversight, pending work to renew the expired Perma-Fix Northwest permit. WA State Department of Ecology and Department of Health should better coordinate their regulatory oversight of Perma-Fix Northwest to assure that all matters related to Perma-Fix Northwest's operations are adequately, completely and effectively handled. The Department of Ecology should no longer tolerate this risky facility to continue operating under an expired permit.
4. **Evaluate Perma-Fix Northwest Emissions for Air Operating Permit:** EPA and Ecology should consider whether Perma-Fix Northwest emissions should be treated as a Hanford stack for Air Operating Permit purposes, dose evaluation purposes, and transparency.
5. **Posting of Regulatory Information on Hanford's Administrative Record:** Important regulatory matters pertaining to Perma-Fix Northwest should be posted on Hanford's Administrative Record, since over 90% of the waste that Perma-Fix Northwest handles is in fact from Hanford.
6. **Enable WA State Department of Health to Impose Fines and Penalties for Violations of Atomic Energy Act Licensing Requirements:** WA State Department of Health should be granted more regulatory teeth by gaining the ability to impose fines and penalties against nuclear licensees that it oversees on behalf of the NRC, in alignment with the majority of other NRC Agreement States. WA DOH should post more materials about Perma-Fix Northwest on its website, including all license and permit updates, variances, treatability studies and inspection reports.
7. **Increase Department of Energy Oversight of Perma-Fix Northwest:** Department of Energy should increase its oversight and regulation of Perma-Fix Northwest given that the vast majority of Perma-Fix Northwest's inventory comes from Hanford and other DOE facilities. In particular, DOE should consider the Perma-Fix Northwest facility as a Hazardous Category 2 nuclear facility and regulate safety, radiological exposures, and emissions accordingly.

APPENDIX I: About the Authors

Robert Alvarez is an Associate Fellow at the Institute for Policy Studies, where he is currently focused on nuclear disarmament, environmental, and energy policies.

Between 1993 and 1999, Mr. Alvarez served as a Senior Policy Advisor to the Secretary and Deputy Assistant Secretary for National Security and the Environment. While at DOE, he coordinated the effort to enact nuclear worker compensation legislation. In 1994 and 1995, Bob led teams in North Korea to establish control of nuclear weapons materials. He coordinated nuclear material strategic planning for the department and established the department's first asset management program.

Prior to joining the DOE, Mr. Alvarez served for five years as a Senior Investigator for the U. S. Senate Committee on Governmental Affairs, chaired by Senator John Glenn, and as one of the Senate's primary staff experts on the U.S. nuclear weapons program. While serving for Senator Glenn, Bob worked to help establish the environmental cleanup program in the Department of Energy, strengthened the Clean Air Act, uncovered several serious nuclear safety and health problems, improved medical radiation regulations, and created a transition program for communities and workers affected by the closure of nuclear weapons facilities. In 1975 Bob helped found and direct the Environmental Policy Institute (EPI), a respected national public interest organization. He helped enact several federal environmental laws, wrote several influential studies and organized successful political coalitions. He helped organize a successful lawsuit on behalf of the family of Karen Silkwood, a nuclear worker and active union member who was killed under mysterious circumstances in 1974.

Bob Alvarez is an award-winning author and has published articles in prominent publications such as *Science Magazine*, the *Bulletin of Atomic Scientists*, *Ambio*, *Science and Global Security*, *The Journal of Environmental Radioactivity*, *Energy Policy*, *Technology Review* and *The Washington Post*. He has been featured in television programs such as NOVA and *60 Minutes*.

Tom Carpenter is the founder and Executive Director of Hanford Challenge. He is an attorney with a Juris Doctorate from Antioch School of Law (1986) and an MA from Seattle University.

Mr. Carpenter investigated and exposed the extensive, but secret, pollution from Cincinnati's Fernald (Feed Materials Production Center) facility, including representing a whistleblower there. Mr. Carpenter worked on two Congressional oversight hearings on Fernald and appeared on the first national TV news expose (20/20 "The Bomb Factories") on the DOE's abysmal record on environmental protection and health and safety.

He joined the D.C.-based Government Accountability Project during law school in 1985, where he served as a Staff Attorney and Manager of the Nuclear Oversight Campaign until 2007. In 1992, Mr. Carpenter started GAP's West Coast Office in Seattle, WA and became its Director. In that role, Mr. Carpenter represented numerous whistleblowers at both commercial and DOE nuclear sites including Fernald, Rocky Flats, Oak Ridge, Los Alamos, Pantex, Mound, Diablo Canyon, Comanche Peak and more.

In 2007, Mr. Carpenter founded Hanford Challenge, and became its Executive Director, in Seattle, Washington. At Hanford, Mr. Carpenter was a charter member of the Hanford Joint Council for Resolving Employee Concerns (a mediation board that resolved whistleblower issues at Hanford), which later became the Hanford Concerns Council.

In his career at both GAP and Hanford Challenge, Mr. Carpenter has provided legal representation and advocacy services to hundreds of nuclear whistleblowers. He helped draft federal legislation and agency rules protecting nuclear whistleblowers. He helped Hanford scientists reveal that leaked nuclear waste from Hanford's underground waste tanks is migrating to the groundwater beneath the Site, and through persuading Congress to foster independent investigations, brought federal officials to admit the problem and undertake remedial actions.

Mr. Carpenter documented dangerous work conditions at the Hanford Site from exposure to chemical vapors from the Hanford underground tanks, publishing a report (2003) that led to independent investigations, and sued the DOE (along with a Hanford union and the WA State Attorney General) to challenge Hanford management's failure to protect Hanford workers from exposure to toxic chemical vapors emanating from high-level nuclear waste tanks.

Mr. Carpenter also worked with key whistleblowers at Hanford's Waste Treatment Plant, revealing numerous design and construction flaws and nuclear safety violation that led to the suspension of work on the facility and extensive redesign due to the flaws.

Acknowledgements: Special thank you to the Hanford Challenge staff for editing and formatting this extensive report. Thank you to Marco Kaltofen, Ph.D., PE, for help with the executive summary of the report and his review.

APPENDIX II: Perma-Fix Northwest Violations & Potential Violations

Entries below contain quotes from violation documentation located at the link provided.

8/14/2019 - Contaminated Soil/Hazardous Waste

Case Summary: “On August 14, 2019, Region 10 filed a consent agreement and final order to resolve a Resource Conservation and Recovery Act (RCRA) permit violation by Perma-Fix Northwest Richland, Inc. at their Richland, WA facility. This RCRA treatment and storage facility primarily manages mixed waste from the Department of Energy Hanford Site and the permit required compliance with third party liability financial assurance requirements. In 2013-2014, the facility’s liability insurance policy did not provide adequate coverage for third party bodily injury and property damage claims. The company agreed to pay a penalty of \$23,375.”

- Environmental Protection Agency, Case No. 10-2019-0130, *Civil Enforcement Case Report*, available at <https://echo.epa.gov/enforcement-case-report?id=10-2019-0130>, (August 14, 2019).

3/6/2019 – SEPA Workshop Responses Department of Ecology

Land Disposal Restriction (LDR) Treatment Standard

“The LDR treatment standard for high-level waste is verification. Both USDOE and Perma-Fix Northwest have referred to the USDOE Order 435.1 Waste Incidental to Processing, process as authorizing TBI waste to come to Perma-Fix Northwest as low activity waste. Ecology has communicated with USDOE that a 435.1 reclassification does not necessarily remove the LDR treatment standard from TBI waste. Please provide any communication between Perma-Fix Northwest, US EPA, and/or USDOE, regarding compliance with LDR requirements for TBI waste taken to Perma-Fix Northwest. Ecology requests this information so that we may evaluate what mitigation, if any, Ecology should require in a permit issued to Perma-Fix Northwest.”

- WA Department of Ecology, Doc No. 19-NWP-040, *State Environmental Policy Act (SEPA) Workshop Responses*, John B. Price, available at <https://pdw.hanford.gov/document/0063768H>, (March 6, 2019).

11/2/2018 – SEPA Department of Ecology Concerns

“Transportation for Domestic Waste • • • Please describe the transportation modes and routes for the primary customers anticipated during the next 10 years including United States Department

of Energy (USDOE) Hanford, USDOE Idaho, and PermaFix-Tennessee. Your letter states that transuranic waste "is shipped to and from Hanford using a rolling road closure." It is Ecology's understanding that USDOE no longer uses rolling road closures but takes loads out of commerce by using a Federal driver. Please confirm or refute our understanding."

- WA Department of Ecology, Doc. No. 18-NWP-179, *State Environmental Policy Act (SEPA) Scoping for Perma-Fix Northwest Dangerous Waste Regulations Permit*, John B. Price, available at <https://pdw.hanford.gov/document/0064425H>, (November 2, 2018).

8/29/2018 – SEPA Scoping Department of Ecology

"Perma-Fix SEPA EIS Supplement scoping request Your letter requested that the scope of the SEP A EIS supplement "be inclusive of all liquid, solid, and sludge MLLW [Mixed Low Level Waste] streams originating from any commercial or United States Department (USDOE) generator, including the liquid MLLW stream from the TBI" [underline added for emphasis] .. This request goes well beyond the existing permitted capabilities of Perma-Fix's facility, and well beyond the application materials submitted for re-issue of your permit. Additionally, the latest revision of your application has **a large number of deficiencies identified by Ecology over 3 years ago, which have yet to be adequately addressed by Perma-Fix.** (emphasis added) Therefore, the best available information for scoping Perma-Fix existing operations for the SEPA EIS supplement is the waste quantities and waste profiles that have been processed at the facility during the last 20 years. Ecology has separately provided to Perma-Fix an information request so that Ecology can prepare the SEPA EIS supplement for your existing operations. Ecology stated in the meeting held August 28 that Ecology would be willing to include the TBI waste stream in the SEPA analysis once Perma-Fix and USDOE collaborate and submit to Ecology a detailed proposal for the TBI. Ecology will submit to Perma-Fix and USDOE, under separate cover, a list of requested information."

- WA Department of Ecology, Doc. No. 18-NWP-033, John B. Price, *State Environmental Policy Act (SEPA) Scoping for Perma-Fix Northwest Dangerous Waste Regulations Permit*, available at <https://pdw.hanford.gov/document/0064808H>, (August 29, 2018).

1/1/2016 – Improper Handling

Case Summary: "Perma-Fix Northwest will pay the penalty to settle violations for failing to properly designate the waste, storing waste in a non-permitted area, and failing to inspect an area that was found to contain dangerous, potentially cancer-causing substances.

During an inspection, the Washington Department of Ecology found dangerous kitty litter-sized granules of waste on the floor and under a grate associated with a waste shredding unit. Analysis confirmed that the waste contained heavy metal cadmium at a concentration that designates it as dangerous waste, as well as radioactive substances including cobalt, cesium, and uranium. Records indicate the business changed hands in 2007 and the current operators have not used the waste shredding unit left at the facility by the prior owner.

“Under the terms of their operating permit, they had an obligation to inspect all areas of their operation, and ensure that any dangerous, radioactive or mixed waste was identified and cleaned up,” said Alex Smith, Nuclear Waste Program manager for Ecology. “Had anything happened to disturb this material and make it airborne, it would have posed serious health risks to anyone who inhaled it.”

- Department of Ecology, *Richland company agrees to \$36,400 penalty*, available at [https://ecology.wa.gov/About-us/Get-to-know-us/News/2016/Nov-3-Richland-company-agrees-to-\\$36,400-penalty](https://ecology.wa.gov/About-us/Get-to-know-us/News/2016/Nov-3-Richland-company-agrees-to-$36,400-penalty), (November 3, 2016).

7/16/2013 – Chromium Pollution

Case Summary: “On July 16, 2013, Region 10 filed a Consent Agreement and Final Order to resolve violations of RCRA at the Perma-Fix Northwest Richland, Inc. facility in Richland, Washington. Region 10 alleged that Perma-Fix stored six containers of mixed (dangerous and radioactive) waste (baghouse ash) for greater than 90 days without a permit or interim status. The terms of the settlement require Perma-Fix to come into compliance and pay a penalty of \$187,620.”

- Environmental Protection Agency, Case No. 10-2013-0106, *PERMAFIX NORTHWEST*, available at <https://echo.epa.gov/enforcement-case-report?id=10-2013-0106>, (July 16, 2013).

1/31/2013 -7/31/2013 – Department of Energy Inspection

Summary of Concerns:

“1. The "rolling road block" function procedures do not conform to the terms of the exemption from transportation in commerce as explained in the Denny Letter and in 40 CFR Part 171.1 (d)(4). Transportation of radioactive mixed waste and hazardous materials between the DOE-Hanford Facility and Perma-Fix Northwest are not exempt from HMR's.

2. Transportation practices for mixed waste from the Hanford Facility to Perma-Fix Northwest do not conform to the requirements of the dangerous waste regulations and the HMR's incorporated by reference.

3. The selection of non-compliant packages to transport mixed waste presents a risk to human health and the environment.

4. Ecology will review additional information on past waste shipments between the DOE-Hanford Facility and Perma-Fix Northwest. Ecology will determine compliance with the regulatory requirements that are applicable to transportation and waste designation activities: Ecology will evaluate the evidence to determine issuance of a formal or informal enforcement action procedure.”

- U.S. Department of Ecology, Joannette Biebesheimer & Jerry French, Washington Department of Ecology Hazardous Waste and Toxics Reduction Program Compliance Report, (July 8, 2013).

4/27/2012 – Three Incorrectly Marked Barrels

“DOE-Hanford is arranging to send improperly designated and packaged waste to Perma-Fix Northwest. Perma-Fix Northwest accepts the improperly designated and packaged waste and conducts further evaluation and designation of the waste at the Perma-Fix Northwest facility. After the March 22 & 23, 2013 manifested shipments of mixed waste from Hanford to Perma-Fix Northwest (described above), Ecology obtained information from the Washington State Department of Health (WADOH) concerning this shipment. WADOH reported to Ecology the following about what happened at Perma-Fix Northwest after it had accepted the above described shipments:

► Perma-Fix Northwest had notified WADOH several days before April 27, 2012 about a release from Hanford Waste Receiving and Processing Facility (WRAP) drums that were transported to Perma-Fix Northwest and stored within the Perma-Fix Northwest Double Containment Unit (DCU).

► Perma-Fix Northwest opened up three WRAP drum shipment in the DCU DOE-Hanford is arranging to send improperly designated and packaged waste to Perma-Fix Northwest. Perma-Fix Northwest accepts the improperly designated and packaged waste and conducts further evaluation and designation of the waste at the Perma-Fix Northwest facility. After the March 22 & 23, 2013 manifested shipments of mixed waste from Hanford to Perma-Fix Northwest (described above), Ecology obtained information from the Washington State Department of Health CW ADOH) concerning this shipment. WADOH reported to Ecology the following about what happened at Perma-Fix Northwest after it had accepted the above described shipments:

► Perma-Fix Northwest had notified WADOH several days before April 27, 2012 about a release from Hanford Waste Receiving and Processing Facility (WRAP) drums that were transported to Perma-Fix Northwest and stored within the Perma-Fix Northwest Double Containment Unit (DCU).

► Perma-Fix Northwest opened up three WRAP drum shipment in the DCU

Acids and radiation were released within the DCU.

► Perma-Fix Northwest jack hammered and scabbled out the contaminated floor of the DCU.

► Perma-Fix Northwest finds that radiation release had occurred wherever the drum had been moved within the PFNW facility boundary.

Improper identification, designation and packaging of mixed waste by DOE and its contractors and arranging to transport to Perma-Fix Northwest for further evaluation **has caused an imminent hazard to public health and the environment at the point of generation at**

Hanford, during transport on public highway, and at the treatment, storage and disposal facility at Perma-Fix Northwest.” (emphasis added).

- U.S. Department of Ecology, Joannette Biebesheimer & Jerry French, *Washington Department of Ecology Hazardous Waste and Toxics Reduction Program Compliance Report*, (July 8, 2013).

4/19/2012 – WDE Compliance Report

“He went on to add that once the slurry was formulated it was used to neutralize the sludge waste and left for seven days. The waste mixed with the slurry was placed into 1000 ml. plastic wide-mouthed jars.

“Mr. White said that Perma-Fix Northwest was asked by the client to allow the waste extra time to "dry out" by keeping the tops off the jars. We were shown a picture of the jars line up together on the floor of the room with their tops off. Mr. White said that Wednesday of next week Perma-Fix Northwest plans to seal the jars and pack them into 55 gallon drums. Mr. White stated he was uncomfortable doing this, but he needed to do what the client asked him to do”

“We asked if they ever received liquids in boxes, and Mr. White said that liquids in boxes would be noted as non-conforming waste, waste that does not conform to what is expected on the profile. I asked if they ever rejected any non-conforming waste back to the generator, and Mr. White said "no, there are no rejected shipments." He explained that they figure out a way to deal with the problem and would not want to risk returning it to the client. I asked if any of the non-conforming wastes triggered the requirement to send a letter to Ecology with notification of a discrepancy. Mr. White replied that PermaFix resolves the problems within the 15 days and therefore Perma-Fix Northwest does not send Ecology a letter.

I asked about whether receipt of waste that was incompatible with the container in it would be considered non-conforming? He said this hasn't ever happened to his knowledge, Then I asked whether he would consider the corrosive sludge and nitric acid as incompatible since it arrived in metal drums and wouldn't that be nonconforming waste. Mr. White declined to answer.”

Regarding an extremely contaminated (radioactive) Hanford shipment “SB-09” containing sludge.”

- WA Department of Ecology, RCRA ID#: WAR00010355, Kerry Graber, *Report of Compliance Inspection for ID: WAR00010355*, (August 23, 1012).

3/20/2012 - EPA Inspection

“Violation 1- Failure to Determine if a Generated Solid Waste is a Dangerous Waste

Baghouse ash collected from the thermal incineration Bulk Processing Unit (BPU) is a Perma-Fix Northwest generated waste stream. In 2008 EPA and Perma-Fix Northwest entered into a Consent Agreement and Final Order (CAPO) resolving allegations that Perma-Fix Northwest failed to determine if baghouse ash was a dangerous waste. Samples of baghouse ash obtained in

2008 exhibited the characteristic of toxicity for cadmium (D006). EPA obtained data confirming that at least 69 percent of the baghouse ash that Perma-Fix Northwest generated between the dates of July 2007 and May 2010 exhibited the characteristic of toxicity for cadmium (D006) and was therefore a dangerous waste.

Perma-Fix Northwest violated WAC 173-303-070(1) by failing to make a dangerous waste determination for the baghouse ash it generated. For each waste container, failure to make a dangerous waste determination constituted a separate violation.”

Violation 2- Storage of Mixed Waste in Building 15 a Unit Not Covered by the Perma-Fix Northwest Permit

According to records obtained by EPA, Perma-Fix Northwest accumulated and stored at least six containers of baghouse ash, which is generated by processing low level radioactive, non-hazardous waste, debris, and equipment, in Building 15 (a unit not covered by Perma-Fix Northwest's permit) for more than 90 days while awaiting analytical results. The baghouse ash, a mixed waste, is generated by processing low level radioactive non-hazardous waste, debris, and equipment.

Between July 2007 and March 2009, Perma-Fix Northwest generated, in Building 15 (a unit not covered by its permit), at least twenty-two containers of baghouse ash, a mixed waste. PFNW moved these containers of waste from Building 15, the site of generation, to a unit covered by the permit, for treatment, then moved the containers of mixed waste back to Building 15, to await packaging and/or shipping. Once these waste containers were moved from the original site of generation in Building 15, they could no longer meet the criteria for the less-than 90-day storage when moved back to Building 15. These mixed waste containers are identified as: LL08200072, LL08200074, LL08200409, LL08200410, LL08200411., LL08200438, LL08200461, LL08200462, LL08200506, LL08200517, LL08200518, LL08200527, LL08200546, LL08200547, LL08200548, LL08200560, LL08200561, LL08200575, LL08200607, LL08200621, LL09200181, and LL09200182.

Perma-Fix Northwest violated WAC 173-303-800 by storing containers of mixed waste (baghouse ash) in Building 15, a unit not covered by its permit. Each of the 22 containers of mixed waste identified above, stored in Building 15, constituted a separate violation.

Violation 3- Storage of Mixed Waste in Units Not Covered By the Perma-Fix Northwest Permit

As described in Violation 2 above, at the time of the inspection, Perma-Fix Northwest stored mixed waste (baghouse ash) in Building 15. Permit Condition III.A.1.a. and the referenced Attachments do not list Building 15 as a permitted area for placement or storage of mixed waste.

In addition, at the time of the inspection, the inspectors observed five large containers labeled as hazardous waste that were placed on a concrete pad outside the southwest side of Building 13. At least one of these containers showed an accumulation start date of April 26, 2010, one month prior to the inspection. Perma-Fix Northwest explained that a new accumulation start date was placed on the containers when they were moved to the concrete pad. A label was attached which

used the date that the containers were moved as the accumulation start date. Permit Condition III.A.1.a. and the referenced Attachments do not list the concrete pad outside the southwest side of Building 13 as a permitted area for placement or storage of mixed waste. Perma-Fix Northwest violated Permit Condition III.A 1. by storing mixed waste (baghouse ash) in Building 15 and on the concrete pad outside the southwest side of Building 13. Each waste container stored in an unpermitted area constituted a separate violation of the Permit,”

Violation 4 - Storage of On-Site Generated Waste for More Than One Year

“At the time of the inspection, the inspectors noted that between the months of July 2007 and May 2010 at least twenty-one containers of mixed waste (baghouse ash) generated by the facility were stored at the facility for greater than one year after the waste was generated. Analyses confirmed that these were containers of mixed waste.

Perma-Fix Northwest violated Permit condition 2.11 of Attachment LL between July 2007 and May 2010 by storing for more than one year at least twenty-one (21) containers of mixed waste (baghouse ash) generated on site. Each container of waste, stored for more than one year, constituted a separate violation of the Permit.”

Violation 5-Failure to Notify the Department Prior to Changes in Dangerous Waste Activity/ Failure to Modify Permit

Perma-Fix Northwest used Building 15 and the concrete pad outside the southwest side of Building 13 (areas not specified in the Permit) as additional storage units without providing notification to the Department.

Perma-Fix Northwest violated WAC 173-303-060(2) by failing to notify the Department of its activity in storing mixed waste in units not covered by its permit. Perma-Fix Northwest violated Permit condition I.B.3 by failing to follow the prescribed process for adding storage units to its permit.”

- U.S. Environmental Protection Agency, EPA ID No. WAR 0001 0355, Edward J. Kowalski, *Re: NOTICE OF VIOLATION PermaFix Northwest Richland, Inc.*, (March 20, 2012).

3/8/2012 – Forklift Puncture Spill

On March 8, 2012, a forklift that was moving the tank pierced the plastic wrapping. Approximately one cup of liquid spilled from a tear in the plastic wrapping the tank, to the floor in Building 13 room SB-07. A pH test strip indicated the pH of the liquid was approximately neutral. The operators in the area wiped the spill up (the spilled clean up materials later were disposed of with the tank pieces).

After the spill was wiped up, we surveyed the floor for radiological contamination. The survey indicated a small section of the floor was contaminated. We unsuccessfully attempted to remove the radiological contamination by wiping the floor again. In order to remove the radiological

contamination, the floor was scabbled to approximately ¼" depth and repaired with NSP122 Industrial Floor Coating and NSP125 Epoxy Resurfacer which is the manufacturer's recommended repair system. The repair was made consistent with Conditions ill.D.1 and II.D. 7 and Attachment EE of our hazardous waste facility permit and documented in our facility operating record.

At the time of this spill, we reviewed our hazardous waste facility contingency plan and determined that the incident did not trigger plan implementation. The spill involved a very small volume of material, waste entirely contained within building SB-07, did not require response from any off-site emergency response agency or service and did not pose any threat to human health or the environment. In this regard, we note that the floor is coated with epoxy material to contain spills of this type. The building is maintained under negative air with the exhaust controlled through carbon filtration and HEP A filters.

- PermaFix Northwest Richland, Inc., 2012-LTR-1030, Richard Grondin, *Re: Questions about Treated Acid – Ron Skinnerland*, (August 2, 2012).

4/13/2009 – Worker Over-exposure

Case Summary: One worker exposed to estimated dose of 120 REM CDE and 6.8 REM CEDE
Isotopes involved: Am-241, Pu-240/241

“The exact cause of the incident is unknown. The assumed cause is a failure of the respiratory protection system. The licensees corrective actions to prevent reoccurrence are to test each worker with a challenge gas prior to high risk work, increased engineering controls to mitigate airborne contaminants, specific training using phosphorescent powder and black lights for workers, more frequent bioassay samples, inclusion of nasal smears for immediate detection of intakes, use of supplied air respirators over air filtering respirators for high risk work, and training for workers, managers and health physics staff. Note that work was resumed in the area, and no further exposures have occurred.”

“No media coverage of the event.”

- WA Division of Radiation Protection, Event No. 44986, *AGREEMENT STATE REPORT – POTENTIAL OVEREXPOSURE TO THE LUNGS*, available at <https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2009/20090702en.html>, (April 13, 2009).; Department of Nuclear Safety and Security, Event No. 44986, *Worker Overexposure*, available at <https://www.nrc.gov/docs/ML1302/ML13028A427.pdf>, (July 1, 2009).

9/26/2008 – Cadmium Pollution

Case Summary: None available

- Securities and Exchange Commission, *Form 8-K Perma Fix Environmental Services Inc.*, available at <https://sec.report/Document/0001144204-08-065995/>, (November 19, 2008).

4/22/2008 – Transport Trailer Contamination

The following information was received from the State of Washington via e-mail: "Tritium (H-3) contamination was found on a trailer in the outside storage area of Perma-Fix Northwest (Perma-Fix Northwest), a radioactive material licensee in Richland Washington on April 17. A DOH inspector noticed liquid dripping from a trailer that had just been unloaded. The trailer had hauled empty radioactive waste drums from Atomic Energy Limited Canada (Chalk River facility in Ontario). The transport vehicle entered the United States at Sault Ste. Marie, Michigan under a Nuclear Regulatory Commission (NRC) import license and entered Washington at Spokane. The shipment had arrived at the Perma-Fix Northwest facility in late February. It was manifested as a plastic fiber bag with drums inside. Initial surveys on February 28 noted tritium contamination inside the plastic fiber bag, but no contamination was noted outside the bag or on the trailer. Tritium was a primary radionuclide on the manifest. During off-loading of the drums and plastic liner on April 17, liquid was found in and on the drums (one drum is suspected of being at least partially filled with liquid). After off-loading, standing liquids were noticed by the licensee on the inside trailer bed, but not on the outer trailer floor and skin. After the truck was returned to the storage yard, liquid droplets were found dripping from the front of the trailer by the DOH inspector. Initial contamination levels (up to 1.8 million dpm of tritium) on the trailer front were substantially above the U.S. Dept of Transportation limits; but due to the limited quantity (less than one gallon of liquid), do not pose a health risk. There is no indication of leakage during the actual shipment.

"The manifest indicated the total shipment contained H-3 (6.59 mCi) and Cs-137 (7.79 mCi) as the predominant radionuclides. Only tritium contamination has been noted."

- WA Division of Radiation Protection, Event No. 44156, WA Report # WA-08-025, *WASHINGTON AGREEMENT STATE REPORT – EXTERNAL CONTAMINATION ON A TRANSPORT TRAILER*, available at <https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2008/20080425en.html>, (April 22, 2008).

4/19/18 - Review of DFLAW Comments - Summary of Potential Issues

"1) During DFLAW, predicted LERF waste receipt exceeds ETF forecast (improved) capacity by 2-3M gal/yr, and exceeds current ETF throughput performance by 7-8M gal/yr. RL Groundwater folks who previously ran ETF say it should run at 7M/yr minimum, but WRPS operations folks advise the WTP and 242A waste stream will be more complex than previous exclusively-groundwater waste streams and necessarily more challenging to treat. Stepping up performance objectives immediately to 68M gal/yr, to work off backlog before DFLAW,

performing immediate upgrades to increase throughput, and increasing storage capacity at LERF within the next 5 years, will likely be necessary to address throughput challenges.

2) There are two constituents of WTP EMF waste above the regulatory WAC for LERF/ETF. Impacts will include replacement of the Peroxide Decomposer, and revised permitting. Peroxide decomposer replacement is currently above the line for FY19-20 funding.

3) UV oxidation skids in ETF are obsolete. Spares were procured to last 3-5 years. UV/OX replacement is currently above the line for FY20-21 planning.

4) The thin-film dryer is a significant process bottle neck. In addition, the current powdered waste form does not meet IDF WAC. A load-out station is planned to truck liquid waste to Permafix for grouting. An option may be to truck powdered waste to Permafix, where the powdered waste form would be mixed with water and grout to make a solid waste form, but this is rather inefficient and doesn't solve the process bottleneck (although it may be an option initially to address Permafix's permit gap, see item 11).

5) Transfer lines to LERF need mods to leak detectors (WRPS), tie-ins (WTP), and permitting. The leak detector activities were recently added to WRPS contract scope and are in the integrated schedule for FY19 completion.

6) There are numerous maintenance and process issues with ETF. There are workarounds in place which will not work with WTP waste...the peroxide decomposer is one example. Technology is mature, but engineering, procurement, and maintenance activities need to be done, and the facility needs numerous upgrades and suffers from deferred maintenance and corrosion. Replacement of the STT tanks to address chlorides in the EMF waste stream and other corrosion-prevention upgrades are not in FY19 or FY20 planning tools. The Engineering Mission Analysis team in WRPS is building an Operations Research model of the ETF to study reliability-availability-maintainability issues, but the model is not currently mature enough to be of value. The review team recommends a reliability centered maintenance approach to identification and prioritization of the upgrades such as those described herein.

7) Increased chlorides from EMF waste will be addressed in ETF by replacing the STT tanks and selecting different materials for enhanced corrosion resistance, but this activity is not currently in FY19 or FY20 planning tools and has not been identified as a pre-DFLAW activity. The current plan is to mitigate corrosion by controlling concentration factor in the STT. However, that may have an adverse impact on throughput, as will accommodating replacement of these components during DFLAW operations.

8) There are potential vapors issues associated with the predicted ammonia concentration of EMF waste. The ammonia stays in ammonium form throughout the ETF process due to waste being kept acidic throughout processing, but at Permafix it will evolve. Recent testing of a grout that keeps ammonium phosphate in the waste form was reportedly successful, but the path to implementation of this grout formula by Permafix is not clearly defined at this time.

9) There is an outstanding question whether Perma-Fix will have its SEPA done and permits in place to support off-site solidification consistent with the One System Decision Document on the subject (OSDD 4). The current projected estimate is this could be ready in 2022/2023.

10) There is a question whether Perma-Fix has the physical capacity and personnel required to handle the volume of waste which will be generated from the DFLAW operations.

11) All solid waste from WTP operations, which will include all ETF solid waste, must be disposed of in IDF based on the December 13, 2013 Tank Closure and Waste Management Record of Decision. The IDF capacity is not an issue...additional cell capacity is on the order of 500,000 cubic meters. ETF waste is included in the IDF PA, but it was run without potential secondary waste streams resulting from breaking the EMF recycle, so this waste stream would have to be added with a special analysis (weeks not months, not a schedule risk as long as the result is acceptable), and IDF disposal volume to accommodate it would need to be verified.

12) Perma-Fix is currently in the process of updating their permit in order to be able accommodate waste coming from LERF/ETF. However, Ecology has yet to approve their permit modifications and Perma-Fix has not submitted the design information to support modifications to their permit to support DFLAW based on the 2014 letter from Ecology. Several concerns as to what the issues might be:

- Perma-Fix was fined in 2016 for improperly handling mixed dangerous and radioactive waste. They failed to “properly designate the waste, storing waste in a non-permitted area, and failing to inspect an area that was found to contain dangerous, potentially cancer-causing substances”
- Perma-Fix reportedly performed a poor mock-up demonstration for EPA where they punctured a drum containing simulant waste with a forklift.
- Perma-Fix’s Class 1 modification to replace a drum mixer was recently rejected by Ecology “due to new knowledge regarding the intent of the process”. (Ecology letter 18-NWP-086 dated May 24, 2018, Rejection of PMR-181 In-Container Mixer Replacement). PermaFix will need a Class 1 permit modification and a demonstration test must be conducted before the Class 1 permit modification will be approved. This has not been scheduled. The drum mixer will have to be the same design and capacity that Perma-Fix currently has. No expansion of capacity is being considered.

These concerns should be investigated immediately as it seems unlikely for Perma-Fix to be approved for their permit modifications in time to support the DFLAW liquid secondary waste mission. Suggest DOE consider treating waste on site to meet LDR requirements, similar to what was done prior to 2008, when capacity existed at Central Waste Complex, WRAP and T-Plant to treat waste.”

The Perma-Fix permitting risk is captured in the DFLAW risk register as DFLAW-0206-R.

- U.S. Department of Energy, “OA Database entry 37276, Chief Engineer/TPD/TOD/MIO/ECD review of DFLAW Readiness, Downstream Treatment &

Disposal (LERF, ETF, Off-Site Treatment of MLLW, SALDS, TEDF, IDF),(April 8, 2018), see *supra.*, footnote 199.

8/5/2009 – Department of Energy Audit

“Based on the overall results of the DOECAP audit, it is concluded that PFN continues to maintain and implement adequate management systems and operational activities necessary to meet DOE requirements for the storage, handling, transportation, processing, or final disposition of DOE material.” However, the DOE found the following problems:

- A review of waste sampling and procedures by the DOE auditors found that “actual practices used in sampling thermal residues and baghouse ash in the LLW treatment facility were not in conformance with PFNW procedures submitted to the EPA. .. inspection of sample storage areas indicated that sample custody was not consistently maintained or documented as required ..[by] EPA requirements and the facility hazardous waste permit.”
- None of the containers in waste storage “inside and outside” the 90-day accumulation areas were labeled to warn of major risk(s) pertaining to corrosive, flammable substances, as required under state regulation, for emergency response and to determine chemical compatibility. The company had claimed that all wastes in the 90-day accumulation are were “labeled as required,”, when in fact that none were not.
- The facility’s chemical laboratory was storing an accumulation of old and expired and potentially hazardous reagents, including poisonous liquids, and spontaneously combustible materials in the same drum.
- Posting of radiological areas were not in accordance with Washington State regulations. Areas with the potential for airborne contamination were not properly posted to advise workers of the presence of radioactivity.
- The staff were not properly recording the stop and start times for the flow rate when radioactive effluents were being discharged into the air. The audit team reported that, “this information is critical for determining radioactive airborne concentrations.
- U.S. Department of Energy Consolidated Audit Program, *Continuing Qualification Audit of Perma-Fix Environmental Services Northwest-Richland, WA*, Audit ID: 090514-PFN, (May 2009)(see footnote 15).

APPENDIX III: Brief History/Summary of Issues at Perma-Fix Northwest

The following chart is based on Washington State Department of Ecology and Environmental Protection Agency reports, Washington State Department of Health letters, Nuclear Regulatory Commission Event Notifications, as well as other documents.

