HNF-SP-0665
Revision 103

Environmental Radiological Survey Summary

Calendar Year 2016, Fourth Quarter
Hanford Site 100, 200, 300, and 600 Areas

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management
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Acronyms

ALARA	as low as reasonably achievable
B/G	beta/gamma
CA	contamination area
CFR	Code of Federal Regulations
CHPRC	CH2M Plateau Remediation Company
cm^2	square centimeter(s)
cpm	counts per minute
CX	categorical exclusions
CY	calendar year
DOE-RL	U.S. Department of Energy Richland Operations Office
dpm	disintegrations per minute
ERDF	Environmental Restoration Disposal Facility
ETF	200 Area Effluent Treatment Facility
IBC	Integrated Biological Control Program
LERF	Liquid Effluent Treatment Facility
mrad/hr	millirad (radiation-absorbed dose) per hour
MSA	Mission Support Alliance, LLC
NEPA	National Environmental Policy Act of 1969
PA	probe area
RA	radiation area
RCCP	River Corridor Cleanup Project
RCW	Revised Code of Washington
SCA	soil contamination area
URMA	underground radioactive material area
WAC	Washington Administrative Code
WCH	Washington Closure Hanford, LLC
WIDS	Waste Information Data System
WRPS	Washington River Protection Solutions, LLC
yd	yard

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1.0 INTRODUCTION

This quarterly report summarizes the radiological surveys performed and contamination incidents reported by multiple Hanford Site contractors in support of near-facility environmental monitoring. This document presents the contamination occurrences that were reported during the fourth quarter of 2016. Any incidents not reported prior to publication are not included in this summary. The survey results and the status of corrective actions required are also discussed.

Routine radiological surveys are an integral part of the Hanford Site near-facility environmental monitoring for tracking facility and waste site status and to aid in the reduction of the radiological areas at the Hanford Site. Periodic surveys are conducted to ensure that the surface contamination remains fixed to the surface and removable surface contamination levels remain below limits established in Title 10 Code of Federal Regulations (CFR) Part 835. This practice follows the waste management, environmental protection, safety, and as low as reasonably achievable (ALARA) practices on the Hanford Site as well as the protection of property and resources. Radiological Control Groups of Mission Support Alliance, LLC (MSA), CH2M Plateau Remediation Company (CHPRC), Washington River Protection Solutions, LLC (WRPS), and Washington Closure Hanford, LLC (WCH) perform routine radiological surveys on the Hanford Site, and each contractor's reported contamination incidents are captured in this report. The radiological surveys are performed at inactive waste sites, outdoor radiological control areas, tank farm perimeters (including diversion boxes, lift stations, and vent stations), perimeters of active or uncovered waste sites (such as burial grounds, retention basins, ponds, process trenches, and ditches), underground pipelines, and road surfaces.

Developed by the MSA Environmental Surveillance staff members and the MSA radiological control group, the *Hanford Site Environmental Surveillance Master Sampling Schedule* (DOE/RL-2013-53) provides a schedule for the waste sites to be surveyed by MSA. Other Hanford contractors develop and maintain a schedule of waste site surveys their respective company performs. However, some waste sites may not be accessible during the calendar year due to ongoing remediation activities or off-road travel restrictions due to fire hazards. MSA Environmental Surveillance staff members review and summarize the radiological survey reports in the annual *Hanford Site Environmental Report*. Radiological conditions are also tracked, and trends are noted for use by the facility managers and landlords. Newly discovered radioactive waste and unplanned release sites are added to the schedule, as necessary. The survey frequencies are based on site history, radiological conditions, and general maintenance. Non-routine surveys may also be conducted, if conditions warrant (e.g., as described in section 4.1, the presence of deep-rooted vegetation is noted at a waste site). Radiological surveys are conducted to detect surface contamination that may be a result of biological intrusion, erosion, and site maintenance conditions. Survey data are compared with standards identified in MSC-OTHER-RC-5173, *MSC Radiological Control Manual*; CHPRC-00073, *CH2M HILL Plateau Remediation Company Radiological Control Manual*; and/or HNF-5183, *Tank Farms Radiological Control Manual* as well as previous surveys to determine trends, assess environmental impacts, and allow determination of where corrective actions are needed.

The Occurrence Reporting System is used to track legacy radioactive contamination greater than 10 times the total contamination values included in 10 CFR Part 835 Appendix D, (1,000 dpm/100 cm^2 removable or 5,000 dpm/100 cm^2 total contamination) exclusive of its footnote 3, and found outside of

the following locations: areas routinely posted, controlled and monitored for contamination, and areas controlled in accordance with 10 CFR Section 835.1102(c) and, per Section 835.604(a), any non-posted area under the continual observation and control of an individual empowered to implement access and exposure control measures.

These radiological surveys are conducted to determine surface radiological conditions and do not constitute a release survey. Therefore, surveys that detect no contamination in radiological areas do not release the site from control but may result in changing the posting status. Surveillance of the active nuclear facilities, waste sites, and radiologically posted areas are the responsibility of the contractor to which those areas are assigned.

2.0 PROGRAM DESCRIPTION

2.1 Environmental Radiological Survey Objectives

The objective of the radiological surveys is to determine whether there have been changes in the radiological status of the 100, 200, 300, and 600 Areas radioactive waste sites. These sites include surface water disposal units, cribs, trenches, burial grounds, tank farm diversion box perimeters, contamination areas, and reverse wells (refer to section 6.0 for the listing of waste sites). Routine radiological surveys focus primarily on the perimeters of these sites. Determining trends in radiation levels or radiological contamination may aid in assessing the adequacy of waste containment by detecting the movement of radioactive material away from radiological control areas or by detecting releases that might otherwise go unrecognized. When activity is detected, a thorough survey is performed using a portable count rate meter equipped with a thin-window, pancake-type probe that measures ionizing radiation. The appropriate facility manager or landlord is notified if contamination is identified, and the responsible manager initiates corrective actions.

2.2 Environmental Standards

Radiological survey data are used to determine compliance of radioactive waste sites with MSC-PRO-EI-15334, *Effluent and Environmental Monitoring* and MSC-RD-15332, *Environmental Protection Requirements* for MSA monitored sites; TFC-ESHQ-RP_MON-P-10, *Required Radiological Surveillances* for WRPS managed sites; PRC-RD-EP-15332, *Environmental Protection Requirements*, and PRC-PRO-EP-15334, *Effluent and Environmental Monitoring for Radionuclide Airborne Emissions* for CHPRC managed sites; and ENV-1, Chapter 1.9, *Environmental Monitoring and Management* for WCH managed sites. These procedures are reviewed and updated per the contractor's procedure policy.

To compare field instrument values with the standards listed in the contractor's radiological control manuals, a conversion factor is necessary. This factor was established using a Geiger-Mueller detector with a pancake-type probe where 20,000 disintegrations per minute (dpm; 2,000 counts per minute [cpm]) are approximately equivalent to one millirem per hour for beta-emitting radionuclides as indicated in UCRL-88275, *Evaluation of Beta Energy (E max) and Spectral Type Using Survey Instruments*. It should be understood that converting field instrument values, which include both beta and gamma energies, is approximate for field reporting purposes and does not allow for absolute precision.

2.3 Survey Methods and Procedures

Surveys documented in this report include road surfaces, cribs, ground surfaces above underground pipelines, stabilized burial grounds, covered ponds and ditches, tank farm perimeters, active burial ground perimeters, unplanned release sites, and other radiological areas. Vegetation, animal burrows, and animal feces are also monitored to detect biological transport when they are present within the survey area.

Methods and procedures for these surveys can be found in RC-PRO-RC-60605 *Required Radiological Surveillances*; MSC-OTHER-RC-5173, *MSC Radiological Control Manual*; CHPRC-00073, *CH2M HILL Plateau Remediation Company Radiological Control Manual*; HNF-5183, *Tank Farms Radiological Control Manual*; and WCH procedure ENV-1, Chapter 2.35, *Environmental Monitoring and Management*. Individual contractors follow their appropriate methods and procedures for proper instrument calibration and use.

Waste sites and other radiological areas are surveyed with portable site approved field instruments. The portable field instrument survey results are reported in dpm per 100 square centimeter (cm^2). Efficiency correction factors, as documented in the various contractor radiological control manual/procedures, are applied. These can vary between contractors but are approved as part of each contractor's radiological control program. Surveys include the area perimeter and portions of the ground surface of radiological areas. Wherever possible, smear surveys are made on the surface of exposed equipment and other hard surfaces within a radiological area.

3.0 RADIOLOGICAL SURVEY SUMMARY

A total of 7 new contamination incidents were discovered in the fourth quarter of the calendar year (CY) 2016: 2 vegetation incidents, 3 animals or animal waste material, and 2 soil contamination incidents. Contamination levels ranging from a low of 1,300 dpm/100 cm^2 beta/gamma to 1,500,000 dpm/100 cm^2 beta/gamma were reported. 4 contamination incidents were discovered by CHPRC and 3 were discovered by WRPS. Of the 7 contamination incidents, 4 (2 vegetation, 1 animal, and 1 soil) were found to be at levels that required reporting to the Occurrence Notification Center. Reportable contamination is contamination found with activity >50,000 dpm/100 cm^2 beta/gamma.

Contamination was removed for proper disposal at all 7 of the contamination occurrence locations. No contamination incident locations were posted in the fourth quarter of calendar year 2016. The radiologically contaminated areas (CAs) are posted to meet the requirements as outlined in the respective contractor's radiological control manual. The posting includes the following categories: High Contamination (activity >100,000 dpm/100 cm^2 beta/gamma and/or >2,000 dpm/100 cm^2 alpha), Contamination, Soil Contamination, Underground Radioactive Material, Radiological Buffer, and Radiation and High Radiation areas. Information contained in the following tables will be included as part of a comprehensive mapping effort that will be completed following the fourth quarter of each calendar year. Table 1 summarizes CY 2016 reported contamination incidents listed by discovering contractor, including responses and occurrence dates.

