1243672
[00716644]

HNF-SP-0665-67

Quarterly Environmental Radiological Survey Summary

Fourth Quarter 2007
100, 200, 300, and 600 Areas

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

Project Hanford Management Contractor for the
U.S. Department of Energy under contract DE-AC06-96RL13200

Fluor Hanford
P.O. Box 1000
Richland, Washington

RECEIVED
APR 05 2017
EDMC

Approved for Public Release;
Further Dissemination Unlimited

Quarterly Environmental Radiological Survey Summary Fourth Quarter 2007 100, 200, 300, and 600 Areas

Document Type: RPT

S. M. McKinney
M. C. Dorsey
Energy *Solutions* Federal Services, Inc.

Date Published
January 2008

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

Project Hanford Management Contractor for the
U.S. Department of Energy under contract DE-AC06-96RL13200

Fluor Hanford

P.O. Box 1000
Richland, Washington

Release Approval 01/29/2008 Date

Approved for Public Release;
Further Dissemination Unlimited

TRADEMARK DISCLAIMER

Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, OR otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

This report has been reproduced from the best available copy.

Printed in the United States of America

QUARTERLY ENVIRONMENTAL RADIOLOGICAL SURVEY SUMMARY FOURTH QUARTER 2007 - 100, 200, 300, AND 600 AREAS

PREPARED BY

S. M. McKinney, Scientist
Energy *Solutions* Federal Services, Inc.
Environmental Monitoring and Investigations

01/22/08
Date

REVIEWED BY

R. C. Roos, Scientist
Energy *Solutions* Federal Services, Inc.
Environmental Monitoring and Investigations

01/24/08
Date

APPROVED BY:

J. J. Dorian, Program Manager
Energy *Solutions* Federal Services, Inc.
Environmental Monitoring and Investigations

01/22/08
Date

K. A. Peterson, Manager
Fluor Hanford, Inc.
Monitoring and Reporting

1/23/08
Date

EXECUTIVE SUMMARY

This report provides a summary of the radiological surveys performed in support of near-facility environmental monitoring at the Hanford Site during the fourth quarter of 2007 and calendar year (CY) 2007. The survey results and the status of actions required are summarized below. During the fourth quarter of CY 2007:

- Eighty-two routine environmental radiological surveys scheduled during October, November, and December were performed as planned. .

- Sixty-three scheduled surveys were conducted at Fluor Hanford, Inc. (FH) managed sites, and nineteen at CH2M Hill Hanford Group (CHG) managed sites. The Washington Closure Hanford, LLC (WCH) waste site surveys scheduled for CY 2007 were completed during the third quarters.

- Contamination above background levels was found at twenty-five of the FH sites, twenty of the CHG sites, and one of the WCH sites. Contamination levels were detected as high as >9,000,000 disintegrations per minute (dpm) per 100cm^2 beta/gamma. Of the forty-six sites where contamination was found, thirty-four sites were in located in underground radioactive materials (URM) areas, five were in radiologically controlled areas (RCA), five were in contamination areas (CA), and two were in unposted areas. The contamination found was removed in all but five areas, and these sites were posted to meet the requirements of HNF-5173.

  Of the forty-six contamination incidents discovered, eight were caused by animal/insect intrusion, thirty-three were caused by vegetation uptake, four were from soil/specks and one was caused by legacy contamination (pipe elbow joint).

- Stabilization activities during the fourth quarter of CY 2007 were conducted on waste sites in the 200-East and the Wautoma Burn areas which consisted of re-seeding with native grasses and forbs on 2,070 hectares (7,338 acres).

- No new waste sites were identified for inclusion into the Waste Identification Data System (WIDS) during the fourth quarter of CY 2007.

Biological Control Program accomplishments for the fourth quarter of 2007 include:

- 243 hectares (600 acres) of Hanford land were treated with herbicides.

- 7,503 pest control responses were conducted for Hanford Site facilities.

- 45 hectares (109 acres) of the underground transfer line right-of-ways inside the 200-E and 200-W areas were mowed during this period.

- 14.5 non-regulated compactor truckloads of tumbleweeds were taken to the 200-W burn pit for disposal and 2 regulated compactor truck loads were taken to Permafix NW for disposal (1-compactor truckload ≈ 20 cubic yards).

The survey results and accomplishments for calendar year 2007 are summarized below.

- During CY 2007, four hundred sixty-four scheduled radiological surveys were performed. Contamination was found in one hundred twenty-two of the waste sites surveyed, 11 in contamination/soil contamination areas (CA/SCA), 97 in underground radioactive material areas (URM), 8 in radiologically controlled/radioactive materials areas (RCA/RMA), 2 in fixed contamination areas (FCA), and 4 in unposted areas.

- The number of incidents of contaminated animals/insects observed during 2007 (34) was approaching the high years reported in 1996 (44) and 1998 (46). The majority of the contaminated animal/insect incidents in 2007 were due primarily to rabbit/mice activity.

- The number of vegetation incidents in 2007 (62) was in between those in 2004 (60) and 2005 (66), two of the higher years to date. An assessment of the biological control program conducted during 2006 concluded that the vegetation had developed a chemical resistance from the usage of the same herbicide over a period of years. A program was developed to rotate the herbicides used to control the deep rooted vegetation and was implemented during 2007. The effectiveness of this program should be realized during CY 2008.

- Remediation activities in the 100 and 600 areas have resulted in the release from posting of 7 hectares (18 acres). Waste sites receiving interim closure by the River Corridor Project during CY 2007 include the 100-B-14 Process Sewer Pipelines, 1607-B2 Septic Tank System, 100-C-9 Process Sewer Pipelines, 118-C-1 Burial Ground, 100-F-20 Animal Farm Trenches, 116-F-15 Sump, 126-F-1 Powerhouse Ash Pit, 1607-F-3 Septic Tank System, 132-H-1 Reactor Stack Burial Site, and the 216-N-5 Trench.

- Six waste disposal cells have been excavated in the Environmental Restoration Disposal Facility (ERDF). The contract for the construction of cells 7 and 8 was awarded in December 2007. When the new expansion is completed the ERDF will have a capacity of over eleven million tons of waste from decommissioning activities in the 100, 200, 300, and 600 areas.

Biological Control program accomplishments during CY 2007 included:

- 5,009 hectares (12,378 acres) of Hanford land were treated with herbicides.
  - 2,055 hectares (5,078 acres) were treated for contamination control and fire protection.
  - 2,954 hectares (7,300 acres) were treated for noxious weed control.
- There were 27,606 pest control responses for Hanford Site facilities.

- 146 hectares (360 acres) of waste transfer lines in the 200-East and 200-West areas were mowed.
- 207 non-regulated compactor truckloads of tumbleweeds were taken to the 200-W burn pit for disposal.
- 18 regulated compactor truckloads of contaminated tumbleweeds were removed for disposal at Permafix NW (formerly PEcoS).

TOP TEN PRIORITY RANKING FOR CONTAMINATED WASTE SITES

Below is a ranking of the top ten contaminated waste sites in order of the highest priority for contamination control. Rankings are based on levels and types of contamination, proximity to human occupied or utilized areas and the history or potential to spread contamination. The prioritization system and rankings are described on page 12 of this report.

Waste Site	Custodian	Levels	Location	Mobility	Total
216-BC Cribs/Control Area	FH	4	3	5	12
241-C Tank Farm	CHG	5	2	5	12
216-U-10 Pond	FH	4	3	5	12
218-E-12B Burial Ground	FH	4	3	5	12
216-U-11 Pond	FH	4	2	5	11
241-BX/BY Tank Farm	CHG	4	2	5	11
UPR-600-20 Transfer Line	CHG	3	3	5	11
241-B Tank Farm	CHG	5	1	5	11
218-E-12A Burial Ground	FH	4	3	4	11
241-SX/SY Tank Farm	CHG	5	1	5	11

CH2M Hill Hanford Group = CHG
Fluor Hanford, Inc. = FH

This page intentionally left blank.

TABLE OF CONTENTS

EXECUTIVE SUMMARY i

TOP TEN PRIORITY RANKING FOR CONTAMINATED WASTE SITES iii

1.0 INTRODUCTION 1

AREA RADIOLOGICAL CONTAMINATION ILLUSTRATIONS 2-11

2.0 PROGRAM DESCRIPTION 12

2.1 ENVIRONMENTAL RADIOLOGICAL SURVEY OBJECTIVES 12

2.2 PRIORITY RANKING SYSTEM 12

2.3 ENVIRONMENTAL STANDARDS 13

2.4 SURVEY METHODS AND PROCEDURES 13

3.0 RADIOLOGICAL SURVEY SUMMARY 14

3.1 FOURTH QUARTER RADIOLOGICAL SURVEY SUMMARY 14

TABLE 1, CONTAMINATION INCIDENTS CY 2007 15

TABLE 2, CONTAMINATION INCIDENTS BY TYPE AND AREA . . 18

4.0 BIOTIC TRANSPORT 19

4.1 DEEP ROOTED VEGETATION VECTORS 19

TABLE 3, CONTAMINATED VEGETATION INCIDENTS 20

FIGURE 11, CONTAMINATION INCIDENTS VEGETATION 21

FIGURE 12, VEGETATION INCIDENTS BY MONTH 22

4.2 ANIMAL/INSECT VECTORS 23

TABLE 4, CONTAMINATED ANIMAL/INSECT INCIDENTS 24

FIGURE 13, CONTAMINATION INCIDENTS ANIMAL/INSECT 25

FIGURE 14, ANIMAL/INSECT INCIDENTS BY MONTH 26

4.3 BIOLOGICAL CONTROL PROGRAM 27

4.3.1 SURVEILLANCE 27

4.3.2 CLEANUP 27

4.3.3 CONTROL 28

4.3.4 NOXIOUS WEED CONTROL 29

4.3.5 SITE RESTORATION 29

5.0 SUMMARY 30

5.1 RADIOLOGICAL POSTING CHANGES 30

5.2 BIOTIC TRANSPORT ACTIVITY 30

TABLE 5, OUTDOOR CONTAMINATION STATUS 31

TABLE OF CONTENTS (CONTINUED)

TABLE 6, CONTAMINATION STATUS 32
FIGURE 15, BIOTIC TRANSPORT AT HANFORD 33
DISTRIBUTION 34

1.0 INTRODUCTION

Routine radiological surveys are an integral part of near-facility environmental monitoring, for tracking facility and waste site status, and to aid in directing the reduction of the radiological areas at the Hanford Site. The River Corridor Contractor and the Project Hanford Management Contract Radiological Control Groups perform the routine radiological surveys.

The surveys are performed at inactive waste sites; outdoor radiological control areas; tank farm perimeters; diversion boxes; lift stations; vent stations; perimeters of active or uncovered waste sites such as burial grounds, retention basins, ponds, process trenches, and ditches; underground pipelines; and road and rail, road surfaces (see Figures 1 through 10).

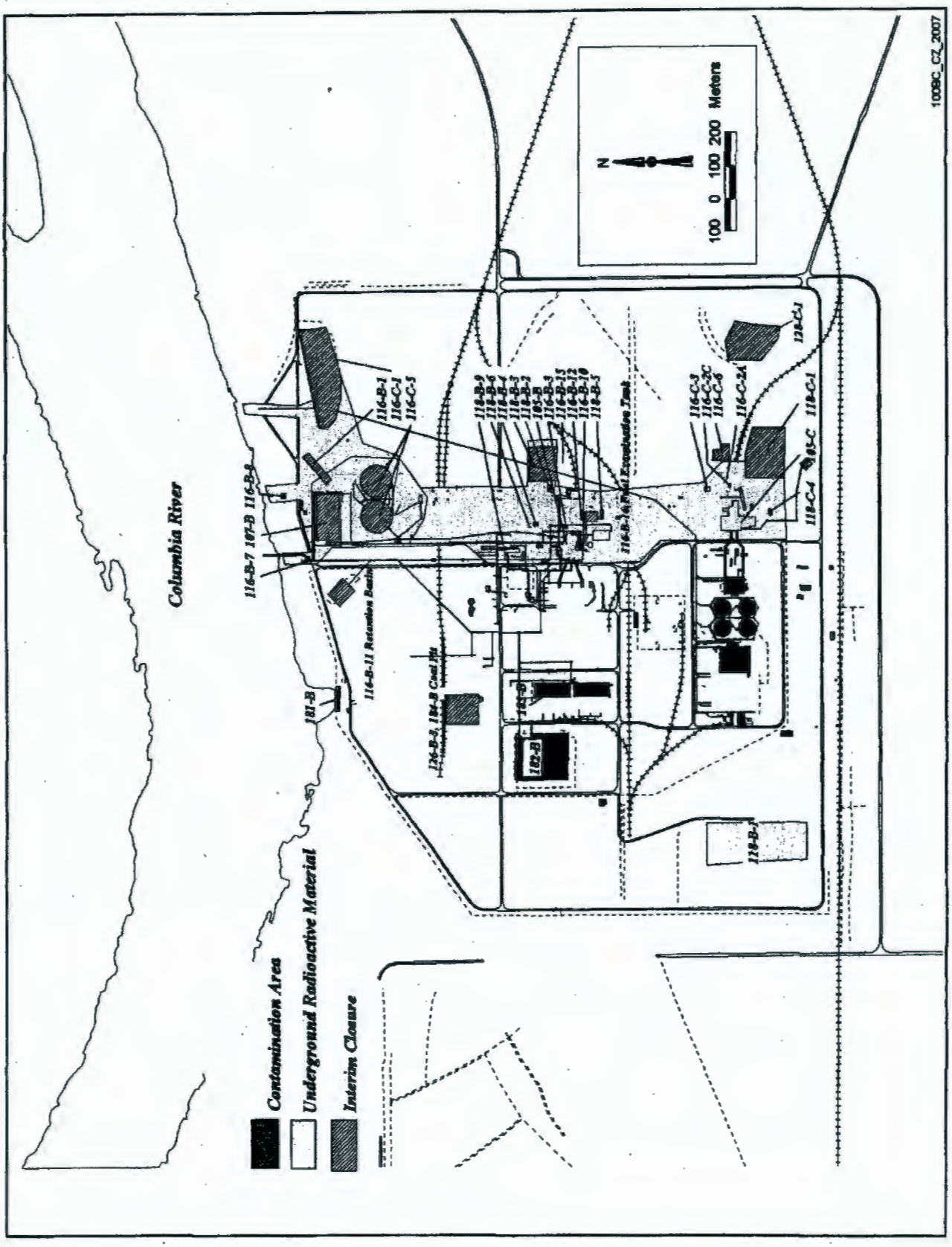
This report summarizes the radiological surveys performed in support of near-facility environmental monitoring at the Hanford Site during the fourth quarter of 2007 and calendar year 2007. The survey results and the status of actions required are also discussed.

