
FIELD SAMPLING PLAN ADDENDUM 5

WEST LAKE LANDFILL SUPERFUND SITE OPERABLE UNIT 1

Prepared For:

The United States Environmental Protection Agency Region VII



Prepared on Behalf of:

The West Lake Landfill OU-1 Respondents

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LIST OF ACRONYMS

ACRONYM	Definition
CDF	cumulative distribution function
DI	Design Investigation
DIWP	Design Investigation Work Plan
DMP	Data Management Plan
DOE	U.S. Department of Energy
DPT	direct push technology
EPA	U.S. Environmental Protection Agency
ft	foot/feet
FSP	Field Sampling Plan
GSMO	Geostatistical Modeling Objective
HSA	hollow stem auger
OU	Operable Unit
pCi/g	picocurie/gram
QAPP	Quality Assurance Project Plan
RIM	radiologically impacted material

1.0 ADDITIONAL BORINGS IN SUPPORT OF GEOSTATISTICAL MODELING

1.1 Introduction

This Field Sampling Plan (FSP) Addendum 5 Work Plan has been prepared on behalf of West Lake Landfill OU-1 Respondents Bridgeton Landfill, LLC, Cotter Corporation (N.S.L.), and the U.S. Department of Energy (DOE) (collectively, Respondents) for the design investigation for the selected Amended Remedy for Operable Unit-1 (OU-1) of the West Lake Landfill Superfund Site (Site). U.S. Environmental Protection Agency (EPA) approved (with modifications) the FSP, with the associated Design Investigation Work Plan (DIWP), Quality Assurance Project Plan (QAPP), and Data Management Plan (DMP) in September 2020. The final version of the FSP is dated October 16, 2020.

This Addendum 5 Work Plan has been prepared to present preliminary validation work that has been performed to compare the results from Design Investigation (DI) borings with the predictions of the previous geostatistical model, as well as to propose borings with the purpose of further refining the geostatistical model output and delineating areas of radiologically impacted material (RIM) greater than ($>$) 52.9 picocuries per gram (pCi/g). Newly proposed borings will be drilled, logged, and sampled using the procedures developed for interior borings, as prescribed in the FSP and referenced below.

1.2 Additional Interior Borings

Analytical results for soil boring samples obtained for both pre-DI and DI are depicted on Figure A5-1A (Area 1) and Figure A5-1B (Area 2). The symbology on both figures demonstrates the magnitude of activity concentrations for either combined thorium or combined radium, whichever was higher. These figures were used to aid in selection of the boring locations discussed below.

Twenty-one additional interior borings (seven borings in Area 1 and 14 borings in Area 2) are proposed to bound and/or further delineate the extent of RIM >52.9 pCi/g and further refine the geostatistical model output. The locations of these additional interior borings are shown on Figure A5-2A (Area 1) and Figure A5-2B (Area 2). These locations were selected based on visual analysis of spatial distribution of Pre-DI and DI borings with analytical results >52.9 pCi/g without a corresponding boring with analytical results <52.9 pCi/g within a general radius of 50 to 100 feet (ft).

Proposed additional borings will be drilled, logged, and sampled using the procedures prescribed for interior borings in the following sections of the FSP:

- Section 2.2.1 – Drilling Methods
- Section 2.4.1 – Soil Description
- Section 2.4.3.1 – Laboratory Analytical Sample Collection Strategy

Proposed borings will be installed to 20 ft below the 2005 ground surface using sonic drilling methods with 4-ft core runs. Boring details are shown in Table A5-1, including: proposed coordinates, target drill depth, number of laboratory samples, downhole/core scanning intervals, and rationale for boring placement.