[Appendix III Documents Referenced.](#)

REF #	DATE/DOC NUMBER	ISSUE
1	July 15, 1997 AIR 97-701	<p>DOH FINDS DEFICIENCIES – to ATG - Calculations for Potential to Emit are missing. Maintenance procedures are missing. Design documentation is inadequate for emissions units. Technology Standards are not verified met. In-Place HEPA testing is not conducted annually. No documentation of training program for air and effluent samples.</p> <p>Reference: Letter, Allen Conklin, DOH, to Doc Dennis, Allied Technology Group, No Title (re June 17, 1997 Compliance Inspection), dated July 15, 1997.</p>
2	October 8, 1997 AIR 97-1004	<p>DOH APPROVES ATG VARIANCE TO INJECT PLANT SERVICE AIR INTO THE SAMPLE LINE BELOW THE INTAKE [DILUTION OF SAMPLE] TO MITIGATE MOISTURE PROBLEMS.</p> <p>Reference: Letter, Allen Conklin, DOH, to Curt Cannon, ATG, No Title (re request for injection of plant service air), dated October 8, 1997.</p>
3	February 1, 1998 FINAL EIS for TREATMENT Of Low Level Mixed Waste. Jacobs Engineering. No document number.	<p>EIS BASIS FOR APPROVING OPERATIONS</p> <p>The Final EIS Basis relies on historical data for commercial LLW (prior to 1998). Worker doses are based on historical averages for the existing ATG LLW Facility. *Not one of the subsequent air license variances appears to ever have been analyzed against the EIS material at risk assumption, and records requests to DOE, Ecology, and DOH show that NONE OF THEM CAN EVEN FIND the underlying calculations which would show the inventory assumed. DOE and Ecology are SURE they don't have it, and DOH is still looking for it. AMERICIUM-241 IS NOT EVEN MENTIONED OR LISTED IN THIS EIS.] In the Comments, Ecology commented that “Overall, Ecology applauds the <i>brevity</i> and completeness of the EIS.” The EIS Accident Scenarios were all based on an assumed plant life of 10 years, with the actual plant life expected (in 1998) to be 20 years. The routine radiological dose from both (LLW and MLLW) treatment facilities combined was not expected to exceed 200 mrem/year per involved worker as used in the impact analysis.</p> <p>“Groundwater depth at the ATG [now PFNW] Site is slightly greater than 3 m (10 ft) (Ecology 1995, “Washington State Department of Ecology. Letter to the Honorable Jim Hansen, Mayor of Richland, regarding the proposed ATG Thermal Treatment Facility. August 1995.”).” [NOTE: This poses a risk if new waste is liquid and could spill – potentially contaminating Richland’s</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>drinking water wells.] <i>This EIS stated there were <u>no scenarios evaluated that impacted the groundwater.</u></i> This is not the case if PFNW receives sufficient volumes liquid waste (the EIS did not anticipate the case for Oak Ridge Technetium-99 laden sewage sludge transported to PFNW in 5,000 gallon tank car loads....) No evaluation of accidents was made to see if the capacity of secondary containment could be exceeded or if spills of liquid occurred before entering secondary containment. The EIS anticipated receipt of liquids only in small containers. No use of rail transport for MLLW was anticipated either to or from the PFNW site. NOTE: THE DOH AIR PERMIT WN-I0508-1 for Mixed Waste, Amendment 42, allows rail transport into the facility in spite of the lack of scope in the EIS. An EIS/QA/Safety Envelope review versus the permits is needed.</p> <p>This EIS included the Plasma Energy “GAS-VIT” process but not the SAFGLAS (Safeglas caused volatilized cesium) or GEOMELT processes (retention and off-gas systems unknown).</p> <p>Reference: FINAL ENVIRONMENTAL IMPACT STATEMENT FOR TREATMENT OF LOW-LEVEL MIXED WASTE, Prepared by: Jacobs Engineering Group, Inc. for Allied Technology Group, Inc., Richland, Washington, dated February 1998.</p>
4	July 6, 1998 AIR 98-703	<p>DOH NOTICE OF CORRECTION - Associated with Unannounced Inspection of SAFGLAS project on April 24, 1998. The conditions of the NOTICE OF CONSTRUCTION (NOC) were not being met as required by WAC 246-247. A review of waste processing records indicate that [unidentified] radionuclides were processed that were not included in the Notice of Construction.</p> <ul style="list-style-type: none"> • The activity of some radionuclides listed in the NOC have been exceeded, which if allowed to persist, would have had a potential of exceeding the 10 mrem/yr standard. [VIOLATION] <p>Reference: Letter, Allen Conklin, DOH, to Bill Hewitt, Allied Technology Group, No Subject (re Unannounced Inspection), dated July 6, 1998.</p>
5	May 11, 1999 AIR 99-503 EXCEEDING PERMIT CONDITIONS	<p>DOH NOTICE OF CORRECTION CLOSED. As a result of the issuance of new Notices of Constructions (including the replacement of the SAFGLAS emission unit), DOH decided to close its Notice of Correction (letter # AIR 98-703). The Notice of Correction was issued to ATG for <u>exceeding the permit conditions</u> as defined in the original SAFGLAS Notice of Construction.</p> <p>Reference: Letter, Allen Conklin, DOH, to Curt Cannon Allied Technology Group, No Subject, (re issuance of new Notices of Construction at ATG.</p>
162	October 18, 2002 AIR 02-1011 DOH Approval of New Isotopes in ATG Non-	<p>A review of your request to add radionuclides to Non-Thermal Waste Processing Facility has been approved.</p> <p>The conditions, controls; monitoring requirements and limitations for this project (NOC ID 457) are enclosed and replace all previous conditions of approval. These conditions must be observed in order to be in compliance</p>

REF #	DATE/DOC NUMBER	ISSUE
	Thermal Waste Processing Facility. Isotopes not identified.	<p>with our regulations. Failure to meet these conditions and limitations may result in the revocation of approval, and issuance of Notices of Violation, and other potential actions under WAC 246-247-100.</p> <p>These conditions and limitations apply to this NOC only, This approval does not apply to future projects without further review and approval by the Department or Health.</p> <p>[NOTE: Radionuclides are NOT identified. The enclosure to this letter was also missing. The subject of the "project" was not identified.]</p> <p>REFERENCE: Letter, AIR 02-1011, from Allen Conklin, DOH, to Curt Cannon, Allied Technology Group, Inc., no title, dated October 18, 2002.</p>
6	August 1, 2003 PV-03-03	<p>ATG Requests a Variance from their DOH AIR Permit</p> <p>The request is that ATG be allowed up to 300 mCuries of Am-241 in addition to the 100 mCuries allowed for all 84-103 atomic number isotopes and 500 mCuries specifically allowed of Ra-226.</p> <p>I am requesting this extension run through December 31, 2003 which is the same time frame that the contract runs for processing "Legacy" Philotechnics waste. We would like to start thermally processing Philotechnics "Legacy" waste currently on the storage portion of this license.</p> <p>Reference: Letter, Curt Cannon, ATG, to Earl Fordham, DOH, No Subject, (re variance request), dated August 1, 2003.</p>
7	August 5, 2003 DOCKET NO. RCRA-10-2019-0130 Consent Agreement	<p>OWNERSHIP CHANGE. Prior to August 5, 2003, the PFNW Facility was owned and operated by <u>ATG Richland Corporation (ATG)</u>. On August 5, 2003, a <u>bankruptcy court</u> approved the sale of ATG's facility, license, and brokered waste to Pacific EcoSolutions, Inc. (PEcoS) (later to be purchased by Perma-Fix Northwest.)</p> <p>Reference: DOCKET NO. RCRA-10-2019-0130 CONSENT AGREEMENT in the Matter of Perma-Fix Northwest Richland, Inc., U.S. Environmental Protection Agency, August 14, 2019.</p>
163	State of Washington Radioactive Materials License, Amendment No. 20 September 15, 2003	<p>Revision to the ATG License to Change the Company Name. This License Revision includes topics such as a July 16, 2000 request to possess 20 Ci of Ra-226, a request to remove time restrictions from Condition 9, a request to add weight limits to the license, and an amendment request to grant relief from animal carcass storage requirements.</p> <p>ATG shall not receive animal carcasses and other materials that need refrigeration unless onsite cold storage (i.e., <32 °F) is available for all packages requiring cold storage. ATG will maintain such packages in cold storage until thermal processing.</p> <p>Animal carcasses that are not to be processed (i.e., only overpacked for disposal per a licensed disposal site requirement) thermally, may be stored without refrigeration in metal DOT 7A packages or equivalent.</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>A new condition was also added regarding waste allowed onsite when ATG shutdown.</p> <p>REFERENCE: Washington Department of Health License Number WN-10393-1, Amendment 20, dated September 15, 2003, by Mike Elsen, Supervisor. [Copy Unsigned].</p>
8	November 20, 2003 PV-03-03 INCORRECTLY MANIFESTED WASTE AmBe	<p>Pacific EcoSolutions (PEcoS) Request for Variance Modification To Add a Source from Non-Conforming Waste. Currently we have a variance that allows us to have 300 milliCuries of Am-241, this variance expires at the end of the year. ...we may have a source on site that may have been manifested incorrectly to us. Duke University manifested an Am-241 source to us as 50 microCuries. It was reported to us that it may have been an AmBe source with an activity of 50 milliCuries. [Off by a factor of 1,000] If we <u>assume</u> the source is here at the 50 milliCurie range then we will still be in compliance with the variance limits. Unless you notify us that this is inappropriate we will <u>plan to assume that this source is tracked within the current Am-241 variance.</u></p> <p>Reference: Letter, Curt Cannon, Pacific EcoSolutions, to Sean Murphy, DOH, No Subject, (re incorrectly manifested waste), dated November 20, 2003.</p>
9	November 25, 2003 V-03-03	<p>DOH Approves PEcoS Variance Modification to add Non-Conforming Waste. This is in response to your variance request dated November 20, 2003, in which PEcoS sought permission to add one additional americium 241 source to the current valiance (up to 300 mCi of Am-241 until December 31, 2003) possession limits listed in condition 8.D (Atomic numbers 84- 103) of your state of Washington radioactive materials license, WN-10393-1. PecoS's request to <u>add</u> the shipment which contained the Am-241 number LLR01-156 to the current valiance issued on August 21, 2003 (for shipment number LLRQ1-297) is APPROVED.</p> <p>This variance expires on December 31, 2003.</p> <p>Reference: Letter Nancy Darling, DOH, to Curt Cannon, Pacific EcoSolutions, No Subject, (re: variance request of November 20, 2003), dated November 25, 2003.</p>
10	December 22, 2003 PV-03-05 Was V-03-03	<p>Pacific EcoSolutions Request for Variance Extension for <u>Waste not shipped as planned</u> during Variance PV-03-03</p> <p>We currently have a variance allowing up to 300 mCuries of Am-241 which expires December 31, 2003. This waste includes approximately <i>150 mCuries which has been processed</i> and awaiting disposition. We are currently in negotiations with Envirocare of Utah to determine the disposal method (profile and container) for approximately 100 mCuries. Duke University is responsible for 50 mcuries and we are working with them to determine an appropriate recycle facility for this activity.</p> <p>I am requesting that we be allowed up to 200 mCuries of Am-241 in addition to the 100 mCuries allowed for all 84-103 atomic number isotopes and 500 mCuries specifically allowed of Ra-226.</p> <p>I am requesting this extension run through April 30, 2004.</p>

REF #	DATE/DOC NUMBER	ISSUE
		Reference: Letter, Curt Cannon, Pacific EcoSolutions, to Sean Murphy, DOH, No Subject, (Variance Request), dated December 22, 2003.
11	December 23, 2003 V-03-05 No DOH Letter Number	<p>DOH Approves PEcoS Variance Extension with a New Number. This variance request is needed in-order to process approximately 100 mCi of Am-241 waste contained in shipment LLR01-297 and approximately 50 mCi of Am-241 contained in shipment LLR01-156, a neutron gauge that was erroneously sent to ATG by Duke University. [Non-conforming waste.]</p> <p>Your request for a variance to possess 200 mCi of Am241 is approved. This variance expires on March 31, 2004, or when the material is shipped off site.</p> <p>Reference: Letter, Sean Murphy, DOH, to Curt Cannon, PacificEco Solutions, LLC, No Subject (response to variance request), dated December 23, 2003.</p>
12	February 20, 2004 AIR 04-205	<p>DOH NOTICE OF CORRECTION to PEcoS.</p> <p>Associated with December 3, 2003 Inspection. 1) PEcoS is required to compute the effective dose equivalent to a maximally-exposed member of the public from annual facility air emissions... Emissions of radioiodine to the ambient air from the facility were not included in the dose calculations for CY 2002. 2) PEcoS has not conducted monitoring of the effluent stream or analyzed air samples for carbon 14, tritium, and radioiodine as required in licenses for some or its major emission units. 3) The facility has not complied with the requirements of AROP 217 5.2.2 which requires written documentation be sent to the Department for any monitoring data exceeding the "investigation" level. Stack data published in the facility annual report indicates that "trigger levels" for some radioactive constituents in air were exceeded, most notably in May 2002. 4) The facility has not complied with the requirements of the Protean operating procedures AROP 240 that instruct the operator to measure thorium 230 and a cesium 137 source at least five times/week. 5) 40 CFR 61, Appendix B, Method 114, (4.7) requires audits of contract laboratories. The facility uses two contract laboratories and does not monitor either laboratory's compliance with the Quality Assurance Program. Neither laboratory is accredited by Washington State for analysis of radionuclides in air.</p> <p>Reference: Letter, Roy B. Evans, DOH, to Curt Cannon, Pacific EcoSolutions, LLC., No Subject, (re inspection of facility emission units on December 3, 2003), dated February 20, 2004.</p>
13	March 15, 2004 V-03-03 V-03-05 V-04-02	<p>Pacific EcoSolutions Request for Variance Extension. The current variance that was approved on December 23, 2003 allows up to 200 mCuries of Am-241 . [This variance, for the same material, actually dates to AUGUST 2003.] This variance expires March 31, 2004. As you are aware, we have encountered problems with two of the waste streams which contain the bulk of the Am-241 on site. First, 50 mCuries was originally a source that was <u>not manifested correctly</u> [Note - non-conforming waste]. We have thermally treated this source and are working with the generator (Duke University), our customer (Philotechnics), and Envirocare of Utah to determine if it can be</p>

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		<p>disposed of as Am-241 contaminated lead rather than a shielded source. We have initiated an Unusual Event Report (UE) for this source and will close it out upon disposition.</p> <p>Second, during packaging of the second waste stream for disposal, prohibited items for the disposal site were found (lead pigs and batteries). Further investigations found that a source (most likely Cs-137) was located in one of the lead pigs. We have assigned an UE for this occurrence, in addition to contacting the customer concerning the path forward for this waste/material. PEcoS requests that we be allowed to continue the current variance of 200 mCuries of Am-241 in addition to the 100 mCuries allowed for all 84-103 atomic number isotopes and the 500 mCuries specifically allowed of Ra-226. Further, we request that this extension run through September 15, 2004.</p> <p>Reference: Letter, Curt Cannon, Pacific EcoSolutions, to Sean Murphy, DOH, No Subject (re variance extension request), dated March 15, 2004.</p>
14	March 17, 2004 V-03-03 V-03-05 V-04-02	<p>DOH Approves PEcoS Second Variance Extension with a New Number. According to your letter, PEcoS is requesting permission to possess not more than 200 mCi of Am-241, in addition to the license limit of 100 mCi of atomic numbers 84 -103 specified in item 8.D. This variance request is needed in order to process approximately 50 mCi of Am-241 contained in shipment LLR01-156, a neutron gauge that was erroneously sent to ATG by Duke University, and material from Dupont chemical (incoming shipment number LL01- 0297) that was found to contain lead and Cs-137 that was not manifested. [Note - NONCONFORMING WASTE].</p> <p>Your request to extend the variance to possess 200 mCi of Am241 is approved. [NOTE - Approval in only 2 days] This variance expires on May 31, 2004, or when the material is shipped off site, whichever occurs sooner.</p> <p>Reference: Letter, Sean Murphy, DOH, to Curt Cannon, PacificEco Solutions, LLC., No Subject, (re response to March 15 variance request), dated March 17, 2004.</p>
15	April 9, 2004 V-04-05	<p>Pacific EcoSolutions Requests a Variance. This letter is to request an extension to license condition 8.A. of our Radioactive Materials License# WN-I0393-1, Amendment 20. The current activity limit is 360 Curies. [Total Curies to be Possessed at Any One Time]</p> <p>At the time of the purchase (September 15, 2003) of the license and the facility by Pacific EcoSolutions (PEcoS) we agreed to reduce the total activity and combine a couple of the license conditions. Prior to the purchase, the limit of isotopes consistent with condition 8A was 450 Curies. ... <u>The current inventory is approximately 349.4 Curies with current brokerage customers requesting to ship approximately 43.7 Curies.</u> We have already notified these brokerage firms and requested they hold the shipments due to license limitations. PEcoS requests that we be allowed a variance of an additional 60 Curies (less than the amount ready to ship to Envirocare) to 420 Curies for condition 8A This variance is requested until July 31, 2004.</p> <p>Reference: Letter, Curt Cannon, DOH, to Sean Murphy, DOH, No Subject (re extension to 360 Curie activity limit), dated April 9, 2004.</p>

REF #	DATE/DOC NUMBER	ISSUE
16	May 13, 2004 AIR 04-502	<p>DOH CLOSES FINDINGS from December 2, 2003 Inspection [Report dated February 20, 2004]. We have reviewed and accept your responses to areas requiring correction identified by Department of Health inspectors in December 3, 2003, letter # AIR 04-205, Audit # 334. As noted in our original letter, WDOH inspectors will reassess these areas in future inspections. In addition, you note the GasVit process ventilation (Finding ID: 411) has not operated for the past couple years, and current stack monitoring practices are outside the requirements of the license. We propose to meet regularly with your staff throughout this year to revise, as necessary, all emission licenses at your facility.</p> <p>Reference: Letter, AIR 04-502, Roy B. Evans, DOH, to Curt Cannon, Pacific EcoSolutions, LLC., No Subject (re Responses to areas requiring correction), dated May 13, 2004.</p>
17	May 13, 2004 PV-04-07	<p>Pacific EcoSolutions Requests a Variance EXTENSION This letter is to request an extension to the variance received March 17, 2004 and due to expire May 31, 2004 to our Radioactive Materials License# WN-10393-1, Amendment 20, condition 8D. [200 mCi Am-241]. PEcoS requests that we be allowed to continue with this variance increase at the 200 millicurie level until September 15, 2004.</p> <p>Reference: Letter, Curt Cannon, Pacific EcoSolutions, to Sean Murphy, DOH, No Subject, (re variance request), dated May 13, 2004.</p>
18	May 17, 2004 V-04-05	<p>DOH Approves PEcoS Variance For Total Activity. This is in response to your letter of April 9, 2004, requesting a variance to your radioactive material license number WN-I0393-2 condition 8A. Specifically, you requested the activity allowed by the license be temporarily increased to 420 curies from its current level of 360 curies. According to your letter, you were in contract negotiations with Envirocare of Utah (ECU). Since the date of your request, you have informed us that the contract have been signed, for new, legacy and ATG legacy material. You have also informed us that there is insufficient time to process the paperwork, and additional time is needed to reduce your inventory. This variance is approved. This variance expires on July 31, 2004, at which time the current license amount shall be enforced (360 curies).</p> <p>Reference: Letter, Sean Murphy, DOH, to Curt Cannon, Pacific Eco Solutions, LLC., No Subject, (re response to variance request), dated May 17, 2004.</p>
19	May 18, 2004 NO LETTER NUMBER. PV-04-07	<p>DOH Requests More information on Variance Extension Request PV-04-07. We have received your request for variance from Condition 8.D of your radioactive material license number WN-10393-1, dated May 13, 2004. You requested to extend a current variance that allows PEcoS to possess up to 200.0 mCi of Atomic Number 84-103. In your letter, you describe the waste as being sources that are contained in lead pigs, that can be macro encapsulated, separated, or both. You also indicate that you are working with Philotechnics to resolve these issues. We need more information to process your request.</p>

REF #	DATE/DOC NUMBER	ISSUE
		Reference: Letter, Sean Murphy, DOH, to Curt Cannon, Pacific EcoSolutions, LLC., No Subject, (re May 13, 2004 variance request), dated May 18, 2004.
20	May 21, 2004 PV-04-07	<p>Pacific EcoSolutions Responds to Request for Information. Response: This waste has been on site since before the bankruptcy of ATG.</p> <p><i>Generally, why do you require a variance from your license?</i> Response: The license activity on site exceeds those limits allowed by WDOH since the transfer of the license to PEcoS.</p> <p>[NOTE: THIS IS A VIOLATION SINCE AUGUST 5, 2003]</p> <p><i>What isotopes are causing you to exceed your license limit?</i> Response: Am-241</p> <p>Reference: Letter, Curt Cannon, Pacific EcoSolutions, to Sean Murphy, DOH, No Subject, (re response to May 18, 2004 letter requesting information), dated May 21, 2004.</p>
21	June 1, 2004 PV-04-07	<p>DOH APPROVES VARIANCE EXTENSION. PV-04-07. We have received your request for variance from condition 8.D of your radioactive material license number WN-I0393-1, dated May 13 and May 21, 2004. You requested to extend a current variance that allows PEcoS to possess up to 200 mCi of atomic number 84-103. [due to Am-241] In your letter, you describe the waste as being sources that are contained in lead pigs, that can be macro encapsulated, separated, or both. You also indicate that you are working with Philotechnics and the original generators to resolve these issues. This variance is approved, and expires on July 1, 2004.</p> <p>Reference: Letter, Sean Murphy, DOH, to Curt Cannon, Pacific Ecosolutions, LLC. (PEcoS), No Subject, (re May 13 and Mat 21, 2004 variance request), dated June 1, 2004.</p>
22	June 30, 2004 PV-04-07	<p>Pacific EcoSolutions Requests Variance Extension. The purpose of this letter is to request an extension to the variance received June 1, 2004, and due to expire July 1, 2004 to our Radioactive Materials License# WN-I0393- 1, Amendment 20, condition 8 D. ... PEcoS requests that we be allowed to continue with this variance increase at the 200 millicurie level until September 15, 2004. [Am-241]</p> <p>Reference: Letter, Curt Cannon, Pacific EcoSolutions, to Sean Murphy, DOH, No Subject, (re request variance extension for variance receive June 1, 2004), dated June 20, 2004.</p>
23	June 30, 2004 PV-04-07	<p>DOH MAKES VARIANCE APPROVAL. We have received your request for variance from Condition 8.D of your radioactive material license number WN-10393-1, dated May 13, May 21, and June 30, 2004. You requested to extend a current variance that allows PEcoS to possess up to 200 mCi of atomic number 84-103. In your letters, you describe the waste as being sources</p>

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		<p>that are contained in lead pigs, that can be macro encapsulated, separated, or both. You also indicate that you are working with Philotechnics and the original generators to resolve these issues.</p> <p>This variance is approved, and expires on August 1, 2004. [Am-241]</p> <p>Reference: Letter Sean Murphy, DOH, to Curt Cannon, Pacific EcoSolutions, LLB (PEcoS), No Subject, (re May 13, May 21 and June 30, 2004 variance request), dated June 30, 2004.</p>
24	July 29, 2004 PV-04-07	<p>Pacific EcoSolutions Requests Variance Extension. The purpose of this letter is to request an extension to the variance received June 30, 2004, and due to expire August 1, 2004 to our Radioactive Materials License# WN-10393-1, Amendment 20, condition 8 D. ...PEcoS requests that we be allowed to continue with this variance increase at the 200 millicurie level until September 15, 2004. [Am-241]</p> <p>Reference: Letter, Curt Cannon, DOH, to Sean Murphy, Pacific EcoSolutions, No Subject, (re extension to variance received June 30, 2004), dated July 29, 2004.</p>
25	July 30, 2004 PV-04-07	<p>VARIANCE APPROVED BY DOH [1 Day APPROVAL]. We have received your request dated July 29, 2004, for a variance extension from Condition 8.D of your state of Washington radioactive materials license WN-10393-1. You requested to extend the current variance (issued 8-21-03) that allows PEcoS to possess up to 200 mCi of Atomic Numbers 84-103, that expires August 1, 2004. In your letter, you described the waste as being sources that are contained in lead pigs, that can be macro-encapsulated, separated, or both. You have also indicated that you are working with Philotechnics and the original generators to resolve these issues, and have told them that future shipments may be curtailed if this material is not removed. Your request for an extension to the variance is granted. This approval expires on September 15, 2004. Am-241.</p> <p>Reference: Letter, Sean Murphy, DOH, to Curt Cannon, Pacific EcoSolutions, LLC., (PECoS), No Subject, (re Request of July 29, 2004), dated July 30, 2004.</p>
26	September 13, 2004 PV-04-07	<p>Pacific EcoSolutions Requests Variance Extension. The purpose of this letter is to request an extension to the variance received July 30, 2004 and due to expire September 15, 2004 to our Radioactive Materials License# WN-10393-1, Amendment 20, condition 8 D. With the past difficulties we have had with disposal of waste at EnviroCare, Pecos considers it prudent to have the profile approved before we combine and package any waste for shipment. Initial contact has been made with EnviroCare and we feel we believe we should be able to get the profile approved within the next 45 days. With an additional two weeks to prepare for shipment and a two week contingency we are requesting this variance be extended to December 1, 2004.</p>

REF #	DATE/DOC NUMBER	ISSUE
		Reference: Letter, Curt Cannon, Pacific EcoSolutions, to Sean Murphy, DOH, No Subject, (re extension for variance received July 30, 2004), dated September 13, 2004.
27	September 22, 2004 PV-04-07	<p>DOH MAKES VARIANCE APPROVAL. In the original approval letter, PEcoS was granted a variance to possess not more than 200 mCi of Am-241, in addition to the 100 mCi limit for Atomic Numbers 84-103, specified in Item 8.D of your license. This variance request is needed in order to process approximately 50 mCi of Am-241 contained in shipment LLR01-156, a neutron gauge that was erroneously sent to ATG by Duke University, and material from Dupont Chemical (incoming shipment number LL01-0297) that was found to contain lead and Cs-137 that was not manifested. According to your September 13 letter, PEcoS will transfer the waste to the mixed waste license (WN-I0508-1), and then ship it to Envirocare of Utah for treatment and disposal no later than December 1, 2004. Your request to extend the variance to possess the additional 200 mCi of Am-241 is approved. This variance expires on December 1, 2004, or when the material is shipped offsite, whichever occurs sooner.</p> <p>Reference: Letter, illegible, for Sean Murphy, DOH, to Curt Cannon, Pacific EcoSolutions, LLC., No Subject, (re response to September 13, 2004 variance extension request), dated September 22, 2004.</p>
28	October 7, 2004 AIR 04-1003	<p>DOH REJECTION of Pacific EcoSolutions Notice of Construction Application for Off-Gas HEGA Removal. Because high efficiency gas adsorber (HEGA) banks are the only abatement for radioactive Iodine, their removal is difficult to justify. Process control problems apparently do exist, and render the maintenance and effectiveness of the HEGAs problematic. This alone does not justify removal of the HEGAs. Process control improvements should be investigated. If such improvements prove to be of prohibitively high cost for the benefit gained, then removal of the HEGA banks might be justifiable. The studies that establish the prohibitive cost benefit should be incorporated into the NOC application</p> <p>Reference: Letter, AIR 04-1003, A.W. Conklin, DOH, to Curt Cannon, Pacific EcoSolutions, No Subject (re: review of July 8, 2004 Notice of Construction information provided on August 2, 2004, and August 27, 2004, dated October 7, 2004.)</p>
29	January 14, 2005 AIR 05-102	<p>DOH VIOLATION NOTICE. Operation with degraded abatement equipment that has been claimed in the license application is a violation of the license. DOH learned in 2004 that PEcoS has operated its low level radioactive waste-thermal (LLRW-T) process with degraded high efficiency gas adsorbers (HEGA). An abatement efficiency of 90% was claimed in emission estimate calculations supporting the license. PEcoS has informed DOH that actual HEGA efficiency is closer to 1%. This constitutes a potentially serious emissions problem, because the HEGA is the only abatement for processed radioactive isotopes of iodine. PEcoS is required to cease processing if abatement equipment efficiency is degraded below that claimed in the emissions calculations that support the</p>

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		<p>license. PEcoS may request to resume processing under special administrative controls.</p> <p>Reference: Letter, AIR 05-102, No Subject, Allen Conklin, DOH, to Curt Cannon, Pacific EcoSolutions, No Subject, (re Notice of Construction), dated January 14, 2005.</p>
30	<p>February 18, 2005 (letter said 2004) PV-05-04</p> <p>No emergency Plan Note: letter is dated 2004, but the receipt stamp of 2/24/2005 indicates the year was a typo.</p>	<p>Pacific EcoSolutions Request for ADDITIONAL AM-241 VARIANCE. This letter is to request a variance to our Radioactive Materials License #WN-10393-1, Amendment 20, Condition 8 D., specifically concerning Am-241. A customer has requested that we receive, inspect and verify conformance, and ship to EnviroCare of Utah disposal site five (5) drums of waste with high levels of Am-241. The anticipated activity for the drums is [a total of 2,370 mCi (2.37 Ci).] [Waste from Du Pont.] In earlier discussions Washington Department of Health (WDOH) has expressed interest in PEcoS implementing an Emergency or Contingency Plan. PEcoS will commit to submit a draft of the plan to WDOH for initial review on or before June 30, 2005. PEcoS is requesting this variance for receiving and processing this waste for appropriate disposal. The variance would be needed for eight months from the receipt of the waste.</p> <p>Reference: Letter, Curt Cannon, Pacific EcoSolutions, to Sean Murphy, DOH, No Subject, (re: variance request for 5 drums with Am-241 with anticipated amounts of 652, 145, 891, 100, and 582 millicuries), dated “February 18, 2004” but stamped “received” by DOH on February 24, 2005.</p>
31	<p>March 8, 2005 PV-05-04</p>	<p>DOH DENIES VARIANCE FROM Feb 18, 2004. VARIANCE FOR 2.4 Ci AM-241 DENIED. PRIMARILY DUE TO LACK OF EMERGENCY PLAN. This is in response to your letter dated February 18, 2005, seeking a variance to possess five drums of radioactive material containing approximately 2400 mCi of Am-241. This amount would be in addition to the 100 mCi limit for Atomic Numbers 84-103, specified in Condition 8.D of license WN-I0393-1. This variance request is needed in order to process material contained in a single [future] shipment from DuPont Chemical. This request is not only for a variance to Condition 8.D, but also to Condition 24 of your license. Condition 24 requires <i>in part that you possess an emergency plan if the sum of fractions for WAC 246-235-150, Table C, exceeds unity</i>. The limit for Am-241 is 2000 mCi; the sum of fractions for your facility would be greater than one for this material alone. As discussed previously, PEcoS <i>is already close to unity</i> for the material you already possess, and allowing this request would result in the sum of fractions being greater than unity. The Department of Health's primary objection is your lack of an emergency plan, [NOTE - no public safety was evaluated] and that you will be exceeding unity as specified in WAC 246-235-150. By reviewing WAC 246-235-077, you may find methods of handling this material that are suitable to your facility and to the department. Your request for a variance from Condition 8.D for Am-241 is denied.</p>

REF #	DATE/DOC NUMBER	ISSUE
		Reference: Letter, Sean Murphy, DOH, to Curt Cannon, Pacific EcoSolutions, No Subject, (Re: response to February 18, 2005 variance request), dated March 8, 2005.
32	April 1, 2005 PV-05-07 or PV-05-04.	<p>Pacific EcoSolutions SECOND Request for ADDITIONAL AM-241 VARIANCE (first was February 18, 2005). These drums were not shipped yet and were NOT legacy waste from ATG. This letter is to request a variance to our Radioactive Materials License #WN-10393-1, Amendment 20, Condition 8 D., specifically concerning Am-241. A customer has requested that we receive, inspect and verify conformance, and ship to EnviroCare of Utah disposal site five (5) drums of waste with high levels of Am-241. The anticipated activity for the drums is as follows: 652 mCi • 145 mCi • 891 mCi 100 mCi • 582 mCi [Total is 2,370 MCI]</p> <p>Reference: Letter, Curt Cannon, Pacific EcoSolutions, to Sean Murphy, DOH, No Subject, (re: variance request), dated April 1, 2005.</p>
33	<p>April 18, 2005 Case 3:09-cv-00472-PLR-CCS Document 1</p> <p>[Document filed 10/29/09]</p>	<p>On April 18, 2005, Philotechnics and the then-party to the Contract, Pacific EcoSolutions, entered into Task Order no. 4 to the Contract for the processing of twelve drums of waste from DuPont that was contaminated with what was believed to be at the time low levels of Americium Isotope 241 (Am-241). Thereupon, PFNW discovered that instead of containing the low levels of Am-241 identified in the shipping papers, the DuPont waste contained isotopes that exceeded PFNW's WAC limits. In particular, PFNW discovered that the DuPont waste included Am-241 at levels <u>higher than reported as well as Strontium 90 (Sr-90), an isotope that was</u> nowhere disclosed on the waste characterization information included in the shipping manifest provided by Philotechnics to PFNW the nuclear activity levels exhibited by the nonconforming waste stored at the PFNW facility exceed[ed] both the facility's license quantity and the limits of the volume and nature of the work that PFNW can undertake to perform.</p> <p>Reference: Complaint, Perma-Fix Northwest, Richland Inc., v Philotechnics, LTD, Case 3:09-cv-00472-PLR-CCS Document 1, Complaint, filed in the U.S. District Court, Eastern District of Tennessee, Document 1, October 29, 2009.</p>
34	April 20, 2005 PV-05-04	<p>VARIANCE APPROVED BY DOH. DOH ROUNDS UP. This is in response to your letter dated April 1, 2005 seeking a variance to possess five drums of radioactive material containing approximately 2500 mCi of Am-241. This amount would be in <i>addition to the 100 mCi</i> limit for Atomic Numbers 84-103, specified in Item 8.D of license WN- 10393-1. This variance request is needed in order to process material contained <i>in a single shipment of five drums from DuPont Chemical</i>. According to your letter, PEcoS will open only one container of material at a time, for the purpose of non-thermal processing which would include sorting and inspection for prohibited items and compaction if possible. All containers that are not open will be stored in a DOT type B container as required by WAC 246-235. Each opened drum will</p>