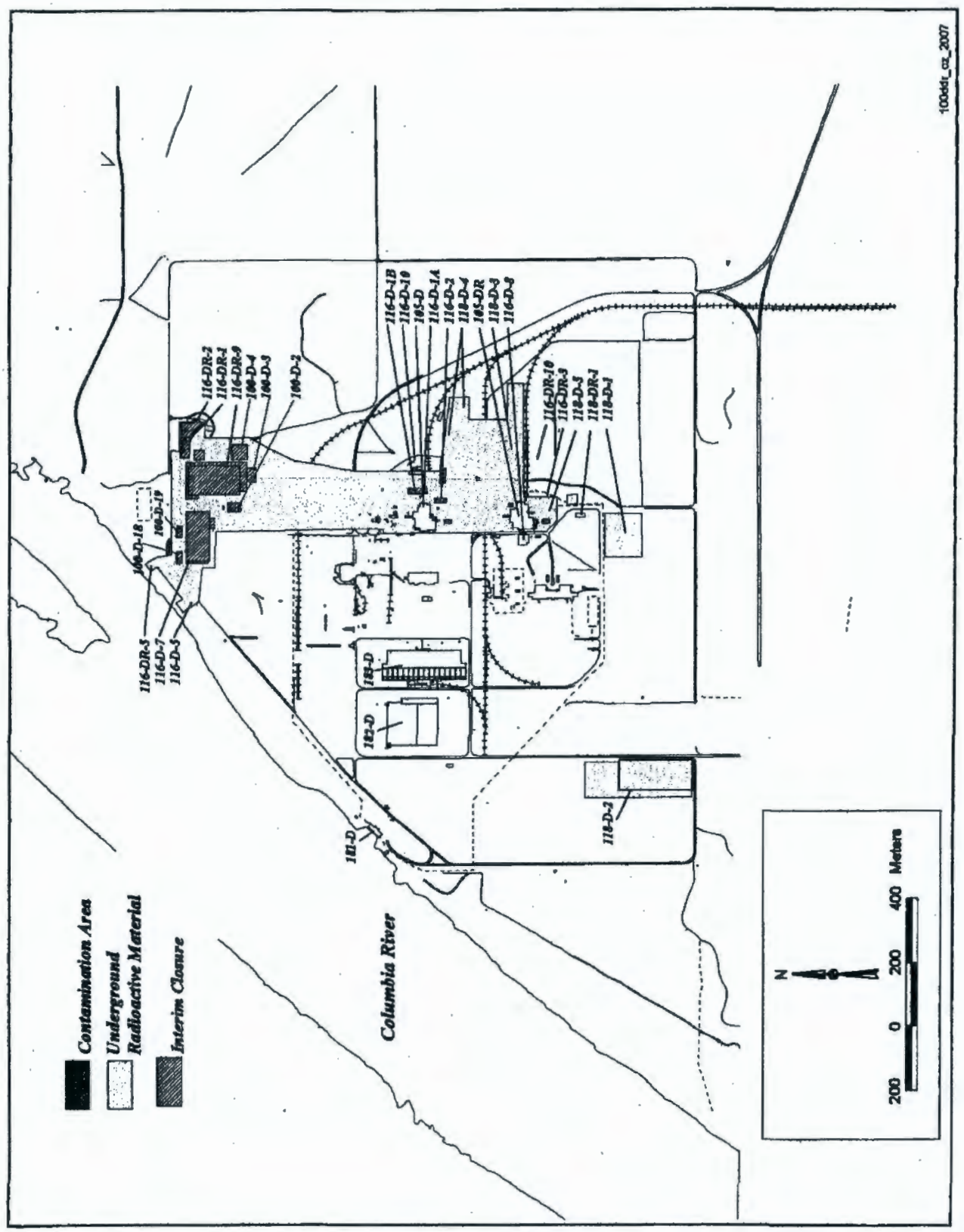
Complete surveillance coverage was assured by completing a waste site survey schedule, *Routine Environmental Monitoring Schedule, Calendar Year 2007*, (HNF-SP-0098-18). Environmental Monitoring and Investigations (EM&I) personnel working with the site Radiological Control Groups developed the schedule. EM&I personnel review the radiological survey reports and file a copy for summarization in the site annual environmental report, for historical purposes, and for reference. Radiological conditions are tracked and trends noted for use by the facility managers and the landlords.

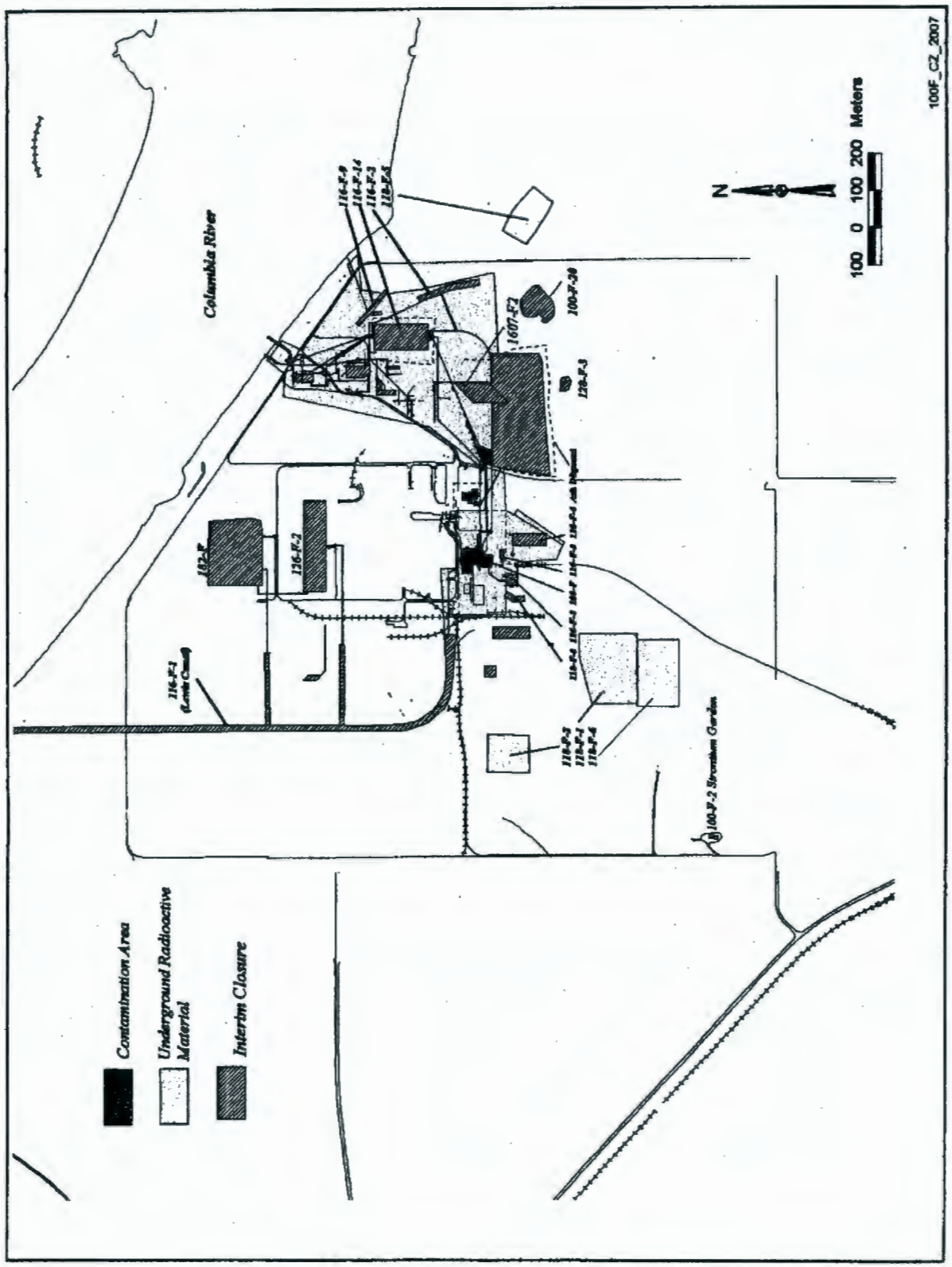
All known radioactive waste sites are surveyed at least once each year. Newly discovered radioactive waste sites/unplanned release sites are added to the schedule as necessary. The survey frequencies for particular sites are based on site history, radiological conditions, and general maintenance. Special surveys may be conducted at irregular frequencies if conditions warrant (i.e., growth of deep-rooted vegetation is noted at a waste site). Radiological surveys are conducted to detect surface contamination and document changes in vegetation growth, biological intrusion, erosion, and site maintenance conditions. Survey data are compared with standards identified in *PHMC Radiological Control Manual* (HNF-5173), as well as previous surveys to determine trends, assess environmental impact, and allow determination of where corrective actions are needed.

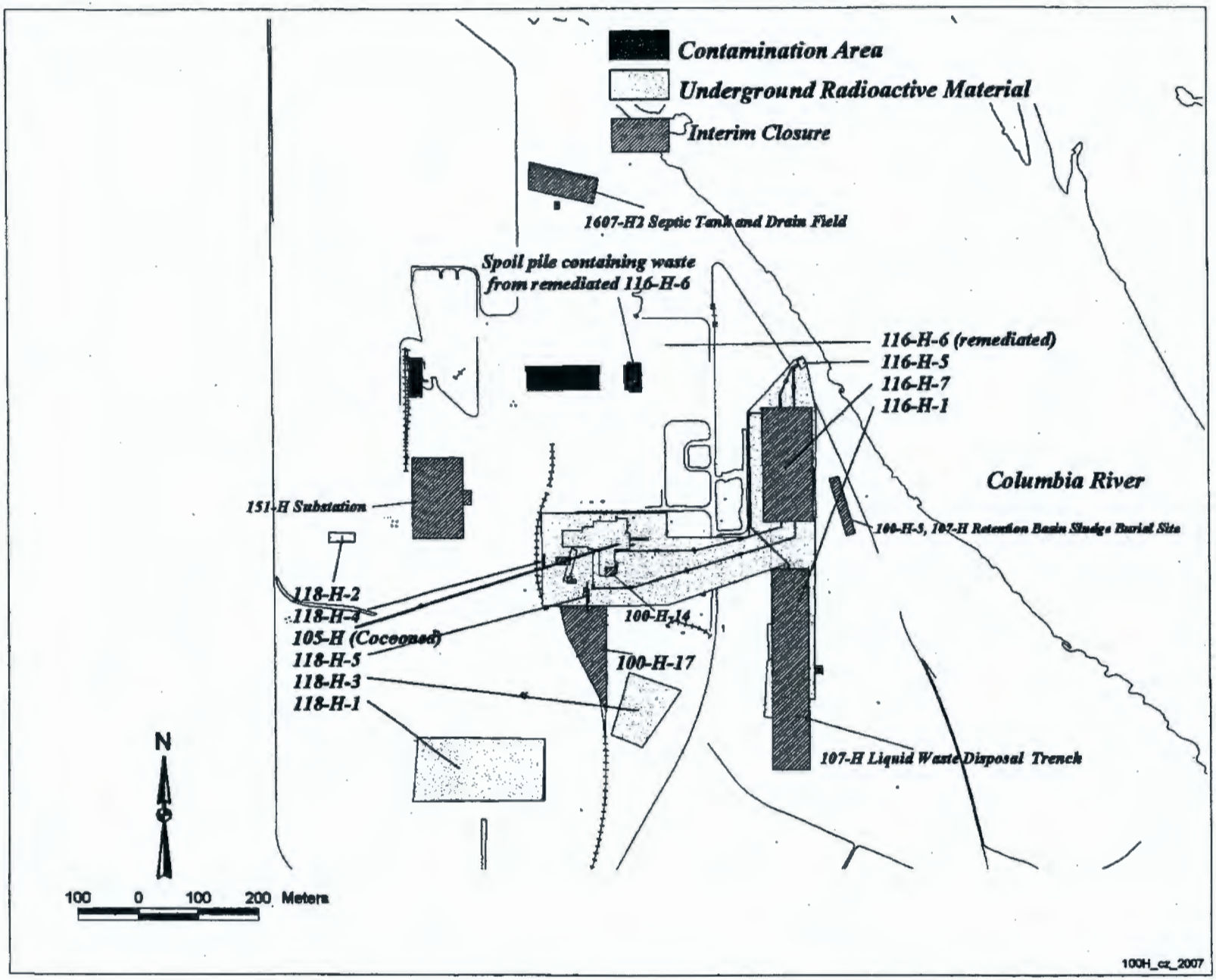
The Occurrence Reporting system is used to track legacy radioactive contamination greater than 10 times the total contamination values in 10 CFR Part 835, Appendix D and that is found outside a posted Contamination Area, High Contamination Area, Airborne Radioactivity Areas, Radiological Buffer Areas, and areas controlled in accordance with 10 CFR 835.1102(c).