1.3 Supplemental Sampling of Archived Soil Cores

From the DI perimeter subsurface soil samples results (samples collected in fall 2020) there are instances where composite samples resulted in concentrations >52.9 pCi/g (or near 52.9 pCi/g) and within 20 ft of the 2005 ground surface. These composite samples are likely biased low and will be resampled to allow for further definition of activity concentrations and the extent of RIM >52.9 pCi/g (Geostatistical Modeling Objective [GSMO] #3; DIWP). Supplemental grab samples are proposed from archived cores at the following locations/depths:

- A2-PB-147 (18-20 ft)
- A2-PB-153 (10-15 ft and 15-20 ft)
- A2-PB-156 (10-15 ft)

Samples will be collected in accordance with “SB” procedures outlined in Section 2.4.3 of the FSP and WS #11 of the QAPP, and will likely consist of two samples.

1.4 Data Integration into the Geostatistical Model

The analytical results from the Addendum 5 borings will be included in the geostatistical model kriging tasks without updating the regressions and cumulative distribution functions (CDFs). It is expected that the relatively small amount of additional data proposed for collection in this work plan is unlikely to result in significant change to the regressions and CDFs.

1.5 Proposed Schedule

The proposed schedule for this data evaluation is as follows:

Milestone	Target Schedule
EPA approval of Work Plan	30 days after submittal
Addendum 5 Drilling	2 weeks after approval

