
Eastern Michaud Flats Site, Pocatello, Idaho

**Supplemental Surface Soil Radionuclide
Investigation Report for the Off-Plant OU**

FINAL

November 2010



EXECUTIVE SUMMARY

ES.1 INTRODUCTION

This Executive Summary briefly describes the background and objectives of the investigation into radionuclide levels in surface soils within areas of the Off-Plant and Simplot Plant Operable Units (OUs), which are part of the Eastern Michaud Flats (EMF) Superfund Site. The findings of this report are also summarized.

The EMF Site includes two adjacent phosphate ore processing facilities, owned and operated respectively by the J.R. Simplot Company (Simplot) and FMC Idaho LLC (FMC). The Simplot-owned properties at the Site are referred to as the Simplot Plant OU; the FMC-owned properties comprise the FMC Plant OU. The impacted areas owned by neither of the two companies are referred to as the Off-Plant OU. The 2009 field work was limited to seven identified Decision Units (DUs) located on properties that are not owned by FMC or Simplot and, thus, are within the Off-Plant OU. An eighth DU, located on Simplot property, northeast of the Simplot Don Plant, was also investigated.

ES.2 OFF-PLANT OU SOILS RADIONUCLIDE INVESTIGATION BACKGROUND AND OBJECTIVES

Background. The EMF Site, including the Off-Plant OU, was investigated during the EMF RI (Bechtel, 1996) and the sampling previously conducted had been believed sufficient for characterization purposes. However, at the request of the EPA, specific areas of the Off-Plant OU and Simplot Plant OU were further investigated in order to review and update the findings of the RI in areas targeted for land use controls in the June 1998 *Record of Decision for the EMF Site (1998 ROD; EPA, 1998)*, using current sampling and analytical protocols. The investigation was performed in accordance with the EPA-approved *Off-Plant OU Supplemental Surface Soil Radionuclide Investigation Work Plan (Off-Plant OU Work Plan; MWH, 2009)*.

Soil Radionuclide Field Work Objectives. The primary objective of this sampling was to collect and analyze samples of surface soils for specified radionuclides to further evaluate human health risks to potential future receptors in these areas. Specifically, the data were initially compared to risk-based screening Comparative Values (CVs) to determine the Radionuclides of Concern (ROCs) to be evaluated in a quantitative Supplemental Off-Plant OU Human Health Risk Assessment Addendum for the Supplemental Surface Soil Radionuclide Investigation (Supplemental Off-Plant OU HHRA Addendum).

Sample Design. The eight DUs consist of lands within the Off-Plant OU and Simplot OU that are closest to the plant areas of the EMF facilities. The sampling approach developed for this study followed an “inside out” strategy based on the conceptual site model that any elevated radionuclide levels in Off-Plant OU surface soils are primarily related to historic fugitive dust emissions from the EMF facilities. Composite soil samples were collected from two surface soil intervals throughout the eight DUs. The

investigation was limited to surface soil sampling based upon the assumption that potential impacts to these off-plant areas was limited to surface deposition of windblown dust and, to a lesser extent, stack emissions from the facilities. A total of eight composite samples were collected from 0-2 inch bgs and 2-6 inch bgs from each DU (i.e., a total of 16 composite samples per DU). Each composite sample was comprised of 20 discrete samples randomly collected throughout each area/parcel. The composite samples were analyzed for target radionuclide analytes, uranium-238, radium-226, and lead-210.

ES.3 FINDINGS OF THE OFF-PLANT OU SURFACE SOILS RADIONUCLIDE INVESTIGATION

Concentrations of detected constituents in sampled surface soils were initially compared to risk-based screening CVs, developed from human health soil screening levels (SSLs) and background values. This screening provided the basis for which DUs and constituents were quantitatively evaluated in the Supplemental Off-Plant OU HHRA Addendum. The findings of the Supplemental Off-Plant OU HHRA Addendum, which evaluated risks to potential future human receptors from exposure to existing surface materials, are summarized in Table ES-1. Risks to potential future receptors (residents and worker) in DUs 1, 3, 4, 5, 6, and 7 are below a level of health concern, as documented by the fact that all of the soil radionuclide concentrations were found to be below their corresponding residential and site worker CVs in the initial screening evaluation. While exceedances of screening CVs were documented in DUs 2 and 8, the Supplemental Off-Plant OU HHRA Addendum determined that the reasonable maximum exposure (RME) cumulative lifetime cancer risks to potential future receptors (residents and workers) in these areas are within EPA's acceptable risk range¹. This finding is supported by the fact that concentrations of the target radionuclides in DUs 2 and 8 are lower than the residential and worker PRGs that were recently developed for these, and other, constituents, in the Supplemental Feasibility Study (SFS) for the FMC Plant OU.

The investigation findings also corroborate the assumption that elevated levels of radionuclides detected in surface soil samples collected in the Off-Plant OU and Simplot Plant OU DUs are the result of windblown dust and, to a lesser extent, stack emissions from the facilities. This conclusion is supported by the fact that DUs located directly downwind from areas of the FMC and Simplot plant sites at which historic ore-handling operations occurred (i.e., DUs 2 and 8) are more heavily impacted by EMF facility-related constituents than DUs located either in an upwind (e.g., DUs 6 and 7) or cross-wind (e.g., DUs 1 and 3) direction. Additionally, surface soil impacts decrease with distance from the FMC and Simplot plant sites (i.e., concentrations in downwind areas DUs 4 and 5 are lower than those in DU 2), which further supports the "inside-out" investigation approach and the conclusion that EMF impacts are related to the dispersion and deposition of facility air emissions.

¹ EPA's acceptable range range is generally defined as 1E-04 to 1E-06 but also includes an upperbound of 3E-04 as essentially equivalent to 1E-04 (see EPA's *Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination*, OSWER No. 9200.4-18, 1997).

In summary, sufficient data have been collected to characterize radionuclide levels in surface soils within DUs 1 through 8. Evaluation of these data also confirms that the investigated areas are representative of worst-case radionuclide surface soil impacts in the Off-Plant OU. Nonetheless, the Supplemental Off-Plant OU HHRA Addendum found that potential human health risks associated with the measured radionuclide levels are below a level of concern in all 8 DUs.

Based on the above findings, the following conclusions/recommendations are made:

1. No further investigation of radionuclide soil levels is necessary in Off-Plant OU DUs 1 through 7 and Simplot Plant OU DU 8.
2. No additional investigation of radionuclide levels is necessary in other Off-Plant OU areas, since they are located further from the EMF facilities than the DUs evaluated in this report.

TABLE ES-1

SUMMARY OF RADIONUCLIDE TOTAL CANCER RISKS TO POTENTIAL FUTURE HUMAN RECEPTORS ON THE OFF-PLANT OU
 SUPPLEMENTAL SURFACE SOIL RADIONUCLIDE INVESTIGATION
 EMF Superfund Site, Pocatello, Idaho
 (Page 1 of 2)

	<i>RME Lifetime Cancer Risk (CR)</i>		<i>ROCs</i>				TOTAL RME CR	Risk Drivers*
	Exposure Pathway	External Gamma Exposure	Incidental Soil Ingestion	Ingestion of Homegrown Produce	Fugitive Dust Inhalation			
		RME	RME	RME	RME			
DU 1	Resident	BScr	BScr	BScr	BScr	BScr	-	
	Outdoor Commercial/Industrial Worker	BScr	BScr	NA	BScr	BScr	-	
	Indoor Commercial/Industrial Worker	BScr	BScr	NA	NA	BScr	-	
	Construction Worker	BScr	BScr	NA	BScr	BScr	-	
	Utility Worker	BScr	BScr	NA	BScr	BScr	-	
	<i>CTE Lifetime Cancer Risk (CR)</i>		<i>ROCs</i>				TOTAL CTE CR	Risk Drivers*
	Exposure Pathway	External Gamma Exposure	Incidental Soil Ingestion	Ingestion of Homegrown Produce	Fugitive Dust Inhalation			
		CTE	CTE	CTE	CTE			
	Resident	BScr	BScr	BScr	BScr	BScr	-	
	Outdoor Commercial/Industrial Worker	BScr	BScr	NA	BScr	BScr	-	
	Indoor Commercial/Industrial Worker	BScr	BScr	NA	NA	BScr	-	
Construction Worker	BScr	BScr	NA	BScr	BScr	-		
Utility Worker	BScr	BScr	NA	BScr	BScr	-		
DU 2	<i>RME Lifetime Cancer Risk (CR)</i>		<i>ROCs</i>				TOTAL RME CR	Risk Drivers*
	Exposure Pathway	External Gamma Exposure	Incidental Soil Ingestion	Ingestion of Homegrown Produce	Fugitive Dust Inhalation			
		RME	RME	RME	RME			
	Resident	1.E-04	8.E-06	8.E-06	2.E-09	1.E-04	Ra-226, Pb-210	
	Outdoor Commercial/Industrial Worker	6.E-05	7.E-07	NA	7.E-09	6.E-05	Ra-226	
	Indoor Commercial/Industrial Worker	3.E-05	4.E-07	NA	NA	3.E-05	Ra-226	
	Construction Worker	BScr	BScr	NA	BScr	BScr	-	
	Utility Worker	BScr	BScr	NA	BScr	BScr	-	
	<i>CTE Lifetime Cancer Risk (CR)</i>		<i>ROCs</i>				TOTAL CTE CR	Risk Drivers*
	Exposure Pathway	External Gamma Exposure	Incidental Soil Ingestion	Ingestion of Homegrown Produce	Fugitive Dust Inhalation			
		CTE	CTE	CTE	CTE			
Resident	2.E-05	8.E-07	2.E-06	3.E-10	2.E-05	Ra-226, Pb-210		
Outdoor Commercial/Industrial Worker	1.E-05	9.E-08	NA	2.E-09	1.E-05	Ra-226		
Indoor Commercial/Industrial Worker	6.E-06	9.E-08	NA	NA	6.E-06	Ra-226		
Construction Worker	BScr	BScr	NA	BScr	BScr	-		
Utility Worker	BScr	BScr	NA	BScr	BScr	-		
DU 3	<i>RME Lifetime Cancer Risk (CR)</i>		<i>ROCs</i>				TOTAL RME CR	Risk Drivers*
	Exposure Pathway	External Gamma Exposure	Incidental Soil Ingestion	Ingestion of Homegrown Produce	Fugitive Dust Inhalation			
		RME	RME	RME	RME			
	Resident	BScr	BScr	BScr	BScr	BScr	-	
	Outdoor Commercial/Industrial Worker	BScr	BScr	NA	BScr	BScr	-	
	Indoor Commercial/Industrial Worker	BScr	BScr	NA	NA	BScr	-	
	Construction Worker	BScr	BScr	NA	BScr	BScr	-	
	Utility Worker	BScr	BScr	NA	BScr	BScr	-	
	<i>CTE Lifetime Cancer Risk (CR)</i>		<i>ROCs</i>				TOTAL CTE CR	Risk Drivers*
	Exposure Pathway	External Gamma Exposure	Incidental Soil Ingestion	Ingestion of Homegrown Produce	Fugitive Dust Inhalation			
		CTE	CTE	CTE	CTE			
Resident	BScr	BScr	BScr	BScr	BScr	-		
Outdoor Commercial/Industrial Worker	BScr	BScr	NA	BScr	BScr	-		
Indoor Commercial/Industrial Worker	BScr	BScr	NA	NA	BScr	-		
Construction Worker	BScr	BScr	NA	BScr	BScr	-		
Utility Worker	BScr	BScr	NA	BScr	BScr	-		
DU 4	<i>RME Lifetime Cancer Risk (CR)</i>		<i>ROCs</i>				TOTAL RME CR	Risk Drivers*
	Exposure Pathway	External Gamma Exposure	Incidental Soil Ingestion	Ingestion of Homegrown Produce	Fugitive Dust Inhalation			
		RME	RME	RME	RME			
	Resident	BScr	BScr	BScr	BScr	BScr	-	
	Outdoor Commercial/Industrial Worker	BScr	BScr	NA	BScr	BScr	-	
	Indoor Commercial/Industrial Worker	BScr	BScr	NA	NA	BScr	-	
	Construction Worker	BScr	BScr	NA	BScr	BScr	-	
	Utility Worker	BScr	BScr	NA	BScr	BScr	-	
	<i>CTE Lifetime Cancer Risk (CR)</i>		<i>ROCs</i>				TOTAL CTE CR	Risk Drivers*
	Exposure Pathway	External Gamma Exposure	Incidental Soil Ingestion	Ingestion of Homegrown Produce	Fugitive Dust Inhalation			
		CTE	CTE	CTE	CTE			
Resident	BScr	BScr	BScr	BScr	BScr	-		
Outdoor Commercial/Industrial Worker	BScr	BScr	NA	BScr	BScr	-		
Indoor Commercial/Industrial Worker	BScr	BScr	NA	NA	BScr	-		
Construction Worker	BScr	BScr	NA	BScr	BScr	-		
Utility Worker	BScr	BScr	NA	BScr	BScr	-		

TABLE ES-1

SUMMARY OF RADIONUCLIDE TOTAL CANCER RISKS TO POTENTIAL FUTURE HUMAN RECEPTORS ON THE OFF-PLANT OU
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 EMF Superfund Site, Pocatello, Idaho
 (Page 2 of 2)

	<i>RME Lifetime Cancer Risk (CR)</i>		<i>ROCs</i>				TOTAL RME CR	Risk Drivers*
	Exposure Pathway	External Gamma Exposure	Incidental Soil Ingestion	Ingestion of Homegrown Produce	Fugitive Dust Inhalation			
		RME	RME	RME	RME			
DU 5	Resident	BScr	BScr	BScr	BScr	BScr	-	
	Outdoor Commercial/Industrial Worker	BScr	BScr	NA	BScr	BScr	-	
	Indoor Commercial/Industrial Worker	BScr	BScr	NA	NA	BScr	-	
	Construction Worker	BScr	BScr	NA	BScr	BScr	-	
	Utility Worker	BScr	BScr	NA	BScr	BScr	-	
	<i>CTE Lifetime Cancer Risk (CR)</i>		<i>ROCs</i>				TOTAL CTE CR	Risk Drivers*
	Exposure Pathway	External Gamma Exposure	Incidental Soil Ingestion	Ingestion of Homegrown Produce	Fugitive Dust Inhalation			
		CTE	CTE	CTE	CTE			
	Resident	BScr	BScr	BScr	BScr	BScr	-	
	Outdoor Commercial/Industrial Worker	BScr	BScr	NA	BScr	BScr	-	
	Indoor Commercial/Industrial Worker	BScr	BScr	NA	NA	BScr	-	
Construction Worker	BScr	BScr	NA	BScr	BScr	-		
Utility Worker	BScr	BScr	NA	BScr	BScr	-		
DU 6	<i>RME Lifetime Cancer Risk (CR)</i>		<i>ROCs</i>				TOTAL RME CR	Risk Drivers*
	Exposure Pathway	External Gamma Exposure	Incidental Soil Ingestion	Ingestion of Homegrown Produce	Fugitive Dust Inhalation			
		RME	RME	RME	RME			
	Resident	BScr	BScr	BScr	BScr	BScr	-	
	Outdoor Commercial/Industrial Worker	BScr	BScr	NA	BScr	BScr	-	
	Indoor Commercial/Industrial Worker	BScr	BScr	NA	NA	BScr	-	
	Construction Worker	BScr	BScr	NA	BScr	BScr	-	
	Utility Worker	BScr	BScr	NA	BScr	BScr	-	
	<i>CTE Lifetime Cancer Risk (CR)</i>		<i>ROCs</i>				TOTAL CTE CR	Risk Drivers*
	Exposure Pathway	External Gamma Exposure	Incidental Soil Ingestion	Ingestion of Homegrown Produce	Fugitive Dust Inhalation			
		CTE	CTE	CTE	CTE			
Resident	BScr	BScr	BScr	BScr	BScr	-		
Outdoor Commercial/Industrial Worker	BScr	BScr	NA	BScr	BScr	-		
Indoor Commercial/Industrial Worker	BScr	BScr	NA	NA	BScr	-		
Construction Worker	BScr	BScr	NA	BScr	BScr	-		
Utility Worker	BScr	BScr	NA	BScr	BScr	-		
DU 7	<i>RME Lifetime Cancer Risk (CR)</i>		<i>ROCs</i>				TOTAL RME CR	Risk Drivers*
	Exposure Pathway	External Gamma Exposure	Incidental Soil Ingestion	Ingestion of Homegrown Produce	Fugitive Dust Inhalation			
		RME	RME	RME	RME			
	Resident	BScr	BScr	BScr	BScr	BScr	-	
	Outdoor Commercial/Industrial Worker	BScr	BScr	NA	BScr	BScr	-	
	Indoor Commercial/Industrial Worker	BScr	BScr	NA	NA	BScr	-	
	Construction Worker	BScr	BScr	NA	BScr	BScr	-	
	Utility Worker	BScr	BScr	NA	BScr	BScr	-	
	<i>CTE Lifetime Cancer Risk (CR)</i>		<i>ROCs</i>				TOTAL CTE CR	Risk Drivers*
	Exposure Pathway	External Gamma Exposure	Incidental Soil Ingestion	Ingestion of Homegrown Produce	Fugitive Dust Inhalation			
		CTE	CTE	CTE	CTE			
Resident	BScr	BScr	BScr	BScr	BScr	-		
Outdoor Commercial/Industrial Worker	BScr	BScr	NA	BScr	BScr	-		
Indoor Commercial/Industrial Worker	BScr	BScr	NA	NA	BScr	-		
Construction Worker	BScr	BScr	NA	BScr	BScr	-		
Utility Worker	BScr	BScr	NA	BScr	BScr	-		
DU 8	<i>RME Lifetime Cancer Risk (CR)</i>		<i>ROCs</i>				TOTAL RME CR	Risk Drivers*
	Exposure Pathway	External Gamma Exposure	Incidental Soil Ingestion	Ingestion of Homegrown Produce	Fugitive Dust Inhalation			
		RME	RME	RME	RME			
	Resident	1.E-04	2.E-06	7.E-07	1.E-09	1.E-04	Ra-226	
	Outdoor Commercial/Industrial Worker	6.E-05	8.E-07	NA	8.E-09	6.E-05	Ra-226	
	Indoor Commercial/Industrial Worker	3.E-05	5.E-07	NA	NA	3.E-05	Ra-226	
	Construction Worker	BScr	BScr	NA	BScr	BScr	-	
	Utility Worker	BScr	BScr	NA	BScr	BScr	-	
	<i>CTE Lifetime Cancer Risk (CR)</i>		<i>ROCs</i>				TOTAL CTE CR	Risk Drivers*
	Exposure Pathway	External Gamma Exposure	Incidental Soil Ingestion	Ingestion of Homegrown Produce	Fugitive Dust Inhalation			
		CTE	CTE	CTE	CTE			
Resident	2.E-05	2.E-07	2.E-07	1.E-10	2.E-05	Ra-226		
Outdoor Commercial/Industrial Worker	1.E-05	9.E-08	NA	2.E-09	1.E-05	Ra-226		
Indoor Commercial/Industrial Worker	6.E-06	1.E-07	NA	NA	6.E-06	Ra-226		
Construction Worker	BScr	BScr	NA	BScr	BScr	-		
Utility Worker	BScr	BScr	NA	BScr	BScr	-		

Notes:

- RME = Reasonable maximum exposure.
- CTE = Central tendency exposure.
- BScr = ROC concentrations are below screening CVs for this receptor.
- NA = Not an applicable exposure route for the receptor of concern.
- * When applicable, the two ROCs contributing most significantly to exceedances of a 1E-04 cancer risk are identified.