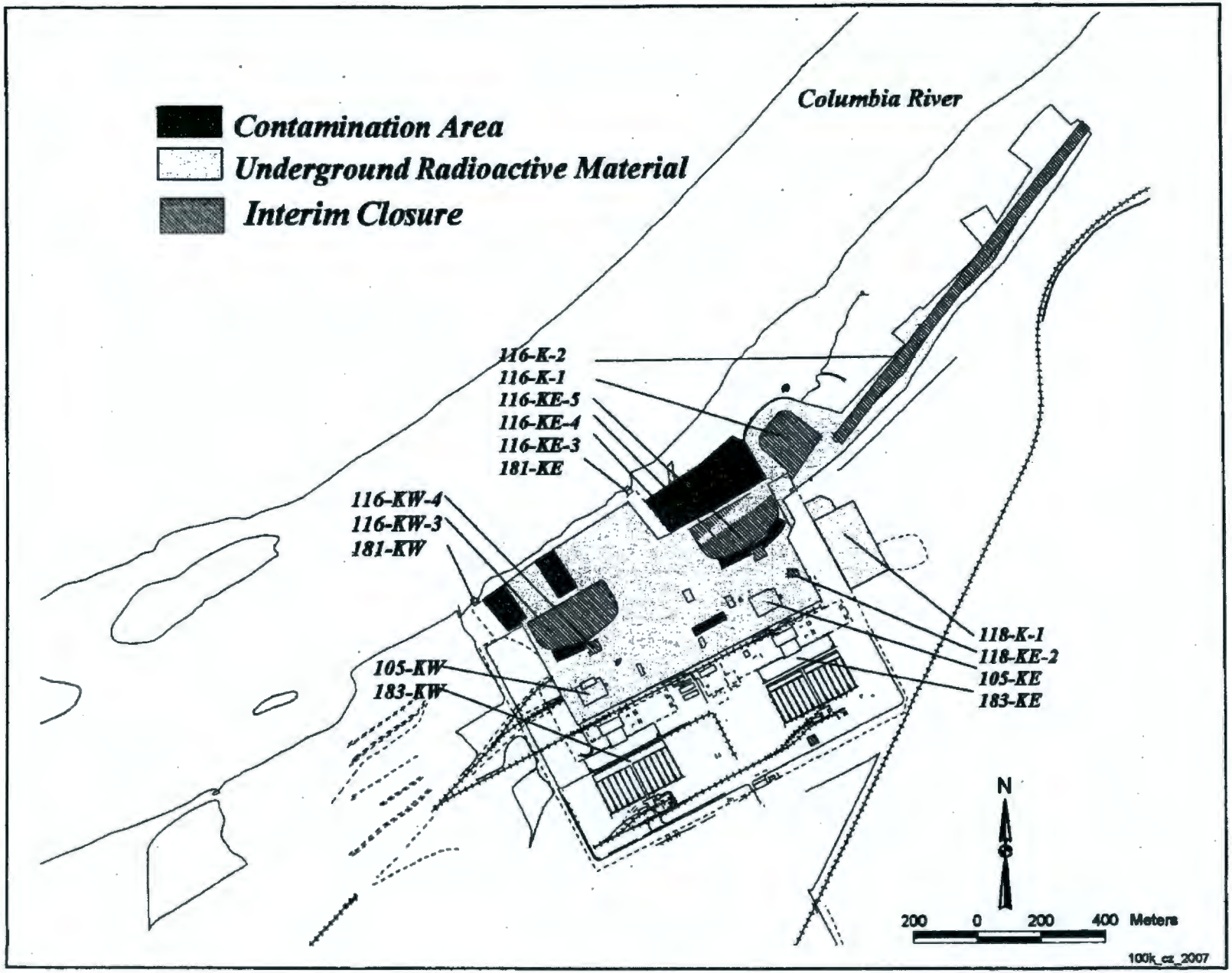
These radiological surveys are conducted to determine surface radiological conditions and do not constitute a release survey. Therefore, surveys that detect no contamination in radiological areas do not release the site from control, but may result in a posting status change. Surveillance of the active nuclear facilities and the areas inside the tank farm fences is the responsibility of the individual facility landlord.

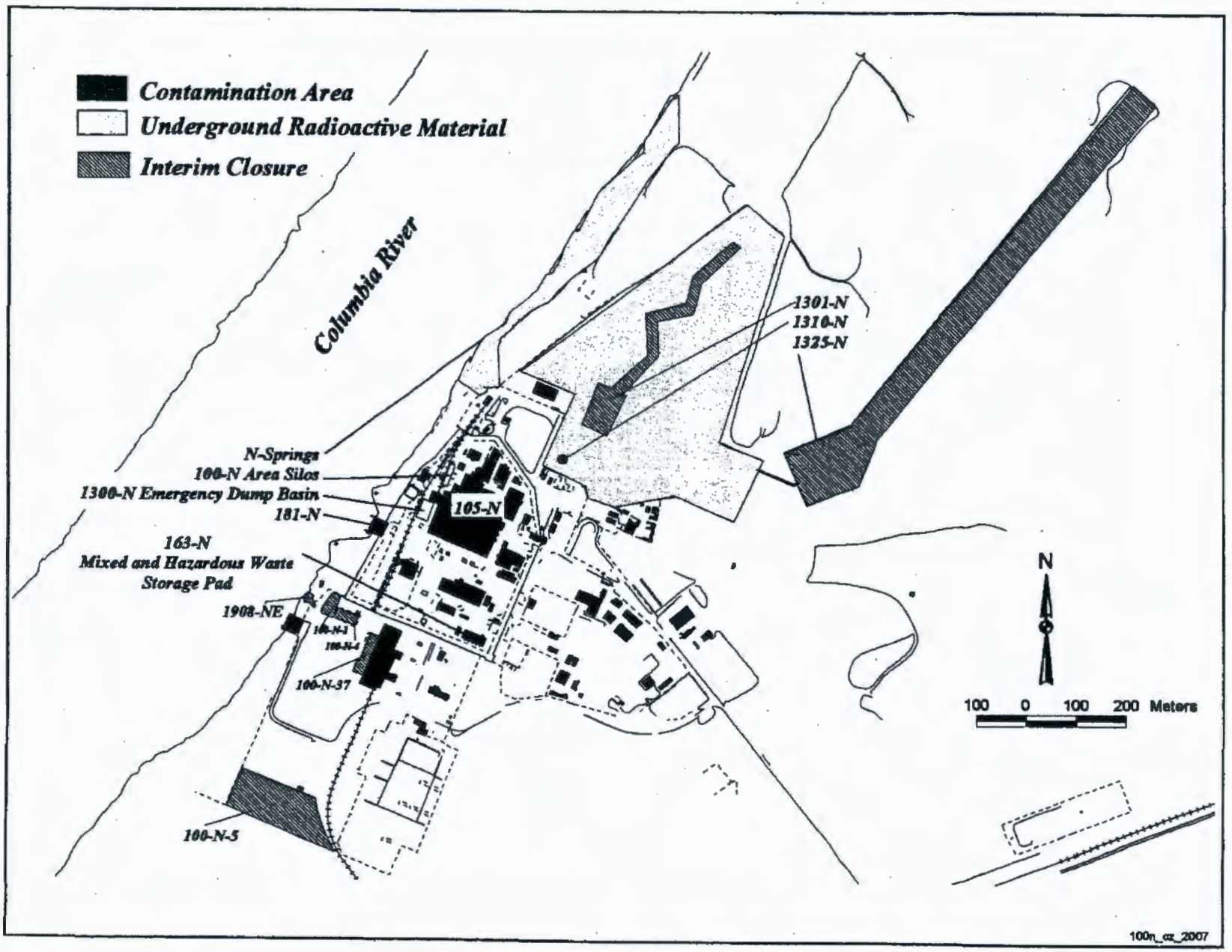

Columbia River
Contamination Area
Underground Radioactive Material
Interim Closure
N
100 0 100 200 Meters
1008C_CZ_2007

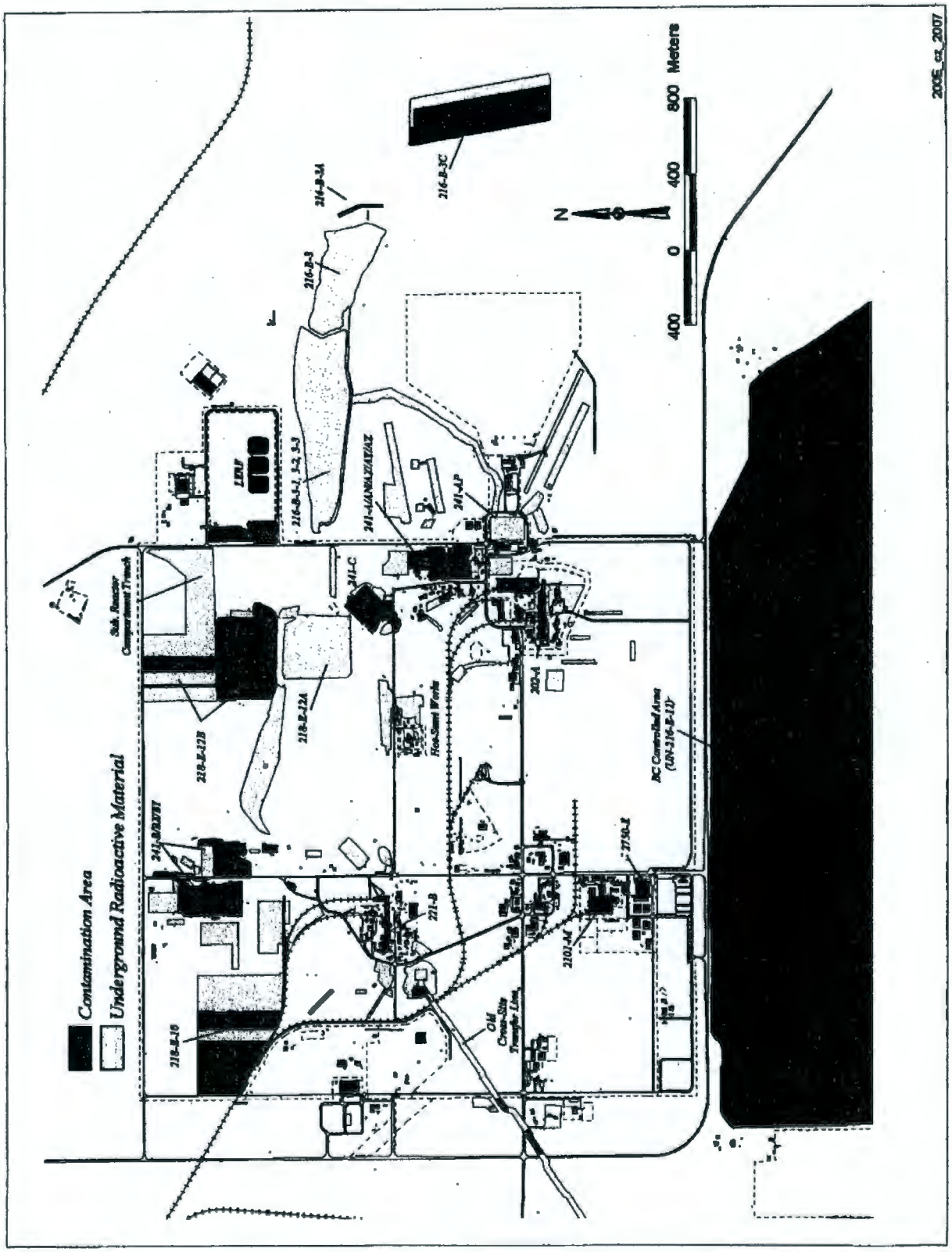

100d1_cz_2007
116-DR-2
116-DR-1
116-DR-9
100-D-4
100-D-5
100-D-2
116-D-1B
116-D-10
183-D
116-D-1A
116-D-2
118-D-4
183-DR
118-D-5
116-D-9
116-DR-10
116-DR-3
118-D-3
118-DR-1
118-D-1
100-D-18
100-D-19
116-DR-5
116-D-7
116-D-5
182-D
181-D
118-D-2
Columbia River
Contamination Area
Underground Radioactive Material
Interim Closure
N
200
0
200
400 Meters

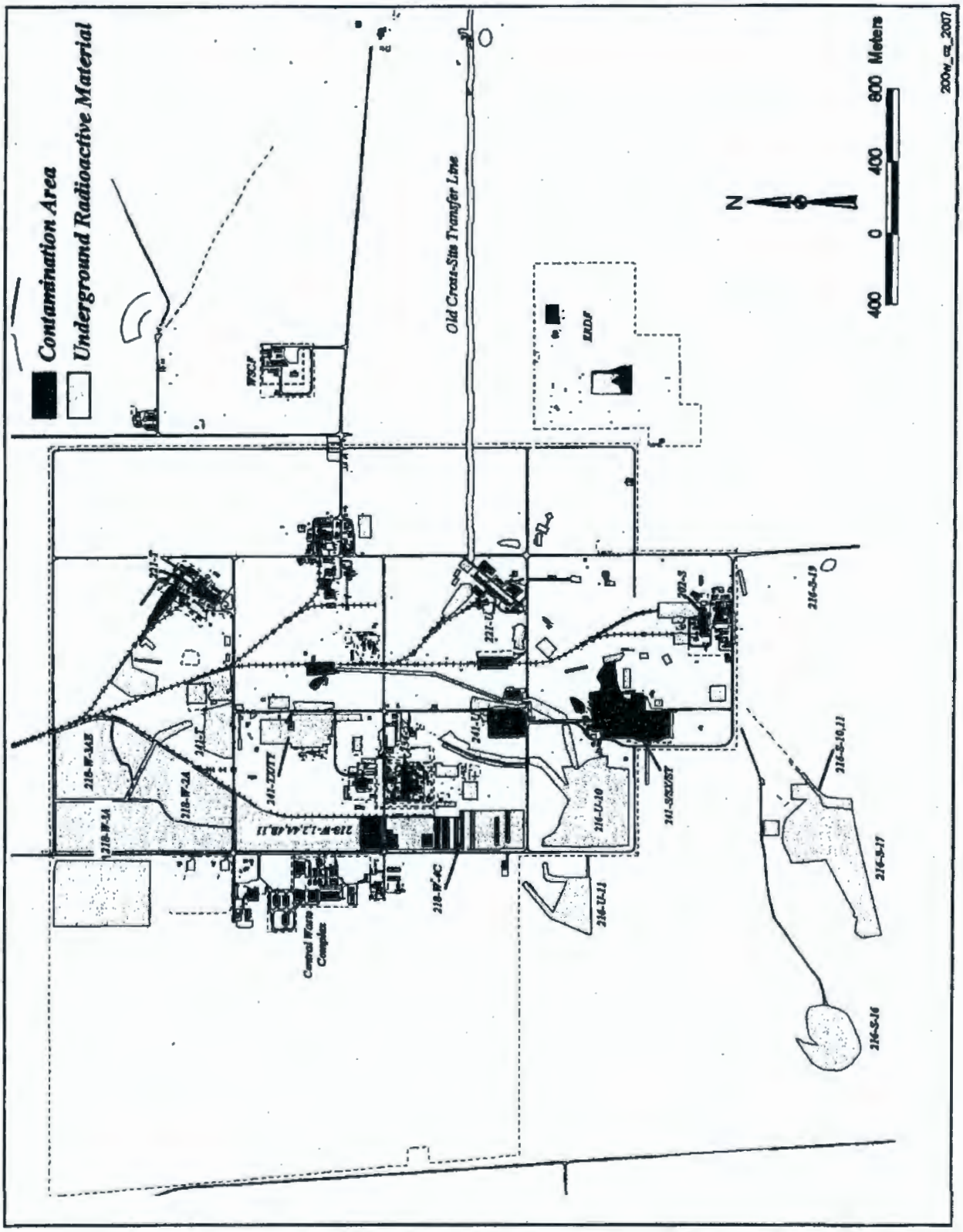

Columbia River
N
100 0 100 200 Meters
100F_CZ_2007
Contamination Area
Underground Radioactive Material
Interim Closure
116-F-1
132-F
126-F-2
1607-F2
100-F-30
126-F-3
116-F-9
116-F-14
116-F-3
118-F-3
118-F-1
118-F-4
100-F-2 Strontium Garden