TABLES

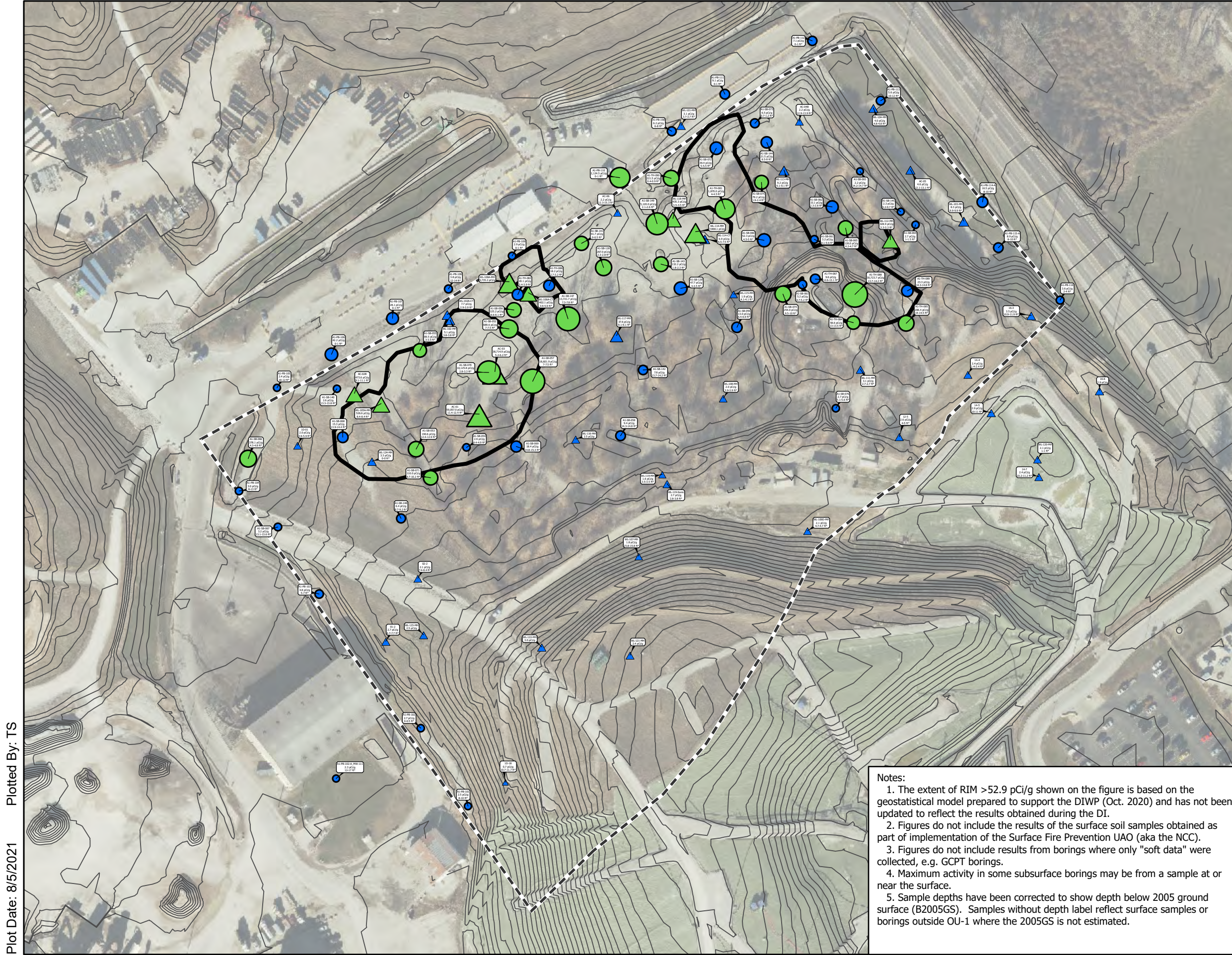
TABLE A5-1 PROPOSED BORING SAMPLE COLLECTION DETAIL

Area	Location ID	Northing (NAD83)	Easting (NAD83)	Estimated Total Boring Depth (feet B2005GS)	Total Laboratory Analytical Samples	Core Scan Interval (feet B2005GS)	Downhole Gamma Interval (feet B2005GS)	Rationale for Boring Placement
Area 1	A1-SB-158	1069021.43	836158.06	20	5	0 - 20	0 - 20	Verify the absence of RIM (>52.9 pCi/g) in an area where no boring currently exists
Area 1	A1-SB-159	1069209.43	836124.25	20	5	0 - 20	0 - 20	Confirm presence of RIM >52.9 within RIM area defined by model where no boring is present
Area 1	A1-SB-160	1069221.00	836339.23	20	5	0 - 20	0 - 20	Verify the absence of RIM (>52.9 pCi/g) in an area where no boring currently exists
Area 1	A1-SB-161	1069337.49	836393.58	20	5	0 - 20	0 - 20	Verify the absence of RIM (>52.9 pCi/g) in an area where no boring currently exists
Area 1	A1-SB-162	1069514.40	836533.52	20	5	0 - 20	0 - 20	Confirm presence of RIM >52.9 within RIM area defined by model where no boring is present
Area 1	A1-SB-163	1069315.88	836652.83	20	5	0 - 20	0 - 20	1) Verify the absence of RIM (>52.9 pCi/g) in an area where no boring currently exists 2) Confirm the edge of RIM along the boundary where the depth of RIM increases below the 16 ft below 2005 ground surface
Area 1	A1-SB-164	1069290.95	836851.99	20	5	0 - 20	0 - 20	1) Verify the absence of RIM (>52.9 pCi/g) in an area where no boring currently exists 2) Confirm the edge of RIM along the boundary where the depth of RIM increases below the 16 ft below 2005 ground surface
Area 2	A2-SB-165	1069469.57	835382.58	20	5	0 - 20	0 - 20	Verify the absence of RIM (>52.9 pCi/g) in an area where no boring currently exists
Area 2	A2-SB-166	1069667.51	835009.41	20	5	0 - 20	0 - 20	Confirm presence of RIM >52.9 within RIM area defined by model where no boring is present