TABLE OF CONTENTS

Section	Page
ES EXECUTIVE SUMMARY.....	ES-1
1 INTRODUCTION	
1.1 Background.....	1-1
1.2 Site Descriptions and Regulatory History.....	1-2
1.2.1 Off-Plant OU.....	1-2
1.2.2 Simplot Plant OU.....	1-3
1.3 Report Organization.....	1-3
2 FIELD INVESTIGATION PROGRAMS AND TECHNIQUES	
2.1 Field Investigation Programs and Rationale.....	2-1
2.2 Field Equipment and Procedures.....	2-1
2.2.1 Surface Soil Sampling.....	2-2
2.2.2 Sample Labeling, Handling, Shipment and Analysis.....	2-3
2.2.3 Sample Identification.....	2-3
2.2.4 Investigation Derived Waste.....	2-4
3 EVALUATION OF AREA SPECIFIC FINDINGS	
3.1 Introduction.....	3-1
3.2 Decision Unit 1 Soil Sampling Results and Evaluation.....	3-1
3.2.1 DU 1 Site Description.....	3-1
3.2.2 DU 1 Problem Statement.....	3-2
3.2.3 DU 1 Risk Assessment Screening Results.....	3-2
3.2.4 DU 1 Risk Characterization and Uncertainty Discussion.....	3-3
3.3 Decision Unit 2 Soil Sampling Results and Evaluation.....	3-3
3.3.1 DU 2 Site Description.....	3-3
3.3.2 DU 2 Problem Statement.....	3-3
3.3.3 DU 2 Risk Assessment Screening Results.....	3-3
3.3.4 DU 2 Risk Characterization and Uncertainty Discussion.....	3-5
3.4 Decision Unit 3 Soil Sampling Results and Evaluation.....	3-6
3.4.1 DU 3 Site Description.....	3-6
3.4.2 DU 3 Problem Statement.....	3-6
3.4.3 DU 3 Risk Assessment Screening Results.....	3-6
3.4.4 DU 3 Risk Characterization and Uncertainty Discussion.....	3-7
3.5 Decision Unit 4 Soil Sampling Results and Evaluation.....	3-7
3.5.1 DU 4 Site Description.....	3-7
3.5.2 DU 4 Problem Statement.....	3-8
3.5.3 DU 4 Risk Assessment Screening Results.....	3-8
3.5.4 DU 4 Risk Characterization and Uncertainty Discussion.....	3-9
3.6 Decision Unit 5 Soil Sampling Results and Evaluation.....	3-9
3.6.1 DU 5 Site Description.....	3-9

3.6.2	DU 5 Problem Statement	3-9
3.6.3	DU 5 Risk Assessment Screening Results.....	3-9
3.6.4	DU 5 Risk Characterization and Uncertainty Discussion.....	3-10
3.7	Decision Unit 6 Soil Sampling Results and Evaluation.....	3-10
3.7.1	DU 6 Site Description.....	3-10
3.7.2	DU 6 Problem Statement	3-11
3.7.3	DU 6 Risk Assessment Screening Results.....	3-11
3.7.4	DU 6 Risk Characterization and Uncertainty Discussion.....	3-12
3.8	Decision Unit 7 Soil Sampling Results and Evaluation.....	3-12
3.8.1	DU 7 Site Description.....	3-12
3.8.2	DU 7 Problem Statement	3-12
3.8.3	DU 7 Risk Assessment Screening Results.....	3-13
3.8.4	DU 7 Risk Characterization and Uncertainty Discussion.....	3-13
3.9	Decision Unit 8 Soil Sampling Results and Evaluation.....	3-14
3.9.1	DU 8 Site Description.....	3-14
3.9.2	DU 8 Problem Statement	3-14
3.9.3	DU 8 Soil Investigation Results	3-14
3.9.4	DU 8 Risk Characterization and Uncertainty Discussion.....	3-16
4	CONCLUSIONS AND RECOMMENDATIONS	
4.1	Introduction	4-1
4.2	Conclusions	4-1
4.2.1	General Conclusions.....	4-1
4.2.2	Decision Unit 1	4-1
4.2.3	Decision Unit 2.....	4-2
4.2.4	Decision Unit 3	4-2
4.2.5	Decision Unit 4.....	4-3
4.2.6	Decision Unit 5	4-3
4.2.7	Decision Unit 6.....	4-4
4.2.8	Decision Unit 7	4-4
4.2.9	Decision Unit 8	4-5
4.3	Recommendations.....	4-5
5	REFERENCES.....	5-1

APPENDICES

Appendix

A FIELD FORMS

- A-1 SOIL SAMPLE FORMS
- A-2 FIELD BOOKS
- A-3 GPS SAMPLE COORDINATES
- A-4 CHAIN OF CUSTODY FORMS

B VALIDATED DATA

- B-1 LABORATORY REPORTS
- B-2 LDC VALIDATION REPORTS

C LABORATORY VALIDATION REPORT

D SUPPLEMENTAL OFF-PLANT OU HUMAN HEALTH RISK ASSESSMENT ADDENDUM FOR THE SUPPLEMENTAL SURFACE SOIL RADIONUCLIDE INVESTIGATION

E EPA IN-SITU GAMMA-RAY MEASUREMENTS ON THE OFF-PLANT OPERABLE UNIT

F RESPONSE TO AGENCY COMMENTS

FIGURES

Figure

- 1-1 Regional Setting of the Eastern Michaud Flats Site
- 1-2 Site Map Decision Units

- 2-1 Decision Unit 1 Sample Locations
- 2-2 Decision Unit 2 Sample Locations
- 2-3 Decision Unit 3 Sample Locations
- 2-4 Decision Unit 4 Sample Locations
- 2-5 Decision Unit 5 Sample Locations
- 2-6 Decision Unit 6 Sample Locations
- 2-7 Decision Unit 7 Sample Locations
- 2-8 Decision Unit 8 Sample Locations

TABLES

Table

- ES-1 Summary of Radionuclide Total Cancer Risks to Potential Future Human Receptors on the Off-Plant OU

- 3-1 Human Health Soil Screening Levels
- 3-2 DU 1 Data Summary and Evaluation against Residential and Worker CVs and PRGs

- 3-3 Summary of Constituents Exceeding Comparative Values
- 3-4 DU 2 Data Summary and Evaluation against Residential and Worker CVs and PRGs
- 3-5 Summary of Potential Human Health Risks to Future Receptors in DU 2

- 3-6 DU 3 Data Summary and Evaluation against Residential and Worker CVs and PRGs
- 3-7 DU 4 Data Summary and Evaluation against Residential and Worker CVs and PRGs
- 3-8 DU 5 Data Summary and Evaluation against Residential and Worker CVs and PRGs
- 3-9 DU 6 Data Summary and Evaluation against Residential and Worker CVs and PRGs
- 3-10 DU 7 Data Summary and Evaluation against Residential and Worker CVs and PRGs
- 3-11 DU 8 Data Summary and Evaluation against Residential and Worker CVs and PRGs
- 3-12 Summary of Potential Human Health Risks to Future Receptors in DU 8

Section 1

INTRODUCTION

FMC and Simplot collected surface soil samples from eight decision units (DUs) at the Eastern Michaud Flats Superfund Site (EMF Site) in accordance with the EPA-approved *Off-Plant OU Supplemental Surface Soil Radionuclide Investigation Work Plan (Off-Plant Work Plan*; MWH, 2009). Seven of the identified DUs are located on properties that are not owned by FMC or Simplot and, thus, are within the Off-Plant Operable Unit (OU). The eighth DU is located on Simplot property, northeast of the Simplot Don Plant. The EMF Site, including the Off-Plant OU, was investigated during the EMF RI and the sampling previously conducted had been believed sufficient for characterization purposes. However, at the request of the EPA, specific areas of the Off-Plant OU and Simplot Plant OU were further investigated in order to review and update the findings of the RI in areas targeted for land use controls in the June 1998 *Record of Decision for the EMF Site (1998 ROD*; EPA, 1998), using current sampling and analytical protocols. The primary objective of this proposed sampling was to collect and analyze samples of surface soils for specified radionuclides to further evaluate human health risks to potential future receptors in these areas.

1.1 BACKGROUND

The EMF Site is located in southeast Idaho, approximately 2.5 miles northwest of Pocatello, Idaho. The EMF Site was listed on the National Priorities List (NPL) on August 30, 1990. The EMF Site includes two adjacent production facilities, a former FMC Corporation elemental phosphorus processing plant that ceased operation in 2001 (FMC Plant OU) and a phosphate fertilizer processing facility operated by the J.R. Simplot Company (Simplot Plant OU). The EMF Site is shown on Figure 1-1 and encompasses both the FMC and Simplot plants and surrounding areas affected by releases from these facilities. The FMC Plant OU is on privately-owned fee land, most of which is located within the exterior boundaries of the Fort Hall Indian Reservation. The easternmost portions of the FMC Plant OU, as well as the Simplot Plant OU, are located outside the reservation boundary.

FMC, Simplot and EPA entered into a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Administrative Order on Consent (AOC) in May 1991 under which the companies agreed to conduct a Remedial Investigation/Feasibility Study (RI/FS) for the site. During the RI/FS the site was divided into three “Subareas:” 1) the FMC Subarea, consisting of the FMC plant and other FMC-owned properties at the site; 2) the Simplot Subarea, consisting of the Simplot plant and other Simplot-owned properties at the site; and 3) the Offsite Subarea, consisting of the remainder of the site. EPA changed these designations to the FMC Plant OU, the Simplot Plant OU, and the Off-Plant OU after its *1998 ROD*.

As required under the 1991 AOC, FMC and Simplot developed a number of EMF Site studies and reports. These included the January 1994 *Preliminary Site Characterization*

Summary (PSCS, BEI, 1994), the August 1996 *EMF Remedial Investigation Report (RI Report)*, BEI, 1996), and the April 1997 *Feasibility Study Report FMC Subarea (FMC FS Report)*, BEI, 1997), *Feasibility Study Report Simplot Subarea (Simplot FS Report)*, MFG, 1997) and *Feasibility Study Report Offsite Subarea (Offsite FS Report)*, FMC Corp and J.R. Simplot Company, 1997). EPA reviewed and approved these reports. The EPA conducted the baseline human health and ecological risk assessments concurrently with the companies' RI/FS work and issued the final reports for those studies in July 1996 and July 1995, respectively. The conclusions of those risk assessments were incorporated into the *FS Report* and the *1998 ROD*. The *1998 ROD* addressed all three Subareas/OUs at the EMF Site.

1.2 SITE DESCRIPTION AND REGULATORY HISTORY

1.2.1 Off-Plant OU

The Off-Plant OU includes agricultural areas, rangeland for cattle grazing within the Fort Hall Indian Reservation and Bureau of Land Management (BLM) lands, and some residences. The *1998 ROD* divided the Off-Plant OU into three areas, by reference to the three types of remedial action the ROD selected for this OU:

- Areas Subject to Land Use Controls
- Areas Subject to Fluoride Monitoring
- Areas Subject to Company Monitoring for Residential Development

The areas subject to land use controls were the focus of this supplemental investigation. These are areas where the soil contaminant levels were found in the Baseline Human Health Risk Assessment (HHRA) to exceed a hazard quotient (HQ) of 1 for cadmium and/or pose greater than a 1 in 10,000 excess lifetime cancer risk for radium-226 under a reasonable maximum exposure (RME) scenario. These areas include portions of the Interstate 86 (I-86) Right-of-Way; Chevron Tank Farm; City of Pocatello Property; a portion of the land owned by a private party named R. Rowland, and a portion of BLM lands to the southwest of the FMC facility. This Off-Plant OU investigation targeted these areas in order to update the characterization of radionuclide impacts with current sampling and analytical protocols.

As shown on Figure 1-2, seven (7) separate DUs within the Off-Plant OU were selected based on the areas subject to land use controls. The DUs are located in the areas where radionuclide activities in surface soils were found in the Baseline HHRA (E&E, 1996) to exceed the 10⁻⁴ incremental cancer risk level. This risk contour, which was based on soil data collected during the RI, is also shown on Figure 1-2. The risk contour north of I-86 was based on concentrations detected in several discrete RI surface soil samples. Four of these samples (293-1B01, 293-1B04, 315-1B, and 000-1C) were collected within the Off-Plant OU, and the rest are located within the FMC-owned Northern Properties section of the FMC Plant OU. The risk contour in the area southwest of the FMC Plant Site was based on only one RI sample location (248-3B).

1.2.2 Simplot Plant OU

The eighth DU is located on property owned by Simplot and is located northeast of Simplot's Don Plant. This DU was included following EPA recommendations in order to conservatively characterize conditions in the north-east quadrant of the Off-Plant OU, and is consistent with the "inside out" sampling strategy presented in the *Off-Plant OU Work Plan*, which was developed based on the conceptual site model that any elevated radionuclide levels in Off-Plant OU surface soils are primarily related to historic fugitive dust emissions from the EMF facilities. This DU lies adjacent to agricultural land and Simplot ponds, but consists of relatively undisturbed land.

1.3 REPORT ORGANIZATION

This document is a component of the investigation at the EMF Site. Additional details on the FMC and Simplot facility operations, previous environmental investigations with potential relevance to the EMF facilities, and physical characteristics of the EMF Site and surrounding area based on the results of the EMF RI investigations are not repeated here. This information can be found by referring to the *EMF RI Report*.

This report is organized as follows:

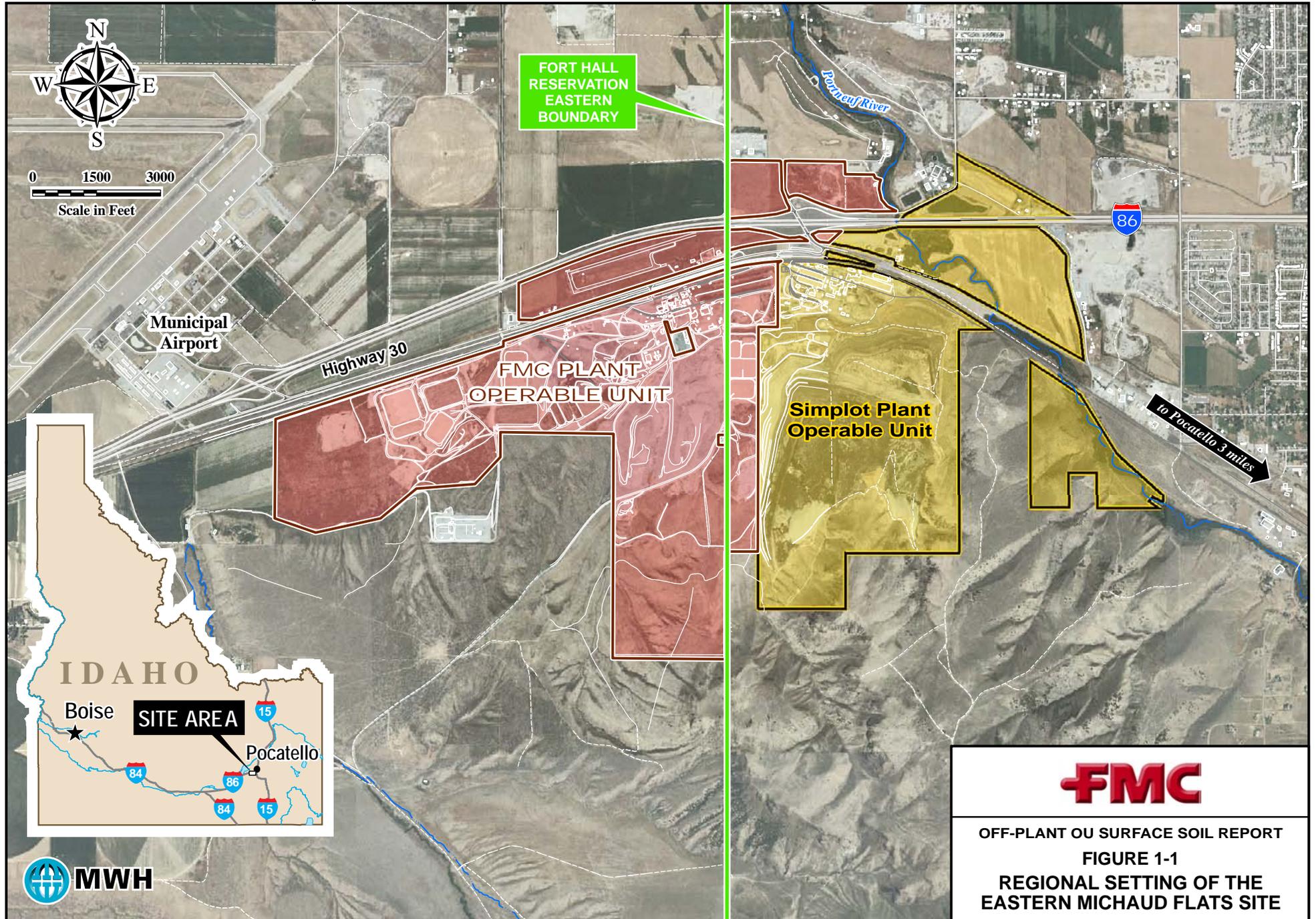
Section 1 provides a brief summary of the scoping process and the objectives of the Off-Plant OU radionuclide investigation.

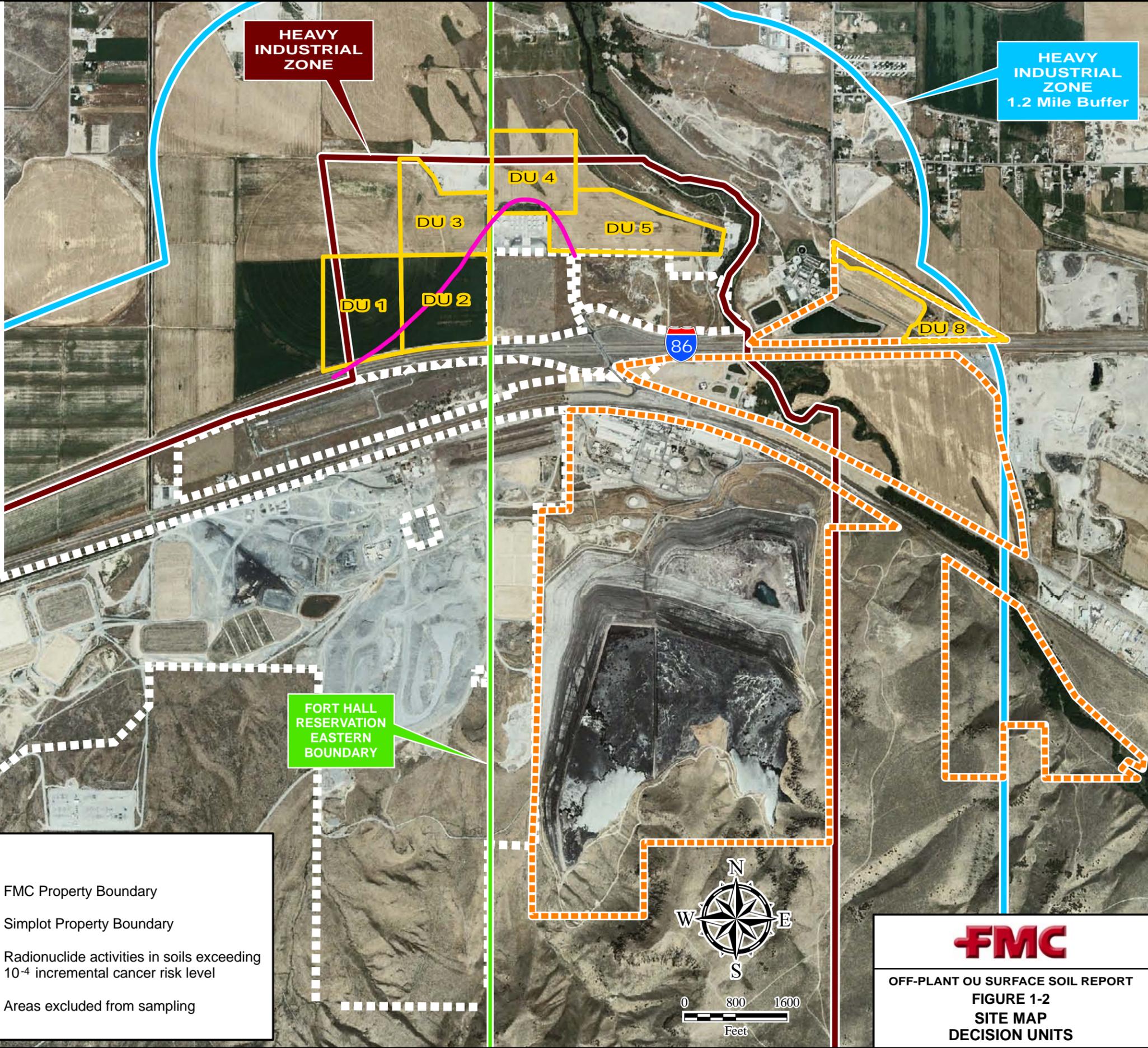
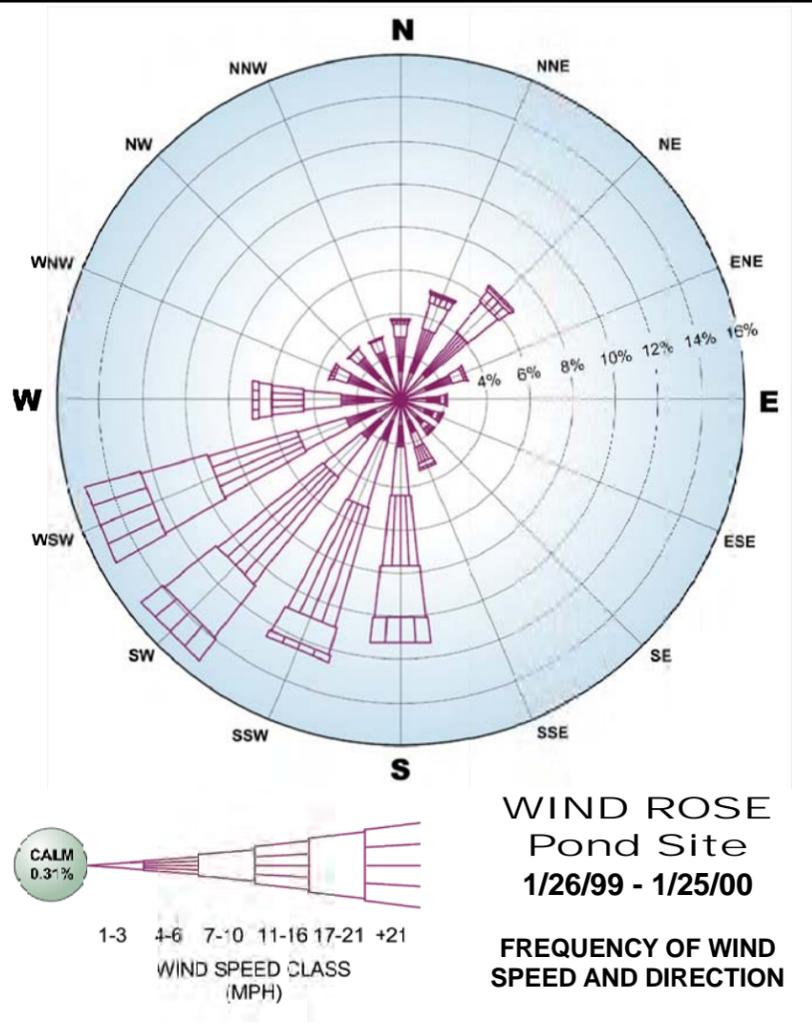
Section 2 describes the field programs that were conducted during the Off-Plant OU radionuclide investigation, including data collection equipment and procedures and sample analytical methods.

Section 3 describes on a DU-specific basis the nature and extent of radiological constituents that appear to be associated with historic emissions from the EMF facilities. Descriptions of individual DUs are also included in this section of the report. Concentrations of detected constituents in sampled surface soils are initially compared to risk-based comparative values (CVs), developed from risk-based soil screening levels (SSLs) and background values, to identify constituents and DUs to be carried forward into the quantitative Supplemental Off-Plant OU HHRA Addendum. The findings of the Supplemental Off-Plant OU HHRA Addendum, which summarize risks to potential future receptors from exposure to existing surface materials, are also discussed.

Section 4 summarizes the findings of each field program and presents the key conclusions for the program as a whole and, where appropriate, for individual DUs.

Section 5 includes the references cited in this *Off-Plant OU Supplemental Surface Soil Radionuclide Investigation Report*.