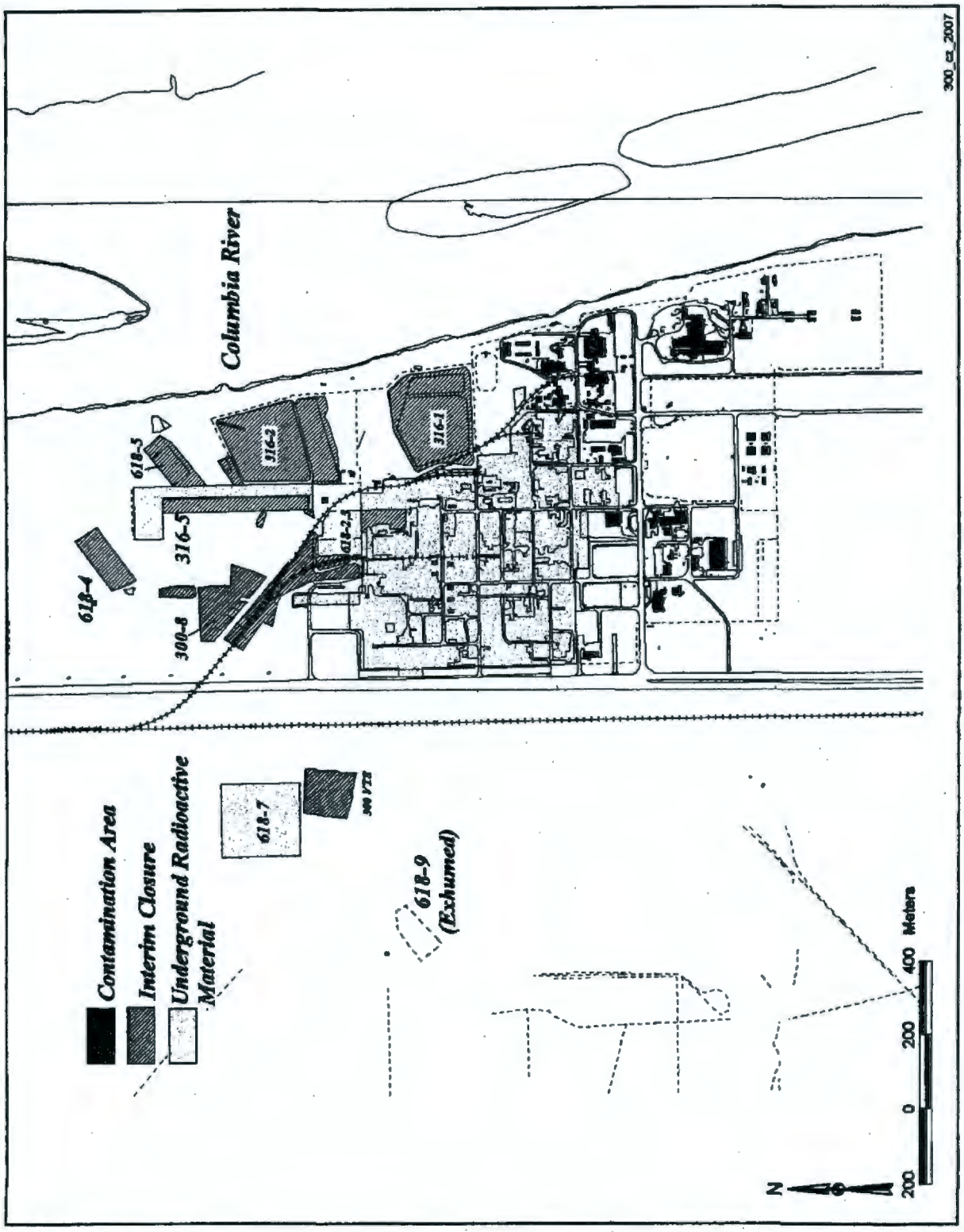

Contamination Area
Underground Radioactive Material
Interim Closure
1607-H2 Septic Tank and Drain Field
Spoil pile containing waste from remediated 116-H-6
116-H-6 (remediated)
116-H-5
116-H-7
116-H-1
Columbia River
151-H Substation
100-H-5, 107-H Retention Basin Sludge Burial Site
118-H-2
118-H-4
105-H (Cocooned)
118-H-5
118-H-3
118-H-1
100-H-14
100-H-17
107-H Liquid Waste Disposal Trench
N
100 0 100 200 Meters
100H_cz_2007

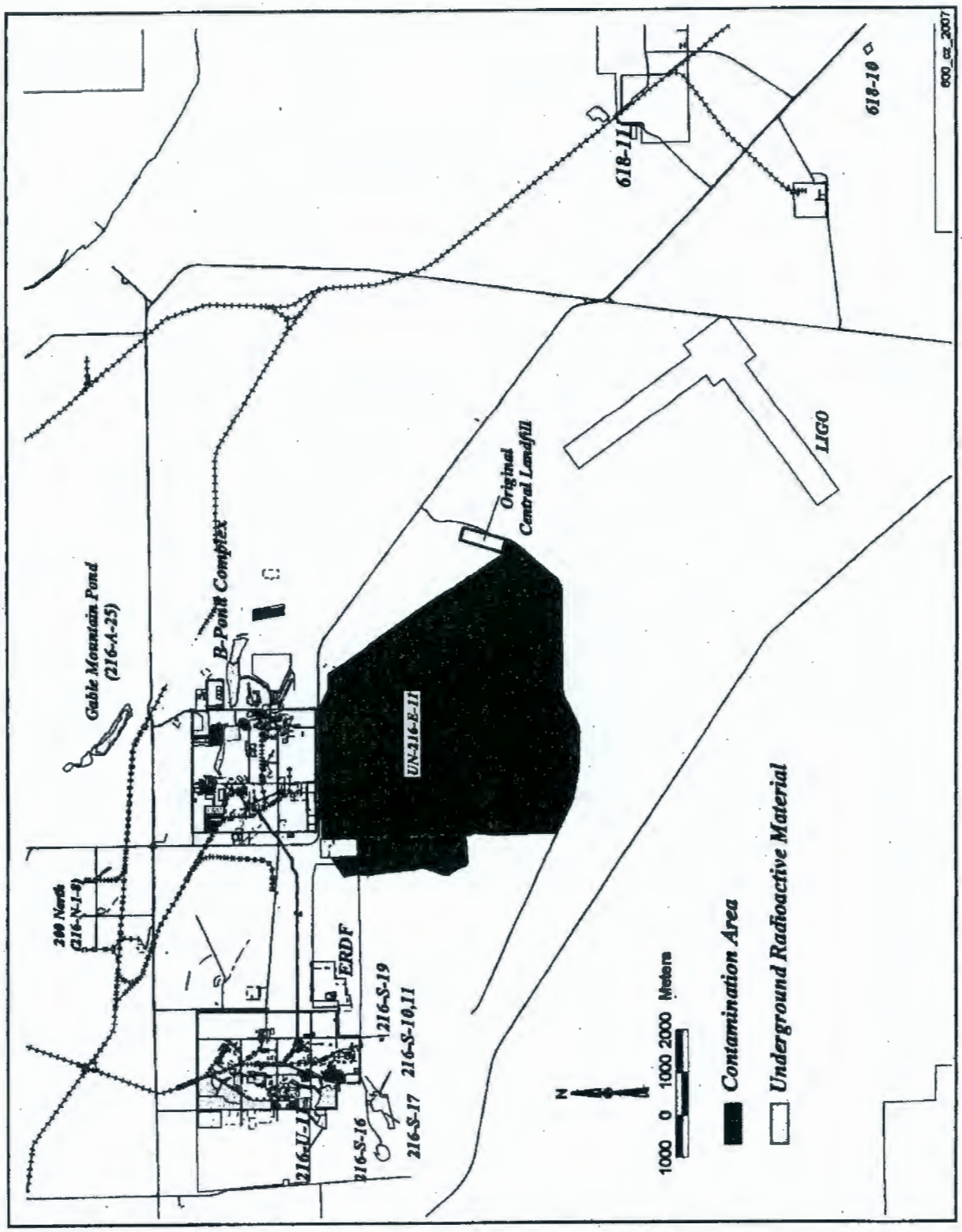

Contamination Area
Underground Radioactive Material
Interim Closure
Columbia River
116-K-2
116-K-1
116-KE-5
116-KE-4
116-KE-3
181-KE
116-KW-4
116-KW-3
181-KW
105-KW
183-KW
118-K-1
118-KE-2
105-KE
183-KE
N
200 0 200 400 Meters
100k_cz_2007


Contamination Area
Underground Radioactive Material
Interim Closure
Columbia River
1301-N
1310-N
1325-N
N-Springs
100-N Area Silos
1300-N Emergency Dump Basin
181-N
105-N
163-N
Mixed and Hazardous Waste
Storage Pad
1908-NE
100-N-1
100-N-4
100-N-37
100-N-5
N
100 0 100 200 Meters
100n_oz_2007


Contamination Area
Underground Radioactive Material
N
400
0
400
800 Meters
2005_cx_2007
216-B-3C
216-B-3A
216-B-3
LERF
241-AP
241-C
218-E-12B
218-E-12A
218-E-10
221-B
Old Cross-Site Transfer Line
200-A
2750-E


Contamination Area
Underground Radioactive Material
Old Cross-Site Transfer Line
ERDF
N
400 0 400 800 Meters
200w_cs_2007
Central Waste Complex


Columbia River
618-5
316-3
316-1
316-5
618-4
300-8
618-7
618-9
(Exhumed)
Contamination Area
Interim Closure
Underground Radioactive
Material
N
200
0
200
400 Meters
300_ca_2007


618-11
618-10
600_cz_2007
LIGO
Original Central Landfill
B-Pond Complex
Gable Mountain Pond (216-A-25)
UN-216-E-11
200 North (216-N-1-2)
ERDF
216-S-19
216-S-10,11
216-S-17
216-S-16
216-U-1
N
1000 0 1000 2000 Meters
Contamination Area
Underground Radioactive Material

2.0 PROGRAM DESCRIPTION

2.1 ENVIRONMENTAL RADIOLOGICAL SURVEY OBJECTIVES

Radiological surveys are conducted to determine whether there have been changes in the radiological status of the 100, 200, 300, and 600 Areas outdoor radioactive waste sites. These sites include surface water disposal units, cribs, trenches, burial grounds, tank farm and diversion box perimeters, and reverse wells. The *Routine Environmental Monitoring Schedule, Calendar Year 2007*, WHC-SP-0098-18 (McKinney 2006), lists the waste sites and the survey frequency. 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. The appropriate facility manager or landlord is notified if contamination is identified and the responsible manager initiates corrective actions.

2.2 PRIORITY RANKING SYSTEM

A numerical ranking system is used for categorizing contaminated waste sites relative to environmental radiological concerns. This system provides a priority guideline to responsible landlords for clean up or interim stabilization of waste sites.

The history of each waste site, level and type of contamination, site accessibility and size, and contamination mobility, are all used as a basis for review. A numerical value is assigned to each site based on this review.

Contamination levels ranging from 1,000 disintegration's per minute (dpm) to greater than 10 mrad/hr (as measured on Radiological Control's field survey instruments) are considered and assigned a numerical value of 1 (lowest value) to 5 (greatest value). Any removable alpha contamination is considered a high priority and automatically receives a numerical rank value of 5.

The location is evaluated for accessibility. A restricted site in a remote area would receive the lowest point value of 1. They would progress up to a value of 5 where the public may have access.

Mobility scoring is based on contamination that can be or has a history of being transported from where it was originally identified to places outside of the posted radiological area. Fixed contamination would receive a value of 1 progressing to contamination that can potentially be blown by the wind or through biological uptake and transport receiving a value of 5. There is a maximum of 15 points possible with this ranking system.

It should be noted that this system is not intended to be a total qualitative or quantitative risk assessment, but rather a way of communicating environmental significance to the landlord and respective program office. Before a site is designated for remediation, other elements of the site clean-up process are also considered such as costs, location, public/regulatory interest, risk assessments, and engineering strategies.

2.3 ENVIRONMENTAL STANDARDS

Radiological survey data are used to determine compliance of Radioactive Waste Sites with *Effluent and Environmental Monitoring* (HNF-PRO-15334), and *Environmental Protection Requirements* (HNF-RD-15332), for Fluor Hanford, Inc. (FH) and CH2M HILL Hanford Group (CHG) managed sites. Procedure ENV-1.1-7, Environmental Monitoring & Management requires radiation contamination monitoring to satisfy the requirements of DOE Order 450.1 for Washington Closure Hanford (WCH) managed sites.

In order to compare field instrument values with the standards listed in the *PHMC Radiological Control Manual* (HNF-5173), a conversion factor is necessary. This conversion factor has been established using a Geiger-Mueller detector with a pancake type probe where 20,000 dpm [2,000 counts per minute (cpm)] are approximately equivalent to one millirem per hour for beta-emitting radionuclides. 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.

2.4 SURVEY METHODS AND PROCEDURES

Surveys documented in this report include road surfaces, railroads and sidings, cribs, underground pipelines, stabilized burial grounds, covered ponds and ditches, tank farm perimeters, active burial ground perimeters, unplanned release sites and other radiological areas. Methods and procedures for these surveys can be found in *Operational Environmental Monitoring* (DTS-OEM-001); *PHMC Radiological Control Manual* (HNF-5173); *D & D Radiation Protection Procedures* (HNF-IP-1277); and *Radiological Control Field Procedures*, RC-200.

Waste sites and other radiological areas are surveyed with portable field instruments. The portable field instrument survey results are reported in dpm per 100cm^2(using an efficiency correction factor of 10 dpm/cpm and six probe areas/100 cm^2) as detected by using a Geiger-Mueller detector for beta/gamma radiation equipped with a pancake type probe. Alpha survey results are reported in dpm/100 cm^2 (using a correction factor of 7 dpm/cpm and two probe areas/100 cm^2) as measured with a portable alpha meter (PAM). Surveys include the 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.

Vegetation, animal burrows, and animal feces are also monitored to detect biological transport.

3.0 RADIOLOGICAL SURVEY SUMMARY

Eighty-two of the scheduled routine environmental radiological surveys were completed during the fourth quarter of calendar year 2007.

Routine surveys found contamination above background levels at twelve of the surveyed sites. Non-routine radiological surveys found thirty-four additional incidents of contamination discovered outside posted contamination areas. Contamination levels ranging from a low of 10,000 dpm/100cm^2 to a high of 9,000,000 dpm/100cm^2 beta/gamma were reported. The contamination was found at twenty-five of the FH sites, twenty of the CHG sites, and one of the WCH sites. Of the forty-six incidents found, two were located in unposted areas, thirty-four were located in URMA's, five were in RCA's, and five were in CA's.