Area 2	A2-SB-167	1069771.08	835129.62	20	5	0 - 20	0 - 20	Confirm presence of RIM >52.9 within RIM area defined by model where no boring is present
Area 2	A2-SB-168	1069906.19	835189.83	20	5	0 - 20	0 - 20	Verify the absence of RIM (>52.9 pCi/g) in an area where no boring currently exists
Area 2	A2-SB-169	1069875.05	835374.77	20	5	0 - 20	0 - 20	Verify the absence of RIM (>52.9 pCi/g) in an area where no boring currently exists
Area 2	A2-SB-170	1070204.78	835039.86	20	5	0 - 20	0 - 20	Verify the absence of RIM (>52.9 pCi/g) in an area where no boring currently exists
Area 2	A2-SB-171	1070459.02	834924.17	20	5	0 - 20	0 - 20	Confirm presence of RIM >52.9 within RIM area defined by model where no boring is present
Area 2	A2-SB-172	1070522.99	834746.31	20	5	0 - 20	0 - 20	Verify the absence of RIM (>52.9 pCi/g) in an area where no boring currently exists
Area 2	A2-SB-173	1070636.01	834694.83	20	5	0 - 20	0 - 20	Verify the absence of RIM (>52.9 pCi/g) in an area where no boring currently exists
Area 2	A2-SB-174	1070921.04	834900.40	20	5	0 - 20	0 - 20	Verify the absence of RIM (>52.9 pCi/g) in an area where no boring currently exists
Area 2	A2-SB-175	1070924.29	835116.90	20	5	0 - 20	0 - 20	Verify the absence of RIM (>52.9 pCi/g) in an area where no boring currently exists
Area 2	A2-SB-176	1070823.73	835299.24	20	5	0 - 20	0 - 20	Verify the absence of RIM (>52.9 pCi/g) in an area where no boring currently exists
Area 2	A2-SB-177	1070678.90	835526.40	20	5	0 - 20	0 - 20	Verify the absence of RIM (>52.9 pCi/g) in an area where no boring currently exists
Area 2	A2-SB-178	1070374.50	835422.72	20	5	0 - 20	0 - 20	Verify the absence of RIM (>52.9 pCi/g) in an area where no boring currently exists
TOTAL BORING/ SAMPLE COUNT	21	-	-	-	105	-	-	-