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FMC

OFF-PLANT OU SURFACE SOIL REPORT
FIGURE 1-2
SITE MAP
DECISION UNITS

Section 2

FIELD INVESTIGATION PROGRAMS AND TECHNIQUES

This section summarizes the surface soil radionuclide field program that was conducted in 2009 for seven DUs within the Off-Plant OU and one DU within the Simplot Plant OU. Both the Off-Plant OU and the Simplot Plant OU are part of the EMF Site. Field sampling of the DUs was completed during the fall of 2009. The primary areas sampled were DUs 1 through 5 located north of the FMC Plant OU, DUs 6 and 7 located west of the FMC Plant OU, and DU 8 located on Simplot-owned property to the north of the Simplot Don facility. Discussed in this section are the sampling design and the equipment/procedures that were used during this field event. Field work performed was consistent with the objectives and procedures outlined in the EPA-approved *Off-Plant OU Work Plan*.

2.1 FIELD INVESTIGATION PROGRAMS AND RATIONALE

Visual Sampling Plan, v.4.3. (VSP) software was used to place eight sampling grids on each DU. Each of the 8 sampling grids across a DU contained 20 sampling locations on a random origin. The sampling location points on DUs 1 through 8 are shown in Figures 2-1 through 2-8. As shown on Figure 1-2, six of the DUs (1, 2, 3, 4, 5, and 8) are located on private properties north of I-86, and two of the DUs (6 and 7) are located on private property west of the FMC Plant OU.

Prior to sampling, each of the gridded sample locations was visually evaluated and the type of surface soil logged in general accordance with the Unified Soil Classification System. Two discrete surface soil samples were then collected at each of the 20 locations that formed each of the 8 sampling grids within a DU; the first from the 0-to-2 inch bgs interval and the second from the 2-to-6 inch bgs interval. These soil samples collected from each grid were then combined and composited to create 1) one 20-increment composite soil sample from 0-to-2 inches bgs and 2) a second 20-increment composite soil sample from 2-to-6 inches bgs, for a total of 2 composite samples from each of the eight (8) random origin grids within each DU. This resulted in a total of 16 composite soil samples from each DU (8 from 0-to-2 inches bgs and 8 from 2-to-6 inches bgs) that were submitted to the laboratory for analyses. These composite samples were analyzed for target radionuclides (radium-226, lead-210, and uranium-238).

2.2 FIELD EQUIPMENT AND PROCEDURES

The equipment and procedures used to collect the composite soil samples are explained in detail below. In general, the field equipment and procedures followed those outlined in the EPA-approved *Off-Plant OU Work Plan* and standard operating procedures (SOPs) discussed in that document. The field forms, field log books, GPS sample coordinates as well as chain-of-custody forms for the 2009 field activities are presented in Appendix A.

2.2.1 Surface Soil Sampling

Both discrete and composite surface soil samples were collected from all 8 DUs during the 2009 Off-Plant OU radionuclide investigation program. Individual (discrete) soil sample locations within each grid were located in the field using a portable GPS unit with sub-meter accuracy. Each sample location was marked with a labeled pin flag with a corresponding number. When the gridded sample locations were found to be inaccessible to soil sampling (e.g., paved roadway), they were not sampled. For these locations, the sampling point was moved to an area with soil by randomly selecting a direction (north, south, east, or west) and moving five feet in that direction as described in the *Off-Plant OU Work Plan*. This process was repeated until a new, viable soil sample location was determined. Individual (discrete) surface soil samples were collected from each of the 20 locations that comprised a sample grid according to SOP-15 of the *Off-Plant OU Work Plan*. In order to collect the soil samples, the top layer of vegetative debris was carefully removed, when present, in order to expose the surface of the soil column. Extraneous material (e.g., larger rocks, leaves, sticks) was also removed at the time of sample collection per the laboratory's instruction.

In order to remove the surface vegetative material, field teams utilized a decontaminated spade, or removed the material by hand using a clean pair of disposable gloves. A clean three inch-by-three inch-by-2 inch (3-inch x 3-inch x 2-inch) stainless steel frame was laid on the soil surface to mark the extent of each excavation prior to soil removal, and was hammered into the soil until the top of the sampler was flat on the ground surface using a large rubber dead blow hammer. The sampler stayed in place and the 0-to-2 inches of soil within the metal frame was carefully removed using a decontaminated spade or scraper. The soil removed from the frame was placed into a decontaminated measuring cup. At each sample location, an additional sample was retrieved from 2-to-6 inch bgs using a different decontaminated spade or scraper and a different decontaminated measuring cup. The 2-to-6 inch soil sample was retrieved through the 0-to-2 inch frame. Leaving the frame in the soil from 0-to-2 inches prevented mixing or cross contamination of the soil between the 0-to-2 inch and 2-to-6 inch intervals. The field teams were careful to collect similar volumes of soil at each sample location and retrieved soils were placed into labeled Zip-lock® bags and subsequently transported and hand delivered to the on-site compositing area. Individual surface soil samples were hand delivered to the on-site compositing area. Each of the 20 discrete surface soil samples in each grid was then composited into one sample by the methods and procedures described in SOP-16A.

The composited soil samples were placed into new, appropriately-sized sample jars provided by the laboratory. One soil jar was submitted for each 20 increment composite surface soil sample to the off-site laboratory.

2.2.2 Sample Labeling, Handling, Shipment, and Analysis

Composite soil samples were labeled, handled, and shipped following the sample handling protocols described in Section 5 and SOP-12 of the *SRI FSP* (MWH, 2007). Sample identification/labeling is discussed in more detail in Section 2.2.3 below. All non-dedicated sample equipment was decontaminated according to SOP-3 of the *SRI FSP*. Equipment rinsate blanks and source water samples were collected according to Section 6 of the *SRI FSP*.

Composite samples collected from the 0-to-2 inch bgs and 2-to-6 inch bgs intervals were analyzed for target radionuclides as summarized below.

- Lead-210 (Pb-210) – scintillation counting,
- Radium-226 (Ra-226) – radon emanation, and
- Uranium-238 (U-238) – alpha spectroscopy.

Replicate soil samples were collected at a rate of approximately ten percent. Matrix spike/matrix spike duplicate (MS/MSD) samples were collected a rate of five percent, or one per DU. Equipment rinsate samples were collected at a frequency of one per week. Weekly equipment rinsate samples were collected on different types of sampling equipment such as mixing bowls, spoons and incremental samplers.

Samples were shipped to the designated off-site laboratory for analysis by the overnight carrier Federal Express, and were maintained under chain of custody protocol. All soil and water samples were analyzed by ALS Laboratory Group (formerly Paragon Analytics) of Fort Collins, Colorado. Data was independently validated by Laboratory Data Consultants (LDC) of Sacramento, California. The laboratory data reports and LDC validation reports are provided in Appendix B. The Data Verification and Validation Report are presented in Appendix C.

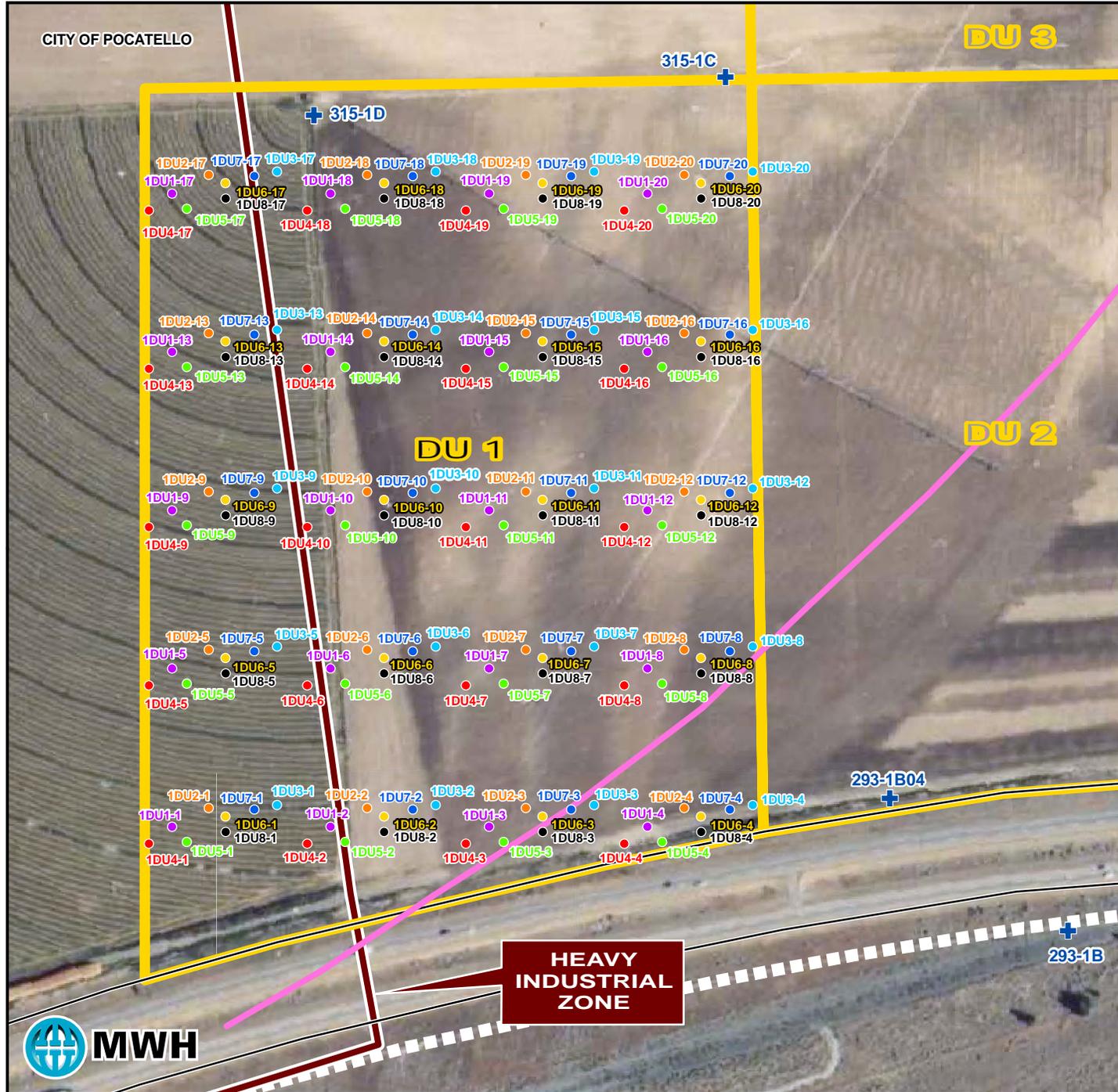
2.2.3 Sample Identification

The sample identification scheme for the DU composite samples from the 0-to-2-inch and 2-to-6-inch bgs intervals is discussed below.

- *Composite samples* have individual soil location designations and samples were recorded sequentially at each area. The composite sample designation includes the area from which it came (DU1 through DU8), the sample type (SS), followed by the acronym “C” for composite, and finally the depth interval where the individual samples were collected. For example, the fourth composite comprised of twenty (20) 0-to-2 inch surface sample locations collected from DU1 was designated “DU1-SSC004(0-2 in)”, whereas the fourth composite sample comprised of soil collected from twenty (20) 2-to-6 inch surface sample locations collected from DU4 was designated DU4-SSC004(2-6 in).”

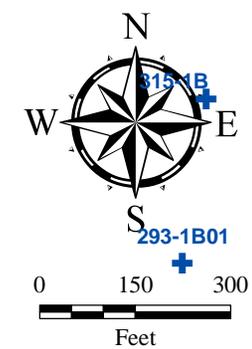
2.2.4 Investigation Derived Waste

The NCP, codified in 40 Code of Federal Regulations (CFR) Part 300, requires that investigation derived waste (IDW) generated during a CERCLA site investigation be managed in compliance with all applicable or relevant and appropriate requirements (ARARs) to the extent practicable, considering the urgency of the situation. As in most site investigations, IDW was generated during the 2009 Off-Plant OU field investigation. The type of IDW generated during the 2009 investigation included soil collected from sampling, decontamination water, disposable gloves, sampling containers (Zip-lock® bags), disposable Tyvek coveralls, Tyvek boot covers and paper towels. The IDW was characterized and handled according to the methods and procedures identified in the *SRI FSP* and the *SRI Report*. No hazardous waste was generated during the Off- Plant OU surface soil radionuclide investigation.



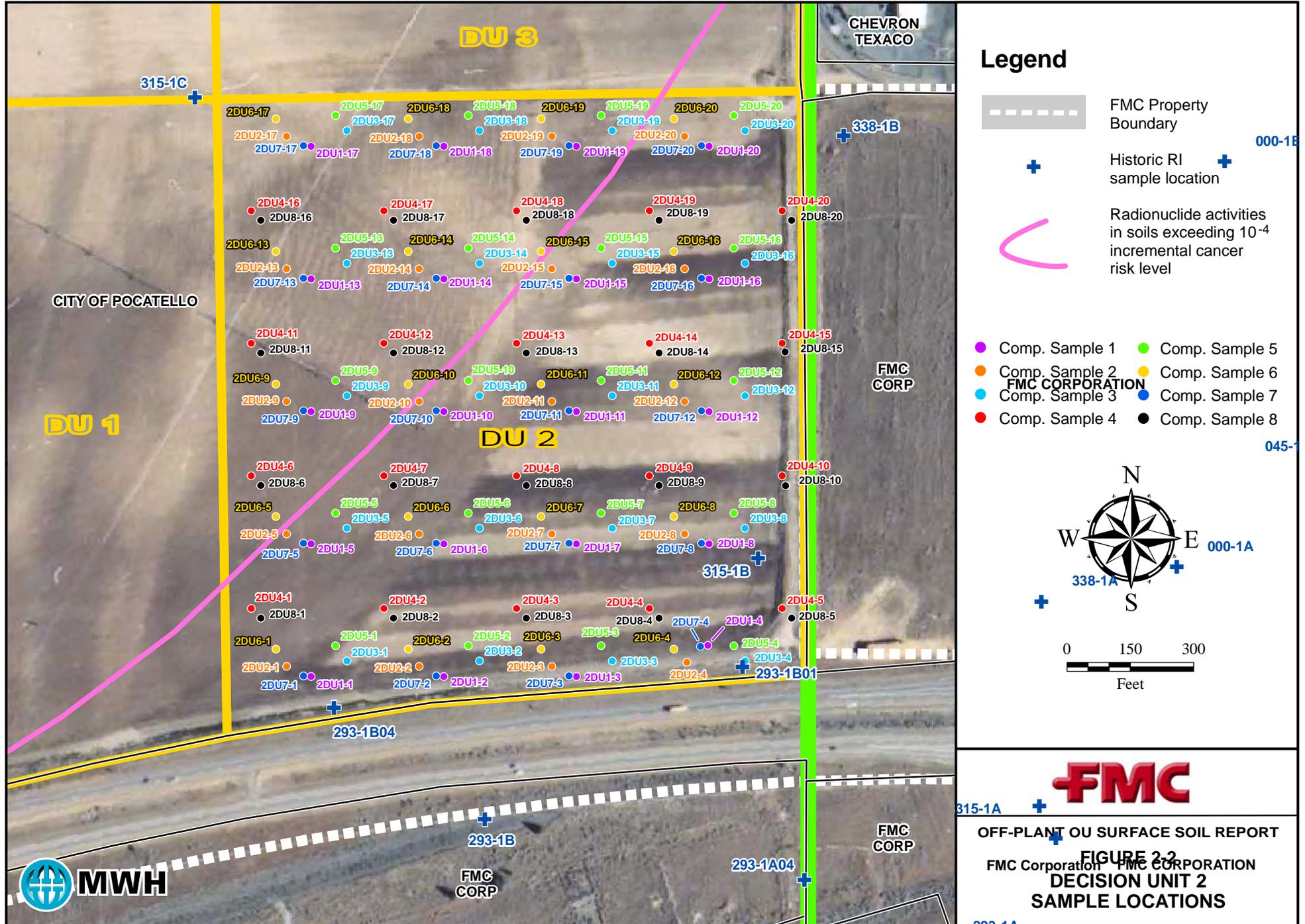
Legend

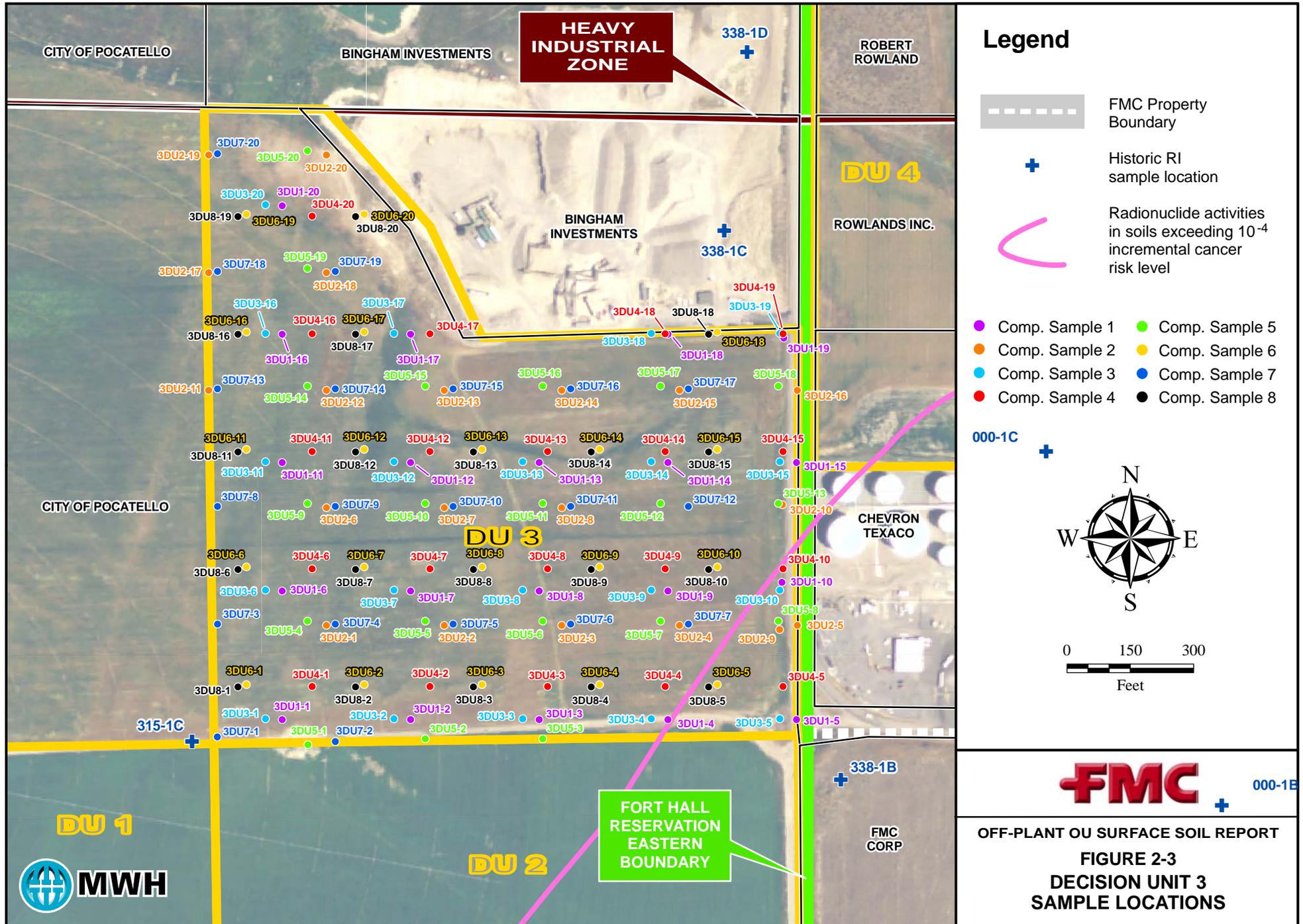
-  FMC Property Boundary
-  Historic RI sample location
-  Radionuclide activities in soils exceeding 10^{-4} incremental cancer risk level
-  Comp. Sample 1
-  Comp. Sample 2
-  Comp. Sample 3
-  Comp. Sample 4
-  Comp. Sample 5
-  Comp. Sample 6
-  Comp. Sample 7
-  Comp. Sample 8

