United States Environmental Protection Agency (USEPA)

Santa Susana Field Laboratory (SSFL)

Stakeholder Meeting
December 14, 2011

EPA Stakeholder Meeting Agenda December 14, 2011

1. RTL Technical Memorandum
2. Subarea 5C Round 2 FSP Addendum
3. Deep Borehole FSP Addendum
4. Update on EPA work and schedule
5. Project Completion Plan

United States Environmental Protection Agency (USEPA)

Santa Susana Field Laboratory (SSFL)

Radiological Trigger Levels

December 14, 2011

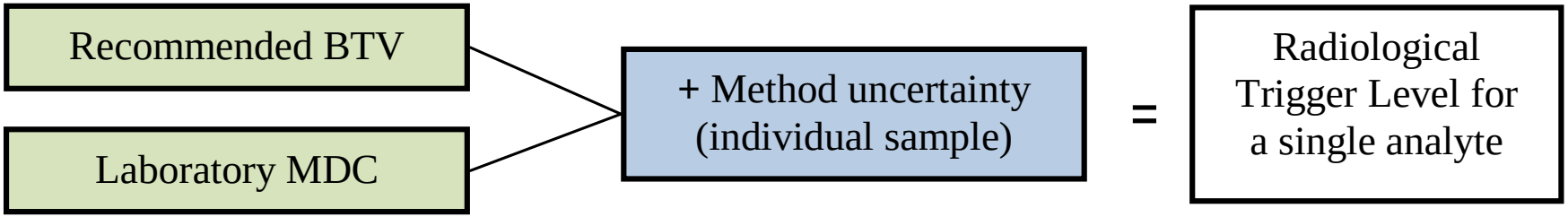
Develop Radiological Trigger Levels from Recommended BTVs and Minimum Detectable Concentrations

Evaluate Site Radiological Results From Lower and Higher Contamination Subareas Using Radiological Trigger Levels

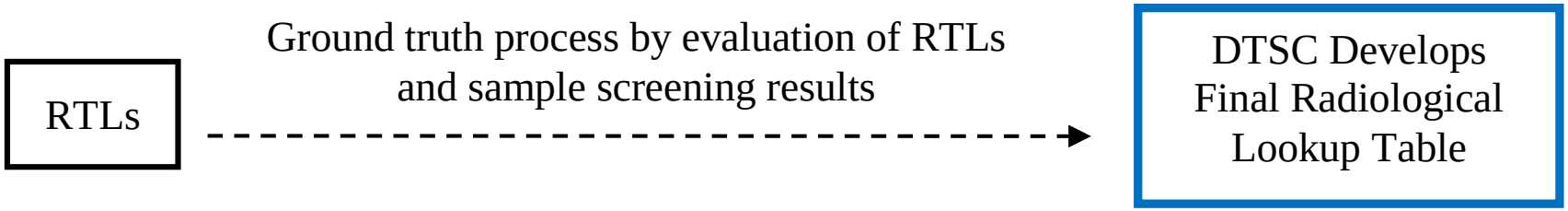
Apply Trigger Levels To Round 1 Results and Recommend Radiological Look Up Table Values To DTSC

Development of Radiological Trigger Levels

Step 1: Develop each RTL



Step 2: Apply RTLs to Subareas 5C and 6 Analytical Results



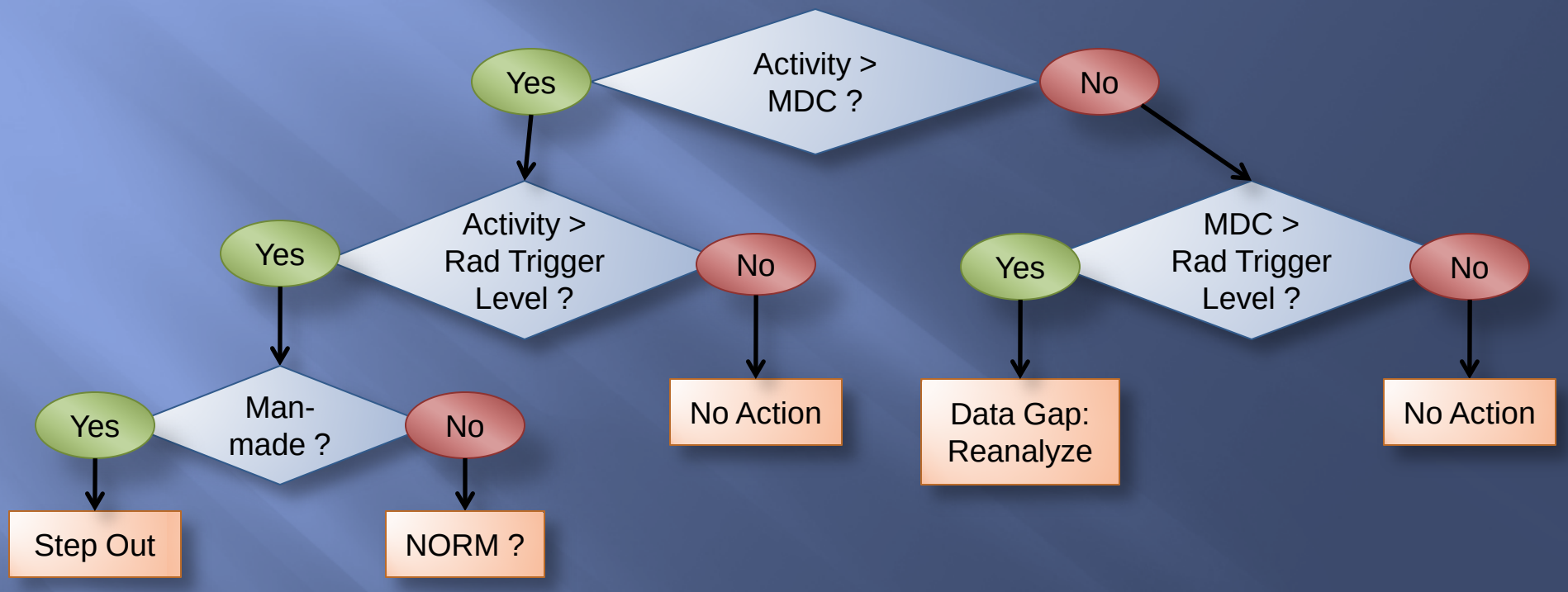
Radiological Trigger Levels

Radionuclide	Method	Suite	Source	RTL (pCi/g)
actinium-227+D	Gamma	Default	MDC	2.17E-01
actinium-228			BTV	2.40E+00
antimony-125+D			BTV	3.54E-01
bismuth-212			BTV	2.15E+00
bismuth-214			BTV	1.59E+00
cadmium-113m			BTV	3.03E+03
lead-212			BTV	2.69E+00
lead-214			BTV	1.70E+00
cesium-134			MDC	8.64E-02
cesium-137+D			BTV	2.07E-01
cobalt-60			MDC	2.80E-02
europium-152			MDC	5.66E-02
europium-154			MDC	1.50E-01
europium-155			BTV	2.31E-01
holmium-166m			BTV	4.32E-02
neptunium-236			MDC	4.70E-02
neptunium-239			MDC	1.39E-01
niobium-94			MDC	2.14E-02
potassium-40			BTV	3.24E+01
protactinium-231			BTV	9.36E-01
sodium-22			MDC	3.70E-02
tellurium-125m			BTV	8.38E-02
thallium-208			BTV	9.37E-01
thulium-171			MDC	7.24E+01
tin-126			MDC	2.37E-02
strontium-90+D (Y-90)	Sr-Y	Default	MDC	4.85E-01