Table 1. Summary of Reported Contamination Incidents by Discovering Contractor (CY 2016)

Date	Incident	Quantity/Size*	Contractor	Response	Reportable†
01/11/2016	Tumbleweed	3" × 3" area of fragments	MSA	Dispose	Y
01/12/2016	Tumbleweed	20' × 80' area of fragments	MSA	Posted	Y
01/12/2016	Tumbleweed	6 whole	MSA	Dispose	N
01/13/2016	Tumbleweed	6 fragments & 1 whole	MSA	Dispose	Y
01/13/2016	Tumbleweed	1 whole	MSA	Dispose	N
01/14/2016	Tumbleweed	30–32 whole	MSA	Dispose	Y
01/18/2016	Rabbit feces		WRPS	Dispose	N
01/18/2016	Soil	Speck	MSA	Dispose	Y
01/23/2016	Concrete	15 cm^2 area	WRPS	Posted	N
01/26/2016	Tumbleweed	6 in^2 area of fragments	MSA	Dispose	N
02/01/2016	Tumbleweed	5–7 fragments	MSA	Dispose	Y
02/02/2016	Tumbleweed	2 whole	MSA	Dispose	N
02/08/2016	Soil	10 yard (yd) × 15 yd area	CHPRC	Posted	Y
02/10/2016	Soil	3 yd × 4 yd area	CHPRC	Posted	N
02/10/2016	Bird feces		WRPS	Posted	Y
02/17/2016	Tumbleweed	5–7 fragments	MSA	Dispose	Y
02/22/2016	Tumbleweed	6 whole	CHPRC	Dispose	Y
02/22/2016	Soil	3 areas 1' × 1' or less	CHPRC	Dispose	Y
03/01/2016	Bird nest		MSA	Dispose	N
03/02/2016	Bird nest		MSA	Dispose	N
03/02/2016	Rabbit feces		WRPS	Dispose	N
03/07/2016	Soil	1' × 1' area	CHPRC	Dispose	Y
03/07/2016	Mud Dauber nest inside wooden box	2.5' × 2.5' × 4'	CHPRC	Dispose	Y
03/09/2016	Soil	10 yd × 10 yd area	CHPRC	Posted	Y
03/09/2016	Soil	Speck	MSA	Dispose	Y
03/14/2016	Tumbleweed	1 whole	CHPRC	Dispose	Y
03/17/2016	Mouse feces		WRPS	Posted	Y
03/21/2016	Tumbleweed	2 whole	MSA	Dispose	Y
03/22/2016	Tumbleweed	4 whole	CHPRC	Posted	Y
03/22/2016	Soil	2 yd × 2 yd area	CHPRC	Posted	N
03/24/2016	Mouse	1 whole	MSA	Dispose	N
03/30/2016	Tumbleweed	Fragment ~1' long	MSA	Dispose	Y
04/06/2016	Bird feces		WRPS	Dispose	N
04/11/2016	Tumbleweed	1 whole	MSA	Dispose	N
04/12/2016	Tumbleweed	6 whole	MSA	Dispose	Y
04/13/2016	Bird feces		WRPS	Dispose	Y
04/19/2016	Tumbleweed	1 whole	MSA	Dispose	Y
04/19/2016	Egg shell/bird feces		WRPS	Dispose	N
04/19/2016	Soil		WRPS	Dispose	N
04/20/2016	Bird egg	1 egg	WRPS	Dispose	N
04/21/2016	Bird feces		WRPS	Dispose	N
04/22/2016	Bird feces		WRPS	Posted	Y
04/22/2016	Bird nest		WRPS	Dispose	Y
04/23/2016	Bird feces		WRPS	Dispose	N
04/24/2016	Bird feces		WRPS	Dispose	Y
04/27/2016	Tumbleweed	1 whole	CHPRC	Dispose	N

Table 1. Summary of Reported Contamination Incidents by Discovering Contractor (CY 2016)

Date	Incident	Quantity/Size*	Contractor	Response	Reportable†
04/27/2016	Tumbleweed	7 whole	CHPRC	Dispose	Y
04/27/2016	Soil		CHPRC	Dispose	Y
04/28/2016	Tumbleweed	1 whole	WRPS	Dispose	Y
04/28/2016	Soil	specks 6"× 6" & 2'× 2' areas	WCH	Dispose	Y
04/28/2016	Bird feces		WRPS	Dispose	N
04/29/2016	Tumbleweed		WRPS	Dispose	N
04/29/2016	Bird feces		WRPS	Dispose	N
04/30/2016	Bird feces		WRPS	Dispose	N
05/02/2016	Bird feces		WRPS	Dispose	N
05/03/2016	Starling	2 birds	WRPS	Dispose	N
05/09/2016	Soil	24"× 24" area	MSA	Posted	Y
05/10/2016	Starling	2 birds	MSA	Dispose	Y
05/12/2016	Bird feces		WRPS	Dispose	Y
05/12/2016	Bird egg		WRPS	Dispose	Y
05/13/2016	Bird nest/eggs	4 eggs	WRPS	Dispose	N
05/19/2016	Bird carcass	1 bird	WRPS	Dispose	Y
05/20/2016	Bird feces		WRPS	Dispose	Y
05/26/2016	Bird feces		Bechtel	Dispose	Y
05/30/2016	Tumbleweed	Fragments	WRPS	Dispose	Y
05/31/2016	Tumbleweed	1 fragment	WRPS	Dispose	Y
06/02/2016	Tumbleweed	5 Fragments	WRPS	Dispose	Y
06/06/2016	Bird feces		WRPS	Dispose	Y
06/07/2016	Bird feces	4 areas	CHPRC	Dispose	N
06/09/2016	Tumbleweed	1 whole	CHPRC	Dispose	Y
06/13/2016	Tumbleweed	1 fragment	WRPS	Dispose	Y
06/13/2016	Cloth rag	1 rag	WRPS	Dispose	Y
06/13/2016	Cardboard	Small piece	WRPS	Dispose	Y
06/15/2016	Tumbleweed	2 whole	MSA	Dispose	N
06/15/2016	Bird carcass	1 bird	CHPRC	Dispose	N
06/20/2016	Tumbleweed	1 whole	MSA	Dispose	N
06/22/2016	Soil	6" × 6" area	CHPRC	Dispose	Y
06/23/2016	Mouse	1 mouse	MSA	Dispose	N
06/27/2016	Shrubs	7 whole 8yd × 10 yd area	CHPRC	Posted	Y
06/28/2016	Bats	15	MSA	Dispose	N
07/06/2016	Bird feces	3 spots	CHPRC	Dispose	N
07/07/2016	Tumbleweed	1 whole	CHPRC	Dispose	Y
07/11/2016	Mouse	1	MSA	Dispose	Y
07/13/2016	Tumbleweed	3 whole in 1yd X 1yd area	CHPRC	Dispose	N
07/14/2016	Wooden Power Pole	In crack from 3' to 7' above ground	MSA	Dispose	Y
07/19/2016	Mouse	1	MSA	Dispose	N
07/20/2016	Bird feces	200cm2 area	WRPS	Posted	N
07/21/2016	Debris	Speck	MSA	Dispose	N
07/26/2016	Rabbit feces	3 spots	WRPS	Dispose	N
07/26/2016	Bird feces		WRPS	Posted	N
07/27/2016	Mouse	1	MSA	Dispose	N
07/27/2016	Bird feces	3 areas	CHPRC	Dispose	N
07/27/2016	Tumbleweed	1 whole	MSA	Dispose	N

Table 1. Summary of Reported Contamination Incidents by Discovering Contractor (CY 2016)

Date	Incident	Quantity/Size*	Contractor	Response	Reportable†
08/02/2016	Bird feces	4 Spots	CHPRC	Dispose	N
08/02/2016	Tumbleweed	5-7 fragments	WRPS	Dispose	Y
08/02/2016	Tumbleweed	4 fragments	CHPRC	Dispose	Y
08/02/2016	Soil	2 Specks	WRPS	Dispose	Y
08/03/2016	Bird feces	4 Spots	CHPRC	Dispose	N
08/04/2016	Tumbleweed	1 whole & fragments	CHPRC	Dispose	Y
08/08/2016	Mouse	1	MSA	Dispose	N
08/15/2016	Mouse	1	MSA	Dispose	N
08/15/2016	Tumbleweed	Fragments	WRPS	Dispose	N
08/18/2016	Bird feces	5-7 Spots	WRPS	Dispose	Y
08/22/2016	Tumbleweed	Fragments	WRPS	Dispose	Y
08/26/2016	Tumbleweed	1 whole	WRPS	Dispose	Y
08/29/2016	Bird feces	1 spot	CHPRC	Dispose	N
09/01/2016	Tumbleweed	15 whole	CHPRC	Dispose	Y
09/01/2016	Animal Urine	1 Spot	WRPS	Dispose	N
09/07/2016	Bird feces	1 spot	CHPRC	Dispose	N
09/13/2016	Tumbleweed	1 whole	CHPRC	Dispose	Y
09/14/2016	Mouse	1	MSA	Dispose	Y
09/15/2016	Tumbleweed	6 whole	CHPRC	Dispose	Y
09/16/2016	Tumbleweed	1 whole & fragments	CHPRC	Dispose	Y
09/19/2016	Bird feces	1 spot	CHPRC	Dispose	N
09/27/2016	Bird feces	1 spot	CHPRC	Dispose	Y
10/05/2016	Soil	5 spots	CHPRC	Dispose	Y
10/13/2016	Rabbit feces		WRPS	Dispose	Y
10/18/2016	Sparrow	1 bird	CHPRC	Dispose	N
11/02/2016	Tumbleweed	31 tumbleweeds in 13 locations	CHPRC	Dispose	Y
11/07/2016	Tumbleweed	5-7 fragments in 6"X6" area	WRPS	Dispose	Y
12/06/2016	Soil	1 spot	CHPRC	Dispose	N
12/14/2016	Raven	1 bird	WRPS	Dispose	N

* Quantity is not always provided in an incident report. If left blank, no data were provided in report.
† Threshold for reportable contamination is greater than 50,000 dpm/100 cm² beta/gamma.

While conducting radiological surveys, contaminated media were encountered and collected for analysis and/or disposal. Media found above action levels defined in the respective Contractor's radiological control manual are documented via the various contractor-reporting mechanisms such as Radiological Problem Reports, Problem Evaluation Requests, and/or Occurrence Reports. Table 2 summarizes the reported contamination found, location, and the corresponding maximum field reading per contamination incident.

