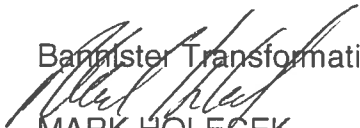




Department of Energy
National Nuclear Security Administration
Kansas City Field Office
14520 Botts Road
Kansas City, MO 64147



1 March, 2017

MEMORANDUM FOR: Bannister Transformation & Development LLC
FROM: 
MARK HOLECEK
FIELD OFFICE MANAGER
NATIONAL NUCLEAR SECURITY ADMINISTRATION
KANSAS CITY FIELD OFFICE
DEPARTMENT OF ENERGY
SUBJECT: Unrestricted Use/Unlimited Exposure Determination at Bannister
Federal Complex

The purpose of this memorandum is to document that residual uranium concentrations at the Bannister Federal Complex (BFC) meet unrestricted use/unlimited exposure (UU/UE) requirements. After consultation with the appropriate state and federal regulators, NNSA has determined that the risk from exposure to residual uranium concentration are within the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) target risk range of 1×10^{-4} to 1×10^{-6} , and institutional controls are not required at the BFC.

The U.S. Department of Energy's (DOE) National Nuclear Security Administration (NNSA) Kansas City Field Office (KCFO) is formally releasing 121 acres of DOE real property within the 227-acre tract of the BFC that lies west of the railroad tracks at the Kansas City Plant (KCP) in Kansas City, Missouri. Custody and control of this property is being combined with 106 acres at the BFC currently under the control of the General Services Administration (GSA) to be transferred to the Bannister Transition & Development LLC. Per the MDA 2014 authority, the surplus GSA-controlled land and improvements will be transferred to the NNSA immediately prior to the transfer of the combined property out of the Federal inventory. The analysis performed and conclusions drawn by the DOE-KCFO concerning the UU/UE determination for the property apply to the entire 227-acre portion of the BFC being transferred.

Records and analytical data have demonstrated that uranium metal, both natural and depleted, were processed at the BFC. To assess the potential impacts to hypothetical future human exposure to uranium in site soils, DOE compared soil sampling data to CERCLA risk-based preliminary remediation goals (PRGs) to determine if residual concentrations are within the target risk range of 10^{-4} to 10^{-6} . Note that the U.S. Environmental Protection Agency has defined the upper bound for the CERCLA risk range for radionuclides as 3×10^{-4} (EPA 2014). If residual concentrations are within (or below) the CERCLA target risk range for a conservative residential receptor (though the property is zoned for industrial use), DOE will conclude that the property receives a UU/UE designation.

The following describes the steps that lead to the UU/UE determination for uranium at the BFC. These steps include the estimate of background uranium concentrations, the estimate of residual uranium concentrations in potentially impacted soil, and the assessment of risk from net residual concentrations.

URANIUM IN BACKGROUND

Uranium is ubiquitous in soil, thus the assessment of risk also required the estimation of uranium in background soils (i.e., soils that have not been impacted by radiological operations). Table 1 presents a summary of surface soil and subsurface soil background data in units mg/kg, and the same data converted to natural uranium in units pCi/g. Natural abundance is assumed here given depleted or enriched uranium is only associated with man-made processes and are not expected in areas unassociated with process-related operations. The first/upper half of Table 1 presents summary statistics of soil data collected in the GSA portion of the Kansas City Plant. This area was selected for estimating background because the soil is presumed to be similar to that in the BFC portion of the property, and no record or evidence exists to suggest that the area was impacted by site radiological operations. Figure 1 (at the end of the main text) presents the location of all uranium samples from across the entire site, and Figure 2 presents only those samples in the GSA area used to estimate background concentrations.

The background data was divided into two populations: surface and subsurface soils. Surface is generally defined here as the top two feet below the ground surface, with subsurface soils defined as anything below the surface interval. However, some sample intervals cross over the 2-foot threshold. Therefore, any sample collected predominantly in the surface interval (i.e., 0.5-2.5 ft. below ground surface [bgs]) was placed in the surface population. Any sample collected predominantly in the subsurface interval (e.g., 1.5-3.5 ft. bgs) was placed in the subsurface population. Uranium data from each population were copied into ProUCL software (EPA 2013), and summary statistics were generated, as presented in Table 1. It is noted that a simple comparison of mean and median results can indicate whether the dataset suitably represents background conditions. For both surface and subsurface soil sample populations, average and median values are the same, as noted in Table 1. This comparison strongly suggests that the samples collected from the GSA area footprint are suitable for use as background.

The second/bottom half of Table 1 presents the same data converted from mg/kg to pCi/g using the conversion factor of 0.7, derived using the *Health Physics Manual of Good Practices for Uranium Facilities* (INEL 1988) rule of thumb for natural uranium. Once again, this data was copied into ProUCL to generate the summary statistics presented in Table 1. The upper 95% confidence interval on the mean concentration (UCL95s) in pCi/g units represents the background screening values for comparing site results. The UCL95 is considered for background because site residual concentrations (presented later in this document) are also presented as UCL95 values, human health risk estimates are presented for net (above background) concentrations, thus the subtraction will include the UCL95 of residual site concentrations minus UCL95 background concentrations (i.e., subtraction of like terms) Conversion to pCi/g is required because cancer risk is assessed considering uranium as a

radionuclide (in pCi/g) rather than a metal (in mg/kg). The 0.7 conversion factor (i.e., divide by 0.7 mg/kg per pCi/g) assumes that uranium in background is present in natural abundance.

To calculate UCL95 background, 103 surface and 171 subsurface samples were used. The surface concentrations ranged from 0.96 mg/kg (1.4 pCi/g) to 4.3 mg/kg (6.1 pCi/g). The subsurface concentrations ranged from 0.55 mg/kg (0.79 pCi/g) to 3.3 mg/kg (4.7 pCi/g). The UCL95 calculated background for surface and subsurface is 1.8 mg/kg (2.6 pCi/g) and 1.4 mg/kg (2.0 pCi/g), respectively.

Table 1. Summary of Surface and Subsurface Background Soil Data			
Uranium Data from the GSA Property (mg/kg)			
Parameter	Units	Surface Soil^a	Subsurface Soil^b
Observations	Unitless	103	177
Minimum	mg/kg	0.96	0.55
Maximum	mg/kg	4.3	3.3
Standard Deviation	mg/kg	0.48	0.41
Mean	mg/kg	1.7	1.3
Median	mg/kg	1.7	1.3
UCL95	mg/kg	1.8	1.4
Uranium Data from the GSA Property (pCi/g)			
Parameter	Units	Surface Soil^a	Subsurface Soil^b
Observations	Unitless	103	177
Minimum	pCi/g	1.4	0.79
Maximum	pCi/g	6.1	4.7
Standard Deviation	pCi/g	0.7	0.59
Mean	pCi/g	2.5	1.9
Median	pCi/g	2.5	1.9
UCL95	pCi/g	2.6	2.0

^aSurface soils are 0-2 ft.

^bSubsurface soils are >2 ft.

RESIDUAL URANIUM CONCENTRATIONS

Over 1,800 uranium samples have been collected across the BFC, primarily through the collection of soil borings (See Figure 1). Sampling results from a ~1,500 sq. ft. area east of Building 59 exhibited low-level, isolated concentrations above the background values listed in Table 1. This area, pictured in Figure 3, was extensively sampled and has been shown to contain residual concentrations in excess of background concentrations and is, therefore, the focus of this discussion. Figure 4 shows the Building 59 area relative to GSA area where the background dataset was collected.