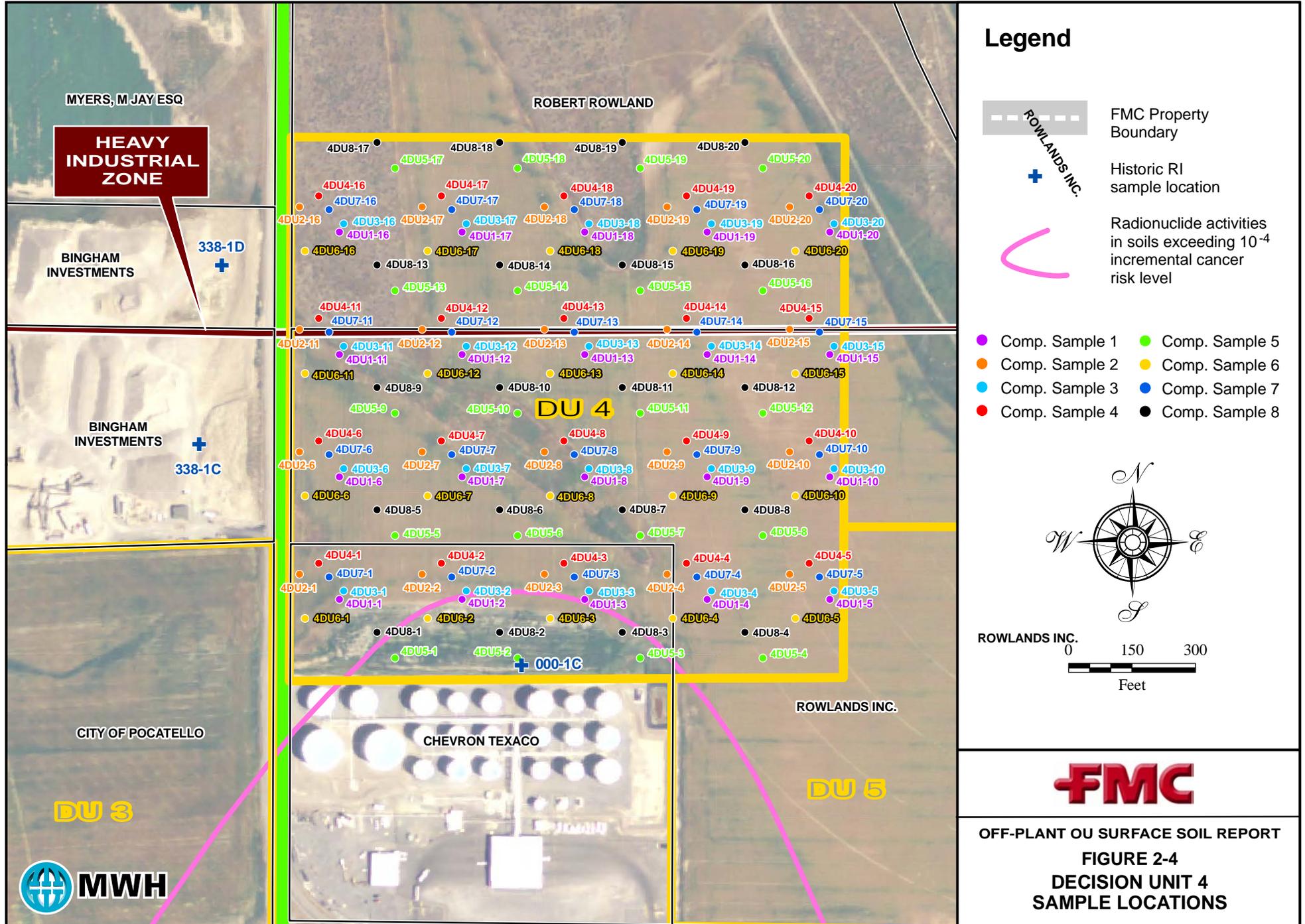


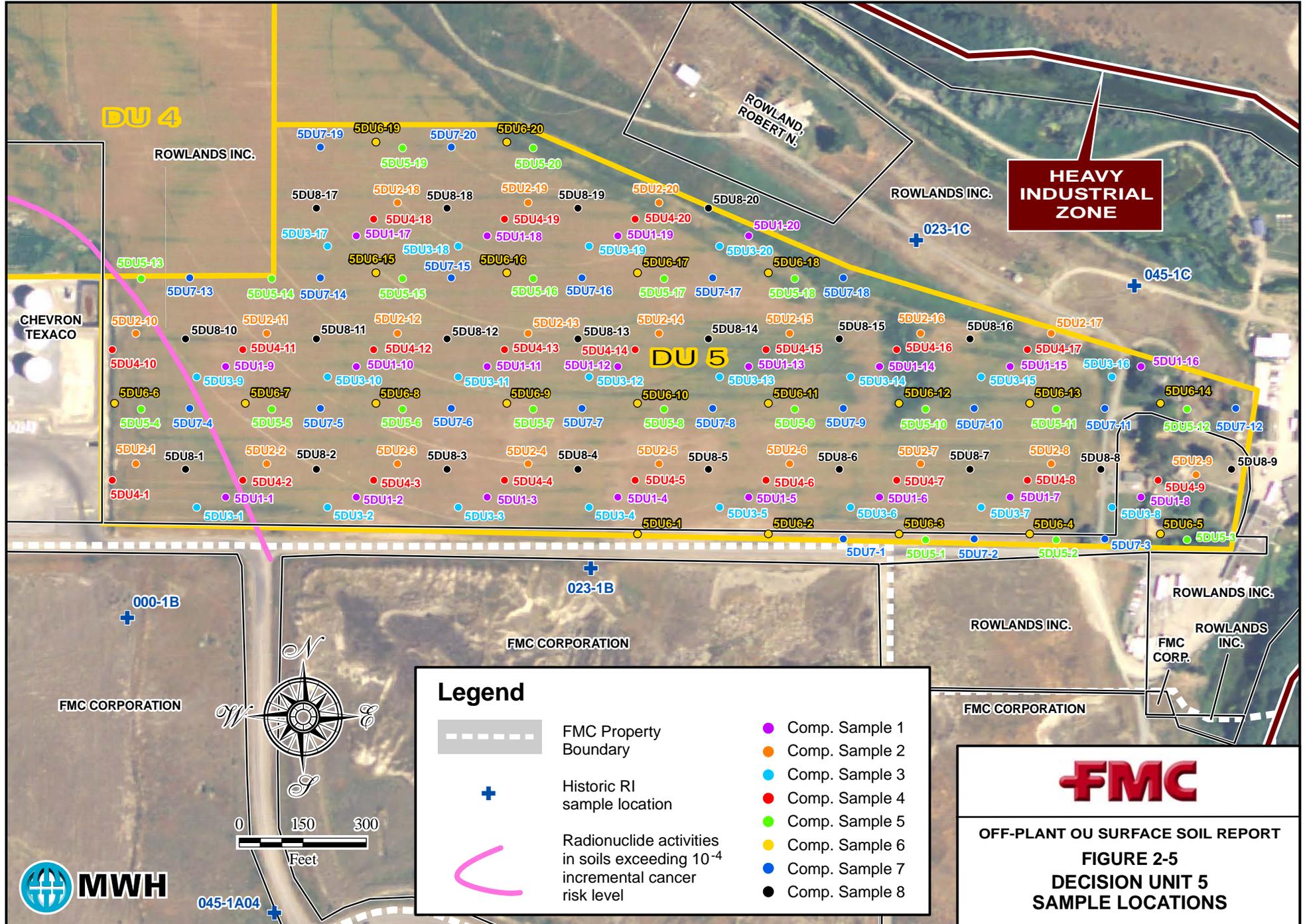
OFF-PLANT OU SURFACE SOIL REPORT
 FIGURE 2-1
 293-1B02 DECISION UNIT 1
 SAMPLE LOCATIONS

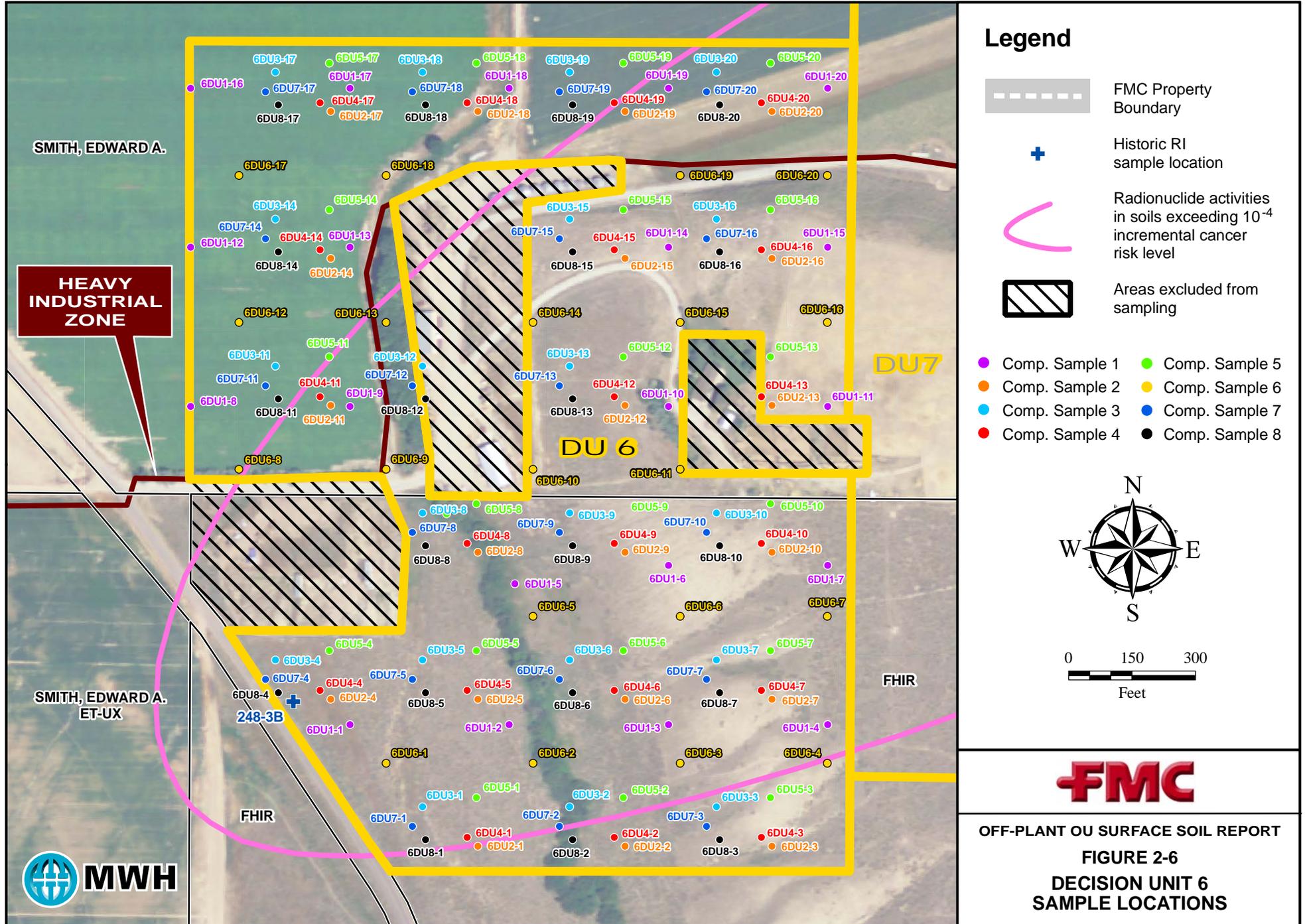


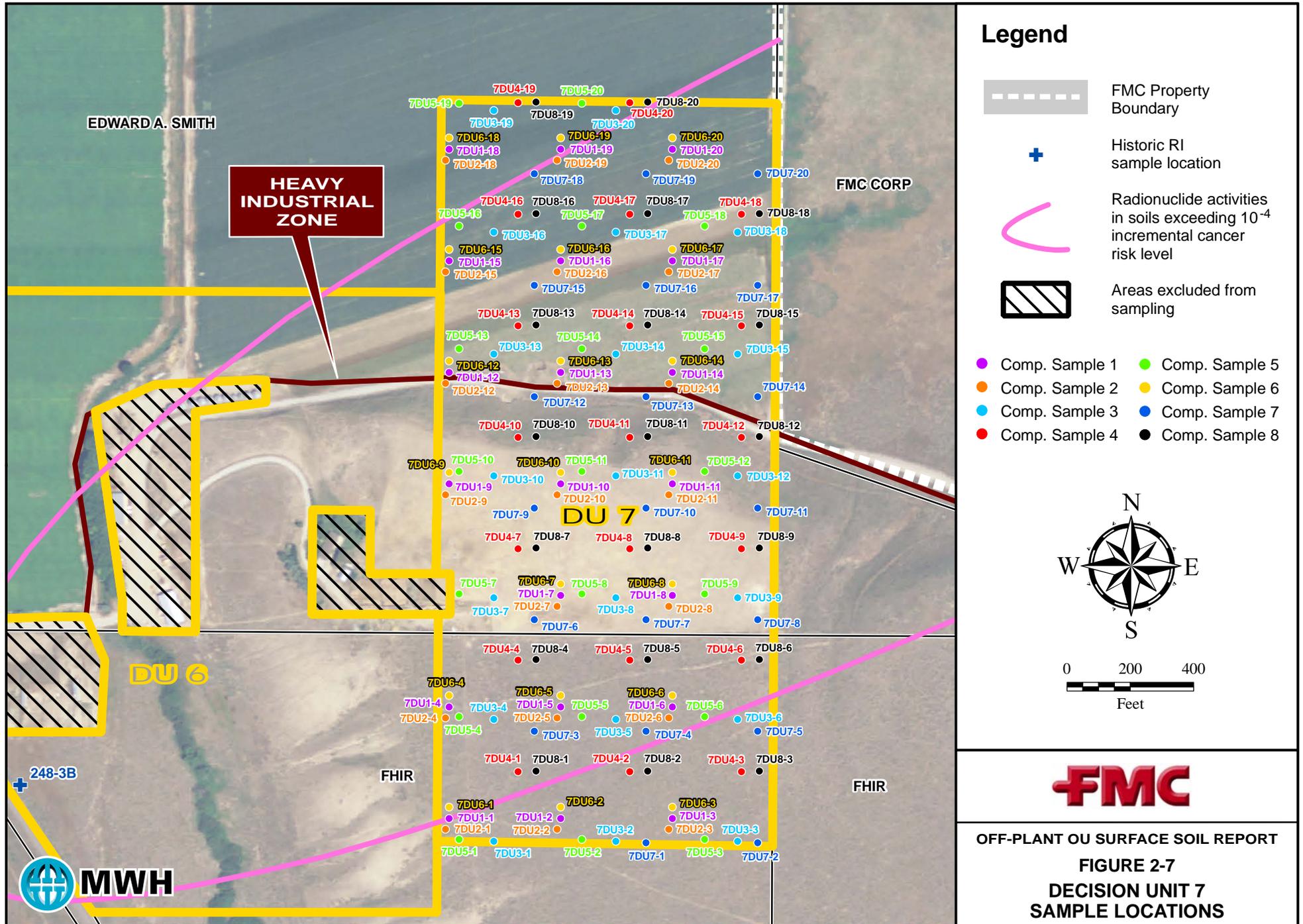














Legend

-  Simplot Property Boundary
-  Historic RI sample location
-  Comp. Sample 1
-  Comp. Sample 2
-  Comp. Sample 3
-  Comp. Sample 4
-  Comp. Sample 5
-  Comp. Sample 6
-  Comp. Sample 7
-  Comp. Sample 8



0 90 180
Feet



OFF-PLANT OU SURFACE SOIL REPORT
FIGURE 2-8
DECISION UNIT 8
SAMPLE LOCATIONS

Section 3

EVALUATION OF AREA SPECIFIC FINDINGS

3.1 INTRODUCTION

The 2009 radionuclide investigation activities were conducted to collect and analyze surface soil samples to further evaluate human health risks to potential future receptors in the seven DUs located within the Off-Plant OU and the one DU in the Simplot Plant OU.

The results from the 2009 radionuclide investigation are presented and discussed below as they apply to each DU. Conditions within each DU are evaluated in the following subsections:

- 1) Site Description – discusses the current and historic land use of each DU.
- 2) Problem Statements – includes rationale for the field programs conducted within each DU from the EPA-approved *Off-Plant OU Work Plan*;
- 3) Investigation Results – presents summary data from the 2009 radionuclide sampling activities. These results are screened against risk-based human health comparative values (CVs) (i.e., Soil Screening Levels [SSLs] + background) developed in the EPA-approved *Off-Plant OU Work Plan*. The SSLs, background levels and CVs used in this screening process are summarized in Table 3-1. Those constituents found to exceed their respective human health CVs are identified as Radionuclides of Concern (ROCs) for quantitative evaluation in the Supplemental Off-Plant OU HHRA Addendum (Appendix D).
- 4) Contamination Assessment – presents evaluations and implications of the results in each of the investigation areas. For those DUs in which risk-based screening CVs were found to be exceeded, this section includes a summary of the findings of the Supplemental Off-Plant OU HHRA Addendum, along with a comparison to relevant Preliminary Remediation Goals (PRGs) that were recently developed in the Supplemental Feasibility Study (SFS) for the FMC Plant OU.

3.2 DECISION UNIT 1 SOIL SAMPLING RESULTS AND EVALUATION

3.2.1 DU 1 Site Description

DU 1 is about 46 acres in size and is located on property owned by the City of Pocatello. DU 1 is bounded to the south by I-86, by DU 2 to the east, and agricultural land to the north and west. The City of Pocatello uses this land for the surface application of sewage sludge from the City of Pocatello's Publically Owned Treatment Works (POTW), and leases the property for agricultural production of wheat and/or hay crops. Sewage sludge had most recently been applied and tilled into the soil approximately two to four weeks prior to soil sampling. Crops were not growing on the property at the time of soil

sampling. Plant material that had been tilled into the soil was present on the surface and in the subsurface soil as noted on the field sampling forms.

3.2.2 DU 1 Problem Statement

The following field program was performed in DU 1. The problem statement that identifies the data gap for the program was defined in the *Off-Plant OU Work Plan* and is set forth below.

- **Risk Assessment** - Verify through surface soil sampling that there are no unacceptable human health risks in DU 1 to ensure that potential remedies within the Off-Plant OU are protective of potential future human receptors in these areas.

3.2.3 DU 1 Risk Assessment Screening Results

Surface Soil Sample Results. The eight 0-to-2-inch bgs composite samples and the eight 2-to-6-inch bgs composite samples collected across DU 1 were analyzed for target radionuclide analytes uranium-238, radium-226 and lead-210. These data were used to compute 0-to-6 inch bgs weighted average² concentrations. Per the decision rules specified in the EPA-approved *Off-Plant OU Work Plan*, the mean concentration was initially compared to the residential and site worker CVs in order evaluate the significance of the DU 1 data.

Residential Human Health CV Comparison. As shown in Table 3-2, the target radionuclides, lead-210, radium-226, and uranium-238, were all reported at concentrations below their respective residential CVs within the 0-to-6 inch bgs sampling interval.

- Lead-210 was reported at 1.42 pCi/g, below its residential CV of 1.91 pCi/g.
- Radium-226 was reported at 1.21 pCi/g, below its residential CV of 1.22 pCi/g.
- Uranium-238 was reported at 1.03 pCi/g, below its residential CV of 1.74 pCi/g.

Future Worker CV Comparison. As shown in Table 3-2, all targeted radionuclides reported mean concentrations below their respective commercial/industrial worker and construction worker CVs within the 0-to-6 inch bgs sampling interval at DU 1.

- Lead-210 was reported at 1.42 pCi/g, below its commercial/industrial and construction worker CVs of 2.40 pCi/g and 8.90 pCi/g, respectively.
- Radium-226 was reported at 1.21 pCi/g, below its commercial/industrial and construction worker CVs of 1.23 pCi/g and 2.13 pCi/g, respectively.
- Uranium-238 was reported at 1.03 pCi/g, below its commercial/industrial and construction worker CVs of 2.37 pCi/g and 21.6 pCi/g, respectively.

² $Concentration\ 0\text{-to-}2 \times 0.33] + [Concentration\ 2\text{-to-}6 \times 0.67] = Concentration\ 0\text{-to-}6$

Summary. As described above, none of the target radionuclides exceed their corresponding risk-based CVs in DU 1. Therefore, based on application of the decision rules from the *Off-Plant Work Plan* to the validated data (i.e., analyte comparisons to CVs), none of the target radionuclides were carried forward into the quantitative human health risk assessment for this DU. This finding is summarized in Table 3-3.

3.2.4 DU1 Risk Characterization and Uncertainty Discussion

Human Health Assessment. A human health risk assessment was not performed for DU 1 because, as previously discussed, none of the target radionuclide surface soil concentrations exceeded their respective residential or worker screening CVs.

Summary. Based on the investigation findings, further action to evaluate radionuclide levels in surface soils within this area is not warranted.

3.3 DU 2 SOIL SAMPLING RESULTS AND EVALUATION

3.3.1 DU 2 Site Description

DU 2 is about 45 acres in size and is located on property owned by the City of Pocatello. DU 2 is bounded to the south by I-86, by DU 1 to the west, by DU 3 to the north and non-agricultural land owned by FMC to the east. The City of Pocatello uses this land for surface application of sewage sludge from the City of Pocatello's POTW and leases the property for agricultural production of wheat and/or hay crops. Sewage sludge was most recently applied and tilled into the soil approximately two to four weeks prior to soil sampling. Crops were not growing on the property at the time of soil sampling. Plant material that had been tilled was present on the surface and in the subsurface soil as noted on the field sampling forms.

3.3.2 DU 2 Problem Statement

The following field program was performed in DU 2. The problem statement that identifies the data gap for the program was defined in the *Off-Plant OU Work Plan* and is set forth below.

- Risk Assessment - Verify through surface soil sampling that there are no unacceptable human health risks in DU 2 to ensure that potential remedies within the Off-Plant OU are protective of potential future human receptors in these areas.

3.3.3 DU 2 Risk Assessment Screening Results

Surface Soil Sample Results. The eight 0-to-2-inch bgs composite samples and the eight 2-to-6-inch bgs composite samples collected across DU 2 were analyzed for target radionuclide analytes uranium-238, radium-226 and lead-210. These data were used to compute 0-to-6 inch bgs weighted average concentrations. Per the decision rules specified in the EPA-approved *Off-Plant OU Work Plan*, the mean concentration was

initially compared to the residential and site worker CVs in order evaluate the significance of the DU 2 data.

Residential Human Health CV Comparison. As shown in Table 3-4, uranium-238 reported a mean concentration below its residential human health CV within the 0-to-6 inch sampling interval at DU 2. However, lead-210 and radium-226 were determined to exceed their residential human health CVs in this sampling interval.

- Lead-210 was reported at 1.99 pCi/g, exceeding its residential CV of 1.91 pCi/g.
- Radium-226 was reported at 1.64 pCi/g, exceeding its residential CV of 1.22 pCi/g
- Uranium-238 was reported at 1.16 pC/g, below its residential CV of 1.74 pCi/g.

As two target radionuclides exceeded their respective residential CVs, the results from DU 2 for these constituents were also compared to their corresponding residential PRGs, which were recently developed in the SFS for the FMC Plant OU.

Residential Human Health PRG Comparison. As shown in Table 3-4, the 0-to-6 inch bgs 95% UCL on the mean concentrations of lead-210 and radium-226 were reported below their respective residential PRGs.

- Lead-210 was reported at 2.22 pCi/g, below its residential PRG of 31.0 pCi/g.
- Radium-226 was reported at 1.73 pCi/g, below its residential PRG of 2.51 pCi/g.

Future Worker CV Comparison. As shown in Table 3-4, the mean concentrations of two (2) of the targeted radionuclides of potential concern to human health (lead-210 and uranium-238) were reported below their respective commercial/industrial worker and construction worker CVs at the 0-to-6 inch bgs sampling interval at DU 2. One radionuclide, radium-226, was reported at a mean concentration in exceedance of its respective commercial/industrial worker CV, but was not found to exceed its construction worker CV.