Table 2. Summary of Reported Environmental Contamination Incidents (CY 2016)

Date	Incident	Area	Location	Maximum Field Reading (beta/gamma)
01/11/16	Tumbleweed	200E	218-E-12B Burial Ground Perimeter	150,000 dpm/100 cm^2
01/12/16	Tumbleweed	200E	218-E-12B Burial Ground Perimeter	800,000 dpm/100 cm^2
01/12/16	Tumbleweed	200E	East end of Liquid Effluent Retention Facility Loop Rd	40,000 dpm/100 cm^2

01/13/16	Tumbleweed	200E	Gate 810 northeast corner of 200 East	100,000 dpm/100 cm^2
01/13/16	Tumbleweed	200E	218-E-12B outside perimeter	15,000 dpm/100 cm^2
01/14/16	Tumbleweed	200E	Trench 94 (Naval Reactor Trench)	>1,000,000 dpm/100 cm^2
01/18/16	Rabbit feces	200E	242A Courtyard (old filter bank)	10,000 dpm/100 cm^2
01/18/16	Soil	200W	East fence line outside SX/SY Tank Farm	500,000 dpm/100 cm^2
01/23/16	Concrete	200E	2025ED	4,500 dpm/100 cm^2
01/26/16	Tumbleweed	200E	241BX/BY Tank Farm perimeter	25,000 dpm/100 cm^2
02/01/16	Tumbleweed	200E	241A Tank Farm Perimeter	55,000 dpm/100 cm^2
02/02/16	Tumbleweed	200W	200W Fence line at Cooper & 13th Ave	5,000 dpm/100 cm^2
02/08/16	Soil	200E	UPR-200-E-83 URMA (B/C Controlled Area)	120,000 dpm/100 cm^2
02/10/16	Soil	200E	UPR-200-E-83 URMA (B/C Controlled Area)	42,000 dpm/100 cm^2
02/10/16	Bird feces	200E	2025 ED/ Exterior wall	59,000 dpm/100 cm^2
02/17/16	Tumbleweed	200E	218-E-12A Burial Ground perimeter	150,000 dpm/100 cm^2
02/22/16	Tumbleweed	200E	218-E-12A Burial Ground perimeter	600,000 dpm/100 cm^2
02/22/16	Soil	200E	218-E-12A Burial Ground perimeter	60,000 dpm/100 cm^2
02/29/16	Bird nest	105N	105N/109N Bird and mud dauber nest removal	99,500 dpm/100 cm^2
03/01/16	Bird nest	105N	105N/109N Bird and mud dauber nest removal	34,500 dpm/100 cm^2
03/02/16	Rabbit feces	200E	242A Evaporator	60,000 dpm/100 cm^2
03/07/16	Soil	100K	100 K Area inside south perimeter fence	3,000,000 dpm/100 cm^2
03/07/16	Mud Dauber nest inside wooden box	100K	100 K Area inside south perimeter fence	100,000 dpm/100 cm^2
03/09/16	Soil	200E	UPR-200-E-83 B/C Controlled Area	420,000 dpm/100 cm^2
03/09/16	Soil	200E	218-E-12B Trench 94	250,000 dpm/100 cm^2
03/14/16	Tumbleweed	200E	289E MODU-Tanks	107,000 dpm/100 cm^2
03/17/16	Mouse feces	200E	MO 724 & MO 725/ 2704 HV	131,000 dpm/100 cm^2
03/21/16	Tumbleweed	200E	200-E-109 WIDS site perimeter	950,000 dpm/100 cm^2
03/22/16	Tumbleweed	200E	UPR-200-E-83 near southwest corner of cribs	>5,000,000 dpm/100 cm^2
03/22/16	Soil	200E	UPR-200-E-83 near southwest corner of cribs	20,000 dpm/100 cm^2
03/24/16	Mouse	105K	105KW Room 8A	5,000 dpm/100 cm^2
03/30/16	Tumbleweed	200E	Eastern Perimeter of 289E	65,000 dpm/100 cm^2
04/06/16	Bird feces	200E	Effluent Treatment Facility Surge Berm	17,460 dpm/100 cm^2
04/11/16	Tumbleweed	200E	Effluent Treatment Facility East Perimeter Fence	25,000 dpm/100 cm^2
04/12/16	Tumbleweed	200E	Effluent Treatment Facility West Perimeter Fence/Canton Ave	800,000 dpm/100 cm^2
04/13/16	Bird feces	200E	Effluent Treatment Facility	80,000 dpm/100 cm^2
04/19/16	Tumbleweed	200E	200E Northeast Fence Line Gate 810	70,000 dpm/100 cm^2
04/19/16	Egg shell/bird feces	200E	Effluent Treatment Facility	9,000 dpm/100 cm^2
04/19/16	Soil	200E	Effluent Treatment Facility	12,000 dpm/100 cm^2
04/20/16	Bird egg	200E	Effluent Treatment Facility	26,000 dpm/100 cm^2
04/21/16	Bird feces	200E	Effluent Treatment Facility	10,000 dpm/100 cm^2
04/22/16	Bird feces	200E	Southeast corner of 2025E	74,000 dpm/100 cm^2
04/22/16	Bird nest	200E	Southeast corner of 2025E	340,000 dpm/100 cm^2
04/23/16	Bird feces	200E	Effluent Treatment Facility	13,000 dpm/100 cm^2
04/24/16	Bird feces	200E	Verification berm between A and B Tanks	60,000 dpm/100 cm^2
04/27/16	Tumbleweed	200E	289E MODU-Tanks	25,000 dpm/100 cm^2
04/27/16	Tumbleweed	200E	216-B-3-1 Pond	450,000 dpm/100 cm^2
04/27/16	Soil	200E	216-B-3-1 Pond	80,000 dpm/100 cm^2
04/28/16	Tumbleweed	200E	Effluent Treatment Facility/ 2025E	80,000 dpm/100 cm^2

04/28/16	Soil	600	618-10 Burial Ground	4,500,000 dpm/100 cm^2
04/28/16	Bird feces	200E	Effluent Treatment Facility	19,920 dpm/100 cm^2
04/29/16	Tumbleweed	200E	Effluent Treatment Facility	2,000 dpm/100 cm^2
04/29/16	Bird feces	200E	Effluent Treatment Facility	12,000 dpm/100 cm^2
04/30/16	Bird feces	200E	Effluent Treatment Facility Cooling Tower	45,000 dpm/100 cm^2
05/02/16	Bird feces	200E	Effluent Treatment Facility	15,000 dpm/100 cm^2
05/03/16	Starling	200E	Effluent Treatment Facility	49,500 dpm/100 cm^2
05/09/16	Soil	200E	L780 Power Line Project	288,000 dpm/100 cm^2
05/10/16	Starling	200E	Effluent Treatment Facility	100,000 dpm/100 cm^2
05/12/16	Bird feces	200E	Under Pine tree within 242A Facility Boundary	65,000 dpm/100 cm^2
05/12/16	Bird egg	200E	Southeast of Surge Berm	53,000 dpm/100 cm^2
05/13/16	Bird nest/eggs	200E	In Pine Tree at Effluent Treatment Facility	6,320 dpm/100 cm^2
05/19/16	Bird carcass	200E	Outside of building 2025E door #4	80,000 dpm/100 cm^2
05/20/16	Bird feces	200E	Northeast corner of 2025E	185,000 dpm/100 cm^2
05/26/16	Bird feces	200E	Pretreatment Facility, foot elevation, Column line A-15	200,000 dpm/100 cm^2
05/30/16	Tumbleweed	200E	Outside of building 2025E	80,000 dpm/100 cm^2
05/31/16	Tumbleweed	200E	South side of 2025E	100,000 dpm/100 cm^2
06/02/16	Tumbleweed	200W	241U Tank Farm fence line near MO 873	100,000 dpm/100 cm^2
06/06/16	Bird feces	200E	East side of 2025E	100,000 dpm/100 cm^2
06/07/16	Bird feces	200E	289E MODU-Tanks	30,000 dpm/100 cm^2
06/09/16	Tumbleweed	200E	218-E-12A Burial Ground northeast corner	2,400,000 dpm/100 cm^2
06/13/16	Tumbleweed	200E	Outside posted CA east of LERF Basin 44	200,000 dpm/100 cm^2
06/13/16	Cloth rag	200E	Outside posted CA east of LERF Basin 44	300,000 dpm/100 cm^2
06/13/16	Cardboard	200E	Outside posted CA east of LERF Basin 44	500,000 dpm/100 cm^2
06/15/16	Tumbleweed	200E	2025E	30,000 dpm/100 cm^2
06/15/16	Bird carcass	600	Near Well C-9478 near intersection of Rt.1 and Rt.2	15,000 dpm/100 cm^2
06/20/16	Tumbleweed	200E	Gate 810	20,000 dpm/100 cm^2
06/22/16	Soil	200E	West end of UPR-200-E-83	60,000 dpm/100 cm^2
06/23/16	Mouse	200E	Conex CC2E0117 west side of Buffalo Ave.	15,000 dpm/100 cm^2
06/27/16	Shrubs	200E	200-E-160 Pipeline	600,000 dpm/100 cm^2
06/28/16	Bats	100	105DR Reactor	3,000 dpm/100 cm^2
07/06/16	Bird feces	200E	289E MODU-Tanks	16,000 dpm/100 cm^2
07/07/16	Tumbleweed	200E	289E MODU-Tanks	1,800,000 dpm/100 cm^2
07/11/16	Mouse	200E	2237-E Shop Building	55,000 dpm/100 cm^2
07/13/16	Tumbleweed	200E	UPR-200-E-83 URMA (Cribs)	36,000 dpm/100 cm^2
07/14/16	Wooden Power Pole	200E	L780 Power Line Replacement Project	180,000 dpm/100 cm^2
07/19/16	Mouse	200E	2237-E Shop Building	4,000 dpm/100 cm^2
07/20/16	Bird feces	200E	242A Evaporator Building south of AMU room	10,000 dpm/100 cm^2
07/21/16	Debris	100	105DR vestibule floor	15,000 dpm/100 cm^2
07/26/16	Rabbit feces	200E	North side of 242A Evaporator	25,000 dpm/100 cm^2
07/26/16	Bird feces	200E	North side of 242A Evaporator	10,000 dpm/100 cm^2
07/27/16	Mouse	200E	200E Tank Farms (2237E)	30,000 dpm/100 cm^2
07/27/16	Bird feces	200E	289E MODU-Tanks	30,000 dpm/100 cm^2
07/27/16	Tumbleweed	200W	216-S-17 Pond Inside Posted SCA	240,000 dpm/100 cm^2
08/02/16	Bird feces	200E	289E MODU-Tanks	15,000 dpm/100 cm^2
08/02/16	Tumbleweed	200W	241S Tank Farm north and east perimeter fence line	300,000 dpm/100 cm^2
08/02/16	Tumbleweed	200E	WIDS 218-E-4 Burial Ground (north end)	210,000 dpm/100 cm^2