Key
Naturally Occurring Radionuclides
Maximum Non-Detect BTV - Use MDC

Radionuclide	Method	Suite	Source	RTL (pCi/g)
thorium-228+D	Th-isotopic	Default	BTV	3.98E+00
thorium-230			BTV	2.20E+00
thorium-232			BTV	3.10E+00
thorium-234			BTV	3.19E+00
thorium-229+D	Th-229	Site Specific	MDC	1.45E-01
uranium-233/234	U-isotopic	Default	BTV	2.02E+00
uranium-235+D/236			BTV	1.51E-01
uranium-238+D			BTV	1.80E+00
uranium-232	U-232	Site Specific	MDC	1.17E-01
plutonium-238	Pu-isotopic	Default	MDC	4.15E-02
plutonium-239/240			MDC	4.04E-02
plutonium-242			MDC	4.06E-02
plutonium-236	Pu-236	Site Specific	MDC	7.79E+00
plutonium-244+D	Pu-244		MDC	3.13E-02
plutonium-241	Pu-241	Site Specific	MDC	1.04E+01
americium-241	Am-241-Cm Isotopic	Default	MDC	4.54E-02
curium-243/244			MDC	4.43E-02
americium-243+D	Am-243-Cm Isotopic	Site Specific	MDC	4.01E-02
curium-245/246			MDC	3.06E-02
curium-248			MDC	3.33E-02
neptunium-237+D	Np-237	Site Specific	MDC	4.01E-02
radium-226+D	Gamma Ra	Site Specific	BTV	2.03E+00
radium-228+D			BTV	2.40E+00
tritium (H-3) organic	H-3	Site Specific	MDC	1.19E+01
carbon-14	C-14	Site Specific	MDC	2.96E+00
iron-55	Fe-55	Site Specific	MDC	5.94E+00
nickel-59	Ni-59	Site Specific	MDC	5.96E+00
nickel-63	Ni-63	Site Specific	MDC	4.92E+00
technetium-99	Tc-99	Site Specific	MDC	1.63E+00
promethium-147	Pm-147	Site Specific	MDC	1.75E+01

Analytical Result Decision Tree



The AOC mentions provisions for evaluating results of naturally occurring decay series of U, Th, and Ra

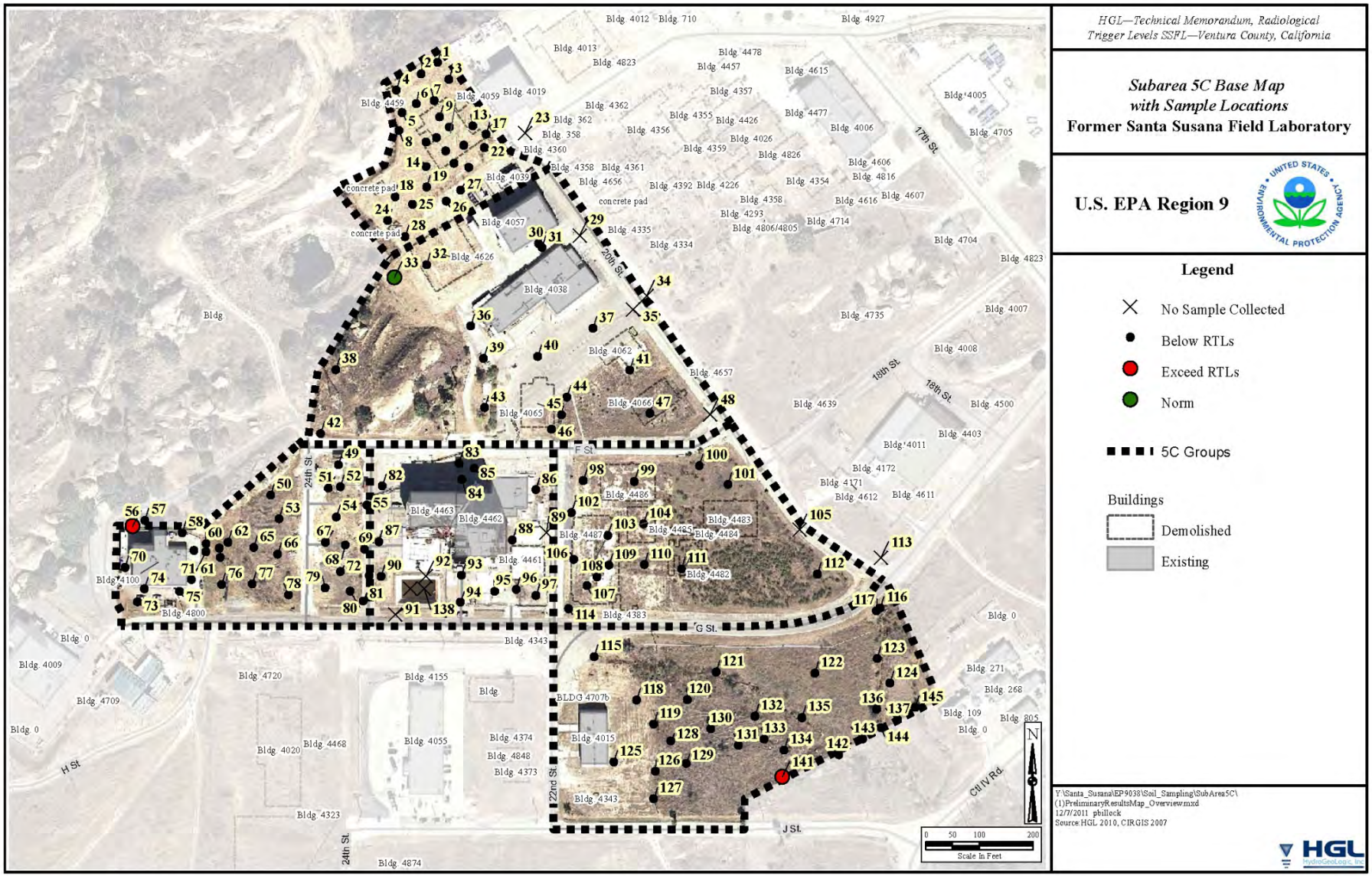
RTL Screening Example of Subset of Analytical Results

Field Sample ID	Analyte Name	Activity	MDC	Detected? (Activity > MDC)	Radiological Trigger Level (RTL)	Detected Above RTL	Detected Activity /RTL
10242	Pa-231	0.009	0.61		0.936		
10242	Pb-212	1.74	0.025	Yes	2.690		
10242	Pb-214	1.1	0.027	Yes	1.700		
10242	Pu-236	-0.002	0.006		7.790		
10242	Pu-238	0.004	0.004	Yes	0.042		
10242	Pu-239/Pu-240	0.049	0.001	Yes	0.040	**Yes**	**1.203**

