

FINAL

Preliminary Assessment Report

Christmas Valley Radar Site

Christmas Valley, Oregon

Perfluorooctane-Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites
ARNG Installations, Nationwide

May 2020

Prepared for:



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Contract Number: W912DR-12-D-0014
Delivery Order: W912DR17F0192

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Acronyms and Abbreviations

AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AOI	Area of Interest
ARNG	Army National Guard
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSM	conceptual site model
°F	degrees Fahrenheit
FTA	fire training area
ORARNG	Oregon Army National Guard
PA	Preliminary Assessment
PFAS	per- and poly-fluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PIL	Pollutant Initiation Level
SI	Site Inspection
US	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency

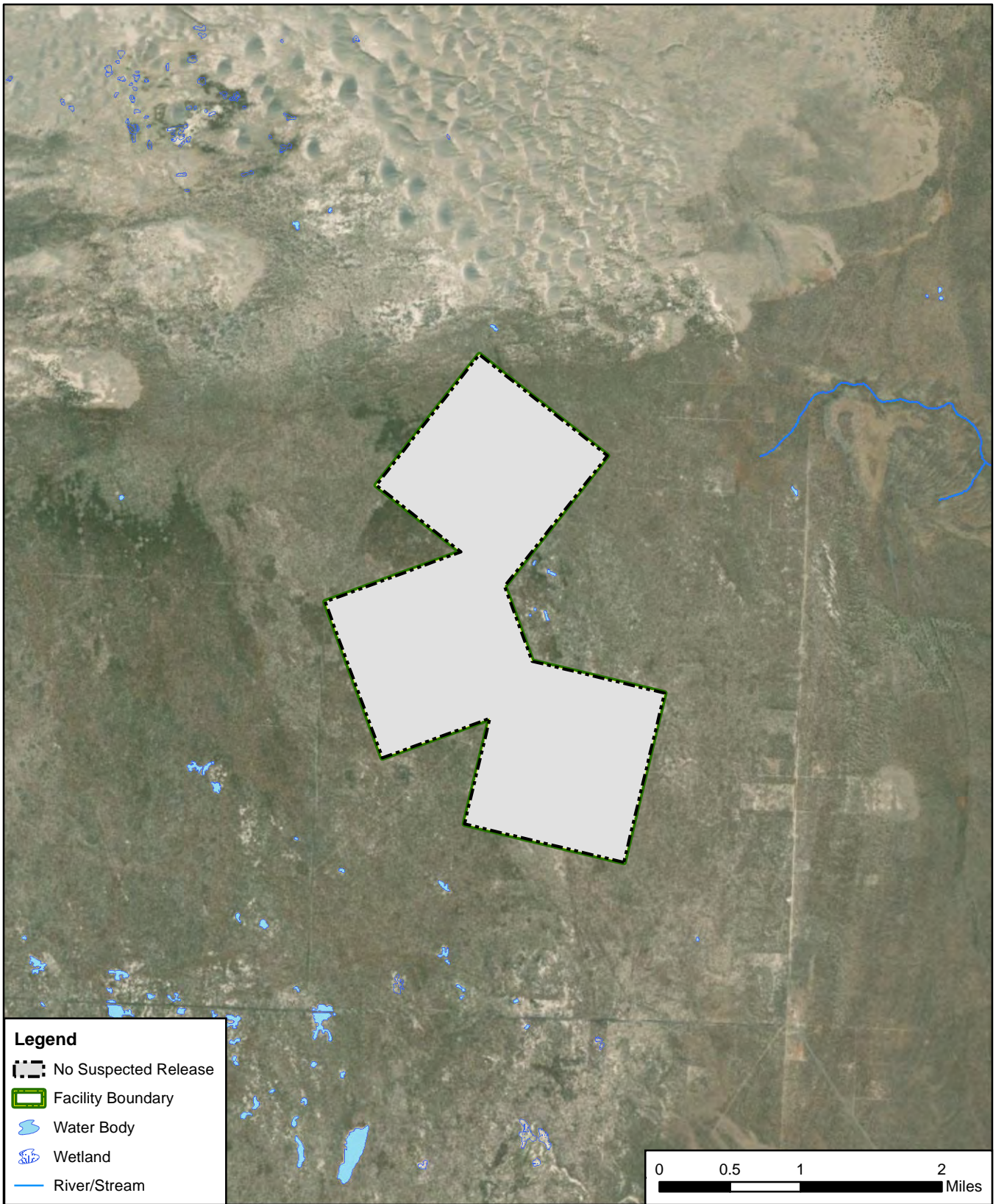
Executive Summary

The United States Army Corps of Engineers Baltimore District on behalf of the Army National Guard (ARNG)-Installations & Environment Division, Cleanup Branch contracted AECOM Technical Services, Inc. (AECOM) to perform *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide*. The ARNG is assessing potential effects on human health related to processes at facilities that used per- and poly-fluoroalkyl substances (PFAS), primarily in the form of aqueous film forming foam released as part of firefighting activities, although other PFAS sources are possible.

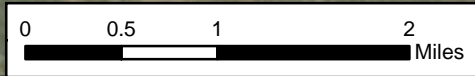
AECOM completed a PA for PFAS at the Christmas Valley Radar Site in Christmas Valley, Oregon, to assess potential PFAS release areas and exposure pathways to receptors. The performance of this PA included the following tasks:

- Reviewed data resources to obtain information relevant to suspected PFAS releases
- Conducted a site visit on 3 October 2018
- Interviewed current Oregon ARNG personnel during the site visit as well as environmental managers and operations staff
- Completed visual site inspections to confirm absence of PFAS-related activities and documented with photographs

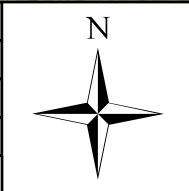
No Area(s) of Interest related to potential PFAS use, release, or storage were identified at Christmas Valley during the PA (**Figure ES-1**). Based on facility history and interviews with various personnel, there is no potential for exposure to PFAS contamination in surface soil, subsurface soil, groundwater, surface water, and sediment.



Legend	
	No Suspected Release
	Facility Boundary
	Water Body
	Wetland
	River/Stream



CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Christmas Valley Radar Site, OR			
REVISED	3/15/2019	GIS BY	MS	3/15/2019
SCALE	1:63,360	CHK BY	TK	3/15/2019
		PM	RG	3/15/2019



Summary of Findings	
 12420 Milestone Center Drive Germantown, MD 20876	Figure ES-1

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1. Introduction

1.1 Authority and Purpose

The United States (US) Army Corps of Engineers (USACE) Baltimore District on behalf of the Army National Guard (ARNG)-Installations & Environment Division, Cleanup Branch contracted AECOM Technical Services, Inc. (AECOM) to perform *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide* under Contract Number W912DR-12-D-0014, Task Order W912DR17F0192, issued 11 August 2017, and Modification 01 issued 30 September 2017. The ARNG is assessing potential effects on human health related to processes at facilities that used per- and poly-fluoroalkyl substances (PFAS), primarily in the form of aqueous film forming foam (AFFF) released as part of firefighting activities, although other PFAS sources are possible. In addition, the ARNG is assessing businesses or operations adjacent to the ARNG facility (not under the control of ARNG) that could potentially be responsible for a PFAS release.