08/02/16	Soil	200E	East of 241AP Tank Farm outside perimeter fence	640,000 dpm/100 cm^2
08/03/16	Bird feces	200E	289E MODU-Tanks	19,000 dpm/100 cm^2
08/04/16	Tumbleweed	200W	216-T-34 (crib) posted URMA	240,000 dpm/100 cm^2
08/08/16	Mouse	200E	2237-E Shop Building	5,000 dpm/100 cm^2
08/15/16	Mouse	200E	2237-E Shop Building	10,000 dpm/100 cm^2
08/15/16	Tumbleweed	200E	241AY Tank Farm	19,510 dpm/100 cm^2
08/18/16	Bird feces	200E	2025E (East side) and North of the Cooling Towers	150,000 dpm/100 cm^2
08/22/16	Tumbleweed	200W	241SY Tank Farm perimeter fence	299,000 dpm/100 cm^2
08/26/16	Tumbleweed	200E	MO-269 Parking Lot	198,500 dpm/100 cm^2
08/29/16	Bird feces	200E	289E MODU-Tanks	18,000 dpm/100 cm^2
09/01/16	Tumbleweed	200E	218-E-5, 5A, 2, 9 Burial Ground	360,000 dpm/100 cm^2
09/01/16	Animal Urine	200E	South of the 242S Evaporator	50,000 dpm/100 cm^2
09/07/16	Bird feces	200E	289E MODU-Tanks	12,338 dpm/100 cm^2
09/13/16	Tumbleweed	200W	218-W-11 Burial Ground	120,000 dpm/100 cm^2
09/14/16	Mouse	200E	225-BE Maintenance Shop	90,000 dpm/100 cm^2
09/15/16	Tumbleweed	200W	216-T-34 Crib	210,000 dpm/100 cm^2
09/16/16	Tumbleweed	200W	UPR-200-W-58 (crib)	240,000 dpm/100 cm^2
09/19/16	Bird feces	200E	289E MODU-Tanks	7,500 dpm/100 cm^2
09/27/16	Bird feces	200E	289E MODU-Tanks	200,000 dpm/100 cm^2
10/05/16	Soil	600	618-10 Burial Ground	300,000 dpm/100 cm^2
10/13/16	Rabbit feces	200E	2025E building at the Effluent Treatment Facility	200,000 dpm/100 cm^2
10/18/16	Sparrow	200E	WESF- next to West Crane (outside)	1,300 dpm/100 cm^2
11/02/16	Tumbleweed	200E	218-E-4 & 218-E-2-5-5A-9 Burial Grounds	1,500,000 dpm/100 cm^2
11/07/16	Tumbleweed	200E	Liquid Effluent Retention Facility (LERF) along north perimeter fence line	130,000 dpm/100 cm^2
12/06/16	Soil	200W	West side of 218-W-6 Burial Ground	30,000 dpm/100 cm^2
12/14/16	Raven	200E	Outside perimeter fence of 241-C Tank Farm – near MO-826	5,000 dpm/100cm^2

3.1 Waste Information Data System (WIDS) Summary

There were no waste sites that were interim closed or received final close out during the fourth quarter of CY 2016.

The *Administrative Interface Agreement between CH2M HILL Plateau Remediation Company (CHPRC), Washington Closure Hanford (WCH), Washington River Protection Solutions (WRPS), Mission Support Alliance (MSA), and Pacific Northwest National Laboratory (PNNL) for Hanford Environmental Data Integration* (HNF-48562) states that an area posted as a soil contamination area (SCA) or CA that is not located on an existing WIDS site should be added to the WIDS database as a new waste site if it cannot be cleaned up and down-posted within 90 days.

3.2 Discovery Type and Location Mapping

The contamination events discovered in 2016 can be categorized into area and waste site type. Table 3 summarizes the reported contamination incidents by area and media type for CY 2016, including

"Other" for miscellaneous items (e.g., clothing, equipment, etc.). 100 of the 121 contamination events discovered in 2016 were in 200 East Areas.

Table 3. Reported Contamination Incidents by Area and Type (CY 2016)

Area/Waste Site Type	Vegetation	Animals	Soil/Specks	Other*	Total
200 East Tank Farms	5	13	1	0	19
200 West Tank Farms	3	0	1	0	4
200 East Burial Grounds	11	0	2	0	13
200 West Burial Grounds	1	0	1	0	2
200 East Cribs, Ponds, & Ditches	3	0	6	0	9
200 West Cribs, Ponds, & Ditches	4	0	0	0	4
200 East Fence Lines	6	0	0	0	6
200 West Fence Lines	1	0	0	0	1
200 East Roads & Rail Roads	0	0	0	0	0
200 West Roads & Rail Roads	0	0	0	0	0
200 East Unplanned Release Sites	0	0	0	0	0
200 West Unplanned Release Sites	0	0	0	0	0
200 East Underground Pipelines	1	0	0	0	1
200 West Underground Pipelines	0	0	0	0	0
Cross-Site Transfer Line	0	0	1	1	2
600 Area Burial Grounds	0	0	0	0	0
200 East Miscellaneous	0	13	0	0	13
200 West Miscellaneous	0	0	0	0	0
200 East LERF/ETF	10	24	1	2	37
200 North Area	0	0	0	0	0
100 Areas	0	5	2	0	7
300 Areas	0	0	0	0	0
400 Areas	0	0	0	0	0
600 Areas	0	1	2	0	3
1100 Areas	0	0	0	0	0
TOTALS	**45**	**56**	**17**	**3**	**121**

*** Miscellaneous items such as clothing, tools and equipment, building materials and other non-soil or biotic media.**

Contamination events discovered in 2016 are shown spatially in Figures 1 through 4. The figures provide visual representation of the contamination events. Also shown on the figures is the surrounding WIDS sites and the dominating wind rose of the map extent. Coordinates for these events were often estimated based solely on event discovery descriptions, therefore the accuracy of the points should be considered for display purposes only. As depicted in Table 3 and discussed in the previous paragraph the majority of both animal and vegetation events reside in the 200 East Area, more specifically the northeast of the 200 East Area. The highest concentration of soil events was also located in the 200 East Area. From the data provided only cursory observations and mapping can be presented. No further mathematical evaluation of the data has been made and observations are solely based on the spatial clustering of events and are in no way a formal recommendation or statement of contamination origins.

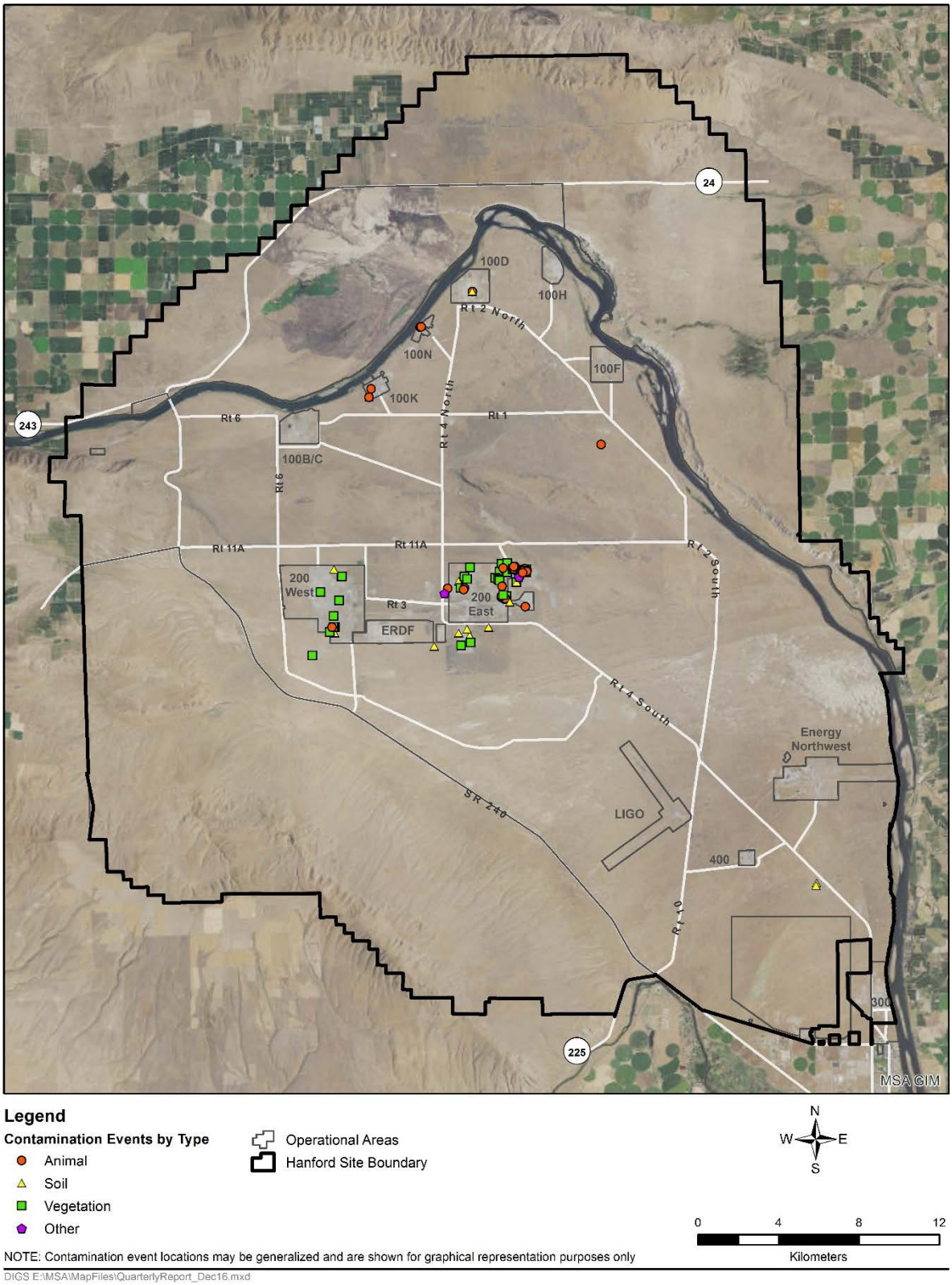


Figure 1. Overview map of contamination incidents discovered through 4th quarter 2016