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		<p>be processed in a tent, and the tent will be either decontaminated, or removed and disposed of following processing of this material. All of the material will be removed from your site by November 1, 2005.</p> <p>In addition to having only one of the five drums out of its type B container at a time, any waste container generated as a result of this project will also be either:</p> <ul style="list-style-type: none"> • stored in a type B container under this variance, • stored under license number WN-10393-1, or • Transferred to another license. <p>Your request for a variance from Condition 8.D for Am-241 is approved. This variance will expire on November 1, 2005.</p> <p>Reference: Letter, Sean Murphy, DOH, to Curt Cannon, Pacific EcoSolutions, No Subject, (re: response to variance request of April 1, 2005), dated April 20, 2005.</p>
35	May 6, 2005 PV-05-07	<p>Pacific EcoSolutions Request for REVISION by VARIANCE. <i>This letter is a request to revise the LLTH air permit AIR 05-305. The below paragraph is the revised version of the last paragraph of the application for describing the off-gas system for the BPU's (see #5 page 3). I am additionally requesting that a variance be approved concerning the description in the AROM allowing us to make these upgrades as part of the approach PEcoS is taking to <u>minimize moisture in the off-gas system</u>. [The upgrades during this phase are expected to take approximately eight weeks to complete.</i></p> <p>“OFF-GAS TREATMENT <i>The off-gas from the thermal processing units passes into the process off-gas system. The hot off-gas first passes into a Dry Acid Absorber chamber. The absorber chamber is equipped with back up quench capability for emergency cooling by an atomized spray of water and/or air that is provided if the first quencher does not lower the temperature to a temperature of less than 550°F The cooled off-gas then gases passes into the baghouse, which removes both coarse and fine particulate matter with an efficiency of greater than 99% for particles larger than 1.0µm and 85% for 0.3µm. The gas then passes through a high temperature filtration unit which consists of a bank of pre-filters, intermediate filters and HEPA filters. The treated process off-gas is then discharged into the main ventilation plenum. The gas is typically above 220 °F when it mixes with building ventilation air. The building ventilation air and process off-gas mixture is further treated through pre-filters, intermediate filters, and HEPA filters prior to monitoring and discharge. A duct heater may be used to maintain the off-gas temperature above the dew point.”</i></p> <p>PEcoS requests that the variance be issued and approved until an amendment can be issued to update the AROM facility descriptions.</p> <p>Updated drawings of the LLTH process flow off-gas to be submitted to WDOH with license amendment request by September 15, 2005 [NOTE – MOISTURE CAUSES CORROSION AND MAKES CONTAMINATION MOBILE and PFNW has moisture in the off-gas system]</p> <p>Reference: Letter, Curt Cannon, Pacific EcoSolutions, to Al Conklin and</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>Sean Murphy, DOH, No Subject, (re: request to revise Low Level Thermal Air Permit 05-305), dated May 6, 2005.</p>
36	<p>July 5, 2005 PV-05-07 No DOH Letter Number.</p>	<p>DOH REJECTS Pacific EcoSolutions VARIANCE. This is in response to your letter dated May 6, 2005, seeking a variance and amendment from your radioactive materials license number WN-I0393-1. Specifically, you requested a variance and amendment to change the description of the off gas system for the BPU's, [Bulk Thermal Process Units] as described in the AROM (LLOM) section 2.2.8.1 (E) and (F).</p> <p>Please resubmit this request in the form of a license amendment application. Include the process description as it appears on your air emissions license and drawing with the system in its final configuration. Also include updates to your LLOM and drawings that have changed since the initial issue of your license, such as the new gate on the west fence.</p> <p>[NOTE – LICENSE HAS NOT BEEN KEPT UP TO DATE.]</p> <p>Reference: Letter, Illegible for Sean Murphy, DOH, to Curt Cannon, Pacific EcoSolutions, LLC., No Subject, (re: response to May 6 variance and amendment requests), dated July 5, 2005.</p>
37	<p>October 18, 2005 PV-05-14 (Previously Was PV-05-04)</p>	<p>Pacific EcoSolutions Request for VARIANCE EXTENSION FROM APRIL 1, 2005 and April 20, 2005 (and February 18, 2005). This letter is a request for an extension of a variance which was requested on April 1, 2005 and approved April 20, 2005. [FOR 2,500 mCi of Am-241 in a NEW shipment - not legacy ATG waste.] Said variance is related to our Radioactive Materials License #WN-I0393-1, Amendment 20, Condition 8 D., specifically concerning Am-241 which is set to expire November 1, 2005.</p> <p>The waste material [Originally from DuPont] has all been sorted, which included an inventory of all sources found. The bulk of the activity seems to be in the sources. The inventory has been sent to Los Alamos National Lab (LANL) with the plan to send the sources to them as part of the off-site source recovery project. LANL requested additional information. Leak tests results, identifying markings and the basic measurements were forwarded to LANL. Five of the sources were found to be too large (physical size) for their standard special form containers. Work has been ongoing for how those five sources will be packaged.</p> <p>During the week of November 14, 2005, LANL representatives from the source recovery program will be at PEcoS to assist in preparing the sources for shipping. The sources are currently stored in closed type B containers. The sources will need to be removed from the type B containers and packaged as special form and prepared for shipment by PEcoS and LANL staff.</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>The sources should be packaged and ready for shipment by November 30, 2005 and shipped to LANL by December 31, 2005.</p> <p>Reference: Letter, Curt Cannon, Pacific EcoSolutions, to Sean Murphy, DOH, No Subject, (Re: request for extension of variance that was approved April 20, 2005), Dated October 18, 2005.</p>
38	November 8, 2005 PV-05-14 [was PV-05-04]	<p>DOH APPROVES VARIANCE EXTENSION This is in response to your letter dated October 18, 2005, requesting an extension to the variance issued April 20, 2005, that allows possession of five drums of radioactive material containing approximately 2500 mCi of Am-241.</p> <p>According to your letter, this request is needed to allow for further inspection, packaging, and shipping of the material <i>which was not originally anticipated</i>. Additionally, you stated that you will be removing the sources that meet the definition of Special Form (WAC 246-231-010(21)), and packaging them for shipment. The department has reviewed your request and approves the request for an extension. Approval is subject to the following requirements:</p> <ol style="list-style-type: none"> 1. PEcoS will open containers only in a tent, which will be either decontaminated, or removed and disposed of following processing of the material. 2. PEcoS may possess the special form sources which may exceed the 2 Ci limit of 246-235, Table 2, outside of a Type B container while preparing the sources for transport; however, the sources must be returned to a Type B container when not being prepared for shipment, and at the end of each day. This variance will expire on December 31, 2005, or when the material is removed from your facility, whichever occurs sooner. <p>Reference: Letter, Sean Murphy, DOH, to Curt Cannon, Pacific EcoSolutions, No Subject, (re: response to October 18, 2005 request for variance extension), dated November, 8, 2005.</p>
39	May 10, 2006 PV-06-07	<p>Pacific EcoSolutions Request for VARIANCE. This letter is to request a variance to our Radioactive Materials License #WN-I0393-1, Amendment 23, Condition 8 D., specifically concerning Am-241.</p> <p>A customer has requested that we receive, inspect, verify conformance, and ship to Energy Solutions of Utah disposal site twelve (12) drums of waste with high levels of Am-241. The anticipated activity for this license condition is 190 millicuries <i>from these drums alone</i>. Each drum would be brought in for non-thermal processing which would include sorting and inspection for prohibited items and compaction if possible. The drums would be opened in a containment tent located in an existing process room with the ventilation tied into the building process ventilation system. The containment has a process area and an egress area that may be used for decontamination and/or transferring equipment into other containers. In the event the tent cannot be decontaminated to a reasonable level, it would be collapsed and added to the waste sent to Energy Solutions of Utah. The waste in question would most likely be received later this month. The processing, approval for shipping, and disposal is estimated to take from six to eight months. PEcoS is requesting this variance to condition 8. D. up to 300 millicuries for receiving and processing of this waste for appropriate disposal. The variance would be needed for eight months from the receipt of the waste. [NOTE: SEE</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>ENTRY FROM OCTOBER 29, 2009. This waste Exceeded PFNW Waste ACCEPTANCE CRITERIA.]</p> <p>Reference: Letter, Curt Cannon, Pacific EcoSolutions, to Sean Murphy, DOH, No Subject, (re: variance request for 12 drums with Am-241), dated May 10, 2006.</p>
40	June 13, 2006 PV-06-07	<p>DOH APPROVES Pacific EcoSolutions VARIANCE. This is in response to your letter dated May 10, 2006, in which you sought a variance from License Condition 8.D of license WN-I0393-1. Specifically, you requested that PEcoS be allowed to receive Am-241 in excess of your License Condition 8.D. The Am-241 is in 12 drums, and PEcoS will sort the drums and dispose of the material at Energy Solutions in Utah.</p> <p>As you stated in your letter and discussion with you on June 8, 2006, the drums will be opened in a tent located in building 1 or 2 (volume reduction), <i>and a process ventilation system will be connected to the tent and then to the building ventilation.</i> The containment tent has an egress area that can be used for decontamination and for transferring or repackaging material. The tent and other contaminated material will be disposed of as customer waste if it cannot be decontaminated. This variance increases the amount of radioactive material with atomic numbers 84-103 you may possess onsite from 100 mCi to 300 mCi. Provided that all statements and representations made in your letter are strictly adhered to, your request for a variance is approved. This variance allows PEcoS to receive, process, and store up to 300 mCi of Am-241 in accordance with this letter and your radioactive material license. This variance expires February 28, 2007 or when the waste is shipped offsite, whichever occurs first.</p> <p>Reference: Letter, Illegible, for Sean Murphy, DOH, to Curt Cannon, Pacific EcoSolutions, "Subject: PV-06-07," dated June 13, 2006.</p>
41	July 5, 2006 PV-06-11 Tritium	<p>Pacific EcoSolutions Request for VARIANCE. This letter is to request a variance to our Radioactive Materials License #WN-I0393-1, Amendment 24, Condition 8 A., specifically concerning H-3.</p> <p>PNNL has requested that we receive and process approximately ten containers of liquid and/or solidified liquid containing a total of approximately 500 Curies of H-3. [This exceeds the maximum quantity of 360 Curies allowed to be present at any one time.]</p> <p>Each container would be processed in the low-level thermal (LLTH) facility (most likely BPU1). The total allowed H-3 for the LLTH facility is 2500 Curies [total tritium annual possession limit for a whole year]. PEcoS has processed approximately 78.6 Curies this year. PEcoS has baseline data for the process technicians who might work with this waste. Additional <i>(follow-up) monitoring</i> would occur in the event that any person came in direct contact with contamination levels in excess of 100,000 dpm/100 cm² [Note – this is after the fact] .</p> <p>The waste in question is anticipated to be received in July 2006 with the ability to remove this activity within thirty days of receipt.</p> <p>Rather than request a variance to the levels in condition 8.A, [NOTE: 8A limits the sum of curies to 380 for all isotopes from atomic numbers 1 to 83 present at any one time] PEcoS is requesting a <i>variance line item strictly</i></p>

REF #	DATE/DOC NUMBER	ISSUE
		<p><i>for this waste allowing up to 500 Curies to be received in July 2006 and processed and removed from site or added to the current license condition 8.A, thirty days following receipt. [Note - the thermal facility means the tritium goes right up the stack into the air - a novel definition of "removed from the site!"] The variance means allowing PFNW to exceed the maximum quantity limit for any one time, and put it up the stack in a thermal process in 30 days.</i></p> <p>Reference: Letter, Scott Call, Pacific EcoSolutions, to Sean Murphy, DOH, No Subject, (re: license variance request for tritium), dated July 5, 2006.</p>
42	July 6, 2006 Case 3:09-cv-00472 Document 44 (filed January 10, 2012)	<p>On or about July 6, 2006, the twelve drums of DuPont Waste under Task Order No. 4 were delivered to the Facility. Thus, in accordance with its contractual obligation to complete the work within 450 days, PFNW (via its predecessors) had until SEPTEMBER 29, 2007, to do so. [See entry at April 18, 2005].</p> <p>Reference: Complaint, Perma-Fix Northwest, Richland Inc., v Philotechnics, LTD, Case 3:09-cv-00472-PLR-CCS Document 44, Third Party Complaint, filed in the U.S. District Court, Eastern District of Tennessee, Document 1, January 10, 2012.</p>
43	July 17, 2006 PV-06-11	<p>DOH APPROVES Pacific EcoSolutions TRITIUM VARIANCE. This letter is in response to your request of July 5, 2006, in which PEcoS sought permission to increase the license limit above Condition 8.A (360 curies - 13.3 TBq atomic numbers 1-83). Specifically, PEcoS is requesting permission to possess ten containers containing approximately 500 curies of tritium from PNNL as a separate line item under Condition 8.A. <i>The ten packages will be processed and removed from your facility within 30 days.</i></p> <p>A variance for possession of 500 curies of tritium, contained in ten containers from PNNL, in addition to the 360 curies allowed under Condition 8.A, is granted.</p> <p>This variance expires on August 31, 2006, or when the material is removed from your site.</p> <p>Reference: Letter, Illegible for Sean Murphy, DOH, to Curt Cannon, Pacific EcoSolutions, Subject: WN-I0393-1 Variance (PV-06-11), dated July 17, 2006.</p> <p>Third Party Complaint, Perma-Fix Northwest, Richland Inc., v Philotechnics, LTD, Case 3:09-cv-00472-PLR-CCS Document 44, filed in the U.S. District Court, Eastern District of Tennessee, Document 44, January 10, 2012.</p>
44	November 8, 2006 NRC Event Report 42962 Material from 12 Drums	<p>NRC REPORTABLE NUCLEAR LICENSING EVENT. WASHINGTON STATE AGREEMENT STATE REPORT. "On November 1, three workers were involved in separating sources, lead pigs</p>

REF #	DATE/DOC NUMBER	ISSUE
	= VARIANCE PV-06-07	<p>(shielded containers) and trash from a barrel. Work was being conducted in a ventilated enclosure within a PEcoS (Pacific EcoSolutions) waste processing building. Two workers inside the enclosure were wearing respirators and the supervisor (not wearing a respirator) was immediately outside the enclosure directing the work. At the end of the day, the supervisor noted he was contaminated. The supervisor was scheduled for whole-body counting at the Battelle facility early the next day. An uptake of approximately 11.7 nanocuries of Americium 241 was confirmed. The preliminary dose estimate to the individual's lung was 97.5 Rem CDE. The individual was started on chelation treatment. The other two workers were sent for whole body counting on November 3.</p> <p>"The operation included opening one lead pig that contained three Am-241 sources. ...</p> <p>"Isotope and Activity involved: Am-241 total activity from twelve drums was manifested at 6.8 GigaBq (184 millicuries). Only one drum was open at the time of the incident..... One worker has an apparent over exposure of 97.5 Rem CDE to the Lung.</p> <p><i>[NOTE – THESE ARE THE 12 DRUMS FOR WHICH PEcoS/PFNW requested a variance on MAY 10, 2006, PV-06-07, APPROVED by DOH on JUNE 13, 2006. The offending drum would not have been present if there was no variance to accept waste above 100 mCi of Am-241. NOTE ALSO, According to court documents, “instead of containing the low levels of Am-241 identified in the shipping papers, the DuPont waste contained isotopes that exceeded PFNW’s WAC limits.” Including Sr-90. See April 18, 2005 Entry.</i></p> <p>Reference: U.S. NRC Event Notification Report for November 8, 2006 Event No. 42962, “Washington State Agreement State Report,” available at https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2006/20061108en.html</p>
157	November 9, 2006 PEcoS <u>DRAFT Am-241 Work Plan</u>	<p>“Introduction... PEcoS <u>has accepted</u> a waste stream of Americium-241 in receipt LLR60-059 containing <u>"orphan sources"</u> that <u>present a risk to those who come in contact with them</u>. EPA, other federal, state and industry organizations are working together to locate and retrieve orphan sources throughout the U.S. Room 3 of building #2 Volume Reduction (YR) is the process location for this receipt.”</p> <p>“Purpose This plan is to assist the Health Physics (HP) and Operations personnel in setting up and preparing a safe work area for the <u>initial access and future processing of the Americium contaminated material.</u>”</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>“A Ludlum model 12-4 KEM BALL is available and will be used to take Neutron dose measurements of any Americium/Beryllium sources which <u>may be</u> in this receipt.”</p> <p>NOTE: No mention is made in this plan of the overexposure event of November 8, or that this was <u>non-conforming waste</u> as identified (Am-Be) source per entry on <u>November 20, 2003</u>. The original variance was solely for AM-241. This document is only a draft. Why was there no plan in 2003? Why did DOH allow PEcoS to process “orphan” sources? Where was the hazards analysis? Note – this is not planning for “initial access” since an accident has already occurred.</p> <p>Reference:</p>
158	November 14, 2006 DOH Status Memo AM-241 Overexposure	<p>“On November 1, 2006, employees at the Pacific EcoSolutions plant in Richland Washington were overexposed to airborne radioactive material. The isotope of concern was Am-241. Following discovery of the loss of control of the material, the building in which the work was being conducted was evacuated. The employees were decontaminated externally, invivo and invitro bioassays were conducted, and medical treatments were started to help remove the Am-241 from their bodies.”</p> <p>“The employee's are <u>still being treated</u> with a chelating agent. This week should be the start of reduced administration of the agent. It will be several weeks before the final dose can be calculated, based on the initial lung count, the bioassay results (urine/fecal), and the effectiveness of the chelate at removing the americium from the body.”</p> <p>“The contaminated room is still inaccessible.”</p> <p>“The investigation is continuing, and the actual cause of the event does not appear to be a single cause, rather compounding mistakes, errors in judgment and complacency for the seriousness of this type material.”</p> <p>[NOTE – the complacency appears to include DOH]</p> <p>“Corrective action that are being taken are primarily based on self evaluation, using the worker and technical staff, and responding to the issues raised in a <u>contentious manner.</u>”</p> <p>Reference: Memo, Sean Murphy to Pecos 11-1-06 Am-241 Incident File, “Status of Event,” dated November 14, 2006. Company not identified and there is no signature, however, Sean Murphy is listed elsewhere as a DOH Employee.</p>
159	PEcoS Radiological Survey Report Narrative November 14, 2006	<p>“Room 3 has containment with an ante-room which is ventilated by a bag-house and an air-mover tied into the process vent. An air mover is staged inside the room to assist with removal of airborne contaminants.</p> <p>Containment with 2 person and 2 equipment ante-rooms is located outside of room 3.</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>Entry was made into the room by Scott Call (Supplied Air/SA) .</p> <p>1st ante-room Jeremy Rutherford (APR) 2nd ante-room Eric Jones (APR) East Bay Canyon Hoopes (APR)</p> <p>Annex count station - Rhonda Coughren / Paul Muth</p> <p>Jeremy and I had to cut the flooring of the containment outside of room 3 to allow access as the layers were too deep to allow the man door to be opened. I accessed the room on S/A, moved to the room 3 air-line placed through a hole in the garage door. Pulled into the room and moved to the man door for assistance in transferring from the trailing air-line to the room 3 air-line. Transfer completed.</p> <p>Air sample set-up upon entry and moved to the south side of the containment in the room to open aside and allow for a greater negative air flow for the room. Bag-house and the air mover attached to the containment did not exhibit any discernable velocity of air flow, although a slight movement air into the vents was verified.</p> <p><u>~ 4-5 million dpm/100cm2 alpha contamination was on the plastic.</u> I moved the drums and air mover off of the plastic (highlighted in yellow) and rolled the plastic from the North to the South and bagged. See location the bag was left at on the survey report in red.</p> <p>Follow-up smears of the floor following were--~400-500,000dpm/100cm2 alpha. I then wetwiped the entire floor twice with wetted rags pushed across the floor area with a masslin mop.</p> <p>As the floor was drying I wiped down the supplied air line and prepared for exit. Outer pair removed and the bagged model three stripped of the plastic covering. S/A line transition made with Jermemy's assistance and he surveyed me methodically from head to toe. ~20k dpm/PA was identified on my lower arms, likely from the wrapping of the flooring. Taped a location and wet wiped from elbows down to wrist the inner pair of PPE. Exited outer containment and the others were able to complete the wrap-up of the entry.</p> <p>Air sample results: 3.1e-8 uci/cc (Room3) ~7.5- 10 DAC air 9.27e-12 usi/cc (East Bay)</p> <p>I am scheduled for a Lung Count to confirm a negative as the nasal and mouth swipes were negative of all east bay / room 3 access personnel</p> <p>· Close-out with Curt Cannon/ Mike McCargar and Dave Dalton ~17:30 hrs. to discuss the next actions.</p> <p>* Determined that VR/Room3 Ventilation to improve negative is the first action (TimBurckhard)"</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>Reference: RADIOLOGICAL SURVEY REPORT, No Organization Identified, Dated 11/30/06, text is on page 13, dated November 14, 2006, signed November 15, 2006, signature illegible.</p>
45	<p>November 17, 2006 NRC Event Report 42962 Update Material from 12 Drums = VARIANCE PV-06-07</p>	<p>Update as of 14 November:</p> <p>"The three employees are still being treated with a chelating agent. This week should be the last week. At this time, there is no update on the original activity or the activity left in the body, except that the amount of activity in the lung is decreasing. It will be several weeks before the final dose can be calculated by the licensee's consultants, which will be based on the initial lung count, the bioassay results (urine/fecal), and the effectiveness of the chelate at removing the americium from the body. At this point, we assume there are three individuals who may have exceeded their annual dose limit of 50 Rem to the bone. The final dose received by the three individuals will be calculated when sufficient information is accumulated. The three workers have returned to work exhibiting some emotional stress and slight effects from the medical treatments. ... "The plant is being restarted incrementally after a safety shutdown imposed by the company. After DOH approval, two process lines have been restarted: the super compactor on the mixed waste side of operations and an inspection and sorting process, also on the mixed waste side. The licensee is completing items identified on the mixed waste thermal systems safety evaluation, and expects to restart those processes in the next few days. In addition, they are completing items identified on the low level thermal systems, but a restart date is pending. The low level processes that were affected by this accident are not being restarted, until the contamination in the building is controlled. The building that the material is in is being decontaminated, and continues to be a respirator area. The contaminated room is still inaccessible, however, a plan was completed to re-enter the room to assess the extent of the contamination. This initial entry was conducted on 11-14-06 by senior members of the Health Physics staff. As a result of the surveys conducted during the reentry, the extent of the problem they face is better understood. A plan is being developed to decontaminate the room.</p> <p>"The investigation is continuing, and the actual cause of the event does not appear to be a single cause, but rather compounding mistakes, errors in judgment and complacency for the seriousness of this type material. Corrective actions that are being taken by the licensee at this time, are primarily based on self evaluation, using the workers and technical staff. In addition, at this time DOH is requiring the company to retrain the radiological technicians as well as the workers in the different waste processes prior to restart of any process. DOH is working with the company to identify the root causes of this incident. [NOTE: One of the causes of this event was DOH's decision to allow a variance above 100 mCi. But NRC did not discuss this.] NRC did not report that "instead of containing the low levels of Am-241 identified in the shipping papers, the DuPont waste contained isotopes that exceeded PFNW's WAC limits."</p> <p>Reference: U.S. NRC Event Notification Report for November 17, 2006</p>

REF #	DATE/DOC NUMBER	ISSUE
		Event No. 42962, "Washington State Agreement State Report," November 14 th Update, available at https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2006/20061117en.html
160	December 20, 2006 DOH Notice of Correction NO LETTER NUMBER. Am-241 overexposure	<p><u>DOH Notice of Correction is for NINE VIOLATIONS, THIRTEEN INFRACTIONS, and SIX DEFICIENCIES</u></p> <p>This letter constitutes a notice of correction (pursuant to RCW 43.05.100 and the Regulatory Reform Act of 1995) and refers to our investigation of the Am-241 contamination incident of November 1, 2006 and the inspection conducted on November 29, 2006.</p> <p>The inspection and investigation revealed the following items of noncompliance with the requirements of the license and the Washington State Rules and Regulations for <u>Radiation Protection</u>.</p> <p>Generally, violations are those items which have a high probability of causing an overexposure to personnel, infractions are those items which could cause an excessive exposure in certain circumstances, and deficiencies are those items of noncompliance which have a minor safety significance or minor environmental impact.</p> <p>VIOLATIONS INCLUDE:</p> <ol style="list-style-type: none"> 1) Three workers were exposed to an estimated 442 Rem, 313 Rem, and 68 Rem CDE to the bone. This is classified as a VIOLATION. (Exceeds 50 Rem/year). 2) Two workers were exposed to an estimated 24 Rem and 17 Rem Committed Effective Dose Equivalent (CEDE). This is classified as a VIOLATION. (Exceeds 5 Rem TEDE to occupationally exposed workers.) 3) Inadequate engineering controls were in place at the time of this incident. The work being conducted was not performed in a containment system, with air line respirators or control over the air emissions associated with opening packages containing Am-241. This is classified as a VIOLATION. 4) PEcoS did not take adequate surveys to determine the extent of the contamination. As a result PEcoS was not fully aware of the airborne hazard. This is classified as a VIOLATION. 5) Air sample results were not used to identify the potential hazard. This is classified as a VIOLATION. 6) air samples that were collected and analyzed from this job were not used to ensure the dose to the workers was ALARA. This is classified as a VIOLATION.

REF #	DATE/DOC NUMBER	ISSUE
		<p>7) The specific Radiation Work Permit (RWP) issued for this job was not properly executed, nor was it followed. This is classified as an VIOLATION.</p> <p>8) Work was not stopped when unexpected airborne contamination was detected. This is classified as a VIOLATION.</p> <p>9) The ventilation system used for this operation was not hooked up properly, and was operated in a manner such that material could be spread to uncontaminated areas. This is classified as a VIOLATION.</p> <p>...you are not to resume any radioactive materials processing in the Volume Reduction Building" without specific authorization from our on-site inspector, <u>Mr. Scan Murphy</u>.</p> <p>Be prepared to discuss corrective actions to the above noted items. In addition we will address <u>other recent incidents, and other items of noncompliance</u> at your facility.</p> <p>Your corrective actions should include items such as management reorganization, including additional Radiation Safety personnel, training, procedures, increased internal audits, facility inspections by management, and reports to the department. <u>The corrective actions must ensure future compliance with your radioactive materials license and state of Washington regulations.</u></p> <p><u>[NOTE: - these corrective actions were ineffective as demonstrated by repeat events in 2009.]</u></p> <p>Reference – Letter, Department of Health, Mike J. Elsen, Supervisor, to Dave Dalton, President, Pacific EcoSolutions, LLC., No Title, [Re Notice of Correction], dated December 20, 2006.</p>
161	December 20, 2006 Pacific EcoSolutions Response Letter to Washington DOH	<p>“This letter is in response to your <u>emailed letter sent December 19, 2006</u> concerning the NOC for the PEcoS Volume Reduction Facility and the Am-241 event occurring on November 1, 2006 in room 3 of that building. Comments received from WDOH will be shown in bold followed by our response.”</p> <p><i>The portable baghouse recirculated room air from an area of higher contamination (IBC Room 3) to an area of lower contamination (East Bay area). <u>Operation of the portable baghouse therefore deviated from this code requirement. [WAC 246-247-130] NOTE – NONCOMPLIANT WITH ALARA RULES FOR FLOW FROM AREAS OF LOW CONTAMINATION TO AREAS OF HIGHER CONTAMINATION]</u></i></p> <p>The allowed annual possession quantity for the said air license is 50 Curies of Am-241 per calendar year. For the current year (2006) PEcoS has processed 0.722 Curies of manifested waste/material in buildings 1 and 2.</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>PEcoS is requesting to resume operations in buildings 1 and 2 with the exception of room 3 <u>which would have a specific plan to complete the desired task in recovery of this room.</u></p> <p>REFERENCE: Letter, Curt Cannon, Pacific EcoSolutions, to Sean Murphy, Department of Health, No Title, (RE : Concerning the NOC), dated December 20, 2006.</p> <p>[NOTE: it appears DOH sent an advance copy of the NOC letter on the 19th, since the actual NOC letter is dated the 20th].</p>
164	<p>AIR 06-1204</p> <p>December 21, 2006</p> <p>DOH NOTICE OF CORRECTION</p> <p>FAILURE of ALARA in DESIGN</p>	<p>DOH Notice of Correction: The Washington State Department of Health issues this Notice of Correction to PEcoS following the November 1, 2006, 241-Am contamination event in the PEcoS Volume Reduction (VR) Facility.</p> <p>PEcoS operated a portable baghouse in the VR Facility, taking suction from the IBC Room 3 and discharging into the East Bay space. This deviated from applicable regulatory technology standards and resulted in a potential modification of the VR ventilation system. The VR Facility activities are subject to DOH regulation as approved in Reference 2 under WAC 246-247, Radiation Protection - Air Emissions.</p> <p>Discussion: WAC 246-247-130 Appendix C ALARACT Compliance Demonstration cites Reference 1. Section 5.1.5 of Reference 1 precludes recirculation of room air from an area of higher contamination to an area of lower contamination. ASME N509 Article 4.7 echoes this requirement. The portable baghouse recirculated room air from an area of higher contamination (IBC Room 3) to an area of lower contamination (East Bay area). Operation of the portable baghouse therefore deviated from this code requirement.</p> <p>The VR Facility ventilation system is designed to pas air from all areas of the facility through the building HEPA filters. The design should ensure that only fully filtered air is discharged to the environment. Discharge of air from the portable baghouse into the VR ventilated space may perturb the air flow within the ventilated space, resulting in the release of radioactively contaminated air to the environment without filtration.</p> <p>Us of the portable baghouse, therefore, constitutes a potential modification of the ventilation system, as defined in WAC 246-247-030(16). That potential modification should have been evaluated under the facility Design Control Procedure.</p> <p>REFERENCE: Letter, Sarah Clark (for John Martell), DOH, to Curt Cannon, Pacific EcoSolutions LLC, no subject, Dated December 21, 2006.</p>
46	<p>December 21, 2006</p> <p>AIR 06-1204 NOC 457</p>	<p>DOH NOTICE OF CORRECTION. [WAC VIOLATION AFFECTING SAFETY.] Pacific EcoSolutions operated a portable baghouse in the (Volume Reduction) VR Facility, taking suction from the IBC Room 3 and discharging into the East Bay space. This deviated from applicable</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>regulatory technology standards and resulted in a potential modification of the VR ventilation system. The VR Facility ventilation system is designed to pass air from all areas of the facility through the building HEPA filters. The design should ensure that only fully filtered air is discharged to the environment. Discharge of air from the portable baghouse into the VR ventilated space may perturb the air flow within the ventilated space, resulting in the release of radioactively contaminated air to the environment without filtration.</p> <p>...Resume operation in IBC Room 3 only with approval from the Waste Management Section of the Office of Radiation Protection... Within six months, secure approval of a new radioactive air emissions license for the VR Facility and operations. ...Use of the portable baghouse, therefore, constitutes a potential <u>modification of the ventilation system as defined in WAC 246-247-030(16).</u> That potential modification <u>should have been evaluated</u> under the facility Design Change Control procedure.</p> <p>Reference: Letter, Sarah Clark, DOH, to Curt Cannon, Pacific EcoSolutions, LLC, No Subject, (re: Notice of Correction following November 1, 2006, Americium-241 contamination event), dated December 21, 2006.</p>
47	<p>February 7, 2007 November 17, 2006 NRC Event Report 42962 Update Material from 12 Drums = VARIANCE PV-06-07</p>	<p>Three workers were involved. The first worker had an initial internal deposition result of 11.7 nCi. Two additional workers have been confirmed as having an internal deposition: initial results were 6.9 nCi and 1.5 nCi. Subsequent counts of all three involved personnel were lower. All three workers were given chelating treatment. The final dose will be calculated by the Battelle internal dosimetry program, following extensive testing. Other workers who were in the area are being tested. The estimated dose to the endosteal (white bone matter) from 11.7nCi is about 95 rem CDE."</p> <p>R4DO (Johnson) and NMSS EO (Camper) notified. Washington State Report # WA-06-063.</p> <p>* * * UPDATE ON 02/06/07 AT 1600 EST VIA E-MAIL FROM MIKEL ELSEN TO MACKINNON * * *</p> <p>"Update as of 5 February, 2007</p> <p>"From the Department of Health's investigation into this incident, it appears that the root cause of the event was failure to adhere to procedures and plans set forth for the project, [NO MENTION OF THE VARIANCE] and inadequate training. Preliminary corrective actions taken by the licensee to prevent recurrence are disciplinary action to the employees involved for procedure and policy violations, a functional Alpha CAM was put in service, training performed for all staff working with radioactive material, with follow-up testing. Additionally, a reorganization of the facility which relieves the RSO of numerous tasks not related to Radiation Safety has taken place, and the facility has made a new position Special Project Lead who is assigned to work with HP and Operations Staff on special projects and compile lessons etc. The final exposure to the individuals has not yet been assigned. When the DTPA treatments have been determined done then exposures will be able to be assigned. <u>Currently it is anticipated that the final dose calculation will be assigned by the end of February 2007.</u> The amount of Am-241 activity in the involved drum was <u>manifested as 71 millicuries Am-241."</u> R4DO (Nease) &</p>

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		<p>NMSS (Greg Morell) notified.</p> <p>[NOTE: The original request indicated the anticipated sum of the drums was 190 mCi of Am-241, <u>without consideration of the rest of the on-site waste</u>. The average activity per drum was about 15.8 mCi. The offending drum contained $71/15.8 = 4.5$ times the average drum manifested in the shipment. ALSO – NRC seems unaware that “<i>instead of containing the low levels of Am-241 identified in the shipping papers, the DuPont waste contained isotopes that exceeded PFNW’s WAC limits.</i>” Including Sr-90. See entry at April 18, 2005 (court record).</p> <p>Reference: Reference: U.S. NRC Event Notification Report for February 7, 2007 Event No. 42962, “Washington State Agreement State Report,” February 6th Update, available at https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2007/20070207en.html</p>
48	<p>March 9, 2007 PV-07-06 Originated as PV-06-07 - 12 Drums variance approved on June 13, 2006.</p>	<p>Pacific EcoSolutions Request for VARIANCE EXTENSION. This letter is to request a variance extension to our Radioactive Materials License #WN-10393-1, Amendment 25, Condition 8 D., specifically concerning Am-241. The original variance which expired February 28, 2007 was issued for receipt and process of Am-241 sources in receipt LLR06-059. During the segregation of this receipt and its sources there was a contamination incident and the waste material has been sealed up awaiting a plan forward for processing these sources.</p> <p>PECoS is requesting an extension to the variance to condition 8. D. up to 300 millicuries for receiving and processing of this waste for appropriate disposal. The variance request is for six months (August 31, 2007) with the understanding that processing will not resume for LLR06-059 until WDOH has had the opportunity to approve the process forward. [NOTE – one of the causes of the contamination incident, resulting in exceedance of annual dose limits to workers, was DOH’s approval of the initial variance, without which, the shipment with this material would not have been present.]</p> <p>[NOTE: It appears waste was retained after expiration of this variance.]</p> <p>Reference: Letter, Curt Cannon, Pacific EcoSolutions, to Sean Murphy, DOH, No Subject, (re: request a variance extension from a <u>variance that expired February 28, 2007</u>), dated March 9, 2007.</p>
49	<p>March 20, 2007 PV-07-06 Originated as PV-06-07 - 12 Drums variance approved on June 13, 2006.</p>	<p>DOH Approves extension of Variance. This is in response to your request dated March 9, 2007, seeking a variance to Condition 8.D of your state of Washington radioactive materials license WN-I0393-1. License Condition 8.D requires in part that the total activity of isotopes with atomic numbers 84- 103 possessed is less than 300 mCi. Due to receipt number LLR06-059, the amount of 84-103 isotopes onsite, specifically Am-241, is greater than 100 mCi. According to your letter, PECoS is requesting an extension to the variance</p>

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		<p>issued by the department (PV-06-07) on June 13, 2006, which increased the 84-103 limit to 300 mCi. The reason for not processing the material within the time limit is the <i>contamination incident of November 2006</i>. Your request for a variance is approved, provided all of the condition from your original variance request date May 10, 2006, the department's approval letter dated June 13, 2006, and your variance request dated March 9, 2007 are strictly adhered to. This variance expires on August 31, 2007, or when the material is shipped offsite, whichever occurs first.</p> <p>[Note: No mention from DOH that this variance had expired on February 28, 1007 and the facility was in violation of its permit.]</p> <p>Reference: Letter, Kristin Felix, DOH to Curt Cannon, Pacific EcoSolutions, No Subject, (re: response to March 9, 2007 variance extension request), dated March 20, 2007.</p>
50	<p>April 30, 2007 https://ir.perma-fix.com/press-releases/detail/2253/perma-fix-enters-into-definitive-agreement-to-acquire</p>	<p>ATLANTA, April 30 /PRNewswire-FirstCall/ -- Perma-Fix Environmental Services, Inc. (Nasdaq: PESI; BSE: PESI; Germany: PES.BE), today announced that it has entered into a definitive agreement to acquire Nuvotec USA, Inc. (Nuvotec) and its wholly owned subsidiary, Pacific EcoSolutions, Inc. (PEcoS), for \$11.6 million. ... In addition, at the closing of this acquisition the debt of Nuvotec is not to exceed \$9.4 million, which Perma-Fix will assume, <u>plus the debts and obligations of PEcoS incurred in the ordinary course of PEcoS' business.</u></p> <p>Reference: Perma-Fix Web Page, Perma-Fix Enters Into Definitive Agreement to Acquire PEcoS' Radioactive and Mixed Waste Treatment Facility, dated April 30, 2007, located at https://ir.perma-fix.com/press-releases/detail/2253/perma-fix-enters-into-definitive-agreement-to-acquire.</p>
51	<p>MAY 18, 2007 AIR 07-502 TRITIUM</p>	<p>DOH ISSUES NOTICE OF CORRECTION to Pacific EcoSolutions ACCORDING TO AIR 07-1003. LETTER AIR-07-502 IS NOT AVAILABLE. Inadequate tritium monitoring. Inadequate maintenance of tritium monitoring equipment. Failure to exchange silica gel.</p> <p>Reference: Letter AIR-07-1003, John Martell, DOH, to Richard Grondin, PermaFix Northwest, No Subject, (re: May 2007 Notice of Correction Issued as Letter AIR 07-502 on May 18, 2007), dated October 10, 2007.</p> <p>AIR 07-1003 refers to AIR 07-502.</p>
52	<p>June 13, 2007 Ownership Change</p>	<p>OWNERSHIP CHANGE. On June 13, 2007, the Pacific EcoSolutions, Incorporated (PEcoS) facility was acquired by PFNW. The facility's name was changed to <u>Perma-Fix Northwest Richland, Incorporated (PFNW).</u></p> <p>Reference: Docket No. RCRA-10-2019-0130, Consent Agreement In the Matter of Perma-Fix Northwest, Richland, Inc. Before the United States Environmental Protection Agency, dated August 14, 2019.</p>

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53	August 13, 2007 PV-07-14 Request for INCREASE including and above PV-06-07	<p>PFNW MAKES VARIANCE EXTENSION REQUEST AND VARIANCE INCREASE REQUEST to 1 CURIE AM-241 or other TRU isotopes IN ORDER TO BID ON CONTRACTS. This letter is to request a variance <i>extension</i> to our Radioactive Materials License #WN-I0393-1, Amendment 26, Condition 8 D. The current variance expires August 31, 2007 and has been continued from an original request submitted May 10, 2006 with an updated request submitted March 9, 2007. The original request was issued for receipt and process of Am-241 sources in receipt LLR06-059. During the segregation of this receipt and its sources there was a contamination incident and the waste material has been sealed up awaiting a plan forward for processing these sources.</p> <p><i>PFNW is currently receiving shipments from customers with Am-241 levels that have been requiring us to maintain at levels close to the variance level</i></p> <p>With the Perma-fix acquisition we have recently received contracts and bid on other contracts that will be bringing in additional wastes. These new contracted waste will increase our average activity on site for condition 8.D. [NOTE: The 300 mCi variance was granted for 12 drums already received, but now they are backfilling with new waste]. ... PFWN is requesting a variance to condition 8. D. to 1 Curie for receiving and processing for appropriate disposal. The variance request is for ninety days or until the license can be amended. It is expected that this license condition will limit the processing of waste/ material and is not for discrete sources of any single isotope. PFWN will consider using the Low Level Operational Procedure (LLOP) 104 "Non Routine Operational Planning" for containers which have greater than 10 millicuries of any single isotope in this category. Additionally the work plan will be submitted to WDOH for concurrence of the planned process on any container with greater than <i>100 millicuries of any single isotope that falls into this category</i> (condition 8.D.) [NOTE: EXPANDED VARIANCE REQUESTED BEFORE THE ORIGINAL MESS IS CLEANED UP.]</p> <p>Reference: Letter, Curt Cannon, PFWN, to Sean Murphy, DOH, No Subject, (re: request for variance extension from original requests of May 10, 2006 and March 9, 2007), dated August 13, 2007.</p>
54	August 21, 2007 PV-07-14 increasing variance levels above PV-06-07	<p>DOH APPROVES EXPANDED VARIANCE TO 1 CURIE OF AM-241 or similar isotopes. This letter in is response to your letter of August 13, 2007, in which you requested a variance from License Condition 8.D of your license. In your letter, you requested that the activity of atomic numbers 84-103 be increased from the current licensed possession limit of 100 mCi to 1 curie (37GBq). [NOTE – a FACTOR OF 10] This increase in activity is requested due to the need of your customers to send greater concentrations of these isotopes for processing and the continued possession of LLR06-059, and approved for review due to the completion of your emergency plan. The department approves a variance from License Condition 8.D, increasing the authorized possession limit to 1 Ci (37 GBq) under the following conditions: For any container in which the diffuse waste activity of atomic numbers 84-103 is greater than 10 mCi, PEcoS will institute Low Level Operating Procedure 104 (Non-Routine Operational Planning). In addition, if the activity in any diffuse waste container is greater than 100 mCi,</p>