PFAS are classified as emerging environmental contaminants that are garnering increasing regulatory interest due to their potential risks to human health and the environment. PFAS formulations contain highly diverse mixtures of compounds. Thus, the fate of PFAS compounds in the environment varies. The regulatory framework at both federal and state levels continues to evolve. The US Environmental Protection Agency (USEPA) issued Drinking Water Health Advisories for PFOA and PFOS in May 2016, but there are currently no promulgated national standards regulating PFAS in drinking water. In the absence of federal maximum contaminant levels, some states have adopted their own drinking water standards for PFAS. The Oregon Department of Environmental Quality has set Pollutant Initiation Levels (PILs) for PFAS/PFOA, which are not water quality standards (ORDEQ, 2017). According to OAR 340-045-0100, only facilities that operate under National Pollution Discharge Elimination System and Water Pollution Control Facility permits in Oregon are required to analyze effluent for PFAS/PFOA and report concentrations that exceed the PILs.

This report presents findings of a PA for PFAS at the Christmas Valley Radar Site, formally known as the Over the Horizon Backscatter Site, in Christmas Valley, Oregon, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations Part 300), and USACE requirements and guidance.

This PA documents potential locations where PFAS may have been used, stored, or released into the environment at Christmas Valley Radar Site. The term PFAS will be used throughout this report to encompass all PFAS chemicals being evaluated, including PFOS and PFOA, which are key components of AFFF.

1.2 Preliminary Assessment Methods

The performance of this PA included the following tasks:

- Reviewed data resources to obtain information relevant to suspected PFAS releases
- Conducted a site visit on 3 October 2018
- Interviewed current Oregon ARNG (ORARNG) personnel during the site visit as well as environmental managers and operations staff
- Completed visual site inspections to confirm absence of PFAS-related activities and documented with photographs

1.3 Report Organization

This report has been prepared in accordance with the USEPA *Guidance for Performing Preliminary Assessments under CERCLA* (USEPA, 1991). The report sections and descriptions of each are:

- **Section 1 – Introduction:** identifies the project purpose and authority and describes the facility location, environmental setting, and methods used to complete the PA
- **Section 2 – Fire Training Areas:** describes the fire training areas (FTAs) at the facility identified during the site visit
- **Section 3 – Non-Fire Training Areas:** describes other locations of PFAS releases at the facility identified during the site visit
- **Section 4 – Emergency Response Areas:** describes areas of AFFF release at the facility, specifically in response to emergency situations
- **Section 5 – Adjacent Sources:** describes sources of PFAS release adjacent to the facility that are not under the control of ARNG
- **Section 6 – Conceptual Site Model:** describes the pathways of PFAS transport and receptors for the Areas of Interest (AOIs) and the facility
- **Section 7 – Conclusions:** summarizes the data findings and presents the conclusions of the PA
- **Section 8 – References:** provides the references used to develop this document
- **Appendix A – Data Resources**
- **Appendix B – Preliminary Assessment Documentation**
- **Appendix C – Photographic Log**

1.4 Facility Location and Description

Christmas Valley Radar Site is on Christmas Valley Highway (**Figure 1-1**) in Lake County, Christmas Valley, Oregon. Situated in the remote part of Central Oregon, the facility is 14 miles east to the nearest small town of Christmas Valley, three miles south of County Highway 5-14E, and 1 mile north of Christmas Valley Highway. The land surrounding the facility is public rangeland managed by US Bureau of Land Management including the Fossil Lake, Christmas Valley Sand Dunes, and Lost Forest Research Natural Area, all just north of the Site. The communities of Fort Rock, Silver Lake, Summer Lake, Hampton, and Wagontire lie within 40 miles of the facility.

The entire facility is formally known as the Over-the-Horizon Backscatter Radar Site, occupies 2,622 acres of undeveloped public land which was withdrawn from public use in 1989 and previously managed by the Air Force. ORARNG was granted a deed in 2010 for 326 acres of land which includes the former operations buildings, storage areas, and outside training areas (USAFCC, 2005 & 2006). The facility is split into three parcels of equal size, measuring approximately one square mile each, and includes perimeter roads around each parcel. The three parcels lie in an arc shape, with the concave center facing to the east. A 100-foot wide strip of land was established as an access road from the facility to Christmas Valley Highway with a wooden security fence enclosing the entire site.

Christmas Valley Radar Site was developed in the early 1970s to provide all-altitude, long-range surveillance of aerial approaches to the US. By using the ionosphere to refract outgoing radar waves and return signals, the radar systems could detect and track targets that would otherwise be hidden by the curvature of the earth. Each system requires a transmitter site and a receiver

site. The Christmas Valley radar system was built by General Electric beginning in 1986 and the Air Force accepted control of the system in December 1990.

The sites were operated on a 24-hour basis, from November 1990 to January 1991. Following a January 1991 decision to reduce operations, caretaker status was achieved by the end of September 1991 (USAF, 1991). In 2005, the Air Force initiated closure of the Christmas Valley Radar Site by removing all external radar equipment, fences, and computers (USAFCC, 2005 & 2006). Following closure, facility ownership was transferred to the ORARNG. The facility has remained closed and abandoned since ORARNG took over the property in 2010 (**Appendix A**).

1.5 Facility Environmental Setting

Christmas Valley Radar Site is on the relatively flat, dry bed of a large late Pleistocene lake, within the Fort Rock Basin. The Fort Rock Basin stretches from the Cascade Mountain Range in the west to the Owyhee Uplands in the east. The elevation of the facility is approximately 4,300 feet above mean sea level. The site is relatively flat, with only a 4 foot increase in elevation one half mile to the southeast. The area surrounding the radar site is all undeveloped public land that is vegetated by native brush and grasses. There are no trees, surface water, or other terrain features.

1.5.1 Geology

The Fort Rock Basin, part of the greater Oregon Closed Lakes Basin, is made up of Pliocene and Pleistocene age rocks. Much of the basin floor is underlain at shallow depths by the Fort Rock Formation, which is comprised of pyroclastics, diatomite, basaltic agglomerate, and basaltic lava rock types. The facility is situated in the Oregon's geologic province of the High Lava Plains. This area has some of the most recent faulting and youngest volcanic activity in Oregon. No faulting is visible around the facility; however, many northwest trending faults are present in the surrounding hills that enclose the basin. A few miles to the north and east of the facility are large areas of dune sand composed of ash pumice and rock forming minerals, resulting from the eruption of Mount Mazama 7,700 years ago (USGS, 2002). Also found in the area are volcanic parent material consisting of Lacustrine and ash deposits that were ejected from the volcanic eruption.