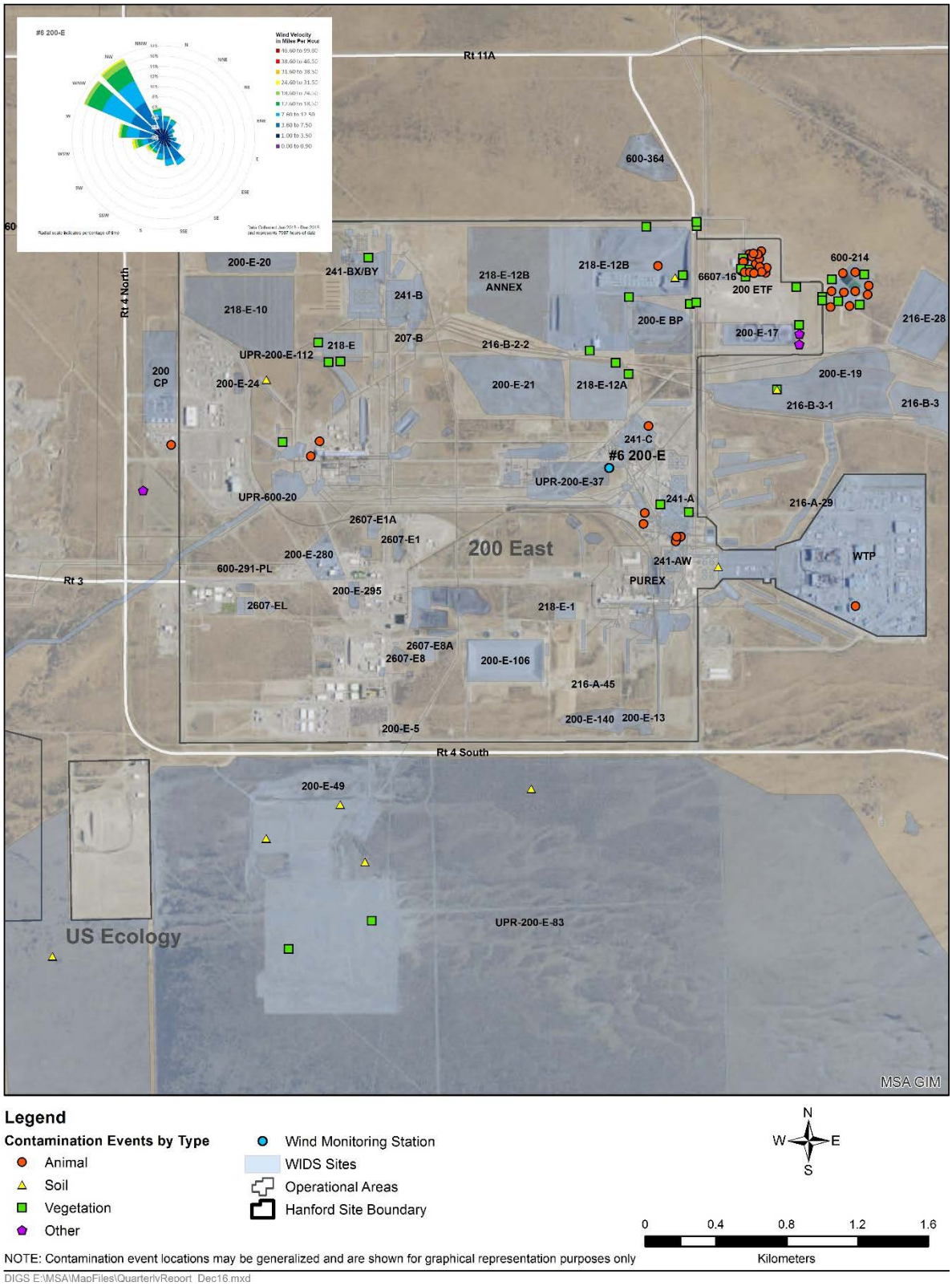


Figure 2. Contamination Incidents discovered in the 200 East Area and 600 Area through 4th quarter 2016

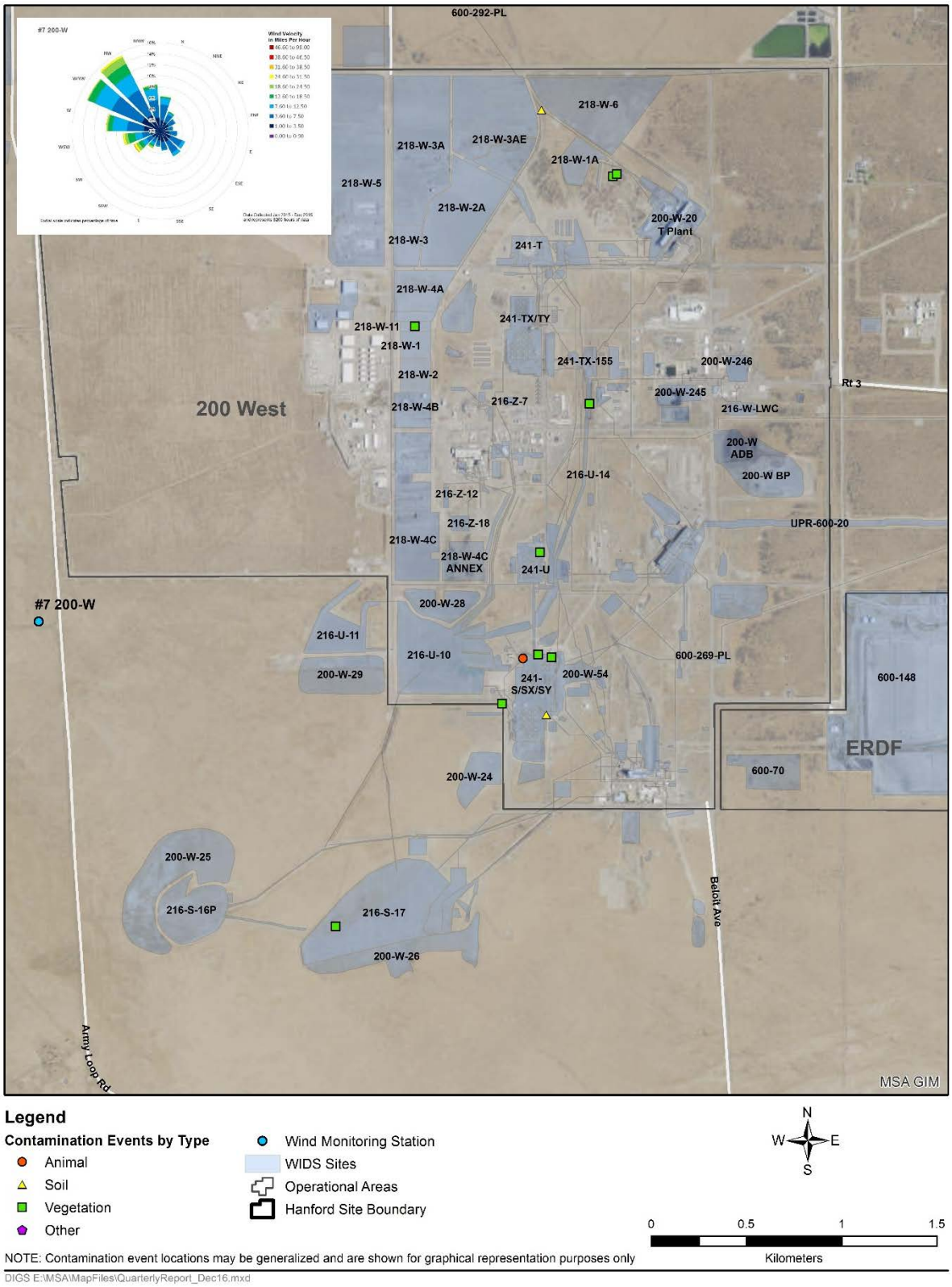


Figure 3. Contamination incidents discovered in 200 West and 600 Area through 4th Quarter 2016

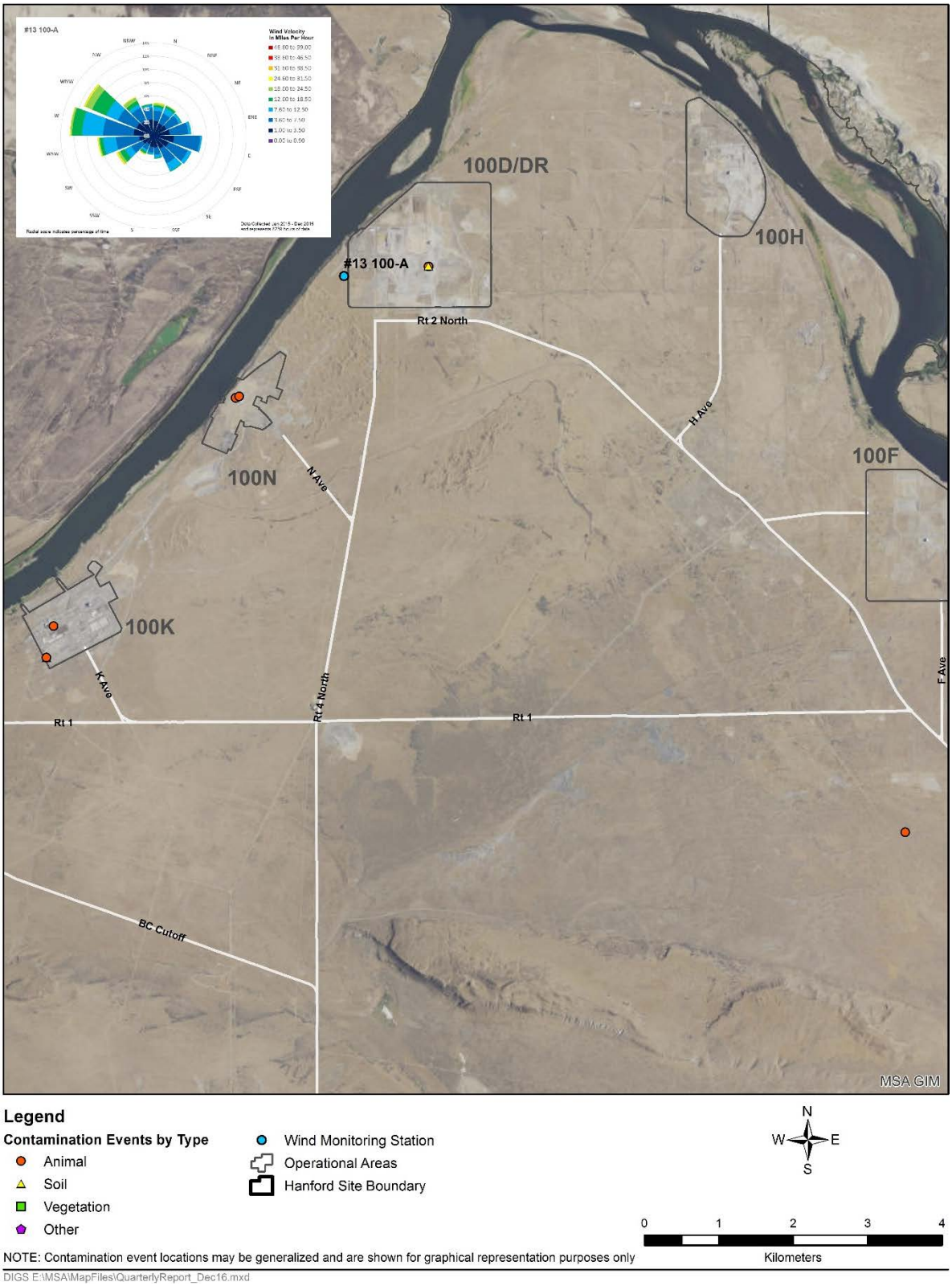


Figure 4. Contamination incidents discovered in the 100 Areas and 600 Area through 4th quarter 2016