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		<p>departmental approval will be required prior to receipt of the waste. Any container or package that contains a discrete source (sealed or otherwise) greater than 10 mCi will require departmental approval prior to receipt or prior to processing for material already on site including LLR06-059.</p> <p>This variance will expire upon issuance of a license amendment, or on September 15, 2007, whichever occurs first. This variance will not be renewed.</p> <p>Reference: Letter, Illegible, for Sean Murphy, DOH, to Curt Cannon, Pacific EcoSolutions, Inc., (fully owned by Perma-Fix Northwest), “Variance for WN-I0393-1 to Increase Possession Limit of Atomic Numbers 84-103 (PV-07-14),” dated August 21, 2007.</p>
55	<p>September 14, 2007 PV-07-14 (Increased to include and exceed PV-06-07)</p>	<p>DOH UNILATERALLY EXTENDS PFNW VARIANCE. This letter in is response to your letter of August 13, 2007, in which you requested a variance from License Condition 8.D of your license. ...</p> <p>The expiration date of this variance has been extended from September 15, 2007 to October 5, 2007, or upon issuance of a license amendment, whichever occurs first.</p> <p>[NOTE: DOH solves a contamination safety problem (enabled by a DOH variance) by intending to issue an increased scope of license – WHAT is the basis for this trust?]</p> <p>Reference: Letter, Kristen Schwab, DOH, to Curt Cannon, Pacific EcoSolutions, Inc., (fully owned by Perma-Fix Northwest), “Extension to Variance for WN-I0393-1 to Increase Possession Limit of Atomic Numbers 84-103 (PV-07-14),” dated September 14, 2007.</p>
165	<p>DOH Memo to FILE</p> <p>October 10, 2007</p> <p>Subject: November 1, 2006 Am-241 Contamination Incident</p>	<p>On November 1, 2006, three workers at a waste processing company were contaminated internally with Am241 , two of the three workers received organ dose greater than the limits. The building they were working in was inaccessible for several weeks, and the room they were working in was inaccessible for several months. The workers were attempting to process a drum of waste material separating lead, trash and sources so they could be managed separately. During the sorting process, <u>alpha radioactivity was detected outside of the room where the work was being conducted, signaling a series of events resulting in three worker received an inhalation dose. One worker located outside of the room was not wearing a respirator, but the two workers located inside the room were wearing air purifying respirators (APR). Operations at the site were shut down as a result of this incident. The three workers were counted on a lung counter, and were given treatments of chelating agent.</u></p> <p>On July 6, 2006, a shipment of two boxes that contained 6 small drums and pails was received at the PEcoS facility (receipt number LLR06-059). , The drums contained waste and small sources. <u>The only radionuclide listed on the shipping manifest was Am . The work to be completed on the material was to sort the contents into waste that could be thermally treated, waste that required disposal at a mixed waste land fill (mainly lead), and the sources. The sources were to</u></p>

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		<p>be separated, catalogued and surveyed with the intent of reusing some, then disposing of the unusable sources. Useable sources were to be transferred the Department of Energy's source recovery program (Off-Site Source Recovery Project, OSRP) while unusable sources would be disposed at an appropriate disposal facility. LLR06-059 was the second part of a job from IE Dupont, the first part was received on shipment number LLR05-095...</p> <p>[NOTE: for a prior shipment, LLR05-095, from the same location, and several senior people with experience at the Hanford nuclear reservation were involved in the planning and preparation. This does not appear to be the case for the second shipment.]</p> <p>The attendees at the meeting decided that the work should be conducted near the door to room 3, <u>outside of the containment</u>. This is a key point of the incident. This area is reportedly directly below a supply ventilation register, which blows down in front of the door, although this could not be verified at the time this report was prepared (no access to room 3).</p> <p><i>The inexperienced workers reported that a verbal request was made to slow down, which was heeded for a short time and then the pace gradually quicken again. One operator also stated that an air flow indicator (piece of paper attached to the door frame) did not always indicate that airflow was into the room.</i></p> <p>An air sample collected in the room during this evolution was counted by an HPT who determined the air concentration was $1.3 \text{ E-}8 \mu\text{Ci/ml}$. The Derived Air Concentration (DAC) for Am241 is $3 \times 10^{-12} \mu\text{Ci/ml}$ (breathing air at the DAC for 2000 hours will deliver 5 rem CEDE or 50 rem CDE of exposure). <i>The HPT took no action as a result of this very high level.</i></p> <p>At about 10:00 a.m., a worker collected a smear on the outside of one of the drums that was being processed. The smear showed contamination levels greater than 2 million counts per minute (the meter had exceeded its operating range). After some discussion between the HPT and workers, and walking from one counting station to another, the workers and the HPT decided that the contamination had spread.</p> <p>During subsequent investigation by PEcoS management, it was determined that there were more problems with the ventilation system. The bag house that was thought to be hooked up to the LANCS containment was not, but instead hooked up to another piece of equipment in room 3, and discharged not into the building ventilation system, but into the next room (East bay).</p> <p>REFERENCE: Memo "To: File," Sean Murphy, DOH, Subject: November 1, 2006 Americium 241 contamination incident at Pacific EcoSolutions (PEcoS), 2025 Battelle Blvd, Richland Washington.</p>

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		Radioactive material license number WN-I0393-1, dated October 10, 2007.
56	October 10, 2007 AIR 07-1003 TRITIUM	<p>PERMA-FIX HAS INADEQUATE TRITIUM MONITORING VIOLATION CORRECTIONS... Radioactive Air Emissions (RAE) issued a Notice of Correction (NoC) to PEcoS in May of 2007 (AIR 07-502 Reference 1). [NOTE: PEcoS was purchased by PFNW in June 2007, based on an agreement made in April of 2007, and PFNW knowingly acquired the liability (debts and obligations.) A NOC is used to inform the licensee of issues affecting compliance to their radioactive air license, and requests corrective action by the licensee. Adequate corrective action in response to the NOC affords the licensee an opportunity to avoid formal enforcement action. PermaFix responded to the NOC in Reference 2 [June 17, 2007, LETTER NOT AVAILABLE]. The response (dated June 17, 2007) is inadequate, for reasons detailed in the Enclosure. RAE considers the issues at stake to be significant. It is recognized that the present company owners did not cause the conditions that led to the present state of affairs. Despite this, it is incumbent on the present ownership to implement adequate control of facility operations and regulatory compliance. For the low level radioactive waste- thermal process, PEcOS violated its own operating procedures by failing to exchange silica gel used to measure tritium emissions... <u>The 2006 manifested H-3 activity processed in this facility was less than the monitored activity used to calculate the 2006 dose from air emissions with the EPA COMPLY program.</u> The poor agreement of facility and laboratory quantitative analyses is unacceptable... Perma-Fix shall obtain a full scope independent audit of their radionuclide analytical operations, to include instruments, methods, qualification of personnel, training, and QA processes. Significant corrective action is required, -also detailed in the Attachment.</p> <p>[NOTE: DOH APPROVED A TRITIUM VARIANCE July 5, 2006 PV-06-11 for 500 CURIES OF TRITIUM, potentially contributing to the problem in May 2007.] Also tritium was undercounted in the manifests, and under reported by PFNW. A copy of the 2006 annual Environmental Report is needed.</p> <p>Reference: Letter, AIR 07-1003, John Martell, DOH, to Richard Grondin, PermaFix Northwest, Inc., No Subject, (re Notice of Correction), dated October 10, 2007.</p>
57	October 24, 2007 AIR 07-1019	<p>DOH NOTIFICATION OF NUMEROUS DEFICIENCIES AND 8 VIOLATIONS - This letter provides written notification of the <u>numerous compliance deficiencies under the PermaFix radioactive air emissions licenses</u> (References 1, License AIR-05-501 Mixed Waste Thermal, and 2 License AIR 05-612 Low Level Rad Waste Thermal). To address these deficiencies, the Washington State Department of Health's Radioactive Air Emissions Section (RAES) has prepared a PermaFix compliance plan and schedule (PCPS). Table 1 (enclosed) broadly identifies certain license violations, <u>inadequate responses to required corrective actions</u> (References 3,4, and 5), and several areas of concern that have arisen in the course of reviewing the deficiencies.</p>

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		<p>Table 2 (enclosed) lists some of the off-normal events the facility has experienced in the past decade, including the 241-Am contamination event of November 2006. Taken together, these events indicate an ongoing lack of management control of design of the facility and work in the facility. These problems merit committed action by PermaFix. It is recognized that the outstanding violations occurred before the present facility owners acquired the facility. <i>[NOTE: – only some of the violations were before PFNW/PEcoS acquired ATG]</i> Despite this, it is incumbent on the present ownership to ensure regulatory compliance and to implement adequate management control of facility design and operations. PARTIAL LIST OF EVENTS AT PERMA-FIX LAST DECADE:</p> <p>1999 HEGA LLRW Th FIRE. 1999 <u>Corrosive Failure of LLRW TH HEPA Housings.</u> 1999 <u>SAFGLAS Molten Glass Leak.</u> 2004 Unreported HEGA Failure. 2005 Baghouse Fire LLRW TH. 2006 Nitric Acid Spill. 2 2006 RTD Fire MW-th. 2006 Am-241 Contamination.</p> <p>Attachment contains lists of unresolved design and safety issues.</p> <p><i>[NOTE: PFNW (as PEcoS) acquired ATG in 2003. Items after 2003, including the 2006 Am-241 contamination, were the fault of PEcoS, which had conducted due diligence in the 2003 acquisition and which arranged for shipment of the twelve Am-241 drums, including variance. PFNW, which had conducted due diligence in its 2007 acquisition, assumed the resulting liability.]</i></p> <p>Reference: Letter, AIR 07-1019, P. John Martell, DOH, to Richard Grondin, No Subject, (re: notification of numerous compliance deficiencies), dated October 24, 2007.</p>
	October 31, 2007 DOH LETTER WITH NO LETTER NUMBER	<p>DOH LIMITS ANNUAL POSSESSION QUANTITY FOR PFNW VOLUME REDUCTION FACILITY DUE TO NON CONSERVATIVE LICENSE. The license identifies a potential-to-emit (PTE) of 3.9 E+04 mrem/yr [39,000 mrem] and the abated emission limit of 0.2 mrem/yr. This implies that a decontamination factor of 200,000 has been used in the license application.</p> <p>Based on the current facility configuration, we believe the controls in place are one pre-filter and two HEPA filters in series. The in-situ filter challenge test is performed across the whole array of three filters to an acceptance criterion of 99.95% efficiency. This array-test combination justifies a decontamination factor of <u>2000</u>, a factor of 100 less than used in the license. The present APQ allowed by the license is thus non-conservative. You are required, upon receipt of this letter, to limit the APQ for the VR Facility as described in the enclosure. An APQ limitation will be imposed for interim operation. The APQ limit for this year will be reduced to 2.5 times what you processed January through July of 2007, on an isotope-by- isotope basis, as provided in the spreadsheet attached to Reference 2.</p>

REF #	DATE/DOC NUMBER	ISSUE
		Reference: Letter, P. John Martell, DOH, to Richard Grondin, PFNW, No Subject, (re: review of PFNW license for volume reduction facility), dated October 31, 2007.
58	February 6, 2008 AIR 08-203	DOH APPROVES PFNW VOLUME REDUCTION FACILITY SUPPLEMENTAL VENTILATION FOLLOWING LICENSE REJECTION AND APQ REDUCTION. This letter approves your request to employ supplemental ventilation in the PFNW Volume Reduction Facility (VRF) West bay during an upcoming drum crushing campaign (Reference 1). Approval extends to the processing of material described by the Work Authorization for Allied Technology Group (ATG) Burnt Drums, dated October 4, 2007, with the conditions and limitations given in the enclosure... 11. APQ limit for approved work: Radionuclide APQ, mCi 22-Na 0.054 54-Mn 0.35 57-Co 11.6 60-Co 1.94 63-Ni 1.42 95-Zr 1.3 109-C d 0.14 110 m-Ag 0.075 134-Cs 0.64 137-Cs 0.9 152-Eu 0.2 232-Th 0.033 241-Am 0.02 Reference: Letter, John Martell, DOH, to Curt Cannon, Perma-Fix Northwest, Inc., “Re: Approval of Volume Reduction Facility (VRF) Supplemental Ventilation,” dated February 6, 2008.
59	March 4, 2008 April 7, 2008 NOC #456 I-129 Ventilation Components Email only – a letter specific to NOC#456 is Not Available. Records are incomplete.	DOH EMAIL NOTICE OF CORRECTION to PFNW. REDUCTION OF APQ for Radioiodine. Curt - In your 1 March 2008 letter to John Martell, you requested approval to <u>restart the Low Level Rad Waste-Thermal process</u> under certain restricted operating conditions. These include a limitation to 50% of the Annual Possession Quantity now licensed on a dose equivalent basis. A new license submittal will be placed as an item on the Compliance Plan and Schedule. <i>The Department plans to inspect the new components of your ventilation system in the near future.</i> <u>You are not permitted to process radioiodine at quantities exceeding 50% of those permitted by your existing license.</u> You may otherwise proceed to interim operations under the four restrictions of your letter: 1) Abated emission to remain below 1.4 mrem/yr, slightly less than the present license limit of 1.5 mrem/yr 2) The APQ restriction noted above 3) A new license application will be provided on a schedule <u>yet to be determined</u> 4) Only non-thermal activities associated with the thermal process, or

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		<p>maintenance activities, will be performed in the LLTH process buildings.</p> <p>[Note - this is after numerous deficiencies identified on October 24, 2007, and previous operation with faulty iodine monitoring.]</p> <p>Reference: Email, Fred Adams, DOH, to Curt Cannon, PFNW, “PFNW LLRW-Th Operations,” dated March 4, 2008. Forwarded to Shawna Berven, DOH, in association with NOC #456, on April 7, 2008.</p>
60	<p>April 3, 2007 April 7, 2008 NOC #456 Stack SAMPLE Event</p> <p>Email only – a letter specific to NOC#456 is Not Available. Records are incomplete.</p>	<p>DOH EMAIL NOTICE OF CORRECTION to PFNW. On March 26, [2008] PFNW notified WDOH of stack effluent sample counting results having risen above investigation levels, to a level approximately 1000 times normal operation. Inspectors from the Radioactive Air Emissions Section (RAES) visited PFNW on March 27, to learn what had happened and what was being done. Sean Murphy told us today that PFNW desires to restart in the near future.</p> <p>LLRW Thermal startup email.</p> <p>Verify and document that the HEPA filters installed in the Building 16 housing and in the POG housings are <u>compliant with ASME AG-1 requirements</u>.</p> <p>Reference: Email, P John Martell, DOH to Curt Cannon, “LLW-Th Start Up,” dated April 3, 2008. Forwarded by Fred Adams, DOH, to Shawna Berven, DOH, in association with NOC #456, on April 7, 2008</p>
61	<p>April 23, 2008 AIR 08-401 DUCT WORK WITH HOLES</p>	<p>DOH Identifies EXTENSIVE Noncompliance in the PFNW Volume Reduction Facility (Mixed Waste) This letter describes requirements, including redesign, for future operation of the Perma-Fix Northwest (PFNW) Volume Reduction Facility (VRF),...Extensive and substantive items of non-compliance are revealed, as described in Enclosure 1. Among other things, redesign of the system is necessary to bring the facility into full compliance with the appropriate regulations, as described in Enclosure 2.</p> <p>The non-compliant High Efficiency Particulate Air (HEPA) housings, ductwork, and associated fans SF# 2, SF# 3, and SF# 4 pose the potential for contamination of air in the relatively clean space of the East Bay when operating. This equipment shall be removed or rendered inactive on the authority of this letter. If there is then insufficient fan capacity to effectively ventilate the entire VRF, selected rooms may be decontaminated as necessary and sealed temporarily or permanently, as judgment dictates.</p> <p>20 Deviations from ASME AG-1 N509 and N510 Requirements are Listed. EXAMPLES - Ductwork downstream of SF 2, 3, and 4 is potentially contaminated and holed. The location of a potentially contaminated pressurized duct in a clean area is an unrecommended configuration per ASME AG-1, SA. Design drawings don't reflect the field configuration (now square, drawings show tapered). System airflow measurements performed in May 2007 used undocumented or non-standard methods. AG-I Fans: Fans are</p>

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		<p>largely non-compliant with AG-I Section BA. Section IA of AG-1 covers instrumentation. Instrumentation is mostly non-compliant due to a lack of proper documentation. Filter Housings: 1x5 HEPA housing for EF #1 is supported by the 3x5 HEPA housing. The structural capability of the supporting housing is unknown.</p> <p>Reference: Letter, AIR 08-401, P. John Martell, DOH, to Richard Grondin, PFNW, "Re: Requirements for Future Operation of the Volume Reduction Facility," dated April 23, 2008.</p>
62	<p>April 25, 2008 NRC Event Notification Report 44156 TRITIUM</p>	<p>NRC Notification Report. "Tritium (H-3) contamination was found <u>on a trailer in the outside storage area</u> of Perma-Fix Northwest (PFNW), a radioactive material licensee in Richland Washington on April 17. A DOH inspector noticed liquid dripping from a trailer that had just been unloaded. The trailer had hauled empty radioactive waste drums from Atomic Energy Limited Canada (Chalk River facility in Ontario). The transport vehicle entered the United States at Sault Ste. Marie, Michigan under an Nuclear Regulatory Commission (NRC) import license and entered Washington at Spokane. The shipment had arrived at the PFNW facility in late February. It was manifested as a plastic fiber bag with drums inside. Initial surveys on February 28 noted tritium contamination inside the plastic fiber bag, but no contamination was noted outside the bag or on the trailer. Tritium was a primary radionuclide on the manifest. During off-loading of the drums and plastic liner on April 17, liquid was found in and on the drums (one drum is suspected of being at least partially filled with liquid). After off-loading, standing liquids were noticed by the licensee on the inside trailer bed, but not on the outer trailer floor and skin. After the truck was returned to the storage yard, liquid droplets were found dripping from the front of the trailer by the DOH inspector. Initial contamination levels (up to 1.8 million dpm of tritium) on the trailer front were <u>substantially above the U.S. Dept of Transportation limits</u>; but due to the limited quantity (less than one gallon of liquid), do not pose a health risk. There is no indication of leakage during the actual shipment.</p> <p>"The manifest indicated the total shipment contained H-3 (6.59 mCi) and Cs-137 (7.79 mCi) as the predominant radionuclides. Only tritium contamination has been noted." [Note: No indication of the actual versus manifested activity. Was it more, as was the case for the 12 Am-241 drums?]</p> <p>Reference: U.S. NRC Event Notification Report for April 25, 2008 Event No. 44256, WASHINGTON AGREEMENT STATE REPORT - EXTERNAL CONTAMINATION ON A TRANSPORT TRAILER, available at https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2008/20080425en.html</p>
63	<p>July 24, 2008 PV-08-05 3.3 Ci Am-241 9 Ci Sr-90 PV-06-07 PV-07-14</p>	<p>PFNW MAKES A VARIANCE REQUEST, DUE TO MORE ACTIVITY THAN ORIGINALLY MANIFESTED. NON-CONFORMING WASTE FROM 2006 RADIATION OVEREXPOSURE. As you are aware based on letters you were copied on dated 7-23-08 and 7-24-08 PFNW has identified a waste stream that has appears to have more activity associated with it than was originally manifested, The current estimation of the activity assigned is 3.3</p>

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	REPEAT ISSUE	<p><u>Curies of Am-241 and 9 curies of Sr-90.</u> There is still one drum unopened that requires sorting and additional information needs to be gathered from the sources that have already been identified while sorting through it. The remaining drum was originally manifested at 21 millicuries Am-241. It was also manifested with a dose rate of 1.2 Rem/hr; however, the dose rates we have found have been less than 200 mRem/hr. <i>There is also the portion of waste that was drummed up at the time of the 2006 incident that caused an Am-241 uptake for three Pacific EcoSolutions (PEcoS) employees.</i> PFNW estimates that a variance of <u>4 Curies for Am-241 and 9 Curies for Sr-90</u> should be sufficient for allowing this job to be completed.</p> <p>This project was originally brought in under PEcoS [in 2005] with the understanding that it had been stored for an extended period of time at the customers facility and that the contents were <i>estimated</i> based on inventory records and dose rate calculations. [NOTE: PFWN acquired the company and the liability in 2007].</p> <p>Before this project was resumed this year WDOH materials and air reviewed and agreed with the processing plan and Work Authorization (WA) instructions. [NOTE: THERE IS NO INDICATION THAT NRC WAS INFORMED THAT THE MANIFESTED ACTIVITY IN THE 12 DRUMS WAS WELL BELOW REALITY.] SEE NRC EVENT REPORT 42962, above. The initial variance of up to 300 millicuries, was insufficient.</p> <p>Reference: Letter, Curt Cannon, PFWN, to Sean Murphy, DOH, No Subject, (re: request for variance), dated July 24, 2008.</p>
64	August 2008 PV-08-05	<p>January 16, 2009 letter from PFWN indicates DOH approved the July 24, 2008 Variance Request for 4 Ci of Am-241 and 9 Ci of Sr-90 in August of 2008. DOH letter from August 2008 is missing.</p> <p>Reference: Letter, Curt Cannon, PFWN, to Sean Murphy, DOH, No Subject (re: request to extend variance originally approved in August 2008 based on the PFWN variance request of July 24, 2008), dated January 16, 2009.</p>
65	September 26, 2008 EPA RCRA-10-2008-0161 PENALTY \$304,500	<p>EPA AND PERMA-FIX CONSENT DECREE AND FINAL ORDER. Prior to June 13, 2007, <i>the facility was owned and operated by the former permittee, Pacific EcoSolutions, Inc (PEcoS)*.</i> On June 13, 2007, the facility was acquired by Respondent [Perma-Fix]. Time of the EPA inspection was on March 6, 2007.</p> <p><i>The violations alleged in this CAFO are based on information obtained during a March 6, 2007 EPA and Ecology inspection and on information obtained subsequent to that inspection.</i></p> <p>Count 1: Storage Of RCRA Waste Generated On-site For More Than One Year</p> <p>Count 2: Failure To Dispose Of TSCA PCB Waste In Storage Within 365 Days</p>

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		<p>Count 3: Failure To Manage Mixed-TSCA Regulated PCB Waste In Accordance With The Permit</p> <p>Count 4: Failure To Label Containers Of Dangerous Waste</p> <p>Count 5a: Failure To Determine If A Generated Solid Waste Is A Dangerous Waste [Incinerator Baghouse Dust]</p> <p>Count 5b: Failure To Determine Whether Hazardous Waste Must Be Treated To Meet Land Disposal Restrictions [LDRs]</p> <p>Count 5c: Transporting a Dangerous Waste Without a Manifest</p> <p>Count 5d: Disposal of a Dangerous Waste at an Unpermitted Facility</p> <p>Count 6: Failure to Properly Label Containers of Used Oil</p> <p>Count 7: Failure To File Exception Reports For Waste Shipments With Unsigned Manifests</p> <p>*The June 13, 2007 sale included PFNW's acquisition of <u>the debts and obligations of PEcoS incurred in the ordinary course of PEcoS' business.</u></p> <p>Reference: Docket No. RCRA-10-2008-0161, Before the United States Environmental Protection Agency, In the Matter of Perma-Fix Northwest, Richland, Icn., <i>Consent Agreement and Final Order</i>, dated September 26, 2008.</p>
66	<p>January 16, 2009 PV-09-01</p> <p>DOH Records indicate that PV-09-01 Extends PV-08-05 No DOH Record is available for PV-08-05. <u>No August 2008 DOH Letter.</u></p>	<p>PFNW REQUESTS A VARIANCE EXTENSION. This letter is to request an extension to the variance originally <u>approved in August of 2008</u> to the PFNW radioactive materials license WN-I0393-1 Amendment 29 conditions 8. A and condition 8. D. ... PFNW has completed the phases mentioned above and has the sources safely secured and available for additional inspection if needed. We have been in contact with LANL concerning these sources. They have been researching the various sources for acceptability. At this time it appears that most of them (if not all) will be acceptable. When they have completed their research then they will schedule a time to come to the facility and perform further inspection and hopefully prepare them for shipment to LANL. At this time I am requesting an additional 90 for this to occur. Approval of this variance extension request would then require that the sources be shipped off-site by May 1, 2009. [NOTE - DOH August 2008 Letter is missing] PV-08-05 was for 3.3 Ci Am-241 and 9 Ci Sr-90, after the original variance PV-06-07 (approved June 13, 2006) for 300 millicuries of Am-241 was insufficient, and employees were overexposed.]</p> <p>Reference: Letter, Curt Cannon, PFNW, to Sean Murphy, DOH, No Subject (re: request to extend variance originally approved in August 2008 based on the PFNW variance request of July 24, 2008), dated</p>

REF #	DATE/DOC NUMBER	ISSUE
		January 16, 2009.
67	January 22, 2009 PV-09-01 PV-08-05	<p>DOH Approves VARIANCE EXTENSION. The Department of Health has reviewed your letter dated January 16, 2009, requesting a variance from your Washington State radioactive materials license #WN-I0393-1 conditions 8A and 8.D. Specifically, you requested an extension to the variance approval dated July 25, 2008, for the possession of 6 Ci of isotopes 84-103 and 9 Ci of Sr-90 until May 1, 2009. By May 1, 2009, any material/sources not accepted by LANL or a licensed disposal site must be returned to the generator. [DuPont Sources processed through Philotechnics.] [NOTE: The DOH Letter of July 25, 2008 approving the increase from 3.3 Ci of Am-241 to 6 Curies Am-241 is missing.]</p> <p>Reference: Letter, Sean Murphy, DOH, to Curt Cannon, "Pacific EcoSolutions," No Subject (re DOH has reviewed the variance requested on January 16, 2009 to extend the variance approved July 25, 2008) dated January 22, 2009.</p>
NA	February 3, 2009 Am-241	PFNW Worker Receives Dose of 120 REM CDE and 6.8 REM CEDE. No DOH Letter of Violation is found. See NRC Reports No. 44896 and associated updates, below.
168	February 3, 2009 Am-241 and Pu-239? Or Pu-240/241. DOH Incident WA-09-013 Description.	<p>Mixed Waste Facility On February 9, 2009, a worker was sent for a lung count at the Battelle (Pacific Northwest National Laboratory) lung counter for a bioassay measurement.</p> <p>The lung count was ordered [Note: 6 days later] due to the worker working in an area where airborne contamination levels could cause more than 2.5 DAC-hrs (with respiratory protection factors applied), and greater than 520 DAC- hrs, assuming no respiratory protection was worn in one day.</p> <p>The reason for requiring this count was to ensure that measures used to protect the workers were functioning properly. The worker's first lung count detected approximately 0.2 nCi of Am-241. Assuming the exposure was from 10 days prior, the intake was approximately 1.9 nCi of Am-241. The annual limit of intake for Am-241 is 6n Ci (1µm AMAD particle size). The estimated dose was about one-third of the annual limit, or 16 REM CDE (Annual limit 50 REM). The worker had previous whole body exposure, but this added amount did not cause a limit to be exceeded.</p> <p>On March 25, 2009, the licensee informed the Washington State Department of Health that <u>further testing</u> by Battelle caused a revision to the original calculated dose, and the new calculated dose would exceed the 50REM CDE limit.</p> <p>The date of exposure (February 3, 2009) was assumed by the licensee, based on air sample data and the use of respiratory protection that may</p>

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		<p>not have provided adequate coverage (use of filtering respirator instead of supplied air).</p> <p>On February 3, the worker was in a containment in which air sample results were about $1\text{e-}8$ $\mu\text{Ci/ml}$ gross alpha activity concentration for several hours, and was wearing a Powered Air Purifying Respirator (PAPR, protection factor of 1000). Bioassay results (fecal) from one other worker who was also in the containment showed a small amount of activity, and a dose was assigned to this second worker that did not exceed the legal limit. The second worker's lung count was less than detection limits.</p> <p>The cause is still unknown.</p> <p>Contributing factors - high airborne activity, loss of respiratory protection.</p> <p>There was no media coverage of this incident.</p> <p>Activity and isotope(s) involved:</p> <ul style="list-style-type: none"> • Am-241, Pu-240/241. <p>[NOTE: On March 25, 2009, PFNW said the second isotope was Pu-239]</p> <p>Overexposures: (number of workers/members of public; dose estimate; body part receiving dose; consequence):</p> <ul style="list-style-type: none"> • There was one potential overexposed worker, no members of the public were exposed, and estimated dose to the worker is about 100 REM CDE and 5 REM CEDE. This value will change following further measurements, investigation, and calculations. <p>REFERENCE: WA-09-013, Incident Report ("New"), License No. WN-I0508-1, DOH, date of Incident is February 3, 2009. [NOTE – the date this report was prepared is absent from the documentation. It must be March 25 or later]</p>
166	<p>Perma-Fix Letter</p> <p>March 25, 2009</p> <p>Pu-239 and Am-241 Overexposure</p>	<p>PFNW NOTIFICATION OF OVEREXPOSURE</p> <p>This letter is intended to officially notify you In accordance with WAC 246-221-250 and 246-221-260, that we have reason to believe that a Perma-Fix Northwest (PFNW) employee may exceed the total effective dose equivalent of 5 rem and has likely exceeded the total organ dose equivalent of 50 rem.</p> <p>As has been discussed with you and members of your staff PFWN has an employee that has received an uptake of Pu-239 and Am-141. Throughout the week while dismantling and repackaging of a glove box PFWN employees were using supplied air respiratory equipment. For the final entry of the week two individuals used PAPR equipment instead of the</p>

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		<p>supplied air set up. The DAC calculation for the final entry showed levels up to 6.6 DAC while the two individuals were in the process area. There was no loss of contamination outside the work area and no skin contamination was identified on the individuals.</p> <p>As a precaution all four (4) workers who had been involved in the process that week were sent to Battelle for lung counts. Follow-up counts were needed for the two involved in the final entry using PAPR's. At this time no additional dose has been assigned to either individual. Both employees are currently being held outside airborne work areas until the evaluation is complete. Current estimates for one individual are that the initial counts were a false positive and no additional dose will be assigned, however; a final report is pending following review of the urine and fecal samples collected and comparisons made with the lung counts performed.</p> <p>The second individual appears the have received an uptake that could result in ~5 rem CEDE and exceed the 50 rem CED allowed limit.</p> <p>A call to the phone number identified in 246-241-250 (2) was not made since notification and discussions have been ongoing with you and your staff following receiving the results of the lung count that identified a potential over exposure.</p> <p>PFNW is currently investigating how this exposure may have occurred while working to finalize the dose to be assigned.</p> <p>An unusual event report (UE-0901) is currently being prepared and will be submitted to you at its completion along with the final dose report for the individual/s receiving additional dose. Other areas to be included In the report will include but not be limited to: probable causes, equipment found or identified as malfunctioning, and corrective actions taken.</p> <p>[NOTE: See Below – PFW did not identify that the exposure occurred MONTHS earlier on February 3, 2009. SEE ENTRY at Feb 3rd.]</p> <p>REFERENCE: Letter, Curt Cannon, PFW, to Mikel Elsen, DOH, No Subject, dated March 25, 2009.</p>
68	<p>April 3, 2009 PV-09-03 PV-08-05 PV-06-07 PV-07-14 REPEAT ISSUE 3.3 Ci Am-241 9 Ci Sr-90</p>	<p>PFW REQUESTS VARIANCE EXTENSION. This letter is to request an extension to the variance originally approved in August of 2008 to the PFW radioactive materials license WN-I0393-1 Amendment 29 conditions 8. A and condition 8. D. Excerpt from July 24, 2008 variance request:</p> <p>It is unclear the exact time frame PFW will be able to get these sources approved and received by LANL. PFW is confident that they can have the phase 1 and 2 operations completed and the paperwork submitted to LANL within 45 days of WDOH approval to proceed. Past operations took in excess of 90 days to schedule and ship off sources to LANL. To be on the safe side PFW requests this variance to be extended to February 1, 2009 to allow for the completion of the phases, submittal of the paperwork, repackaging to meet</p>

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		<p>special form (if needed) and shipping to LANL.</p> <p>Current Status</p> <p>PFNW has completed the phases mentioned above and has the sources safely secured and available for additional inspection if needed. We have been in contact with LANL concerning these sources. They have been researching (the various sources for acceptability. At this time it appears that most of them (if not all) will be acceptable. They have requested that twenty (20) of the sources be tested again since the passing data is over six months old. When they have completed their research then they will schedule a time to come to the facility and perform further inspection and hopefully prepare them for shipment to LANL. At this time I am requesting an additional three months for this to occur. Approval of this variance extension request would then require that the sources be shipped off-site by August 1, 2009. [NOTE: DOH Letter of August 2008, is missing.]</p> <p>Reference: Letter, Curt Cannon, PFWN, to Sean Murphy, DOH, No Subject, (re: request variance extension for variance originally approved by DOH in August of 2008, based on July 24, 2008 variance request), dated April 3, 2009.</p>
69	<p>April 16, 2009 NRC Event Notification 44986 WORKER OVEREXPOSURE Am-241 Pu-240/241</p>	<p>NRC EVENT NOTIFICATION REPORT FOR APRIL 16, 2009.</p> <p>FEBRUARY 2009 WORKER EXPOSURE. Reported by DOH to NRC on April 13, 2009. The following report was received from the state of Washington via e-mail:</p> <p>"On February 9 2009, a worker was sent for a lung count at the Battelle (Pacific Northwest National Laboratory) lung counter for a bioassay measurement. The lung count was ordered due to the worker working in an area where airborne contamination levels could cause more then 2.5 DAC-hrs (with respiratory protection factors applied), and greater then 520 DAC-hrs assuming no respiratory protection was worn in one day. The reason for requiring this count was to ensure that measures used to protect the workers were functioning properly. The workers first lung count detected approximately 0.2 nCi of Am-241. Assuming the exposure was from 10 days prior, the intake was approximately 1.9 nCi Am-241. The annual limit of intake for Am-241 is 6 nCi (1micron AMAD particle size). The estimated dose was about 1/3 of the annual limit, or 16 REM CDE (Annual limit 50 REM). The worker had previous whole body exposure, but this added amount did not cause a limit to be exceeded.</p> <p>"On March 25, 2009 the licensee informed the Washington State Department of Health that further testing by Battelle caused a revision to the original calculated dose and the new calculated dose would exceed the 50 REM CDE limit. The date of exposure (February 3, 2009) was assumed by the licensee, based on air sample data and the use of respiratory protection that may not have provided adequate coverage (use of filtering respirator instead of supplied air). On February 3, the worker was in a containment in which air sample results were about 1e-8 microCi/ml gross alpha activity concentration for several hours and was wearing a Powered Air Purifying Respirator (PAPR, protection factor of 1000). Bioassay results (fecal) from one other worker who was also in the containment showed a small amount of activity, and a dose was</p>

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		<p>assigned to this second worker that did not exceed the legal limit. The second workers lung count was less than detection limits.</p> <p>"The cause is still unknown.</p> <p>"Contributing factors: High airborne activity, loss of respiratory protection. "DOH is conducting an investigation of this incident. "Corrective action : Curtailment of work in containment, training on removal of anti contamination clothing and respirator, investigation of respiratory protection failure.</p> <p>"There was no media coverage of this incident.</p> <p>"Activity and isotope(s) involved: Am-241, Pu-240/241 Overexposures: (number of workers/members of public; dose estimate; body part receiving dose; consequence): There was one potential overexposed worker, no members of the public were exposed, estimated dose to the worker is about 100 REM CDE and 5 REM CEDE. This value will change following further measurements, investigation and calculations. "Worker was removed from the restricted area, work in stopped, pending the outcome of further investigation."</p> <p>Washington State Incident Number: WA-09-013</p> <p>Reference: U.S. NRC Event Notification Report for April 16, 2009 Event No. 44986, AGREEMENT STATE REPORT - POTENTIAL OVEREXPOSURE TO THE LUNGS, available at https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2009/20090416en.html#en44986</p>
70	April 28, 2009 PV-09-03 PV-08-05	<p>DOH APPROVAL OF VARIANCE EXTENSION. The Department of Health has reviewed your letter dated April 3, 2009, requesting a variance from your Washington State radioactive materials license WN-I0393-1, conditions 8.A and 8.D. Specifically, you requested an extension to the variance approval dated July 25, 2008, for the possession of 6 Ci of isotopes 84-103 and 9 Ci of Sr-90 until August 1, 2009. According to your letter, Perma-Fix Northwest has completed the processing of these sources and is awaiting a decision from Los Alamos National Labs (LANL) as to the acceptability of the sources at LANL. Any opening of these containers will require departmental approval. The other material (secondary waste resulting from processing the sources) must be sent for disposal at a licensed disposal site. Your request for an extension is approved. This approval expires on August 1, 2009. Any material/sources not accepted by LANL or a licensed disposal site by August 1, 2009 must be returned to the generator.</p> <p><i>The waste is greater than class C, even if distributed over an intermodal, due to Sr-90. Other alternative: return to generator for storage, WIPP, Texas (WCS), USE (variance from NW compact.). DOH believes that PFNW and DuPont are actively working on removing this material safely, it is difficult,</i></p>