Formed from silty lake sediments, Christmas Valley is dominated by the Flagstaff soil series, which consist of poorly drained, very fine silt loam over silty clay loam, sodic soils, and underlying hardpans. The surface layer consists of an ashy silt loam, approximately 4 inches thick at 0 to 1 percent slopes, with underlying subsoil of ashy silty clay loam, approximately 8 inches thick. A dense hardpan occurs at a depth of about 14 inches (USDA, 2006).

A small portion of the facility is covered by the Bonnick soil series, consisting of somewhat excessively drained soils formed in gravelly loamy sand weathered from volcanic rocks basalts. Typically, the surface layer consists of very gravelly ashy loamy sand, about 7 inches thick and 0 to 10 percent slope, whereas the subsoil consists of gravelly loamy sand, approximately 13 inches thick. Soils beneath that depth consist of gravelly loamy sand and gravelly coarse sand, to depths over 40 inches. A hardpan layer is present below a depth of 40 inches (USDA, 2006).

1.5.2 Hydrogeology

Christmas Valley Radar Site is on the Pacific Northwest basaltic-rock aquifer system, which is an igneous and metamorphic rock aquifer. Containing unconsolidated deposits of sand and gravel, the aquifer is the most productive and widespread aquifer in Idaho, Oregon, and Washington. Aquifer recharge is through inflow from fractures in bedrock. Discharge is through withdrawals from wells. This aquifer system is a major source of domestic water for local residents. Drinking

water for the town of Christmas Valley is supplied by Christmas Valley Domestic Water Supply. Drinking water within the Christmas Valley Radar Site was historically supplied by four on-site wells; however, the drinking water treatment system for the facility is no longer active. In 2017, Tetra Tech completed drinking water sampling at the facility to evaluate the potential presence of PFAS; PFOA and PFOS were not detected above laboratory method reporting limits in these samples. Currently, all four drinking water wells at this facility are inoperable.

Oregon Water Resources Department maintains State Observation Wells throughout the state of Oregon. Multiple wells are located within Lake County, three of them within 10 miles of the center of the facility. State Wells, at depths of less than 400 feet, include Lake 1210 located 3.5 miles southeast, Lake 673 located 7.5 miles northwest, and Lake 284 located 8.5 miles west of the facility. Groundwater flow direction is unknown; however, depths to groundwater in these surrounding wells vary between 24 and 36 feet below ground surface (Shaw, 2010). This soil has a water table at a depth of 24 to 40 inches (USDA, 2006). According to the Oregon Water Resources Department (OWRD), no potable water wells are currently active at Christmas Valley Radar Site; however, active domestic wells and monitoring wells exist within four miles of the facility (**Figure 1-2**). Based on the USEPA Unregulated Contaminant Monitoring Rule 3 data, it was indicated that no PFAS was detected in a public water system above the USEPA Health Advisory level within 20 miles of the facility.

1.5.3 Hydrology

No perennial or ephemeral streams traverse the Christmas Valley Radar Site, nor are surface drainage patterns apparent within several miles (**Figure 1-3**). According to the USGS, several small wetlands exist throughout the facility; however, based on information obtained during interviews, historical document review, aerial photography, and the low annual precipitation, these wetlands are usually dry and rarely contain water.

The flat terrain results in very slow runoff and a low water erosion hazard. The area is saturated by dry lakebeds. The closest surface water is a lacustrine system of wetlands that sits in a depression 9 miles from the facility. The surface water is present for brief periods during the growing season or rain events, but the water table lies well below the ground surface for most of the season. Regional surface water features include Lake Albert and Lake Summer, part of the Oregon Closed Lake Basin, south of the facility.

1.5.4 Climate

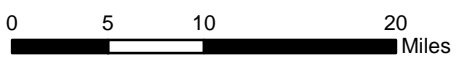
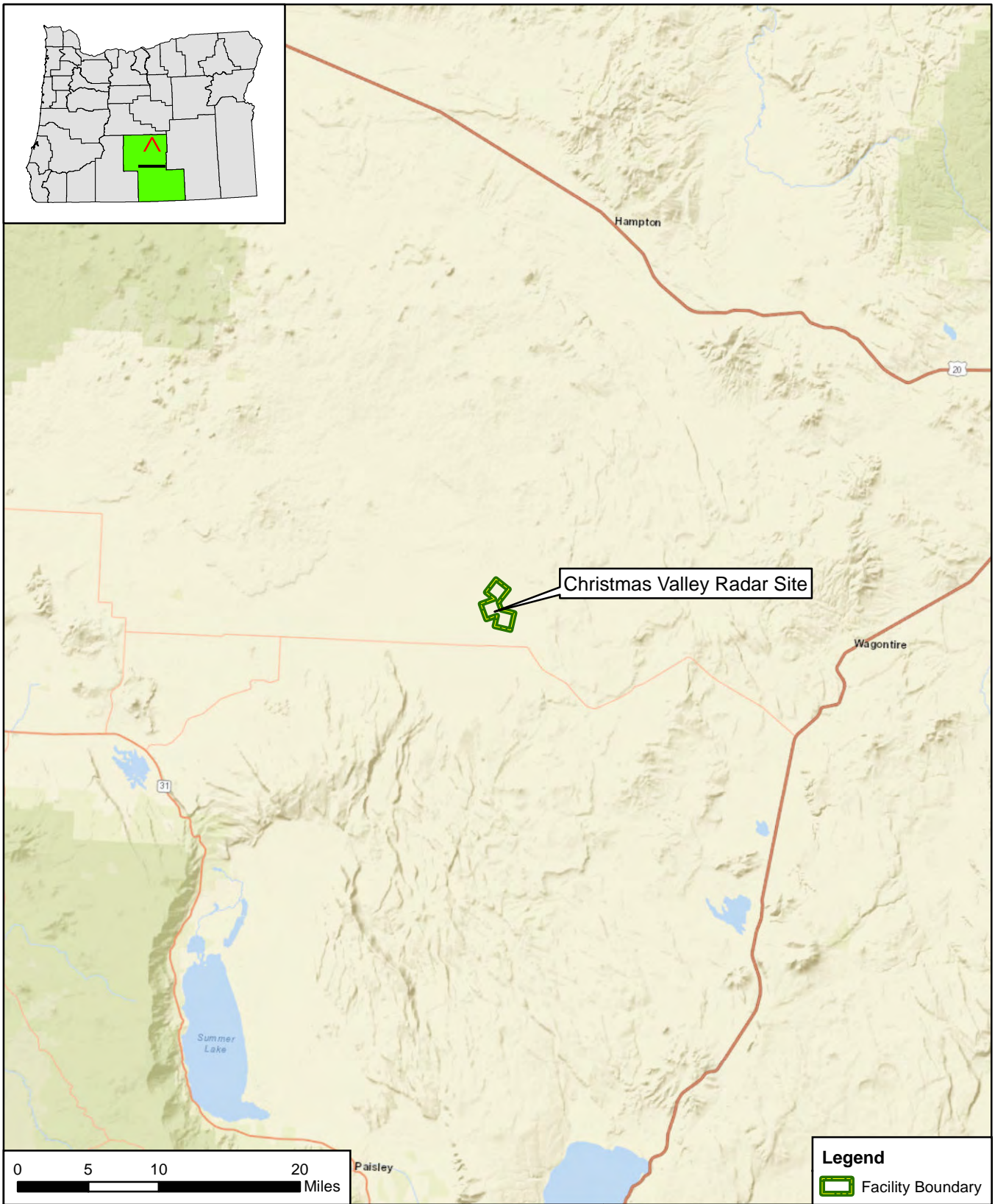
Christmas Valley Radar Site is situated in the High Lava Plains physiographic province of central Oregon. Well-preserved in a high desert climate, volcanic features stand out about the plains. The region experiences hot and dry summers, very cold nights, and winters with snow. The yearly average temperature is 71 degrees Fahrenheit (°F). The high temperature in summers reach above 90°F and winter temperatures reach down to 20°F, respectively (NOAA, 2017). Average rainfall is about 9 inches and snow is about 15 inches per year. According to the Köppen Climate Classification system, Christmas Valley has a warm-summer Mediterranean climate.