4.0 BIOTIC TRANSPORT

Waste management, environmental protection, safety, and ALARA practices on the Hanford Site require that whenever possible, radiological contamination exposed to the environment be cleaned up or stabilized so that it is not easily transported from posted radiological control areas. 10 CFR 835 requires that appropriate controls be maintained and verified which prevent the inadvertent transfer of removable contamination to locations outside of radiological areas under normal operating conditions.

In response to a U.S. Department of Energy, Richland Operations Office (DOE-RL) concern, a centralized Integrated Biological Control (IBC) Program to control the spread of contamination caused by biotic vectors was established in 1999. The IBC provides vegetation control through herbicide application, mechanical removal, and vegetation removal in areas of accumulation. Trapping, baiting, fumigation, and the application of pesticides are used to control the spread of contamination by animals and insects.

4.1 Deep-Rooted Vegetation Vectors

Deep-rooted vegetation (e.g., tumbleweeds, sagebrush) growing over underground sources of radionuclides may selectively uptake contaminants into their tissues. When radionuclides are transported from roots to aerial portions of the plant, surface contamination may result, which poses a potential risk of environmental transport or human contact and can be very costly to clean up and/or stabilize.

A review of radiological reports (Radiological Problem, Problem Evaluation, Daily Activity, Occurrence, IBC Monthly, and Radiological Survey Records) identified 2 incidents of contaminated vegetation during the fourth quarter of CY 2016.

Table 4 summarizes the number of reported incidents of contaminated vegetation found and the range of activity encountered between CY 1995 and CY 2016. It has been determined through field readings that the dose rate for meter readings on tumbleweeds having greater than 6,000,000 dpm/100 cm^2 ranges from approximately 2.0 to 50 millirad (mrad)/hr.

Table 4. Yearly Summary of Reported Contaminated Vegetation Incidents

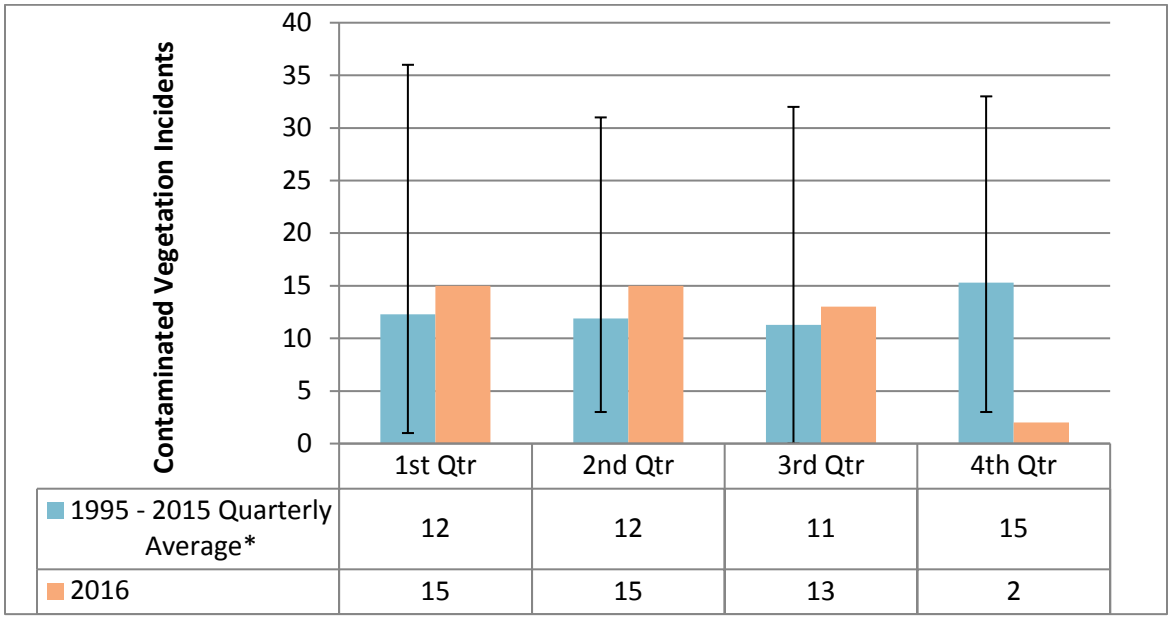
Year	Number of Incidents	Maximum Activity (dpm) B/G*	Minimum Activity (dpm) B/G
2016	45	>5,000,000/100 cm^2	2,000/100 cm^2
2015	48	2,000,000/100 cm^2	2,000/100 cm^2
2014	50	3,600,000/100 cm^2	2,000/100 cm^2
2013	35	1,200,000/100 cm^2	5,000/100 cm^2
2012	18	2,400,000/100 cm^2	4,000/100 cm^2
2011	29	>1,000,000/100 cm^2	5,000/100 cm^2
2010	31	>1,000,000/100 cm^2	7,000/100 cm^2
2009	88	>6,000,000/100 cm^2	2,500/100 cm^2
2008	127	>6,000,000/100 cm^2	6,000/100 cm^2
2007	62	2,400,000/100 cm^2	3,000/100 cm^2
2006	75	5,397,000/100 cm^2	10,000/100 cm^2
2005	66	1,800,000/100 cm^2	6,000/100 cm^2
2004	60	540,000/100 cm^2	4,000/100 cm^2
2003	32	3,600,000/100 cm^2	6,000/100 cm^2
2002	16	1,800,000/100 cm^2	3,000/100 cm^2
2001	31	>6,000,000/100 cm^2 †	6,000/100 cm^2
2000	65	>1,000,000/100 cm^2	5,000/100 cm^2
1999	84	>1,000,000/100 cm^2	8,000/100 cm^2
1998	51	>1,000,000/100 cm^2	4,000/100 cm^2
1997	42	>1,000,000/PA	2,500/PA
1996	21	800,000/PA	6,000/PA
1995	12	250,000/PA	2,000/PA

* The reporting of the activity changed in 1998 to meet the requirements identified in each contractor's radiological control manuals. The activity is reported in dpm per probe area prior to 1998 and in dpm per 100 cm^2 since 1998 (unless otherwise noted; e.g., for a speck or insect).

† The >6,000,000/100 cm^2 used in 2001 and subsequent years includes a factor of 6 to correct from probe area to 100 cm^2 that was not used in previous years.

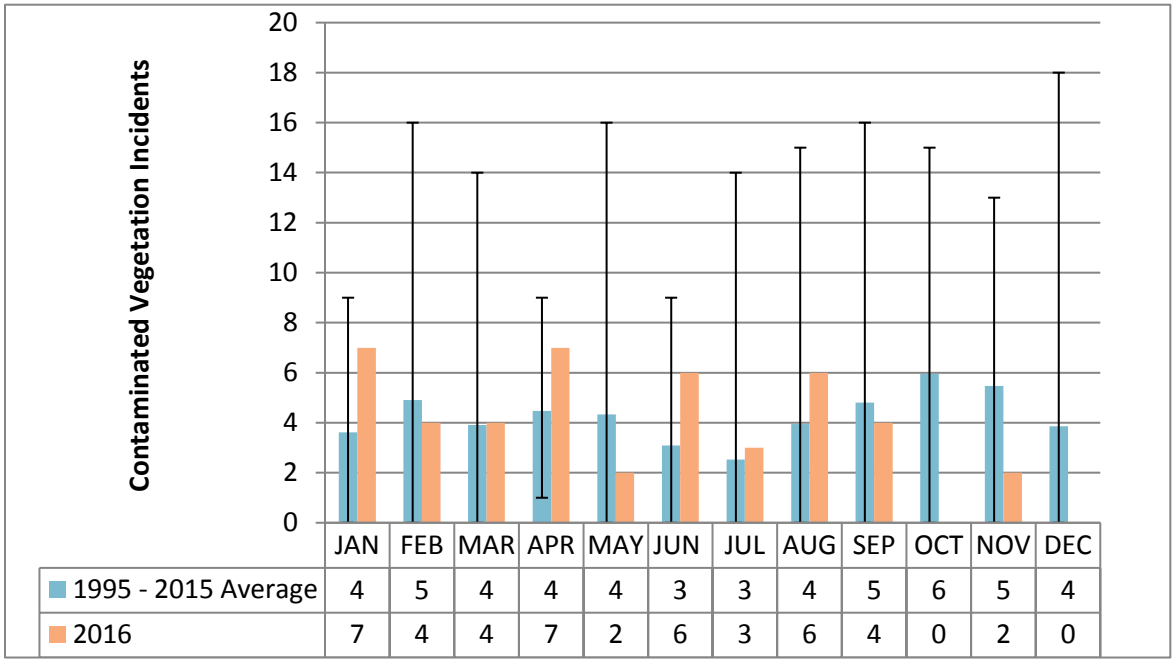
Figure 5 depicts graphically the average number of reported contaminated vegetation incidents encountered quarterly between CY 1995 and CY 2015 and the number of incidents occurring quarterly during CY 2016. Figure 6 displays the average number of reported contaminated vegetation incidents encountered monthly between CY 1995 and CY 2015 and the number of incidents occurring monthly during CY 2016. Figures 5 and 6 are a direct comparison of quarterly and monthly averages to the current year and not figures of cumulative results throughout the year. These graphics also demonstrate the increase in spring and summer growth and the spread of deceased plant material during the fall and winter. This focus provides a visual explanation for whether a given period has had an increase compared to recent years as opposed to looking for the data only each year.