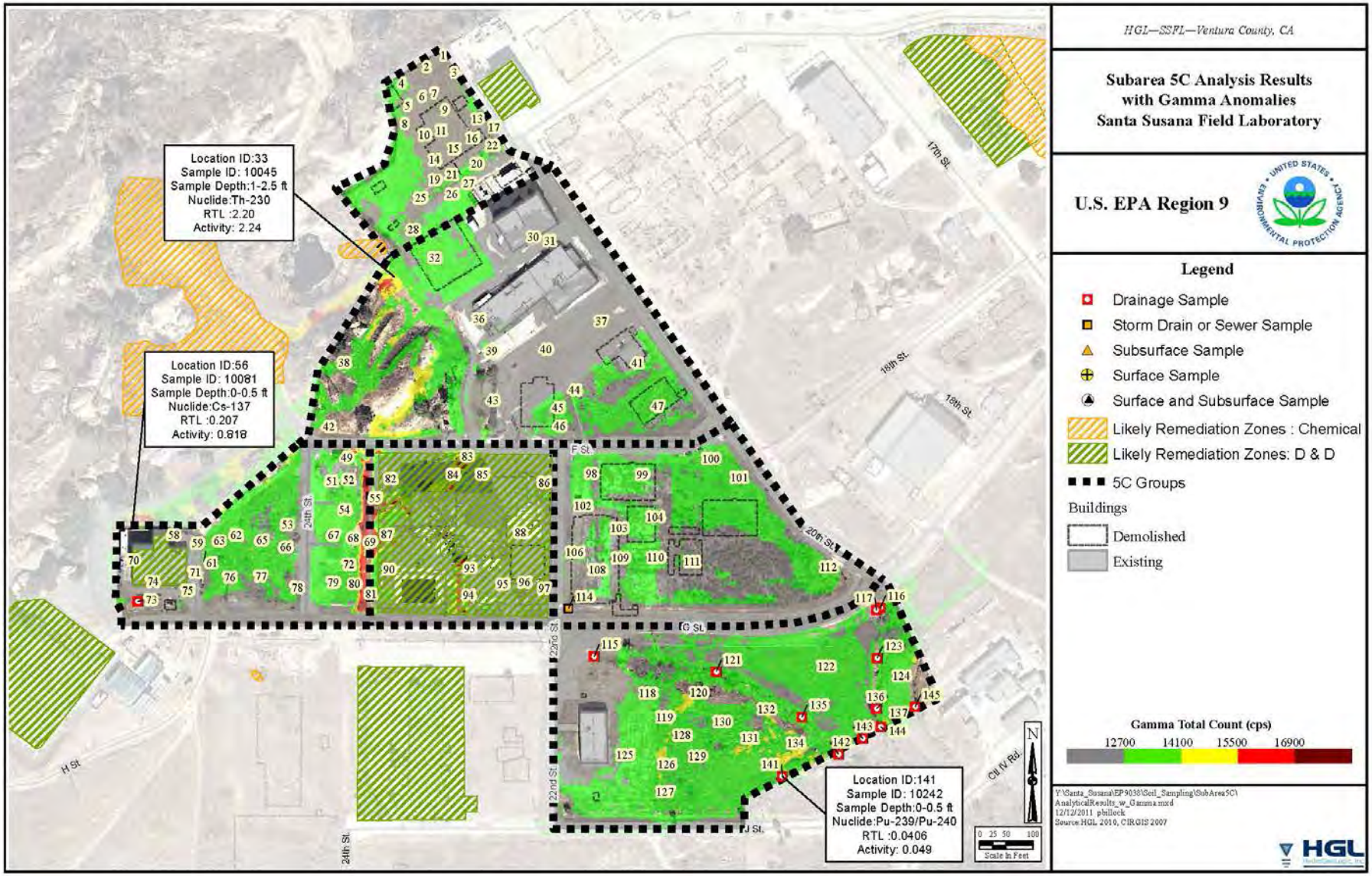
Summary of 5C Screening Results (Preliminary)

Field Sample ID	Analyte Name	Activity	MDC	Detected? (Activity > MDC)	Radiological Trigger Level (RTL)	Detected Above RTL	Detected Activity /RTL
10081	Cs-137	0.818	0.015	Yes	0.207	**Yes**	**3.95**
10242	Pu-239/Pu-240	0.0486	0.0013	Yes	0.040	**Yes**	**1.20**
10045	Pb-214	1.95	0.031	Yes	1.700	**Yes**	**1.15**
10045	Bi-214	1.72	0.031	Yes	1.590	**Yes**	**1.08**
10045	Th-230	2.24	0.008	Yes	2.200	**Yes**	**1.02**
3		**Count**		**4967**		**5**	