Available data from the Building 59 area includes a combination of results reported in mg/kg or pCi/g. As with the background dataset, mg/kg results were converted to pCi/g. This time a more conservative conversion factor of 0.49 (multiply by 0.49 pCi/g per mg/kg) for depleted uranium was used. Depleted is considered here to be conservative because, as will be

presented later in this document, depleted uranium PRGs are lower (i.e., more restrictive) than natural uranium PRGs. The dataset also includes a combination of random and bias samples (i.e., non-random, often collected to investigate field measurements) that are not equally weighted. For example, three exploratory trenches were excavated, and at least twelve discrete samples were collected from the face of each excavation. Discrete samples from each excavation were, therefore, averaged so the associated results could be included with random samples with equal weighting.

As with the background data, the Building 59 area samples were divided in surface and subsurface intervals using the aforementioned rules. Doing so allows for direct comparison of depth-specific results from potentially impacted and background soils. Table 2 presents summary statistics from the Building 59 area soils.

Parameter	Units	Surface Soil^a	Subsurface Soil^b
Observations	Unitless	43	12
Minimum	pCi/g	0.58	0.19
Maximum	pCi/g	18.28	15.32
Standard Deviation	pCi/g	3.59	4.18
Mean	pCi/g	2.42	2.75
Median	pCi/g	0.88	1.13
UCL95	pCi/g	4.80	8.00

^aSurface soils are 0-2 ft.

^bSubsurface soils are >2 ft.

RISK FROM RESIDUAL URANIUM

To estimate human health risk, DOE-KCFO used the on-line PRG Calculator to generalize the values presented in Table 3. The PRG Calculator inputs used to generate the Table 3 results are presented in Attachment 1, including the input variable name and associated units, the values used, and default. Note that most inputs are default values. The exception is to account for region-specific environmental conditions, including the selection climate zone 5 and a mean wind speed of 4.65 m/s (compared to the default of 4.69 m/s). The calculator generates values for individual isotopes, specifically uranium-234, -235, and -238, which were combined to generate total uranium values for comparison to background and Building 59 area results. Values for natural and depleted uranium under varying risk levels are given in Table 3 and are rounded by two significant digits.

Risk estimates are calculated in excess of that generated by background concentrations (i.e., calculations exclude the risk from background concentrations). Because risk and concentration are directly proportional, risk from residual concentrations can be estimated as follows:

$$Residual Risk = (UCL95_C - UCL95_B) \times \left(\frac{Risk Level}{PRG} \right) \quad Eq. 1$$

Where:

$UCL95_C$ is the depth-interval-specific value for the Building 59 area (pCi/g),
 $UCL95_B$ is the depth-interval-specific value for the background area (pCi/g),
Risk Level is the selected risk from Table 3 (unitless), and
PRG is Table 3 value that corresponds to the associated *Risk Level* (pCi/g).

Table 3. BFC PRG Values				
PRG Calculator Values (pCi/g)				
Nuclide	1E-06	1E-05	1E-04	3E-04
Uranium-234	0.064	0.64	6.4	19
Uranium-235	0.051	0.51	5.1	15
Uranium-238	0.048	0.48	4.8	14
U (Natural)	0.055	0.55	5.5	16
U (Depleted)	0.052	0.52	5.2	16

PRG values from: https://epa-prgs.ornl.gov/cgi-bin/radionuclides/rprg_search

Table 4 presents the human health risk estimate by depth interval. The results show a net surface soil concentration of 2.2 pCi/g corresponds to a lifetime risk of 4×10^{-5} , and a net subsurface soil concentration of 6.0 pCi/g corresponds to a lifetime risk of 1×10^{-4} . Both risk levels are within the CERCLA target risk range of 10^{-4} to 10^{-6} .

Table 4. Surface and Subsurface Background Risk Estimates			
Uranium Data from the GSA Property (mg/kg)			
Parameter	Units	Surface Soil	Subsurface Soil
$UCL95_C$ (Gross Concentration)	pCi/g	4.3	8.0
$UCL95_B$ (Background)	pCi/g	2.6	2.0
Net Concentration	pCi/g	2.2	6.0
Risk Estimate	Lifetime ⁻¹	4E-05	1E-04

Due to the low concentrations of residual uranium in site soils, the data supports the conclusion that the concentrations at BFC are below levels that would be of concern for human health and the environment. As a result, the BFC will not require institutional controls for uranium in soil even when conservatively considering hypothetical residential future-use scenarios. Based on the evaluations conducted, the levels support a UU/UE determination for uranium.

CONCLUSION

DOE-KCFO has thoroughly investigated and evaluated the BFC in accordance with normal DOE mandates and all applicable standards for transfer of areas associated with radiological activities conducted under the control of DOE. These reports and material support the conclusion that the UU/UE determination for uranium at the BFC presented here is scientifically valid and meets EPA target risk range requirements. As a result, the site does not require institutional controls and is fully protective of the public and the environment.

Attachments:

1. PRG Calculator Input Values
- 2-1. GSA Area Surface Soil Uranium Data
- 2-2. GSA Area Subsurface Soil Uranium Data
3. Building 59 Area Uranium Results

The POC for this project is Kingsley Edwards. He can be contacted at 816-488-4200 or Kingsley.Edwards@nnsa.doe.gov.

Email cc:

Andy Gibler, KCFO
Albert Guarino, KCFO
Sybil Chandler, KCFO
Ralph Tennant, KCFO
Hilary Cole, KCFO
Kingsley Edwards, KCFO
Joseph F. Waddell, NA-APM
Barbara H. Stearrett, NA-APM
David McNeil, NNSA HQ
Bill Mayers, NNSA HQ

REFERENCES

INEL 1988. *Health Physics Manual of Good Practices for Uranium Facilities*. EEG-2530. Idaho National Engineering Laboratory. Idaho Falls, Idaho. June.

EPA 2013. *ProUCL Version 5.0.00 User Guide - Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations*, EPA/600/R-07/041. U.S. Environmental Protection. Office of Research and Development. September.

EPA 2014. *Radiation Risk Assessment at CERLCA Sites: Q & A*, U.S. Environmental Protection Directive 9200.4-20m. Office of Superfund Remediation and Technological Innovation. May.