Figure 5. Quarterly Average of Reported Contaminated Vegetation Incidents



NOTE: *Historical data also shows range of the number of contaminated vegetation incidents reported.*
** Not cumulative total*

Figure 6. Reported Contaminated Vegetation Incidents by Month



NOTE: *Historical data also shows range of the number of contaminated vegetation incidents reported.*

4.2 Animal Vectors

Biotic transport of radiological contamination through animal (insects, mice, etc.) vectors has been a major cause of contamination spread throughout the Hanford Site for a number of years. A review of radiological reports (Radiological Problem, Problem Evaluation, Daily Activity, Occurrence, IBC monthly, and Radiological Survey Records) during this reporting period identified 3 incidents of a contaminated animal.

Table 5 shows the number of reported contaminated animal-related incidences found and the range of activity encountered during CY 1995 through CY 2016. It should be noted that the dose rates for meter readings greater than 6,000,000 dpm/100 cm^2 or 1,000,000 dpm/PA detected in the animals and insects could range as much as approximately 1.5 to 15 mrad/hr.

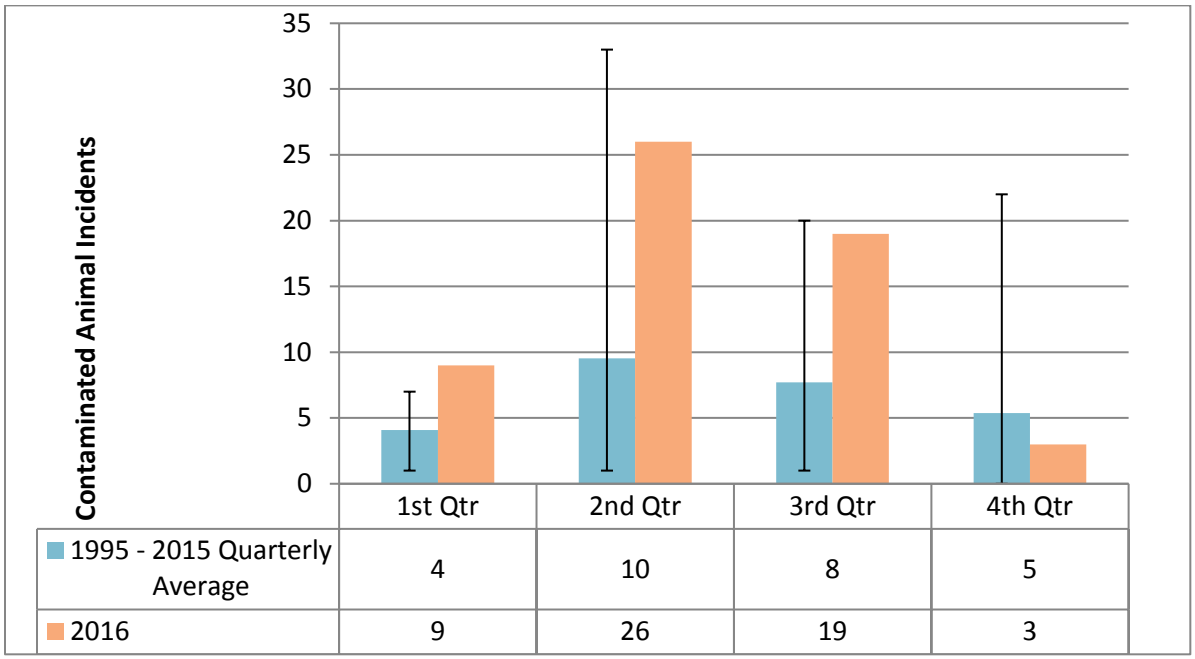
Table 5. Yearly Summary of Reported Contaminated Animal-/Insect-Related Incidents

Year	Number of Incidents	Maximum Activity (dpm) B/G*	Minimum Activity (dpm) B/G
2016	56	340,000/100 cm^2	3,000/100 cm^2
2015	45	200,000/100 cm^2	2,500/100 cm^2
2014	33	1,400,000/100 cm^2	1,000/100 cm^2
2013	48	1,800,000/100 cm^2	500/100 cm^2
2012	13	>1,000,000/100 cm^2	7,000/100 cm^2
2011	19	>1,000,000/100 cm^2	18,000/100 cm^2
2010	21	1,950,000/100 cm^2	3,000/100 cm^2
2009	26	>1,000,000/100 cm^2	20,000/100 cm^2
2008	30	3,600,000/100 cm^2	1,500/100 cm^2
2007	6	600,000/100 cm^2	20,000/100 cm^2
2006	17	>1,000,000/100 cm^2	4,000/100 cm^2
2005	13	>1,000,000/100 cm^2	4,000/100 cm^2
2004	20	649,000/100 cm^2	1,500/100 cm^2
2003	26	1,200,000/100 cm^2	900 cpm
2002	10	42,000/100cm^2 alpha †	2,500/100 cm^2
2001	10	>6,000,000/100 cm^2 ‡	1,000/PA
2000	13	300,000/100 cm^2	3,000/100 cm^2
1999	17	500,000/100 cm^2	2,000/PA
1998	46	>1,000,000/100 cm^2	4,000/100 cm^2
1997	27	>1,000,000/PA	NR
1996	44	>1,000,000/PA	500/PA
1995	28	>1,000,000/PA	2,000/PA

NR = no activity above background recorded in the field
* The reporting of the activity changed in 1998 to meet the requirements identified in each contractor's radiological control manuals. The activity is reported in dpm per probe area prior to 1998 and in dpm per 100 cm^2 since 1998 (unless otherwise noted; e.g., for a spec or insect). Activity is reported as beta/gamma, unless otherwise noted.
† No beta/gamma reported on this incident.
‡ The >6,000,000/100 cm^2 being used in 2001 and subsequent years includes a factor of 6 to correct from probe area to 100 cm^2 that was not used in previous years.

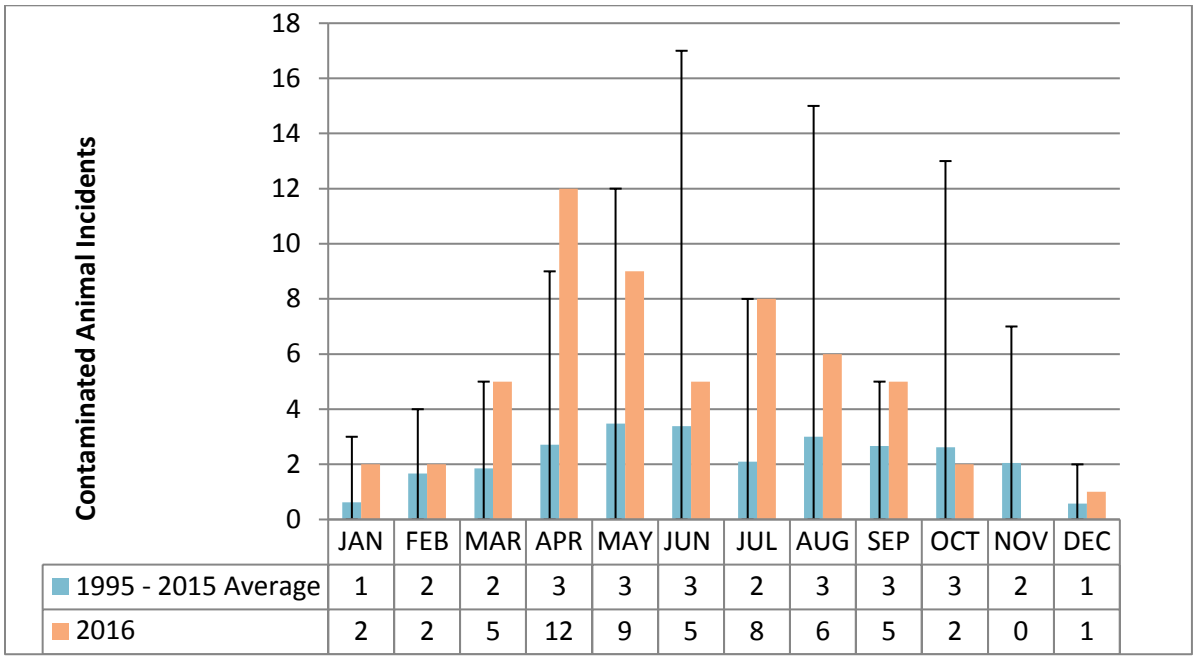
Figure 7 summarizes the average number of reported contaminated animal incidents encountered quarterly from CY 1995 through CY 2015 and the number of incidents occurring quarterly during CY 2016. This graphic also demonstrates the increase in spring and summer activity and the decreased activity of animals during the winter. An increased effort of radiological surveys at the liquid effluent retention facility and effluent treatment facility has led to an increase in discovering animal incidents. This is reflected in the locations listed in Table 2 and the high number of surveys performed by WRPS in section 5.0. Figure 8 displays the average number of reported contaminated animal incidents encountered monthly between CY 1995 and CY 2015 and the number of incidents occurring monthly during CY 2016. Figures 7 and 8 are a direct comparison of quarterly and monthly averages to the current year and not a figure of cumulative results throughout the year. This focus provides a visual explanation for whether a given period has had an increase compared to recent years as opposed to looking for the data only each year.

Figure 7. Quarterly Average of Reported Contaminated Animal/Insect Incidents



NOTE: *Historical data also show range of the number of contaminated animal incidents reported.*
**Not cumulative total*

Figure 8. Reported Contaminated Animal/Insect Incidents by Month



NOTE: *Historical data also shows range of the number of contaminated animal incidents reported.*

4.3 Integrated Biological Control Program

The IBC Program implements the requirements of DOE/RL-98-77 Rev 0, *Control of the Spread of Radioactive Contamination Due to Biological Transport on the Hanford Site*. Radioactive contamination control within facility perimeters is the responsibility of the affected facility landlord and the facility Radiation Protection organization. However, by agreement with the affected facility landlord (i.e., Administrative Interface Agreement) and the facility Radiation Protection organizations, the IBC program may take actions inside facility perimeters consistent with the IBC mission and the Hanford Strategic Plan. The agreement establishes the applicable contract and radiological program controls.