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		<p><i>and very hard to predict the labyrinth of requirements.</i></p> <p>[NOTE: DOH could have required the return to the generator at any time, once 300 millicuries was found to be exceeded. This was July of 2008 or Earlier.]</p> <p>Reference: Letter, Kristen R. Felix, DOH, to Curt Cannon, PFNW, No Subject, (re: DOH review of April 3, 2009 variance request), dated April 28, 2009.</p>
71	<p>May 21, 2009 DEMAND FOR REMOVAL AND OFFER TO TREAT FOR MONEY Case 3:09-cv-00472- PLR-CCS Document 1 Filed 10/29/09</p>	<p>Philotechnics and the then-party to the Contract, Pacific EcoSolutions, entered into Task Order no. 4 to the Contract for the processing of twelve drums of Waste from DuPont that was contaminated with <i>what was believed to be at the time low levels of Americium Isotope 241 (Am-241)</i>. This task was agreed on April 18, 2005.</p> <p>[NOTE: On May 10, 2006, before they were shipped, PEcoS stated that these twelve (12) drums contained waste with <u>high levels [not low levels] of Am-241</u>. “The anticipated activity for this license condition is 190 millicuries from these drums alone.” The May 2006 variance request, PV-06-07, was for 300 millicuries total. PFNW purchased PEcoS in June 2007.]</p> <p>Thereupon, <u>PFNW discovered</u> that instead of containing the low levels of Am-241 identified in the shipping papers, the DuPont waste contained isotopes that exceeded PFNW’s WAC limits. In particular, PFNW discovered that the DuPont waste included Am-241 at levels higher than reported as well as Strontium 90 (Sr-90), an isotope that was nowhere disclosed on the waste characterization information included in the shipping manifest provided by Philotechnics to PFNW .</p> <p>Following discovery of these nonconformities, PFNW repeatedly demanded that Philotechnics remove the waste under the Return-of-Waste clause. [NOTE– but not very hard, since return did not occur, and DOH helped the waste to stay, only threatening much later to require the waste to be returned.]</p> <p>Alternatively, PFNW several times offered to attempt to treat the nonconforming DuPont waste provided that Philotechnics <u>pay</u> PFNW the additional cost of treatment necessary to make the waste conform to PFNW's WAC limits.</p> <p>[Note: Profit over safety?]</p> <p>Finally, by letter dated May 21, 2009, PFNW formally demanded that Philotechnics <u>remove the nonconforming DuPont waste under the Return-of-Waste clause</u>. Also in that letter, PFNW alternatively offered to treat the nonconforming DuPont waste for a <u>price of \$1,935,013.50</u>.</p> <p>[NOTE: The waste was NOT returned, resulting in what appears to be <u>TWO employee overexposures.</u></p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>Reference: Complaint, Perma-Fix Northwest, Richland Inc., v Philotechnics, LTD, Case 3:09-cv-00472-PLR-CCS, Document 1, filed in the U.S. District Court, Eastern District of Tennessee, Document 1, October 29, 2009.</p>
167	<p>May 26, 2009</p> <p>DOH NOTICE OF CORRECTION</p> <p>Am-241 Employee Overexposure</p> <p>[NOTE: A REPEAT issue from 2006]</p>	<p>This letter constitutes a notice of correction (pursuant to RCW 43.05.100 and the Regulatory Reform Act of 1995) and refers to the investigation I conducted of the February 3, 2009 americium 241/plutonium 239 multiple worker intake incident.</p> <p>The inspection revealed the following items of noncompliance with the requirements of the license and the Washington State Rules and Regulations for Radiation Protection. For your information, each item of noncompliance is categorized according to severity; as a violation, an infraction, or a deficiency. Generally, violations are those items which have a high probability of causing an overexposure to personnel...</p> <p>as PFNW reported to the department on <u>May 1, 2009</u>, dose estimates indicate the 5 rem annual dose limit was exceeded for one worker. Exceeding the annual worker TEDE of 5 rem is classified as a VIOLATION.</p> <p>PFNW placed a worker who, by dose estimates, exceeded the annual TEDE dose limit, back into a radiological area (PFNW finding number 2009-68). Placing an overexposed worker back into a radiological area is classified as a VIOLATION.</p> <p>bioassay monitoring of workers did not occur within 48 hours of exceeding procedural conditions LLOP 202 sections 4.4.2.1 and 4.4.2.2, despite review of air sample data by the Health Physics Manager and the Radiation Safety Officer. Workers were allowed to continue working through the week, and bioassay monitoring was scheduled for the next week after job completion (PFNW finding number 2009-67). Not performing bioassay monitoring within 24 hours as required by LLOP 202 4.4.2.1 and 4.4.2.2, and delaying bioassay monitoring until job completion, is classified as a VIOLATION.</p>
169	<p>May 27, 2009</p> <p>DOH Letter</p> <p>DOH Removes Restrictions on PFNW Operations in SB-11</p>	<p>This is in response to your letters dated May 1 and May 13, 2009, requesting approval to resume operations in SB-11. The Department of Health had restricted operations in SB-11 on April 1, 2009, due to a radionuclide uptake by a worker, that is likely to result in an overexposure.</p> <p>Your May 1 submittal included an unusual occurrence report, as well as a list of specific items that you have done as part of the restart request. Your May 13 letter shows the status of the items as being completed. By</p>

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		<p>this letter, the department withdraws the restrictions placed on operations being conducted in SB-11, and Perma-Fix Northwest may resume performing operations in this room.</p> <p>[NOTE: DOH apparently did not verify the completed items, and trusted the PFNW “May 13 letter”, in approving a restart. The attachments to this DOH letter include actions listed in emails, but no formal May 13 letter from PFNW. The emails include a notation from DOH that DOH is being “held up” by PFNW failure to send quarterly billing for DOH for 4th quarter 2008.] The PFNW May 13 letter is missing.</p> <p>REFERENCE: Letter, (no letter number), Illegible for Sean Murphy, DOH, to Curt Cannon, PFNW, No Title, dated May 27, 2009.</p>
172	June 24, 2009	<p>DOH Accepts Corrective Actions for February 3, 2009 Overexposure.</p> <p>We have received your letter dated June 22, 2009, informing us of the steps you have taken to correct the items of noncompliance noted during the investigation of the intake of Am-241 on February 3, 2009. We have reviewed your corrective actions and found that the changes should be adequate to prevent the recurrence of this type of problem in the future.</p> <p>REFERENCE: Letter, Illegible for Sean Murphy, DOH, to Curt Cannon, PFNW, to title, dated June 24, 2009.</p>
170	<p>June 30, 2009</p> <p>DOH OVER EXPOSURE Report Item Number WA90013 from Event Date 02/03/2009.</p>	<p>Identified as Event Closed <u>by the State</u>.</p> <p>Narrative; On February 12, 2009, a worker was sent for a lung count at the Battelle (Pacific Northwest National Laboratory) lung counter for a bioassay measurement. The lung count was ordered by the licensee due to the worker working in an area where airborne contamination levels could cause more than 2.5 DAC-hrs (with respiratory protection factors applied), and greater than 520 DAC-hrs assuming no respiratory protection was worn in one day. The reason for requiring this count was to ensure that measures used to protect the workers were functioning properly. The workers first lung count detected an average of approximately 0.4 nCi of Am-241. Assuming the exposure was from 10 days prior, the intake was approximately 1.9 nCi Am-241. The annual limit of intake for Am-241 is 6 nCi (1 µm AMAD particle size). The estimated dose was about 1/3 of the annual limit, or 16 REM CDE (Annual limit 50 REM).</p> <p>The worker had previous whole body exposure, but this added amount did not cause a limit to be exceeded.</p> <p>On March 25, 2009 the licensee informed the Washington State Department of Health that further testing by Battelle caused a revision to the original calculated dose and the new calculated dose would exceed the</p>

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		<p>50 REM CDE limit. The date of exposure (February 3, 2009) was assumed by the licensee, based on air sample data and the use of respiratory protection that may not have provided adequate coverage (use of filtering respirator instead of supplied air). On February 3, the worker was in a containment in which air sample results were about 1.0 E-8 μCi/ml gross alpha activity concentration for several hours and was wearing a Powered Air Purifying Respirator (PAPR, protection factor of 1000). Bioassay results (fecal) from one other worker who was also in the containment showed a small amount of activity, and a dose was assigned to this second worker that did not exceed regulatory limits. The second workers lung count was less than detection limits.</p> <p>On June 22, 2009 the licensee informed the Washington State Department of Health that the Committed Effective Dose Equivalent (CEDE) for the worker was 6.8 cSv (6.8 REM) and the Committed Dose Equivalent (CDE) was 120 cSv (120 REM) to the bone surface. The workers Deep Dose Equivalent (DDE) from his dosimetry for the first quarter 2009 was 0.3 mSv (30 mRem). The dose calculation was completed by a consultant for the licensee. Intake was calculated using methodology of ICRP 30, modified for clearance function. Intake for Am-241 was calculated from lung deposition and calculated clearance rates. Intake of Plutonium (Pu) was inferred from excreta bioassay results and assumed ratios of Am-241 to Pu. Dose was calculated using CINDY code version 1.2. The particle size was considered, and a 1 μm Activity Median Aerodynamic Diameter (AMAD) was chosen as the best fit. The total calculated intakes are:</p> <p>Am-241 153 Bq (4.14 nCi), Pu239/240 89.9 Bq (2.43 nd), Pu 238 16.8 Bq (0.455 nd).</p> <p>The exact cause of the incident is unknown. The assumed cause is a failure of the respiratory protection system. The licensees corrective actions to prevent reoccurrence are to test each worker with a challenge gas prior to high risk work, increased engineering controls to mitigate airborne contaminants, specific training using phosphorescent powder and black lights for workers, more frequent bioassay samples, inclusion of nasal smears for immediate detection of intakes, use of supplied air respirators over air filtering respirators for high risk work, and training for workers, managers and health physics staff. Note that work was resumed in the area, and no further exposures have occurred.</p> <p>Worker was removed from the restricted area, work in the area where the intake was assumed to occur was stopped, changes to operations and training methods, changes to engineering controls, changes to testing of respirators prior to use.</p> <p>Contributing factors - High airborne activity, loss of respiratory protection.</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>DOH has completed an investigation of this Incident.</p> <p>There was no media coverage of this incident,</p> <p>Activity and isotope(s) involved: Am-241, Pu-240/241, Pu 238 Overexposures: (number of workers/members of public; dose estimate; body part receiving dose; consequence): There was one overexposed worker. No members of the public were exposed. Estimated dose to (he worker was 120 REM CDE and 6.8 REM CEDE.</p> <p>The corrective actions attached to this report identify the type of dose as “extremity, occupational,” with effect of exposure “NONE.”</p> <p>The source of the radiation was identified as three “UNSEALED SOURCES,” with the source, model, serial numbers, and amount and type of radioactivity BLANK (not identified).</p> <p>Corrective actions were listed as additional training, and a new procedure written.</p> <p>REFERENCE: DOH EXP OVEREXPOSURE REPORT Item Number WA090013, Last updated June 30, 2009.</p>
72	<p>July 2, 2009 NRC Event Notification No. 44896 UPDATE From April 16, 2009.</p> <p>120 REM EXPOSURE Am-241 Pu</p>	<p>NRC Event Notification UPDATE. AGREEMENT STATE REPORT - POTENTIAL OVEREXPOSURE TO THE LUNGS. * * * UPDATE PROVIDED VIA EMAIL FROM KETTER TO PARK AT 0823 EDT ON 7/1/09 * * *</p> <p>"On June 22, 2009 the licensee informed the Washington State Department of Health that the Committed Effective Dose Equivalent (CEDE) for the worker was 6.8 cSv (6.8 REM) and the Committed Dose Equivalent (CDE) was 120 cSv (120 REM) to the bone surface. The workers Deep Dose Equivalent (DDE) from his dosimetry for the first quarter 2009 was 0.3mSv (30 mRem). The dose calculation was completed by a consultant for the licensee. Intake was calculated using methodology of ICRP 30, modified for clearance function. Intake for Am-241 was calculated from lung deposition and calculated clearance rates. Intake of Plutonium (Pu) was inferred from excreta bioassay results and assumed ratios of Am-241 to Pu. Dose was calculated using CINDY code version 1.2. The particle size was considered, and a 1micron Activity Median Aerodynamic Diameter (AMAD) was chosen as the best fit. The total calculated intakes are: Am-241 153 Bq (4.14 nCi), Pu239/240 89.9 Bq (2.43 nCi), Pu 238 16.8 Bq (0.455 nCi).</p> <p>"The exact cause of the incident is unknown.</p> <p>The assumed cause is a failure of the respiratory protection system. The licensees corrective actions to prevent reoccurrence are to test each worker with a challenge gas prior to high risk work, increased engineering controls to mitigate airborne contaminants, specific training using phosphorescent powder and black lights for workers, more frequent bioassay samples, inclusion of nasal smears for immediate detection of intakes, use of supplied air respirators over air filtering respirators for high risk work, and training for workers,</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>managers and health physics staff. Note that work was resumed in the area, and no further exposures have occurred.</p> <p>"Worker was removed from the restricted area, work in the area where the intake was assumed to occur was stopped, changes to operations and training methods, changes to engineering controls, changes to testing of respirators prior to use.</p> <p>"Contributing factors [are] high airborne activity, [and] loss of respiratory protection.</p> <p>"DOH has completed an investigation of this incident.</p> <p>"There was no media coverage of this incident.</p> <p>"There was one overexposed worker. No members of the public were exposed. Estimated dose to the worker was 120 REM CDE and 6.8 REM CEDE."</p> <p>Notified the R4DO (Pick) and FSME EO (McIntosh).</p> <p>[NOTE: THIS EVENT WAS TRANSMITTED TO THE IAEA AS A LEVEL 2 INTERNATIONAL NUCLEAR EVENT. NRC did not recognize this as a repeat issues from 2006.</p> <p>Reference: U.S. NRC Event Notification Report for July 2, 2009, Update to April 16, 2009 Event No. 44986, AGREEMENT STATE REPORT - POTENTIAL OVEREXPOSURE TO THE LUNGS, available at https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2009/20090702en.html#en44986</p>
73	<p>July 7, 2009 PV-09-01 PV-08-05</p> <p>PV-09-06</p>	<p>PFNW REQUESTS A VARIANCE EXTENSION. FOR SOURCES FROM 2006. This letter is to request an extension for a portion of the variance originally approved in August of 2008 to the Perma-Fix Northwest (PFNW) radioactive materials license WN-10393-1, Condition 8.A and Condition 8.D. The current variance approved April 28, 2009 Is set to expire August 1, 2009,</p> <p>PFNW has separated items believed to be sources from material received in 2006 (see attached tables for items identified as potential sources). The Washington Department of Health (WDOH) Waste Management Section has worked with PFWN on the separation and management of these sources. PFWN has also been working with Los Alamos National Lab (LANL) representatives who manage the Department of Energy (DOE) source recovery program to try to get as many sources as possible accepted.</p> <p>During the last telephone conference call between PFWN, WDOH and LANL it was determined that LANL personnel would not be able to come out until "sometime" in July due to other commitments. PFWN still does not currently have a date for the LANL personnel to come and inspect the sources and package and prepare those that meet the DOE source recovery program for shipment.</p> <p>PFNW is requesting a new variance for the attached list until September 30, 2009 as a separate line item that does not go against the current license storage or process limits. Following the LANL inspection and removal of approved sources PFWN will then Incorporate the remaining Items from the list into the Radioactive Materials license conditions if unable to disposition before this date.</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>[NOTE: This request is contrary to DOH instructions of January 22, 2009 for the earlier variances PV-09-01 and PV-08-05: DOH previously stated - "<u>By May 1, 2009</u>, any material/sources not accepted by LANL or a licensed disposal site <u>must be returned to the generator.</u>"</p> <p>Reference: Letter, Curt Cannon, PFNW, to Sean Murphy, DOH, No Subject (re: Request extension for non-source portion of variance originally approved in August of 2008), dated July 7, 2009.</p>
74	<p>July 31, 2009 PV-09-06 PV-09-01 PV-08-05 2.5 Ci Am-241</p>	<p>DOH APPROVES AND SPLITS VARIANCE EXTENTION BEYOND MAY 1, 2009 DATE – PART 1. The Department of Health has reviewed your letter dated July 7, 2009, requesting a variance from your Washington State Radioactive Materials license #WN-I0393-1, condition 8.D. Specifically, you requested an extension to the variance approval dated July 25, 2008 for the possession of 2.5 Ci (current estimate) of isotopes 84-103 until September 30, 2009. On July 27 you <i>verbally requested</i> to open the containers when Department of Energy's Orphan Source Recovery Program (OSRP) personnel are on site.</p> <p>Your request to possess 2.5 Ci of isotopes 84-103 contained in the drums listed above is approved. This activity will be administratively separate from the other material on your inventory (a separate line item). All activities involving opening of these drum will be under LLOP 104 planning. By October 1, 2009, any material/sources not accepted by OSRP, or a licensed disposal site, must be returned to the generator.</p> <p>PV-08-05 is 'split' into two variance (06 and 07), one for the sources and the other for DAW. ["DAW" is not defined.] The two categories will be going separate directions to OSRP and to Philo, respectively. The total activity allowed on site decreases with this variance, but is still above the site limit of 1 Ci [NOTE THIS IS AN INCREASED VALUE OVER THE ORIGINAL AMOUNT].</p> <p>The drum numbers were asked for on the phone. (LL08402464-b/c 802, LL08402417-B/C 805, LL08402272- B/C 806, LL08402111- B/C 807, LL08402290- B/C 810) Activities are estimates, and may change when OSRP technicians view/test sources. Also a <i>verbal request on 7-27-2009</i> to open the drums and inner packages. Only those which were <i>not leaking</i> per WAC 246-221-080 can be removed from inner package (plastic bag). Administratively separated from the inventory (separate line item) to prevent 'backfilling' the available inventory if the estimate of these sources decreases. Some sources may be returned to generator is OSRP cannot take them. ...<i>The only two choices are to approve some type of variance for this material or to make them stop accepting waste.</i> I want them to continue to work on this project - if we shut them down, then what? ... <i>I think we should give them a variance for this material.</i></p> <p>[NOTE - NOT A WORD ABOUT SAFETY OR PUBLIC RISK. NOT A WORD ABOUT VIOLATING THE PREVIOUS REQUIREMENT TO SHIP</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>ITEMS BACK THAT WERE NOT GONE BY MAY 1, 2009. SEE January 2, 2009 DOH Letter]</p> <p>Reference: Letter, Illegible for Sean Murphy, DOH, to Curt Cannon, PFNW, No Subject (re: variance extension request for 2.5 Ci (current estimate) of Isotopes 84-103 until September 30, 2009), dated July 31, 2009.</p>
75	July 31, 2009 PV-09-07 PV-08-09	<p>DOH APPROVES AND SPLITS VARIANCE EXTENTION BEYOND MAY 1, 2009 DATE – PART 2. The Department of Health has reviewed your letter dated July 7, 2009, requesting a variance from your Washington State Radioactive Materials license #WN-10393-1, condition 8.D. Specifically, you requested an extension to the valiance approval dated July 25, 2008 for the possession of 1.1 Ci (current estimate) of isotopes 84-103 and 650 mCi or Sr-90 until September 30, 2009.</p> <p>According to your letter, Perma-Fix Northwest has completed the processing of the related sources and is waiting for the generator/broker of this material to schedule a shipping cask for transportation. <u>You have requested to administratively separate this activity from your on-site inventory by maintaining it as a separate line item.</u> The 38 drum numbers are listed in your letter.</p> <p>[NOTE: Case 3:09-cv-00472 Document 44 states that PFNW informed Philotechnics that the 12 drums of DuPont waste had (somehow) grown to 38 drums of waste.]</p> <p>Your request to possess 1.1 Ci of isotopes 84-103 and 650 mCi of Sr-90 contained in the drums listed in your letter is approved. This activity will be administratively separate from the other material on your inventory (a separate line item). By October 1, 2009, [NOTE: Last time this was May 1, 2009.] all material must be shipped off site.</p> <p>Approve: This is material that was separated from LLR08-059 and LLR05-096, DuPont. It is not acceptable for burial at Clive, and there is no disposal option for it. The only acceptable path to remove it from PFNW is to return it to the generator/broker (Philo technics). It requires a type B shipping cask for transportation. PFNW is not an authorized user for a shipping cask, and is expecting Philo to schedule and package the material. Approval will include the caveat to obtain the necessary approval to ship in a type B container. The container will not be opened. <u>The activity was re-calculated based on the results of surveys and calculations. Most of the drums are greater than class C waste. I want to make this waste a separate line item on the inventory, as the activity is adjusted with each new estimate, a moving target.</u> (this is more restrictive because it does not allow the available activity to be used for[NOTE: i.e. “backfilled with] other waste streams.) [NOTE: Looks likes the variances have been “less restrictive so far, PFNW has been able to keep using up to the max variance allowed by accepting new waste, despite the variance requests that were for only certain items.]</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>Reference: Letter, Illegible for Sean Murphy, DOH, to Curt Cannon, PFNW, No Subject, (re: variance extension for 1.1 Ci (current estimate) of isotopes 84-103 and 650 mCi of Sr-90 until September 30, 2009), dated July 31, 2009.</p>
173	<p>September 24, 2009</p> <p>DOH Incident Report</p>	<p>Subject: DOH Americium 241 Personnel Internal Overexposure Incident of February 3, 2009</p> <p>This is an 11 page report. Of note are:</p> <p>On February 12, 2009, an employee (worker #1) at the Perma-Fix Northwest (PFNW) mixed waste processing facility in Richland, Washington (radioactive material license number WN- 10508-1) was given two lung counts, and an average of 0.434 nCi of Am-241 was found. The initial estimated intake, based on WAC 246-249-221, was about 2.5 nCi, or about one-third of the legal limit. More rigorous dose estimates were conducted by Gene Carbaugh of Pacific Northwest National Labs (PNNL) at the request of PFNW^ and a modified intake was calculated and a dose assigned at levels above the legal limits for exposure. The intake was assumed to have occurred nine days prior to the lung counts on February 3, 2009, while the worker was dismantling a large glove box for a US. Department of Energy (USDOE) contractor. The glove box originated from the 308 building on the Hanford Nuclear Reservation in Washington State. The exact cause of the intake is unknown. The most plausible explanation for this intake was a failure of the respiratory protection system.</p> <p>The waste being processed was an intact glove box, <u>roughly the size of a small automobile</u>. ... The owner of the glove box is USDOE, on the Hanford Nuclear Reservation. The glove box was used in the 300 Area for research and fuel processing activities in the 308 building, and was highly contaminated with americium 241 and various plutonium isotopes.</p> <p>The room where the work occurred is referred to as SB-11. This room is located in the mixed waste building and is approximately 20 feet by 40 feet, and two stories tall.</p> <p>PFNW purchased a large, three-room containment and erected it in SB-11. The containment was manufactured by LANCS of Seattle, and was made of heavy plastic and an external metal frame. The doors are flaps with hook and loop closures, and the walls are mostly clear plastic windows. The processing that is the focus of this investigation occurred in this LANCS containment.</p> <p>The LANCS containment is vented using a dedicated blower and separate High Efficiency Air Filter (HEPA), which discharges through a flexible pipe culminating near a building exhaust duct.</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>Following the size reduction activity, the pieces were staged in the LANCS containment. When sufficient pieces had accumulated, a representative from USDOE would observe the loading of each piece (from outside the LANCS containment and inside SB-11) to ensure that only the waste and no hazardous material was placed in the disposal box. This process is called verification. Following verification, the waste material is entombed by flood grouting the box and creating a steel-encased concrete monolith. The boxes are then sent to a USDOE disposal site.</p> <p>On March 25, 2009, after analysis of several lung counts, urine bioassay, and fecal bioassay results for worker #1, PNNL recalculated the dose to the worker as possibly having exceeded the regulatory limit, but could not provide an actual number - only that it would be greater than 50 rem and less than 100 rem CDE to the bone, and greater than 5 rem CEDE.</p> <p>A Hazard-Barrier-Target (HBT) analysis was conducted on this incident. The result was that the only plausible cause was a respiratory protection program failure or contamination control failure during the dotting process.</p> <p>One possible route of intake is from the worker's anti-contamination clothing to his respiratory track during doffing. The scenario was that contamination was spread to the middle set of clothing (which is still worn while the mask is removed), in quantities high enough to cause the intake, and then aspirated by the worker while he removed this set of coveralls. The levels on his clothing would have been high and very easy to re-suspend in the air.</p> <p>A loose or detached [Respirator] filter was identified as a potential cause.</p> <p>Inadequate respirator selection. This was a contributing factor. <u>The PAPR was not intended to be used in air concentrations of the magnitude found on February 3, 2009.</u> Shortly after starting work, the HPT, the HPS, and the RSO concluded this, and removed the workers from the work area.</p> <p>The USDOE observers interviewed, who were trained radiation workers, thought the job was conducted safely, in a consistent manner and professionally. [Note – of course it was a DOE glovebox, and criticism of PFNW could result in missing TPA milestones.]</p> <p>CONCLUSION The cause of the intake is most likely a PAPR failure (either equipment or operational). The exact cause of the intake was not found.</p> <p>FINDINGS DOH did not find a violation that led to this intake. DOH found two items of noncompliance (IONC) for occurrence after the intake occurred:</p>

REF #	DATE/DOC NUMBER	ISSUE
		<ul style="list-style-type: none"> • Bioassays were not collected within 48 hours after an exposure that could have resulted in more than 4 DAC-hrs, assuming a protection factor, or greater than 520 DAC-hrs, assuming no respiratory protection was used. • The RSO allowed the worker to re-enter the radiation areas, when his dose was not known. <p>[Note – No evaluation was performed of whether the glove box should have been stabilized before removal from the Hanford site.]</p>
76	September 29, 2009 PV-09-09 Extend PV-09-06 2.5 Ci AM-241	<p>PFNW MAKES ANOTHER VARIANCE EXTENSION REQUEST. For a 1-year extension. This letter is to request an extension for a portion of the variance approved July 31, 2009 to the Perma-Fix Northwest (PFNW) radioactive materials license WN-10393-1, Condition 8.A and Condition 8.D (2.5 curies atomic numbers 84 to 103). The current variance is set to expire October 1, 2009.</p> <p>PFNW previously separated items believed to be sources from material received in 2006. The Washington Department of Health (WDOH) Waste Management Section worked with PFWN on the separation and management of these sources. PFWN has also been working with Los Alamos National Lab (LANL) representatives who manage the Department of Energy (DOE) source recovery program to try to get as many sources as possible accepted. Currently LANL has assisted PFWN in removing twenty-one (21) sources from the site and placing them into the DOE source recovery program,</p> <p>PFNW has notified Philotechnics that they must take the remaining sources back as part of the return of waste clause in their 2006 contract with the facilities previous owners.</p> <p>[NOTE: THIS NOTIFICATION COULD HAVE BEEN MADE AT ANY TIME ONCE THE NONCOMPLIANCE WAS DISCOVERED, BUT HAS TAKEN YEARS SINCE JULY 6, 2006].</p> <p>“The legal process has begun to force the return of the sources. PFWN is concerned that this process will continue to drag out now that it is in the legal system.”</p> <p>PPNW is requesting an extension to the variance until October 1, 2010 as a separate line item that does not go against the current license storage or process limits. A copy of the correspondence between PFWN and Philotechnics can be made available for your review. PFWN will continue to store these sources in a safe manner until the court requires the customer to take them back.</p> <p>Reference: Letter, Illegible for Sean Murphy, DOH, to Curt Cannon, PFWN, “PV-09-09 WN-10393-1, Request to Possess 84-103 Isotopes” dated December 22, 2009. [possess 2.5 Ci of atomic numbers 84-103 until October 1, 2009.]</p>
77	September 29, 2009	PFNW MAKES A SECOND VARIANCE EXTENSION REQUEST. For

REF #	DATE/DOC NUMBER	ISSUE
	PV-09-07 PV-09-10 1.1 Ci Am-241 and 650 mCi Sr-90	<p>a 1-year extension. This letter is to request an extension to the variance approved in July 31, 2009 to the Perma-Fix Northwest (PFNW) radioactive materials license WN-I0393-1, Condition 8.A and Condition 8.D (1.1 Curies atomic #84-103 and 650 millicuries Sr-90). The current variance approved is set to expire October 1, 2009.</p> <p>PFNW has separated items believed to be sources from material received in 2006. The Washington Department of Health (WDOH) Waste Management section worked with PFWN on the separation and management of this waste stream.</p> <p>During the sorting process, activity was identified (Sr-90) that was not originally manifested. The originator of the material (DuPont) has stated that they do not believe that this material contained Sr-90 and has contracted Canberra to come to our facility to analyze the drums for a <i>more accurate assessment</i>.</p> <p>This is currently scheduled to occur during the week of October 5, 2009. PPNW has agreed to support this activity in the event that it help move the material off-site in a more expeditious manner.</p> <p>PFNW has notified Philotechnics that they must take the material back as part of the return of waste clause in their 2006 contract with the facilities previous owners. The legal process has begun to force the return of the sources. PFWN is concerned that this process will continue to drag out now that it is in the legal system.</p> <p>PFNW is requesting an extension to the variance until October 1, 2010 as a separate line item that does not go against the current license storage or process Limits. A copy of the correspondence between PFWN and Philotechnics can be made available for your review. PFWN will continue to store this waste in a safe manner until the court requires the customer to take them back.</p> <p>[NOTE: NOTIFICATION THAT THE WASTE MUST BE TAKEN BACK COULD HAVE BEEN MADE AT ANY TIME ONCE THE NONCOMPLIANCE WAS DISCOVERED, BUT HAS TAKEN YEARS SINCE JULY 6, 2006, apparently as PFWN has sought to profit from it].</p> <p>Reference: Letter, Illegible for Sean Murphy, DOH, to Curt Cannon, PFWN, "Re: PV-09-10 WN-10393-1, Request to Possess 84-103 and Sr-90 Isotopes," dated December 22, 2009. [650 mCi of Sr-90 and 1.1 Ci of Am-241 until October 1, 2009]</p>
176	October 2, 2009 LANL Ownership Transfer of 21 Am-241 Sources from PFWN to	<p>TRANSFER OF AM-241 SOURCES TO DOE</p> <p><i>Enclosed please find a signed Authorization to transfer/Relinquishment of Ownership/Custody form concerning: Perma-Fix Northwest, Inc. 2025 Battelle Blvd Richland, WA 99354</i></p>

REF #	DATE/DOC NUMBER	ISSUE
	DOE	<p>The radioactive sources described on the form have been removed from Perma-Fix Northwest, Inc. in Richland, WA and are in storage at NSSI in Houston, TX. These sources have been transferred to Department of Energy (DOE) ownership and are being stored under DOE license exemption.</p> <p>This action was completed as part of the Off-Site Source Recovery (OSR) Project managed by this office. If you need any further information on this action, please contact the OSR Project Office at 505-667-7440.</p> <p>Note: The attachment to this letter indicates 21 Am-241 Sources, ranging from a minimum of 0.014 Ci to 1.0 Ci each. The sum of the activity in the sources is 3.77 Ci.</p> <p>REFERENCE: Letter, Rick Rasmussen, Los Alamos National Laboratory, to Arden Scroggs, DOH, RE: ATRO#2009:81, License#WM-10393-1, dated October 2, 2009.</p>
78	October 29, 2009 Case 3:09-cv-00472- PLR-CCS Document 1	<p>COURT DOCUMENT FILED ON THIS DATE SHOWS THE TWELVE DRUMS from VARIANCE PV-07-06 EXCEEDED THE ACTIVITY SHOWN IN THE SHIPPING PAPERS. AM-241. SR-90. In this Document PFNW asserts the cost to maintain and manage the waste was estimated to be \$1 million, with additional disposal costs of \$2 million.</p> <p>Reference: Complaint, Perma-Fix Northwest, Richland Inc., v Philotechnics, LTD, Case 3:09-cv-00472-PLR-CCS Document 1, Complaint, filed in the U.S. District Court, Eastern District of Tennessee, Document 1, October 29, 2009.</p>
79	December 22, 2009 PV-09-06 PV-09-09 2.5 Ci Am-241	<p>DOH APPROVES FIRST PART VARIANCE EXTENSION.</p> <p>We have reviewed your letter dated September 29, 2009, requesting approval to extend variance number PF-09-06, approved on July 31, 2009. PV-09-06 allowed PFNW to possess 2.5 Ci of atomic numbers 84-103 until October 1, 2009. Your current request is to extend this variance until October 1, 2010. In your letter, you describe the work that has been accomplished toward removing this material. You have also provided legal paperwork from the Eastern District of Tennessee at Knoxville showing that PFNW is attempting to remedy and <i>enforce the return of waste clause with Philotechnics</i> (the broker). The department recognizes this as a unique situation. <i>We do not usually provide a variance from your license for long periods such as you are requesting.</i></p> <p>Your request is approved, with a shortened expiration date. It is expected that you will continue to pursue safe removal and disposition of this material. Continue to keep the department apprised of the status of these wastes, and the legal proceedings with Philotechnics. This approval does not authorize PFNW to process these wastes. This material can be maintained as a separate line item for licensed inventory, but it must be included in the quantity of concern total activity on site. This variance expires April 1, 2010.</p> <p>Reference: Letter, Illegible for Sean Murphy, DOH, to Curt Cannon,</p>

REF #	DATE/DOC NUMBER	ISSUE
		PFNW, “Re: PV-09-09 WN-I0393-1, Request to Possess 84-103 Isotopes,” dated December 22, 2009.
80	December 22, 2009 PV-09-07 PV-09-10 650 mCi Sr-90 1.1 Ci Am-241	<p>DOH APPROVES SECOND PART VARIANCE EXTENSION. We have reviewed your letter dated September 29, 2009, requesting approval to extend variance number PV-09-07 for license #WN-10393-1, Condition 8.D, approved on July 31, 2009. PV-09-07 allowed PFWN to possess 650 mCi of Sr-90 and 1.1 Ci of Am-241 until October 1, 2009. This material is contained in 38 drums listed in your previous request letter dated July 31, 2009. Your current request is to extend this variance until October 1, 2010. In your letter, you describe the work that has been accomplished toward removing this material. You have also provided legal paperwork from the Eastern District of Tennessee at Knoxville showing that PFWN is attempting to remedy and <u>enforce the return of waste clause</u> with Philotechnics (the broker). The department recognizes this as a unique situation. <i>We do not usually provide a variance from your license for long periods such as you are requesting.</i></p> <p>Your request is approved with a shortened expiration date. It is expected that you will continue to pursue safe removal and disposition of this material. Continue to keep the department apprised of the status of these wastes, and the legal proceedings with Philotechnics. This approval does not authorize PFWN to process these wastes; This material can be maintained as a separate line item for licensed inventory, but it must be included in the quantity of concern total activity on site. This variance expires April 1, 2010.</p> <p>Reference: Letter, Illegible for Sean Murphy, DOH, to Curt Cannon, PFWN, “Re: PV-09-10 WN-I0393-1, Request to Possess 84-103 and Sr-90 Isotopes,” dated December 22, 2009.</p>
81	December 23, 2009 AIR 09-1202 HEPA FILTERS VIOLATION	<p>General Notice of Violation (GNoV) 1 of 4. High Efficiency Particulate Air (HEPA) Filter and HEPA Filter Housing Violation</p> <p>You are hereby formally notified that Perma-Fix Northwest, Inc. (PFWN) is in violation of Washington Administrative Code (WAC) 246-247-040 and WAC 246-247-120 at the following emission unit(s) [EU]:</p> <ul style="list-style-type: none"> ■ EU 510, WDOH Letter AIR 02-1011, Low Level Non-Thermal or Volume Reduction Facility ■ EU 507, WDOH Letter AIR 05-612, Low Level Rad-Waste Thermal ■ EU 513, WDOH Letter AIR 01-902, Mixed Waste Non-Thermal/Stabilization ■ EU 506, WDOH Letter AIR 05-501, Mixed Waste Thermal <p>The WDOH has chosen to forgo enforcement against these violations. Enforcement might have included civil penalties in an amount of up to ten thousand dollars per day for each violation, The violation(s) was/were discovered during a Radioactive Air Emissions Section (RAES) audit/inspection (Audit 559) conducted April 9, 2008, at the PFWN facility in Richland, Washington.</p> <p>HEPA filters used by PFWN before April 9, 2008, in the cited facilities were not compliant with AG-1, Section FC, HEPA Filters.</p> <p>HEPA filter housings in the Volume Reduction Facility (VRF) (EU 510)</p>