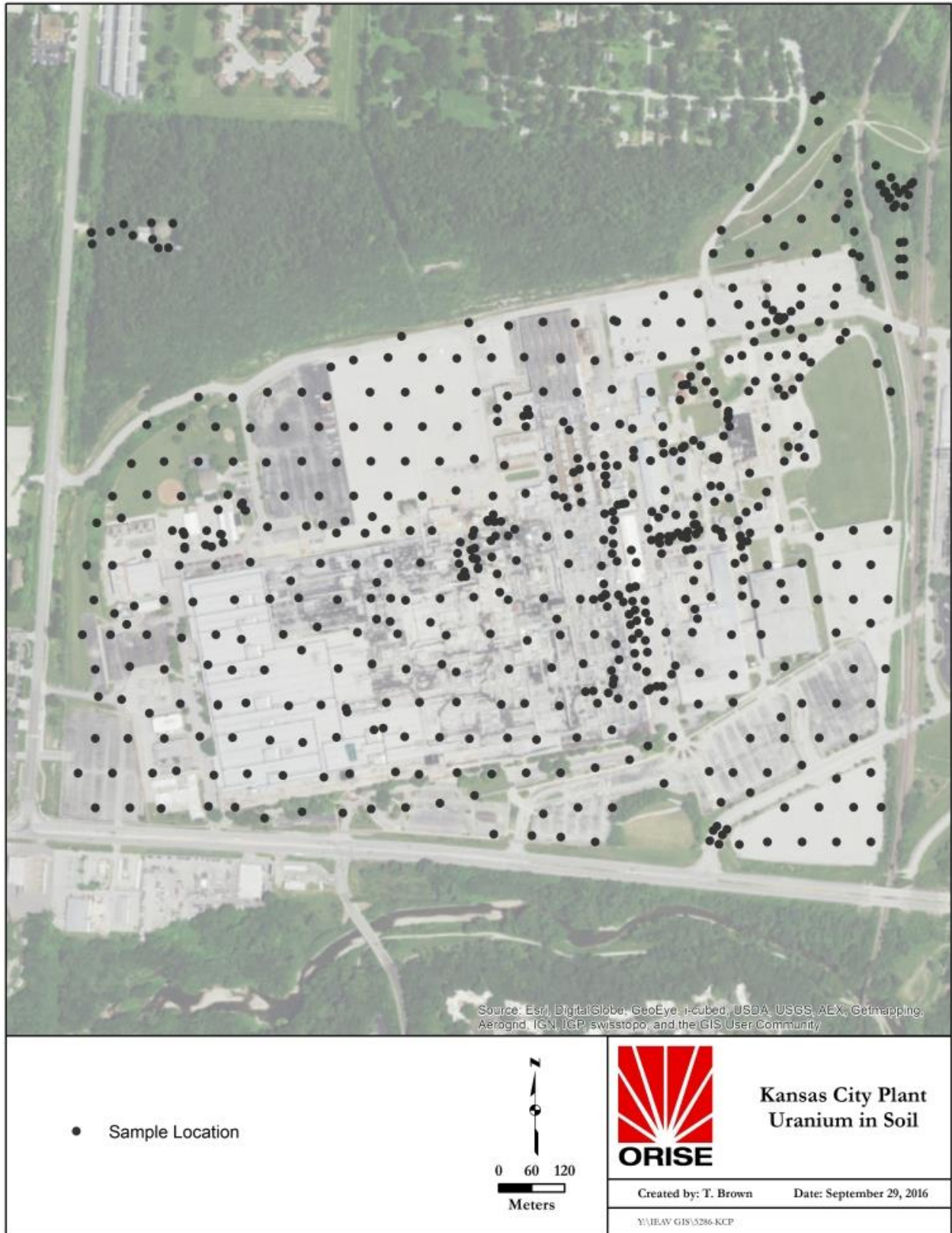


Figure 1. Location of Site-Wide Uranium Samples

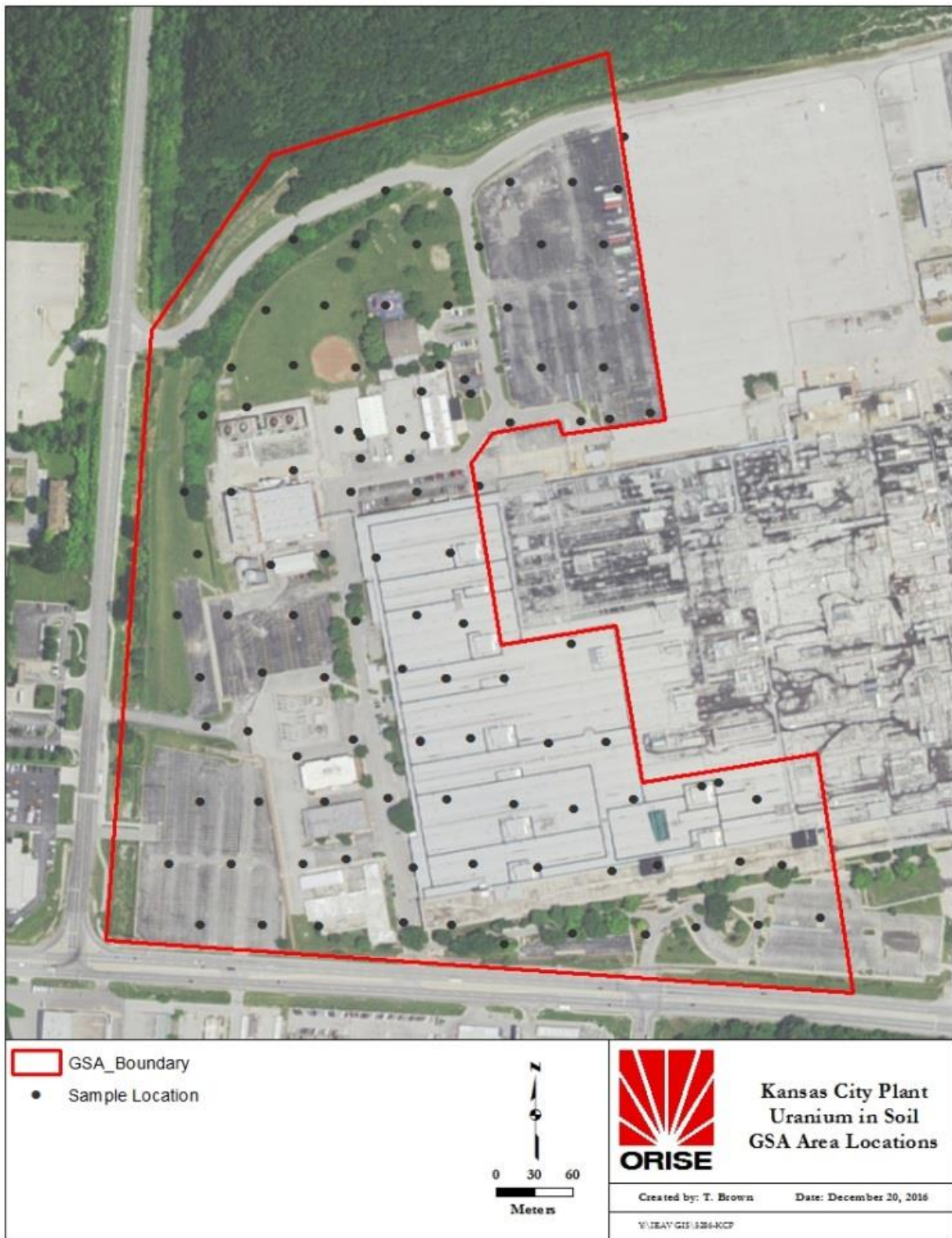


Figure 2. GSA Area and Background Sample Location



Figure 3. BFC Impacted Soils Area and Soil Sample Locations

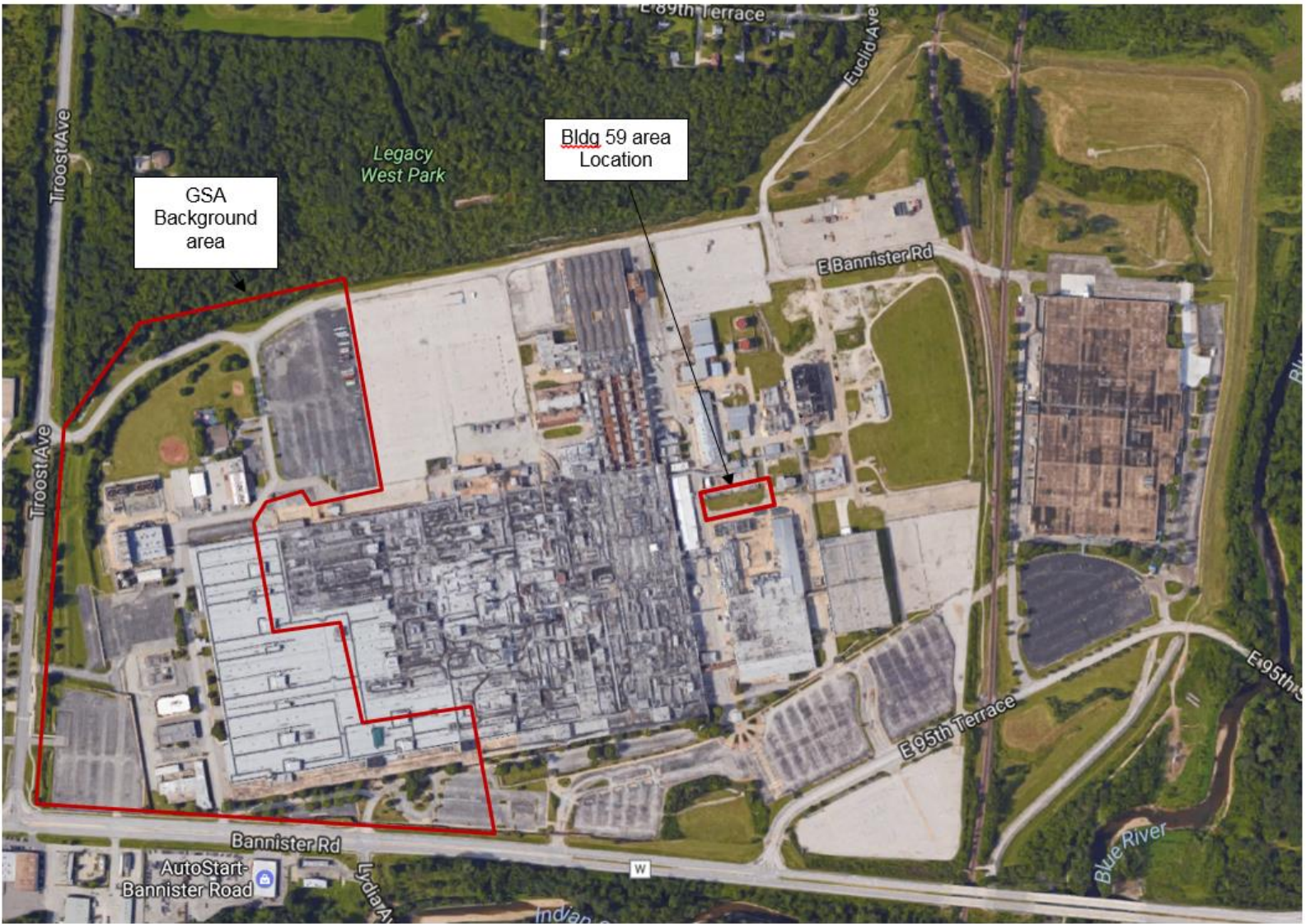


Figure 4. Background and Building 59 Area Boundaries at the Bannister Federal Complex

ATTACHMENT 1
PRG CALCULATOR INPUT VALUES

PRG Calculator Input Variable Name with Units	Value	Default
TR (target cancer risk) unitless	0.000001	0.000001
t _{res} (time - resident) yr	26	26
ED _{res} (exposure duration - resident) yr	26	26
ET _{res} (exposure time - resident) hr/day	24	24
ET _{res-c} (exposure time - resident child) hr/day	24	24
ET _{res-a} (exposure time - resident adult) hr/day	24	24
ET _{res-i} (exposure time - indoor resident) hr/day	16.416	16.416
ET _{res-o} (exposure time - outdoor resident) hr/day	1.752	1.752
ED _{res-c} (exposure duration - resident child) yr	6	6
ED _{res-a} (exposure duration - resident adult) yr	20	20
EF _{res} (exposure frequency - resident) day/yr	350	350
EF _{res-c} (exposure frequency - resident child) day/yr	350	350
EF _{res-a} (exposure frequency - resident adult) day/yr	350	350
IRS _{res-a} (soil intake rate - resident adult) mg/day	100	100
IRS _{res-c} (soil intake rate - resident child) mg/day	200	200
IRA _{res-a} (inhalation rate - resident adult) m ³ /day	20	20
IRA _{res-c} (inhalation rate - resident child) m ³ /day	10	10
IFS _{res-adj} (age-adjusted soil ingestion factor - resident) mg	1120000	1120000
IFA _{res-adj} (age-adjusted soil inhalation factor - resident) m ³	161000	161000