The contamination found was immediately cleaned up and no further action was required with the exception of five areas. A pipe elbow was posted as a fixed contamination area (FCA), an ant mound and an area of frozen soil were posted as CA's, a box containing contaminated rabbit feces was sealed and posted as an RMA and removed for proper disposal, and an area of approximately 100 square meters containing contaminated tumbleweed fragments and specks was posted as a CA.

The radiologically contaminated areas are posted to meet the requirements as outlined in the *PHMC Radiological Control Manual*, (HNF-5173). The posting includes the following categories *High Contamination* (activity >100,000 dpm/100 cm^2 β/γ and/or >2,000 dpm/100 cm^2 α), *Contamination, Soil Contamination, Underground Radioactive Material, Radiological Buffer, and Radiation/High Radiation* areas. For continuity between quarterly reports, the use of the term, "Contamination Areas" (CA), in this report includes High Contamination, Contamination, and Soil Contamination Areas categories/designations. Underground Radioactive Material, Radiological Buffer, Radiologically Controlled areas, and Radiation/High Radiation areas are referred to when required.

3.1 FOURTH QUARTER RADIOLOGICAL SURVEY SUMMARY

One small area of approximately 100 square yards was down posted and no new waste sites were discovered during the fourth quarter of CY 2007.

The Environmental Restoration Disposal Facility (ERDF) continued to receive waste from the remediation activities in the 100, 200, 300, and 600 Areas. To date, 107 hectares (264 acres) have been remediated and released from posting along the river corridor, including 85 hectares (210 acres) in the 100 areas and 22 hectares (54 acres) in the 300 areas.

While conducting radiological surveys, contaminated media were encountered and collected for analysis and/or disposal. Media found above actions levels defined in the *PHMC Radiological Control Manual* (HNF-5173), are documented with a Radiological Problem Report and/or an Occurrence Report. Table 1 summarizes the contamination found, location, survey document, and the corresponding field readings. The laboratory results of the contaminated samples that were sent in for analyses can be found in the Hanford Site Near-Facility Environmental Monitoring Data Report that is published annually in August.

Table 1. Contamination Incidents CY 2007

SAMPLE NUMBER	DATE	DESCRIPTION	LOCATION	DOCUMENT	FIELD READING (Beta/Gamma)
N/A	01/07/07	Contaminated Soil	North side of the 105-KW Reactor Bldg.	PHMC-SNF-2007-0001	450,000dpm/100cm^2
N/A	01/09/07	Contaminated Rock	200-W-92	RC-03648	217,813dpm/100cm2
N/A	01/25/07	Tumbleweeds (2)	241-S Tank Farm fenceline	PHMC-GEN-2007-0002	48,000dpm/100cm2
N/A	01/24/07	Tumbleweeds (2)	North of 221-T Plant	RPR-D&D-07-001	360,000dpm/100cm2
N/A	01/29/07	Paint Chips	1310N Waste Storage Pad	WCH-DND-2007-0001	1,000,000dpm/100cm2
N/A	01/30/07	Tumbleweed Fragments	North of 241-AY/AZ Tank Farm	PHMC-GEN-2007-0002	200,000dpm/100cm2
N/A	01/30/07	Transfer Line	Inside 216-BC Crib Area	RC-03689	60 mR/hr
N/A	01/31/07	Tumbleweed Fragments/Specks	East & North perimeter 241-C Tank Farm	PHMC-GEN-2007-0002	>1,000,000dpm/100cm2
N/A	02/01/07	Rabbit Feces	West of 272-S Paint Shop	PHMC-GEN-2007-0002	600,000dpm/100cm2
N/A	02/01/07	Paint Chips	105-N Fission Product Trap Berm	WHC-RISS-2007-0001	343,000dpm/100cm2
N/A	02/05/07	Animal Fur & Soil Specks	South Perimeter Fence 241-U	PHMC-GEN-2007-0002	150,000dpm/100cm2
N/A	02/06/07	Tumbleweeds (2)	218-E-12B Trench 94	PHMC-GEN-2007-0002	2,400,000dpm/100cm2
N/A	02/06/07	Animal urine	Near RMA100 South of 241-SX	PHMC-GEN-2007-0002	32.5 mRad/hr
N/A	02/06/07	Specks (2)	East Side of 241-AZ Tank Farm	CH2M-PER-2007-0299	6,500dpm/100cm2
N/A	02/07/07	Tumbleweed	218-E-12B Trench 94	PHMC-GEN-2007-0002	2,400,000dpm/100cm2
N/A	02/15/07	Tumbleweeds (2)	218-E-12B Trench 94	PHMC-GEN-2007-0002	300,000dpm/100cm2
N/A	02/22/07	Rabbit Feces	241-U Tank Farm Perimeter Fenceline	CH2M-PER-2007-0358	20,000dpm/100cm2
N/A	02/23/07	Duct Tape	Between PFP and the LLBG	PHMC-GEN-2007-0002	60,000dpm/100cm2
N/A	02/26/07	Tumbleweed	UPR-200-W-38 Shotcrete @ 221-T	PHMC-GEN-2007-0002	3,000dpm/100cm2
N/A	03/05/07	Animal urine	Outside the 241-SY Tank Farm Perimeter	PHMC-GEN-2007-0002	89,000dpm/100cm2
N/A	03/09/07	Duct Tape 24" long	216-Z-9 Trench	SS-274034	120,000dpm/100cm2
N/A	03/09/07	Tumbleweed	216-Z-9 Trench	SS-274034	36,000dpm/100cm2
N/A	03/12/07	Speck	Near Southeast Corner of 241-S	SS-274135	200,000dpm/100cm2
N/A	03/14/07	Insect Carcass	241-U Tank Farm perimeter	RPR-D&D-07-007	20,000dpm/100cm2
N/A	03/21/07	Specks (4)	244-BX DCRT	PHMC-GEN-2007-0002	50,000dpm/100cm2
N/A	03/26/07	Specks	241-C Tank Farm	PHMC-GEN-2007-0002	6,000,000dpm/100cm2
N/A	04/02/07	Soil	216-A-20 Crib	RC-03808	15,000dpm/100cm2
N/A	04/03/07	Mud Dauber Nest	109N Interim Safe Storage Area	PHMC-GEN-2007-0003	160,000dpm/100cm2
N/A	04/04/07	Tumbleweed	Perimeter of 200-E-53 @ 218-E-12B	PHMC-GEN-2007-0003	240,000dpm/100cm2
N/A	04/05/07	Tumbleweed, Soil, Fragments	Perimeter of 200-E-53 @ 218-E-12B	PHMC-GEN-2007-0003	400,000dpm/100cm2
N/A	04/09/07	Rabbit Feces	South of the 272-S Paint Shop	PHMC-GEN-2007-0003	300,000dpm/100cm2
N/A	04/11/07	Tumbleweed Fragments	3'X6' area on SC area of UPR-200-W-38	PHMC-GEN-2007-0003	84,000dpm/100cm2
N/A	04/11/07	Rabbit Fece/Tumbleweed Fragments	200-E-133 @ West Perimeter 241-C	PHMC-GEN-2007-0003	60,000dpm/100cm2
N/A	04/11/07	Mud Dauber Nest Fragments	Crane in 109N Interim Safe Storage Area	PHMC-GEN-2007-0003	90,000dpm/100cm2
N/A	04/12/07	Mud Dauber Nest Fragments	Trailer HO-84-5199 @ 100-H	PHMC-GEN-2007-0003	1,184,000dpm/100cm2
N/A	04/23/07	Specks (2)	Adjacent to the 241-SX Tank Farm Fence	PHMC-GEN-2007-0003	450,000dpm/100cm2
N/A	05/03/07	Mud Dauber Nest Fragments, Soil, Oil	105-H Laydown Area	PHMC-GEN-2007-0003	8,000dpm/100cm2
N/A	05/08/07	Suspect Rabbit Urine	Inside RMA-100 in the 241-SX Tank Farm	PHMC-GEN-2007-0003	14mrem/hr
N/A	05/09/07	Tumbleweed	LERF Loop Rd. Fenceline	PHMC-GEN-2007-0003	600,000dpm/100cm2
N/A	05/09/07	Mouse	Mouse Trapped Inside 2715-AW	PHMC-GEN-2007-0003	40,000dpm/100cm2
N/A	05/10/07	Tumbleweeds	218-E-12B Trench 94	PHMC-GEN-2007-0003	9,000,000dpm/100cm2
N/A	05/14/07	Rabbit Pellet	241-S Tank Farm Perimeter	PHMC-GEN-2007-0003	45,000dpm/100cm2
N/A	05/16/07	Rabbit Pellet	West side 241-S,SX,SY Tank Farm Perimeter	SS274368	550,000dpm/100cm2
N/A	05/17/07	Tumbleweed Fragments	241-A Tank Farm Perimeter	PHMC-GEN-2007-0003	79,000dpm/100cm2
N/A	05/17/07	Tumbleweed Fragment	3' Outside the 241-C Tank Farm	PHMC-GEN-2007-0003	350,000dpm/100cm2

Table 1. Contamination Incidents CY 2007

SAMPLE NUMBER	DATE	DESCRIPTION	LOCATION	DOCUMENT	FIELD READING (Beta/Gamma)
N/A	05/22/07	Mouse and Bait Station	241-B Tank Farm Perimeter	PHMC-GEN-2007-0003	200,000dpm/100cm2
N/A	05/24/07	Rabbit Feces	Outside 241-S Tank Farm South of 272-S Bldg.	PHMC-GEN-2007-0003	300,000dpm/100cm2
N/A	06/04/07	Speck	UPR-200-E-101 Between 241-B & 242-B	PHMC-GEN-2007-0003	2,800,000dpm/100cm2
N/A	06/04/07	Starling	221-T Head End Stairs	RPR-D&D-07-014	28,000dpm/100cm2
N/A	06/07/07	Rabbit Feces (4)	South Side of 272-S Paint Shop	PHMC-GEN-2007-0003	400,000dpm/100cm2
N/A	06/11/07	Fixed & Removable in Soil	Near 216-Z-9 Crib	PHMC-PFP-2007-0011	24,000dpm/100cm2Alpha
N/A	06/13/07	Cotton Tail Rabbit	West of the 272-S Paint Shop	PHMC-GEN-2007-0003	>1,000,000dpm/100cm2
N/A	06/14/07	Rabbit Fecal Pellet	Outside West Perimeter of 241-C Tank Farm	PHMC-GEN-2007-0003	300,000dpm/100cm2
N/A	06/18/07	Gopher Snake	Outside 105-KW	ACO Log 6/18/07	40,000dpm/100cm2
N/A	06/20/07	Heat Transfer Condenser	300-275 Sub Site #7	WHC-REMACT-2007-0003	120,000dpm/100cm2
N/A	06/20/07	Decomposing Rabbit Feces	Outside 241-C Tank Farm	CH2M-PER-2007-1071	80,000dpm/100cm2
N/A	06/22/07	Tumbleweed Fragments & Soil	On 200-E-117 Transfer Lines South of 241-BX/BY	PHMC-GEN-2007-0003	4,500,000dpm/100cm2
N/A	07/02/07	Rabbit Fece	Southwest End of 241-SX Tank Farm	CH2M-PER-2007-1140	39,500dpm/100cm2
N/A	07/03/07	Deer Mouse	Inside 244-BBL	ACO Log 7/0307	3,000dpm/100cm2
N/A	07/03/07	Tumbleweed Fragment	Outside Southeast Perimeter of 241-A	PHMC-GEN-2007-0005	630,000dpm/100cm2
N/A	07/19/07	Decomposed Rabbit Fecal Pellet	Outside Middle 241-C Tank Farm Fence	PHMC-GEN-2007-0005	25,000dpm/100cm2
N/A	07/19/07	Tumbleweed Fragments	East of Canton Ave.	PHMC-GEN-2007-0005	6,000dpm/100cm2
N/A	07/31/07	Tumbleweed	Growing thru Asphalt @ 241-A Tank Farm Courtyard	CH2M-PER-2007-1362	2,000dpm/100cm2
N/A	08/01/07	Tumbleweed Fragment	Inside 241-A Courtyard	CH2M-PER-2007-1362	10,000dpm/100cm2
N/A	08/02/07	Tumbleweed Fragments	UPR-200-E-121 NE of 241-B Tank Farm	PHMC-GEN-2007-0005	4,800,000dpm/100cm2
N/A	08/02/07	Tumbleweeds(~100)	216-U-10 Pond	PHMC-GEN-2007-0005	60,000dpm/100cm2
N/A	08/06/07	Speck	West Perimeter of 241-S Tank Farm	PHMC-GEN-2007-0005	150,000dpm/100cm2
N/A	08/06/07	Tumbleweeds (~20)	UPR-200-W-161 East of 241-U Tank Farm	PHMC-GEN-2007-0005	>1,000,000dpm/100cm2
N/A	08/07/07	Speck	Outside 241-S Tank Farm	PHMC-GEN-2007-0005	19,000dpm/100cm2
N/A	08/14/07	Speck	Northeast Corner 241-C Tank Farm	PHMC-GEN-2007-0005	30,000dpm/100cm2
N/A	08/20/07	Tumbleweeds (20)	241-U-151 Diversion Box	PHMC-GEN-2007-0005	240,000dpm/100cm2
N/A	08/23/07	Tumbleweeds	216-U-14 Ditch	RPR D&D-07-020	42,000dpm/100cm2
N/A	09/06/07	Rust Colored Particles	Portable Air Stack Handler @ 216-Z-19 Trench	PHMC-PFP-2007-0014	200,000dpm/100cm2
N/A	09/13/07	Tumbleweeds (7)	216-T-20 trench	PHMC-GEN-2007-0005	199,000dpm/100cm2
N/A	09/15/07	Tumbleweeds (15)	UPR-200-E-77 Outside 241-B-154 Diversion Box	PHMC-GEN-2007-0005	60,000dpm/100cm2
N/A	09/21/07	Tumbleweeds & Fragments	UPR-200-W-161 East of 241-U Tank Farm	PHMC-GEN-2007-0005	384,000dpm/100cm2
N/A	10/03/07	Pipe Elbow Joint	On Roof of Building 109-E	WCH-DND-2007-0010	400,000dpm/100cm2
N/A	10/03/07	Animal Feces	North Perimeter 241-AY Tank Farm	PHMC-GEN-2007-0006	100,000dpm/100cm2
N/A	10/08/07	Tumbleweed	UPR-200-E-92 East of 218-E-12B	PHMC-GEN-2007-0006	120,000dpm/100cm2
N/A	10/09/07	Animal Feces & Urine	Outside CA at 212-R	PHMC-GEN-2007-0006	1,600,000dpm/100cm2
N/A	10/10/07	Tumbleweed	218-W-2A Burial Ground	PHMC-GEN-2007-0006	300,000dpm/100cm2
N/A	10/10/07	Tumbleweeds (4)	218-W-3 Burial Ground	PHMC-GEN-2007-0006	1,200,000dpm/100cm2
N/A	10/12/07	Speck	241-T Tank Farm Perimeter	PHMC-GEN-2007-0006	1,000,000dpm/100cm2
N/A	10/15/07	Tumbleweed (Wind Blown)	Corner of Canton Ave and 12th Street	PHMC-GEN-2007-0006	21,000dpm/100cm2
N/A	10/16/07	Tumbleweed & Concrete Fragments	241-C Tank Farm Perimeter	PHMC-GEN-2007-0006	150,000dpm/100cm2
N/A	10/17/07	Tumbleweeds (2)	218-E-12B Trench 94	PHMC-GEN-2007-0006	120,000dpm/100cm2
N/A	10/17/07	Speck	244-A Lift Station	PHMC-GEN-2007-0006	40,000dpm/100cm2
N/A	10/18/07	Tumbleweed	Canton Ave. @ 8th Street	PHMC-GEN-2007-0006	54,000dpm/100cm2
N/A	10/22/07	Tumbleweeds (4)	216-A-30 Crib	PHMC-GEN-2007-0006	120,000dpm/100cm2
N/A	10/23/07	Tumbleweed	12th and Canton Ave.	RPR-D&D-07-024	21,000dpm/100cm2