Winds generally are of constant, mild velocities originating from the south-southwest. While some gusting does occur during the spring and summer months, most of the region remains relatively dust-free due to the thick growth of low sagebrush. The ashy soil however is affected by moderate wind erosion.

1.5.5 Current and Future Land Use

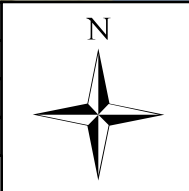
The ORARNG obtained the land deed for Christmas Valley Radar Site in 2010 from the USAF. The facility has been closed and abandoned throughout the duration of ORARNG ownership. The

deed allows for ORARNG to undertake emergency management response uses and training exercises; however, according to interviews, neither of these activities have occurred at the facility during ORARNG operational history. Reasonably anticipated future land use is not expected to change from current land use.



Legend
 Facility Boundary

CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Christmas Valley Radar Site, OR			
REVISED	3/14/2019	GIS BY	MS	3/14/2019
SCALE	1:633,600	CHK BY	MB	3/14/2019
Base Map: Sources: Esri, HERE, DeLorme, USGS, Intermap, Increment P Corp., NRCAN, Esri Japan, METI,		PM	RG	3/14/2019

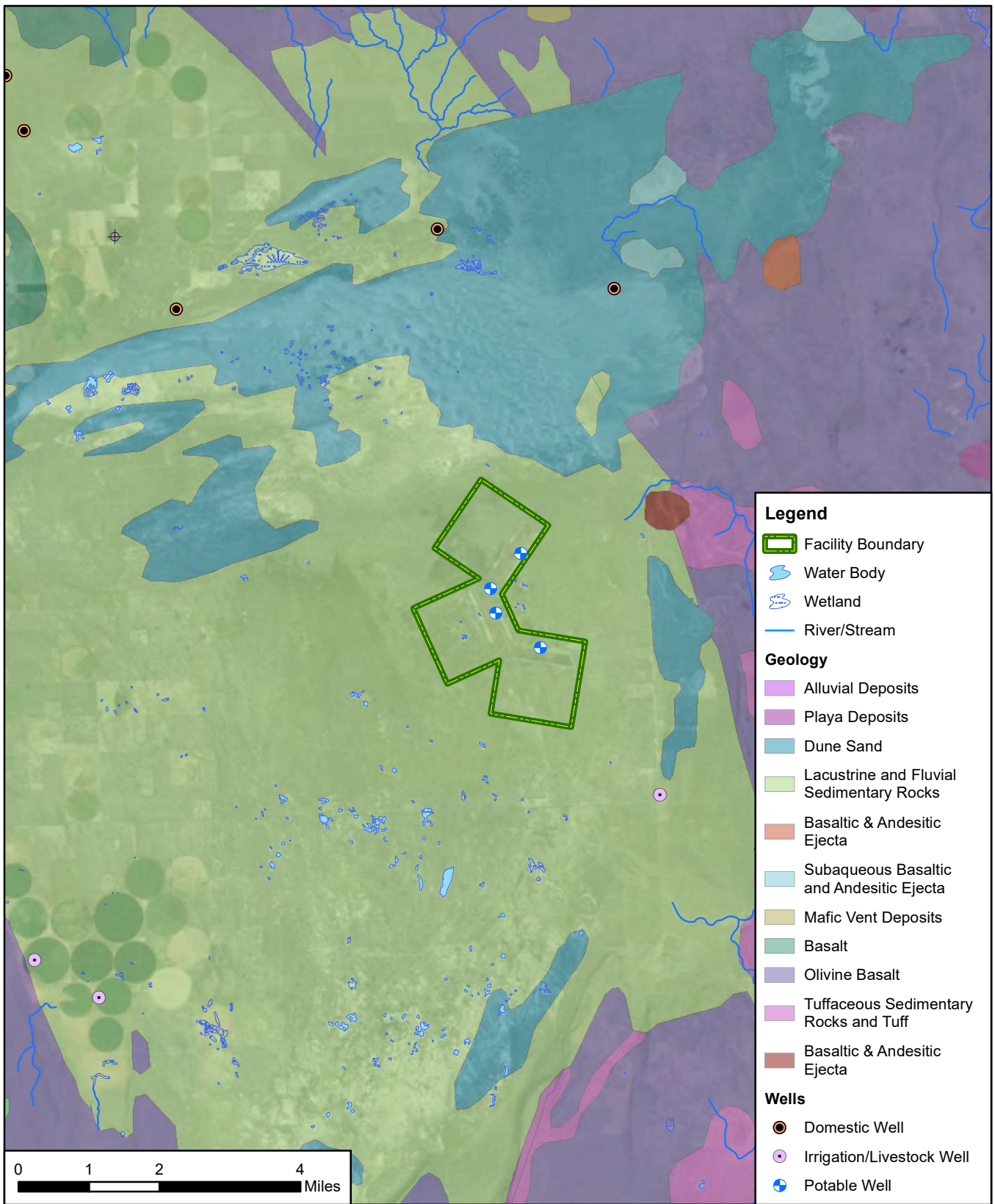


Facility Location

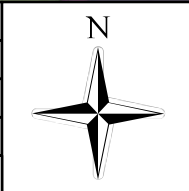
AECOM
 12420 Milestone Center Drive
 Germantown, MD 20876