GSF _i (gamma shielding factor - indoor) unitless	0.4	0.4
MLF _{produce} (produce plant mass loading factor) unitless	0.26	0.26
Slab size for ACF (area correction factor) m ²	2000	Default
Cover thickness for GSF (gamma shielding factor) cm	0	Default
IRV _{res-a} (vegetable consumption rate - resident adult) g/day	128.9	128.9
IRV _{res-c} (vegetable consumption rate - resident child) g/day	41.7	41.7
IFV _{res-adj} (age-adjusted vegetable ingestion factor - resident) g	989870	989870
IFF _{res-adj} (age-adjusted fruit ingestion factor - resident) g	1462510	1462510
IRF _{res-a} (fruit consumption rate - resident adult) g/day	188.5	188.5
IRF _{res-c} (fruit consumption rate - resident child) g/day	68.1	68.1
CF _{res-produce} (contaminated plant fraction) unitless	0.25	0.25
TR (target cancer risk) unitless	0.000001	0.000001
ED _{res-c} (exposure duration - resident child) yr	6	6
ED _{res-a} (exposure duration - resident adult) yr	20	20
EF _{res-c} (exposure frequency - resident child) day/yr	350	350
EF _{res-a} (exposure frequency - resident adult) day/yr	350	350
City (Climate Zone)	5	Default
A _s (acres)	0.5	0.5
Q/C _{wp} (g/m ² -s per kg/m ³)	71.39908	93.77
PEF (particulate emission factor) m ³ /kg	1.13E+09	1.36E+09
A (PEF Dispersion Constant)	12.4964	16.2302

PRG Calculator Input Variable Name with Units	Value	Default
B (PEF Dispersion Constant)	18.4476	18.7762
C (PEF Dispersion Constant)	210.2128	216.108
V (fraction of vegetative cover) unitless	0.5	0.5
U_m (mean annual wind speed) m/s	4.65	4.69
U_t (equivalent threshold value)	11.32	11.32
F(x) (function dependant on U_m/U_t) unitless	0.182	0.194