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		<p>cannot be demonstrated compliant to ASME N509 requirements.</p> <p>The WDOH might have pursued criminal penalties in accordance with RCW 70.94.430, had such been warranted. In this case, letters sent to WDOH (References 1, 2, and 3) state that PFNW HEPA filters comply with MIL-51068, a standard equivalent to AG-1, Section FC. <u>These letters appear to submit material false statements</u> in support of the Radioactive Air Emissions License(s) at PFNW. "A person who knowingly makes a false or misleading material statement to a public servant is guilty of a gross misdemeanor" (RCW 9A.76.175). A gross misdemeanor is punishable by up to one year in jail and/or up to \$5000 fine (RCW 9.92.020). <u>The statute of limitations on this violation has expired.</u></p> <p><u>[NOTE: Gross Mismanagement on the Part of DOH?]</u></p> <p>Reference: Letter, AIR 09-1202, by Certified Mail, John Martell, DOH, to Richard Grondin, PFNW, "Re: Perma-Fix Northwest, Inc. (PFNW) High Efficiency Particulate Air (HEPA) Filter and HEPA Filter Housing Violation," dated December 23, 2009.</p>
82	<p>December 23, 2009 AIR 09-1203 PORTABLE VENTILATION NOT APPROVED</p>	<p>General Notice of Violation (GNoV) 2 of 4. This GNoV constitutes notice of violation(s) at the following emission unit(s) (EU):</p> <ul style="list-style-type: none"> ■ EU 513, Mixed Waste Non-Thermal or Mixed Waste Stabilization <p>During the month of August 2008, PFNW conducted waste treatment operations on radioactive materials in Room 11 of the Mixed Waste Stabilization facility without:</p> <ol style="list-style-type: none"> a. submitting a formal request for approval of the associated portable ventilation; or b. b. written approval prior to construction or operation of the portable ventilation. <p>The WDOH has chosen to forgo formal enforcement for these violations. Enforcement might have included civil penalties in an amount of up to ten thousand dollars per day for each violation, ... The WDOH might also have pursued criminal penalties in accordance with RCW 70.94.430, had such been warranted.</p> <p>[NOTE: WHY was it not warranted? DOH does not say.]</p> <p>Reference: Letter, AIR 09-1203, by Certified Mail, John Martell, DOH, to Richard Grondin, PFNW, "Re: Perma-Fix Northwest, Inc. (PFNW) Unlicensed Waste Treatment Operation in Mixed Waste Stabilization," dated December 23, 2009.</p>
83	<p>December 23, 2009 AIR-09-1204 Continuous Monitoring</p>	<p>General Notice of Violation (GNoV) 3 of 4. Violation of Continuous Monitoring Requirement</p> <p>You are hereby formally notified that PFNW is in violation of Washington</p>

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	VIOLATION TRITIUM	<p>Administrative Code (WAC) 246-247-075(2) at the following emission unit(s) [EU]:</p> <ul style="list-style-type: none"> • EU 506, Washington State Department of Health (WDOH) letter AIR 05-501, Mixed Waste Thermal • EU 507, WDOH letter AIR 05-612, Low Level Rad Waste Thermal <p>The WDOH has chosen to forgo enforcement against these violations. Enforcement might have included civil penalties in an amount of up to ten thousand dollars per day for each violation.. Enforcement might also have included a license action... The WDOH might have pursued criminal penalties...</p> <p>The EU 506, Mixed Waste Thermal and EU 507, Low Level Rad Waste Thermal tritium air sampling units had more than 75% pink silica gel in the respective tritium sampling columns at the time of inspection.</p> <p>[NOTE this Indicates inability to capture and account for all tritium that was discharged up the stack.]</p> <p>Reference: Letter, AIR 09-1204, by Certified Mail, John Martell, DOH, to Richard Grondin, PFNW, “Re: Perma-Fix Northwest, Inc. (PFNW) Violation of Continuous Monitoring Requirement,” dated December 23, 2009.</p>
84	<p>December 23, 2009 AIR 09-1205</p> <p>EXCEEDED ANNUAL POSSESSION QUANTITY FOR AM-241 and SR-90</p>	<p>General Notice of Violation (GNoV) 4 of 4. General Notice of Violation (GNoV). EXCEEDED ANNUAL POSSESSION QUANTITY.</p> <p>This letter transmits a General Notice of Violation (GNoV). You are hereby formally notified that Perma-Fix Northwest, Inc. (PFNW) is in violation of Washington Administrative Code (WAC) 246-247-040 at the following emission unit(s) [EU]:</p> <ul style="list-style-type: none"> • EU 510, Washington State Department of Health (WDOH) letter AIR 02-1011, Low Level Non-Thermal or Volume Reduction Facility <p>During sorting and repacking of the DuPont drums during the month of August 2008, PFNW discovered that drum contents significantly exceeded manifested amounts of 241-Am and 90- Sr. The activity of sealed sources contained in the drums exceeded the amounts manifested, and subsequent leak tests determined that enough of the sources were leaking to cause the APQ to reach approximately 170% of the licensed limit.</p> <p>The WDOH has chosen to forgo enforcement against these violations. Enforcement might have included civil penalties in an amount of up to ten thousand dollars per day for each violation, Enforcement might also have included a license action... The WDOH might have pursued criminal penalties...</p> <p>Reference: Letter, AIR 09-1205, by Certified Mail, John Martell, DOH, to Richard Grondin, PFNW, “Re: Perma-Fix Northwest, Inc. (PFNW) Exceeded Annual Possession Quantity (APQ) Limit in Volume Reduction Facility (VRF),” dated December 23, 2009.</p>

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85	January 13, 2010 PS-10-01, PA-10-01, WN-05-01 DEFICIENCY	DOH Inspection Findings and Licensee Acknowledgement - Deficiency - Radiation Area Not Properly Posted. WSB-4 dose rate at boundary 15 mR/hr corrected during audit.
86	March 11, 2010 NOTICE OF CORRECTION License Violation	DOH NOTICE OF CORRECTION. License WN-I0939-1. License Condition 8 requires that material received must be onsite for no longer than one year from the date of receipt. Contrary to the above, the inventory of material stored onsite (March 3rd Inspection) was 372,953 net pounds as reported by you on March 3, 2010. Extended waste is material that has been held under your license for more than one year from the date of receipt. The minimum required corrective action is to remove the extended waste material from your site. Reference: Letter, Kristen R. Felix, DOH, to Curt Cannon, PFNW, No Subject, (re: March 3, 2010 inspection), dated March 11, 2020.
	March 31, 2010 DEFICIENCY PS-10-03 TRITIUM INADEQUATE MONITORING	DOH Inspection Findings and Licensee Acknowledgement - Deficiency - Tritium Monitor in Mixed Waste Thermal (MWTH) was 100% absorbed (unable to absorb more moisture). Corrected during audit. (Consequence is underestimation of tritium released). License I0-508-1 [NOTE: this is a REPEAT ISSUE FROM DECEMBER 23, 2009] Reference: DOH Inspection Findings and Licensee Acknowledgement Form, PS-10-03, (re tritium monitor) signed March 31, 2010.
87	April 9, 2010 DOH Approval	DOH letter We have received your letter dated April 1, 2010, informing us of the steps you have taken to correct the items of noncompliance noted during the inspection on February 17 and 18, 2010 . We have reviewed your corrective actions and found that the changes <i>should be</i> adequate to prevent the recurrence of this type of problem in the future. Reference: Letter, Kristen Felix, DOH, to Curt Cannon, PFNW, No Subject, (re: Letter dated April 1, 2010), dated April 9, 2010.
88	August 20, 2010 DOH Approval	DOH Letter: We have received your letter dated August 5, 2010, informing us of the steps you have taken to correct the items of noncompliance noted during the inspection on August 3, 2010. We have reviewed your corrective actions and found that the changes <i>should be adequate</i> to prevent the recurrence of this type of problem in the future. Reference: Letter, Kristen Felix, DOH, to Curt Cannon, PFNW, No Subject, (re: Letter dated April 5, 2010), dated August 20, 2010.
171	September 24, 2010 Nuclear Street News	Perma-Fix Receives Approval to Construct a Rail Spur to Support Hanford Cleanup Perma-Fix Environmental Services, Inc. announced on Wednesday that it

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	RAIL SPUR APPROVED BY ECOLOGY	<p>has received final approval for construction of a rail spur at the Perma-Fix Northwest Facility (PFNW) adjacent to the Hanford nuclear site in Richland, Washington. The rail spur is expected to be completed in early 2011 and <u>will facilitate the movement of radioactive wastes directly into the facility</u>, thereby minimizing any health risk to the local community.</p> <p>The PFWN Facility is a radioactive waste treatment facility that supports cleanup of the U.S. Department of Energy (DOE) Hanford Site, nuclear power utilities, national laboratories, and research facilities.</p> <p>Richard Grondin, Vice President and General Manager of PFWN, stated, "Perma-Fix is gratified by gaining State of Washington approval to construct the rail spur, which is a perfect example of a private company/public sector partnership. Perma-Fix will provide funds to construct this rail spur and has worked closely with the Washington Department of Ecology, the City of Richland, and the Tri-City and Olympia Railroad to design and begin construction. This effort has taken several months to get underway, and will tie in the rail line located within the Horn Rapids Industrial Park that is owned by the City of Rich- land directly into our facility."</p> <p>Dr. Louis F. Centofanti, Chairman and Chief Executive Officer, stated, "Perma-Fix is dedicated to the long term financial investment in the Tri-Cities area, and thus we continue to make capital investments in our PFWN Facility. We believe these investments not only provide needed local community support, but also support DOE's mission to clean up its largest Environmental Management site. Hanford cleanup is critical to protection of the environment and the Columbia River and we are proud to be a part of DOE's effort for this important work. Perma-Fix has built its business on designing innovative treatment capabilities for our nation's most challenging radioactive waste streams, and we look forward to providing enhanced transportation capabilities that will also support cleanup from around the nation."</p> <p>[NOTE: It appears Ecology excused PFWN from the lack of evaluation for mixed waste rail transport in the EIS. The 1998 EIS (page 49) clearly states: "There would be no impacts to the rail system because <u>no construction material and or materials or waste related to the MWF operations are anticipated to be transported by rail to or from the ATG Site.</u>"</p> <p>Also, "ATG anticipates that all shipments will come from the west from Hanford or use the 240 Bypass Highway to avoid residential streets."</p> <p>REFERENCE: Article, Nuclearstreet.Com, "Perma-Fix Receives Approval to Construct a Rail Spur to Support Hanford Cleanup, Edited By Chris Reed, September 24, 2010, located at: https://nuclearstreet.com/nuclear_power_industry_news/b/nuclear_pow...onstruct-a-rail-spur-to-support-hanford-cleanup-092403#.X8FqAC1h1yp</p>

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89	January 6, 2011 AIR 11-101 DOH General Notice of Violation AIR EMISSIONS VIOLATION	<p>DOH General Notice of Violation (GNoV). This letter transmits a General Notice of Violation (GNoV). You are hereby formally notified that PFNWR is in violation of Washington Administrative Code (WAC) Chapters 246-247-040(1) and 173-480-040 for exceeding the legal limit for radioactive air emissions. Compliance with the radioactive air emission standards is required without the use of occupancy factors. The reported (2009 PFNW Annual Report, Page 7) PFNW environmental alpha dose becomes 24.8 mrem/yr without the occupancy factor. This emission exceeds the 10 mrem/yr standard of Chapter 173-480-040 WAC and it also exceeds the sum of the abated emission limits of the licenses for the PFNW Richland site.</p> <p>Reference: Letter, by certified mail, AIR 11-101, John Martell, DOH, to Richard Grondin, PFNW, "Re: Violation of Radioactive Air Emission Standard at Perma-Fix Northwest Richland, Inc. (PFNWR) – 2009," dated January 6, 2011.</p>
90	January 14, 2011 AIR 11-109 DOH Letter	<p>Regarding Perma-Fix Northwest Richland, Inc. (PFNWR) Request for Pre-Enforcement Meeting References AIR 11-101. The Radioactive Air Emissions Section (RAES) issued a GNoV in Reference 1 (AIR-11-101), for violating the radioactive air emission standard at PFNWR. The RAES also offered a pre-enforcement meeting · in Reference 1. At the pre-enforcement meeting, you are entitled to present information that bears on the GNoV. You are expected to provide certified documentation of those points you wish considered, prior to or at the meeting.</p> <p>Reference: Letter, Earl Fordham, DOH, to Richard Grondin, PFNW, "Re: Perma-Fix Northwest Richland, Inc. (PFNWR) Request for Pre-Enforcement Meeting," dated January 14, 2011.</p>
91	February 1, 2011 EPA INVESTIGATION REPORT NEICVP088SE01 RCRA PERMIT VIOLATIONS	<p>EPA RESOURCE CONSERVATION AND RECOVERY ACT COMPLIANCE INVESTIGATION REPORT</p> <p>PFNW was not applying the accumulation start date at the point of generation for their baghouse [incinerator] ash, which is generated from the thermal BPU on the low level side of the plant.</p> <p>PFNW was accumulating containers of mixed "dangerous" waste for more than 90 days in an area not covered by its permit.</p> <p>PFNW was storing hazardous waste in an area that was not included in its permit. PFNW has permitted treatment units that have not undergone closure but which received their final quantity of waste several years prior to the NEIC inspection.</p> <p>The following inactive units were observed during the inspection: Gas</p>

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		<p>vittrification unit - last used around 1998 or 1999; PFNW has an existing WDOE operating permit that was issued on May 28, 1999. The Waste Analysis Plan (WAP) contained in the current operating permit does not adequately describe how the facility will comply with the requirements of 40 CFR § 264.13(a). The new application, submitted in May 2009, also does not adequately address current waste sampling frequency or the rationale for ensuring that treated wastes meet the Land Disposal Restrictions (LOR) treatment standards.</p> <p>The waste analysis plan does not fully describe the analysis of incoming wastes used to develop a treatment recipe; Empty containers waiting to be sent back to generators are being stored throughout the facility. PFNW should develop a plan to return the containers in order to maintain inventory control and good housekeeping on-site; Currently, PFNW has a number of tanks and processing equipment that is included in the permit, but is inoperable. The facility's permit should reflect the current operations at the site, and discontinued operations should be closed and taken out of the permit; violations were found during the RCRA inspection in March 2007, and EPA issued an administrative penalty action on September 26, 2008.</p> <p>[NOTE: See September 25, 2008 entry, RCRA-10-2008-0161 PENALTY \$304,500]</p> <p>Reference: U.S. EPA Office of Enforcement and Compliance Assurance, NEICVP0885E01, RESOURCE CONSERVATION AND RECOVERY ACT COMPLIANCE INVESTIGATION REPORT, Perma-Fix Northwest, May 24-May 28, 2010. Submitted by Memorandum, February 1, 2011, from David Parker NEIC Program Coordinator, to Linda Meyer, US EPA Region 10, "Transmittal of Final Report - "Resource Conservation and Recovery Act Compliance Investigation, Perma-fix Northwest - Richland, Washington."</p>
174	<p>April 21, 2011</p> <p>PFNW News Release Completion of Rail Line Connecting to Hanford</p>	<p>NEW RAIL LINE CONNECTS PFNW TO HANFORD</p> <p>ATLANTA, April 21, 2011 (GLOBE NEWSWIRE) -- Perma-Fix Environmental Services, Inc. (Nasdaq:PESI) today announced it has completed <u>the new rail line</u> connecting the Department of Energy's (DOE) Hanford Site and the Perma-Fix Northwest Richland (PFNW) facility in Richland, Washington.</p> <p>Dr. Louis F. Centofanti, Chairman and Chief Executive Officer, stated, "We expect the new rail line will help reduce the amount of waste on public roads and provide for a much faster and safer means of transporting waste directly to our facility. <u>Completion of the rail line is another important step in a long- term upgrade of PFNW, which will enable us to handle larger volumes of high activity waste."</u></p> <p>REFERENCE: Web Announcement, Perma-Fix Announces Completion of Rail Line Connecting DOE Hanford Site and Perma-Fix Northwest</p>

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		<p>Richland Facility, April 21, 2011. Available at https://www.nbcnews.com/id/wbna42702318</p> <p>[NOTE: Transportation of Mixed Waste/Liquids via rail was not analyzed in the 1998 PFNW EIS.]</p>
92	<p>May 4, 2011 DOH AIR 11-501 AIR EMISSIONS VIOLATION JUSTIFICATION REJECTED.</p>	<p>DOH Notice of Findings from Pre-Enforcement Meeting- Violation of Radioactive Air Emission Standard at Perma-Fix Northwest Richland, Inc. (PFNW) - 2009. [Reference to AIR 11-101.]</p> <p>During the pre-enforcement meeting, the licensee was requested to provide information in written form. The licensee did so via Reference 3. That information in our judgment is: Insufficient to alter the facts alleged in the General Notice of Violation.</p> <p>Please see the enclosed discussion for the basis for this finding. Based on this disposition, we will proceed to: Determine appropriate enforcement action. You will receive notice of this action 30 days prior to the commencement of enforcement action.</p> <p>Neither the law nor the PFNW radioactive air emissions licenses allow the use of occupancy factors in determining compliance with the radioactive air emissions standard.</p> <p>Approval of compliance demonstration methods for radioactive air emissions is the responsibility of WDOH and its delegate in such matters, RAES. Neither WDOH nor RAES has approved PFNW's use of occupancy factors to demonstrate compliance to the radioactive air emissions standard or license emission limits.</p> <p>Reference: Letter, John Martell, DOH, to Richard Gronding, PFNW, "Re: Notice of Findings from Pre-Enforcement Meeting- Violation of Radioactive Air Emission Standard at Perma-Fix Northwest Richland, Inc. (PFNW) – 2009," dated May 4, 2011.</p>
93	<p>May 12, 2011 AIR 11-503 FAILURE TO PROVIDE COMPLIANCE PLAN AIR EMISSIONS</p>	<p>DOH LETTER: VIOLATION. In Reference 1 (AIR-11-101), Perma-Fix Northwest Richland, Inc. (PFNWR) was notified of a violation of a standard of Washington Administrative Code (WAC) Chapter 246-247-040, and was also informed of the requirement to submit a compliance plan within 45 days. To date, the Radioactive Air Emissions Section (RAES) has not received the required compliance plan or a request to delay its submittal.</p> <p>The 45 day requirement is measured from the date of receipt of the notice of violation. That notice was issued by RAES on January 6, 2011, and received by PFNWR on January 10, 2011. The compliance report was due on February 24, 2011. The pre-enforcement meeting proceedings do not relieve you of the burden of compliance with this requirement of the law.</p> <p>RAES will process this violation if PFNWR fails to provide the required</p>

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		<p>compliance plan via letter by close of business on May 31, 2011.</p> <p>[NOTE: DOH ONLY THREATENS TO PROCESS A KNOWN VIOLATION]</p> <p>Reference: Letter, AIR 11-503, John Martell, DOH, to Richard Grondin, PFNW, "Re: Required Submittal of Compliance Plan," dated May 12, 2011.</p>
94	<p>June 10, 2011 DOH LICENSE VIOLATION WASTE NOT CONFORMING TO MANIFEST DOSE RATE</p>	<p>DOH License Violation - WN-I019-1. The exposure rate on this package was manifested as 4.8 mSv/hr, while surveys at the facility found an exposure rate of 3.85 mSv/hr; this difference is <i>not within instrument tolerances</i>. Permit #G1137. Response required in 30 days.</p> <p>Reference: Letter, Kristin Felix, DOH, to Larry Morin, PFNW, No Subject, (re: shipment of radioactive waste from PFNW to US Ecology Disposal Site), dated June 10, 2011.</p>
95	<p>September 9, 2011 DOE 4TH Quarter Regulatory Compliance Score Card NON-CONFORMING WASTE FROM DOE WASTE NOT CONFORMING TO MANIFEST DOSE RATE</p>	<p>9/09/2011 --- Hanford Site, Off-Site --- Washington State Department of Health Issues Letter of Noncompliance Following Radioactive Waste Shipment --- On August 30, 2011, the Washington State Department of Health issued a letter of noncompliance to the U.S. Department of Energy, Office of River Protection, and Washington River Protection Solutions (WRPS) resulting from a radioactive waste material shipment that was received on August 17, at a low-level radioactive waste processing facility operated by Perma-Fix Northwest, Inc. (PFNW), in Richland, Washington. The noncompliance letter stated that the external radiation level on a radioactive material shipment from WRPS to PFNW was found to be higher than level recorded on the manifest. The external radiation level recorded on the manifest was 50 mR/hr; however, the radiation surveys taken at PFNW detected a rate of 75 mR/hr. This difference is <i>not within instrument tolerances</i> as required by the PNFN license condition 29.C. No Department of Transportation limits were exceeded. WRPS decided to report the event, although it was not a WRPS license requirement, site, or facility. This NOV was received and resolved during the quarter, and is now considered closed. [THIS IS A REPEAT ISSUE. THIS TIME THE VIOLATION WAS ISSUED TO DOE AND NOT PFNW. WHY?]</p> <p>Reference: U.S. Department of Energy Environmental Management Site-Level Summary of Final 4th Quarter FY 2011 Scorecard, dated January 31, 2012, available at https://www.energy.gov/sites/prod/files/em/FINAL-4TH-QUARTER-FY-2011-SCORECARD-01-31-12%281%29.pdf.</p>
96	<p>November 10, 2011 AIR 11-1101 DOH REJECTION of PFNW AIR DOSE</p>	<p>DOH REJECTS: Perma-Fix Northwest Richland, Inc. (PFNWR) 2009 Revised Annual Report.</p> <p>Reference - Letter, R. Grondin (PFNWR) to J. Martell (RAES), transmitting</p>

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	CALCULATIONS 2009 Revised Annual Report	<p>2009 Annual Report information, June 13, 2011.</p> <p>We have completed our review of the 2009 environmental air dose calculations transmitted via Reference 1. <i>The dose calculations and methodology are non-conservative and unacceptable.</i> Therefore, we cannot approve them.</p> <p>The COMPLY code is approved for point source air dose estimates. The source at PFNWR has not been shown to be a point source. Until the source is identified and described, use of the COMPLY code is not justified.</p> <p>The <i>source strength assumed in the calculations is significantly underestimated, resulting in a significant underestimate of the dose.</i></p> <p>The calculation assumes a Maximally Exposed Individual (MEI) 50 meters beyond the site perimeter, resulting in a significant underestimate of the dose. PFNWR's MEI is at the perimeter.</p> <p>This list is not a complete list of the problems with the method used and the claims surrounding it. It does, however, provide a sufficient basis for rejection of the method and calculation.</p> <p>Reference: Letter, AIR 11-1101, John Martell, DOH, to Richard Grondin, PFNW, "Re: Perma-Fix Northwest Richland, Inc. (PFNWR) 2009 Revised Annual Report," dated November 10, 2011.</p>
97	November 17, 2011 DOH Audit PA-1106 INCORRECT AIR SAMPLE CALCULATIONS FOR IODINE	<p>DOH Inspection Findings and Licensee Acknowledgement - Deficiency - several air sample calculations for environmental <i>iodine were calculated incorrectly.</i> Corrected during audit. 393-1/508-1</p> <p>Reference: DOH Inspection Findings and Licensee Acknowledgement Form, PA-11-06, PFNW, <i>Incorrect Air Sample Calculations</i>, signed November 17 and November 18, 2011</p>
98	March 1, 2012 PFNW TRUM SPILL	<p>PFNW TRUM SPILL</p> <p>On 03/01/2012, we received a large, used tank from CHPRC that was being managed as TRUM waste for disposal. The spill occurred while we were in the process of moving the tank from storage in Building 13 to room SB-09.</p> <p>On March 8, 2012, a forklift that was moving the tank pierced the plastic wrapping. Approximately one cup of liquid spilled from a tear in the plastic wrapping the tank, to the floor in Building 13 room SB-07.</p> <p>After the spill was wiped up, we surveyed the floor for radiological contamination. The survey indicated a small section of the floor was contaminated. We unsuccessfully attempted to remove the radiological contamination by wiping the floor again. In order to remove the radiological contamination, the floor was scabbled to approximately 1/4" depth</p> <p>Reference: Perma-Fix Letter No. 2012-LTR-1030, Richard Grondin to Ron Skinnerland, Department of Ecology, "Re: Questions About Treated Acid," Dated July 30, 2012,</p>

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99	<p>March 7, 2012</p> <p><u>DOH WALK BACK OF VIOLATIONS PLUS TWO NEW NON-COMPLIANCES FOR AIR SAMPLING and MONITORING AND TESTING</u></p> <p>AIR 12-344</p>	<p>DOH VIOLATION RESCINDED PLUS [NEW] NON COMPLIANCES.</p> <p>This letter is being sent to Perma-Fix Northwest, Inc. Richland (PFNWR) <u>to rescind the GNOV regarding failure to adhere to the 10 mrem standard in 2009.</u></p> <p>Additionally, this letter serves to inform you of two items of non-compliance discovered during the discussions around the GNOV. (Reference AIR 11-101.) On January 6, 2011, the Washington State Department of Health (WDOH) issued PFNWR a GNOV (AIR 11-101) for exceeding the 10 mrem/yr air emission standard called out in Washington Administrative Code (WAC) Chapter 173-480-040 for calendar year 2009. Recently, the Radioactive Air Emission Section (RAES) has received information from the state's Public Health Lab (PHL) indicating the high levels of emissions measured by the ambient air samplers MAY be due to naturally occurring radioactive material. We are currently working with the PHL to verify this possibility. Based on this preliminary information, the WDOH is rescinding the GNOV.</p> <p>ITEMS OF NONCOMPLIANCE ARE: 1) Failure to comply with Radioactive Air Emissions License (RAEL) AIR 05-305, Monitoring and Testing Procedures (requiring the use of blanks during the analysis of air sample filters per Environmental Protection Agency [EPA] Method 114); and 2. Failure to comply with RAEL AIR 05-305, Condition #19 (requiring isotopic analysis of air samples).</p> <p>While the 2009 member of the public dose is likely [based on what final report?] below its reported value of 24.8 mrem from alpha emissions, the 2010 member of the public dose should be 8.1 mrem from alpha emissions. <u>The use of an occupancy factor is not allowed in demonstrating compliance to the air emissions standard.</u></p> <p>[NOTE: I have not found independent documentation of a spike in naturally occurring radiation in general in 2009. DOH has NOT confirmed the presence of Naturally Occurring Radioactive Materials to Verify the Excuse]. Where was the follow up that prevented enforcement?</p> <p>Reference: Letter, AIR 12-344, Earl Fordham, DOH, to Richard Grondin, PFNW, "Re: General Notice of Violation (GNOV) (AIR 11-101)," dated March 7, 2012.</p>
100	<p>March 20, 2012</p> <p>EPA NOTICE OF VIOLATION</p>	<p>Notice of Violation</p> <p>These violations were identified through an inspection performed by the Environmental Protection Agency (EPA) on May 24-28, 2010 at PFNW's facility located at 2025 Battelle Boulevard, Richland, Washington, and through other information obtained by EPA.</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>Violation 1- Failure to Determine if a Generated Solid Waste is a Dangerous Waste - Baghouse ash collected from the thermal incineration Bulk Processing Unit (BPU) is a PFNW generated waste stream. In 2008 EPA and PFNW entered into a Consent Agreement and Final Order (CAPO) resolving allegations that PFNW failed to determine if baghouse ash was a dangerous waste. At the time of the May 2010 inspection, PFNW had not made a dangerous waste determination for fifteen containers of baghouse ash at the facility. For each waste container, failure to make a dangerous waste determination constituted a separate violation.</p> <p>Violation 2- Storage of Mixed Waste in Building 15, a Unit Not Covered by the PFNW Permit According to records obtained by EPA, PFNW accumulated and stored at least six containers of baghouse ash, which is generated by processing low level radioactive, non-hazardous waste, debris, and equipment, in Building 15 (a unit not covered by PFNW's permit) for more than 90 days while awaiting analytical results. The baghouse ash, a mixed waste, is generated by processing low level radioactive non-hazardous waste, debris, and equipment.</p> <p>Violation 3- Storage of Mixed Waste in Units Not Covered By the PFNW Permit - Permit Condition III.A.I.a. and the referenced Attachments do not list Building 15 as a permitted area for placement or storage of mixed waste.</p> <p>Violation 4 - Storage of On-Site Generated Waste for More Than One Year - At the time of the inspection, the inspectors noted that between the months of July 2007 and May 2010 at least twenty-one containers of mixed waste (baghouse ash) generated by the facility were stored at the facility for greater than one year after the waste was generated. Analyses confirmed that these were containers of mixed waste.</p> <p>Violation 5- Failure to Notify the Department Prior to Changes in Dangerous Waste Activity/ Failure to Modify Permit - PFNW used Building 15 and the concrete pad outside the southwest side of Building 13 (areas not specified in the Permit) as additional storage units without providing notification to the Department. PFNW violated Permit condition I.B.3 by failing to follow the prescribed process for adding storage units to its permit.</p> <p>Required Actions- Within fifteen (15) days of receipt of this NOV, EPA requests that PFNW submit a written response that identifies all actions PFNW has taken or will take to correct the violations and the time frame for completing such action. PFNW's response should include proper documentation of the corrected action.</p> <p>Reference: Certified Mail 70111150 0000 7954 1011, Edward J. Kowalski, EPA Region 10 to Richard Grondin, PFNW, "NOTICE OF VIOLATION," OCE-127, March 20, 2012. [SEE "pile of docs" file]</p>
101	May 3, 2012 AIR 12-503 DOH Request for	DOH Letter - The Radioactive Air Emissions Section (RAES) is reviewing the Reference 1 letter, in which Perma-Fix Northwest Richland, Inc. (PFNWR) claims to be in compliance, contrary to the violations alleged in Reference 2

REF #	DATE/DOC NUMBER	ISSUE
	Additional Information regarding VIOLATIONS AIR SAMPLING MONITORING AND TESTING CLAIM REJECTED	<p>[AIR 12-344 (dated March 7, 2012)]. DOH Requests additional information:</p> <ol style="list-style-type: none"> 1. The chain of custody forms, and other documentation, that records the transmittal of blank filter papers of the same manufacturer and lot for each environmental air sample analyzed by your laboratory services vendor between January 2006 and the present; and 2. The laboratory services vendor's reported analytical results for each blank filter transmitted. <p>Secondly, PFNWR claims that it need not perform complete isotopic analysis of environmental air samples because such analysis is not required by the single format license (Reference 3). The single format license does not supersede the Reference 4 license. The requirement for complete isotopic analysis in Condition 19 of that license is still binding. The PFNWR claim in regard to this violation is rejected.</p> <p>Reference: Letter, John Martell, DOH, to Richard Grondin, PFNW, "RE: Review of Perma-Fix Northwest Richland Response to Notice of Violation Rescission," AIR 12-503, Audit 672, dated May 3, 2012.</p>
102	August 16, 2012 DOH NOTICE OF CORRECTION NO LETTER NUMBER	<p>NOTICE of CORRECTION. Your letter to the department dated August 6, 2012 revealed the following items of noncompliance... License Condition 56 requires in part that all comments associated with Low Level Operating Procedures must be completed by the mandatory date of August 1, 2012.</p> <p>Contrary to the above, all comments were not addressed by August 1, 2012. This item is categorized as a deficiency. Respond in writing in 30 days. WN-I0393-1.</p> <p>Reference: Letter, Mike Elsen, DOH, to Curt Cannon, Perma-Fix Northwest, "Notice of Correction", dated August 16, 2012.</p>
103	October 30, 2012 DOH Thank You Letter for Incomplete Work NO LETTER NUMBER PA-12-02	<p>DOH Letter WN-10393-1 and WN-10508-1, Thank you for your letter dated October 24, 2012, informing us of the steps you have taken to correct the items of noncompliance noted during the September 25-27, 2012 Radioactive Materials License inspection of your Washington State Radioactive Materials License Numbers WN- 10393-1 and WN-10508-1.</p> <p>We have reviewed your corrective actions and request that all LLOP and MWOP revisions be added as new items on the IONC report. Do not combine these comments with already existing comments from the license renewal. The completion date for these procedure revisions will be January 31, 2013.</p> <p>Reference: Letter, Kristin Schwab, DOH, to Curt Cannon, Perma-Fix Northwest, "Notice of Correction Response for September 25-27, Inspection PA-12-02, dated October 30, 2012.</p>
104	November 6, 2012 DOH NOTICE OF CORRECTION NO LETTER NUMBER PA-12-03	<p>NOTICE OF CORRECTION - WN-10393-1 and WN-10508-1 - Letter refers to Inspection conducted October 16-18, 2012. on numerous occasions, one employee with an expired medical evaluation was issued a respirator and entered Airborne Radiation Area. Wearing a respirator without a current medical evaluation is categorized as an INFRACTION. Not implementing the buddy system as required by LLOP 208 is categorized as an</p>

REF #	DATE/DOC NUMBER	ISSUE
	WORKER SAFETY, RESPIRATORS, AIR SAMPLING	<p>INFRACTION. the calibration on air sampler pump #20 expired May 4, 2012. Not calibrating air sampling equipment at the required frequency is categorized as a DEFICIENCY. Generally, violations are those items which have a high probability of causing an overexposure to personnel, infractions are those items which could cause an excessive exposure in certain circumstances, and deficiencies are those items of noncompliance which have a minor safety significance or minor environmental impact.</p> <p>Reference: Letter, Kristen Schwab, DOH, to Curt Cannon, PFNW, "Notice of Correction for October 16-18, 2012 and PA-12-03," dated November 6, 2012.</p>
105	<p>November 27, 2012 DOH NOTICE OF CORRECTION PA-12-04 NO LETTER NUMBER IMPROPER LABELS EXPIRED RESPIRATOR INCORRECT EQUATION.</p>	<p>NOTICE OF CORRECTION for November 7-8, 2012 Inspection PA-12-04. WN-10393-1 and WN-10508-1. Contrary to the above, on numerous occasions containers bore labels that did not contain the words CAUTION or DANGER. Not having the correct labels on radioactive materials containers is categorized as a DEFICIENCY. ...Contrary to the above, a respirator outside of SB07 had an inspection date of 09/26/12. This respirator should have been removed from rotation on 10/26/12 for re-inspection. Not removing a respirator from rotation for re-inspection after 30 days is categorized as a DEFICIENCY. ...The source cabinet in the Trailer# 1 Whole Body Counter Trailer was not posted with a CAUTION RADIOACTIVE MATERIALS sign. Staff posted the cabinet prior to the inspection closing.</p> <p>it is recommended your facility consider: <i>Revising the equation</i> for the MDA calculation, <u>as it is not correct.</u> ...Revising the ft3 to cm3 conversion factor units from 2.83e4 ft3 /cm3 to 2.83e4 cm3 /ft3 .</p> <p>[NOTE: The conversion factor was backwards at 28,300 cubic feet per cubic centimeter! The result could be off by a LOT!]</p> <p>[NOTE: MDA is the Minimum Detectable Activity that can be detected by a device.</p> <p>Reference: Letter, Kristen Schwab, DOH, to Curt Cannon, PFNW, "Notice of Correction for November 7-8, 2012 and PA-12-04," dated November 27, 2012.</p>
175	<p>April 2, 2013</p> <p>DOH Update to 26, 2009 Notice of Correction – by Memo to File, 4 years LATER.</p>	<p>A review of the Incident file for an Americium 241 Personnel internal Overexposure Incident of <u>February 3, 2009</u> noted that the incident report and close-out did not include the follow-up actions performed by Department of Health personnel.</p> <p>As a result of the overexposure, the licensee (Perma-Fix Northwest) was issued a notice of correction on May 26, 2009. The notice cited the licensee for</p> <ol style="list-style-type: none"> 1. Dose estimates indicated that the 5 rem annual dose limit was exceeded for one worker. 2. PFNW placed a worker who, by dose estimates, exceeded the annual TEDE dose limit, back into a radiological area.