Figure 1-1

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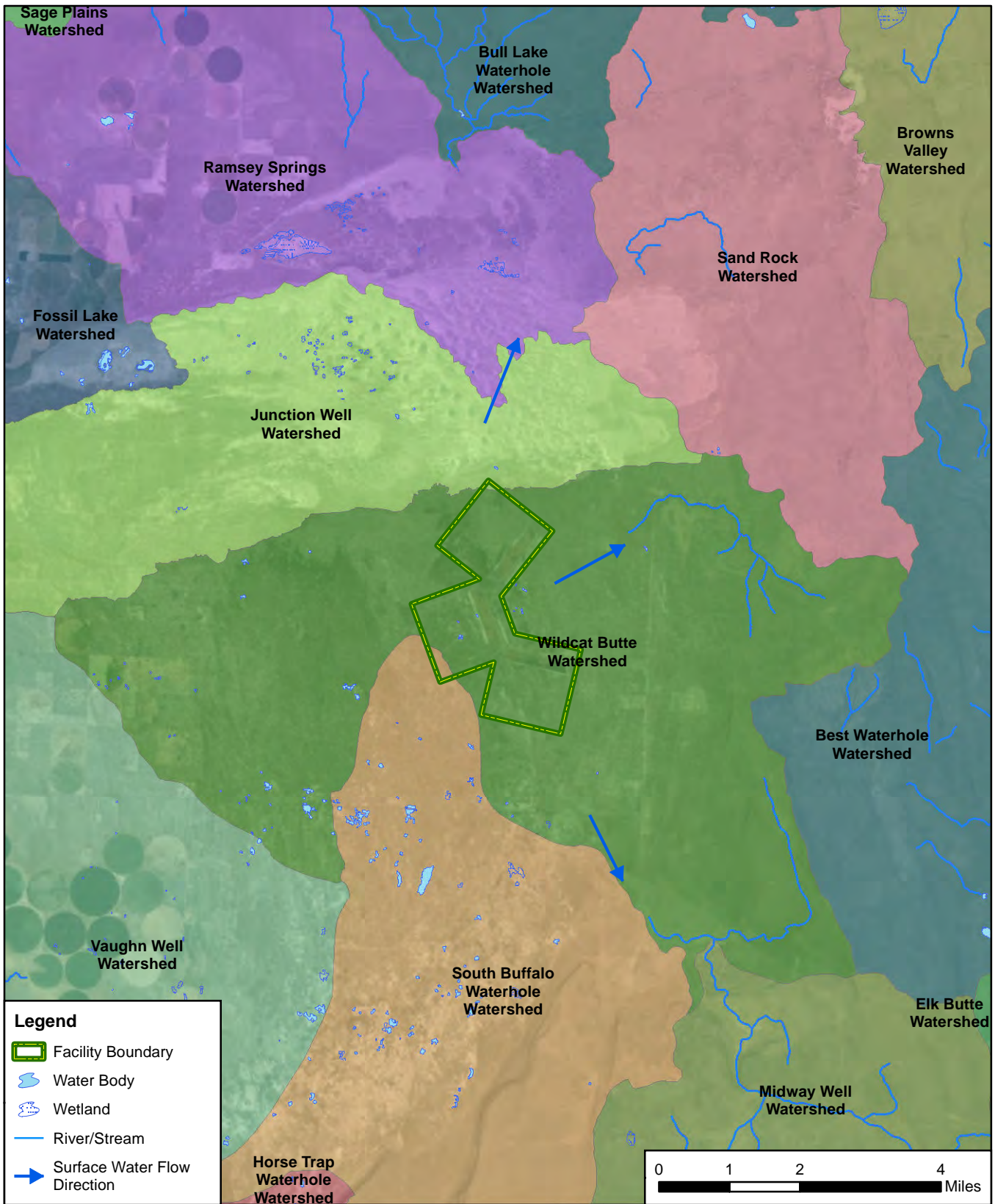


CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Christmas Valley Radar Site, OR			
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SCALE	1:126,720	CHK BY	TK	11/7/2019
		PM	RG	11/7/2019



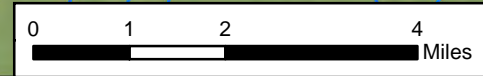
Groundwater Features	
AECOM	Figure 1-2
12420 Milestone Center Drive Germantown, MD 20876	

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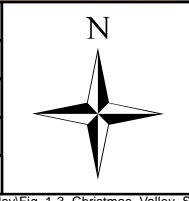


Legend

- Facility Boundary
- Water Body
- Wetland
- River/Stream
- Surface Water Flow Direction



CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Christmas Valley Radar Site, OR			
REVISED	3/15/2019	GIS BY	MS	3/15/2019
SCALE	1:126,720	CHK BY	TK	3/15/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,	PM	RG	3/15/2019	



Surface Water Features

12420 Milestone Center Drive
Germantown, MD 20876

Figure 1-3

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2. Fire Training Areas

No FTAs were identified at the Christmas Valley Radar Site during the PA through interviews or Environmental Data Resource Reports. The facility has been abandoned since ORARNG took control in 2010. There are no full-time staff that are located at this facility and no fire training activities have occurred during ORARNG operational history at this facility.

3. Non-Fire Training Areas

No non-FTAs were identified at Christmas Valley Radar Site. During the PA, interviewees indicated that AFFF was not used, stored and/or released at the facility at any time during ORARNG use and occupancy of the property (**Appendix B**). Additionally, the fire suppression systems previously present at the facility included only halon or water and did not include AFFF or any other PFAS-containing materials.

4. Emergency Response Areas

No emergency response areas were identified within the Christmas Valley facility during the PA through interviews or Environmental Data Resource Reports. Any emergency response services would be handled by the local Christmas Valley Rural Fire Protection District.

5. Adjacent Off-Facility Sources

No potential off-facility sources of PFAS adjacent to the Christmas Valley Radar Site, not under the control of the ORARNG, were identified during the PA through interviews, Environmental Data Resource Reports, or historical document review.

6. Conceptual Site Model

Based on the PA findings from interviews with facility personnel, on-facility observations, review of Environmental Data Resource reports, and online research, no use, release, or storage areas were identified as AOIs at the Christmas Valley Radar Site and no nearby off-facility sources were identified during this PA.

A conceptual site model (CSM) identifies three components necessary for potentially complete exposure pathways related to a site: (1) source, (2) pathway, and (3) receptor. If any of these elements are missing, the pathway is considered incomplete. However, since no PFAS sources were identified to originate at the Christmas Valley Radar Site or from activities associated with the facility, CSMs were not developed.

7. Conclusions

This report presents a summary of available information gathered during the PA on the potential use, storage, or release of AFFF and other PFAS-related activities at Christmas Valley Radar Site (see **Figure 7-1**). The PA findings are based on the information presented in **Appendix A** and **Appendix B**.

7.1 Findings

Based on information obtained during interviews conducted with facility personnel, facility observations, and reviewed documentation, it is confirmed that AFFF has never been stored, used, or released at the Christmas Valley Radar Site since ORARNG took control of the facility; therefore, no AOIs related to PFAS releases were identified. No information was available pertaining to potential historic PFAS-related releases prior to ORARNG taking control of the property.

Interviewee knowledge from ORARNG personnel at the facility and from the Oregon Military Department dates to at least 2010 when the facility came under control of the ORARNG. Evidence obtained during the PA supports that current or former ARNG activities have not contributed to any potential PFAS contamination in soil, groundwater, surface water, or sediment.

7.2 Uncertainties

A number of information sources were investigated during this PA to determine the potential for PFAS-containing materials to have been stored, used, or released at the facility. Historically, documentation of PFAS use was not required because PFAS were considered benign. Therefore, records were not typically kept by the facility or available during the PA on the disposition and use of PFAS in training, firefighting, or other non-traditional activities.