Output generated 05OCT2016:11:58:57

ATTACHMENT 2-1

GSA AREA SURFACE SOIL URANIUM DATA

Attachment 2-1. GSA Area Surface Soil Uranium Data

Location ID	Easting	Northing	Start Depth (ft)	End Depth (ft)	Result (mg/kg)	Result (pCi/g)
CP-019-A	2767190.9	1015500.6	0.0	2.0	1.50	0.53
CP-019-A	2767190.9	1015500.6	0.0	2.0	1.29	0.45
CP-022-A	2767670.5	1015455.2	0.0	2.0	1.26	0.44
CP-023-A	2767845.0	1015483.0	0.0	2.0	2.14	0.75
CP-024-A	2768034.0	1015478.0	0.0	2.0	2.02	0.71
CP-024-A	2768034.0	1015478.0	0.0	2.0	2.09	0.73
CP-138-A	2766825.0	1016303.0	0.0	2.0	1.73	0.61
CP-163-A	2766878.0	1016463.0	0.0	2.0	1.18	0.41
CP-186-A	2766846.0	1016623.0	0.0	2.0	1.71	0.60
CP-210-A	2767006.1	1016841.6	0.0	2.0	1.77	0.62
CP-210-A	2767006.1	1016841.6	0.0	2.0	2.00	0.70
CP-230-A	2766965.0	1016943.0	0.0	2.0	1.73	0.61
CP-230-A	2766965.0	1016943.0	0.0	2.0	1.62	0.57
CP-231-A	2767125.0	1016950.0	0.0	2.0	2.35	0.82
CP-233-A	2767501.5	1016948.9	0.0	2.0	1.77	0.62
CP-251-A	2767054.0	1017093.0	0.0	2.0	1.89	0.66
CP-252-A	2767205.0	1017103.0	0.0	2.0	1.57	0.55
CP-254-A	2767525.0	1017103.0	0.0	2.0	1.32	0.46
CP-269-A	2767125.0	1017274.0	0.0	2.0	1.37	0.48
CP-269-A	2767125.0	1017274.0	0.0	2.0	1.93	0.68
CP-270-A	2767285.0	1017263.0	0.0	2.0	1.20	0.42
CP-271-A	2767445.0	1017263.0	0.0	2.0	1.72	0.60
CP-272-A	2767605.0	1017257.0	0.0	2.0	1.74	0.61
CP-287-A	2767365.0	1017401.0	0.0	2.0	2.62	0.92
CP-288-A	2767525.0	1017398.0	0.0	2.0	1.65	0.58
CP-253-A	2767365.0	1017103.0	0.3	2.3	1.72	0.60
CP-046-A	2767946.2	1015643.9	0.5	2.5	1.95	0.68
CP-046-A	2767946.2	1015643.9	0.5	2.5	1.92	0.67
CP-048-A	2768278.5	1015666.9	0.5	2.5	1.38	0.48
CP-048-A	2768278.5	1015666.9	0.5	2.5	1.36	0.48
CP-289-A	2767685.0	1017423.0	0.5	2.5	1.95	0.68
CP-4502-A(0-2)	2767456.3	1016880.6	0.5	2.5	1.72	0.60
CP-049-A	2768387.1	1015657.3	0.5	2.5	1.46	0.51
CP-049-A	2768387.1	1015657.3	0.5	2.5	1.34	0.47
CP-121-A	2767842.3	1016230.8	0.5	2.5	1.07	0.37
CP-121-A	2767842.3	1016230.8	0.5	2.5	0.97	0.34
CP-047-A	2768065.1	1015659.6	0.6	2.6	1.42	0.50
CP-047-A	2768065.1	1015659.6	0.6	2.6	1.49	0.52
CP-118-A	2767407.5	1016164.0	0.6	2.6	2.77	0.97
CP-118-A	2767407.5	1016164.0	0.6	2.6	1.31	0.46
CP-021-A	2767533.2	1015504.8	0.7	2.7	1.57	0.55
CP-021-A	2767533.2	1015504.8	0.7	2.7	1.76	0.62
CP-4505-A(0-2)	2767426.0	1016708.9	0.7	2.7	1.74	0.61
CP-1802-A(0-2)	2767961.9	1017402.6	0.7	2.7	1.96	0.69
CP-093R-A	2767453.9	1015979.2	0.7	2.7	2.04	0.71
CP-166-A	2767338.3	1016453.9	0.7	2.7	1.30	0.46

Attachment 2-1. GSA Area Surface Soil Uranium Data

Location ID	Easting	Northing	Start Depth (ft)	End Depth (ft)	Result (mg/kg)	Result (pCi/g)
CP-070-A	2767847.2	1015803.8	0.8	2.8	1.80	0.63
CP-069-A	2767695.5	1015815.2	0.8	2.8	1.83	0.64
CP-096-A	2767933.3	1015977.8	0.8	2.8	2.04	0.71
CP-120R-A	2767669.8	1016139.1	0.8	2.8	2.53	0.89
CP-094-A	2767584.6	1015987.2	0.8	2.8	2.25	0.79
CP-094-A	2767584.6	1015987.2	0.8	2.8	2.62	0.92
CP-140-A	2767125.0	1016303.0	0.8	2.8	1.80	0.63
CP-140-A	2767125.0	1016303.0	0.8	2.8	2.01	0.70
CP-141-A	2767285.0	1016288.0	0.8	2.8	1.53	0.54
CP-141-A	2767285.0	1016288.0	0.8	2.8	1.56	0.55
CP-211R-A	2767292.0	1016777.9	0.8	2.8	1.37	0.48
CP-211R-A	2767292.0	1016777.9	0.8	2.8	2.60	0.91
CP-4502R-A(0-2)	2767456.3	1016880.6	0.8	2.8	1.09	0.38
CP-1602-A(0-2)	2768045.6	1016826.6	0.8	2.8	1.78	0.62
CP-1801-A(0-2)	2767979.0	1017538.7	0.8	2.8	2.12	0.74
CP-4501-A(0-2)	2767583.4	1016875.8	0.8	2.8	1.46	0.51
CP-4507-A(0-2)	2767568.8	1016911.4	0.8	2.8	1.84	0.64
CP-068-A	2767522.1	1015827.5	0.9	2.9	2.00	0.70
CP-071-A	2768004.4	1015828.2	0.9	2.9	1.85	0.65
CP-232-A	2767285.0	1016943.0	0.9	2.9	1.55	0.54
CP-095-A	2767783.1	1015974.4	0.9	2.9	2.26	0.79
CP-167-A	2767531.7	1016464.5	0.9	2.9	1.67	0.58
CP-167-A	2767531.7	1016464.5	0.9	2.9	1.88	0.66
CP-072R-A	2768221.3	1015870.7	1.0	3.0	1.64	0.57
CP-072R-A	2768221.3	1015870.7	1.0	3.0	1.12	0.39
CP-072-A	2768179.4	1015862.0	1.0	3.0	1.39	0.49
CP-073-A	2768321.2	1015829.9	1.0	3.0	2.50	0.88
CP-119R-A	2767520.7	1016139.5	1.0	3.0	1.52	0.53
CP-025-A	2768165.0	1015497.0	1.0	3.0	1.19	0.42
CP-041-A	2767150.0	1015663.0	1.0	3.0	2.44	0.85
CP-042-A	2767260.8	1015673.5	1.0	3.0	1.57	0.55
CP-065-A	2767037.0	1015823.0	1.0	3.0	4.29	1.50
CP-066-A	2767205.0	1015823.0	1.0	3.0	1.71	0.60
CP-066-A	2767205.0	1015823.0	1.0	3.0	1.55	0.54
CP-089-A	2766900.0	1016017.0	1.0	3.0	1.17	0.41
CP-090-A	2767007.0	1016003.0	1.0	3.0	2.22	0.78
CP-091-A	2767135.6	1015939.6	1.0	3.0	1.99	0.70
CP-092-A	2767280.0	1015983.0	1.0	3.0	1.26	0.44
CP-115-A	2766885.0	1016143.0	1.0	3.0	1.38	0.48
CP-115-A	2766885.0	1016143.0	1.0	3.0	1.37	0.48
CP-116-A	2767045.0	1016156.0	1.0	3.0	1.47	0.51
CP-117-A	2767205.0	1016143.0	1.0	3.0	1.44	0.50
CP-139-A	2766955.0	1016303.0	1.0	3.0	1.25	0.44
CP-142-A	2767445.0	1016303.0	1.0	3.0	0.99	0.35
CP-164-A	2767065.8	1016434.8	1.0	3.0	1.22	0.43
CP-190-A	2767445.0	1016623.0	1.0	3.0	1.69	0.59

