

**PUREX STORAGE TUNNELS
ADDENDUM F
PREPAREDNESS AND PREVENTION
CHANGE CONTROL LOG**

Change Control Logs ensure that changes to this unit are performed in a methodical, controlled, coordinated, and transparent manner. Each unit addendum will have its own change control log with a modification history table. The “**Modification Number**” represents Ecology’s method for tracking the different versions of the permit. This log will serve as an up to date record of modifications and version history of the unit.

Modification History Table

Modification Date	Modification Number
09/30/2010	

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**ADDENDUM F
PREPAREDNESS AND PREVENTION**

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3 **ADDENDUM F**
4 **PREPAREDNESS AND PREVENTION**

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1 **F. PREPARDENESS PREPAREDNESS AND PREVENTION**

2 **F.1 Preparedness and Prevention Requirements**

3 This addendum discusses preparedness and prevention measures for the Plutonium Uranium Extraction
4 Facility (PUREX) Storage Tunnels. The PUREX Storage Tunnels are permitted as miscellaneous units
5 under Washington Administrative Code (WAC) 173-303-680 and comprise Closing Unit Group 25.

6 On May 9, 2017 workers discovered a portion of Tunnel Number 1 had collapsed, prompting an
7 immediate response action to protect workers and the environment. A structural evaluation revealed the
8 threat of further failure of Tunnel Number 1. An interim stabilization measure to fill Tunnel Number 1
9 with engineered grout was taken under Section J.4.5 of the PUREX Tunnels Contingency Plan and Permit
10 Condition V.25.A.1 of the Hanford Facility RCRA Permit. Grouting in Tunnel Number 1 was completed
11 in November 2017. Filling the tunnel void spaces with grout improved tunnel stability, provided
12 additional radiological protection, and increased durability while not precluding final closure actions.

13 A structural evaluation also revealed the threat of future failure of Tunnel Number 2. To protect stored
14 waste containers from potential damage caused by a tunnel failure event (e.g., puncture of a container by
15 a falling structural member) and to prevent any associated release of dangerous waste constituents to the
16 environment, an interim closure action to cover the stored waste and fill Tunnel Number 2 void spaces
17 around the waste with engineered grout is being taken. Until grouting is completed, enhanced surveillance
18 and monitoring measures have been implemented using video equipment to provide daily observation of
19 the tunnel surface.

20

21 **F.1.1 Equipment Requirements**

22 The following sections describe the internal and external communications systems and emergency
23 equipment required.

24 **F.1.1.1 Internal Communications**

25 ~~The PUREX Storage Tunnels are not occupied and personnel entry is allowed only on a very limited basis~~
26 ~~and under close supervision. Normal and emergency communications equipment (portable two-way~~
27 ~~radios) is available for use. PUREX Storage Tunnel Number 1 is filled with grout and personnel entry is~~
28 ~~not possible. Because of the threat of structural failure, personnel entry into Tunnel Number 2 is~~
29 ~~prohibited. When grouting is completed in Tunnel Number 2, the tunnel will be filled and personnel~~
30 ~~entry will not be possible. No internal communications equipment is required.~~

31

32 **F.1.1.2 External Communications**

33 External communications equipment for summoning emergency assistance from the Hanford Fire
34 Department and/or emergency response teams are provided by two-way portable radios or other devices
35 during normal surveillance activities and during interim closure activities (grouting).

36 **F.1.1.3 Emergency Equipment**

37 Equipment included in the emergency plan for the PUREX Storage Tunnels is provided in Addendum J.

38 **F.1.1.4 Water for Fire Control**

39 The fire hazard associated with the operation of the PUREX Storage Tunnels was considered to be very
40 low because of the minimal amount of combustibles stored within the tunnels and the lack of an ignition
41 source. Filling the tunnels with grout during the response action for Tunnel Number 1 and interim closure
42 for Tunnel Number 2 further isolates the waste from ignition sources and essentially eliminates the air
43 supply required to sustain a fire inside the tunnels. During the grout curing period following placement,
44 some heat of hydration is generated as a result of the curing process. However, because of the lack of
45 available air, a fire inside the dangerous waste storage area would not be sustainable.