Table 1. Contamination Incidents CY 2007

SAMPLE NUMBER	DATE	DESCRIPTION	LOCATION	DOCUMENT	FIELD READING (Beta/Gamma)
N/A	10/24/07	Tumbleweeds (12)	Southwest of 241-C @ Buffalo & 7th	RPR-D&D-07-026	3,600,000dpm/100cm2
N/A	10/25/07	Red Ant Hill	218-W-4A Burial Ground	PHMC-GEN-2007-0006	4,500,000dpm/100cm2
N/A	10/25/07	Tumbleweed	218-W-4A Burial Ground	PHMC-GEN-2007-0006	90,000dpm/100cm2
N/A	10/26/07	Tumbleweed Fragments	RMA North of MO-235	PHMC-GEN-2007-0006	15,000dpm/100cm2
N/A	10/29/07	Tumbleweeds (4)	218-W-4A Burial Ground	SS274687	4,200,000dpm/100cm2
N/A	10/30/07	Rodent Feces Inside Wooden Box	Outside of 242-B/BL	PHMC-GEN-2007-0006	60,000dpm/100cm2
N/A	10/30/07	Tumbleweeds (10)	On Top of 218-W-2 Burial Ground	PHMC-GEN-2007-0006	294,000dpm/100cm2
N/A	10/30/07	Mouse Feces	Purge Water Truck 68C-4524 Inside 2711-E	PHMC-GEN-2007-0006	10,000dpm/100cm2
N/A	10/31/07	Tumbleweed	Across 13th Ave A 216-U-10 Pond	PHMC-GEN-2007-0006	60,000dpm/100cm2
N/A	11/07/07	Specks (3)	Outside 701-AZ Decon Trailer @ 241-AX	PHMC-GEN-2007-0006	80,000dpm/100cm2
N/A	11/08/07	Tumbleweeds (>100)	216-U-10 Pond	PHMC-GEN-2007-0006	114,000dpm/100cm2
N/A	11/12/07	Cottontail Rabbit	Outside West perimeter 241-SX Tank Farm	PHMC-GEN-2007-0006	>1,000,000dpm/100cm2
N/A	11/13/07	Tumbleweeds (>100)	216-U-10 Pond	PHMC-GEN-2007-0006	80,000dpm/100cm2
N/A	11/13/07	Tumbleweed Fragments & Specks	241-C Tank Farm	PHMC-GEN-2007-0006	150,000dpm/100cm2
N/A	11/13/07	Tumbleweed Fragments & Specks	Outside 271-CR Vault Perimeter	PHMC-GEN-2007-0006	79,000dpm/100cm2
N/A	11/13/07	Tumbleweeds & Fragments	Outside 241-U Tank Farm Perimeter	PHMC-GEN-2007-0006	45,000dpm/100cm2
N/A	11/14/07	Tumbleweeds (6)	Outside West Perimeter 241-SX Tank Farm	PHMC-GEN-2007-0006	54,000dpm/100cm2
N/A	11/14/07	Rabbit Fecal Pellets	Outside West Perimeter 241-SX Tank Farm	PHMC-GEN-2007-0006	>1,000,000dpm/100cm2
N/A	11/20/07	Tumbleweeds (5)	Outside 241-T Tank Farm Perimeter Fence	RPR-D&D-07-026	900,000dpm/100cm2
N/A	11/26/07	Tumbleweed Fragment	Inside the 218-E-12B LLBG	PHMC-GEN-2007-0006	6,000,000dpm/100cm2
N/A	11/27/07	Tumbleweed Fragments	Outside North Perimeter Fence 241-B Tank Farm	PHMC-GEN-2007-0006	>1,000,000dpm/100cm2
N/A	12/03/07	Tumbleweed	200-W Fenceline @ 16th and Dayton	SS275597	30,000dpm/100cm2
N/A	12/05/07	Tumbleweed Fragments	701A Driveway on East Side of 241-A Tank Farm	PHMC-GEN-2007-0006	20,000dpm/100cm2
N/A	12/06/07	Tumbleweed Fragments	241-A & 241-C Tank Farm Perimeter	SS276106	570,000dpm/100cm2
N/A	12/12/07	Tumbleweed Fragments	Outside 241-B south Perimeter	PHMC-GEN-2007-0006	>1,000,000dpm/100cm2
N/A	12/13/07	Tumbleweed	2727W Laydown Yard North Fenceline	SS276116	30,000dpm/100cm2
N/A	12/18/07	Crickets on Glue Board	Inside 242-B/BL Evaporator	ACO Log 12/18/2007	5,500dpm/100cm2
N/A	12/18/07	Specks	Excavation Outside 241-C Tank Farm	PHMC-GEN-2007-0006	750,000dpm/100cm2
N/A	12/19/07	Tumbleweed	Corner of 16th & Dayton Inside Fenceline	SS276124	18,000dpm/100cm2
N/A	12/21/07	Tumbleweeds (12)	Along 16th St. North of 218-E-12B LLBG	PHMC-GEN-2007-0006	>1,000,000dpm/100cm2
N/A	12/26/07	Tumbleweeds (20)	Along Perimeter Fence 218-W-4A LLBG	PHMC-GEN-2007-0006	120,000dpm/100cm2
N/A	12/27/07	Tumbleweeds (3)	Along Perimeter Fence 218-W-4A LLBG	PHMC-GEN-2007-0006	120,000dpm/100cm2

Note: The referenced documents are as follows:
SS-2xxxxx are Site Support Services Radiological Control Radiological Survey Reports
SST-0xxxxx are Tank Farms Radiological Control Radiological Survey Reports
PHMC-HFD-2007, PHMC-GEN-2007, BHI-ERDF-2007, CHG-TANKFARM-2007,
WHC-REMACT-2007etc., are Occurrence Reports
COF-003207, CHG Radiological Survey Reports
DAR xx/xx/2007 are Daily Activity Reports
CH2M-PER-2007-XXXX are CH2M Hill Problem Evaluation Requests
RC-XXXXX are D&D Radiological Survey Reports
ACO Logbook are Animal Control Operations Logbook

Abbreviations used are as follows:
dpm - Disintegrations per minute.
cm^2 – Square Centimeter
N/A - Not applicable or submitted for analysis.
PA - Probe Area.

Activity levels reported are the maximum observed in the field.

Table 2 summarizes the contamination incidents by area and media type discovered during CY 2007. The column "other" in this table is for miscellaneous items (e.g., clothing, duct tape, equipment, etc.).

Table 2. Contamination Incidents by Area and Type,
January 1, 2007 through December 31, 2007

Area/Waste Site Type	Vegetation	Animals	Soil/Specks	Other	Total Incidents
200-East Tank Farms	13	10	6	0	29
200-West Tank Farms	5	11	4	0	20
200-East Burial Grounds	10	1	0	0	11
200-West Burial Grounds	7	1	0	0	8
200-East Cribs, Ponds, & Ditches	2	0	1	0	3
200-West Cribs, Ponds, & Ditches	8	0	1	2	11
200-East Fence Lines	0	0	0	0	0
200-West Fence Lines	0	0	0	0	0
200-East Roads & Rail Roads	0	0	1	0	1
200-West Roads & Rail Roads	0	0	0	0	0
200-East Unplanned Release Sites	3	0	1	0	4
200-West Unplanned Release Sites	4	0	1	0	5
200-East Underground Pipelines	1	0	1	0	2
200-West Underground Pipelines	0	0	0	0	0
Cross-Site Transfer Line	0	0	0	0	0
200-BC Cribs and Trenches	0	0	0	1	1
200-East Miscellaneous	4	3	0	0	7
200-West Miscellaneous	4	4	0	1	9
200-North Area	1	0	0	0	1
100 Areas	0	5	1	3	9
300 Areas	0	0	0	1	1
400 Areas	0	0	0	0	0
600 Areas	0	0	0	0	0
1100 Areas	0	0	0	0	0
TOTALS	62	35	17	8	122

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. Title 10 of the Code of Federal Regulations, Part 835, *Occupational Radiation Protection* 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 DOE/RL concern, FH established a centralized Biological Control Program (BCP) to control the spread of contamination caused by biotic vectors. Prior to the establishment of the BCP, the biological control funding and requests for the application of biological control techniques were the responsibility of the affected facilities. The BCP provides vegetation control through herbicide application, grubbing, 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/insects.

4.1 DEEP-ROOTED VEGETATION VECTORS

Deep-rooted vegetation (e.g., tumbleweeds, sagebrush) growing over underground sources of radionuclides can selectively uptake contaminants into their tissues. When radionuclides are transported from roots to aerial portions of the plant, as often happens with tumbleweeds, surface contamination may result. This surface contamination poses a potential risk of environmental transport or human contact and can be very costly to clean up and/or stabilize. The FH procedures/requirements, *Environmental Protection Processes,* (HNF-PRO-15333), *Effluent and Environmental Monitoring* (HNF-PRO-15334), and *Environmental Protection Requirements* (HNF-RD-15332) require that the tumbleweeds and other deep-rooted vegetation be removed from waste sites where radionuclide uptake is detected or probable.

A review of radiological reports (Radiological Problem Reports, Daily Activity Reports, Occurrence Reports, and Radiological Survey Records) indicates that during the fourth quarter of 2007, there were thirty-three incidents of contaminated vegetation. These incidents were all tumbleweeds and tumbleweed fragments.

Table 3 summarizes the number of incidents of contaminated vegetation found and the range of activity encountered between 1994 and December 31, 2007. It has been determined through field readings that the dose rate for meter readings on tumbleweeds having greater than 6,000,000 dpm/100cm^2 ranges from approximately 2.0 to 50 millirads per hour.

Figure 11 depicts graphically, on a cumulative by quarter basis, the contaminated vegetation incidents encountered between 1994 and the end of the fourth quarter of 2007. The summary data indicate that the cumulative number of vegetation contamination incidents through the fourth quarter of each year gradually increased by a factor of four from 1994 (20) through 1999 (84). They then declined until 2002 (16) but have increased since then to similar levels reported in 2004 (60) and 2005 (66).

Figure 12 displays the number of contaminated vegetation incidents cumulative by month

between 1994 and the end of the fourth quarter of 2007. The upper line in this figure for 1999 indicates the most incidents (84) that have occurred during the last fourteen years, while the lower line represents the fewest number of incidents (12), which occurred in 1995.

There were sixty-two incidents reported during CY 2007. The number of incidents through the same period is lower than CY 2006 with seventy-four and is in between the values reported during the same period in the years CY 2004 (60) and 2005 (66).

Table 3. Yearly Summary of Contaminated Vegetation Incidents

(1994 through December 2007)

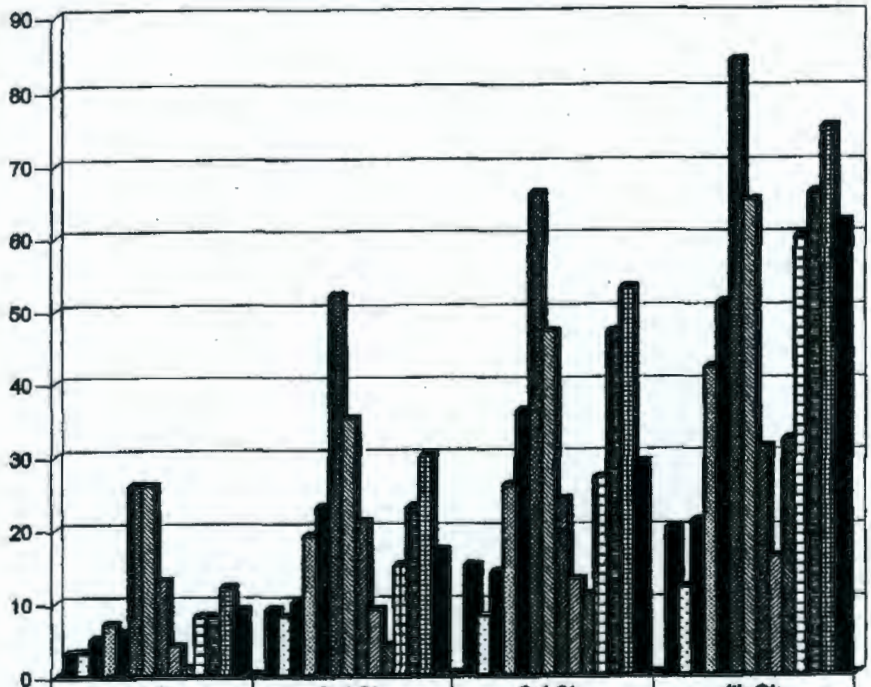
Year	Number of Incidents	Max. Activity (dpm)B/G[a]	Min. Activity (dpm)B/G
2007	62	9,000,000/100cm^2	3,000/100cm^2
2006	75	5,397,000/100cm^2	10,000/100cm^2
2005	66	1,800,000/100cm^2	6,000/100cm^2
2004	60	540,000/100cm^2	4,000/100cm^2
2003	32	3,600,000/100cm^2	6,000/100cm^2
2002	16	1,800,000/100cm^2	3,000/100cm^2
2001	31	>6,000,000/100cm^2[b]	6,000/100cm^2
2000	65	>1,000,000/100cm^2	5,000/100cm^2
1999	84	>1,000,000/100cm^2	8,000/100cm^2
1998	51	>1,000,000/100cm^2	4,000/100cm^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
1994	20	600,000/PA	2,000/PA

[a] The reporting of the activity changed in 1998 to meet the requirements identified in HNF-5173. The activity is reported in dpm per probe area prior to 1998 and in dpm per 100cm^2 since 1998 (unless otherwise noted e.g., for a spec or insect).