Notes:

1. Sample counts do not include QC samples
2. All sample counts are estimates and may vary based on field conditions (e.g. core recovery)

FIGURES



A2-SB-131 Boring ID
 2.2 pCi/g Maximum analytical result
 3-3.5 ft* Depth of maximum result (*ft B2005GS)

Maximum Activity <16 feet B2005GS

- < 52.9 pCi/g
- > 52.9 pCi/g

Pre-DI Subsurface Borings

Maximum Activity <16 feet B2005GS

- ▲ < 52.9 pCi/g
- ▲ > 52.9 pCi/g

Pre-DI Surface Samples (layer is off)

Maximum Activity <16 feet B2005GS

- < 52.9 pCi/g
- > 52.9 pCi/g

▬ RIM Boundary >52.9 pCi/g 0-16 feet B2005GS
 (at 50% probability of exceeding 52.9 pCi/g)

⋯ OU-1 Area Boundary

— Topography: 2021 Surface (2 ft contour interval)



PROJECT
 WEST LAKE LANDFILL SUPERFUND SITE
 OU-1 REMEDIAL DESIGN
 BRIDGETON, ST. LOUIS COUNTY, MO

PREPARED FOR
 WEST LAKE LANDFILL
 13570 ST. CHARLES ROCK ROAD
 BRIDGETON, MISSOURI 63044

FIGURE A5-1A

Area 1 DI and Pre-DI Analytical -
 Maximum Activity Less than 16 feet B2005GS
 Field Sampling Plan Addendum 5 Work Plan