The conclusions of this PA are predominantly based on the information provided during interviews with personnel who had direct knowledge of PFAS use at the facility. Sometimes the provided information was vague or conflicted with other sources. Gathered information has a degree of uncertainty due to the absence of written documentation, the limited number of personnel with direct knowledge due to staffing changes, the time passed since PFAS was first used (1969 to present), and a reliance on personal recollection. Inaccuracies may arise in potential PFAS release locations, dates of release, volume of releases, and the concentration of AFFF used. There is also a possibility the PA has missed a source of PFAS, as the science of how PFAS may enter the environment continually evolves.

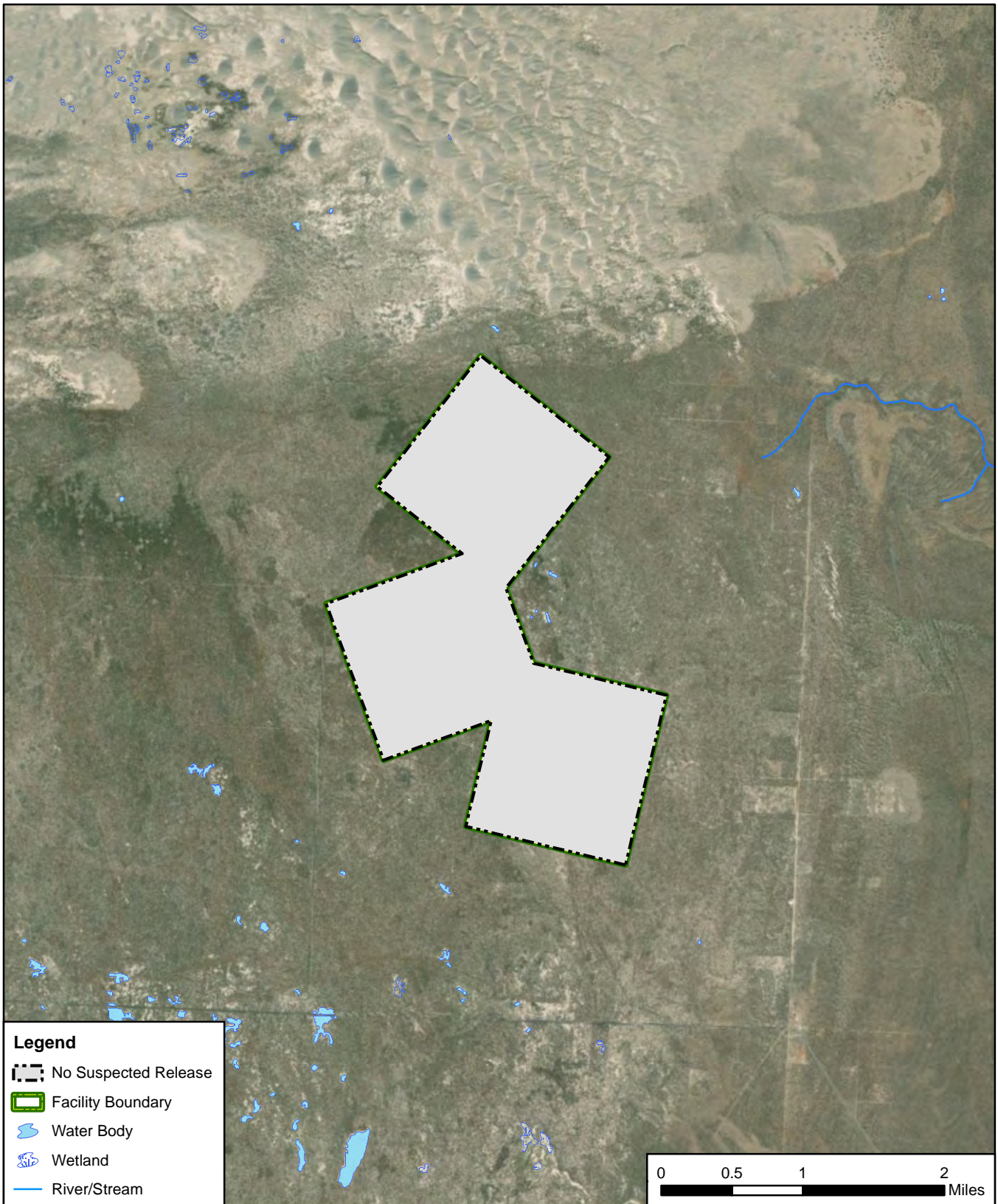
In order to minimize the level of uncertainty, readily available data regarding the use and storage of PFAS were reviewed, current personnel were interviewed, multiple persons were interviewed for the same potential source area, and potential source areas were visually inspected. The uncertainties associated with the PA are summarized in **Table 7-1**.

Table 7-1: Uncertainties






Area	Source of Uncertainty
Christmas Valley Radar Site	Facility knowledge relating to potential use, storage, or release of AFFF or other PFAS-containing materials before ORARNG took control in 2010 is limited.

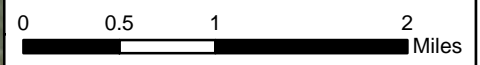
7.3 Potential Future Actions

Based on the documented absence (2010-present) of the use, storage, or release of PFAS-containing materials at Christmas Valley Radar Site, no AOIs were identified during the PA. Evidence does not indicate that current or former ARNG activities contributed PFAS contamination to soil, groundwater, surface water, or sediment at the facility or adjacent areas. Christmas Valley Radar Site will not move forward in the CERCLA process.




Legend

-  No Suspected Release
-  Facility Boundary
-  Water Body
-  Wetland
-  River/Stream



CLIENT		ARNG		
NOTES Preliminary Assessment for PFAS at Christmas Valley Radar Site, OR				
REVISED	3/15/2019	GIS BY	MS	3/15/2019
SCALE	1:63,360	CHK BY	TK	3/15/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	3/15/2019



Summary of Findings	
 12420 Milestone Center Drive Germantown, MD 20876	Figure 7-1

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8. References

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Appendix A

Data Resources

Data Resources will be provided separately on CD. Data Resources for Christmas Valley Radar Site include:

Christmas Valley Leases, Licenses, and Permits

- 2009 Quitclaim Deed between the United State General Services Administration and the State of Oregon Military Department

Previous Investigations Completed at the Christmas Valley

- 2005 Final Environmental Assessment for Equipment Removal at Over-The-Horizon Backscatter Radar – West Coast Facilities
- 2006 Environmental Baseline Survey for Over-The-Horizon Backscatter (OTH-B) Site at Christmas Valley, Oregon, Preliminary Final
- 2010 Phase I Environmental Baseline Survey Over-The-Horizon Backscatter Radar Site Christmas Valley, Oregon