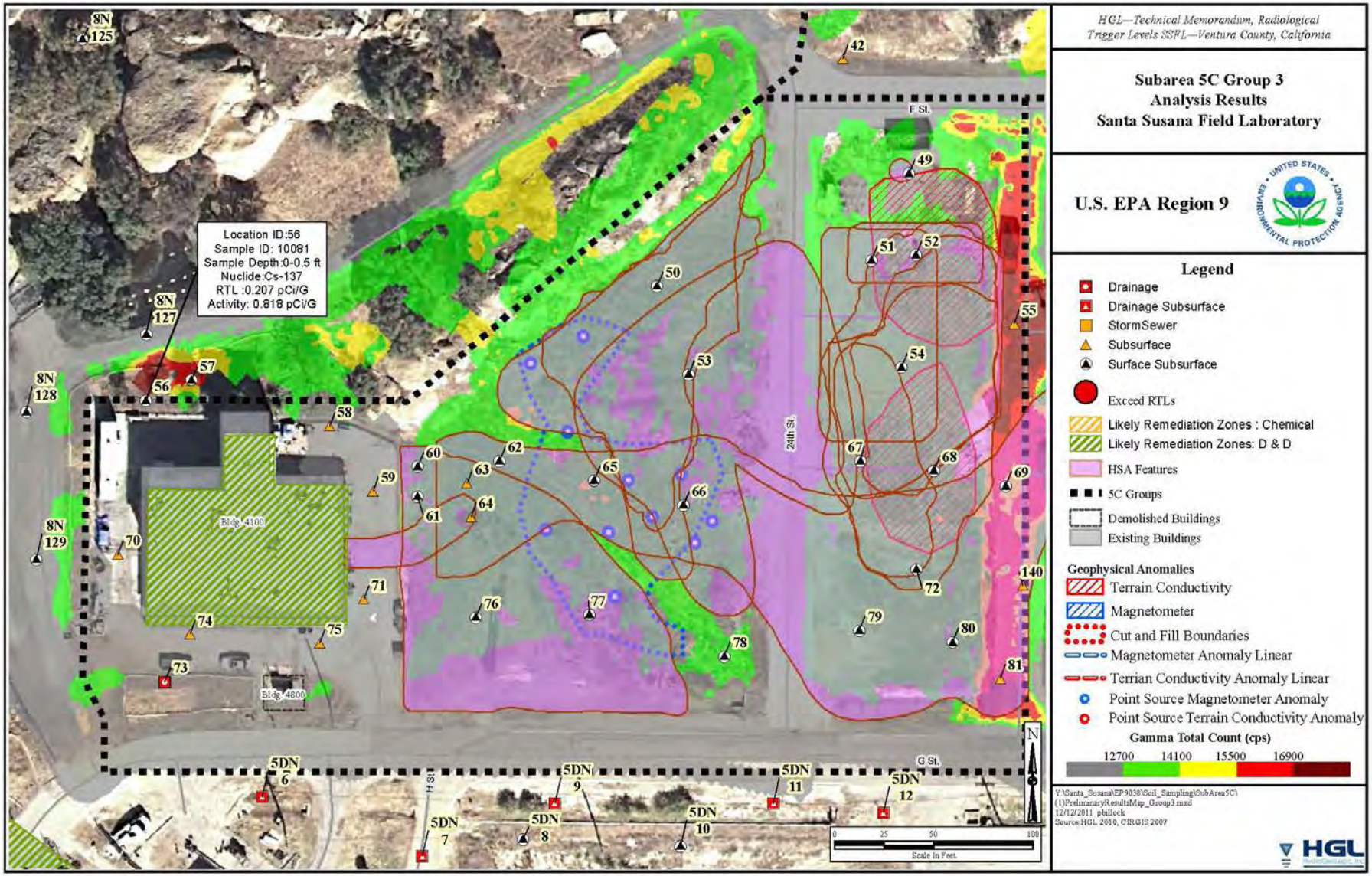
Preliminary Subarea 5C Sample Results



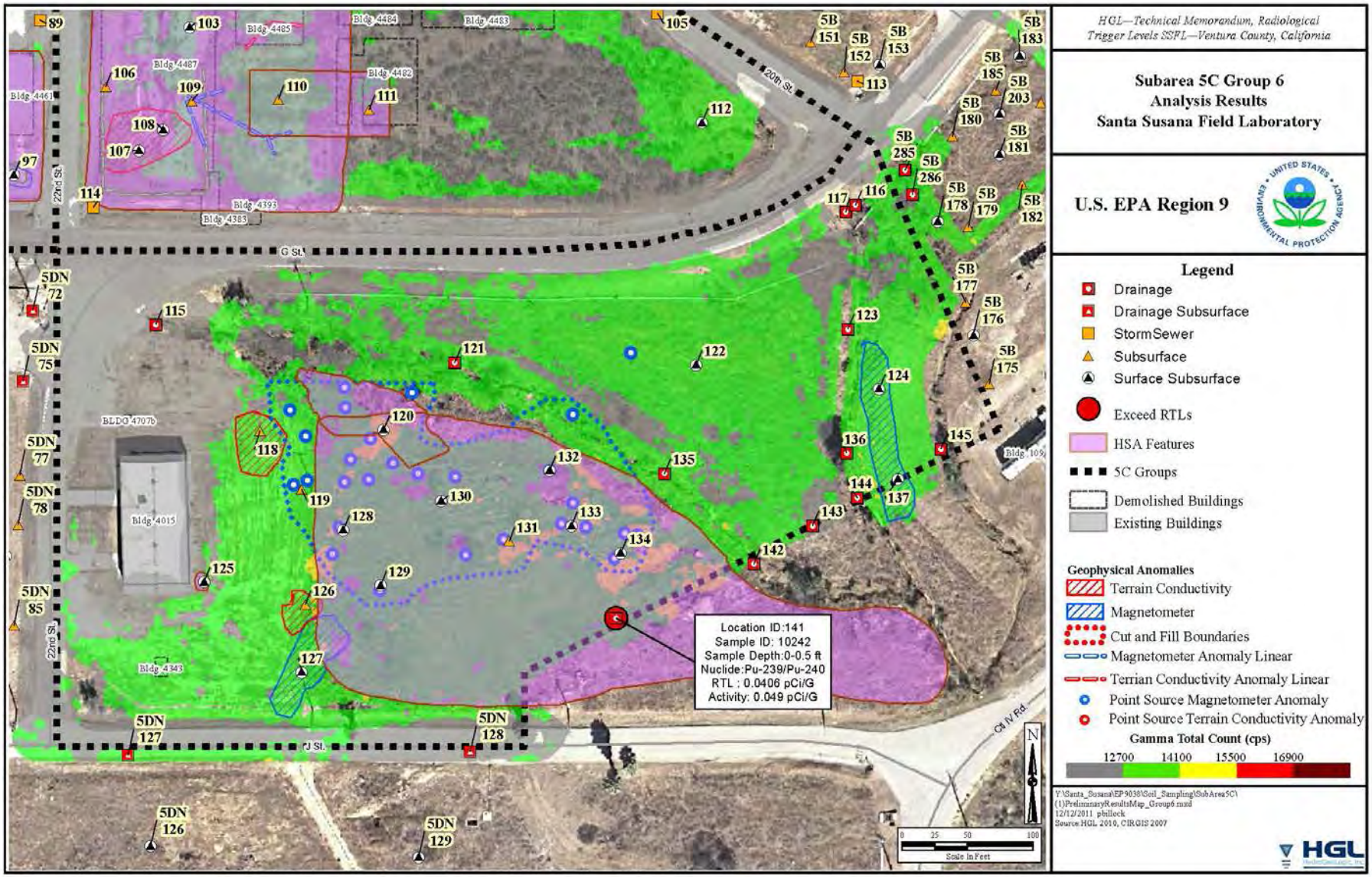
Preliminary 5C Results With Gamma Survey