IBC includes any activity taken to prevent, limit, clean up, or remediate potential environmental, health and safety, or workplace quality impacts from or to plants, animals, or the native environment. These activities include the control of noxious weeds, industrial weeds, other vegetation, animal pests, and clean-up of vegetation and animal remains (windblown tumbleweeds, animal feces, and animal carcasses), for the purposes of protecting employees, the public, and site cultural and environmental (including biological) resources.

IBC conducts a monthly meeting with all Hanford Site contractors to discuss spray, waste site maintenance, lessons learned, findings, and other related information.

4.3.1 Surveillance

There were 3 animal-related contamination incidents reported during the fourth quarter of CY 2016, less than the fourth quarter average of five for CY 1995 through CY 2015. In addition, there were 2 vegetation-related incidents, much less than the fourth quarter average of fifteen for CY 1995 through CY 2015. The radioactivity monitoring and surveillance activities for this quarter indicated that the control of contaminated vegetation-related material was maintained and was consistent with incidents reported during the same period in previous years.

4.3.2 Clean-Up

The IBC continued removal and cleanup of tumbleweeds in the operations areas in CY 2016. Tumbleweeds are collected and disposed of, with uncontaminated tumbleweeds are burned in place, or compacted and transported to a central location where they are burned. Tumbleweeds that may potentially be contaminated are surveyed, and compacted in a regulated compactor. The regulated compactor is a truck mounted compactor, configured and dedicated to handle and transport radioactive tumbleweeds. Potentially contaminated (regulated) tumbleweeds are disposed of in a burial ground licensed for disposal of hazardous and radioactive waste. One full load from either the regulated or non-regulated compactor trucks produce a compacted bale approximately 12 yd^3. Cleanup and stabilization activities during the fourth quarter of CY 2016 include the following:

- A total of 21 non-regulated compactor truckloads of tumbleweeds were taken to the 200-West burn pit for disposal.
- Two (2) regulated compactor truckloads of tumbleweeds were taken to the Environmental Restoration Disposal Facility (ERDF) for disposal.

4.3.3 Control

In CY 2009, the IBC Program was revised and implemented to rotate herbicides used to control deep-rooted vegetation to prevent vegetation from developing a chemical resistance from the usage of the same herbicide chemistry over a period of years. Test plots were set up outside the 200 East and 200 West Areas to test several herbicides and their application rates. New products are being tested so that the most effective herbicide is used on the Hanford Site.

Highlights for this quarter include the following:

- Approximately 417 hectares (1030 acres) of Hanford Site land were treated with herbicides.
- 135 pest control responses for Hanford Site facilities were conducted.
- 3406 bait stations and animal control devices were in place.
- 426 animals were captured.

4.3.4 Noxious Weed Control

The DOE-RL is obligated by the *Agriculture Risk Protection Act of 2000* to control noxious weeds, and each DOE facility is required to have a noxious weed management program for compliance with federal, state, and local laws. The Washington Administrative Code (WAC) 16-750, *State Noxious Weed List and Schedule of Monetary Penalties*, and Revised Code of Washington (RCW) 17.10, *Noxious Weeds – Control Boards*, require all landowners to control noxious weeds on their property and impose specific penalties for failure to do so. The Washington State Noxious Weed laws are enforced by the county Noxious Weed Control Boards.

Noxious weeds are treated with herbicide applications when found on industrial areas such as waste sites, parking lots, and road shoulders. However, noxious weeds treatment outside of active industrial areas has been limited. Recent decisions regarding application of the *National Environmental Policy Act of 1969* (NEPA) to noxious weed control have affected the ability to control weeds, so resolution to the issues is being sought. Currently, herbicide applications by MSA Biological Controls for invasive plants and noxious weeds are addressed by the following two NEPA documents depending upon the scope of the work.

4.3.4.1 DOE/CX-00111, Rev. 3, MSA Annual Categorical Exclusion for Routine Maintenance and Custodial Services under 10 CFR 1021, Subpart D, Appendix B, B1.3

- Localized vegetation and pest control. Localized is defined as landscaped areas around buildings, structures, and infrastructures maintained for visual aesthetics.
- Erosion control and soil stabilization measures (i.e., reseeding, gabions, grading, and revegetation).
- Cultural and ecological resource reviews and clearances are required to apply the Annual CX to work activities.
- Other considerations in accordance with the Work Management System (i.e., Environmental Activity Screening Form, Automated Job Hazards Analysis, etc.) are required to perform the work.

4.3.4.2 DOE/EA-1728-F, Environmental Assessment for Integrated Vegetation Management on the Hanford Site, Richland, Washington

- Application of physical, chemical, biological, prescribed burning, and revegetation methods to control invasive plants and noxious weeds.
- Includes vegetation management in radiological and chemical waste management areas (i.e., tank farms, solid waste burial grounds and landfills, liquid waste ponds, ditches, cribs, and unplanned release sites, infrastructure areas [i.e., roadways, railways, power lines, rights-of-way, and fence lines]), and rangelands).
- Cultural and ecological resource reviews and clearances are required prior to performing work.
- Vegetation management conducted to reduce or eradicate invasive plants and noxious weeds, minimize biological uptake and transport of contaminants, reduce or eliminate wildfire hazards, restore and preserve native and other desirable plant communities and wildlife habitat, and protect natural, cultural, and ecological resources.

Zero (0) acres of herbicide application for noxious weeds occurred during the reporting period. For a detailed description of the noxious weeds found on the Hanford Site, refer to the *Hanford Site Environmental Report*.

5.0 SUMMARY

There were 222 routine outdoor radiological surveys reported as completed during the fourth quarter in the 200, 300, and 600 Areas. Of the 222 surveys reported, 154 were performed by CHPRC, 44 by WRPS, and 24 by MSA.

During the fourth quarter of CY 2016, there were 2 incidents of contaminated vegetation (tumbleweeds and bunch grass), 3 incidents of contaminated animal-related material, and 2 incidents of soil-related contamination. These numbers compare to 14 incidents of contaminated vegetation, 10 incidents of contaminated animal-related material, and 3 soil contamination incidents during the same reporting period in CY 2015. Levels of activity during the fourth quarter of CY 2016 ranged from 1,300 dpm/100 cm^2 to 1,500,000 dpm/100 cm^2 beta/gamma.

6.0 ANNUAL RADIOLOGICAL SURVEYS

6.1 CH2M Plateau Remediation Company

Outdoor radiological waste sites under the responsibility of CHPRC are radiologically surveyed at least once per year. If warranted, more frequent surveys are performed to provide assurance that contamination and migration controls are effective. Visual inspections for housekeeping, proper posting, subsidence, animal or plant intrusion, etc. are also performed annually, at a minimum. CHPRC performs radiological surveys in accordance with PRC-RD-EP-15332, *Environmental Protection*

Requirements, and PRC-PRO-EP-15334, *Effluent and Environmental Monitoring for Radionuclide Airborne Emissions*. Contact the CHPRC radiological control organization for the potential annual survey site list.

6.2 Washington Closure Hanford

Outdoor radiological waste sites under the River Corridor Cleanup Project (RCCP) are the responsibility of WCH and are surveyed at least annually to provide a level of assurance that the contamination controls for the various waste sites are effective. Annual radiological surveys scheduled for some sites under the RCCP may not be performed as scheduled. The RCCP survey schedule is only a recommendation, and the surveys may not be performed as scheduled due to various closure project activities and other actions. Several of these sites are undergoing remediation and receive frequent radiological surveys, while other sites have completed remediation and await final approval for release. WCH performs radiological surveys in accordance with ENV-1, Chapter 1.9, *Environmental Monitoring and Management*. The WCH contract on the Hanford Site expired on September 30, 2016, therefore WCH did not perform any surveys after that date.

6.3 Washington River Protection Solutions

Outdoor radiological waste sites under the responsibility of WRPS are radiologically surveyed at least once per year. If warranted, more frequent surveys are performed to provide assurance that contamination and migration controls are effective. Visual inspections for housekeeping, proper posting, subsidence, animal or plant intrusion, etc. are also performed annually, at a minimum. WRPS performs radiological surveys in accordance with TFC-ESHQ-RP_MON-P-10, *Required Radiological Surveillances*. Contact the WRPS Radiological Control Organization for the potential annual survey site list.

6.4 Mission Support Alliance

MSA performs radiation surveys with portable instruments at active and inactive waste disposal sites and the surrounding terrain to monitor and detect contamination and to provide a coarse screening for external radiation fields. The types of areas surveyed included underground radioactive material areas, contamination areas, soil contamination areas, high-contamination areas, roads, and fence lines. Radiological surveys are required by the Washington State Department of Health as a qualitative indicator of the environmental monitoring program (#FF-01 License, section 5.1.2). MSA performs radiological surveys in accordance with MSC-PRO-EI-15334, *Effluent and Environmental Monitoring* and MSC-RD-15332, *Environmental Protection Requirements.* The MSA potential annual survey site list is provided in DOE/RL-2013-53 *Hanford Site Environmental Surveillance Master Sampling Schedule for Calendar Year 2016*.

REFERENCES

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DOE/EA-1728-F. *Environmental Assessment for Integrated Vegetation Management on the Hanford Site*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-98-077 Rev. 0, *Control of the Spread of Radioactive Contamination Due to Biological Transport on the Hanford Site*, Richland, Washington.

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ENV-1. *Environmental Monitoring and Management,* Washington Closure Hanford, LLC, Richland, Washington.

Hanford Site Environmental Reports. Mission Support Alliance, Richland, Washington.

HNF-48562. *Administrative Interface Agreement between CH2M HILL Plateau Remediation Company (CHPRC) and Washington Closure Hanford (WCH), Washington River Protection Solutions (WRPS), Mission Support Alliance (MSA), and Pacific Northwest National Laboratory (PNNL) for Hanford Environmental Data Integration*, CH2M HILL Plateau Remediation Company, Richland, Washington.

HNF-5183. *Tank Farms Radiological Control Manual,* Washington River Protection Solutions, LLC, Richland, Washington.

MSC-OTHER-RC-5173. *MSC Radiological Control Manual*, Mission Support Alliance, LLC, Richland, Washington.

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RCW 17.10. "Noxious Weeds – Control Boards," *Revised Code of Washington*, as amended.

TFC-ESHQ-RP_MON-P-10. *Required Radiological Surveillances,* Washington River Protection Solutions, LLC, Richland, Washington.

UCRL-88275. *Evaluation of Beta Energy (E max) and Spectral Type Using Survey Instruments*, D. E. Hankins, October 1982.

WAC 16-750. "State Noxious Weed List and Schedule of Monetary Penalties," *Washington Administrative Code*, Olympia, Washington.

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