Christmas Valley Installation Maps

- 2018 Facility Map

Christmas Valley EDR Report

- 2019 Christmas Valley Environmental Data Resource Report

Appendix B

Preliminary Assessment Documentation

Appendix B.1

Interview Records

PA Interview Questionnaire - Environmental Manager

Facility: Christmas Valley
Interviewer: [Redacted]
Date/Time: 9/10/18

Interviewee: [Redacted]	Can your name/role be used in the PA Report? <input checked="" type="radio"/> Y or <input type="radio"/> N
Title: Env. Manager/Cultural Resources Manager	Can you recommend anyone we can interview? <input checked="" type="radio"/> Y or <input type="radio"/> N
Phone Number: [Redacted]	
Email: [Redacted]	

1. Roles or activities with the Facility/years working at the Facility.

[Redacted] OMD Environmental Manager (~15 years)
 [Redacted] OMD Cultural Resources Manager (~15 years)

2. Where can I find previous facility ownership information?

Will send

3. What can you tell us about the history of PFAS including aqueous film forming foam (AFFF) at the Facility? Was it used for any of the following activities, circle all that apply and indicate years of active use, if known? Identify these locations on a facility map.

- Maintenance
- Fire Training Areas
- Firefighting (Active Fire)
- Crash
- Fire Suppression Systems (Hangers/Dining Facilities)
- Fire Protection at Fueling Stations
- Non-Technical/Recreational/ Pest Management
- Metals Plating Facility
- Waterproofing Uniforms (Laundry Facilities)
- Other

} None; past or present

4. Fill out CSM Information worksheet with the Environmental Manager. OK

5. Are any current buildings constructed with AFFF dispensing systems or fire suppression systems? What are the AFFF/suppression system test requirements? What is the frequency of testing the AFFF/suppression system? Do you have "As Built" drawings for the buildings?

No

PA Interview Questionnaire - Environmental Manager

Facility: _____
Interviewer: _____
Date/Time: _____

6. Are fire suppression systems currently charged with AFFF or have they been retrofitted for use of high expansion foam? If retrofitted, when was that done?

NO

7. How is AFFF procured? Do you have an inventory/procurement system that tracks use?

NO

8. What type of AFFF has been/is being used (3%, 6%, Mil Spec Mil-F-24385, High Expansion)? Manufacturer (3M, Dupont, Ansul, National Foam, Angus, Chemguard, Buckeye, Fire Service Plus)?

None

9. Where is the AFFF stored? How is it stored (tanks, 55-gallon drums, 5-gallon buckets)? What size are the storage tanks? Is the AFFF stored as a mixed solution (3% or 6%) or concentrated material?

N/A

10. How many FTAs are/were on this facility and where are they? Locate on a map. How many FTAs are active and inactive? For inactive FTAs, when was the last time that fire training using AFFF was conducted at them?

None

PA Interview Questionnaire - Environmental Manager

Facility: _____
Interviewer: _____
Date/Time: _____

11. When a release of AFFF occurs during a fire training exercise, now and in the past, how is the AFFF cleaned and disposed of? Were retention ponds built to store discharged AFFF? Was the AFFF trickled to the sanitary sewer or left in the pond to infiltrate?

N/A

12. Can you recall specific times when city, county, and/or state personnel came on-post for training? If so, please state which state/county agency or military entity? Do you have any records, including photographs to share with us?

NO

13. Did military routinely or occasionally fire train off-post? List the units that you can recall used/trained at various areas.

NO

14. Did individual units come with their own safety personnel, did they also bring their own AFFF? Was training with AFFF part of these exercises? How were emergencies handled under these circumstances?

NO

15. Are there specific emergency response incident reports (i.e., aircraft or vehicle crash sites and fires)? If so, may we please copy these reports? Who (entity) was the responder?

NO

PA Interview Questionnaire - Environmental Manager

Facility: _____
Interviewer: _____
Date/Time: _____

16. Do you have records of fuel spill logs? Was it common practice to wash away fuel spills with AFFF? Is/was AFFF used as a precaution in response to fuel releases or emergency runway landings to prevent fires?

NO

17. Was AFFF used for forest fires or fire management on-post/off-post? If so, please describe what happened and who was involved?

NO

18. Are there mutual aid/use agreements between county, city, and local fire department? Please list, even if informal. If formalized, may we have a copy of the agreement?

NO

19. Can you provide any other locations where AFFF has been stored, released, or used (i.e. hangars, buildings, fire stations, firefighting equipment testing and maintenance areas, emergency response sites, storm water/surface water, waste treatment plants, and AFFF ponds)?

NO

20. Are you aware of any other creative uses of AFFF? If so, how was AFFF used? What entities were involved?

NO

PA Interview Questionnaire - Environmental Manager

Facility: _____
Interviewer: _____
Date/Time: _____

21. Are there past studies you are aware of with environmental information on plants/animals/ groundwater/soil types, etc., such as Integrated Cultural Resources Management Plans or Integrated Natural Resources Management Plans?

NO

22. What other records might be helpful to us (environmental compliance, investigation records, admin record) and where can we find them?

Potential previous

23. Do you have or did you have a chrome plating shop on base? What were/are the years of operation of that chrome plating shop?

NO

24. Do you know whether the shop has/had a foam blanket mist suppression system or used a fume hood for emissions control? If foam blanket mist suppression was used, where was the foam stored, mixed, applied, etc.?

NO

25. How is off-spec AFFF disposed (used for training, turned in, or given to a local Fire Station)? If applicable, do you know the name of the vendor that removes off-spec AFFF? Do you have copies of the manifest or B/L?

N/A

PA Interview Questionnaire - Environmental Manager

Facility: _____

Interviewer: _____

Date/Time: _____

26. Do you recommend anyone else we can interview? If so, do you have contact information for them?

NO

PA Interview Questionnaire - Other

Facility: Christmas Valley
 Interviewer: [Redacted]
 Date/Time: 10/3/18

Interviewer: [Redacted]	Can your name/role be used in the PA Report? <input checked="" type="radio"/> Y or N
Title: Maint. Operational Super / Facility Maint.	Can you recommend anyone we can interview?
Phone Number: _____	Y or <input checked="" type="radio"/> N
Email: _____	

Roles or activities with the Facility/Years working at the Facility:

[Redacted] - Maintenance Operation Superintendent

[Redacted] - Facility Maintenance

since XMas came under ARNG control
 in 2010

PFAS Use: Identify accidental/intentional release locations, time frame of release, frequency of releases, storage container size (maintenance, fire training, firefighting, buildings with suppression systems (as built), fueling stations, crash sites, pest management, recreational, dining facilities, metals plating, or waterproofing). How are materials ordered/purchased/disposed/shared with others?