- Lead-210 was reported at 1.99 pCi/g, below its commercial/industrial and construction worker CVs of 2.40 pCi/g and 8.90 pCi/g, respectively.
- Radium-226 was reported at 1.64 pCi/g, exceeding its commercial/industrial worker CV of 1.23 pCi/g but below its construction worker CV of 2.13 pCi/g.
- Uranium-238 was reported at 1.16 pCi/g, below its commercial/industrial and construction worker CVs of 2.37 pCi/g and 21.6 pCi/g, respectively.

As radium-226 exceeded its commercial/industrial worker CV, the results from DU 2 were also compared to the commercial/industrial PRGs for radium-226, which was recently developed in the SFS for the FMC Plant OU.

Future Worker PRG Comparison. As shown on Table-3-4, radium-226 was reported at a 95% UCL concentration below its commercial/industrial worker PRG within the 0- to-6 inch bgs sampling interval at DU 2.

- Radium-226 was reported at 1.73 pCi/g, which does not exceed its commercial/industrial worker PRG of 3.75 pCi/g.

Summary. Based on application of the decision rules from the *Off-Plant Work Plan*, Table 3-3 identifies the constituents to be carried forward into the quantitative human health risk assessment. This information is summarized below:

- Residential Receptors – radium-226, lead-210
- Commercial/Industrial Workers – radium-226

3.3.4 DU2 Risk Characterization and Uncertainty Discussion

Human Health Assessment. As shown in Table 3-5, cumulative RME total lifetime cancer risks for all receptors evaluated in the Supplemental Off-Plant OU HHRA (hypothetical future residents and commercial/industrial workers) were within EPA's acceptable risk range³. Specifically, the HHRA estimated that cumulative RME total lifetime cancer risks to the two most highly exposed receptors, hypothetical future residents and future outdoor workers, are 1E-04 and 6E-05, respectively. Radium-226 via the external exposure to gamma radiation pathway was found to drive these risks, comprising approximately 95% of the cumulative total cancer risk estimates for the most highly exposed residential receptors.

It is also noteworthy that the RME lifetime cancer risk associated with background concentrations accounts for over 80% of the total residential and outdoor worker cancer risk estimates. Consequently, cumulative RME incremental cancer risk estimates (i.e., total minus background risks) are significantly lower than the cumulative total cancer risks; e.g., 3E-05 for hypothetical future residents and 1E-05 for future outdoor workers).

In addition, cumulative total lifetime cancer risks under the more realistic CTE scenario were found to be well below 1E-04 for all evaluated receptors; e.g., 2E-05 for hypothetical future residents and 1E-05 for future outdoor workers.

A comprehensive discussion of the methods and assumptions that were used to perform the Supplemental Off-Plant OU HHRA is provided in Appendix D.

Summary. Based on the Supplemental Off-Plant OU HHRA Addendum, risks to the potential future human receptors in DU 2 are within EPA's acceptable risk range.. This conclusion is supported by the fact that the concentrations of the two radionuclides

³ EPA's acceptable range is generally defined as 1E-04 to 1E-06 but also includes an upperbound of 3E-04 as essentially equivalent to 1E-04 (see EPA's *Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination*, OSWER No. 9200.4-18, 1997).

carried forward into the Supplemental Off-Plant OU HHRA for DU 2 (radium-226 and lead-210) are lower than their respective residential and worker PRGs, which were recently developed in the SFS for the FMC Plant OU (see Table 3-4).

3.4 DU 3 SOIL SAMPLING RESULTS AND EVALUATION

3.4.1 DU 3 Site Description

DU 3 is about 37 acres in size and is located on property owned by the City of Pocatello. DU 3 is bounded to the south by DU 2, by agricultural land to the west, by DU 4 and the Chevron tank farm to the east and by an active gravel pit owned by Bingham Investments to the north. The City of Pocatello uses this land for the surface application of sewage sludge from the City of Pocatello's POTW and leases the property for agricultural production, which currently consists of wheat and/or hay crops. Sewage sludge had not been recently applied to the property prior to soil sampling. Crops were not growing on the property at the time of soil sampling. Plant material that had been tilled was present on the surface and in the subsurface soil as noted on the field forms.

3.4.2 DU 3 Problem Statement

The following field program was performed in DU 3. The problem statement that identifies the data gap for the program was defined in the *Off-Plant OU Work Plan* and is set forth below.

- Risk Assessment - Verify through surface soil sampling that there are no unacceptable human health risks in DU 3 to ensure that potential remedies at the Off-Plant OU are protective of potential future human receptors that may be present in these areas.

3.4.3 DU 3 Risk Assessment Screening Results

Surface Soil Sample Results. The eight 0-to-2-inch bgs composite samples and the eight 2-to-6-inch bgs composite samples collected across DU 3 were analyzed for target radionuclide analytes uranium-238, radium-226 and lead-210. These data were used to compute 0-to-6 inch bgs weighted average concentrations. Per the decision rules specified in the EPA-approved *Off-Plant OU Work Plan*, the mean concentration was initially compared to the residential and site worker CVs in order evaluate the significance of the DU 3 data.

Residential CV Comparison. Within the 0-to-6 inch bgs sampling interval, as shown in Table 3-6, targeted radionuclides reported mean concentrations below their respective residential human health CVs at DU 3.

- Lead-210 was reported at 1.36 pCi/g, below its residential CV of 1.91 pCi/g.
- Radium-226 was reported at 1.03 pCi/g, below its residential CV of 1.22 pCi/g.

- Uranium-238 was reported at 1.15 pCi/g, which does not exceed its residential human health CV of 1.74 pCi/g.

Future Worker CV Comparison. As shown in Table 3-6, mean concentrations of targeted radionuclides were found to be below their corresponding commercial/industrial worker and construction worker CVs within the 0-to-6 inch bgs sampling interval.

- Lead-210 was reported at 1.36 pCi/g, below its commercial/industrial worker CV of 2.40 pCi/g and its construction worker CV of 8.90 pCi/g.
- Radium-226 was reported at 1.03 pCi/g, below its commercial/industrial and construction worker CVs of 1.23 pCi/g and 2.13 pCi/g, respectively.
- Uranium-238 was reported at 1.15 pCi/g, below its commercial/industrial worker CV of 2.37 pCi/g and its construction worker CV of 21.6 pCi/g.

Summary. As described above, none of the target radionuclides exceed their corresponding risk-based CVs in DU 3. Therefore, based on application of the decision rules from the *Off-Plant Work Plan* to the validated data (i.e., analyte comparisons to CVs), none of the target radionuclides were carried forward into the quantitative human health risk assessment for this DU. This finding is summarized in Table 3-3.

3.4.4 DU3 Risk Characterization and Uncertainty Discussion

Human Health Assessment. A human health risk assessment was not performed for DU 3 because, as previously discussed, none of the target radionuclide surface soil concentrations exceeded their respective residential or worker screening CVs.

Summary. Based on the investigation findings, further action to evaluate radionuclide levels in surface soils within this area is not warranted.

3.5 DU 4 SOIL SAMPLING RESULTS AND EVALUATION

3.5.1 DU 4 Site Description

DU 4 is about 39 acres in size and is located on property owned by Rowland's Inc. and/or Robert Rowland. DU 4 is bounded to the south by the Chevron tank farm and DU 5, to the west by DU 3, the gravel pit owned by Bingham Investments and non-agricultural land, and to the north and east by agricultural and non-agricultural land owned by Robert Rowland and/or Rowland's Inc. The agricultural portion of the DU 4 is used for the production of potatoes, wheat and/or hay. Undeveloped or non-agricultural land is present in the northwestern and north central portion of the DU, north of the Chevron tank farm and an area roughly running from the northwest to the southeastern part of the DU as shown on Figure 2-4. Both of these areas were sampled and it was noted on the field forms if the soil sample was collected on agricultural or non-agricultural land. New winter wheat crop growth was present on the property at the time of soil sampling.

3.5.2 DU 4 Problem Statement

The following field program was performed in DU 4. The problem statement that identifies the data gap for the program was defined in the *Off-Plant OU Work Plan* and is set forth below.

- **Risk Assessment** - Verify through surface soil sampling that there are no unacceptable human health risks in DU 4 to ensure that potential remedies at the Off-Plant OU are protective of potential future human receptors that may be present in these areas.

3.5.3 DU 4 Risk Assessment Screening Results

Surface Soil Sample Results. The eight 0-to-2-inch bgs composite samples and the eight 2-to-6-inch bgs composite samples collected across DU 4 were analyzed for target radionuclide analytes uranium-238, radium-226 and lead-210. These data were used to compute 0-to-6 inch bgs weighted average concentrations. Per the decision rules specified in the EPA-approved *Off-Plant OU Work Plan*, the mean concentration was initially compared to the residential and site worker CVs in order evaluate the significance of the DU 4 data.

Residential CV Comparison. No targeted radionuclides were found in exceedance of the residential human health CVs within the 0-to-6 inch bgs sampling interval at DU 4. As shown in Table 3-7, mean concentrations of lead-210, radium-226, and uranium-238 were all reported below their corresponding residential human health CVs.

- Lead-210 was reported at 1.30 pCi/g, below its residential CV of 1.91 pCi/g.
- Radium-226 was reported at 0.98 pCi/g, below its residential CV of 1.22 pCi/g.
- Uranium-238 was reported at 1.01 pCi/g, which does not exceed its corresponding residential CV of 1.74 pCi/g.

Future Worker CV Comparison. As shown in Table 3-7, all targeted radionuclides were reported below their respective commercial/industrial and construction worker CVs within the 0-to-6 inch bgs sampling interval at DU 4.

- Lead-210 was reported at 1.30 pCi/g, below its commercial/industrial and construction worker CVs of 2.40 pCi/g and 8.90 pCi/g, respectively.
- Radium-226 was reported at 0.98 pCi/g, below its commercial/industrial CV of 1.23 pCi/g and its construction worker CV of 2.13 pCi/g.
- Uranium-238 was reported at 1.01 pCi/g, which does not exceed its respective commercial/industrial and construction worker CVs of 2.37 pCi/g and 21.6 pCi/g.

Summary. As described above, none of the target radionuclides exceed their corresponding risk-based CVs in DU 4. Therefore, based on application of the decision rules from the *Off-Plant Work Plan* to the validated data (i.e., analyte comparisons to

CVs), none of the target radionuclides were carried forward into the quantitative human health risk assessment for this DU. This finding is summarized in Table 3-3.

3.5.4 DU4 Risk Characterization and Uncertainty Discussion

Human Health Assessment. A human health risk assessment was not performed for DU 4 because, as previously discussed, none of the target radionuclide surface soil concentrations exceeded their respective residential or worker screening CVs.

Summary. Based on the investigation findings, further action to evaluate radionuclide levels in surface soils within this area is not warranted.

3.6 DU 5 SOIL SAMPLING RESULTS AND EVALUATION

3.6.1 DU 5 Site Description

DU 5 is about 44 acres in size and is located on property owned by Rowland's Inc. and/or Robert Rowland. The property is used for agricultural production of potatoes, wheat and/or hay. DU 5 is bounded to the south by non-agricultural property owned by FMC and Rowland's Inc., by the Chevron tank farm and DU 4 to the west, by non-agricultural land owned by Robert Rowland to the north and a light industrial area owned by Rowland's Inc. to the east. The eastern end of the DU is owned by Barkley Roper and includes several out buildings and one residence; land use in this area of the DU is non-agricultural. Both of these areas were sampled and it was noted on the field forms if the soil sample was collected on agricultural or non-agricultural land. New winter wheat crop growth was present on the agricultural portion of the property at the time of soil sampling.

3.6.2 DU 5 Problem Statement

The following field programs were performed in DU 5. The problem statement that identifies the data gap for each program was defined in the *Off-Plant OU Work Plan* and is set forth below.

- **Risk Assessment** - Verify through surface soil sampling that there are no unacceptable human health risks in DU 5 to ensure that potential remedies at the Off-Plant OU are protective of current and potential future human receptors that may be present in these areas.

3.6.3 DU 5 Risk Assessment Screening Results

Surface Soil Sample Results. The eight 0-to-2-inch bgs composite samples and the eight 2-to-6-inch bgs composite samples collected across DU 5 were analyzed for target radionuclide analytes uranium-238, radium-226 and lead-210. These data were used to compute 0-to-6 inch bgs weighted average concentrations. Per the decision rules

specified in the EPA-approved *Off-Plant OU Work Plan*, the mean concentration was initially compared to the residential and site worker CVs in order evaluate the significance of the DU 5 data.

Residential Human Health CV Comparison. As shown in Table 3-8, all targeted radionuclides were reported at mean concentrations below their respective residential human health CVs within the 0-to-6 inch bgs sampling interval at DU 5.

- Lead-210 was reported at 1.46 pCi/g, below its residential CV of 1.91 pCi/g.
- Radium-226 was reported at 1.04 pCi/g, below its residential CV of 1.22 pCi/g.
- Uranium-238 was reported at 1.19 pCi/g, which does not exceed its corresponding residential CV of 1.74 pCi/g.

Future Worker CV Comparison. As shown in Table 3-8, mean concentrations of all targeted radionuclides were reported below all corresponding commercial/industrial and construction worker CVs within the 0-to-6 inch bgs sampling interval.

- Lead-210 was reported at 1.46 pCi/g, below its respective commercial/industrial and construction worker CVs of 2.40 pCi/g and 8.90 pCi/g.
- Radium-226 was reported at 1.04 pCi/g, which does not exceed its respective commercial/industrial and construction worker CVs of 1.23 pCi/g and 2.13 pCi/g.
- Uranium-238 was reported at 1.19 pCi/g, which is below its commercial/industrial and construction worker CVs of 2.37 pCi/g and 21.6 pCi/g, respectively.

Summary. As described above, none of the target radionuclides exceed their corresponding risk-based CVs in DU 5. Therefore, based on application of the decision rules from the *Off-Plant Work Plan* to the validated data (i.e., analyte comparisons to CVs), none of the target radionuclides were carried forward into the quantitative human health risk assessment for this DU. This finding is summarized in Table 3-3.

3.6.4 DU5 Risk Characterization and Uncertainty Discussion

Human Health Assessment. A human health risk assessment was not performed for DU 5 because, as previously discussed, none of the target radionuclide surface soil concentrations exceeded their respective residential or worker screening CVs.

Summary. Based on the investigation findings, further action to evaluate radionuclide levels in surface soils within this area is not warranted.

3.7 DU 6 SOIL SAMPLING RESULTS AND EVALUATION

3.7.1 DU 6 Site Description

DU 6 is about 56 acres in size and is located partially on property owned by the Shoshone-Bannock Tribes (SBT) and partially on property owned in fee by Edward

Smith. DU 6 is bounded to the south by non-agricultural sagebrush steppe property owned by SBT, by agricultural and non-agricultural land to the west, by agricultural land to the north and DU 7 and non-agricultural sagebrush steppe owned by SBT to the east. The portion of DU 6 owned by the SBT is primarily non-agricultural sagebrush steppe, and the portion owned in fee by Edward Smith is non-agricultural sagebrush steppe used for grazing cattle and agricultural land used in the production of potatoes, wheat and/or hay.

3.7.2 DU 6 Problem Statement

The following field program was performed in the DU 6. The problem statement that identifies the data gap for the program was defined in the *Off-Plant OU Work Plan* and is set forth below.

- Risk Assessment - Verify through surface soil sampling that there are no unacceptable human health risks in DU 6 to ensure that potential remedies at the Off-Plant OU are protective of potential future human receptors that may be present in these areas.

3.7.3 DU 6 Risk Assessment Screening Results

Surface Soil Sample Results. The eight 0-to-2-inch bgs composite samples and the eight 2-to-6-inch bgs composite samples collected across DU 6 were analyzed for target radionuclide analytes uranium-238, radium-226 and lead-210. These data were used to compute 0-to-6 inch bgs weighted average concentrations. Per the decision rules specified in the EPA-approved *Off-Plant OU Work Plan*, the mean concentration was compared to the residential and site worker CVs in order evaluate the significance of the DU 6 OU data.

Residential Human Health CV Comparison. As shown in Table 3-9, mean concentrations of lead-210, radium-226, and uranium-238 all were reported below their respective residential CVs within the 0-to-6 inch bgs sampling interval at DU 6.

- Lead-210 was reported at 1.32 pCi/g, below its residential CV of 1.91 pCi/g.
- Radium-226 was reported at 0.93 pCi/g, below its residential CV of 1.22 pCi/g.
- Uranium-238 was reported at 0.96 pCi/g, which does not exceed its corresponding residential CV of 1.74 pCi/g.

Future Worker CV Comparison. All targeted radionuclides, lead-210, radium-226, and uranium-238, were reported at mean concentrations below their respective commercial/industrial and construction worker CVs within the 0-to-6 inch bgs sampling interval at DU 6. Results are shown in Table 3-9.

- Lead-210 was reported at 1.32 pCi/g, below its commercial/industrial and construction worker CVs of 2.40 pCi/g and 8.90 pCi/g, respectively.

- Radium-226 was reported at 0.93 pCi/g, which does not exceed its respective commercial/industrial and construction worker CVs of 1.23 pCi/g and 2.13 pCi/g.
- Uranium-238 was reported at 0.96 pCi/g, which is below its respective commercial/industrial and construction worker CVs of 2.37 pCi/g and 21.6 pCi/g.

Summary. As described above, none of the target radionuclides exceed their corresponding risk-based CVs in DU 6. Therefore, based on application of the decision rules from the *Off-Plant Work Plan* to the validated data (i.e., analyte comparisons to CVs), none of the target radionuclides were carried forward into the quantitative human health risk assessment for this DU. This finding is summarized in Table 3-3.

3.7.4 DU6 Risk Characterization and Uncertainty Discussion

Human Health Assessment. A human health risk assessment was not performed for DU 6 because, as previously discussed, none of the target radionuclide surface soil concentrations exceeded their respective residential or worker screening CVs.

Summary. Based on the investigation findings, further action to evaluate radionuclide levels in surface soils within this area is not warranted.

3.8 DU 7 SOIL SAMPLING RESULTS AND EVALUATION

3.8.1 DU 7 Site Description

DU 7 is about 57 acres in size and is located partially on property owned by the Shoshone-Bannock Tribes (SBT) and partially on property owned in fee by Edward Smith. DU 7 is bounded to the south by non-agricultural sagebrush steppe property owned by SBT, by agricultural and non-agricultural land to the west, by agricultural land to the north and by non-agricultural sagebrush steppe land owned by FMC and SBT to the east. The portion of DU 7 owned by the SBT is primarily non-agricultural sagebrush steppe, and the portion owned in fee by Edward Smith is non-agricultural sagebrush steppe used for grazing cattle and agricultural land used in the production of potatoes, wheat and/or hay.

3.8.2 DU 7 Problem Statement

The following field program was performed in DU 7. The problem statement that identifies the data gap for the program was defined in the *Off-Plant OU Work Plan* and is set forth below.

- Risk Assessment - Verify through surface soil sampling that there are no unacceptable human health risks in DU 7 to ensure that potential remedies at the Off-Plant OU are protective of potential future human receptors that may be present in these areas.

3.8.3 DU 7 Risk Assessment Screening Results

Surface Soil Sample Results. The eight 0-to-2-inch bgs composite samples and the eight 2-to-6-inch bgs composite samples collected across DU 7 were analyzed for target radionuclide analytes uranium-238, radium-226 and lead-210. These data were used to compute 0-to-6 inch bgs weighted average concentrations. Per the decision rules specified in the EPA-approved *Off-Plant OU Work Plan*, the mean concentration was compared to the residential and site worker CVs in order evaluate the significance of the DU 7 data.

Residential Human Health CV Comparison. As shown in Table 3-10, lead-210, radium-226, and uranium-238 all reported mean concentrations below their respective residential human health CVs within the 0-to-6 inch bgs sampling interval at DU 7.

- Lead-210 was reported at 1.37 pCi/g, below its residential CV of 1.91 pCi/g.
- Radium-226 was reported at 1.00 pCi/g, below its residential CV 1.22 pCi/g.
- Uranium-238 was reported at 1.16 pCi/g, which does not exceed its corresponding residential CV of 1.74 pCi/g.

Future Worker CV Comparison. As shown in Table 3-10, all targeted radionuclides within the 0-to-6 inch bgs sampling interval were reported below their corresponding commercial/industrial and construction worker CVs at DU 7.

- Lead-210 was reported at 1.37 pCi/g, below its commercial/industrial and construction worker CVs of 2.40 pCi/g and 8.90 pCi/g, respectively
- Radium-226 was reported at 1.00 pCi/g, which does not exceed its respective commercial/industrial or construction worker CVs of 1.23 pCi/g and 2.13 pCi/g.
- Uranium-238 was reported at a mean concentration of 1.16 pCi/g, below its commercial/industrial and construction worker CVs of 2.37 pCi/g and 21.6 pCi/g.

Summary. As described above, none of the target radionuclides exceed their corresponding risk-based CVs in DU 7. Therefore, based on application of the decision rules from the *Off-Plant Work Plan* to the validated data (i.e., analyte comparisons to CVs), none of the target radionuclides were carried forward into the quantitative human health risk assessment for this DU. This finding is summarized in Table 3-3.

3.8.4 DU7 Risk Characterization and Uncertainty Discussion

Human Health Assessment. A human health risk assessment was not performed for DU 7 because, as previously discussed, none of the target radionuclide surface soil concentrations exceeded their respective residential or worker screening CVs.

Summary. Based on the investigation findings, further action to evaluate radionuclide levels in surface soils within this area is not warranted.

3.9 DU 8 SOIL SAMPLING RESULTS AND EVALUATION

3.9.1 DU 8 Site Description

DU 8 is about 18 acres in size and is located on property owned by Simplot, north of Simplot's Don Plant. DU 8 is an elongated property running roughly in a northwest to southeast direction and is bounded to the south by I-86 and agricultural land, by agricultural land to the north and northeast, and the City of Pocatello's POTW to the west and southwest. A Simplot pond is located to the southeast of DU 8. The land on DU 8 is relatively undisturbed. Several buildings including storage sheds and other out buildings were present on the DU 8 property. Several access roads are present within DU 8 and a drainage ditch/channel is located on the northern side of the property.