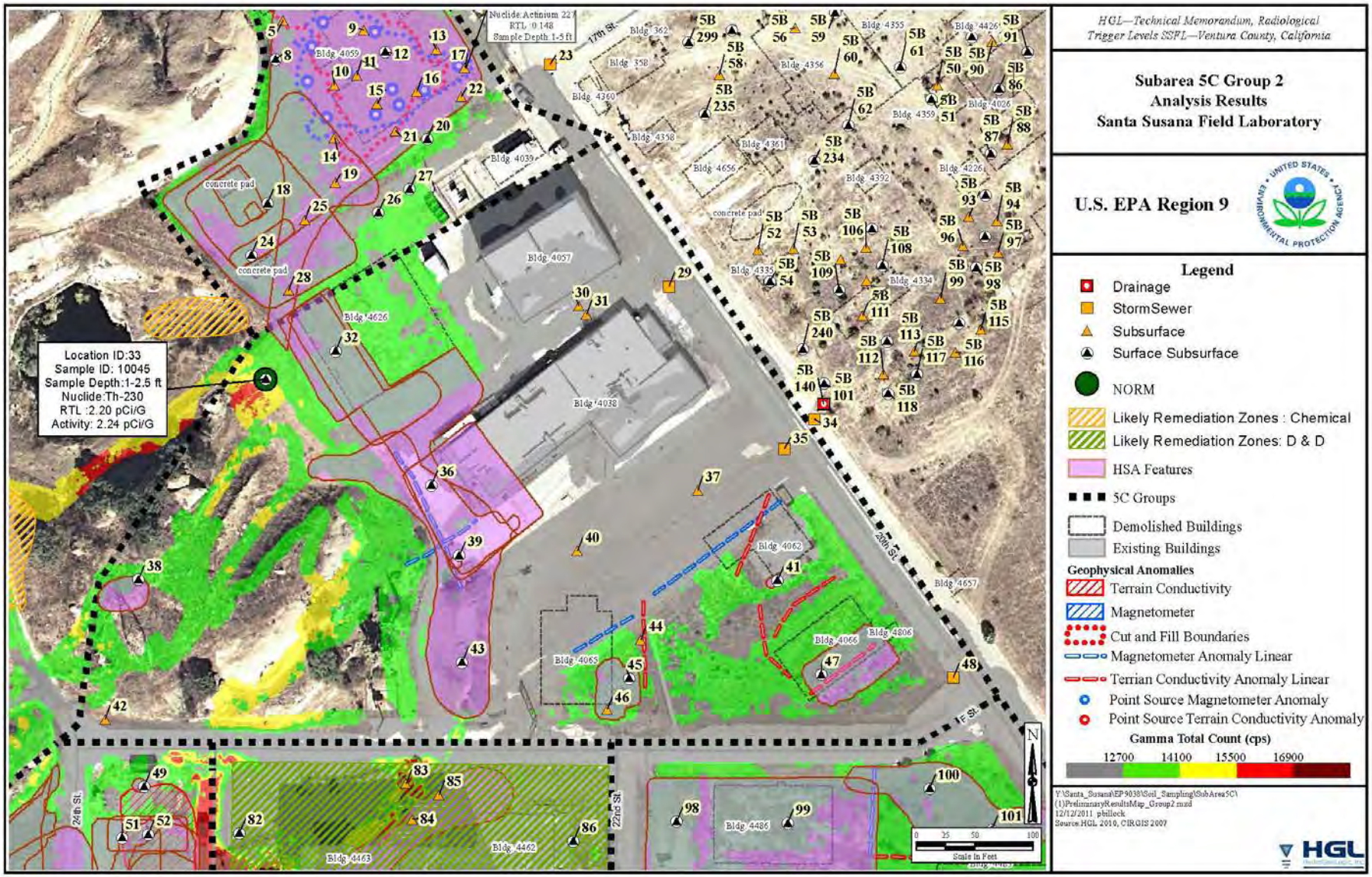
Cs-137 Result Above RTL



Pu-239/240 Result Above RTL



Naturally Occurring Result Above RTL



Next Steps

- Round 2 criteria for locating step-out samples
- Develop Round 2 Field Sampling Plan with stakeholder input
- Soil Sampling for Round 2

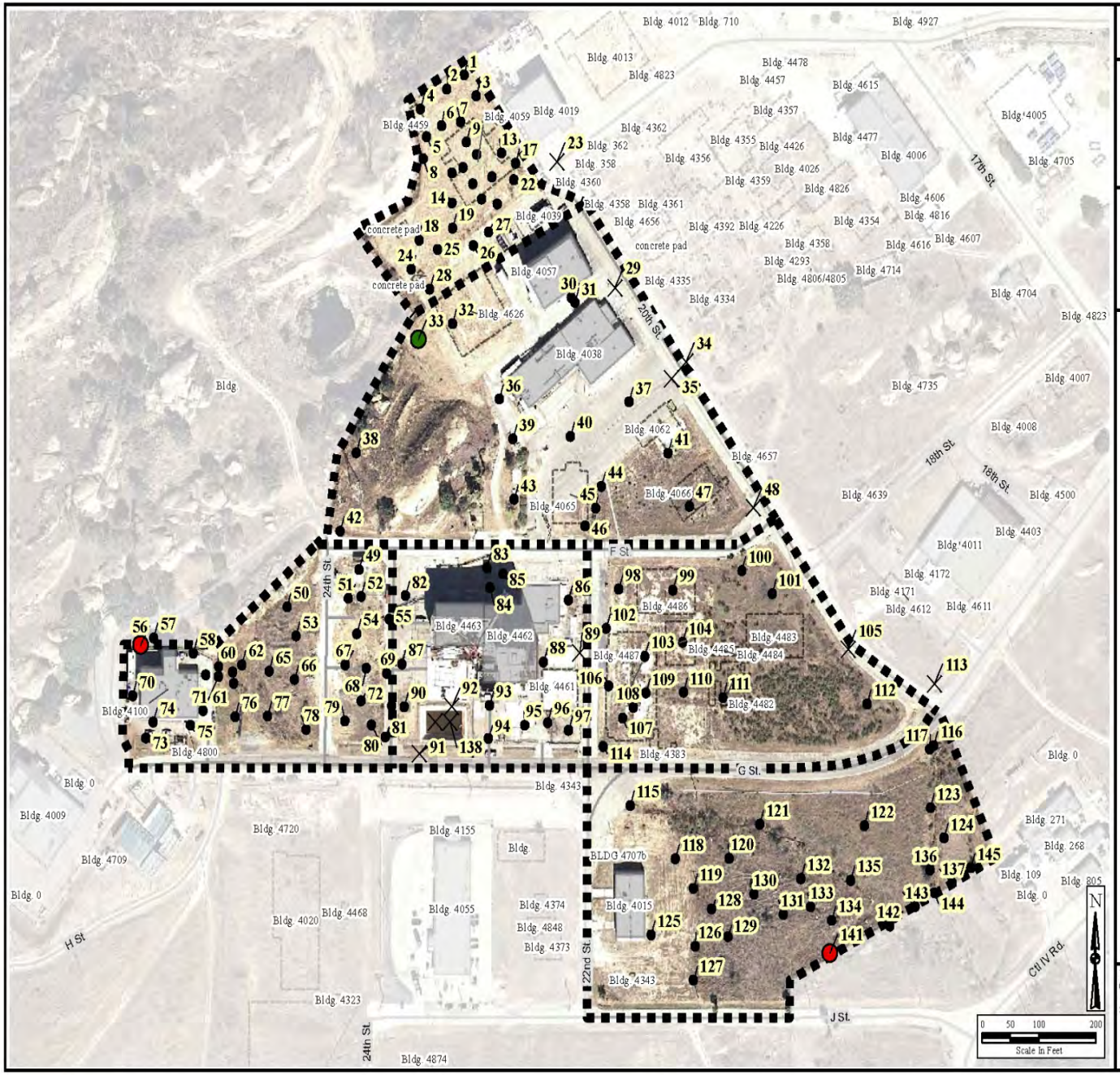
Subarea 5C

Round 2 Sample Design

December 14, 2011

AGENDA

- Discuss Round 1 Data Screening
- Identify locations of elevated radioactivity
- Discuss each location
- Discuss Round 2 Criteria
- Apply Round 2 Criteria
- Show “Step-outs”



HGL—Technical Memorandum, Radiological Trigger Levels SSFL—Ventura County, California