[b] >6,000,000/100cm^2 being used in 2001and subsequent years includes a correction factor of 6 to correct from probe area to 100cm^2 which was not used in previous years.

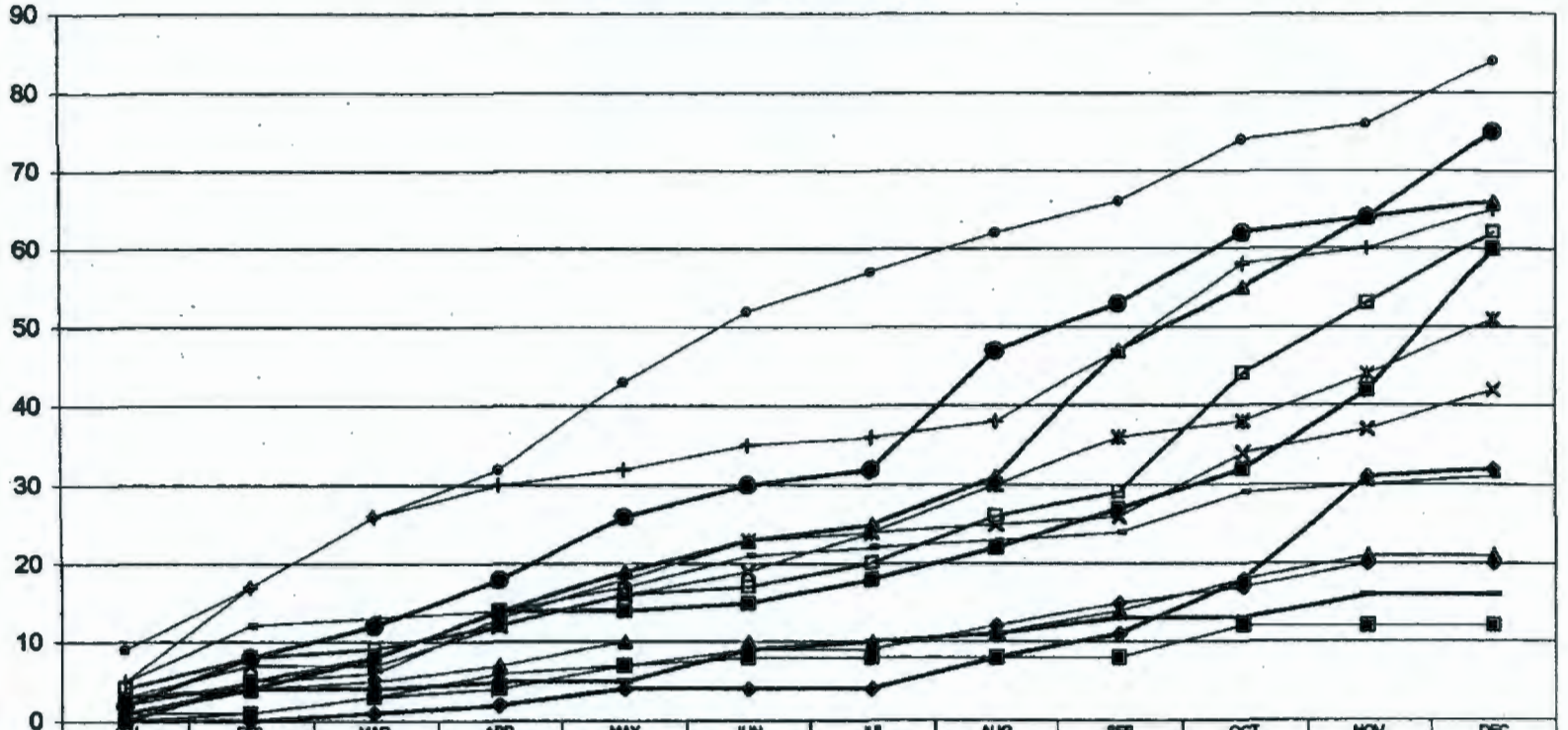
Abbreviations used are as follows:
B/G - Beta/Gamma
dpm - Disintegrations per minute.
PA - Probe Area.

Figure 11. Contaminated Vegetation Incidents 1994 through 2007 (Cumulative by Quarter)



	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
1994	3	9	15	20
1995	3	8	8	12
1996	5	10	14	21
1997	7	19	26	42
1998	6	23	36	51
1999	26	52	66	84
2000	26	35	47	65
2001	13	21	24	31
2002	4	9	13	16
2003	1	4	11	32
2004	8	15	27	60
2005	8	23	47	66
2006	12	30	53	75
2007	9	17	29	62

Figure 12. Contaminated Vegetation Incidents (Cumulative by Month)



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1994	1	1	3	6	7	9	9	12	15	17	20	20
1995	0	1	3	4	7	8	8	8	8	12	12	12
1996	3	4	6	7	10	10	10	11	14	18	21	21
1997	3	7	7	12	16	19	24	26	28	34	37	42
1998	2	6	6	13	18	23	24	30	36	38	44	51
1999	9	17	26	32	43	52	57	62	66	74	76	84
2000	6	17	26	30	32	35	38	38	47	58	60	66
2001	6	12	13	14	17	21	22	23	24	29	30	31
2002	3	4	4	6	6	9	10	11	13	13	16	16
2003	0	0	1	2	4	4	4	8	11	18	31	32
2004	0	5	8	14	14	15	16	22	27	32	42	50
2005	1	4	8	14	19	23	25	31	47	55	64	68
2006	2	8	12	18	28	30	32	47	53	62	64	76
2007	4	8	9	12	16	17	20	26	29	44	53	62

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 Reports, Occurrence Reports, and Radiological Survey Records) indicates that during the fourth quarter of 2007, there were eight incidents of contaminated animal related material (urine/feces, mouse, etc.). Table 4 shows the number of contaminated animal related incidences found and the range of activity encountered for the years 1994 through December 31, 2007. It should be noted that the dose rates for meter readings greater than 6,000,000 dpm/100cm^2 or 1,000,000 dpm/PA detected in the animals/insects can range as much as approximately 1.5 to 15 millirads per hour.

Figure 13 summarizes on a, cumulative by quarter basis; the contaminated animal incidents encountered from 1994 and through the fourth quarter of 2007. This graphic also demonstrates the increased activity of animals during the spring, summer, and fall. The graphic also demonstrates the decreased activity of animals during the winter months.

Figure 14 displays the number of contaminated animal incidents cumulative by month between 1994 and the end of the fourth quarter of 2007. Calendar year 1998 represents the record for the most contamination incidents (46).

Table 4. Contaminated Animal Incidents

(1994 through December 31, 2007)

Year	Number of Incidents	Max. Activity (dpm)B/G[a]	Min. Activity (dpm)B/G
2007	35	4,500,000/100cm^2	3,000/100cm^2
2006	17	>1,000,000/100cm^2	4,000/100cm^2
2005	13	>1,000,000/100cm^2	4,000/100cm^2
2004	20	649,000/100cm^2	1,500/100cm^2
2003	26	1,200,000/100cm^2	900cpm
2002	10	42,000/100cm^2 Alpha [b]	2,500/100cm^2
2001	10	>6,000,000/100cm^2 [c]	1,000/PA
2000	13	300,000/100cm^2	3,000/100cm^2
1999	17	500,000/100cm^2	2,000/PA
1998	46	>1,000,000/100cm^2	4,000/100cm^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
1994	24	>1,000,000/PA	2,000/PA

[a] The reporting of the activity changed in 1998 to meet the requirements identified in HNF-5173. The activity is reported in dpm per probe area prior to 1998 and in dpm per 100cm^2 since 1998 (unless otherwise noted e.g., for a spec or insect). Activity reported as beta/gamma unless otherwise noted.

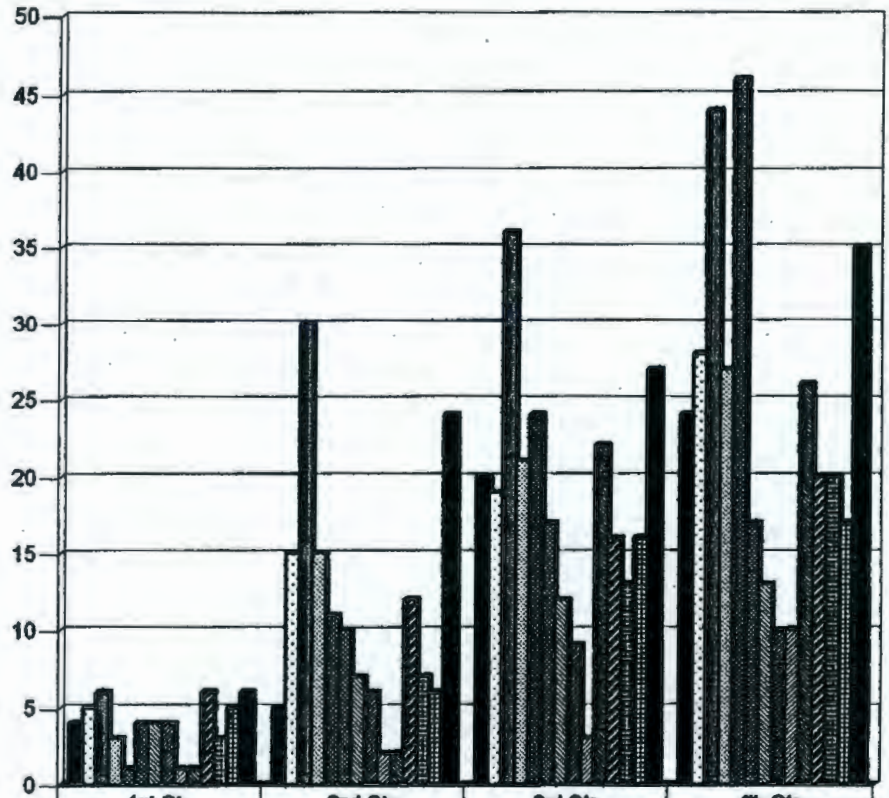
[b] No Beta/Gamma reported on this incident.

[c] >6,000,000/100cm^2 being used in 2001 and subsequent years includes a correction factor of 6 to correct from probe area to 100cm^2 which was not used in previous years.

Abbreviations used are as follows:

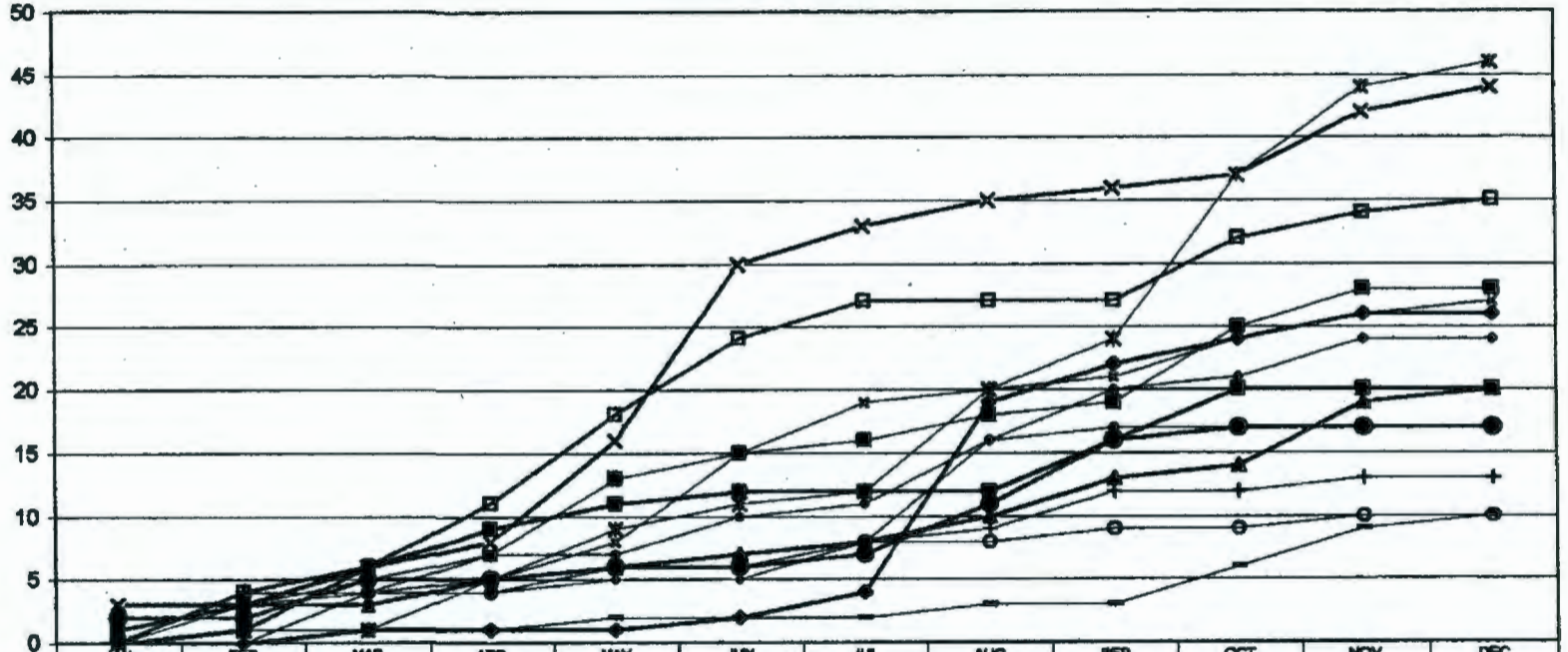
B/G - Beta/Gamma
dpm - Disintegrations per minute.
NR - No activity above background recorded in the field.
PA - Probe Area.