3.9.2 DU 8 Problem Statement

The following field program was performed in the DU 8. The problem statement that identifies the data gap for the program was defined in the *Off-Plant OU Work Plan* and is set forth below.

- **Risk Assessment** - Verify through surface soil sampling that there are no unacceptable human health risks in DU 8 to ensure that potential remedies at the Simplot Plant OU are protective of potential future human receptors that may be present in these areas.

3.9.3 DU 8 Risk Assessment Screening Results

Surface Soil Sample Results. The eight 0-to-2-inch bgs composite samples and the eight 2-to-6-inch bgs composite samples collected across DU 8 were analyzed for target radionuclide analytes uranium-238, radium-226 and lead-210. These data were used to compute 0-to-6 inch bgs weighted average concentrations. Per the decision rules specified in the EPA-approved *Off-Plant OU Work Plan*, the mean concentration was compared to the residential and site worker CVs in order evaluate the significance of the DU 8 data.

Residential Human Health CV Comparison. As shown in Table 3-11, lead-210 and uranium-238 were reported at mean concentrations below their respective residential CVs within the 0-to-6 inch bgs sampling interval at DU 8. Only one targeted radionuclide, radium-226, was reported at a mean concentration in exceedance of its corresponding residential CV.

- Lead-210 was reported at 1.67 pCi/g, below its residential CV of 1.91 pCi/g.
- Radium-226 was reported at 1.50 pCi/g, which exceeds its corresponding residential human health CV of 1.22 pCi/g.
- Uranium-238 was reported at 1.26 pCi/g, below its residential CV of 1.74 pCi/g.

As radium-226 exceeded its residential CV, the data from DU 8 were also compared to the residential PRG for radium-226 that was recently developed in the SFS for the FMC Plant OU.

Residential PRG Comparison. As shown in Table 3-11, radium-226 reported a 95% UCL on the mean concentration below its corresponding residential human health PRG.

- Radium-226 was reported at 1.73 pCi/g, below its residential PRG of 2.51 pCi/g.

Future Worker CV Comparison. As shown in Table 3-11, reported mean concentrations for lead-210 and uranium-238 were below respective commercial/industrial and construction worker CVs within the 0-to-6 inch bgs sampling interval. One targeted radionuclide, radium-226, was reported at a mean concentration in exceedance of its corresponding commercial/industrial worker CV, but was below its respective construction worker CV within the same sampling interval.

- Lead-210 was reported at 1.67 pCi/g, below its respective commercial/industrial and construction worker CVs of 2.40 pCi/g and 8.90 pCi/g.
- Radium-226 was reported at 1.50 pCi/g, which is below its respective construction worker CV of 2.13 pCi/g but exceeds its commercial/industrial worker CV of 1.23 pCi/g.
- Uranium-238 was reported at 1.26 pCi/g, below its commercial/industrial and construction worker CVs of 2.37 pCi/g and 21.6 pCi/g, respectively.

As radium-226 exceeded its commercial/industrial worker CV, the results from DU 8 were also compared to the commercial/industrial worker PRG for radium-226 that was recently developed in the SFS for the FMC Plant OU.

Future Worker PRG Comparison. As shown in Table 3-11, radium-226 was reported at a 95% UCL on the mean concentration below its commercial/industrial worker PRG within the 0-to-6 inch bgs sampling interval at DU 8.

- Radium-226 was reported at 1.73 pCi/g, below its commercial/industrial worker PRG of 3.75 pCi/g.

Summary. Based on application of the decision rules from the *Off-Plant Work Plan*, Table 3-3 identifies which constituents will be carried forward into the quantitative human health risk assessment. This information is summarized below:

- Residential Receptors – radium-226
- Commercial/Industrial Workers – radium-226

3.9.4 DU8 Risk Characterization and Uncertainty Discussion

Human Health Assessment. As shown in Table 3-12, cumulative RME total lifetime cancer risks for all receptors evaluated in the Supplemental Off-Plant OU HHRA (hypothetical future residents and commercial/industrial workers) were within EPA's acceptable risk range. Specifically, the HHRA estimated that cumulative RME total lifetime cancer risks to the two most highly exposed receptors, hypothetical future residents and future outdoor workers, are $1\text{E-}04$ and $6\text{E-}05$, respectively. Radium-226 via the external exposure to gamma radiation pathway was found to drive these risks, comprising over 98% of the cumulative total cancer risk estimates for the most highly exposed residential receptors.

It is also noteworthy that the RME lifetime cancer risk associated with background concentrations accounts for approximately 75% of the total residential and outdoor worker cancer risk estimates. Consequently, cumulative RME incremental cancer risk estimates (i.e., total minus background risks) are significantly lower than the cumulative total cancer risks; e.g., $3\text{E-}05$ for hypothetical future residents and $2\text{E-}05$ for future outdoor workers).

In addition, cumulative total lifetime cancer risks under the more realistic CTE scenario were found to be well below $1\text{E-}04$ for all evaluated receptors; e.g., $2\text{E-}05$ for hypothetical future residents and $1\text{E-}05$ for future outdoor workers.

A comprehensive discussion of the methods and assumptions that were used to perform the Supplemental Off-Plant OU HHRA is provided in Appendix D.

Summary. Based on the Supplemental Off-Plant OU HHRA Addendum, risks to the potential future human receptors in DU 8 are within EPA's acceptable risk range.. This conclusion is supported by the fact that the concentration of radium-226, the only constituent found to exceed screening CVs in DU 8, is below the residential and worker PRGs developed in the SFS for the FMC Plant OU (see Table 3-11).

TABLE 3-1
HUMAN HEALTH SOIL SCREENING LEVELS (pCi/g)^{a,b}
OFF-PLANT OU SUPPLEMENTAL SURFACE SOIL RADIONUCLIDE INVESTIGATION
EMF Superfund Site, Pocatello, Idaho
(Page 1 of 1)

Constituents	Background Value (95% UCL on the mean)	Region 10 Residential SSL^c	Residential CV	Commercial/Industrial Worker SSL^d	Commercial/Industrial Worker CV	Construction Worker SSL^d	Construction Worker CV	Utility Worker SSL^d	Utility Worker CV
Lead-210	2.02	0.45	2.47	0.94	3.0	7.4	9.5	96.7	99
Radium-226	0.95	0.013	0.97	0.023	0.98	0.93	1.9	12.3	13
Uranium-238	0.88	0.78	1.66	1.4	2.3	20.6	21.5	267	268

All concentrations in pCi/g.

- a) The surface soil CV will consist of the Region 10 residential SSL + 95% UCL background concentration.
- b) The sub-surface soil CV will consist of the lowest worker SSL + 95% UCL background concentration.
- c) EPA Region 10 guidance recommends use of Region 6 screening levels. EPA Region 6 currently recommends use of EPA Region 3's Risk Based Concentration (RBC) Table for chemicals and EPA's Preliminary Remediation Goals website (<http://epa-prgs.ornl.gov/radionuclides/>) for radionuclides. Per EPA Region 10 guidance, residential SSLs established at a cancer risk threshold of 1E-06 and a non-cancer hazard index = 0.1
- d) Worker SSLs taken from Table 1-7 of the SRI Report (MWH, 2009)

TABLE 3-2
DU1 DATA SUMMARY AND EVALUATION AGAINST RESIDENTIAL AND WORKER CVS AND PRGS
OFF-PLANT OU SUPPLEMENTAL SURFACE SOIL RADIONUCLIDE INVESTIGATION
EMF Superfund Site, Pocatello, Idaho
(Page 1 of 1)

Comparison to Residential and Worker CVs and PRGs

Analyte	Lead-210	Radium-226	Uranium-238
Units	pCi/g	pCi/g	pCi/g
0 - 6" Soil Background (95% UCL on Mean)	1.46	1.21	0.96
Residential Human Health Comparative Value (CV)^a	1.91	1.22	1.74
Residential Human Health PRG^b	31.0	2.51	NC
Commercial/Industrial Worker Comparative Value (CV)^a	2.40	1.23	2.37
Commercial/Industrial Worker PRG^b	67.2	3.75	NC
Construction Worker Comparative Value (CV)^a	8.90	2.13	21.6
Construction Worker PRG^b	615	104	NC
0-6" Mean Concentration	1.42	1.21	1.03
0-6" 95% UCL on Mean Concentration	1.47	1.30	1.14

^a Human health CVs established as the 0-6"95% UCL on mean background concentration + receptor-specific soil screening level (SSL).

^b PRGs documented in SFS Work Plan for the FMC Plant OU (MWH, 2010).

NC Not calculated.

	0-6" mean concentration exceeds the residential CV.
	0-6" mean concentration exceeds residential and worker CVs.
	0-6" 95% UCL concentration exceeds residential or worker PRGs.

Validated Laboratory Data

Analyte				Lead-210	Radium-226	Uranium-238
Units				pCi/g	pCi/g	pCi/g
0 - 2" Soil Background (95% UCL on Mean)				2.02	0.95	0.88
Location Identification	Field Sample Identification	Date Collected	Depth (in)			
DU1-SSC001	DU1-SSC001 (0-2)	11/09/09	0-2	1.51 ± 0.38	1.04 ± 0.28	0.68 ± 0.16
DU1-SSC002	DU1-SSC002 (0-2)	11/10/09	0-2	1.39 ± 0.35	1.19 ± 0.31	0.98 ± 0.22
DU1-SSC003	DU1-SSC003 (0-2)	11/10/09	0-2	1.52 ± 0.38	1.11 ± 0.29	0.93 ± 0.23
DU1-SSC004	DU1-SSC004 (0-2)	11/10/09	0-2	1.46 ± 0.36	1.02 ± 0.30	1.15 ± 0.24
DU1-SSC005	DU1-SSC005 (0-2)	11/10/09	0-2	1.59 ± 0.4	0.89 ± 0.29	1.24 ± 0.26
DU1-SSC205	DU1-SSC205 (0-2)	11/10/09	0-2	1.4 ± 0.35	1.31 ± 0.34	0.90 ± 0.19
DU1-SSC006	DU1-SSC006 (0-2)	11/10/09	0-2	1.48 ± 0.37	1.27 ± 0.34	0.99 ± 0.23
DU1-SSC007	DU1-SSC007 (0-2)	11/11/09	0-2	1.4 ± 0.35	1.20 ± 0.31	1.16 ± 0.25
DU1-SSC008	DU1-SSC008 (0-2)	11/11/09	0-2	1.52 ± 0.38	1.35 ± 0.35	1.02 ± 0.22
0-2" Mean Concentration				1.47	1.16	1.00
0-2" 95% UCL on Mean Concentration				1.51	1.24	1.10
2 - 6" Soil Background (95% UCL on Mean)				1.17	1.34	1.00
DU1-SSC001	DU1-SSC001 (2-6)	11/09/09	2-6	1.34 ± 0.34	1.30 ± 0.32	1.16 ± 0.25
DU1-SSC002	DU1-SSC002 (2-6)	11/10/09	2-6	1.28 ± 0.32	1.25 ± 0.31	1.12 ± 0.24
DU1-SSC003	DU1-SSC003 (2-6)	11/10/09	2-6	1.52 ± 0.38	1.37 ± 0.34	0.95 ± 0.21
DU1-SSC004	DU1-SSC004 (2-6)	11/10/09	2-6	1.45 ± 0.36	1.18 ± 0.30	0.87 ± 0.19
DU1-SSC005	DU1-SSC005 (2-6)	11/10/09	2-6	1.35 ± 0.34	1.17 ± 0.32	0.99 ± 0.21
DU1-SSC205	DU1-SSC205 (2-6)	11/10/09	2-6	1.4 ± 0.35	1.54 ± 0.42	0.95 ± 0.21
DU1-SSC006	DU1-SSC006 (2-6)	11/10/09	2-6	1.43 ± 0.36	1.18 ± 0.32	0.87 ± 0.19
DU1-SSC007	DU1-SSC007 (2-6)	11/11/09	2-6	1.42 ± 0.36	1.30 ± 0.34	1.00 ± 0.21
DU1-SSC008	DU1-SSC008 (2-6)	11/11/09	2-6	1.34 ± 0.34	0.92 ± 0.26	1.40 ± 0.31
2-6" Mean Concentration				1.39	1.23	1.04
2-6" 95% UCL on Mean Concentration				1.45	1.33	1.16

Bold Bolded result indicates positively identified compound.

TABLE 3-4
DU2 DATA SUMMARY AND EVALUATION AGAINST RESIDENTIAL AND WORKER CVS AND PRGS
OFF-PLANT OU SUPPLEMENTAL SURFACE SOIL RADIONUCLIDE INVESTIGATION
EMF Superfund Site, Pocatello, Idaho
(Page 1 of 1)

Comparison to Residential and Worker CVs and PRGs

Analyte	Lead-210	Radium-226	Uranium-238
Units	pCi/g	pCi/g	pCi/g
0 - 6" Soil Background (95% UCL on Mean)	1.46	1.21	0.96
Residential Human Health Comparative Value (CV)^a	1.91	1.22	1.74
Residential Human Health PRG^b	31.0	2.51	NC
Commercial/Industrial Worker Comparative Value (CV)^a	2.40	1.23	2.37
Commercial/Industrial Worker PRG^b	67.2	3.75	NC
Construction Worker Comparative Value (CV)^a	8.90	2.13	21.6
Construction Worker PRG^b	615	104	NC
0-6" Mean Concentration	1.99	1.64	1.16
0-6" 95% UCL on Mean Concentration	2.22	1.73	1.31

^a Human health CVs established as the 0-6"95% UCL on mean background concentration + receptor-specific soil screening level (SSL).

^b PRGs documented in SFS Work Plan for the FMC Plant OU (MWH, 2010).

NC Not calculated.

	0-6" mean concentration exceeds the residential CV.
	0-6" mean concentration exceeds residential and worker CVs.
	0-6" 95% UCL concentration exceeds residential or worker PRGs.

Validated Laboratory Data

Analyte				Lead-210	Radium-226	Uranium-238
Units				pCi/g	pCi/g	pCi/g
0 - 2" Soil Background (95% UCL on Mean)				2.02	0.95	0.88
Location Identification	Field Sample Identification	Date Collected	Depth (in)			
DU2-SSC001	DU2-SSC001 (0-2)	11/05/09	0-2	2.07 ± 0.51	1.6 ± 0.39	1.3 ± 0.28
DU2-SSC002	DU2-SSC002 (0-2)	11/05/09	0-2	1.96 ± 0.49	1.49 ± 0.36	0.54 ± 0.14
DU2-SSC003	DU2-SSC003 (0-2)	11/06/09	0-2	1.91 ± 0.47	1.65 ± 0.40	0.50 ± 0.15
DU2-SSC004	DU2-SSC004 (0-2)	11/06/09	0-2	2.07 ± 0.51	1.67 ± 0.41	1.10 ± 0.24
DU2-SSC005	DU2-SSC005 (0-2)	11/06/09	0-2	2.07 ± 0.51	1.78 ± 0.42	1.26 ± 0.26
DU2-SSC006	DU2-SSC006 (0-2)	11/06/09	0-2	2.01 ± 0.5	1.45 ± 0.39	0.62 ± 0.17
DU2-SSC007	DU2-SSC007 (0-2)	11/06/09	0-2	1.89 ± 0.47	1.92 ± 0.45	1.00 ± 0.22
DU2-SSC008	DU2-SSC008 (0-2)	11/09/09	0-2	2.08 ± 0.51	1.61 ± 0.38	1.08 ± 0.24
DU2-SSC206	DU2-SSC206 (0-2)	11/06/09	0-2	1.93 ± 0.48	1.73 ± 0.42	1.50 ± 0.35
0-2" Mean Concentration				2.00	1.66	0.98
0-2" 95% UCL on Mean Concentration				2.06	1.75	1.18
2 - 6" Soil Background (95% UCL on Mean)				1.17	1.34	1.00
DU2-SSC001	DU2-SSC001 (2-6)	11/05/09	2-6	1.88 ± 0.47	1.66 ± 0.43	1.01 ± 0.22
DU2-SSC002	DU2-SSC002 (2-6)	11/05/09	2-6	3.13 ± 0.77	1.50 ± 0.36	1.11 ± 0.24
DU2-SSC003	DU2-SSC003 (2-6)	11/06/09	2-6	1.74 ± 0.43	1.65 ± 0.40	1.16 ± 0.25
DU2-SSC004	DU2-SSC004 (2-6)	11/06/09	2-6	1.72 ± 0.42	1.61 ± 0.39	1.24 ± 0.25
DU2-SSC005	DU2-SSC005 (2-6)	11/06/09	2-6	1.89 ± 0.47	1.58 ± 0.39	1.23 ± 0.26
DU2-SSC006	DU2-SSC006 (2-6)	11/06/09	2-6	1.82 ± 0.45	1.39 ± 0.35	1.60 ± 0.35
DU2-SSC007	DU2-SSC007 (2-6)	11/06/09	2-6	1.73 ± 0.43	1.89 ± 0.44	1.39 ± 0.31
DU2-SSC008	DU2-SSC008 (2-6)	11/09/09	2-6	2.01 ± 0.49	1.67 ± 0.42	1.58 ± 0.32
DU2-SSC206	DU2-SSC206 (2-6)	11/06/09	2-6	1.74 ± 0.43	1.59 ± 0.39	1.03 ± 0.22
2-6" Mean Concentration				1.99	1.63	1.25
2-6" 95% UCL on Mean Concentration				2.30	1.72	1.37

Bold Bolded result indicates positively identified compound.

TABLE 3-5

**SUMMARY OF POTENTIAL HUMAN HEALTH RISKS TO FUTURE RECEPTORS IN DU 2
OFF-PLANT OU SUPPLEMENTAL SURFACE SOIL RADIONUCLIDE INVESTIGATION
EMF Superfund Site, Pocatello, Idaho
(Page 1 of 1)**

Exposure Pathways	Exposure Scenario																				
	Resident (a)							Outdoor Commercial/Industrial Worker							Indoor Commercial/Industrial Worker						
	RME			CTE			Risk Drivers*	RME			CTE			Risk Drivers*	RME			CTE			Risk Drivers*
	Total	Bkgd	Inc	Total	Bkgd	Inc		Total	Bkgd	Inc	Total	Bkgd	Inc		Total	Bkgd	Inc	Total	Bkgd	Inc	
<i>Lifetime Cancer Risk</i>																					
<u>ROCs</u>																					
External Exposure to Gamma Radiation	1.E-04	9.E-05	2.E-05	2.E-05	1.E-05	6.E-06	Ra-226	6.E-05	5.E-05	1.E-05	1.E-05	1.E-05	4.E-06	Ra-226	3.E-05	2.E-05	5.E-06	6.E-06	4.E-06	2.E-06	Ra-226
Incidental Soil Ingestion	8.E-06	8.E-06	8.E-07	8.E-07	7.E-07	1.E-07	Pb-210, Ra-226	7.E-07	4.E-07	3.E-07	9.E-08	4.E-08	5.E-08	-	4.E-07	2.E-07	2.E-07	9.E-08	4.E-08	5.E-08	-
Ingestion of Homegrown Produce	8.E-06	5.E-06	3.E-06	2.E-06	1.E-06	8.E-07	Pb-210	NA	NA	NA	NA	NA	NA	-	NA	NA	NA	NA	NA	NA	-
Fugitive Dust Inhalation	<u>2.E-09</u>	<u>2.E-09</u>	<u>5.E-10</u>	<u>3.E-10</u>	<u>2.E-10</u>	<u>8.E-11</u>	-	<u>7.E-09</u>	<u>4.E-09</u>	<u>3.E-09</u>	<u>2.E-09</u>	<u>8.E-10</u>	<u>9.E-10</u>	-	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	-
<i>Total ROPC Lifetime Cancer Risk</i>	<i>1.E-04</i>	<i>1.E-04</i>	<i>3.E-05</i>	<i>2.E-05</i>	<i>2.E-05</i>	<i>7.E-06</i>	<i>Ra-226, Pb-210</i>	<i>6.E-05</i>	<i>5.E-05</i>	<i>1.E-05</i>	<i>1.E-05</i>	<i>1.E-05</i>	<i>4.E-06</i>	<i>Ra-226</i>	<i>3.E-05</i>	<i>2.E-05</i>	<i>5.E-06</i>	<i>6.E-06</i>	<i>4.E-06</i>	<i>2.E-06</i>	<i>Ra-226</i>
<i>Total Lifetime Cancer Risk</i>	<i>1.E-04</i>	<i>1.E-04</i>	<i>3.E-05</i>	<i>2.E-05</i>	<i>2.E-05</i>	<i>7.E-06</i>	<i>Ra-226, Pb-210</i>	<i>6.E-05</i>	<i>5.E-05</i>	<i>1.E-05</i>	<i>1.E-05</i>	<i>1.E-05</i>	<i>4.E-06</i>	<i>Ra-226</i>	<i>3.E-05</i>	<i>2.E-05</i>	<i>5.E-06</i>	<i>6.E-06</i>	<i>4.E-06</i>	<i>2.E-06</i>	<i>Ra-226</i>

Notes:

a) Residential cancer risks representative of an age-integrated child/adult receptor.

Bscr = ROC concentrations within this parcel are below screening levels for the receptor of concern.

NA = Not an applicable exposure route for the receptor of concern.

* If applicable, the two ROCs most significantly exceeding an incremental cancer risk of 1E-06 for each exposure pathway are identified.