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		<p>3. PFNW did not perform a bioassay monitoring on workers within 48 hours of exceeding procedural conditions despite the review of air sample data by Health Physics Manager and the Radiation Safety Officer.</p> <p>By letter dated June 22, 2009 the licensee responded to the notice of correction with the corrective actions taken or was <i>in the process of correcting</i>. Additionally, a letter dated May 1, 2009 as well as a follow-up letter dated May 13 outlined corrective actions that have been <i>or would be</i> taken by the licensee.</p> <p>It should be noted that the corrective actions that were performed by the licensee were followed up and verified during subsequent inspections of the facility however those verifications were not documented on the Follow-Up B-14 Form.</p> <p>[NOTE – improper documentation 4 years late is another quality assurance problem, as is updating a notice of correction by using a “memo to file”.]</p> <p>Reference: Memo to Compliance File, Mikel Elsen, DOH, to Compliance File, “Subject: Follow Up to May 26, 2009 Notice of Correction,” dated April 2, 2013.</p>
106	<p>April 12, 2013 NRC EVENT NOTIFICATION REPORT NRC Report No. 48888 SHIPMENT EXCEEDING SURFACE CONTAMINATION LIMITS</p>	<p>NRC Event Notification Report. AGREEMENT STATE REPORT - SHIPMENT EXCEEDED SURFACE CONTAMINATION LIMITS</p> <p>The following information was received from the Washington State Division of Radiation Protection by email:</p> <p>"PermaFix Northwest received a shipment from Perkin Elmer, Inc. that consisted of 32 packages, 4 plastic drums and 28 metal drums, and was shipped as an exclusive use shipment. Upon receipt, the drums were surveyed and 2 plastic drums were found to exceed the 49 CFR 173.443 non-removable contamination limit of 2,200 dpm/cm² for an exclusive use shipment. The drum survey results were reported as 44,391 dpm/100 cm² H-3 and 18,080 dpm/100 cm² C-14; 20,127 dpm/100 cm² H-3 and 18,508 dpm/100 cm² C-14, and 13,323 dpm/100 cm² H-3 and 10,019 dpm/100 cm² C-14. This most contaminated drum was manifested with only H-3 and C-14, the other 2 drums were manifested with only C-14."</p> <p>Washington Incident Number: WA-13-021</p> <p>[NOTE: All drums had tritium, yet tritium was not identified on the manifest for two or three drums. This appears to be non-conforming waste, as it potentially did not match the manifest. NRC reported a violation for 2 plastic drums, yet provided data indicating a violation for three drums in this report.]</p> <p>Reference: U.S. NRC Event Notification Report for April 12, 2013, Event No. 48888, “AGREEMENT STATE REPORT - SHIPMENT EXCEEDED SURFACE CONTAMINATION LIMITS, https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2013/20130412en.html</p>

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107	July 8/July 11, 2013 DEPARTMENT OF ECOLOGY THREAT OF ENFORCEMENT ACTION IMMINENT HAZARD ACID AND RADIATION RELEASE NAICS#: 562211	IMMINENT HAZARD DOE-Hanford is arranging to send improperly designated and packaged waste to PFNW. PFNW accepts the improperly designated and packaged waste and conducts further evaluation and designation of the waste at the PFNW facility. PFNW opened up three WRAP drum shipment in the Double Containment Unit (DCU). Acids and radiation were released within the DCU. PFNW jack hammered and scrubbed out the contaminated floor of the DCU. PFNW finds that radiation release had occurred wherever the drum had been moved within the PFNW facility boundary. Improper identification, designation and packaging of mixed waste by DOE and its contractors and arranging to transport to PFNW for further evaluation has caused an imminent hazard to public health and the environment at the point of generation at Hanford , during transport on public highway, and at the treatment, storage and disposal facility at PFNW. Summary of Concerns 1. The "rolling road block" function procedures do not conform to the terms of the exemption from transportation in commerce as explained in the Denny Letter and in 40 CFR Part 171.1(d)(4). Transportation of radioactive mixed waste and hazardous materials between the DOE-Hanford Facility and PFNW are not exempt from H:MR's. 2. Transportation practices for mixed waste from the Hanford Facility to PFNW do not conform to the requirements of the dangerous waste regulations 'and the HMR's incorporated by reference. 3. The selection of non-compliant packages to transport mixed waste presents a risk to human health and the environment. 4. Ecology will review additional information on past waste shipments between the DOE-Hanford Facility and PFNW. Ecology will determine compliance with the regulatory requirements that are applicable to transportation and waste designation activities: Ecology will evaluate the evidence to determine issuance of a formal or informal enforcement action procedure. Reference: Washington Department of Ecology Hazardous Waste & Toxics Reduction Program Compliance Report, Department of Ecology Joannette Biebesheimer & Jerry French, to Cliff Clark, U. S. Department of Energy, Large Quantity Generator, signed July 8 and July 11, 2013.
108	July 16, 2013 EPA CONSENT AGREEMENT AND FINAL ORDER RCRA PERMIT VIOLATIONS RCRA-10-2013-0106 \$187,620 PENALTY	Consent Agreement and Final Order - Findings from 2010 Inspection Failure to determine if a generated hazardous waste is a dangerous waste; storage of mixed waste in units not covered by the Permit, in violation of WAC 173-303-800 and of Permit condition III.A.1; storage of on-site generated waste for more than one year, in violation of condition 2.11 of Attachment LL to the Permit; failure to notify Ecology prior to changes in dangerous waste activity, in violation of WAC 173- 303-060(2);

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		<p>and failure to follow the permit modification process to add additional storage units, in violation of Permit condition I.B.3.</p> <p>At the time of the 2010 Inspection, Respondent had accumulated and stored at least six containers of baghouse ash, a mixed waste, in Building 15 (a unit not covered by Respondent's permit) for more than 90 days awaiting analytical results.</p> <p>EPA has determined and Respondent agrees that an appropriate penalty to settle this action is one hundred and eighty-seven thousand, six hundred twenty dollars (\$187,620).</p> <p>Reference: EPA Consent Agreement and Final Order in the Matter of PermaFix Northwest Richland, Inc., USEPA, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101, Docket Number: RCRA-10-2013-0106, dated July 13, 2016.</p>
109	<p>August 12, 2013 PFNW Letter 2013-LTR-1031 PFNW Objections to Department of Ecology Compliance Report</p>	<p>Perma-Fix Letter Re March 23, 2012 Waste Shipment cited in July 8, 2013 Compliance Report</p> <p>Among other objections,</p> <p>On July 31, 2013 agents from the EPA's Criminal Investigation Division (CID) came to the home of PFWN's Operations Manager. The purpose of the investigation was to obtain information on recent shipments between Hanford and PFWN. CID was satisfied with the results of their investigation and determined there were no laws broken. It was later determined, that employees from ECY requested the EPA CID investigation. PFWN believes that whatever issues or concerns that ECY had could have been clarified and resolved before involving EPA's CID or the media.</p> <p>Reference: Letter, Richard Grondin, PFWN, to Jane Hedges, Department of Ecology, "Re: Perma-Fix Northwest Richland, Inc. Mixed Waste Facility (MWF) Site Identification Number WAR 00001 0355 RE: March 23, 2012 Waste Shipment cited in July 8, 2013 Compliance Report," dated August 12, 2013.</p>
110	<p>September 12, 2013 DOH INFRACTION Inspection Findings and Licensee Acknowledgement PA-13-01 Inadequate Air Sampling</p>	<p>DOH/PFWN Inspection Findings and Licensee Acknowledgement - INFRACTION - I0508, I0393, "Air filter not seated in holder correctly, part of air sample head is not covered with filter air filter sampler. Checked 2x by staff. [Result in undercount of releases, underestimated doses. INFRACTIONS are items which could cause an excessive exposure in certain circumstances.]</p> <p>Reference: Department of Health – Radiation Protection, "Inspection Findings and Licensee Acknowledgement," PFWN Signed Form, PA-13-01, September 12, 2013.</p>
111	November 20, 2013	DOH/PFWN Inspection Findings and Licensee Acknowledgement -

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	DOH DEFICIENCY Inspection Findings and Licensee Acknowledgement PA-13-04 Inadequate Records	DEFICIENCY - Second Quarter Communications Drills are Missing. DEFICIENCY - inadequate receipt records - use of wrong units. Reference: Department of Health – Radiation Protection, “Inspection Findings and Licensee Acknowledgement,” PFNW Signed Form, PA-13-04, November 20, 2013.
112	February 24, 2014 Department of Ecology Inspection 14-NWP-034 by Certified Mail ALPHA CONTAMINATION	<p>PFNW Compliance Focused Inspection - This facility, formerly known as Allied Technologies Group, Inc. (ATG), has a Part B permit issued by Ecology in July of 1999. This permit expired July 7, 2009, and the facility is currently in the process of permit renewal.</p> <p>[NOTE: This permit has still not been renewed, yet the facility continues to operate.]</p> <p>This inspection was a follow-up to a notification PFNW made to Ecology in a letter received June 21, 2013. The notification was of an unloading incident that occurred at their facility June 19, 2013. Mixed waste facility personnel were unloading two stainless steel, lead-lined glove boxes from a shipping container transported from Hanford's Plutonium Finishing Plant (PFP) facility. An elevated level of radiological contamination was detected. The incident was not identified as a spill of a hazardous substance to the environment and the Contingency Plan was not implemented. Once the high reading was discovered, PFNW HPT performed additional surveys and found alpha radiation on the underside of one of the glove box, on their forklift, on their rigging and concrete unloading pad. DOH conducted their investigation with their emphasis on the found rad contamination on the outside unloading area or concrete pad. Ecology has determined that there <i>"appears to be no dangerous and mixed waste violations"</i> or concerns based on the information and findings of this inspection and its report.</p> <p>For the shipping container to be released and returned to the shipper PFNW staff must perform a series of radiation surveys and large area smears (LAS) samples that their onsite laboratory analyzes. In this case, there were twelve (12) smears taken; and one of these wipes (smears) indicated a reading of 72 dpm per 100 sq/cm. <i>This reading was above the Hanford rad criteria for returning a shipping container.</i></p> <p>There was alpha contamination confirmed on the PFNW concrete pad in the unloading area, equipment, and the bottom of the glove boxes.</p> <p>Reference: Letter 14-NWP-034, Kathy Conaway, Department of Ecology, to Richard Grondin, PFNW, “Re: Dangerous Waste Compliance Focused Inspection at Perma-Fix Northwest Richland on Notification of Unloading Incident RCRA ID# WAR 00001 0355, Index # 13.480.1 on July 1, 2013,” dated February 24, 2014. [With attached Nuclear Waste Program Compliance Report.]</p>
113	June 10, 2014 DOH Thank You Letter for Correction of	Thank you for your letter dated June 9, 2014 informing us of the steps you have taken to correct the items of noncompliance noted during the May 21-22, 2014 inspection of your Washington State Radioactive Materials License

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	UNKNOWN NON-COMPLIANCE NO LETTER NUMBER PA-14-01	<p>Numbers WN- 10393-1 and WN-10508-1. Adequate information has been provided from your facility regarding corrective actions taken for these items of noncompliance noted. Your corrective actions will be verified during future visits.</p> <p>[NOTE: DOH's original inspection letter that identifies non-compliances from May 21-22, 2014 is NOT AVAILABLE. PFNW letter from June 9, 2014 is NOT AVAILABLE].</p> <p>Reference: Letter, Kristen Schwab, Department of Health, to Curt Cannon, PFNW, "Notice of Correction Response for May 21-22, 2014 Inspection PA-14-12, WN-10393-1 and WN-10508-1," dated June 10, 2014.</p>
114	July 24, 2014 DOH Inspection Findings and Licensee Acknowledgement PA-14-02 IMPROPER/MISSING LABELS	<p>DOH/PFNW Inspection Findings and Licensee – DEFICIENCY Acknowledgement - Labels faded (not visible) or not present including Building 15 supersacks. Storage yard and building 15.</p> <p>Reference: Department of Health – Radiation Protection, "Inspection Findings and Licensee Acknowledgement," PFNW Signed Form, PA-14-12, July 24, 2014.</p>
115	August 29, 2014 DOH Thank You Letter for Correction of Non-Compliance Improper/Missing Labels NO VERIFICATION CONDUCTED NO LETTER NUMBER PA-14-02	<p>Thank you for your letter dated August 14, 2014 informing us of the steps you have taken to correct the items of noncompliance noted during the July 23-24, 2014 inspection of your Washington State Radioactive Materials License Numbers WN- 10393-1 and WN-10508-1. Adequate information has been provided from your facility regarding corrective actions taken for these items of noncompliance noted. Your corrective actions will be verified during future visits.</p> <p>Reference: Letter, Kristen Schwab, Department of Health, to Curt Cannon, PFNW, "Notice of Correction Response for July 23-24, 2014 Inspection PA-14-02, "dated August 29, 2014.</p>
116	October 14, 2014 CIVIL DOCKET FOR CASE #: 3:09-cv-00472-PLR-CCS Case Dismissed.	<p>PFNW and Philotechnics Court Case Dismissed. Settlement agreement not made public.</p> <p>[NOTE: This Case was filed <u>October 29, 2009</u>. It is tied to employee overexposures and non-conforming waste that was tolerated by DOH for years. The waste arrived on or about <u>July 6, 2006</u>.]</p> <p>Reference: U.S. District Court – Eastern District of Tennessee (Knoxville) CIVIL DOCKET FOR CASE #: 3:09-cv-00472-PLR-CCS, Perma-Fix Northwest Richland, Inc V. Philotechnics, Ltd. Agreed Order of Dismissal, Doc 145.</p>
117	November 6, 2014 DOH NOTICE OF CORRECTION PA-14-04 DEFICIENCY	<p>DOH DEFICIENCY NOTICE OF CORRECTION</p> <p>WAC 246-235-077(3)(1) requires, in part, that the licensee performs quarterly communications <u>checks with offsite response organizations</u>. Contrary to the above, the 3rd quarter 2014 communications check was not performed. This item is a repeat item from the November 20, 2013 inspection.</p>

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		<p>Not performing quarterly communications checks with offsite response agencies is categorized as a DEFICIENCY.</p> <p>Reference: Letter Kristen Schwab, DOH, to Curt Cannon, PFNW, “Notice of Correction for October 7-8, 2014 Inspection PA-14-04; Radioactive Materials License Numbers WN-I0393-1 and WN-I0508-1,” dated November 6, 2014.</p>
118	<p>July 29, 2015 Washington Department of Ecology Oversight Report</p> <p>Compliance approved before publication of Inspection Report.</p>	<p>NWP Oversight Report - #15.543, this inspection was performed as an <u>announced follow up inspection to Index #15.514.</u></p> <p><u>[NOTE – Inspection Report #15.514 was not published until August 18, 2016. Follow Ups completed before the original inspection was published.]</u></p> <p>The inspection team reviewed PFNW manifest records and waste acceptance records to determine if PFNW: 1) had sent all waste listed in Letter 2015-LTR-1003, Attachment List 1, to DSSI; 2) had more containers of MW that have been stored longer than 90 days before being treated; and 3) is accepting waste to be treated in in-container mixer.</p> <p>At the time of the inspection, PFNW provided documentation of twenty-one additional containers accepted at PFNW on February 26, 2015, which would have required treatment using the in- container mixer. The Ecology inspection team observed through manifest documents that the remaining containers in the original Enclosure 1 list and the additional twenty-one containers were shipped offsite. The Ecology inspection team also observed through review of the PFNW documentation that <i>no containers which require in-container mixer treatment were accepted after February 26, 2015.</i></p> <p>Upon completion of the inspection Ecology is satisfied that PFNW has provided the necessary documentation to confirm the offsite shipment of the subject containers, and is compliant with their current permit.</p> <p>Reference: Department of Ecology NWP Oversight Report #15.543, RCRIS Database Required Information, Prepared by Nancy Ware, signed July 29, 2015.</p>
119	<p>October 20, 2015 AIR 15-1010 DOH</p> <p>Improper HEPA Filter Storage Conditions</p>	<p>Inspection (Audit 1122) for Perma-Fix Northwest Richland, Inc. (PFNW), Storage Conditions for High Efficiency Particulate Air (HEPA) Filters awaiting Installation.</p> <p>DOH We <i>expect</i> PFNW to take the necessary steps to correct these issues and to notify us when corrections are complete, no later than January 15, 2016.</p> <p>Items of Noncompliance (IONC) – No staff assigned to routinely monitor HEPA storage temperatures between 40</p>

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		<p>and 140F.</p> <p>Data logger has no alarm.</p> <p>No surveillance procedure for storing new HEPA filters.</p> <p>ASME NQA-1-2008 not addressed for HEPA integrity.</p> <p>No copies of manufacturer's (MFR) storage recommendations.</p> <p>No area inspection records.</p> <p>Date of Inspection: August 25, 2015</p> <p>Reference: Letter AIR 15-1010, John Martell, DOH, to Richard Grondin, PRNW, "Re: Closeout of Inspection (Audit 1122) for Perma-Fix Northwest Richland, Inc. (PFNW) Storage Conditions for High Efficiency Particulate Air (HEPA) Filters Awaiting Installation," dated October 20, 2015.</p>
120	<p>November 12, 2015 PA-15-02 September 21-23 DOH Inspection</p> <p>DOH Thank You Letter for Unverified Work.</p>	<p>Thank you for your letter dated November 5, 2015 informing us of the steps you have taken to correct the items of noncompliance noted during the September 21-23, 2015 inspection of your Washington State Radioactive Materials License Numbers WN-I0393-1 and WN-I0508-1 .</p> <p>Adequate information has been provided from your facility regarding corrective actions taken for these items of noncompliance noted. <u>Your corrective actions will be verified during future visits.</u></p> <p>[NOTE: PA-15-02 Report is not available. Items of non-compliance are not identified.]</p> <p>Reference: Letter, Kristen Schwab, DOH, to Curt Cannon, PFNW, "Notice of Correction Response for September 21-23, 2015 Inspection PA-15-02," dated November 12, 2015.</p>
121	<p>December 22, 2015 PA-15-04 September 21-23 DOH Inspection</p> <p>DOH Thank You Letter for Unverified Work.</p>	<p>Thank you for your letter dated November 30, 2015 informing us of the steps you have taken to correct the items of noncompliance noted during the November 18-19, 2015 inspection of your Washington State Radioactive Materials License Numbers WN-I0393-1 and WN-I0508-1.</p> <p>Adequate information has been provided from your facility regarding corrective actions taken for these items of noncompliance noted. <u>Your corrective actions will be verified during future visits.</u></p> <p>[NOTE: PA-15-04 Report is not available. Items of non-compliance are not identified.]</p> <p>Reference: Letter, Kristen Schwab, DOH, to Curt Cannon, PFNW, "Notice of Correction Response for November 18-19, 2015 Inspection PA-15-04," dated December 22, 2015.</p>

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122	January 15, 2016 DOH Notice of Correction PA-15-05 INFRACTION DEFICIENCY INADEQUATE WORKER MONITORING REPEAT ITEM OF NONCOMPLIANCE FOR IMPROPER MARKINGS	DOH NOTICE OF CORRECTION - WN-10393-1 and WN-10508-1, PA-15-05. Not performing worker internal monitoring or notifying HP Management and the HP Technician when an air sample exceeds the designated criteria is categorized as an INFRACTION . Storing drums in an unauthorized outdoor area is categorized as an INFRACTION . Numerous containers in the bermed storage yard did not have their receipt markings re-marked as necessary, numerous containers had markings that were not legible, durable or weather proof, and one container had the receipt number on only one side of the container. Containers in the bermed storage yard not having labels/markings that are legible, durable, or weather proof is categorized as a DEFICIENCY . This is a REPEAT item of noncompliance. Reference: Letter, Kristen Schwab, DOH, to Curt Cannon, PFNW, "Notice of Correction for December 16-17, 2015, 2015 Inspection PA-15-05," dated January 15, 2016.
123	June 17, 2016 PA-16-02 May 12, 2016 DOH Inspection DOH Thank You Letter for Unverified Work.	Items of Noncompliance DOH Letter - Thank you for your letter dated June 9, 2016 informing us of the steps you have taken and plan to take, to correct the items of noncompliance noted during the May 12, 2016 inspection of your Washington State Radioactive Materials License Numbers WN-I0393-1 and WN-I0508-1. The department understands the complexities involved in fully resolving this IONC and feels adequate information has been provided from your facility regarding corrective actions expected to be taken for this item of noncompliance. The department anticipates continued discussions as you implement your corrective actions. These corrective actions will be verified during future visits. <u>[NOTE: No information was available to describe the PA-16-02 complex non-compliances.]</u> Reference: Letter, Kristen Schwab, DOH, to Curt Cannon, PFNW, "Notice of Correction Response for May 12, 2016, Inspection PA-16-02," dated June 17, 2016.
124 both	August 18, 2016 Department of Ecology	Thank you for your staff's time during the PermaFix Northwest Richland, Inc. inspection on January 26-27, 2015 . The Department of Ecology's (Ecology)

REF #	DATE/DOC NUMBER	ISSUE
	<p>Compliance Report #15.514 16-NWP-145, by Certified Mail</p> <p>WILLFUL NONCOMPLIANCE IN-CONTAINER MIXER 15 Noncompliances, 8 Concerns.</p>	<p>compliance report of this inspection is enclosed. The report cites 15 areas of non-compliance and 8 concerns listed in the compliance problems section of the report.</p> <p>“PFNW accepted an excess of 50 Mixed Waste (MW) containers during a 12-month time period for treatment in the in-container mixer. PFW failed to comply with their permit conditions when the facility <u>accepted waste for which it had no treatment capability.</u> During this time frame, the facility removed the existing permitted in-container mixer and requested a permit modification for a new in-container mixer and a temporary authorization for its immediate use. A demonstration was provided to Ecology and USEPA staff of this in-container mixer's capabilities. <u>The demonstration of the mixer was not successful, and Ecology denied the temporary authorization and Ecology permit writers instructed PFW to cease acceptance of waste for the in-container mixer line of treatment. It appears that acceptance of MW for treatment in this line continued.</u>”</p> <p>“Ecology directed PFW to stop accepting MW for this treatment process however, the facility continued to accept MW.”</p> <p>[NOTE: the report was issued about 20 MONTHS AFTER the inspection, apparently concealing the topic. Corrections were accepted that referenced the report prior to issuing the report.]</p> <p>References: Letter 16-NWP-145, Kathy Conway, DOH, to Richard Grondin, PFW, “Re: Dangerous Waste Compliance Inspection on January 26-27, 2015 at PermaFix Northwest Richland, Inc., RCRA Site ID: WAR000010355, NWP Compliance Index No. 15.514,” dated August 18, 2016.</p> <p>And</p> <p>Washington Department of Ecology Nuclear Waste Program Compliance Report, PermaFix Northwest Richland, Inc., January 26-27, 2015, Report Dated August 18, 2016.</p>
125	<p>September 21, 2016</p> <p>Washington Department of Ecology Dangerous Waste Violation Settlement Agreement and Agreed Order</p> <p>REPEAT VIOLATIONS</p>	<p>All of the corrective measures required to correct the described violations (as cited in violations one, four, and eleven from Compliance Report for Index #15.514, dated August 18, 2016) were implemented and completed.</p> <p>Perma-Fix Northwest Richland, Inc. must make and Ecology must receive Penna-Fix Northwest Richland, Inc. payment of \$36,400.00 within 30 calendar days of the effective date of this Settlement and Order. I</p> <p>The mixed waste had the potential of exposing humans to cadmium and radioactive components <u>for 11 years.</u> Ecology is recommending issuance of a penalty for violations of failure to designate, illegal storage of waste, and</p>

REF #	DATE/DOC NUMBER	ISSUE
	PENALTY \$36,400.	<p>failure to inspect.</p> <p>Violations of failure to designate and illegal storage are repeat violations from the 2010 USEPA NEIC inspection.</p> <p>All three of the violations presented an actual or imminent threat to human health. The mixed waste was of a powdery and granular consistency. This mixed waste was cut, exposed to the open air on a flat surface and below open grating under the TP-01 Transportable In-process Container (TIC) filling area in a posted radiation area and contamination area. The mixed waste was dry and had the potential to become airborne and be inhaled by people in the area. Gamma specification results submitted to Ecology on February 3, 2015, (for purposes of laboratory acceptance) indicated that isotopes of Cobalt-60, Niobium- 95, Caesium-137, U-Nat (Uranium), and Americium-241 were radioactive components of the mixed- waste. Arnericium-241 is an alpha emitter.</p> <p>Reference: State of Washington Department of Ecology Dangerous Waste Violation Settlement Agreement and Agreed Order, In the Matter of Expedited Enforcement Action for Perma-Fix Northwest Richland, Inc., No. 13808, Exhibit A of Department of Ecology Letter 16-NWP-160, dated September 21, 2016.</p> <p>[NOTE: Ecology Letter 16-NWP-160 is not available.]</p>
126	November 14, 2016 DOH RADIOACTIVE MATERIALS LICENSE REPEAT EVENT DUCT BREACH AIR 16-1102	<p>LOW LEVEL THERMAL DUCT BREACH. DOH Letter.</p> <p>This letter is in response to your Low Level Thermal (LLTH) Radioactive Air Emissions License (Reference 1) and your <i>verbal notification</i> (Reference 2) on November 1, 2016, of a breach (hole) discovered on the LLTH off gas ductwork/piping section that is outside of the LLTH building (located on the roof).</p> <p>This event appears to have involved the same ductwork and is a similar type of event as in October 2015. Your corrective actions and protective measures taken in response to your October 2015 event appear to have not been effective in minimizing or eliminating the chance of recurrence. REPEAT EVENT</p> <p>As a result, we have the following requests and questions related to preparing your LLTH operations for resuming operation on a temporary basis until actions necessary to ready your LLTH operations for long-term operation are determined and completed...</p> <p>[NOTE - no DOH documentation of the 2015 duct breach has been included so far. The topic is mentioned in the 2015 Perma-Fix Environmental Report submitted to DOH. On October 14, 2015, there was a rupture in the process off gas line for Building 8 Low Level</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>Thermal (LLTH) facility. After 15 years of service, the offending location was patched, then replaced in-kind with a slightly thicker wall gauge. No evidence of any extent-of-condition review of all duct work was provided.]</p> <p>REFERENCE: Letter AIR 16-1102, John Martell, DOH, to Richard Grondin, PFNW, "Short Term Compensatory Actions for November 2016 Low Level Thermal Duct Breach (Emission Unit [EU] 507)," dated November 14, 2016.</p>
127	November 22, 2016 DOH Notice of Correction PA-16-04 IMPROPER MARKINGS REPEAT VIOLATION	<p>NOTICE OF CORRECTION -WN-I0393 and WN-I0508-1.</p> <p>The south storage yard had five seavans that <u>did not have markings, labels, or receipt numbers</u>. Additionally, numerous containers in the south storage yard had <u>illegible dose information on the labels</u>. Containers in the south storage yard not having receipt numbers and/or labels/markings that are legible, durable, or weather proof is categorized as a DEFICIENCY. This is a REPEAT item of noncompliance.</p> <p>Reference: Letter, Kristen Schwab, DOH, to Curt Cannon, PFNW, "Notice of Correction for October 26-27, 2016 Inspection PA-16-04.</p>
128	March 9, 2017 THIRD LOW LEVEL THERMAL DUCT BREACH RADIOACTIVE MATERIALS LICENSE. REQUEST FOR DEMONSTRATION DOH AIR 17-309	<p>[SECOND] LOW LEVEL THERMAL DUCT BREACH. DOH Letter.</p> <p>Due to a second breach in the LLTH duct within a period of thirteen months, we are requesting an ALARACT demonstration in accordance with the requirements of Washington Administrative Code (WAC) 246-247-080(1) and WAC 246-247-130Appendix C-ALARACT Demonstrations, for <u>the Low Level Thermal Duct Repair</u> showing that early degradation of the duct repair will be detected and remedied to avoid further breaches (which could potentially result in unfiltered air pathways) in the duct. REPEAT EVENT.</p> <p>[NOTE – THERE WERE TWO DUCT BREACHES. ONE October 14, 2015, a second on NOVEMBER 1, 2016. DOH waited more than three months to request the demonstration.]</p> <p>Reference: Letter AIR 17-309, John Martell, DOH, to Richard Grondin, PFNW, "As Low as Reasonably Achievable Control Technology (ALARACT) Demonstration Request for the Low Level Thermal Duct Repair," dated March 9, 2017.</p>
129	July 10, 2017 PFNW VARIANCE REQUEST DUE TO INCOMPETENCE. PA-17-04 AM-241 Exceeds License Limit.	<p>PFNW EXCEEDS MAXIMUM POSSESSION QUANTITY AND RESPONDS BY REQUESTING A 60% Increase VARIANCE.</p> <p>This letter is intended to formally report an exceedance of a license condition and request a variance to our Radioactive Materials License #WN-I0393-1, Amendment 43, Condition 8. D., regarding maximum possession quantity of "Any other radioactive material, Atomic Numbers 84-103, except Special Nuclear material."</p> <p>On the morning of July 10, 2017, PFNW employees identified that a receipt of</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>material was received at the facility on July 3, 2017 with an amount of activity (primarily Am-241) exceeding condition 8.D. Notification was made to the department via telephone and is being followed up with this notification and variance request.</p> <p>An internal Non-conformance report is being initiated (NCR17-005) and an Item of Non-Conformance (IONC) will also be added to the monthly report.</p> <p>A root cause has not yet been assigned; however, initial discussions believe it to be that the focus was on the SNM portion of the license (8.B.) allowing complacency in checking the other columns in waste tracking with the attention to detail that was/is needed.</p> <p>The company electronic waste tracking program does not flag or actively identify when a level is met or exceeded until a report is generated. ... To allow PFNW to get back into compliance with its license, a variance request is being made to increase the limit of condition 8. D., from 10 curies to 16 curies [Maximum Quantity the Licensee may possess at any one time]. PFNW is currently at 13.9 curies and requests the variance for an additional 2.1 curies to allow a continuation of the waste processing that is currently scheduled through July. It is anticipated that PFNW would be able to ship processed waste off-site on August 3, 2017. Unfortunately we have seen some of these dates shift in the past so PFNW is requesting the variance until August 10, 2017 or until the material is shipped off-site, whichever occurs first.</p> <p>Reference: Letter, Curt Cannon, PFNW, to Cheryl Rogers, DOH, No Subject. "This letter is intended to formally report an exceedance of a license condition...., dated July 10, 2017.</p>
130	<p>July 12, 2017 PV-17-04 DOH APPROVES VARIANCE ABOVE AUTHORIZED POSSESSION LIMIT FOR AM-241.</p>	<p>DOH APPROVES TEMPORARY LICENSE INCREASE ["VARIANCE"]. The Department of Health has reviewed your letter dated July 10, 2017, requesting permission to temporarily increase the possession limit of License Condition 8.D from 10 curies to 16.0 curies due to exceeding the authorized possession limit with receipt of a shipment on July 3, 2017 and identified on July 10,2017.</p> <p>Provided you adhere to the statements made in your letter, separate the shipment into two packages and do not open and process the second package until the sizing and packaging has been completed on the first package, your request to temporarily increase the possession limit of License Condition 8.D from 10 curies to 16.0 curies is approved. This approval expires August 10, 2017 or until the material is shipped off-site, whichever comes first.</p> <p>This request was for a glovebox received in one shipment with 13.3 Ci of Am-241.</p> <p>The licensee notified DOH on July 10, 2017 that the most recent outdoor-offload shipment from PFP, (TB030000), received on July 3, 2017 shipped with 1.33 E+4 mCi of Am-241.</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>This is over the licensee's 10 Ci limit. The licensee noted that License Limit Report: Low Level as of 6/29/2017 showed that the percentage of waste under LC 8. D. would be 139% with the committed waste added. <i>This did not trigger questions</i> due to the fact that waste is often shipped off-site dropping the value below 100%. [Shipped off site 7-27-17]</p> <p>[NOTE: No INDICATION THAT THE BOX SHOULD HAVE BEEN RETURNED TO THE GENERATOR. NO VIOLATION ISSUED.]</p> <p>Reference: Letter, Cheryl Rogers, DOH, to Curt Cannon, PFNW, "Request to Temporarily Increase License Condition 8D Activity Limit (PV-17-04)," dated July 12, 2017.</p>
131	<p>December 19, 2017 PA-17-03 October 3-5, 2017 DOH Inspection</p> <p>DOH Thank You Letter for Unverified Work.</p>	<p>Thank you for your letters dated October 25, 2017 and December 5, 2017 informing us of the steps you have taken to correct the items of noncompliance noted during the October 3-5, 2017 inspection of your Washington State Radioactive Materials License Numbers WN- 10393-1 and WN-10508-1.</p> <p>Adequate information has been provided from your facility regarding corrective actions taken for these items of noncompliance. We look forward to reviewing the revised LLOP 212 by January 30, 2018. As a reminder, LLOM 1.2.4.3.1. F commits to using a contractor/staff Certified Health Physicist to review and approve this procedure prior to submittal to Washington Department of Health.</p> <p><i>Your corrective actions will be verified during a future inspection of this area.</i> The item of noncompliance will remain open until verified as addressed.</p> <p><u>[NOTE: No information was available to describe the PA-17-03 non-compliances or remaining open non-compliance.]</u></p> <p>Reference: Letter, Cheryl Rogers, DOH, to Curt Cannon, PFNW, "Notice of Correction Response for October 3-5, 2017, Inspection PA-17-03," dated December 19, 2017.</p>
132	<p>December 20, 2017 PA-17-04 November 28-29, 2017 DOH Inspection</p> <p>DOH Thank You Letter for Unverified Work.</p>	<p>Thank you for your letter dated December 14, 2017 informing us of the steps you have taken to correct the items of noncompliance noted during the November 28-29, 2017 inspection of your Washington State Radioactive Materials License Numbers WN- 10393-1 and WN-10508- 1. .</p> <p>Adequate information has been provided from your-facility regarding corrective actions taken for these items of noncompliance. We look forward to reviewing the revised LLOP 409 by January 31, 2018.</p> <p><i>Your corrective actions will be verified during a future inspection of this area.</i> The item of noncompliance will remain open until verified as addressed.</p> <p><u>[NOTE: No information was available to describe the PA-17-04 non-</u></p>