Attachment 2-1. GSA Area Surface Soil Uranium Data

Location ID	Easting	Northing	Start Depth (ft)	End Depth (ft)	Result (mg/kg)	Result (pCi/g)
CP-190-A	2767445.0	1016623.0	1.0	3.0	1.37	0.48
CP-212-A	2767685.0	1016800.0	1.0	3.0	1.62	0.57
CP-235-A	2767765.0	1016943.0	1.0	3.0	1.86	0.65
CP-236-A	2767925.0	1016943.0	1.0	3.0	1.55	0.54
CP-255-A	2767680.0	1017098.0	1.0	3.0	1.98	0.69
CP-256-A	2767845.0	1017103.0	1.0	3.0	1.74	0.61
CP-257-A	2768005.0	1017098.0	1.0	3.0	2.29	0.80
CP-273-A	2767765.0	1017263.0	1.0	3.0	2.05	0.72
CP-274-A	2767925.0	1017263.0	1.0	3.0	2.34	0.82
CP-290-A	2767845.0	1017423.0	1.0	3.0	0.96	0.34
CP-1601-A(0-2)	2767941.6	1016809.9	1.0	3.0	2.76	0.97

ATTACHMENT 2-2

GSA AREA SUBSURFACE SOIL URANIUM DATA

Attachment 2-2. GSA Area Subsurface Soil Uranium Data

Location ID	Easting	Northing	Start Depth (ft)	End Depth (ft)	Result (mg/kg)	Result (pCi/g)
CP-045-A	2767756.1	1015651.3	1.1	3.1	1.76	0.62
CP-143-A	2767564.0	1016281.2	1.2	3.2	0.90	0.31
CP-044-A	2767590.3	1015660.7	1.2	3.2	1.33	0.47
CP-039-A	2766805.0	1015663.0	1.3	3.3	1.48	0.52
CP-187-A	2766965.0	1016623.0	1.3	3.3	1.96	0.69
CP-188-A	2767125.0	1016678.0	1.3	3.3	1.68	0.59
CP-209-A	2766892.0	1016819.0	1.4	3.4	1.32	0.46
CP-040-A	2766965.0	1015663.0	1.5	3.5	1.87	0.65
CP-040-A	2766965.0	1015663.0	1.5	3.5	1.72	0.60
CP-043-A	2767435.0	1015653.0	1.5	3.5	1.75	0.61
CP-067-A	2767370.0	1015833.0	1.5	3.5	1.23	0.43
CP-165-A	2767205.0	1016463.0	1.5	3.5	1.42	0.50
CP-020-A	2767410.0	1015509.0	1.7	3.7	1.89	0.66
CP-064-A	2766885.0	1015823.0	1.7	3.7	1.34	0.47
CP-191-A	2767605.0	1016638.0	1.7	3.7	1.35	0.47
CP-211-A	2767243.0	1016783.0	1.7	3.7	2.25	0.79
CP-4503-A(0-2)	2767466.2	1016768.1	1.7	3.7	1.66	0.58
CP-017-A	2766885.0	1015503.0	2.0	4.0	1.43	0.50
CP-017-A	2766885.0	1015503.0	2.0	4.0	1.46	0.51
CP-018-A	2767045.0	1015503.0	2.0	4.0	1.28	0.45
CP-213-A	2767866.2	1016804.2	2.2	4.2	2.02	0.71
CP-189-A	2767275.0	1016623.0	2.3	4.3	1.89	0.66
CP-189-A	2767275.0	1016623.0	2.3	4.3	2.25	0.79
CP-4504-A(0-2)	2767403.4	1016783.6	2.3	4.3	1.24	0.43
CP-026-A	2768325.0	1015503.0	2.5	4.5	1.20	0.42
CP-4505-A(2-5)	2767426.0	1016708.9	2.7	5.7	1.45	0.51
CP-1802-A(2-5)	2767961.9	1017402.6	2.7	5.7	1.12	0.39
CP-4502R-A(2-5)	2767456.3	1016880.6	2.8	5.8	0.85	0.30
CP-1602-A(2-5)	2768045.6	1016826.6	2.8	5.8	1.37	0.48
CP-1801-A(2-5)	2767979.0	1017538.7	2.8	5.8	0.82	0.29
CP-4501-A(2-5)	2767583.4	1016875.8	2.8	5.8	0.93	0.33
CP-4507-A(2-5)	2767568.8	1016911.4	2.8	5.8	1.67	0.58
CP-4506-A(0-2)	2767299.4	1016765.1	3.0	5.0	1.18	0.41
CP-4508-A(0-2)	2767300.0	1016708.0	3.0	5.0	1.32	0.46
CP-1601-A(2-5)	2767941.6	1016809.9	3.0	6.0	1.34	0.47
CP-027-A	2768485.0	1015523.0	3.5	5.5	1.47	0.51
CP-4503-A(2-5)	2767466.2	1016768.1	3.7	6.7	1.50	0.53
CP-4504-A(2-5)	2767403.4	1016783.6	4.3	7.3	1.37	0.48
CP-019-BC	2767190.9	1015500.6	5.0	15.0	1.46	0.51
CP-022-BCD	2767670.5	1015455.2	5.0	20.0	1.89	0.66
CP-023-BC	2767845.0	1015483.0	5.0	15.0	1.20	0.42
CP-024-BC	2768034.0	1015478.0	5.0	15.0	1.50	0.53
CP-138-BCD	2766825.0	1016303.0	5.0	20.0	0.96	0.34
CP-163-BCD	2766878.0	1016463.0	5.0	20.0	0.78	0.27
CP-186-B	2766846.0	1016623.0	5.0	10.0	2.60	0.91
CP-210-BCD	2767006.1	1016841.6	5.0	20.0	0.77	0.27

Attachment 2-2. GSA Area Subsurface Soil Uranium Data

Location ID	Easting	Northing	Start Depth (ft)	End Depth (ft)	Result (mg/kg)	Result (pCi/g)
CP-230-BC	2766965.0	1016943.0	5.0	15.0	0.86	0.30
CP-231-BCD	2767125.0	1016950.0	5.0	20.0	1.28	0.45
CP-233-BCD	2767501.5	1016948.9	5.0	20.0	1.15	0.40
CP-251-BC	2767054.0	1017093.0	5.0	15.0	0.95	0.33
CP-252-BCD	2767205.0	1017103.0	5.0	20.0	1.29	0.45
CP-254-BCD	2767525.0	1017103.0	5.0	20.0	0.81	0.28
CP-269-BCDE	2767125.0	1017274.0	5.0	25.0	0.99	0.35
CP-270-B	2767285.0	1017263.0	5.0	10.0	0.76	0.27
CP-271-B	2767445.0	1017263.0	5.0	10.0	1.05	0.37
CP-272-BC	2767605.0	1017257.0	5.0	15.0	0.87	0.31
CP-287-BC	2767365.0	1017401.0	5.0	15.0	0.90	0.31
CP-288-B	2767525.0	1017398.0	5.0	10.0	0.95	0.33
CP-4506-A(2-5)	2767299.4	1016765.1	5.0	8.0	1.07	0.37
CP-4508-A(2-5)	2767300.0	1016708.0	5.0	8.0	1.68	0.59
CP-253-BC	2767365.0	1017103.0	5.3	15.3	0.86	0.30
CP-046-B	2767946.2	1015643.9	5.5	10.5	1.91	0.67
CP-048-B	2768278.5	1015666.9	5.5	10.5	1.69	0.59
CP-289-B	2767685.0	1017423.0	5.5	10.5	0.81	0.28
CP-047-B	2768065.1	1015659.6	5.6	10.6	1.81	0.63
CP-021-B	2767533.2	1015504.8	5.7	10.7	1.43	0.50
CP-4505-B	2767426.0	1016708.9	5.7	10.7	0.99	0.35
CP-1802-B	2767961.9	1017402.6	5.7	10.7	1.73	0.61
CP-166-BC	2767338.3	1016453.9	5.7	15.7	1.15	0.40
CP-070-BCD	2767847.2	1015803.8	5.8	20.8	1.22	0.43
CP-069-BCD	2767695.5	1015815.2	5.8	20.8	1.47	0.51
CP-096-BC	2767933.3	1015977.8	5.8	15.8	1.29	0.45
CP-094-BCD	2767584.6	1015987.2	5.8	20.8	1.60	0.56
CP-120-BCD	2767670.5	1016139.2	5.8	20.8	1.37	0.48
CP-140-BC	2767125.0	1016303.0	5.8	15.8	1.42	0.50
CP-141-BC	2767285.0	1016288.0	5.8	15.8	1.16	0.41
CP-211R-BC	2767292.0	1016777.9	5.8	15.8	0.74	0.26
CP-4502R-B	2767456.3	1016880.6	5.8	10.8	1.20	0.42
CP-1602-B	2768045.6	1016826.6	5.8	10.8	1.20	0.42
CP-1801-B	2767979.0	1017538.7	5.8	10.8	0.85	0.30
CP-4501-B	2767583.4	1016875.8	5.8	10.8	0.55	0.19
CP-4507-B	2767568.8	1016911.4	5.8	10.8	0.98	0.34
CP-068-BCD	2767522.1	1015827.5	5.9	20.9	1.11	0.39
CP-071-BC	2768004.4	1015828.2	5.9	15.9	1.59	0.56
CP-232-BC	2767285.0	1016943.0	5.9	15.9	1.37	0.48
CP-095-BC	2767783.1	1015974.4	5.9	15.9	1.40	0.49
CP-167-BCD	2767531.7	1016464.5	5.9	20.9	1.33	0.47
CP-072R-BC	2768221.3	1015870.7	6.0	16.0	1.53	0.54
CP-072-B	2768179.4	1015862.0	6.0	11.0	1.30	0.46
CP-073-BC	2768321.2	1015829.9	6.0	16.0	1.55	0.54
CP-119-BCD	2767519.6	1016139.3	6.0	21.0	1.58	0.55
CP-025-BC	2768165.0	1015497.0	6.0	16.0	1.60	0.56