PARSONS
 301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 • 315-451-9560

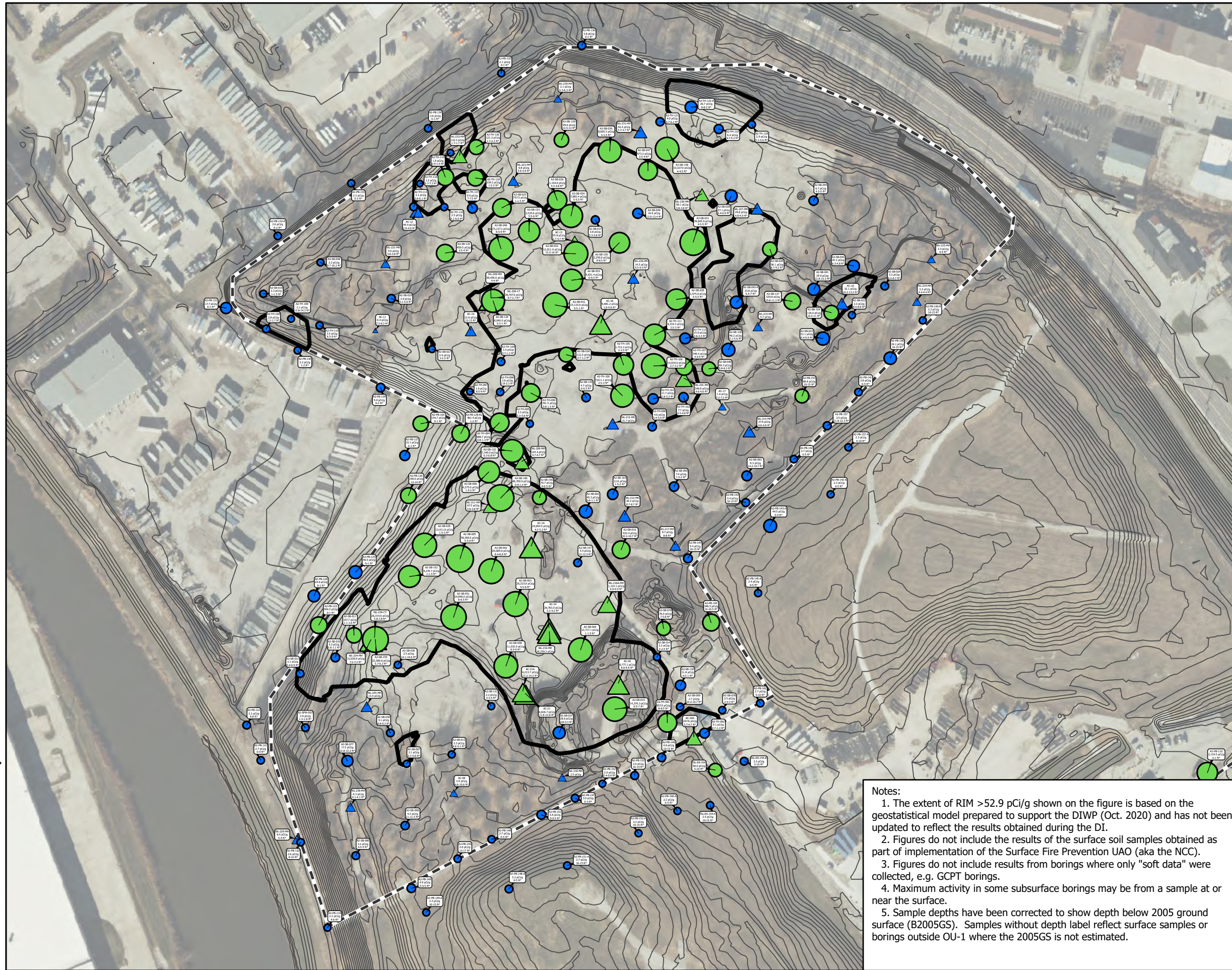
FEEZOR ENGINEERING 406 E WALNUT ST. CHATHAM, IL 62629
 217-483-3118

Notes:
 1. The extent of RIM >52.9 pCi/g shown on the figure is based on the geostatistical model prepared to support the DIWP (Oct. 2020) and has not been updated to reflect the results obtained during the DI.
 2. Figures do not include the results of the surface soil samples obtained as part of implementation of the Surface Fire Prevention UAO (aka the NCC).
 3. Figures do not include results from borings where only "soft data" were collected, e.g. GCPT borings.
 4. Maximum activity in some subsurface borings may be from a sample at or near the surface.
 5. Sample depths have been corrected to show depth below 2005 ground surface (B2005GS). Samples without depth label reflect surface samples or borings outside OU-1 where the 2005GS is not estimated.