Subarea 5C Base Map with Sample Locations

Former Santa Susana Field Laboratory

U.S. EPA Region 9

Legend

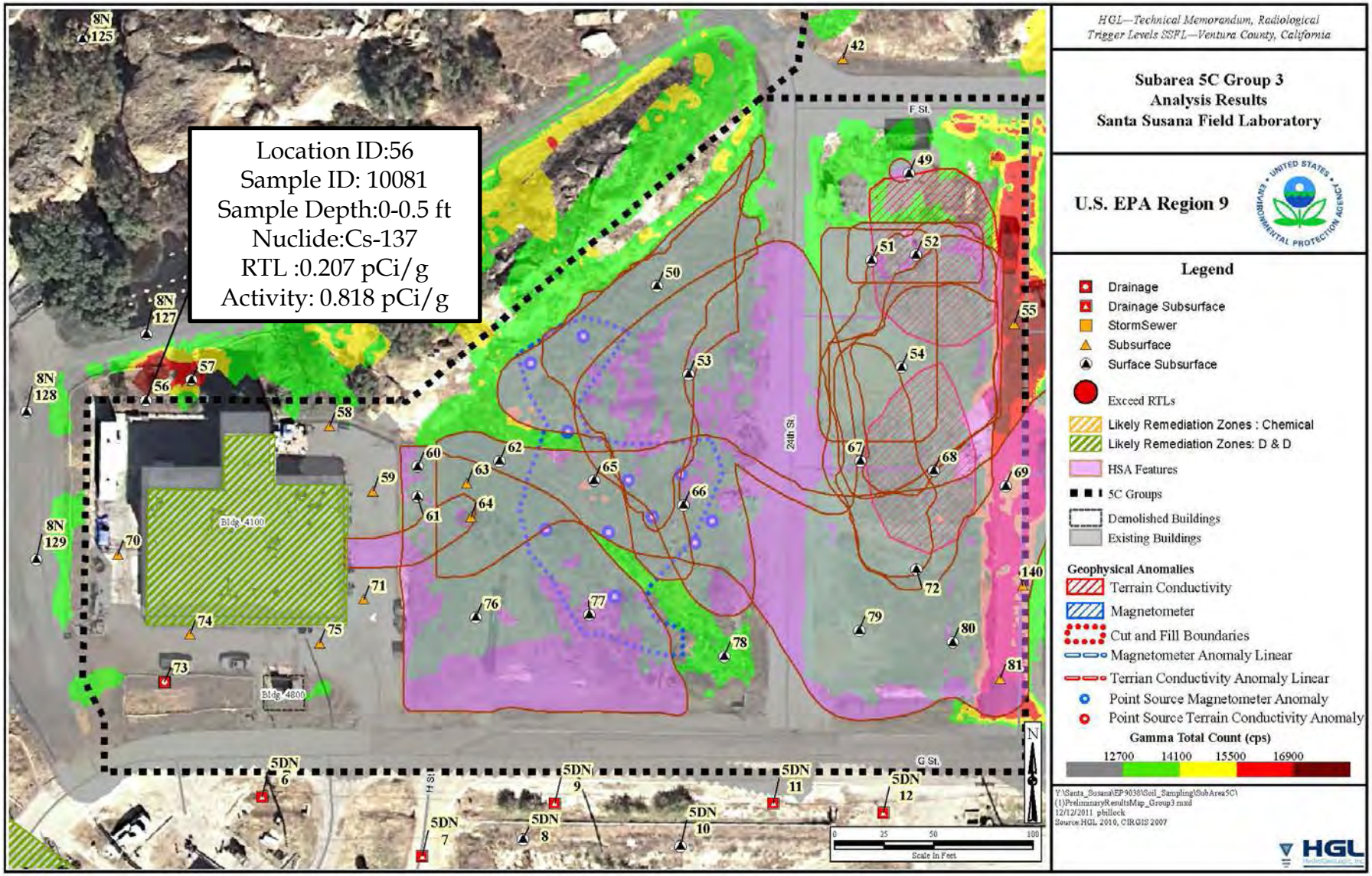
- No Sample Collected
- Below RTLs
- Exceed RTLs
- Norm
- 5C Groups

Buildings

- Demolished
- Existing

Y:\Santa_Susana\EP9038\Soil_Sampling\SubArea5C\
(1)PreliminaryResultsMap_Overview.mxd
12/7/2011 pbillock
Source:HGL 2010, CIRGIS 2007

HGL HydroGeoLogic, Inc.


Location ID:56
Sample ID: 10081
Sample Depth:0-0.5 ft
Nuclide:Cs-137
RTL :0.207 pCi/g
Activity: 0.818 pCi/g
HGL—Technical Memorandum, Radiological Trigger Levels SSFL—Ventura County, California
Subarea 5C Group 3
Analysis Results
Santa Susana Field Laboratory
U.S. EPA Region 9
Legend
Drainage
Drainage Subsurface
StormSewer
Subsurface
Surface Subsurface
Exceed RTLs
Likely Remediation Zones : Chemical
Likely Remediation Zones: D & D
HSA Features
5C Groups
Demolished Buildings
Existing Buildings
Geophysical Anomalies
Terrain Conductivity
Magnetometer
Cut and Fill Boundaries
Magnetometer Anomaly Linear
Terrian Conductivity Anomaly Linear
Point Source Magnetometer Anomaly
Point Source Terrain Conductivity Anomaly
Gamma Total Count (cps)
12700
14100
15500
16900
Bldg 4100
Bldg 4800
24th St.
F St.
G St.
H St.
Scale in Feet
HGL