Attachment 2-2. GSA Area Subsurface Soil Uranium Data

Location ID	Easting	Northing	Start Depth (ft)	End Depth (ft)	Result (mg/kg)	Result (pCi/g)
CP-041-BC	2767150.0	1015663.0	6.0	16.0	1.58	0.55
CP-042-B	2767260.8	1015673.5	6.0	11.0	1.29	0.45
CP-065-BC	2767037.0	1015823.0	6.0	16.0	1.23	0.43
CP-066-BC	2767205.0	1015823.0	6.0	16.0	1.63	0.57
CP-089-BCD	2766900.0	1016017.0	6.0	21.0	0.83	0.29
CP-090-BC	2767007.0	1016003.0	6.0	16.0	1.75	0.61
CP-091-BC	2767135.6	1015939.6	6.0	16.0	1.46	0.51
CP-092-B	2767280.0	1015983.0	6.0	11.0	1.80	0.63
CP-093-BCD	2767454.3	1015977.3	6.0	21.0	1.72	0.60
CP-115-BCD	2766885.0	1016143.0	6.0	21.0	1.09	0.38
CP-116-BC	2767045.0	1016156.0	6.0	16.0	1.44	0.50
CP-117-BC	2767205.0	1016143.0	6.0	16.0	1.33	0.47
CP-139-BCD	2766955.0	1016303.0	6.0	21.0	0.76	0.27
CP-142-BCD	2767445.0	1016303.0	6.0	21.0	1.52	0.53
CP-164-BCD	2767065.8	1016434.8	6.0	21.0	1.42	0.50
CP-190-BCDE	2767445.0	1016623.0	6.0	26.0	1.05	0.37
CP-212-BC	2767685.0	1016800.0	6.0	16.0	1.23	0.43
CP-235-BC	2767765.0	1016943.0	6.0	16.0	1.42	0.50
CP-236-BC	2767925.0	1016943.0	6.0	16.0	1.78	0.62
CP-255-BC	2767680.0	1017098.0	6.0	16.0	1.61	0.56
CP-256-B	2767845.0	1017103.0	6.0	11.0	3.26	1.14
CP-257-BC	2768005.0	1017098.0	6.0	16.0	1.88	0.66
CP-273-B	2767765.0	1017263.0	6.0	11.0	1.02	0.36
CP-274-B	2767925.0	1017263.0	6.0	11.0	2.36	0.83
CP-290-BC	2767845.0	1017423.0	6.0	16.0	1.02	0.36
CP-1601-B	2767941.6	1016809.9	6.0	11.0	1.78	0.62
CP-045-BCD	2767756.1	1015651.3	6.1	21.1	1.53	0.54
CP-143-BC	2767564.0	1016281.2	6.2	16.2	1.31	0.46
CP-044-BCD	2767590.3	1015660.7	6.2	21.2	1.51	0.53
CP-039-BC	2766805.0	1015663.0	6.3	16.3	0.81	0.28
CP-187-BCD	2766965.0	1016623.0	6.3	21.3	2.24	0.78
CP-188-BC	2767125.0	1016678.0	6.3	16.3	0.78	0.27
CP-209-BC	2766892.0	1016819.0	6.4	16.4	1.10	0.39
CP-040-BC	2766965.0	1015663.0	6.5	16.5	0.87	0.30
CP-043-BC	2767435.0	1015653.0	6.5	16.5	1.54	0.54
CP-067-B	2767370.0	1015833.0	6.5	11.5	1.27	0.44
CP-165-BC	2767205.0	1016463.0	6.5	16.5	1.27	0.44
CP-020-BC	2767410.0	1015509.0	6.7	16.7	1.71	0.60
CP-064-BC	2766885.0	1015823.0	6.7	16.7	1.28	0.45
CP-191-BCD	2767605.0	1016638.0	6.7	21.7	1.53	0.54
CP-4503-B	2767466.2	1016768.1	6.7	11.7	1.21	0.42
CP-017-BC	2766885.0	1015503.0	7.0	17.0	0.84	0.29
CP-018-BC	2767045.0	1015503.0	7.0	17.0	1.02	0.36
CP-213-BC	2767866.2	1016804.2	7.2	17.2	1.38	0.48
CP-189-BCDE	2767275.0	1016623.0	7.3	27.3	1.95	0.68
CP-4504-B	2767403.4	1016783.6	7.3	12.3	1.02	0.36