TABLE 3-6
DU3 DATA SUMMARY AND EVALUATION AGAINST RESIDENTIAL AND WORKER CVS AND PRGS
OFF-PLANT OU SUPPLEMENTAL SURFACE SOIL RADIONUCLIDE INVESTIGATION
EMF Superfund Site, Pocatello, Idaho
(Page 1 of 1)

Comparison to Residential and Worker CVs and PRGs

Analyte	Lead-210	Radium-226	Uranium-238
Units	pCi/g	pCi/g	pCi/g
0 - 6" Soil Background (95% UCL on Mean)	1.46	1.21	0.96
Residential Human Health Comparative Value (CV)^a	1.91	1.22	1.74
Residential Human Health PRG^b	31.0	2.51	NC
Commercial/Industrial Worker Comparative Value (CV)^a	2.40	1.23	2.37
Commercial/Industrial Worker PRG^b	67.2	3.75	NC
Construction Worker Comparative Value (CV)^a	8.90	2.13	21.6
Construction Worker PRG^b	615	104	NC
0-6" Mean Concentration	1.36	1.03	1.15
0-6" 95% UCL on Mean Concentration	1.43	1.14	1.23

^a Human health CVs established as the 0-6"95% UCL on mean background concentration + receptor-specific soil screening level (SSL).

^b PRGs documented in SFS Work Plan for the FMC Plant OU (MWH, 2010).

NC Not calculated.

	0-6" mean concentration exceeds the residential CV.
	0-6" mean concentration exceeds residential and worker CVs.
	0-6" 95% UCL concentration exceeds residential or worker PRGs.

Validated Laboratory Data

Analyte				Lead-210	Radium-226	Uranium-238
Units				pCi/g	pCi/g	pCi/g
0 - 2" Soil Background (95% UCL on Mean)				2.02	0.95	0.88
Location Identification	Field Sample Identification	Date Collected	Depth (in)			
DU3-SSC001	DU3-SSC001 (0-2)	10/16/2009	0 - 2	1.44 ± 0.36	1.06 ± 0.22	1.1 ± 0.3
DU3-SSC002	DU3-SSC002 (0-2)	10/19/2009	0 - 2	1.13 ± 0.29	1.19 ± 0.25	1.28 ± 0.39
DU3-SSC003	DU3-SSC003 (0-2)	10/20/2009	0 - 2	1.63 ± 0.41	1.05 ± 0.22	1.05 ± 0.29
DU3-SSC004	DU3-SSC004 (0-2)	10/20/2009	0 - 2	1.39 ± 0.35	1.35 ± 0.28	1.4 ± 0.36
DU3-SSC005	DU3-SSC005 (0-2)	10/20/2009	0 - 2	1.44 ± 0.36	0.69 ± 0.17	1.2 ± 0.31
DU3-SSC006	DU3-SSC006 (0-2)	10/21/2009	0 - 2	1.25 ± 0.32	1.01 ± 0.21	0.99 ± 0.27
DU3-SSC007	DU3-SSC007 (0-2)	10/21/2009	0 - 2	1.55 ± 0.39	1.1 ± 0.25	0.89 ± 0.26
DU3-SSC007 Dup	DU3-SSC207 (0-2)	10/21/2009	0 - 2	1.45 ± 0.36	1.01 ± 0.24	1.12 ± 0.31
DU3-SSC008	DU3-SSC008 (0-2)	10/21/2009	0 - 2	1.34 ± 0.34	1.28 ± 0.29	1.14 ± 0.3
0-2" Mean Concentration				1.39	1.09	1.15
0-2" 95% UCL on Mean Concentration				1.49	1.22	1.24
2 - 6" Soil Background (95% UCL on Mean)				1.17	1.34	1.00
DU3-SSC001	DU3-SSC001 (2-6)	10/16/2009	2 - 6	1.35 ± 0.34	1.15 ± 0.25	1.08 ± 0.29
DU3-SSC002	DU3-SSC002 (2-6)	10/19/2009	2 - 6	1.29 ± 0.33	0.8 ± 0.18	1.08 ± 0.29
DU3-SSC003	DU3-SSC003 (2-6)	10/20/2009	2 - 6	1.49 ± 0.38	0.93 ± 0.2	1.13 ± 0.24
DU3-SSC004	DU3-SSC004 (2-6)	10/20/2009	2 - 6	1.38 ± 0.35	1.06 ± 0.24	1.21 ± 0.32
DU3-SSC005	DU3-SSC005 (2-6)	10/21/2009	2 - 6	1.33 ± 0.34	0.89 ± 0.19	1.34 ± 0.34
DU3-SSC006	DU3-SSC006 (2-6)	10/21/2009	2 - 6	1.29 ± 0.33	1.21 ± 0.25	1.18 ± 0.3
DU3-SSC007	DU3-SSC007 (2-6)	10/21/2009	2 - 6	1.43 ± 0.36	0.93 ± 0.19	1.21 ± 0.32
DU3-SSC007 Dup	DU3-SSC207 (2-6)	10/21/2009	2 - 6	1.28 ± 0.33	1.23 ± 0.27	1.14 ± 0.31
DU3-SSC008	DU3-SSC008 (2-6)	10/21/2009	2 - 6	1.22 ± 0.31	0.84 ± 0.2	1.04 ± 0.28
2-6" Mean Concentration				1.34	1.00	1.15
2-6" 95% UCL on Mean Concentration				1.39	1.10	1.22

Bold Bolded result indicates positively identified compound.

TABLE 3-7
DU4 DATA SUMMARY AND EVALUATION AGAINST RESIDENTIAL AND WORKER CVS AND PRGS
OFF-PLANT OU SUPPLEMENTAL SURFACE SOIL RADIONUCLIDE INVESTIGATION
EMF Superfund Site, Pocatello, Idaho
(Page 1 of 1)

Comparison to Residential and Worker CVs and PRGs

Analyte	Lead-210	Radium-226	Uranium-238
Units	pCi/g	pCi/g	pCi/g
0 - 6" Soil Background (95% UCL on Mean)	1.46	1.21	0.96
Residential Human Health Comparative Value (CV)^a	1.91	1.22	1.74
Residential Human Health PRG^b	31.0	2.51	NC
Commercial/Industrial Worker Comparative Value (CV)^a	2.40	1.23	2.37
Commercial/Industrial Worker PRG^b	67.2	3.75	NC
Construction Worker Comparative Value (CV)^a	8.90	2.13	21.6
Construction Worker PRG^b	615	104	NC
0-6" Mean Concentration	1.30	0.98	1.01
0-6" 95% UCL on Mean Concentration	1.36	1.13	1.08

^a Human health CVs established as the 0-6"95% UCL on mean background concentration + receptor-specific soil screening level (SSL).

^b PRGs documented in SFS Work Plan for the FMC Plant OU (MWH, 2010).

NC Not calculated.

	0-6" mean concentration exceeds the residential CV.
	0-6" mean concentration exceeds residential and worker CVs.
	0-6" 95% UCL concentration exceeds residential or worker PRGs.

Validated Laboratory Data

Analyte				Lead-210	Radium-226	Uranium-238
Units				pCi/g	pCi/g	pCi/g
0 - 2" Soil Background (95% UCL on Mean)				2.02	0.95	0.88
Location Identification	Field Sample Identification	Date Collected	Depth (in)			
DU4-SSC001	DU4-SSC001 (0-2)	10/14/2009	0 - 2	1.61 ± 0.41	1.22 ± 0.27	1.11 ± 0.31
DU4-SSC002	DU4-SSC002 (0-2)	10/14/2009	0 - 2	1.36 ± 0.34	0.83 ± 0.2	1.08 ± 0.29
DU4-SSC003	DU4-SSC003 (0-2)	10/14/2009	0 - 2	1.44 ± 0.36	0.81 ± 0.19	1.17 ± 0.31
DU4-SSC004	DU4-SSC004 (0-2)	10/15/2009	0 - 2	1.35 ± 0.34	0.99 ± 0.21	1.01 ± 0.3
DU4-SSC005	DU4-SSC005 (0-2)	10/16/2009	0 - 2	1.62 ± 0.41	0.65 ± 0.18	1.23 ± 0.36
DU4-SSC006	DU4-SSC006 (0-2)	10/15/2009	0 - 2	1.27 ± 0.32	0.53 ± 0.16	0.87 ± 0.27
DU4-SSC007	DU4-SSC007 (0-2)	10/15/2009	0 - 2	1.38 ± 0.35	1 ± 0.23	1.02 ± 0.29
DU4-SSC008	DU4-SSC008 (0-2)	10/16/2009	0 - 2	1.53 ± 0.38	1.21 ± 0.25	1.08 ± 0.29
DU4-SSC008 Dup	DU4-SSC208 (0-2)	10/16/2009	0 - 2	1.37 ± 0.35	1.37 ± 0.28	1.27 ± 0.35
0-2" Mean Concentration				1.44	0.92	1.08
0-2" 95% UCL on Mean Concentration				1.52	1.09	1.16
2 - 6" Soil Background (95% UCL on Mean)				1.17	1.34	1.00
DU4-SSC001	DU4-SSC001 (2-6)	10/14/2009	2 - 6	1.28 ± 0.32	1.06 ± 0.23	1.14 ± 0.3
DU4-SSC002	DU4-SSC002 (2-6)	10/14/2009	2 - 6	1.16 ± 0.3	1.24 ± 0.28	0.96 ± 0.27
DU4-SSC003	DU4-SSC003 (2-6)	10/15/2009	2 - 6	1.26 ± 0.32	1.14 ± 0.25	0.79 ± 0.23
DU4-SSC004	DU4-SSC004 (2-6)	10/15/2009	2 - 6	1.13 ± 0.29	0.75 ± 0.2	0.93 ± 0.28
DU4-SSC005	DU4-SSC005 (2-6)	10/16/2009	2 - 6	1.32 ± 0.34	0.8 ± 0.19	1.02 ± 0.28
DU4-SSC006	DU4-SSC006 (2-6)	10/15/2009	2 - 6	1.29 ± 0.33	1.25 ± 0.28	0.97 ± 0.28
DU4-SSC007	DU4-SSC007 (2-6)	10/16/2009	2 - 6	1.22 ± 0.31	0.85 ± 0.19	0.96 ± 0.29
DU4-SSC008	DU4-SSC008 (2-6)	10/16/2009	2 - 6	1.3 ± 0.33	0.87 ± 0.21	1.09 ± 0.31
DU4-SSC008 Dup	DU4-SSC208 (2-6)	10/16/2009	2 - 6	1.16 ± 0.3	1.15 ± 0.24	0.95 ± 0.27
2-6" Mean Concentration				1.24	1.01	0.97
2-6" 95% UCL on Mean Concentration				1.28	1.14	1.04

Bold Bolded result indicates positively identified compound.

TABLE 3-8
DU5 DATA SUMMARY AND EVALUATION AGAINST RESIDENTIAL AND WORKER CVS AND PRGS
OFF-PLANT OU SUPPLEMENTAL SURFACE SOIL RADIONUCLIDE INVESTIGATION
EMF Superfund Site, Pocatello, Idaho
(Page 1 of 1)

Comparison to Residential and Worker CVs and PRGs

Analyte	Lead-210	Radium-226	Uranium-238
Units	pCi/g	pCi/g	pCi/g
0 - 6" Soil Background (95% UCL on Mean)	1.46	1.21	0.96
Residential Human Health Comparative Value (CV)^a	1.91	1.22	1.74
Residential Human Health PRG^b	31.0	2.51	NC
Commercial/Industrial Worker Comparative Value (CV)^a	2.40	1.23	2.37
Commercial/Industrial Worker PRG^b	67.2	3.75	NC
Construction Worker Comparative Value (CV)^a	8.90	2.13	21.6
Construction Worker PRG^b	615	104	NC
0-6" Mean Concentration	1.46	1.04	1.19
0-6" 95% UCL on Mean Concentration	1.52	1.16	1.29

^a Human health CVs established as the 0-6"95% UCL on mean background concentration + receptor-specific soil screening level (SSL).

^b PRGs documented in SFS Work Plan for the FMC Plant OU (MWH, 2010).

NC Not calculated.

0-6" mean concentration exceeds the residential CV.
0-6" mean concentration exceeds residential and worker CVs.
0-6" 95% UCL concentration exceeds residential or worker PRGs.

Validated Laboratory Data

Analyte				Lead-210	Radium-226	Uranium-238
Units				pCi/g	pCi/g	pCi/g
0 - 2" Soil Background (95% UCL on Mean)				2.02	0.95	0.88
Location Identification	Field Sample Identification	Date Collected	Depth (in)			
DU5-SSC001	DU5-SSC001 (0-2)	10/13/2009	0 - 2	1.41 ± 0.36 B	1.12 ± 0.25	1.06 ± 0.28
DU5-SSC001	DU5-SSC201 (0-2)	10/13/2009	0 - 2	1.36 ± 0.35 B	0.79 ± 0.21	1.22 ± 0.32
DU5-SSC002	DU5-SSC002 (0-2)	10/13/2009	0 - 2	1.69 ± 0.42 B	1.23 ± 0.25	1.22 ± 0.37
DU5-SSC003	DU5-SSC003 (0-2)	10/8/2009	0 - 2	1.34 ± 0.34 B	1.05 ± 0.23	0.95 ± 0.27
DU5-SSC004	DU5-SSC004 (0-2)	10/13/2009	0 - 2	1.54 ± 0.39 B	1.39 ± 0.3	1.03 ± 0.28
DU5-SSC005	DU5-SSC005 (0-2)	10/9/2009	0 - 2	1.25 ± 0.32 B	0.84 ± 0.19	1.14 ± 0.34
DU5-SSC006	DU5-SSC006 (0-2)	10/13/2009	0 - 2	1.6 ± 0.4 B	1.06 ± 0.22	1.21 ± 0.31
DU5-SSC007	DU5-SSC007 (0-2)	10/13/2009	0 - 2	1.48 ± 0.37 B	0.97 ± 0.21	1.23 ± 0.32
DU5-SSC008	DU5-SSC008 (0-2")	10/14/2009	0 - 2	1.44 ± 0.36	0.79 ± 0.19	1.16 ± 0.31
0-2" Mean Concentration				1.47	1.04	1.14
0-2" 95% UCL on Mean Concentration				1.56	1.17	1.20
2 - 6" Soil Background (95% UCL on Mean)				1.17	1.34	1.00
DU5-SSC001	DU5-SSC001 (2-6)	10/13/2009	2 - 6	1.4 ± 0.35 B	0.83 ± 0.21	1.31 ± 0.34
DU5-SSC001	DU5-SSC201 (2-6)	10/13/2009	2 - 6	1.49 ± 0.38 B	0.98 ± 0.23	1.26 ± 0.32
DU5-SSC002	DU5-SSC002 (2-6)	10/13/2009	2 - 6	1.43 ± 0.36 B	1.16 ± 0.25	1.46 ± 0.41
DU5-SSC003	DU5-SSC003 (2-6)	10/8/2009	2 - 6	1.5 ± 0.38 B	1.16 ± 0.26	1.06 ± 0.3
DU5-SSC004	DU5-SSC004 (2-6)	10/13/2009	2 - 6	1.46 ± 0.37 B	1.2 ± 0.26	1.05 ± 0.29
DU5-SSC005	DU5-SSC005 (2-6)	10/9/2009	2 - 6	1.31 ± 0.33 B	0.83 ± 0.2	1.05 ± 0.3
DU5-SSC006	DU5-SSC006 (2-6)	10/13/2009	2 - 6	1.58 ± 0.4 B	0.96 ± 0.22	1.16 ± 0.32
DU5-SSC007	DU5-SSC007 (2-6")	10/14/2009	2 - 6	1.49 ± 0.37	1.22 ± 0.27	1.48 ± 0.41
DU5-SSC008	DU5-SSC008 (2-6")	10/14/2009	2 - 6	1.42 ± 0.36	0.93 ± 0.22 J-	1.21 ± 0.31
2-6" Mean Concentration				1.45	1.05	1.22
2-6" 95% UCL on Mean Concentration				1.51	1.15	1.34

Bold Bolded result indicates positively identified compound.

B Analyte detected in an associated blank.

J- Data are estimated, potentially biased low due to associated quality control data.

TABLE 3-9
DU6 DATA SUMMARY AND EVALUATION AGAINST RESIDENTIAL AND WORKER CVS AND PRGS
OFF-PLANT OU SUPPLEMENTAL SURFACE SOIL RADIONUCLIDE INVESTIGATION
EMF Superfund Site, Pocatello, Idaho
(Page 1 of 1)

Comparison to Residential and Worker CVs and PRGs

Analyte	Lead-210	Radium-226	Uranium-238
Units	pCi/g	pCi/g	pCi/g
0 - 6" Soil Background (95% UCL on Mean)	1.46	1.21	0.96
Residential Human Health Comparative Value (CV)^a	1.91	1.22	1.74
Residential Human Health PRG^b	31.0	2.51	NC
Commercial/Industrial Worker Comparative Value (CV)^a	2.40	1.23	2.37
Commercial/Industrial Worker PRG^b	67.2	3.75	NC
Construction Worker Comparative Value (CV)^a	8.90	2.13	21.6
Construction Worker PRG^b	615	104	NC
0-6" Mean Concentration	1.32	0.93	0.96
0-6" 95% UCL on Mean Concentration	1.39	1.04	1.02

^a Human health CVs established as the 0-6"95% UCL on mean background concentration + receptor-specific soil screening level (SSL).

^b PRGs documented in SFS Work Plan for the FMC Plant OU (MWH, 2010).

NC Not calculated.

	0-6" mean concentration exceeds the residential CV.
	0-6" mean concentration exceeds residential and worker CVs.
	0-6" 95% UCL concentration exceeds residential or worker PRGs.

Validated Laboratory Data

Analyte				Lead-210	Radium-226	Uranium-238
Units				pCi/g	pCi/g	pCi/g
0 - 2" Soil Background (95% UCL on Mean)				2.02	0.95	0.88
Location Identification	Field Sample Identification	Date Collected	Depth (in)			
DU6-SSC001	DU6-SSC001 (0-2)	11/04/10	0-2	1.66 ± 0.42	1.12 ± 0.23	0.99 ± 0.28
DU6-SSC002	DU6-SSC002 (0-2)	11/04/10	0-2	1.95 ± 0.48	0.82 ± 0.19	1.11 ± 0.3
DU6-SSC202	DU6-SSC202 (0-2)	11/04/10	0-2	1.7 ± 0.43	0.71 ± 0.17	1.13 ± 0.34
DU6-SSC003	DU6-SSC003 (0-2)	11/04/10	0-2	1.75 ± 0.51	1.09 ± 0.23	1.12 ± 0.31
DU6-SSC004	DU6-SSC004 (0-2)	11/04/10	0-2	1.84 ± 0.46	0.86 ± 0.2	0.9 ± 0.26
DU6-SSC005	DU6-SSC005 (0-2)	11/05/09	0-2	1.55 ± 0.39	0.97 ± 0.21	0.95 ± 0.22
DU6-SSC006	DU6-SSC006 (0-2)	11/05/09	0-2	1.7 ± 0.43	0.97 ± 0.22	1.12 ± 0.24
DU6-SSC007	DU6-SSC007 (0-2)	11/05/09	0-2	1.63 ± 0.41	0.92 ± 0.22	1 ± 0.28
DU6-SSC008	DU6-SSC008 (0-2)	11/05/09	0-2	1.55 ± 0.39	1.08 ± 0.23	1.12 ± 0.3
0-2" Mean Concentration				1.69	0.97	1.04
0-2" 95% UCL on Mean Concentration				1.76	1.05	1.10
2 - 6" Soil Background (95% UCL on Mean)				1.17	1.34	1.00
DU6-SSC001	DU6-SSC001 (2-6)	11/04/10	2-6	1.07 ± 0.28	0.81 ± 0.2	0.89 ± 0.26
DU6-SSC002	DU6-SSC002 (2-6)	11/04/10	2-6	1.15 ± 0.29	1.12 ± 0.25	0.71 ± 0.22
DU6-SSC002	DU6-SSC202 (2-6)	11/04/10	2-6	1 ± 0.35	0.98 ± 0.23	0.96 ± 0.27
DU6-SSC003	DU6-SSC003 (2-6)	11/04/10	2-6	1.15 ± 0.3	1.2 ± 0.28	1.03 ± 0.29
DU6-SSC004	DU6-SSC004 (2-6)	11/05/09	2-6	1.33 ± 0.34	1.04 ± 0.23	0.81 ± 0.25
DU6-SSC005	DU6-SSC005 (2-6)	11/05/09	2-6	1 ± 0.26	0.69 ± 0.17	0.98 ± 0.33
DU6-SSC006	DU6-SSC006 (2-6)	11/05/09	2-6	1.19 ± 0.3	0.97 ± 0.21	0.98 ± 0.29
DU6-SSC007	DU6-SSC007 (2-6)	11/05/09	2-6	1.11 ± 0.29	0.84 ± 0.19	0.86 ± 0.25
DU6-SSC008	DU6-SSC008 (2-6)	11/05/09	2-6	1.13 ± 0.29	0.72 ± 0.16	1 ± 0.27
2-6" Mean Concentration				1.13	0.92	0.92
2-6" 95% UCL on Mean Concentration				1.20	1.04	0.98

Bold Bolded result indicates positively identified compound.

TABLE 3-10
DU7 DATA SUMMARY AND EVALUATION AGAINST RESIDENTIAL AND WORKER CVS AND PRGS
OFF-PLANT OU SUPPLEMENTAL SURFACE SOIL RADIONUCLIDE INVESTIGATION
EMF Superfund Site, Pocatello, Idaho
(Page 1 of 1)

Comparison to Residential and Worker CVs and PRGs

Analyte	Lead-210	Radium-226	Uranium-238
Units	pCi/g	pCi/g	pCi/g
0 - 6" Soil Background (95% UCL on Mean)	1.46	1.21	0.96
Residential Human Health Comparative Value (CV)^a	1.91	1.22	1.74
Residential Human Health PRG^b	31.0	2.51	NC
Commercial/Industrial Worker Comparative Value (CV)^a	2.40	1.23	2.37
Commercial/Industrial Worker PRG^b	67.2	3.75	NC
Construction Worker Comparative Value (CV)^a	8.90	2.13	21.6
Construction Worker PRG^b	615	104	NC
0-6" Mean Concentration	1.37	1.00	1.16
0-6" 95% UCL on Mean Concentration	1.52	1.14	1.46

^a Human health CVs established as the 0-6"95% UCL on mean background concentration + receptor-specific soil screening level (SSL).

^b PRGs documented in SFS Work Plan for the FMC Plant OU (MWH, 2010).

NC Not calculated.