Plotted By: TS

Plot Date: 8/5/2021

Plotted By: TS
Plot Date: 8/5/2021



A2-SB-131 Boring ID
2.2 pCi/g Maximum analytical result
3-3.5 ft* Depth of maximum result (*ft B2005GS)

DI Borings
Maximum Activity <16 feet B2005GS
● < 52.9 pCi/g
● > 52.9 pCi/g

Pre-DI Subsurface Borings
Maximum Activity <16 feet B2005GS
▲ < 52.9 pCi/g
▲ > 52.9 pCi/g

Pre-DI Surface Samples (layer is off)
Maximum Activity <16 feet B2005GS
■ < 52.9 pCi/g
■ > 52.9 pCi/g

▬ RIM Boundary >52.9 pCi/g 0-16 feet B2005GS
(at 50% probability of exceeding 52.9 pCi/g)

⋯ OU-1 Area Boundary

— Topography: 2021 Surface (2 ft contour interval)



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FIGURE A5-1B

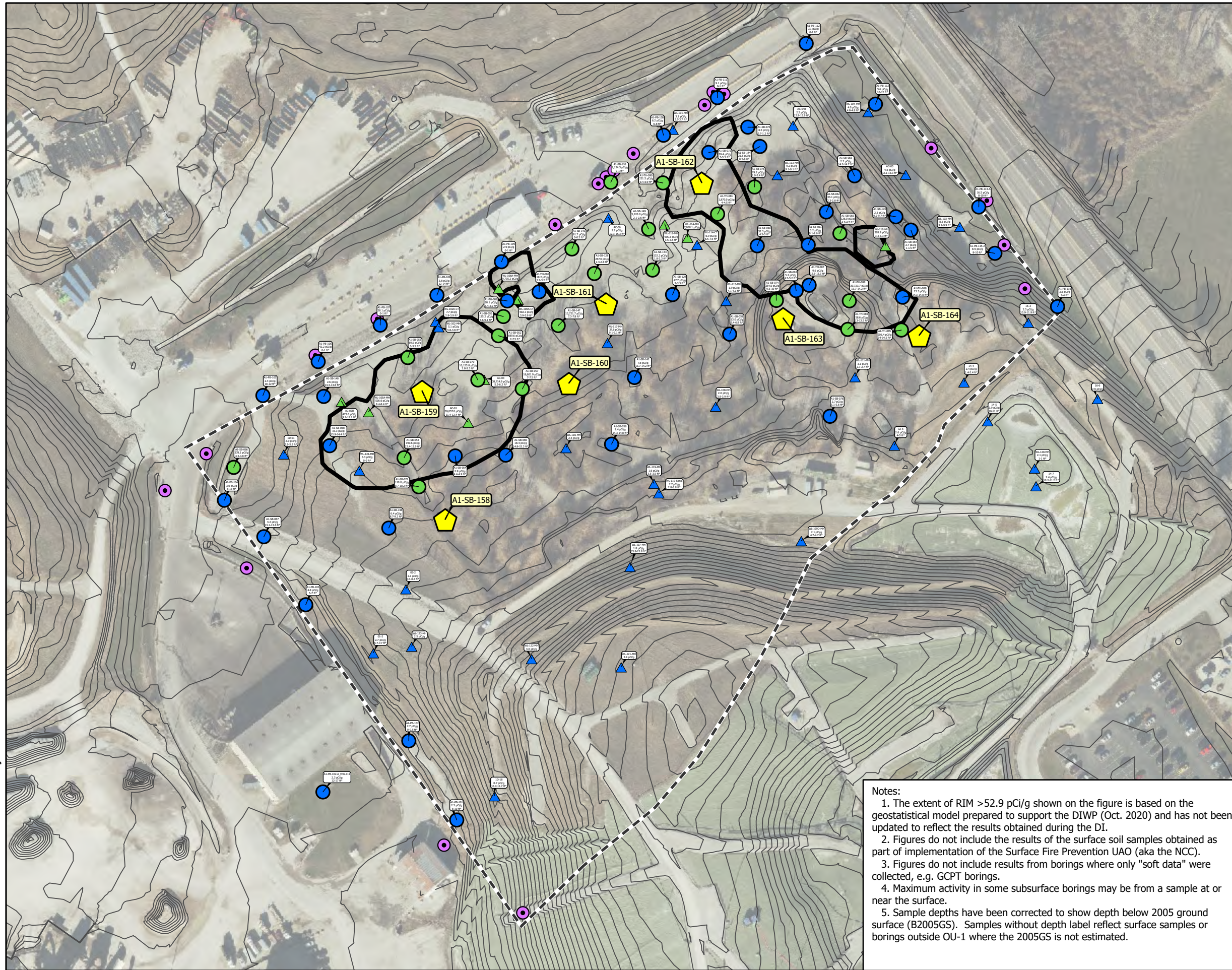
Area 2 DI and Pre-DI Analytical -
Maximum Activity Less than 16 feet B2005GS
Field Sampling Plan Addendum 5 Work Plan