	Known Uses
* Facility came under ARNG in 2010	Use
	Procurement
	Disposition
* No use, storage, or release of AFFF or other PFAS-related materials	Storage (Mixed)
	Storage (Solution)
	Inventory, Off-Spec
Facility abandoned, dismantled ~2005	Containment
	SOP on Filling
FSS are water only	Leaking Vehicles
sprinklers are H ₂ O + original w/ building	Nozzle and Suppression System Testing
No AFFF fire extinguishers	Dining Facilities
No running water; BW wells not active	Vehicle Washing
No knowledge of fuel points	Ramp Washing
No storage, tanks, trucks, or FSS	Fuel Spill Washing and Fueling Stations
	Chrome Plating or Waterproofing

Appendix B.2

Visual Site Inspection Checklists

Visual Survey Inspection Log

Recorded by [redacted]
ARNG Contact [redacted]
Date: 10/3/18

Source/Release Information

Site Name / Area Name / Unique ID: Christmas Valley
Site / Area Acreage:
Historic Site Use (Brief Description): Used by Air Force for radar equipment use; OMD purchased in 2010
Current Site Use (Brief Description): No onsite activities or regular facility personnel

1. Was AFFF used (or spilled) at the site/area? Y N

2. Has usage been documented? Y N
2a. If yes, keep a record (place electronic files on a disk):

3. What types of businesses are located near the site? Industrial / Commercial / Plating / Waterproofing / Residential
3a. Indicate what businesses are located near the site: None

4. Is this site located at an airport/flightline? Y N
4a. If yes, provide a description of the airport/flightline tenants

Other Significant Site Features:

1. Does the facility have a fire suppression system? Y N (Not at this particular location on FTIG)
1a. If yes, indicate which type of AFFF has been used:
1b. If yes, describe maintenance schedule/leaks:
1c. If yes, how often is the AFFF replaced:
1d. If yes, does the facility have floor drains and where do they lead? Can we obtain an as built drawing?

Transport / Pathway Information

Migration Potential:

1. Does site/area drainage flow off installation? Y N
1a. If so, note observation and location:

2. Is there channelized flow within the site/area? Y N
2a. If so, please note observation and location:

3. Are monitoring or drinking water wells located near the site? Y N
3a. If so, please note the location:

4. Are surface water intakes located near the site? Y N
4a. If so, please note the location:

Significant Topographical Features:

1. Has the infrastructure changed at the site/area? Y N
1a. If so, please describe change (ex. Structures no longer exist):

Visual Survey Inspection Log

2. Is the site/area vegetated? Y N
 2a. If not vegetated, briefly describe the site/area composition: _____
3. Does the site or area exhibit evidence of erosion? Y N
 3a. If yes, describe the location and extent of the erosion: _____
4. Does the site/area exhibit any areas of ponding or standing water? Y N
 4a. If yes, describe the location and extent of the ponding: _____

Receptor Information

1. Is access to the site restricted? Y N
 1a. If so, please note to what extent: _____
2. Who can access the site? Site Workers / Construction Workers / Trespassers / Residential / Recreational Users / Ecological
 2a. Circle all that apply, note any not covered above: _____
3. Are residential areas located near the site? Y N
 3a. If so, please note the location/distance: _____
4. Are any schools/day care centers located near the site? Y N
 4a. If so, please note the location/distance/type: _____
5. Are any wetlands located near the site? Y N
 5a. If so, please note the location/distance/type: _____

Additional Notes

Abandoned site w/ no surrounding buildings, facilities
 or water bodies

Photographic Log

Photo ID/Name	Date & Location	Photograph Description

Appendix B.3

Conceptual Site Model Information

Preliminary Assessment – Conceptual Site Model Information

Site Name: Christmas Valley Radar Site

Why has this location been identified as a site? Potential former storage or fire suppression systems (found no evidence of either)

Are there any other activities nearby that could also impact this location? No

Training Events

Have any training events with AFFF occurred at this site? No

If so, how often? N/A

How much material was used? Is it documented? N/A

Identify Potential Pathways: Do we have enough information to fully understand over land surface water flow, groundwater flow, and geological formations on and around the facility? Any direct pathways to larger water bodies?

Surface Water:

Surface water flow direction? Varies depending on area of facility. Generally north in the northern parcel, northeast in the central parcel, and southeast in the southern parcel

Average rainfall? 15 inches/year

Any flooding during rainy season? No

Direct or indirect pathway to ditches? Indirect

Direct or indirect pathway to larger bodies of water? Indirect

Does surface water pond any place on site? No

Any impoundment areas or retention ponds? No

Any NPDES location points near the site? No

How does surface water drain on and around the flight line? N/A

Preliminary Assessment – Conceptual Site Model Information

Groundwater:

Groundwater flow direction? No specified flow; very little annual rainfall and no nearby water bodies

Depth to groundwater? Water table below soil is around 24-40 inches, but depth varies

Uses (agricultural, drinking water, irrigation)? Agricultural and irrigation

Any groundwater treatment systems? No

Any groundwater monitoring well locations near the site? Yes. Monitoring wells located within 4 miles of facility

Is groundwater used for drinking water? No; there is no running water at the facility

Are there drinking water supply wells on installation? No

Do they serve off-post populations? N/A

Are there off-post drinking water wells downgradient? Several domestic wells located around 4 miles north of the facility

Waste Water Treatment Plant:

Has the installation ever had a WWTP, past or present? No

If so, do we understand the process and which water is/was treated at the plant? N/A

Do we understand the fate of sludge waste? N/A

Is surface water from potential contaminated sites treated? N/A

Equipment Rinse Water

1. Is firefighting equipment washed? Where does the rinse water go?

N/A

2. Are nozzles tested? How often are nozzles tested? Where are nozzles tested? Are nozzles cleaned after use? Where does the rinse water flow after cleaning nozzles?

N/A

3. Other?

Preliminary Assessment – Conceptual Site Model Information

Identify Potential Receptors:

Site Worker: No

Construction Worker: No

Recreational User: No

Residential: No

Child: No

Ecological: No

Note what is located near by the site (e.g. daycare, schools, hospitals, churches, agricultural, livestock)?

Only some agricultural and livestock areas located within a few miles south of the facility

Documentation

Ask for Engineering drawings (if applicable). Okay

Has there been a reconstruction or changes to the drainage system? When did that occur? No

Appendix C

Photographic Log

APPENDIX C – Photographic Log

Army National Guard, Preliminary
Assessment for PFAS

Christmas Valley Radar Site

Christmas Valley, Oregon

Photograph No. 1

Description:

Facing north. A view of the main front entrance from the northern-most parcel. This area remains closed at all times.



Photograph No. 2

Description:

Facing northeast. An old storage shed directly across from the main entrance.



APPENDIX C – Photographic Log

Army National Guard, Preliminary
Assessment for PFAS

Christmas Valley Radar Site

Christmas Valley, Oregon

Photograph No. 3

Description:

A view of the old halon fire suppression system within the main building.



Photograph No. 4

Description:

A posted sign confirming halon has been removed from the fire suppression system within the main building.



APPENDIX C – Photographic Log

**Army National Guard, Preliminary
Assessment for PFAS**

Christmas Valley Radar Site

Christmas Valley, Oregon

Photograph No. 5

Description:

One of the many fire alarms located throughout the main building. The fire suppression system formally contained halon but all halon has been removed and the fire suppression system is no longer active.