Attachment 2-2. GSA Area Subsurface Soil Uranium Data

Location ID	Easting	Northing	Start Depth (ft)	End Depth (ft)	Result (mg/kg)	Result (pCi/g)
CP-026-BC	2768325.0	1015503.0	7.5	17.5	1.40	0.49
CP-4506-B	2767299.4	1016765.1	8.0	13.0	1.42	0.50
CP-4508-B	2767300.0	1016708.0	8.0	13.0	1.43	0.50
CP-027-BC	2768485.0	1015523.0	8.5	18.5	1.44	0.50
CP-230-C	2766965.0	1016943.0	10.0	15.0	0.75	0.26
CP-4505-C	2767426.0	1016708.9	10.7	15.7	0.98	0.34
CP-1802-C	2767961.9	1017402.6	10.7	15.7	2.42	0.85
CP-4502R-C	2767456.3	1016880.6	10.8	15.8	0.87	0.30
CP-1602-C	2768045.6	1016826.6	10.8	15.8	1.29	0.45
CP-1801-C	2767979.0	1017538.7	10.8	15.8	0.96	0.34
CP-4501-C	2767583.4	1016875.8	10.8	15.8	0.72	0.25
CP-4507-C	2767568.8	1016911.4	10.8	15.8	0.82	0.29
CP-042-C	2767260.8	1015673.5	11.0	16.0	1.40	0.49
CP-092-C	2767280.0	1015983.0	11.0	16.0	1.48	0.52
CP-1601-C	2767941.6	1016809.9	11.0	16.0	1.13	0.40
CP-067-C	2767370.0	1015833.0	11.5	16.5	1.07	0.37
CP-4503-C	2767466.2	1016768.1	11.7	16.7	1.13	0.40
CP-4504-C	2767403.4	1016783.6	12.3	17.3	1.10	0.39
CP-4506-C	2767299.4	1016765.1	13.0	18.0	0.92	0.32
CP-4508-C	2767300.0	1016708.0	13.0	18.0	1.00	0.35
CP-4505-D	2767426.0	1016708.9	15.7	20.7	2.19	0.77
CP-166-D	2767338.3	1016453.9	15.7	20.7	1.48	0.52
CP-096-D	2767933.3	1015977.8	15.8	20.8	1.34	0.47
CP-4502R-D	2767456.3	1016880.6	15.8	20.8	1.04	0.36
CP-1602-D	2768045.6	1016826.6	15.8	20.8	1.57	0.55
CP-4501-D	2767583.4	1016875.8	15.8	20.8	0.58	0.20
CP-4507-D	2767568.8	1016911.4	15.8	20.8	0.66	0.23
CP-071-D	2768004.4	1015828.2	15.9	20.9	1.46	0.51
CP-095-DE	2767783.1	1015974.4	15.9	25.9	1.47	0.51
CP-072R-D	2768221.3	1015870.7	16.0	21.0	1.42	0.50
CP-073-D	2768321.2	1015829.9	16.0	21.0	1.61	0.56
CP-1601-D	2767941.6	1016809.9	16.0	21.0	2.11	0.74
CP-143-D	2767564.0	1016281.2	16.2	21.2	1.57	0.55
CP-165-D	2767205.0	1016463.0	16.5	21.5	1.42	0.50
CP-4503-D	2767466.2	1016768.1	16.7	21.7	1.05	0.37
CP-018-D	2767045.0	1015503.0	17.0	22.0	0.84	0.29
CP-4504-D	2767403.4	1016783.6	17.3	22.3	1.18	0.41
CP-4506-D	2767299.4	1016765.1	18.0	23.0	0.75	0.26
CP-4508-D	2767300.0	1016708.0	18.0	23.0	1.68	0.59

ATTACHMENT 3
BUILDING 59 AREA URANIUM RESULTS

Attachment 3. Building 59 Area Uranium Results

Location	SampleID	Start Depth (ft)	End Depth (ft)	Result (mg/kg)	Result (pCi/g)	Surface (pCi/g)	Subsurf (pCi/g)
CP-5022	CP-5022-A(0-2)	0.0	2.0	1.74	0.85	0.85	
CP-5022	CP-5022-C	10.0	15.0	1.59	0.78	0.78	
CP-5022	CP-5022-A(2-5)	2.0	5.0	1.39	0.68		0.68
CP-5022	CP-5022-B	5.0	10.0	1.72	0.84	0.84	
CP-5023	CP-5023-A(0-2)	0.0	2.0	5.17	2.53	2.53	
CP-5023	CP-5023-A(2-5)	2.0	5.0	2.40	1.18		1.18
CP-5023	CP-5023-B	5.0	10.0	2.32	1.14	1.14	
CP-5023	CP-5023-C	10.0	15.0	1.18	0.58	0.58	
CP-5024	CP-5024-A(2-5)	2.0	5.0	4.39	2.15		2.15
CP-5024	CP-5024-C	10.0	15.0	1.61	0.79	0.79	
CP-5024	CP-5024-A(0-2)	0.0	2.0	25.90	12.69	12.69	
CP-5024	CP-5024-B	5.0	10.0	2.47	1.21	1.21	
CP-5025	CP-5025-A(0-2)	0.0	2.0	12.20	5.98	5.98	
CP-5025	CP-5025-B	5.0	10.0	1.30	0.64	0.64	
CP-5025	CP-5025-A(2-5)	2.0	5.0	1.64	0.80		0.80
CP-5025	CP-5025-C	10.0	15.0	1.80	0.88	0.88	
CP-5005	CP-5005-A(0-2)	1.5	3.5	1.66	0.81	0.81	
CP-5005	CP-5005-B	6.5	11.5	1.63	0.80	0.80	
CP-5005	CP-5005-C	11.5	16.5	1.63	0.80	0.80	
CP-222	CP-222-BC	5.0	15.0	1.92	0.94	0.94	
CP-222	CP-222-A1	0.0	2.0	1.67	0.82	0.82	
CP-222	CP-222-A	0.0	2.0	3.76	1.84	1.84	
CP-5007	CP-5007-C	10.2	15.2	1.34	0.66	0.66	
CP-5007	CP-5007-B	5.2	10.2	1.33	0.65	0.65	
CP-5007	CP-5007-A(2-5)	2.2	5.2	1.56	0.76		0.76
CP-5007	CP-5007-A(0-2)	0.2	2.2	11.90	5.83	5.83	
CP-5029	CP-5029-A(0-2)	0.0	2.0	2.43	1.19	1.19	
CP-5029	CP-5029-C	10.0	15.0	1.63	0.80	0.80	
CP-5029	CP-5029-A(2-5)	2.0	5.0	3.56	1.74		1.74
CP-5029	CP-5029-B	5.0	10.0	1.61	0.79	0.79	
CP-5028	CP-5028-B	5.0	10.0	1.56	0.76	0.76	
CP-5028	CP-5028-A(2-5)	2.0	5.0	1.63	0.80		0.80
CP-5028	CP-5028-C	10.0	15.0	1.43	0.70	0.70	
CP-5028	CP-5028-A(0-2)	0.0	2.0	1.45	0.71	0.71	
CP-5030	CP-5030-A(0-2)	0.0	2.0	2.28	1.12	1.12	
CP-5030	CP-5030-C	10.0	15.0	1.35	0.66	0.66	
CP-5030	CP-5030-A(2-5)	2.0	5.0	2.20	1.08		1.08
CP-5030	CP-5030-B	5.0	10.0	1.72	0.84	0.84	
CP-5008	CP-5008-A(0-2)	0.2	2.2	2.90	1.42	1.42	
CP-5008	CP-5008-B	5.2	10.2	2.71	1.33	1.33	
CP-5008	CP-5008-C	10.2	15.2	2.69	1.32	1.32	
CP-5008	CP-5008-D	15.2	20.2	1.98	0.97	0.97	
CP-5031	CP-5031C	10.0	15.0	1.50	0.74	0.74	
CP-5031	CP-5031A(0-2)	0.0	2.0	4.77	2.34	2.34	
CP-5031	CP-5031A(2-5)	2.0	5.0	0.39	0.19		0.19
CP-5031	CP-5031B	5.0	10.0	1.31	0.64	0.64	

Attachment 3. Building 59 Area Uranium Results

Location	SampleID	Start Depth (ft)	End Depth (ft)	Result (mg/kg)	Result (pCi/g)	Surface (pCi/g)	Subsurf (pCi/g)
CP-5004	Exc. Surface			18.3	18.28		
	Exc. Pile			10.2	10.21		
	Exc. Subsurface			15.3			15.32
CP-5026	Exc. Surface			4.0	4.01		
	Exc. Pile			6.8	6.76		
	Exc. Subsurface			4.9			4.89
CP-5027	Exc. Surface			2.9	2.92		
	Exc. Pile			3.4	3.43		
	Exc. Subsurface			3.4			3.37