1 In the unlikely event it is determined there is a fire in the storage area of the tunnels, the contingency plan
2 will be activated. Because of the potential of the mixed waste stored within the tunnels to leach, the use
3 of water for fire control will be avoided if possible. ~~Reductions of the air supply to the storage area by
4 isolation of the tunnel exhaust system, if operating, should permit the fire to self-extinguish.~~ Should the
5 fire continue to propagate, heavy equipment and cranes will be called to the scene to cover ~~areas of the
6 tunnels burning segments of the tunnel that might collapse.~~ Heavy equipment and cranes are readily
7 available on the Hanford Facility at all times and generally are available for deployment to the scene of an
8 emergency within 1 hour. ~~In the event that a fire resulted in the collapse of the tunnels, a recovery plan
9 will be developed in accordance with emergency response procedures included in Addendum J. The
10 recovery plan will take into consideration plans, if any, for retrieval of the waste stored within the
11 tunnel(s).~~

12 **F.1.2 Aisle Space Requirement**

13 Requirements for aisle space are not considered appropriate for the safe operation of the PUREX Storage
14 Tunnels and were not included in design documents.

15 **F.2 Preventive Procedures, Structures, and Equipment**

16 The following sections describe preventive procedures, structures, and equipment.

17 **F.2.1 Unloading Operations**

18 Operation of the PUREX Storage Tunnels does not involve the loading or unloading of dangerous waste.
19 ~~All loading and unloading operations are conducted at the PUREX Facility or other onsite units. No
20 additional waste will be received into the tunnels.~~ Therefore, the requirements of
21 [WAC 173-303-806\(4\)\(a\)\(viii\)\(A\)](#) are not applicable to the PUREX Storage Tunnels.

22 **F.2.2 Runoff/Run-On**

23 The design of the PUREX Storage Tunnels included consideration and provisions for the control of runoff
24 and run-on. Construction of both tunnels included the application of a moisture barrier before placement
25 of the soil overburden. On Tunnel Number 1, 40.8-kilogram mineral surface roofing was applied to the
26 external surfaces of the structural timbers (top and sides). The roofing material was nailed in place with
27 an overlap of approximately 10 centimeters at all joints and seams. All interior and exterior steel surfaces
28 of Tunnel Number 2 were coated with at least a 0.9-millimeter bituminous, solvent coal tar base, coating
29 compound. The coating was applied using a two coat system, with each coat not less than
30 0.45 millimeters, ensuring a total dry film thickness of not less than 0.9 millimeter.

31 The soil overburden covering the PUREX Storage Tunnels also is contoured to provide a side slope of
32 2 (horizontal) to 1 (vertical). This construction serves to divert any seasonal or unanticipated run-on
33 away from the storage area of the PUREX Storage Tunnels. ~~Equipment used to support grouting of
34 Tunnel Number 2 is designed to ensure that run-on is diverted away from the tunnel storage area.
35 Grouting is not expected to impact the exterior contouring of either tunnel; however, when grouting is
36 completed, visual observations of the side slopes will be conducted to confirm the contours remain in a
37 condition to ensure proper runoff and to divert run-on away from the tunnel storage area. For potential
38 situations where a natural catastrophic event occurs, inspections of the tunnel side slopes are conducted to
39 ensure the contours remain in a condition that ensures proper runoff and continues to divert run-on away
40 from the tunnel storage areas.~~

41 Run-on at the PUREX Storage Tunnels is controlled by the design features of the exterior of the tunnels
42 that serve to divert run-on away from the interior of the tunnels. Additionally, all waste within the tunnels
43 is stored well above the floor level on railcars. ~~The potential for run-on contacting the waste is further
44 reduced after grouting because the grout encapsulates the waste to present another physical barrier
45 between the source of potential run-on (generally precipitation outside the tunnel) and the waste. The
46 control of run-on combined with the storage of all waste above the floor elevation and grout encapsulation
47 provides adequate assurance that runoff will not occur at the PUREX Storage Tunnels and the potential~~

1 for release of dangerous waste as a result of run-on is negligible. Groundwater at the PUREX Storage
2 Tunnels is approximately 400 feet (120 meters) below ground surface.

3 For potential situations where a natural catastrophic event occurs, inspections as required by the
4 Contingency Plan will be conducted to ensure the contours remain in a condition that ensures proper
5 runoff and continues to divert run-on away from the tunnel storage areas.

6

7 **F.2.3 Water Supplies**

8 Water was supplied to the PUREX Storage Tunnels from the PUREX Plant. This water was used for the
9 sole purpose of filling the water-fillable doors should it have been determined necessary. There are no
10 other sources or uses of water at the PUREX Storage Tunnels. The line that supplied water to the
11 PUREX Storage Tunnels was blanked and emptied during deactivation activities. The doors will not be
12 refilled. In the future, a temporary source of water would be provided for filling the water fillable door.

13 **F.2.4 Equipment and Power Failures**

14 The procedures, structures, and equipment used to mitigate the effects of equipment failure and power
15 outage are described in the following sections.