Subarea 5C Location 56

Picture 1 - Looking Southeast

Subarea 5C Location 56

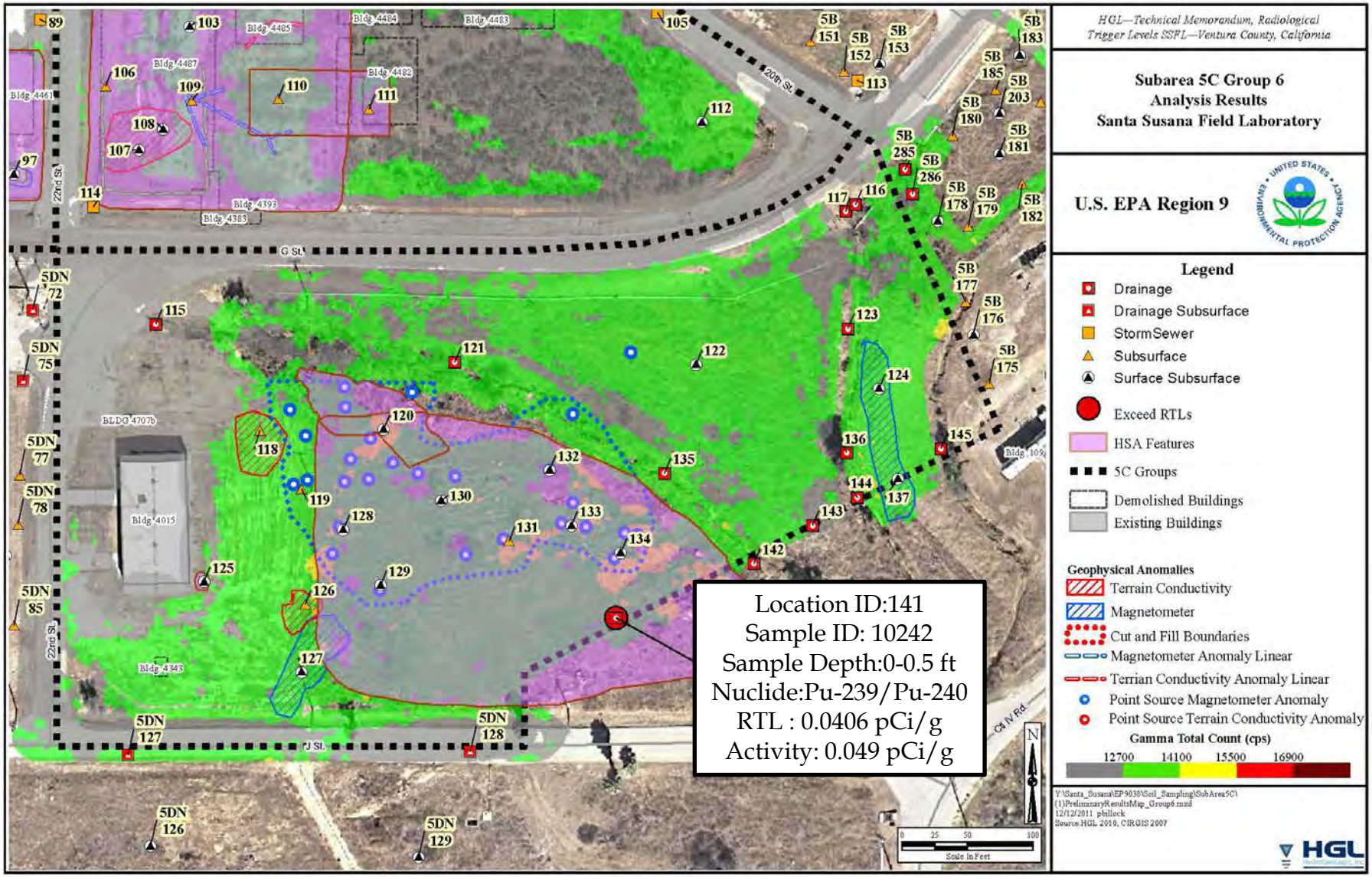
Picture 2 - Looking Southeast

Subarea 5C Location 56

Picture 3 - Looking East

Subarea 5C Location 56

Picture 4 - Looking North


HGL—Technical Memorandum, Radiological Trigger Levels SSFL—Ventura County, California
Subarea 5C Group 6
Analysis Results
Santa Susana Field Laboratory
U.S. EPA Region 9
Legend
Drainage
Drainage Subsurface
StormSewer
Subsurface
Surface Subsurface
Exceed RTLs
HSA Features
5C Groups
Demolished Buildings
Existing Buildings
Geophysical Anomalies
Terrain Conductivity
Magnetometer
Cut and Fill Boundaries
Magnetometer Anomaly Linear
Terrian Conductivity Anomaly Linear
Point Source Magnetometer Anomaly
Point Source Terrain Conductivity Anomaly
Gamma Total Count (cps)
12700
14100
15500
16900
Location ID:141
Sample ID: 10242
Sample Depth:0-0.5 ft
Nuclide:Pu-239/Pu-240
RTL : 0.0406 pCi/g
Activity: 0.049 pCi/g
G St.
J St.
20th St.
22nd St.
Bldg 4015
BLDG 4707b
Scale In Feet
HGL

Subarea 5C Location 141

Picture 3 - Looking North

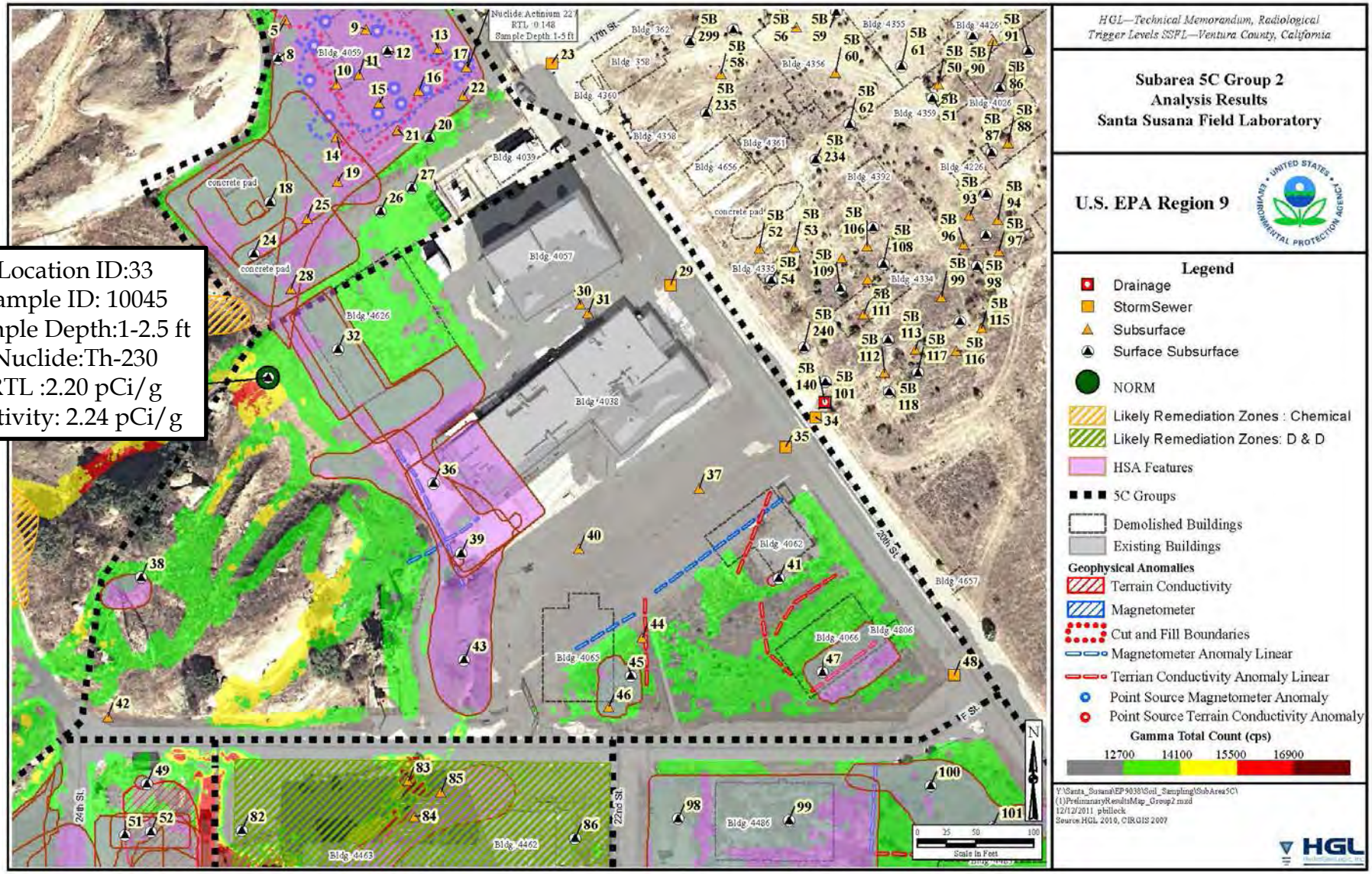
Subarea 5C Location 141

Picture 2 - Looking East

Subarea 5C Location 141

Picture 1 - Looking North

Location ID:33
Sample ID: 10045
Sample Depth:1-2.5 ft
Nuclide:Th-230
RTL :2.20 pCi/g
Activity: 2.24 pCi/g