Figure 13. Contaminated Animal Incidents 1994 through 2007 (Cumulative by Quarter)



	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
1994	4	5	20	24
1995	5	15	19	28
1996	6	30	36	44
1997	3	15	21	27
1998	1	11	24	46
1999	4	10	17	17
2000	4	7	12	13
2001	4	6	9	10
2002	1	2	3	10
2003	1	2	22	26
2004	6	12	16	20
2005	3	7	13	20
2006	5	6	16	17
2007	6	24	27	35

Figure 14. Contaminated Animal Incidents
(Cumulative by Month)



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1994	1	3	4	4	6	6	8	16	20	21	24	24
1995	1	3	5	7	13	15	16	18	19	26	28	28
1996	3	3	6	6	16	30	33	35	36	37	42	44
1997	1	3	3	5	8	16	19	20	21	24	26	27
1998	0	1	1	5	9	11	12	20	24	37	44	46
1999	0	0	4	7	7	10	11	16	17	17	17	17
2000	0	4	4	5	6	7	8	9	12	12	13	13
2001	0	3	4	4	6	8	8	8	9	9	10	10
2002	0	1	1	1	2	2	2	3	3	8	9	10
2003	0	0	1	1	1	2	4	19	22	24	26	26
2004	0	1	8	8	11	12	12	12	16	20	20	20
2005	1	3	3	5	6	7	8	10	13	14	19	20
2006	2	2	5	5	6	6	7	11	16	17	17	17
2007	0	4	8	11	16	24	27	27	27	32	34	35

4.3 BIOLOGICAL CONTROL PROGRAM

The Biological Control Program (BCP) continues to work towards controlling and eliminating the spread of radioactive contamination by biological vectors. The number of contamination incidents through the fourth quarter of 2007 (62) for vegetation related vectors was below the high year of 1999 (84), but similar to the higher than normal years of 2000 (65), 2004 (60), 2005 (66), and 2006 (75). The animal contamination incidents (35) are approaching the high years of 1996 (44) and 1997 (46). The BCP scope includes: 1) integrated surveillance, 2) cleanup, 3) control, and 4) site restoration.

4.3.1 Surveillance

Radioactivity monitoring and surveillance activities indicate that the contaminated vegetation occurrences for fourth quarter of 2007 were within the higher than normal numbers reported for the same period during 2004, 2005, and 2006. The animal contamination occurrences were higher than the previous years since 1999.

4.3.2 Cleanup

The BCP reported continued progress towards cleanup of the operations areas in CY 2007.

4.3.2.1 First Quarter

- Approximately 22 hectares (55 acres) of underground pipeline and power transmission line right of way were brush hogged.
- 90.5 non-regulated compactor truckloads of tumbleweeds were taken to the 200-W burn pit for disposal. (1-compactor truckload $\cong$ 11,000ft^3).
- 8 regulated compactor truckloads of tumbleweeds were taken to PEcoS (a private licensed incinerator) for disposal.

4.3.2.2 Second Quarter

- Approximately 79 hectares (196 acres) of underground pipeline and power transmission line right of way were brush hogged.
- 49 non-regulated compactor truckloads of tumbleweeds were taken to the 200-W burn pit for disposal. (1-compactor truckload $\cong$ 11,000ft^3).
- 5 regulated compactor truckloads of tumbleweeds were taken to PEcoS (a private licensed incinerator) for disposal.

4.3.2.3 Third Quarter

- None of the underground pipeline and power transmission line right of ways were brush hogged.
- 43 non-regulated compactor truckloads of tumbleweeds were taken to the 200-W burn pit for disposal. (1-compactor truckload ≅ 11,000ft^3).
- 3 regulated compactor truckloads of tumbleweeds were taken to Permafix NW (formerly PEcoS, a private licensed incinerator) for disposal.

4.3.2.4 Fourth Quarter

- Approximately 45 hectares (109 acres) of the underground pipeline and power transmission line right of ways were brush hogged.
- 14.5 non-regulated compactor truckloads of tumbleweeds were taken to the 200-W burn pit for disposal. (1-compactor truckload ≅ 11,000ft^3).
- 2 regulated compactor truckloads of tumbleweeds were taken to Permafix NW (formerly PEcoS, a private licensed incinerator) for disposal.

4.3.3 Control

The number of animal incidents is the third highest year reported (see Figure 13). The contaminated vegetation occurrences are similar to the last three years, which are some of the higher years reported. The contaminated vegetation is now removed upon discovery while in the past the area was posted as CA or SCA, increasing the acreage of posted contamination areas.

An assessment of the biological control program conducted during the second half of 2006 concluded that the vegetation had developed a chemical resistance from the usage of the same herbicide over a period of years. A program has been developed to rotate herbicides used to control the deep rooted vegetation and was implemented during 2007. The effectiveness of this program should be seen during 2008.

Highlights for the fourth quarter of 2007 include:

- Approximately 243 hectares (600 acres) of Hanford Site land were treated with herbicides.
- 150 waste site evaluations were performed (herbicide effect, etc.).
- 7,503 pest control responses for Hanford site facilities were conducted.

- 904 bait stations and 1,993 animal control devices were in place.
- 621 animals captured, none of which were contaminated.

4.3.4 Noxious Weed Control

The Department of Energy (DOE) is obligated by the Federal *Noxious Weed Act of 1974* to actively control noxious weeds. *Washington Administrative Code* (WAC 16-750) and (RCW 17.10) require all landowners to control noxious weeds on their property, and impose specific penalties for failure to do so. Washington State Noxious Weed laws are enforced by the county Noxious Weed Control Boards. In compliance with federal, state, and local laws, each DOE facility is required to have a noxious weed management program.

During the CY 2007, 2,954 hectares (7,300 acres) of noxious weeds were treated with an herbicide application.

For a detailed description of the noxious weeds found on the Hanford Site, see the Hanford Site Environmental Report for Calendar Year 2006.

4.3.5 Site Restoration

2,070 hectares (7,338 acres) were seeded with grasses and forbs in support of the Wautoma fire recovery during the fourth quarter of 2007.

5.0 SUMMARY

Eighty-two scheduled routine outdoor radiological surveys were completed during the fourth quarter of 2007 in the 100, 200-East/West, 300, and 600 areas. All the WCH sites scheduled for CY 2007 were completed in the third quarter.

5.1 RADIOLOGICAL POSTING CHANGES

An on going effort to stabilize and/or clean up areas of known contamination and to down post or release these areas from posting is being performed by the River Corridor Project Contractor and by the facility managers. During the fourth quarter of 2007, none of the waste sites were down posted. From the beginning of 1991 through the end of the fourth quarter of 2007, 593 hectares (1,464 acres) remain down posted to URM, and 107 hectares (264 acres) have been interim closed. This currently leaves 3,583 hectares (8,854 acres) of contamination areas remaining to be stabilized and down posted or cleaned up and released. Table 5 indicates the changes in the surface area totals for the contaminated sites from 1996 to the end of the fourth quarter of 2007. These changes can be attributed to either stabilization and down posting, addition of newly discovered waste sites, and/or increased accuracy of waste site surveys.

Remedial action activities in the 100 and 300 areas have resulted in the interim closure and release from posting for 107 hectares (264 acres) see Table 6.

5.2 BIOTIC TRANSPORT ACTIVITY

During the fourth quarter of 2007, there were thirty-three incidents of contaminated vegetation and eight incidents of contaminated animals and animal-related matter (feces/urine). This corresponds, respectively, to twenty-two occurrences of contaminated vegetation and one contaminated animal related occurrence during the same period in 2006. Levels of activity found ranged from 3,000 dpm/100cm^2 to 9,000,000 dpm/100cm^2 beta/gamma and no alpha reported. Figure 15 shows the variation in biotic transport from 1994 through 2007.

TABLE 5. OUTDOOR CONTAMINATION STATUS (CA/SC AREAS) 1996 THROUGH 2007.

[Approximate surface area in hectares (acres)]

Hanford Site Area	1997[a]	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
100 Areas	47 (116)	46 (114)	41 (101)	43 (107)	46 (114)	46 (114)	47(116)	42(104)[f]	10(25)[f]	7(17)[f]	7(17)[f]
200 Areas	91 (225)	87 (215)	88 (217)	97 (239)	103 (255)	99 (245)	85(210)	99(245)	99(245)	98(242)	98(242)
300 Areas	20 (49)	20 (49)	19 (47)	11 (27)	11 (27)	11 (27)	19(47)[e]	9(22)[f]	5(12)[f]	0	0
600 & BC Control Areas	3,832 (9,469)[b,c]	3,480 (8,599)[d]	3,480 (8,599)	3,477 (8,592)	3,478 (8,594)	3,478 (8,594)	3,478 (8,594)	3,478 (8,594)	3,478 (8,594)	3,478 (8,594)	3,478 (8,594)
Totals	3,990 (9,859)	3,633 (8,977)	3,628 (8,964)	3,628 (8,965)	3,638 (8,990)	3,634 (8,980)	3,629 (8,968)	3,628 (8,965)[f]	3,592 (8,876)[f]	3,583 (8,853)[f]	3,583 (8,853)[f]

Note:

[a] There are some discrepancies as to the total acreage reported and areas remediated. This is due to the accuracy gained in measurement from the exclusive use of GPS equipment for the measurement of the contaminated surface areas.

[b] The large acreage in 600 & BC Control Areas is due to the soil contamination areas which was added in 1995 posted around the BC Cribs Control Area.

[c] The ERDF was added during the 3rd quarter of 1997, 1.9 ha (4.8 acres).

[d] The BC Control Areas were mapped in 1998 using the GPS equipment resulting in a decrease in total area.

[e] 8 hectares (20 acres) were remediated and soil samples taken in 2000, however, the waste sites were never down posted to URM or released. The current figures reflect the actual posting in the field.

[f] These acreages reflect those waste sites that have been remediated and received interim closure status.

CA/SC = Contamination Area/Soil Contamination Areas

Table 6. Contamination Status, December 31, 2007.

Area	Contamination Areas[a]		Underground Radioactive Materials Areas[b]		Interim Closed Areas[c]	
	hectares	acres	hectares	acres	hectares	acres
100-B,C	0	0	33	81	13	32
100-D,DR	0	0	22	54	6	15
100-F	0	0	8	19	14	35
100-H	0	0	7	17	7	17
100-K	5	12	45	111	20	49
100-N	2	5	16	40	25	62
200-East	71	175	141	348	0	0
200-West	27	67	224	554	0	0
300	0	0	42	104	22	54
400	0	0	0	0	0	0
600[d]	3,478	8,594	55	136	0	0
Totals	3,583	8,853	593	1,464	107	264

(a) Includes areas posted as contamination/soil contamination or as radiologically controlled and areas that had both underground radioactive material and contamination/soil contamination.

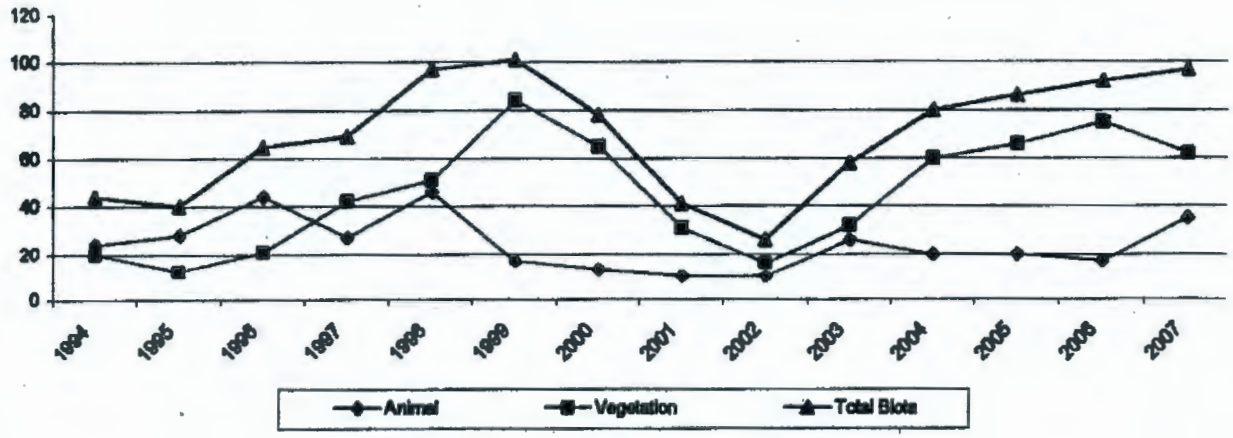
(b) Includes areas with only underground contamination.

(c) Includes areas which have undergone remediation and interim closure.

(d) Includes BC controlled area, Environmental Restoration Disposal Facility, and waste disposal facilities outside the 200-East and 200-West Area boundaries.

Figure 15. Biotic Transport at Hanford

Year	Animal	Vegetation	Total Biota
1994	24	20	44
1995	28	12	40
1996	44	21	65
1997	27	42	69
1998	46	51	97
1999	17	84	101
2000	13	65	78
2001	10	31	41
2002	10	16	26
2003	26	32	58
2004	20	60	80
2005	20	66	86
2006	17	75	92
2007	35	62	97



DISTRIBUTION

Number of Copies

ENERGY SOLUTIONS FEDERAL SERVICES, INC.

17

J. J. Dorian	G1-62
M. C. Dorsey	G1-62
R. F. Giddings	R3-12
S. M. McKinney (10)	G1-62
D. J. Moak	G1-62
J. M. Rodriguez	T1-32
R. C. Roos	R3-12
J. W. Wilde	G1-62

U.S. DEPARTMENT OF ENERGY - Richland

6

T. W. Ferns	A5-15
M. F. Jarvis	A5-15
E. D. MacAlister	S5-31
B. M. Pangborn	A5-17
D. C. Ward	A3-04
DOE Public Reading Room	H2-53

WASHINGTON CLOSURE HANFORD

9

R. A. Carlson	X4-09
L. A. Dietz	H4-22
W. M. Hayward	L1-01
K. D. Haggerty	L1-04
B. G. Headley	X2-17
J. W. Golden	X4-08
T. L. Lafreniere	X3-84
R. J. Landon	H4-21
J. G. Woolard	H4-21

BECHTEL NATIONAL, INC.

2

Lee Bostic	H4-02
Jerry Simiele	H4-02

DISTRIBUTION (*continued*)

Number of Copies

FLUOR HANFORD

18

R. L. Bumgarner	T1-27
D. L. Dyekman	H8-12
D. R. Ekstrom	S2-42
G. S. Hauger	T1-27
M. Kaviani	T3-28
A. R. Johnson	H8-26
S. B. Lamson	R3-60
G. J. LeBaron	S2-42
J. L. Nuzum	H8-12
G. D. Perkins	H8-67
K. A. Peterson (2)	H8-12
D. J. Phipps	S2-42
J. D. Reeve	T1-27
C. D. Sherman	S2-42
G. C. Triner	X3-74
D. J. Watson	X3-79
C. R. Webb	A0-21

FLUOR FEDERAL SERVICES

1

P. I. Thakkar	E6-29

CH2M HILL HANFORD GROUP, INC.

3

E. E. Bickel	R1-05
R. L. Brown	S7-75
P. C. Miller	R1-51

DISTRIBUTION (continued)

Number of Copies

PACIFIC NORTHWEST LABORATORY

4

E. J. Antonio	K3-54
C. L. Caldwell	J2-38
T. M. Poston	K6-75
Hanford Technical Library	P8-55

59