REF #	DATE/DOC NUMBER	ISSUE
		<p><u>compliances or remaining open non-compliance.]</u></p> <p>Reference: Letter, Cheryl Rogers, DOH, to Curt Cannon, PFNW, “Notice of Correction Response for November 28-29, 2017, Inspection PA-17-04,” dated December 20, 2017.</p>
133	<p>March 16, 2018 Stock Options Offered to Robert Ferguson for Hanford Tank Waste Treatment at PFNW.</p> <p>Robert Ferguson is the Co-Chair of the Newly established Non-Profit, “Northwest Energy Associates.”</p>	<p>For Robert Ferguson’s consulting work in connection with the Company’s TBI [Test Red Initiative], on July 27, 2017 (“grant date”), we granted Robert Ferguson a stock option from the Company’s 2017 Plan for the purchase of up to 100,000 shares of the Company’s Common Stock at an exercise price of \$3.65 a share, which was the fair market value of our Common Stock on the date of grant (“Ferguson Stock Option”). The vesting of the Ferguson Stock Option is subject to the achievement of the following milestones (“waste” as noted below is defined as liquid LAW (“low activity waste”) and/or liquid TRU (“transuranic waste”)):</p> <ul style="list-style-type: none"> • Upon treatment and disposal of three gallons of waste at the PFNWR facility by January 27, 2018, 10,000 shares of the Ferguson Stock Option shall become exercisable; [The 10,000 options as noted above became vested by Robert Ferguson on December 19, 2017. The fair value of the 10,000 options was determined to be approximately \$20,000.] • Upon treatment and disposal of 2,000 gallons of waste at the PFNWR facility by January 27, 2019, 30,000 shares of the Ferguson Stock Option shall become exercisable; [amended to December 31, 2021] and • Upon treatment and disposal of 50,000 gallons of waste at the PFNWR facility and assistance, on terms satisfactory to us, in preparing certain justifications of cost and pricing data for the waste and obtaining a long-term commercial contract relating to the treatment, storage and disposal of waste by January 27, 2021 [amended to December 31, 2022], 60,000 shares of the Ferguson Stock Option shall become exercisable. <p>The term of the Ferguson Stock Option is seven (7) years from the grant date. Each of the milestones is exclusive of each other; therefore, achievement of any of the milestones above by Robert Ferguson by the designated date will provide Robert Ferguson the right to exercise the number of options in accordance with the milestone attained.</p> <p>Reference: United States Securities and Exchange Commission Form 10-K, Perma-Fix Environmental Services, Inc., Dated March 16, 2018, as updated.</p>
134	<p>July 3, 2018 PA-18-02 June 13-14, 2018 DOH Inspection</p> <p>DOH Thank You Letter for Unverified Work.</p>	<p>Thank you for your letter dated June 27, 2018 informing us of the steps you have taken to correct the item of noncompliance noted during the June 13-14, 2018 inspection of your Washington State Radioactive Materials License Numbers WN-10393-1 and WN-I0508-1.</p> <p>Adequate information has been provided from your facility regarding corrective actions taken for this item of noncompliance. Your corrective actions will be verified during a future inspection of this area. The item of</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>noncompliance will remain open until verified as addressed.</p> <p><u>[NOTE: No information was available to describe the DOH PA-18-02 non-compliances or remaining open non-compliance. PFNW indicated in nearly illegible writing that results of alpha/beta/gamma contamination surveys were not documented for 2018]</u></p> <p>Reference: Letter, Cheryl Rogers, DOH, to Curt Cannon, PFNW, "Notice of Correction Response for June 14, 2018, Inspection (PA-18-02)," dated July 3, 2018.</p>
135	December 21, 2018 DOH NOTICE OF CORRECTION PA-18-05 INADEQUATE WORKPLACE PARTICULATE SAMPLE DEFICIENCY	<p>NOTICE OF CORRECTION. This letter constitutes a notice of correction (pursuant to RCW 43.05.100 and the Regulatory Reform Act of 1995) and refers to the inspection conducted December 4-5, 2018, of activities authorized by your Washington State Radioactive Materials License Numbers WN-I0393- 1 and WN-I0508-1.</p> <p>Three instances were noted at the <u>Mixed Waste Facility</u> where the criteria for alpha on a <i>workplace particulate sample</i> were exceeded on the first recount and the T 1/2 was not calculated, <u>therefore, the Health Physics Manager was not contacted.</u> Specifically, T 1/2 was not calculated on 8/21/18, 9/4/18 and 9/18/18. This item is categorized as a DEFICIENCY.</p> <p>Reference: Letter, Cheryl Rogers, DOH, to Curt Cannon, PFNW, "Notice of Correction for December 4-5, 2018, Inspection (PA-18-05)," dated December 21, 2018.</p>
136	January 25, 2019 DOH PA-18-05 December 4-5, 2018 DOH Inspection (above) DOH Thank You Letter for Unverified Work.	<p>Thank you for your letter dated January 18, 2019 informing us of the steps you have taken to correct the item of noncompliance noted during the December 4-5, 2018 inspection of your Washington State Radioactive Materials License Numbers WN-I0393-1 and WN-I0508-1.</p> <p>Adequate information has been provided from your facility regarding corrective actions taken for this item of noncompliance. Your corrective actions will be verified during a future inspection of this area. The item of noncompliance will remain open until verified as addressed.</p> <p>[NOTE: DOH provides no indication of adequate closure].</p> <p>Reference: Letter, Cheryl Rogers, DOH, to Curt Cannon, PFNW, "Notice of Correction Response for December 4-5, 2018, Inspection (PA-18-05)," dated January 25, 2019.</p>
137	February 6, 2019 DOH VARIANCE APPROVAL BASED ON EMAILED VARIANCE REQUEST AIR-19-201 Zr-95	<p>Reference: Email (IM# 10,245), Curt Cannon (PFNW) to John Martell and Crystal Mathey (WDOH), "Zr-95 Issue", dated February 1, 2019.</p> <p>Your request to transfer one drum containing Zr-95 to the Low Level Mixed Waste Facility (EU 513) for treatment has been approved. This approval is granted for one time only and constitutes a modification to your license, as defined by Washington Administrative Code (WAC) 246-247- 030(16). An application for this modification should be submitted within 120 days of this</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>letter (no later than June 6, 2019).</p> <p>[NOTE DOH allowed this modification, without explaining its basis or even what it was. The PFNW email reference is not available]</p> <p>Reference: Letter AIR 19-201 from John Martell, DOH, to Richard Grondin, PFNW, "Treatment of Mixed Waste Containing Zr-95," dated February 6, 2019.</p>
138	March 13, 2019 PA-19-01 DOH License INFRACTION	<p>Contrary to LLOM 6.1.1, a comprehensive and independent controls and safety audit was not conducted. Specifically, Item H – Radioactive Materials License conditions, Item L – Posting and Labeling and auditor's qualifications to review radiological controls and safety were not documented.</p> <p>Reference: DOH Inspection Findings and Licensee Acknowledgement Form, PA-19-01, Signed by PFNW March 13, 2019.</p>
139	May 17, 2019 GEOMELT VITRIFICATION FIRE	<p>GEOMELT MONOLITH FIRE AT PFNW Location – Building #13, Mixed Waste Facility (MWF) Incident – Package fire. Cause – A completed monolith was packaged prior to sufficiently cooling below the required temperature. The material consumed in the fire was clean packaging, trash and cribbing material. Corrective Action – Fire was extinguished. Preventative Action – Implementation of administrative controls, including procedure revision, new job hazard analysis and training.</p> <p>REFERENCE: PermaFix Northwest Richland, Inc. Annual Environmental Monitoring Report for 2019, dated June 25, 2020</p>
140	May 20, 2019 Compliance Index #19.655 GEOMELT VITRIFICATION FIRE and three new areas of non-compliance.	<p>Ecology COMPLIANCE INSPECTION REPORT. The fire alarms for the Mixed Waste Facility were not operational during the May 17, 2019 fire. ECY observed on the Mixed Waste facility fire inspection rounds that no fire inspections were performed from 1700 hours on May 16, 2019 until 1545 hours on May 17, 2019.</p> <p>Mr. Cannon said one of their workers observed the fire and went over and put the fire out with a fire extinguisher. He explained their fire alarms were down at the time. Ms. Wiegman said they sent us a notification that the fire alarms were down with the alternate method using employee rounds. During the investigation of the fire incident, it was discovered that <u>hourly fire rounds were not being performed the night of the fire.</u> From midnight to 4:00pm on May 16th, hourly rounds were being performed by Mixed Waste personnel. When the shift for the Mixed Waste personnel ended, there was a failure to communicate that the Low Level personnel were then responsible for the hourly rounds.</p> <p>We walked around to the other side where the fire occurred. While walking through the location of the old Gas Vit System, Mr. Cannon pointed out the wrapped <u>damaged pre-filters</u> changed due to the fire. On</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>the other side where the fire occurred, I observed the melted plastic on the fire alarm pull station and public address horn.</p> <p>In addition, this inspection report identifies 15 non-compliances associated with the 2016 penalty of \$36,400. The report notes that Ecology Letter 16-NWP-215, dated December 14, 2016, documented the determination that all areas of non-compliance from the January, 2015 Compliance Evaluation Inspection (Index Number 15.514) were addressed as of October 20, 2016. [NOTE: It took a year and 10 months to address these non-compliances.]</p> <p>This inspection identified three new areas of non-compliance and three concerns (per 19-NWP-112)</p> <p>Reference: Washington Department of Ecology Nuclear Waste Program Compliance Report, July 11, 2019, for Inspection dates January 30, 2019 and May 20, 2019, Index #: 19.655.</p>
141	<p>June 5, 2019 DOH VARIANCE APPROVAL AIR 19-605 SECOND Zr-95 DRUM</p> <p>See February 6 for first approval.</p>	<p>DOH VARIANCE APPROVAL. TREATMENT OF MIXED WASTE CONTAINING Zr-95. Re - PNNL 90-Day Waste. Your request to transfer one drum containing Zr-95 to the Mixed Waste Non-Thermal Facility (EU 513) for treatment is approved. <u>This constitutes a modification</u> as defined by Washington Administrative Code (WAC) 246-247-030(16). The draft application for this modification (MWNT_NOC_5-2019) was received on May 29, 2019.</p> <p>NOTE: this variance request was received in an email - Email (IM# 10,354), Curt Cannon (PFNW) to John Martell, Crystal Mathey, and Shannan Johnson (WDOH), "PNNL 90-Day Waste", dated June 3, 2019. DOH is no longer requiring formal documentation of variance requests, nor are they numbered. The PFWN June 3, 2019 email is not available.</p> <p>Reference: Letter AIR 19-605, John Martell, DOH, to Richard Grondin, PFWN, "Re: Treatment of Mixed Waste Containing Zr-95," dated June 5, 2019.</p>
142	<p>June 10, 2019 AIR 19-606 DOH NOTICE OF CORRECTION SIX FINDINGS EMISSIONS MONITORING INADEQUATE</p> <p>Pu-241 Annual Possession Quantity Exceeded at 206%</p> <p>[NOTE: A REPEAT FINDING]</p>	<p>DOH Audit/Inspection NOTICE OF CORRECTION FINDINGS. RAEL-012. SIX FINDINGS.</p> <p>The Radioactive Air Emissions Section (RAES) inspected PFWN to determine compliance with the Radioactive Air Emissions License (RAEL-012) and Washington Administrative Code (WAC) 246-247. The inspection consisted of a walk down of the facility and a document review on December 10, 2018. This letter constitutes a Notice of Correction pursuant to Revised Code of Washington (RCW) 43.05.100 for issues found during the inspection.</p> <p>Inspection Test Sheets for performing the ANSI N13.1 -1999 Table 2 do not have adequate detail of maintenance and inspection requirements for all PIC 1 emission units. Constant Emissions Monitor (LLT-CEM-1001)</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>Inspection test sheet documented that the test sample lines showed indication of rust, however, no documentation of cleaning or a Non-Conformance Report (NCR) was performed.</p> <p>Constant Emissions Monitor (LLT-MF-1001) Inspection test sheet documented that there was an indication of rust inside the nozzle. It was also noted that the leak test performed associated with device (LLT-MF-1001) was conducted with a non-calibrated pressure gauge.</p> <p>Constant Emissions Monitor (LLT-MF-1002): same issues - rust, non-calibrated pressure gauge.</p> <p>The MWTH facility's mass flow controller (MW-GV01-MF-1002) calibration data sheet exhibited that the "as found status" of the instrument was "Out of Tolerance" prior to its calibration date. The periodicity of this instrument is every 3 months. It was 6 months. The mass flow controller continues to fall out of tolerance before its calibration due date.</p> <p>It was noted during the document review of the composite stack air samples for all PIC 1 emission units monthly composites were not meeting RAES' advisable detection limits.</p> <p>EMISSIONS MONITORING INADEQUATE.</p> <p>Monitoring requirements described in the Mixed Waste Thermal (MWTH) license (EU 1531, NOC 1335) states that continuous sampling shall be conducted for Strontium 90, Plutonium 238, Plutonium 239, Cesium 137, and Americium 241. Sampling results reviewed showed that Plutonium 238/239 and Strontium 90 were not analyzed.</p> <p>The regulations states that the "Maximally exposed individual" (MEI) means any member of the public (real or hypothetical) who abides or resides in an unrestricted area, and may receive the highest Total Effective Dose Equivalent (TEDE) from the emission unit(s) under consideration, taking into account all exposure pathways affected by the radioactive air emissions." Given the tall stack heights and proximity to businesses/potential MEIs, midpoints should be selected at intervals starting from the fence line up to 2,000 meters to adequately model the plume.</p> <p>Previous undocumented agreements between the regulator and the licensee to model to the fence line did not reflect the MEI appropriately. Guidance changed for CAP 88. Pu-241 CURIE LIMIT EXCEEDED. 206% of APQ.</p> <p>[NOTE: Despite the significance, it took 6 months for DOH to issue a report.]</p> <p>Reference: Letter AIE-19-606, John Martell, DOH to Richard Grondin,</p>

REF #	DATE/DOC NUMBER	ISSUE
		PFNW, “Re: Notice of Correction (NoC) Findings from 2018 Inspection (Audit 1263) of Perma-Fix Northwest Richland, Inc.,” dated June 10, 2019.
143	July 9, 2019 DOH PA-19-03 DOH Thank You Letter for Unverified Work.	<p>Thank you for your letter dated July 2, 2019 informing us of the steps you have taken to correct the item of noncompliance noted during the June 18-19, 2019 inspection of your Washington State Radioactive Materials License Numbers WN- I0393-1 and WN-I0508-1.</p> <p>Adequate information has been provided from your facility regarding corrective actions taken for this item of noncompliance. Your corrective actions will be verified during a future inspection of this area. The item of noncompliance will remain open until verified as addressed.</p> <p>[NOTE: No records are available of the subject of the inspection. The non-compliance is not described.]</p> <p>Reference: Letter, Cheryl Rogers, DOH, to Curt Cannon, PFWN, “Notice of Correction Response for June 19, 2019 Inspection (PA-19-03),” dated July 9, 2019.</p>
144	July 11, 2019 19-NWP-112 Ecology Compliance Inspection #19.655	<p>Thank you for your staff's time during the Perma-Fix Northwest inspection on January 30, 2019 and May 20, 2019. The Department of Ecology's (Ecology) compliance report of this inspection is enclosed [# 19.655]. The report cites three areas of non-compliance and three concerns.</p> <p>To return to compliance, complete the actions required in the compliance problems section of the report and respond to Ecology within the timeframes specified. Include all supporting documentation in your response, (such as photographs, records, and statements explaining the actions taken and dates completed). Submit this information to Jared Mathey at 3100 Port of Benton Boulevard Richland, Washington 99354.</p> <p>Failure to correct the deficiencies may result in an administrative order, a penalty, or both, as provided by the Hazardous Waste Management Act (Revised Code of Washington 70.105.080 and .095). Persons who fail to comply with any provision of this chapter are subject to penalties of up to \$10,000 per day per violation.</p> <p>Specific deficiencies or violations not listed in the enclosed compliance report do not relieve your facility from having to comply with all applicable regulations.</p> <p>Reference: Letter, 19-NWP-112, Jared Mathey, Department of Ecology, to Richard Grondin, PFWN, Dangerous Waste Compliance Inspection on January 30, 2019 and May 20, 2019 at PermaFix Northwest, RCRA Site ID: WAR000010355, NWP Compliance Index No.: 19.655, dated July 11, 2019.</p>
145	August 14, 2019	Consent Agreement -

REF #	DATE/DOC NUMBER	ISSUE
	<p>EPA CONSENT AGREEMENT RCRA-10-2019-0130</p> <p>INADEQUATE FINANCIAL RESPONSIBILITY FOR 5 YEARS</p> <p>PENALTY \$23,375</p>	<p>On or about May 15, 2018, EPA conducted a compliance evaluation inspection of the Richland facility pursuant to Section 3007 of RCRA, 42 U.S.C. § 6927.</p> <p>The EPA alleges that between September 1, 2013 and September 1, 2014, <u>Respondent failed to establish adequate financial responsibility exclusive of legal defense costs in Policy Number PLS-1959292 for bodily injury and property damage to third parties caused by sudden accidental occurrences arising from operations of the Richland facility as required by Permit Condition I-4a and WAC-173-303-620(8)(a).</u></p> <p>3.25. The EPA alleges that Respondent's failure to establish adequate financial responsibility as required by the RCRA authorized regulation at WAC-173-303-620(8)(a) constitutes a violation of Permit Condition I-4a.</p> <p>3.26. Under Section 3008(a) of RCRA, 42 U.S.C. § 6928(a), and 40 C.F.R. Part 19, EPA may assess a civil penalty of not more than \$37,500 per day of noncompliance for each violation of a requirement of Subtitle C of RCRA, issue an order requiring compliance, or both. EPA has determined and Respondent agrees that an appropriate penalty to settle this action is \$23,375 (the "Assessed Penalty").</p> <p>NOTE: the penalty was much smaller than might have been imposed, due to the long time of non-compliance. \$37,500 per day times the year of non-compliance is about \$13.7 million, not \$23,375. And this was not caught for 5 years...]</p> <p>Reference: DOCKET NO. RCRA-10-2019-0130 CONSENT AGREEMENT in the Matter of Perma-Fix Northwest Richland, Inc., U.S. Environmental Protection Agency, August 14, 2019.</p>
146	<p>September 27, 2019 PFNW Letter to DOH.</p> <p>GEOMELT VITRIFICATION</p>	<p>Response to Questions about GEOMELT and Sodium DRUMS and EBR Blankets.</p> <p>This letter is in response to your request for additional information letter dated September 25, 2019 concerning our August 27, 2019 GeoMelt® request. Your comments are shown below followed by the Perma-Fix Northwest (PFNW) response in bold.</p> <p>Axial Subassemblies: The Figure states that each subassembly holds approximately 180 g of sodium. The drums and the assembly fall under a different of rules for waste designation. The drums were considered empty because they were <i>emptied by normal means</i>. This allows for some residual. This is often identified as empty, last contained... for whatever hazardous material might have been originally in the container/drum. This resulted in "empty" drums which could have 3 to 5 pounds of sodium residual inside but they were not considered hazardous because they were empty containers. "The empty drums were a great success."</p> <p>[NOTE: 5 lbs of sodium metal is not non-hazardous. It continues to be water reactive and pyrophoric.]</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>The EBR blanket subassembly is a piece of equipment that contains sodium (a hazardous material). The equipment does not meet the container rule and therefore must be tracked for its contents which happen to be uranium and sodium. Because it has sodium in it and it is no longer going to be used, it is designated as a dangerous waste [NOTE - waste code D003] in Washington State. Because of the uranium it is also considered a radioactive waste and therefore it must be shipped as radioactive material. GeoMelt® treats uranium by chemically oxidizing it in the melt which allows it to be incorporated into the glass at the molecular level.</p> <p>[NOTE: Uranium metal is also pyrophoric].</p> <p>Additionally, convective flow patterns that are established in the melt serve to uniformly mix the oxidized uranium throughout the melt. Uranium oxide has a high solubility in glass on the order of 15 to 20 wt% which allows for a <i>substantial</i> amount of uranium to be incorporated into the glass. All prior GeoMelt® projects related to treatment of uranium-containing materials have been performed successfully.</p> <p>[NOTE: “substantial” is not defined.]</p> <p>Reference: Letter, Curt Cannon, PFNW, to Cheryl Rogers, DOH, Untitled, dated September 27, 2019.</p>
147	September 27, 2019 PFNW Letter to DOH GEOMELT VITRIFICATION EXPANSION	<p>PERMA-FIX REVISION TO GEOMELT PLAN.</p> <p>This letter is a revision to the previously submitted plan (last updated August 27, 2019) for processing the waste through the GeoMelt® process.</p> <p>Following completion of the Fermi drum campaign, PFNW intends to expand the research and technology development by processing additional sodium bearing waste. The next waste stream we are proposing to process will be an Experimental Breeder Reactor (EBR) blanket subassembly originating from the Experimental Breeder Reactor in Idaho. This plan is created to establish the requirements to successfully treat one EBR blanket using the GeoMelt® process. For this treatability study, one unused (non-irradiated) EBR blankets will be treated using the GeoMelt® process (Figure 1). These blankets are a small fraction of the approximately 55 metric tons of the reactive metal waste streams at the Idaho National Laboratory (INL) consisting of sodium-bonded uranium-based material produced during the development of Liquid Metal Fast Breeder/Burner Reactor (LMFBR) technology. This campaign (EBR blanket subassemblies) is expected to be shipped to PFNW in September and completed in October of this year (2019).</p> <p>Reference: Letter, Curt Cannon, PFNW, to Cheryl Rogers, DOH, Untitled, dated September 27, 2019.</p>
148	October 2, 2019 DOH Email GEOMELT	<p>DOH Email. DOH expects Geomelt processing of kg quantities of depleted uranium (DU) and naturally occurring uranium (NU) will be within the license limit and will double check this.</p>

REF #	DATE/DOC NUMBER	ISSUE
	VITRIFICATION	<p>I appreciate the revised plans for the Experimental Breeder Reactor subassembly processing planned for Geomelt. I see he answered my APQ question a bit indirectly, that the Geomelt NOC is “expected” to be sufficient. But looking at the kilogram amounts of DU & NU & associated low specific activities, I expect the Ci amounts to be very low, .008 Ci & .004 Curies respectively. Sodium quantities appear low too. So I tend to concur that they should be well within their Air Emissions license APQ limits. & if not they would be required by the regs to notify us & then need a license mod to proceed. I don’t have any immediate concerns that should hold up your Waste letter but I want to keep an eye on the process.</p> <p>I am out today but I will look at their license & follow up w him Friday & cc you just to make sure we are getting the relevant info we need to continue assessing as they get the info..</p> <p>John, just FYI I think Ecology has some energy & concerns on this RCRA wise. Thanks, Crystal</p> <p>Reference: Email, Crystal Mathey, DOH, to Cheryl Rogers, DOH, “Subject FW: GeoMelt plan and response 9/27/2019, “dated October 2, 2019.</p>
149	<p>October 10, 2019 PA-19-05</p> <p>DOH Thank You Letter for Unverified Work.</p>	<p>Thank you for your letter dated October 9, 2019 informing us of the steps you have taken to correct the item of noncompliance noted during the October 1, 2019 inspection of your Washington State Radioactive Materials License Numbers WN- 10393-1 and WN-10508-1.</p> <p>Adequate information has been provided from your facility regarding corrective actions taken for this item of noncompliance. Your corrective actions will be verified during a future inspection of this area. The item of noncompliance will remain open until verified as addressed.</p> <p>[NOTE: No information was provided to describe the October 1, 2019 Non-Compliance.]</p> <p>Reference: Letter, Cheryl Rogers, DOH, to Curt Cannon, PFNW, “Notice of Correction Response for October 1, 2019 inspection (PA-19-05),” dated October 10, 2019.</p>
150	<p>November 12, 2019 GEOMELT CONTAMINATION SPREAD</p>	<p>PFNW 2019 Environmental Report –</p> <p>November 12, 2019 Location – Building #13, Mixed Waste Facility (MWF) Incident – Loss of radiological contamination control.</p> <p>Cause –A monolith from the Geomelt process was found to be contaminated with a layer of black powder, determined to be uranium oxide, resulting in the spread of radiological contamination during the packaging phase.</p> <p>Corrective Action – All personnel directly involved were surveyed and in vivo bio-assay monitoring was conducted to confirm there was no personnel exposures. Health Physics performed removable contamination surveys throughout the facility, and mapped the areas and contamination</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>levels and identified areas were decontaminated.</p> <p>Preventative Action –A review of the melt plan to allow better mixing and retention of oxides being incorporated into the glass.</p> <p>[NOTE: see entry at September 27, 2019, when PFNW claimed “substantial” incorporation of uranium in glass but failed to quantify it.]</p> <p>Reference: PermaFix Northwest Richland, Inc., “<i>Annual Monitoring Report for 2019</i>”, PFNW Richland, Inc., 2025 Battelle Blvd., Richland, WA 99354, published June 25, 2020.</p>
151	December 16, 2019 PFNW Email Uranium Chip Fire	<p>Auto Ignition of Pyrophoric Uranium</p> <p>PFNW to DOH Email. Activity in the Depleted Uranium Box that auto ignited: 292 mCi of Uranium. 585 kg. Stack count "looks normal." FIRE occurred 12:15 pm December 16. DU CHIPS. (While being grouted)</p> <p>Reference: Email, Crystal Mathey, Subject: “<i>Smoking Box in SB-07 questions,</i>” December 17, 2019.</p>
152	December 17, 2019 PFNW Email Uranium Chip Fire	<p>There was MIXED Waste in the box of depleted uranium (DU) that caught fire. There were flames in the box.</p> <p>Reference: Email, Crystal Mathey, DOH, to John Martell, DOH, Subject: “<i>Update to fire in box 12/16/2019, 1600,</i>” December 16, 2019.</p>
153	December 19, 2019 DOH Email Uranium Chip Fire	<p>DU Fire was in the Mixed Waste Non-Thermal Building. Relying on stack samples for stating it was contained. Results provided were for only one point in time. [NOTE: no other samples?]</p> <p>Reference: email, Shannan E Hardziej, DOH, to Chrystal Mathey, DOH, Subject: “<i>FW: Stack sample initial counts_12-18-2019,</i>” dated December 19, 2019.</p>
180	January 2, 2020 DOH Hold on Processing Depleted Uranium	<p>DOH Letter: Re Processing Depleted Uranium – Temporary Hold</p> <p>As stated in our e-mail to you dated December 19, 2019, the Department is placing a temporary hold on Perma-Fix Northwest's (PFNW) authorization to process depleted uranium waste/material. This hold is in response to the December 16, 2019 event in which in-process depleted uranium waste was found smoking and required the use of a fire extinguisher and the placement of diatomaceous earth and sand over the waste.</p> <p>Prior to resuming the processing of depleted uranium waste/material, PFNW must submit a written request to the Department. The request must include: the unusual occurrence report, root cause analysis, corrective actions, and implementation schedule. PFNW may not resume processing of depleted uranium waste/material without written approval of the Department.</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>The Department understands PFNW intends on investigating the event waste box. For PFNW to proceed with investigating the event waste box, PFNW must notify the Department of investigation plan(s) prior to implementation.</p> <p>REFERENCE: Letter, Cheryl Rogers (for Kristen Schwab), DOH, to Curt Cannon, PFNW, “<i>Re: Processing Depleted Uranium – Temporary Hold,</i>” no letter number, dated January 2, 2020.</p>
177	<p>January 3, 2020 January 6, 2020</p> <p>PFNW Pre-Job Briefing Meeting Minutes Depleted Uranium</p>	<p>PFNW Job Description: Safely remove material from MW19700158.</p> <p>MW19700158 is a 117 cubic foot box with a grout floor and a metal cage the cage is lined with OSB wood sheets to contain the depleted uranium (DU) chips.</p> <p>As shown in the attached drawing [NOT INCLUDED IN THE REFERENCE] the metal box contains the following layers/components.</p> <ul style="list-style-type: none"> -Grout footing holding a <u>metal cage</u> in place that allows a 2 inch gap between cage and box sides. -OSB wood lining inside of cage to allow grout to flow to all sides but hold DU chips inside cage area. -DU chips were then added and the chips were covered with wood to keep them from floating up and being exposed when flood grouted. Grout was then flooded to a approximately 2 inches above the wood. -The second layer was a repeat of the <u>DU Chips, wood and grout</u> but contained less DU chips <p>A jack hammer will be used to break up the top layer of grout. After removing the top layer of grout, <u>remove combustible material (wood)</u> and exposing DU grout mixture. In the event any of the chips start burning use a class D extinguisher or sand to smother the fire.</p> <p>REFERENCE: PFNW PRE-JOB BRIEFING, “Safely Remove Material from MW19700158,” Meeting Minutes and Non-Routine Planning Checklist, dated January 3, 2020 and January 6, 2020, Scope of Job, “Fire Safety,” Signed by Curt Cannon, PFNW.</p>
178	<p>January 7, 2020</p> <p>DOH REVIEW Depleted Uranium Fire Recovery</p>	<p>DOH REVIEW of Incident Summary and Pre-Job Briefing for Unloading and Repacking DU Chips box.</p> <p>Comments were:</p> <p>Preliminary comments/concerns: Reviewed:</p> <ul style="list-style-type: none"> -Incident Summary, WDOH, dated 12/31/2019 -Proposed Pre-Job Briefing: MW19700158, Unload, PFNW, Dated 1/3/2020

REF #	DATE/DOC NUMBER	ISSUE
		<p>-Pyrophoricity of Uranium (U), H. B. Peacock, WCRC-TR-92-106, March 1992.</p> <p>Main concern is potential for ignition during unload and repackaging.</p> <p>Did PFNW enlist specific technical expertise in evaluating DU chips pyrophoricity potential when developing the load and proposed unload procedures?</p> <p>PFNW should provide DOH with specific generator information including characterization of DU chips (size, geometry/ homogeneity, and state of oxidation).</p> <p>REFERENCE: DOH Email, Sheila Pachernegg (DOH) to Cheryl Rogers, DOH, "PFNW – MW19700158 Incident, dated January 7, 2020.</p>
179	<p>January 7, 2020</p> <p>DOH Questions PFNW on Depleted Uranium Recovery Plan, Attaches LANL Report.</p>	<p>Curt, <u><i>Did LANL, the waste generator, review the work plan? We have concerns and feel it is critical they, as technical experts, review the work plan before proceeding as they are both the experts on handling these turnings and the generator of these turning.</i></u> We also have specifics concerns regarding the impacts of oxidation on the turnings once chipped from the incident box and placed into the drums. Our research shows when turnings are generated they are protected from oxidation - your process will generate unprotected turnings. Lastly, it seems the desired processing of this box is being merged with the investigation of this incident, allowing a lot of "assumptions" to play into the decision making of the processing path forward.</p> <p>Along with the above concerns, here are some questions that should be considered before proceeding.</p> <ol style="list-style-type: none"> 1) Since the chips/turnings were small and apparently floated to the top, is there a problem with encountering a layer of chips-not homogenized? 2) Will un-oxidized chips oxidize when exposed to air thus generating heat? 3) Should the chips go through an intermediate step (place in oil?) until ready to place in the 30 gallon containers? <p>We found an article from LANL titled "<u>A Process For Treating Uranium Chips and Turnings</u>". I can scan and send it to you (LA-UR- 95-252) dated 1995.</p> <p>Can we schedule another call today? Kristen is free after 3:45 pm. If this is not workable, let us know and we will try to accommodate.</p> <p>[Note: the turnings were identified as SMALL, and so subject to spontaneous ignition.]</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>REFERENCE: Email, Cheryl Rogers, DOH, to Curt Cannon, PFNW, “Further Discussion on Smoking Box,” dated January 7, 2020. File has document LA-UR-95-252 attached, and it clearly states: <u>“Because high surface area uranium is pyrophoric, the turnings are subject to spontaneous ignition in air.”</u></p>
<p>181</p> <p>And 182</p>	<p>January 9, 2020</p> <p>DOH Accepts Richard Grondin as Self Identified Pyrophorics Expert Instead of LANL and Accepts PFNW 2003 “treatment study”</p>	<p>Sheila,</p> <p>We discussed the concerns we had with Curt & Richard on 1/07/20. Richard Grondin is a technical expert and was involved with the treatment and disposal study conducted by PFNW (2003 report). That report included a lot of steps to wash and neutralize chips to remove RCRA contaminants which is not relevant today.</p> <p>Richard stated that the main problem was the fact that wood was in the box. He stated that Depleted Uranium does not react that fast, it is not spontaneous. It can spark if contacted with metal, for example, jack hammer, but without a source such as wood the spark will die out. They will have a fire extinguisher and sand readily available and keep other packages away from the work area. PFNW has experience processing ~400 drums of depleted uranium. Also, if the chips do smolder, the grout will put it out. They will ensure that the depleted uranium chips are covered either with grout or mineral oil at the end of each work shift.</p> <p>They will either begin this work Monday, 1/ 13/ 20 or the following Monday, 1/ 20/ 20. Richard or Curt will be present. Cheryl</p> <p>NOTE: There are several problems here.</p> <p>First: Mr. Grondin is a manager, and it is unclear that he is a technical expert. If so, he has a conflict of interest. If Mr. Grondin was a good technical expert, his company would not have packaged pyrophoric uranium with combustible wood. His name does not appear in the 2003 PFNW “technology summary report” that he cited.</p> <p>Second: Mr. Grondin’s statement that depleted uranium does not react “that fast” is not supported by any documentation. All isotopes of uranium are pyrophoric. In addition, a 1991 study (REF 182, EEG-48, “An Assessment of the Flammability and Explosion Potential of Transuranic Waste,” states that <u>assuming a slow reaction is incorrect</u>, as follows - “Furthermore, the Draft WIPP FSAR Addendum argues that a fire resulting from a spontaneous ignition within a bin “would be expected to be of a <u>slow smoldering type</u> due to the limited supply of oxygen available and its consumption as the fire proceeds.” However, the explosion of volatile organic compounds at Argonne National Laboratory, the explosion of uranium scrap in liquid coolant at the Y-12 facility at Oak Ridge National Laboratory, and the hydrogen explosion tests conducted by Dykes & Meyer in TRU drums (1990) <u>clearly dispute the concept of a slow smoldering fire in a drum or bin as the result of a spontaneous ignition</u>. REF 182 identifies additional depleted uranium fires.</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>Third: Mr. Grondin relies on a 2003 Report prepared by Perma-Fix using material from Rocky Flats (attached to the email). This report is essentially a sales pitch, and not a project of NQA-1 lab work. No comparison was made to the LANL waste that caught fire at PFNW. Again, there is a conflict of interest.</p> <p>Fourth: contrary to DOH's questions, LANL staff apparently were not asked about the depleted U waste that they generated.</p> <p>Fifth: No one has asked about the extent of condition. How many other waste packages has PFNW prepared containing uranium filings and chips and combustible wood. Are other storage and disposal facilities at risk?</p> <p>REFERENCE: Email, Cheryl Rogers, DOH, to Sheila Pachernegg, DOH, "FW: PF Stabilization Process for Treatment & Disp of Uranium & Thorium Chips," dated January 9, 2020.</p> <p>Also EEG-48, DOE/AL/58309-48, AN ASSESSMENT OF THE FLAMMABILITY AND EXPLOSION POTENTIAL OF TRANSURANIC WASTE, Matthew Silva, Environmental Evaluation Group, New Mexico, June 1991.</p>
154	<p>March 11, 2020 PA-20-01 DOH INSPECTION FINDINGS</p> <p>WORKER NOT WEARING DOSIMETRY. LABELING ERRORS.</p>	<p>INSPECTION FINDINGS AND LICENSEE ACKNOWLEDGEMENT - Worker inside restricted area not wearing dosimetry. Labels not removed for containers in an unrestricted area. DEFICIENCIES.</p> <p>Reference: DOH Inspection Findings and Licensee Acknowledgement, Perma-Fix Northwest, Richland, signed March 11, 2020.</p>
155	<p>May 8, 2020 AIR 20-414 DOH Closeout of Findings from June 10, 2019 Inadequate Emissions Monitoring.</p>	<p>DOH Follow Up and Close Out of Findings from AIR 19-606 Notice of Correction (JUNE 10 2019). This letter serves as a notice of completion for corrective actions identified in the Reference 1 NOC. The NOC is closed upon your receipt of this letter, with follow-up to items 4 and 5 to be completed through the licensing renewal process. [NOTE: CLOSED WITHOUT WORK BEING COMPLETED]</p> <p>4. Corrective Action: Samples shall be composited at least quarterly and analyzed for all radionuclides in accordance with the facility environmental program. 5. Corrective Action: Monitoring requirements described in the Mixed Waste Thermal (MWTH) license (EU 1531, NOC 1335) state that continuous sampling shall be conducted for strontium-90, plutonium-238, plutonium-239, cesium-137, and americium- 241.</p> <p>[NOTE this was not corrected for almost a year, and it is still not corrected. Fix is to update the license? Is this instead of performing the required monitoring?]</p>

REF #	DATE/DOC NUMBER	ISSUE
		<p>Reference: Letter, John Martell, DOH, to Richard Grondin, PFNW, “Follow-up and Closeout of Notice of Correction (NoC) Findings from Inspection# 1263 for Perma-Fix Northwest Richland (PNFW), Emission Units (EUs) 507, 513, 1325, and 1531</p>
156	<p>September 30, 2020 20-PFD-0054 Department of Energy Richland Operations Transmittal Letter to the Department of Ecology.</p> <p>Future DOE/RL Plans for PFNW in Relation to TPA Milestones</p> <p>PFNW to Process 10 boxes of TRUM Waste per year per TPA Milestone through November 2025.</p> <p>This is in addition to other DOE wastes that are not part of the TPA.</p>	<p>M-091 TRANSURANIC MIXED/MIXED LOW-LEVEL WASTE PROJECT MANAGEMENT PLAN, HNF-19169, REVISION 22</p> <p>The following capabilities are necessary to manage the waste and complete the M-091 Milestone series.</p> <p>Removal of large boxes from OSAs-A/B – M-091 large boxes located in OSAs-A/B must be removed by <u>September 30, 2026</u>, as required by M-091-59. Many of these M-091 large boxes stored in OSAs-A/B will have been removed for treatment at Perma-Fix Northwest pursuant to M-091-53A-E.</p> <p>This section describes the DOE plan to prepare TRUM waste into a form certifiable for offsite shipment. Existing offsite capabilities at Perma-Fix Northwest will be used to continue to make progress with repackaging large containers into a certifiable configuration. WRAP and T Plant are currently in a standby condition.</p> <p>For calendar year (CY) 2016 through May 4, 2020 a total of 3,387 m³ of TRU/M has been shipped to Perma-Fix Northwest for repackaging into certifiable form. The total TRUM treated in CY 2020 (through May 4), was 185 m³. <u>Perma-Fix Northwest is the only currently utilized capability for repackaging TRUM waste. [Sole Sourced Work]</u></p> <p>M-091-53A-E is: Remove 10 additional mixed waste containers from OSAs-A/B per year. Each year’s requirement is due on 11/30 of that year. Completion Dates are: 11/30/2021 through 11/30/2025.</p> <p>[NOTE: 10 boxes per year means PFNW is a defacto DOE facility bound by TPA milestones.] As a result, ALL DOH and Ecology inspections and records should be available in the TPA administrative record so that the public can see the risk in context.]</p> <p>Reference: HNF-19169 Revision 22, M-091 TRANSURANIC MIXED/MIXED LOW-LEVEL WASTE PROJECT MANAGEMENT PLAN, HNF-19169, Prepared for the U.S. Department of Energy Assistant Secretary for Environmental Management by CH2MHill Plateau Remediation Company, Richland, WA, September 2020,</p>

NOTE: Documentation is spotty and the WA Department of Health (DOH) issues letters of direction with no letter numbers. Therefore, a Quality Assurance audit of DOH should be

conducted. Documentation of variance numbers is handwritten on letters and is inconsistent and variances have become “business as usual,” thwarting the license process that was intended to protect the public and workers.

APPENDIX IV: Acronyms & Initialisms

ATG:	Allied Technology Group
CDE:	Committed Dose Equivalent
DOE:	United States Department of Energy
DOH:	Washington State Department of Health
DOL:	United States Department of Transportation
EDTA:	Eythlenediaminetetraacetic acid
EPA:	United States Environmental Protection Agency
GDP:	Gaseous Diffusion Plant
GTTC:	Greater-than-Class-C radioactive waste
HMR:	Hazardous Material Regulations
LAW:	Low-activity Waste
LLW:	Low-level Radioactive Waste
MCL:	Maximum Contaminant Level
ME&C:	Materials and Energy Corporation
MLLW:	Mixed Low-level Radioactive Waste
NRC:	United States Nuclear Regulatory Commission
OSHA:	United States Occupational Safety and Health Administration
PFP:	Plutonium Finishing Plant
PNNL:	Pacific Northwest National Laboratory
RCRA:	Resource Conservation and Recovery Act
TOC:	Total Organic Carbon
TRU:	Transuranic Waste
TS:	Total Solids
WCS:	Waste Control and Storage Services