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Plotted By: TS
Plot Date: 8/5/2021



A2-SB-131 Boring ID
2.2 pCi/g Maximum analytical result
3-3.5 ft* Depth of maximum result (*ft B2005GS)

Addendum 5 Proposed Borings

DI Borings

Maximum Activity <16 feet B2005GS

< 52.9 pCi/g

> 52.9 pCi/g

Addendum 3 Borings

Maximum Activity <16 feet B2005GS

< 52.9 pCi/g

> 52.9 pCi/g

Pre-DI Surface Samples (layer is off)

Maximum Activity <16 feet B2005GS

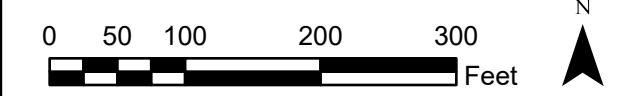
< 52.9 pCi/g

> 52.9 pCi/g

RIM Boundary >52.9 pCi/g 0-16 feet B2005GS
(at 50% probability of exceeding 52.9 pCi/g)

OU-1 Area Boundary

Topography: 2021 Surface (2 ft contour interval)



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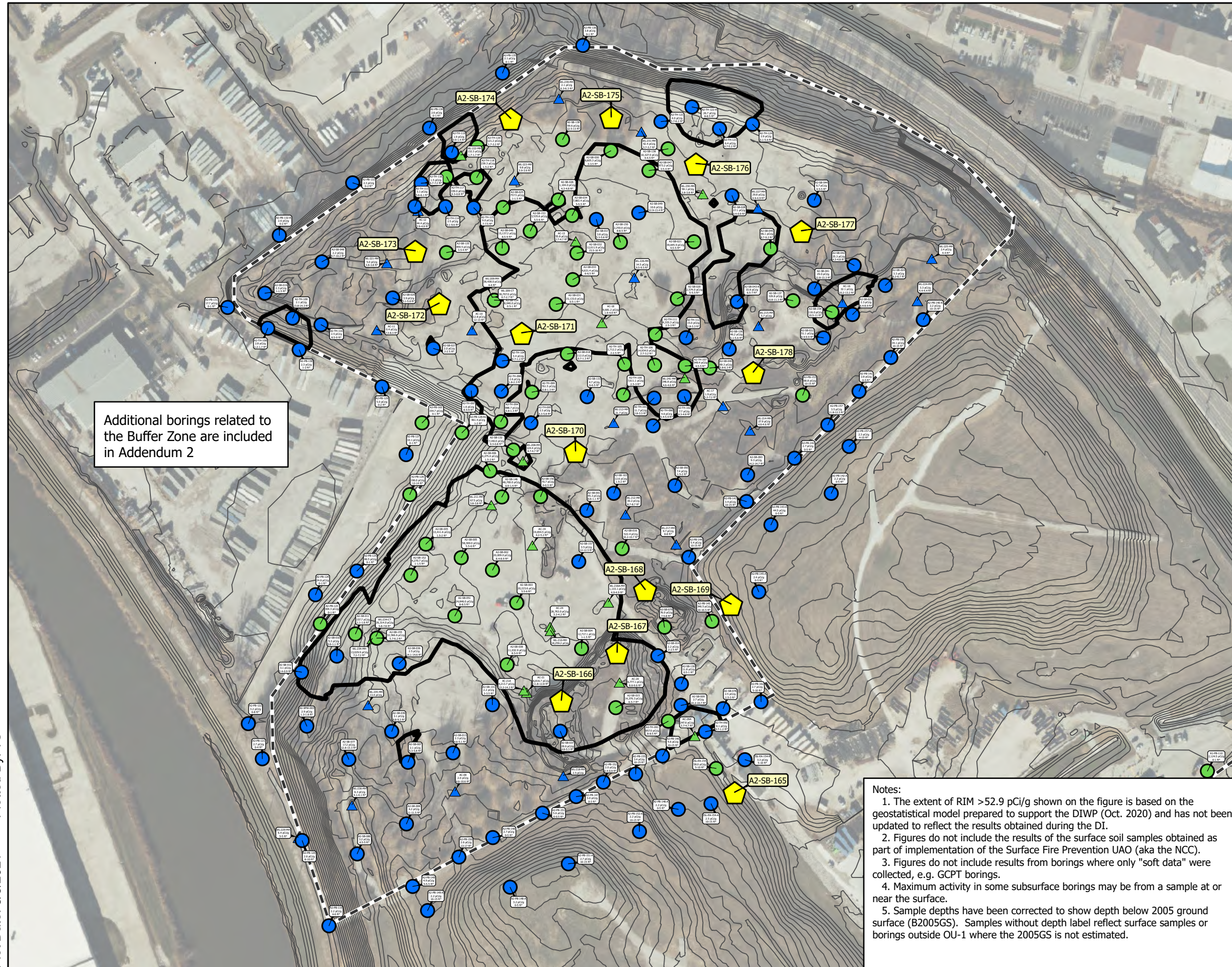
FIGURE A5-2A

Area 1 Additional Borings for Further
Refinement of the 52.9 RIM Boundary
Field Sampling Plan Addendum 5 Work Plan

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A2-SB-131 Boring ID
 2.2 pCi/g Maximum analytical result
 3-3.5 ft* Depth of maximum result (*ft B2005GS)

Yellow pentagon Addendum 5 Proposed Borings

DI Borings
 Maximum Activity <16 feet B2005GS
 Blue circle < 52.9 pCi/g
 Green circle > 52.9 pCi/g

Pre-DI Subsurface Borings
 Maximum Activity <16 feet B2005GS
 Blue triangle < 52.9 pCi/g
 Green triangle > 52.9 pCi/g

Pre-DI Surface Samples (layer is off)
 Maximum Activity <16 feet B2005GS
 Blue square < 52.9 pCi/g
 Green square > 52.9 pCi/g

Thick black line RIM Boundary >52.9 pCi/g 0-16 feet B2005GS (at 50% probability of exceeding 52.9 pCi/g)
 Dashed line OU-1 Area Boundary

Thin grey line Topography: 2021 Surface (2 ft contour interval)



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FIGURE A5-2B

Area 2 Additional Borings for Further Refinement of the 52.9 RIM Boundary Field Sampling Plan Addendum 5 Work Plan

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Plotted By: TS

Plot Date: 8/5/2021