16 **F.2.4.1 Mitigation of the Effects of Equipment Failure**

17 Maintaining safe storage of materials in the PUREX Storage Tunnels is not contingent on continued
18 operation of equipment. Waste in Tunnel Number 1 is encapsulated with grout and requires no operating
19 equipment. When Tunnel Number 2 grouting is completed, waste will also be encapsulated with no
20 operating equipment required. Prior to and during grouting operations, the only operating equipment
21 associated with Tunnel Number 2 is for video surveillance and for grout injection. In-person observation
22 of the tunnel surface can replace video surveillance until equipment can be repaired or replaced.
23 If equipment used in the grouting process fails, grouting can be temporarily halted without impact to safe
24 storage of waste until the equipment is repaired or replaced. The operable equipment associated with the
25 PUREX Storage Tunnels were the remote controlled locomotive or waste placement and removal
26 equipment, the railcars, and the water fillable door and ventilation system for both tunnels. No operable
27 equipment is associated with either tunnel, as these tunnels have been sealed and may no longer receive
28 dangerous waste. Backup or redundant systems are not provided for either tunnel, as failure of the
29 equipment would not have the potential to result in a release of dangerous waste to the environment.
30 There are no hazards associated with tunnel equipment failure.

31 **F.2.4.2 Mitigation of the Effects of Power Failure**

32 Maintaining safe storage of materials in the PUREX Storage Tunnels is not contingent on continued
33 supply of electrical power. Waste in Tunnel Number 1 is encapsulated with grout and safe storage
34 requires no electrical power. When Tunnel Number 2 grouting is completed, waste will also be
35 encapsulated with no electrical power required. Prior to and during grouting operations, the only powered
36 equipment associated with Tunnel Number 2 is for video surveillance and for grout injection. Equipment
37 is powered using portable generators and batteries. If necessary, in-person observation of the tunnel
38 surface can replace video surveillance and grouting can be temporarily halted without impact to safe
39 storage of waste until power can be restored. Electrical power is required to operate the water fillable
40 door and the ventilation fan in both tunnels. Backup or redundant ventilation systems are not provided as
41 the system is operated only to maintain air balance and provide secondary control of mixed waste
42 airborne particulate. Power failure to either tunnel would not have the potential to result in the release of
43 dangerous waste or mixed waste to the environment. There are no hazards associated with the shutdown
44 of the tunnel ventilation systems due to loss of electrical power.

1 **F.2.5 Personnel Protection Equipment**

2 PUREX Storage Tunnel Number 1 is filled with grout, and personnel entry is not possible. Because of
3 the threat of structural failure, personnel entry into Tunnel Number 2 is prohibited. After grouting is
4 completed in Tunnel Number 2, the tunnel will be filled and personnel entry will not be possible. As a
5 result, no special protective clothing or respiratory protection is required to protect personnel from the
6 stored waste.

7 During grouting operations, personnel protection equipment will be determined by work control
8 documents. Personnel are trained and qualified in using protective equipment.

9 ~~Personnel entering the PUREX Storage Tunnels are required to wear special protective clothing and~~
10 ~~respiratory protection at all times because of the material stored in the PUREX Storage Tunnels.~~
11 ~~Protective clothing and full face respirators with filters are considered to be sufficient protection from the~~
12 ~~dangerous waste stored within the PUREX Storage Tunnels. Personnel are trained and qualified in using~~
13 ~~the protective equipment and are checked routinely for mask fit.~~

14 **F.3 Prevention of Reaction of Ignitable, Reactive, and/or Incompatible Waste**

15 There is no reactive or incompatible waste stored in the PUREX Storage Tunnels. The only ignitable
16 waste stored within the tunnels is silver nitrate, an oxidizer. The silver nitrate is present within the silver
17 reactors (deposited on unglazed ceramic packing) stored in Tunnel Number 2.

18 Although silver nitrate exhibits the characteristic of ignitability, it is contained within stainless steel
19 vessels, stored on railcars above the floor level, and isolated from combustible materials and other
20 dangerous waste. Grout fill added to Tunnel Number 2 will be compatible with the ignitable waste
21 although it is unlikely to directly contact the waste because the silver nitrate is contained within stainless
22 steel vessels. Additional measures to prevent reaction of the ignitable waste are not considered necessary
23 before, during, or after grouting.

24 **F.4 Control of Releases to the Atmosphere**

25 Releases to the atmosphere are not a concern from Tunnel Number 1 because the waste is encapsulated by
26 the grout fill. When Tunnel Number 2 is grouted, the waste will be similarly encapsulated. During
27 grouting operations at Tunnel Number 2, air expelled from the tunnel will pass through high-efficiency
28 particulate air (HEPA) filters as described in Chapter 11 to ensure that releases to the atmosphere are not
29 a concern.

30