0-6" mean concentration exceeds the residential CV.
0-6" mean concentration exceeds residential and worker CVs.
0-6" 95% UCL concentration exceeds residential or worker PRGs.

Validated Laboratory Data

Analyte				Lead-210	Radium-226	Uranium-238
Units				pCi/g	pCi/g	pCi/g
0 - 2" Soil Background (95% UCL on Mean)				2.02	0.95	0.88
Location Identification	Field Sample Identification	Date Collected	Depth (in)			
DU7-SSC001	DU7-SSC001 (0-2)	11/03/09	0-2	1.45 ± 0.36	0.83 ± 0.27	1.06 ± 0.23
DU7-SSC002	DU7-SSC002 (0-2)	11/03/09	0-2	2.39 ± 0.59	1.96 ± 0.47	1.81 ± 0.36
DU7-SSC003	DU7-SSC003 (0-2)	11/04/10	0-2	1.65 ± 0.41	1.05 ± 0.29	0.70 ± 0.16
DU7-SSC003	DU7-SSC203 (0-2)	11/04/10	0-2	1.68 ± 0.42	0.97 ± 0.27	1.27 ± 0.25
DU7-SSC004	DU7-SSC004 (0-2)	11/03/09	0-2	1.67 ± 0.42	1.02 ± 0.30	0.90 ± 0.19
DU7-SSC005	DU7-SSC005 (0-2)	11/04/10	0-2	2.09 ± 0.52	0.89 ± 0.26	1.01 ± 0.22
DU7-SSC006	DU7-SSC006 (0-2)	11/03/09	0-2	1.35 ± 0.34	0.92 ± 0.27	0.52 ± 0.13
DU7-SSC007	DU7-SSC007 (0-2)	11/03/09	0-2	1.51 ± 0.38	0.98 ± 0.29	0.97 ± 0.20
DU7-SSC008	DU7-SSC008 (0-2)	11/03/09	0-2	1.84 ± 0.46	0.95 ± 0.27	0.76 ± 0.17
0-2" Mean Concentration				1.75	1.07	1.00
0-2" 95% UCL on Mean Concentration				1.98	1.32	1.25
2 - 6" Soil Background (95% UCL on Mean)				1.17	1.34	1.00
DU7-SSC001	DU7-SSC001 (2-6)	11/03/09	2-6	0.98 ± 0.26	0.83 ± 0.25	1.07 ± 0.24
DU7-SSC002	DU7-SSC002 (2-6)	11/03/09	2-6	1.47 ± 0.37	1.00 ± 0.28	1.86 ± 0.36
DU7-SSC003	DU7-SSC003 (2-6)	11/04/10	2-6	1.2 ± 0.31	0.91 ± 0.27	1.11 ± 0.25
DU7-SSC003	DU7-SSC203 (2-6)	11/04/10	2-6	1.27 ± 0.33	0.84 ± 0.24	0.96 ± 0.23
DU7-SSC004	DU7-SSC004 (2-6)	11/04/10	2-6	1.13 ± 0.29	0.86 ± 0.26	1.09 ± 0.23
DU7-SSC005	DU7-SSC005 (2-6)	11/04/10	2-6	1.05 ± 0.27	0.93 ± 0.26	1.12 ± 0.24
DU7-SSC006	DU7-SSC006 (2-6)	11/03/09	2-6	1.26 ± 0.32	0.96 ± 0.27	0.88 ± 0.19
DU7-SSC007	DU7-SSC007 (2-6)	11/03/09	2-6	1.17 ± 0.3	1.18 ± 0.31	0.74 ± 0.19
DU7-SSC008	DU7-SSC008 (2-6)	11/03/09	2-6	1.21 ± 0.31	1.14 ± 0.32	2.13 ± 0.41
2-6" Mean Concentration				1.19	0.97	1.24
2-6" 95% UCL on Mean Concentration				1.29	1.06	1.57

Bold Bolded result indicates positively identified compound.

TABLE 3-11
DU8 DATA SUMMARY AND EVALUATION AGAINST RESIDENTIAL AND WORKER CVS AND PRGS
OFF-PLANT OU SUPPLEMENTAL SURFACE SOIL RADIONUCLIDE INVESTIGATION
EMF Superfund Site, Pocatello, Idaho
(Page 1 of 1)

Comparison to Residential and Worker CVs and PRGs

Analyte	Lead-210	Radium-226	Uranium-238
Units	pCi/g	pCi/g	pCi/g
0 - 6" Soil Background (95% UCL on Mean)	1.46	1.21	0.96
Residential Human Health Comparative Value (CV)^a	1.91	1.22	1.74
Residential Human Health PRG^b	31.0	2.51	NC
Commercial/Industrial Worker Comparative Value (CV)^a	2.40	1.23	2.37
Commercial/Industrial Worker PRG^b	67.2	3.75	NC
Construction Worker Comparative Value (CV)^a	8.90	2.13	21.6
Construction Worker PRG^b	615	104	NC
0-6" Mean Concentration	1.67	1.50	1.26
0-6" 95% UCL on Mean Concentration	1.93	1.73	1.45

^a Human health CVs established as the 0-6"95% UCL on mean background concentration + receptor-specific soil screening level (SSL).

^b PRGs documented in SFS Work Plan for the FMC Plant OU (MWH, 2010).

NC Not calculated.

	0-6" mean concentration exceeds the residential CV.
	0-6" mean concentration exceeds residential and worker CVs.
	0-6" 95% UCL concentration exceeds residential or worker PRGs.

Validated Laboratory Data

Analyte				Lead-210	Radium-226	Uranium-238
Units				pCi/g	pCi/g	pCi/g
0 - 2" Soil Background (95% UCL on Mean)				2.02	0.95	0.88
Location Identification	Field Sample Identification	Date Collected	Depth (in)			
DU8-SSC001	DU8-SSC001 (0-2)	10/21/09	0-2	1.83 ± 0.45	2 ± 0.46	1.25 ± 0.26
DU8-SSC002	DU8-SSC002 (0-2)	10/23/09	0-2	1.68 ± 0.42	1.24 ± 0.33	0.65 ± 0.18
DU8-SSC003	DU8-SSC003 (0-2)	10/22/09	0-2	1.65 ± 0.41	1.63 ± 0.39	1.05 ± 0.22
DU8-SSC004	DU8-SSC004 (0-2)	10/23/09	0-2	1.64 ± 0.41	1.76 ± 0.41	1.31 ± 0.29
DU8-SSC005	DU8-SSC005 (0-2)	10/27/09	0-2	2.73 ± 0.67	2.26 ± 0.54	1.72 ± 0.33
DU8-SSC006	DU8-SSC006 (0-2)	10/27/09	0-2	1.69 ± 0.42	1.25 ± 0.32	1.23 ± 0.27
DU8-SSC007	DU8-SSC007 (0-2)	10/22/09	0-2	3.02 ± 0.74	2.13 ± 0.48	1.88 ± 0.37
DU8-SSC008	DU8-SSC008 (0-2)	10/27/09	0-2	1.69 ± 0.42	1.24 ± 0.33	1.06 ± 0.22
DU8-SSC204	DU8-SSC204 (0-2)	10/23/09	0-2	1.51 ± 0.38	1.88 ± 0.45	1.92 ± 0.38
0-2" Mean Concentration				1.98	1.70	1.31
0-2" 95% UCL on Mean Concentration				2.36	1.98	1.58

2 - 6" Soil Background (95% UCL on Mean)				1.17	1.34	1.00
DU8-SSC001	DU8-SSC001 (2-6)	10/22/09	2-6	1.56 ± 0.39	1.24 ± 0.32	0.95 ± 0.2
DU8-SSC002	DU8-SSC002 (2-6)	10/23/09	2-6	1.66 ± 0.41	1.62 ± 0.38	1.44 ± 0.29
DU8-SSC003	DU8-SSC003 (2-6)	10/23/09	2-6	1.36 ± 0.35	1.26 ± 0.31	1.06 ± 0.22
DU8-SSC004	DU8-SSC004 (2-6)	10/23/09	2-6	1.51 ± 0.38	1.53 ± 0.38	1.61 ± 0.34
DU8-SSC005	DU8-SSC005 (2-6)	10/27/09	2-6	1.31 ± 0.33	1.28 ± 0.32	1.12 ± 0.23
DU8-SSC006	DU8-SSC006 (2-6)	10/27/09	2-6	1.43 ± 0.36	1.18 ± 0.33	1.05 ± 0.22
DU8-SSC007	DU8-SSC007 (2-6)	10/22/09	2-6	2.16 ± 0.53	1.96 ± 0.45	1.35 ± 0.29
DU8-SSC008	DU8-SSC008 (2-6)	10/27/09	2-6	1.18 ± 0.3	1.12 ± 0.30	1.42 ± 0.29
DU8-SSC204	DU8-SSC204 (2-6)	10/23/09	2-6	1.32 ± 0.33	1.64 ± 0.40	1.44 ± 0.29
2-6" Mean Concentration				1.51	1.41	1.24
2-6" 95% UCL on Mean Concentration				1.71	1.60	1.39

Bold Bolded result indicates positively identified compound.

TABLE 3-12

SUMMARY OF POTENTIAL HUMAN HEALTH RISKS TO FUTURE RECEPTORS IN DU 8
 OFF-PLANT OU SUPPLEMENTAL SURFACE SOIL RADIONUCLIDE INVESTIGATION
 EMF Superfund Site, Pocatello, Idaho
 (Page 1 of 1)

Exposure Pathways	Exposure Scenario																				
	Resident (a)							Outdoor Commercial/Industrial Worker							Indoor Commercial/Industrial Worker						
	RME			CTE			Risk Drivers*	RME			CTE			Risk Drivers*	RME			CTE			Risk Drivers*
	Total	Bkgd	Inc	Total	Bkgd	Inc		Total	Bkgd	Inc	Total	Bkgd	Inc		Total	Bkgd	Inc	Total	Bkgd	Inc	
Lifetime Cancer Risk																					
ROCs																					
External Exposure to Gamma Radiation	1.E-04	9.E-05	3.E-05	2.E-05	1.E-05	6.E-06	Ra-226	6.E-05	5.E-05	2.E-05	1.E-05	1.E-05	4.E-06	Ra-226	3.E-05	2.E-05	7.E-06	6.E-06	4.E-06	2.E-06	Ra-226
Incidental Soil Ingestion	2.E-06	9.E-07	9.E-07	2.E-07	7.E-08	9.E-08	Ra-226	8.E-07	4.E-07	4.E-07	9.E-08	4.E-08	5.E-08	-	5.E-07	2.E-07	2.E-07	1.E-07	4.E-08	5.E-08	-
Ingestion of Homegrown Produce	7.E-07	5.E-07	3.E-07	2.E-07	1.E-07	8.E-08	-	NA	NA	NA	NA	NA	NA	-	NA	NA	NA	NA	NA	NA	-
Fugitive Dust Inhalation	1.E-09	5.E-10	6.E-10	1.E-10	6.E-11	7.E-11	-	8.E-09	4.E-09	4.E-09	2.E-09	8.E-10	9.E-10	-	NA	NA	NA	NA	NA	NA	-
Total ROPC Lifetime Cancer Risk	1.E-04	9.E-05	3.E-05	2.E-05	1.E-05	6.E-06	Ra-226	6.E-05	5.E-05	2.E-05	1.E-05	1.E-05	4.E-06	Ra-226	3.E-05	2.E-05	7.E-06	6.E-06	4.E-06	2.E-06	Ra-226
Total Lifetime Cancer Risk	1.E-04	9.E-05	3.E-05	2.E-05	1.E-05	6.E-06	Ra-226	6.E-05	5.E-05	2.E-05	1.E-05	1.E-05	4.E-06	Ra-226	3.E-05	2.E-05	7.E-06	6.E-06	4.E-06	2.E-06	Ra-226

Notes:

a) Residential cancer risks representative of an age-integrated child/adult receptor.

Bscr = ROC concentrations within this parcel are below screening levels for the receptor of concern.

NA = Not an applicable exposure route for the receptor of concern.

* If applicable, the two ROCs most significantly exceeding an incremental cancer risk of 1E-06 for each exposure pathway are identified.

Section 4

CONCLUSIONS AND RECOMMENDATIONS

4.1 INTRODUCTION

This section summarizes the investigation findings for the 2009 field work and recommends a path forward for the investigation of radionuclides in Off-Plant OU surface soils.

Section 4.2 below sets forth the 2009 radionuclide investigation conclusions, followed by site-specific findings/conclusions for the individual DUs that have been discussed throughout this report. The discussion for each DU is organized as follows: Nature and Extent of Contamination and Risks to Human Health.

Finally, Section 4.3 presents the recommendations based on the investigation findings.

4.2 CONCLUSIONS

4.2.1 General Conclusions

The results discussed in Section 3 corroborate the conclusion that elevated levels of radionuclides detected in surface soil samples collected in the DUs are the result of windblown dust and, to a lesser extent, stack emissions from the facilities.

This conclusion is supported by the fact that DUs located directly downwind from areas of the FMC and Simplot plant sites at which historic ore-handling operations occurred (i.e., DUs 2 and 8) are more heavily impacted by EMF facility-related constituents than DUs located either in an upwind (e.g., DUs 6 and 7) or cross-wind (e.g., DUs 1 and 3) direction. Additionally, surface soil impacts decrease with distance from the FMC and Simplot plant sites (i.e., concentrations in downwind areas DUs 4 and 5 are lower than those in DU 2), which further supports the conclusion that EMF impacts are related to the dispersion and deposition of facility air emissions.

4.2.2 Decision Unit 1

Nature and Extent of Contamination. The investigation findings for DU 1 indicate that sufficient radionuclide data have been collected to evaluate the nature of contamination associated with surficial impacts in this area. This entire DU is located within the external boundary of the Fort Hall Reservation. This DU has been disturbed by historical agricultural activities, which includes present-day application of sewage sludge from the City of Pocatello POTW, as discussed in Section 3.

DU 1 is located cross-wind to the prevailing wind direction in relation to the EMF facilities (see Figure 1-2). Potential impacts from deposition of EMF facility emissions have been characterized by the surface composite soil samples collected across the area

during the investigation. No constituents exceeded their respective residential or site worker CVs as discussed in Section 3.2.3.

Risk to Human Health. Risks to potential future residential and worker receptors in DU 1 are below a level of health concern, as documented by the fact that all of the soil radionuclide concentrations were found to be below their corresponding residential and site worker CVs in the initial screening evaluation.

4.2.3 Decision Unit 2

Nature and Extent of Contamination. The investigation findings for DU 2 indicate that sufficient radionuclide data have been collected to evaluate the nature of contamination associated with surficial impacts in this area. This entire DU is located within the external boundary of the Fort Hall Reservation. This DU has been disturbed by historical agricultural activities, which include present-day application of sewage sludge from the City of Pocatello POTW, as discussed in Section 3.

DU 2 is located in the prevailing downwind direction in relation to the EMF facilities (see Figure 1-2). Potential impacts from deposition of EMF facility emissions have been characterized by the surface composite soil samples collected across the area during the investigation. Two targeted radionuclides exceeded their respective residential CVs (radium-226 and lead-210), whereas only radium-226 exceeded its site worker CV, as discussed in Section 3.3.3. These constituents were further evaluated in the Supplemental Off-Plant OU HHRA as discussed below.

Risk to Human Health. A Supplemental Off-Plant OU HHRA was performed using conservative assumptions to evaluate risks to potential future human (residential and worker) receptors from exposure to ROCs in surface soil that were found to exceed CVs in the initial screening evaluation. The Supplemental Off-Plant OU HHRA report, which details the methods, assumptions and findings of the assessment, is included as Appendix D.

In summary, none of the receptors (residential or worker) evaluated in the Supplemental Off-Plant OU HHRA were found to be associated with RME cumulative lifetime cancer risks in excess of EPA's acceptable risk range. It is also noteworthy that the lifetime cancer risk associated with background comprises the majority (over 80%) of the total risk estimate.

4.2.4 Decision Unit 3

Nature and Extent of Contamination. Off-Plant OU findings for DU 3 indicate that sufficient information have been collected to evaluate the nature of contamination associated with surficial impacts in this area. This entire DU is located within the external boundary of the Fort Hall Reservation. This DU has been disturbed by historical agricultural activities which includes present-day application of sewage sludge by POTW as discussed in Section 3.

DU 3 is located crosswind in relation to the EMF facilities (see Figure 1-2). Potential impacts from deposition of EMF facility emissions have been characterized by the surface composite soil samples collected across the area during the investigation. No constituents exceeded their respective residential or site worker CVs or PRGs as discussed in Section 3.4.3.

Risk to Human Health. Risks to potential future residential and worker receptors in DU 3 are below a level of health concern, as documented by the fact that all of the soil radionuclide concentrations were found to be below their corresponding residential and site worker CVs in the initial screening evaluation.

4.2.5 Decision Unit 4

Nature and Extent of Contamination. The investigation findings for DU 4 indicate that sufficient radionuclide data have been collected to evaluate the nature of contamination associated with surficial impacts in this area. This entire DU is located on private property that includes agricultural or non-agricultural land as discussed in Section 3.0.

DU 4 is located downwind in relation to the EMF facilities (see Figure 1-2). Potential impacts from deposition of EMF facility emissions have been characterized by the surface composite soil samples collected across the area during the investigation. No constituents exceeded their respective residential or site worker CVs as discussed in Section 3.5.3.

Risk to Human Health. Risks to potential future residential and worker receptors in DU 4 are below a level of health concern, as documented by the fact that all of the soil radionuclide concentrations were found to be below their corresponding residential and site worker CVs in the initial screening evaluation.

4.2.6 Decision Unit 5

Nature and Extent of Contamination. The investigation findings for DU 5 indicate that sufficient radionuclide data have been collected to evaluate the nature of contamination associated with surficial impacts in this area. This entire DU is located on private property that includes agricultural, non-agricultural and residential land as discussed in Section 3.

DU 5 is located downwind in relation to the EMF facilities (see Figure 1-2). Potential impacts from deposition of EMF facility emissions have been characterized by the surface composite soil samples collected across the area during the investigation. No constituents exceeded their respective residential or site worker CVs as discussed in Section 3.6.3.

Risk to Human Health. Risks to potential future residential and worker receptors in DU 5 are below a level of health concern, as documented by the fact that all of the soil

radionuclide concentrations were found to be below their corresponding residential and site worker CVs in the initial screening evaluation.

4.2.7 Decision Unit 6

Nature and Extent of Contamination. The investigation findings for DU 6 indicate that sufficient radionuclide data have been collected to evaluate the nature of contamination associated with surficial impacts in this area. This entire DU is located within the external boundary of the Fort Hall Reservation. This DU includes non-agricultural sagebrush steppe used for grazing cattle and agricultural land used in the production of potatoes, wheat and/or hay.

DU 6 is located upwind to the prevailing wind direction in relation to the EMF facilities (see Figure 1-2). Potential impacts from deposition of EMF facility emissions have been characterized by the surface composite soil samples collected across the area during the investigation. No constituents exceeded their respective residential or site worker CVs as discussed in Section 3.7.3.

Risk to Human Health. Risks to potential future residential and worker receptors in DU 6 are below a level of health concern, as documented by the fact that all of the soil radionuclide concentrations were found to be below their corresponding residential and site worker CVs in the initial screening evaluation.

4.2.8 Decision Unit 7

Nature and Extent of Contamination. The investigation findings for DU 7 indicate that sufficient radionuclide data has been collected to evaluate the nature of contamination associated with surficial impacts in this area. This entire DU is located within the external boundary of the Fort Hall Reservation. This DU includes non-agricultural sagebrush steppe used for grazing cattle and agricultural land used in the production of potatoes, wheat and/or hay.

DU 7 is located upwind to the prevailing wind direction in relation to the EMF facilities (see Figure 1-2). Potential impacts from deposition of EMF facility emissions have been characterized by the surface composite soil samples collected across the area during the investigation. No constituents exceeded their respective residential or site worker CVs as discussed in Section 3.8.3.

Risk to Human Health. Risks to potential future residential and worker receptors in DU 7 are below a level of health concern, as documented by the fact that all of the soil radionuclide concentrations were found to be below their corresponding residential and site worker CVs in the initial screening evaluation.

4.2.9 Decision Unit 8

Nature and Extent of Contamination. The investigation findings for DU 8 indicate that sufficient radionuclide data have been collected to evaluate the nature of contamination associated with surficial impacts in this area. This entire DU is located on property owned by Simplot. This DU relatively undisturbed as discussed in Section 3.

DU 8 is located in the prevailing downwind direction in relation to the EMF facilities (see Figure 1-2). Potential impacts from deposition of EMF facility emissions have been characterized by the surface composite soil samples collected across the area during the investigation. One targeted radionuclide exceeded its respective residential and site worker CVs (radium-226), as discussed in Section 3.9.3. These constituents were further evaluated in the Supplemental Off-Plant OU HHRA as discussed below.

Risk to Human Health. A Supplemental Off-Plant OU HHRA was performed using conservative assumptions to evaluate risks to potential future human (residential and worker) receptors from exposure to ROCs in surface soil that were found to exceed CVs in the initial screening evaluation. The Supplemental Off-Plant OU HHRA report, which details the methods, assumptions and findings of the assessment, is included as Appendix D.

In summary, none of the receptors (residential or worker) evaluated in the Supplemental Off-Plant OU HHRA were found to be associated with RME cumulative lifetime cancer risks in excess of EPA's acceptable risk range. It is also noteworthy that the lifetime cancer risk associated with background comprises the majority (approximately 75%) of the total risk estimate.

4.3 RECOMMENDATIONS

The information presented in the conclusion section indicates that sufficient data have been collected to characterize radionuclide levels in surface soils within DUs 1 through 8. Moreover, potential human health risks associated with the measured radionuclide levels are below a level of concern in all 8 DUs.

Based on the above findings, the following conclusions/recommendations are made:

1. No further investigation of radionuclide soil levels is necessary in Off-Plant OU DUs 1 through 7 and Simplot Plant OU DU 8.
2. No additional investigation of radionuclide levels is necessary in other Off-Plant OU areas, since they are located further from the EMF facilities than the DUs evaluated in this report.

Section 5

REFERENCES

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