Subarea 5C Location 33

Picture 1 - Looking West

Subarea 5C Location 33

Picture 2 - Looking West-Southwest

Subarea 5C Location 33

Picture 3 - Looking North

Round 2 Criteria

Step 1: Identify "Elevated" Locations By Screening Soil Results Against RTLs

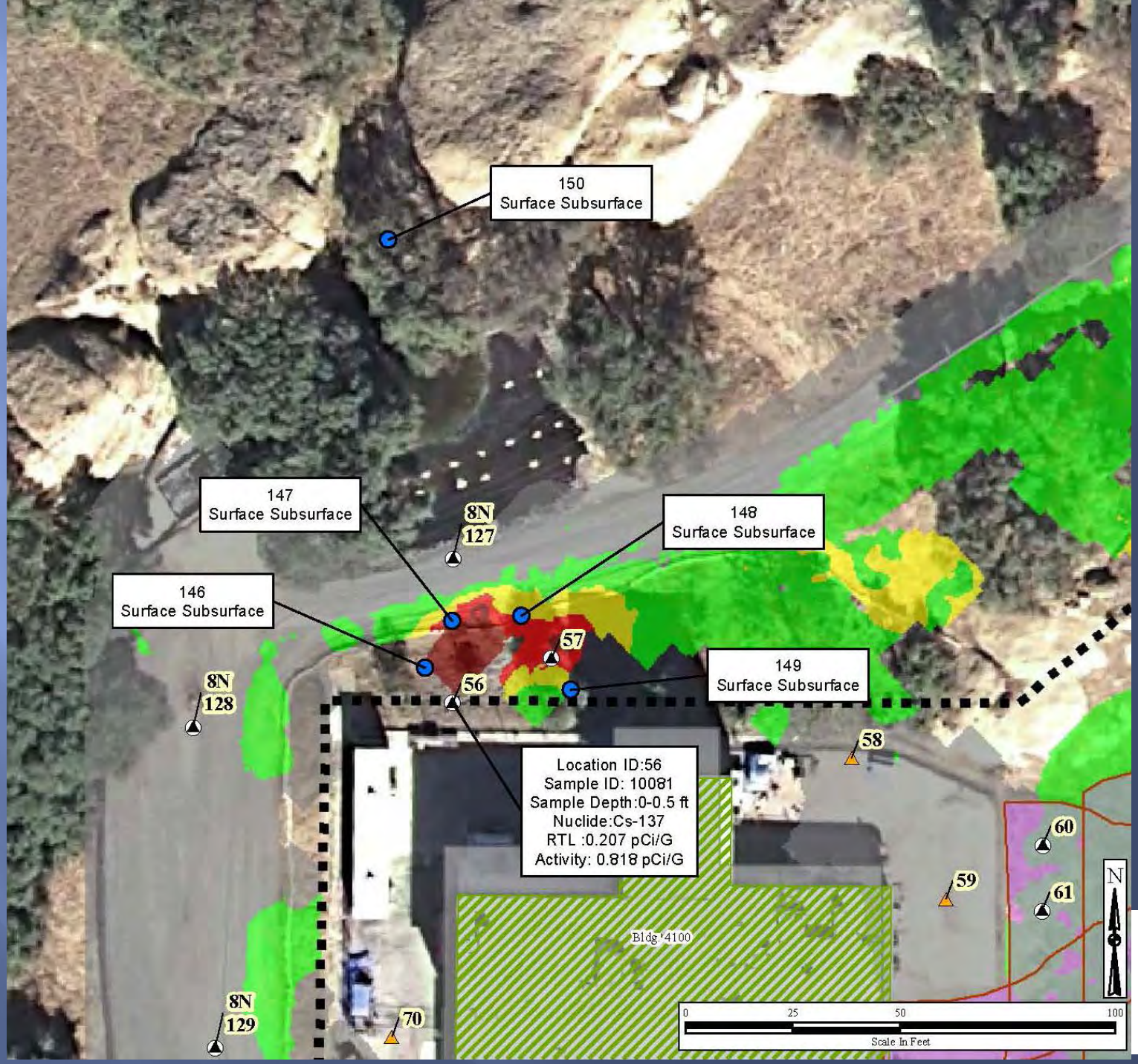
Step 2: Apply Professional Judgement

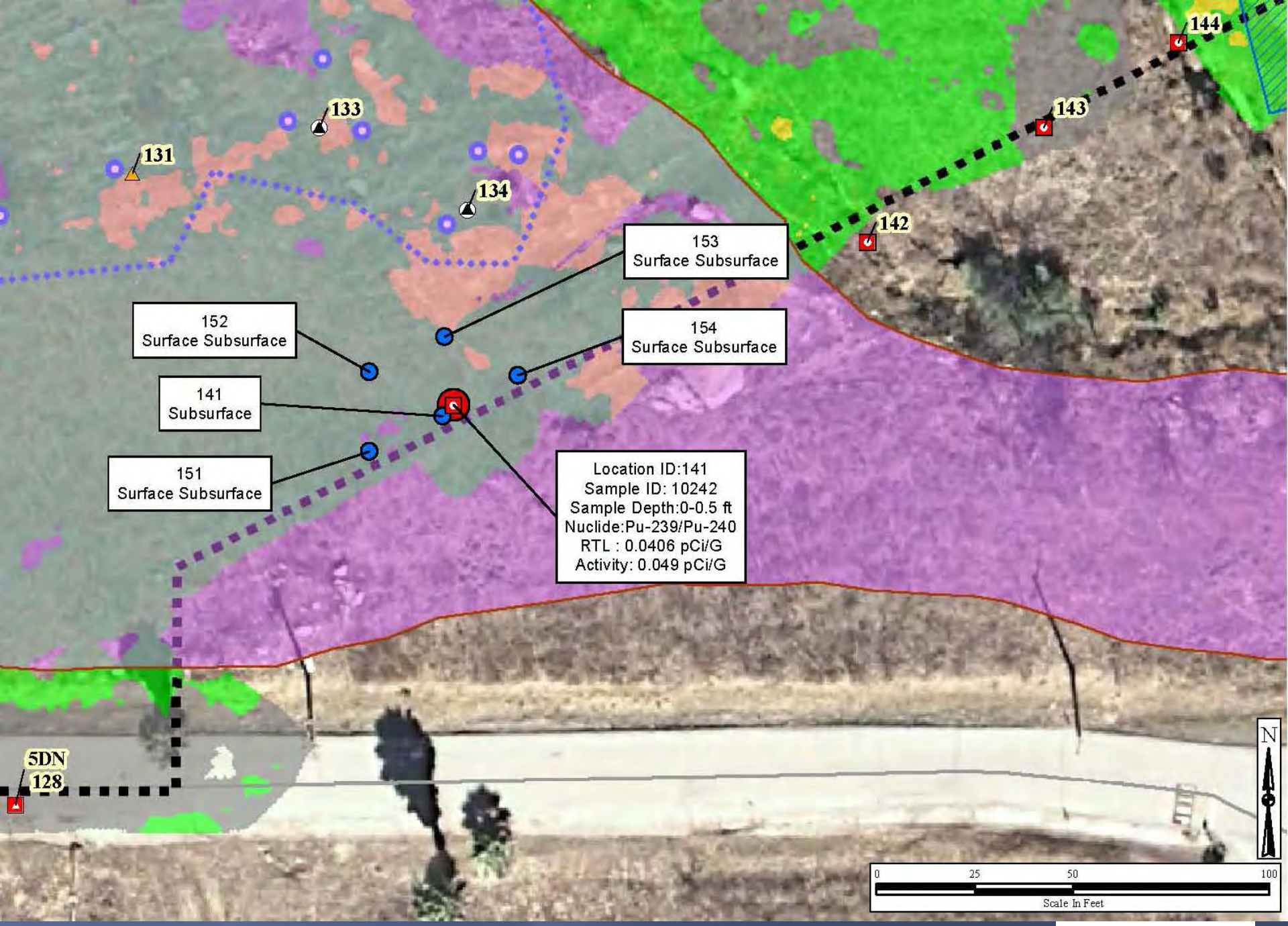
- Relative Activity Comparison
- Process History
- Rock Outcrops (ie. natural radioactivity)

Round 2 Criteria (cont.)

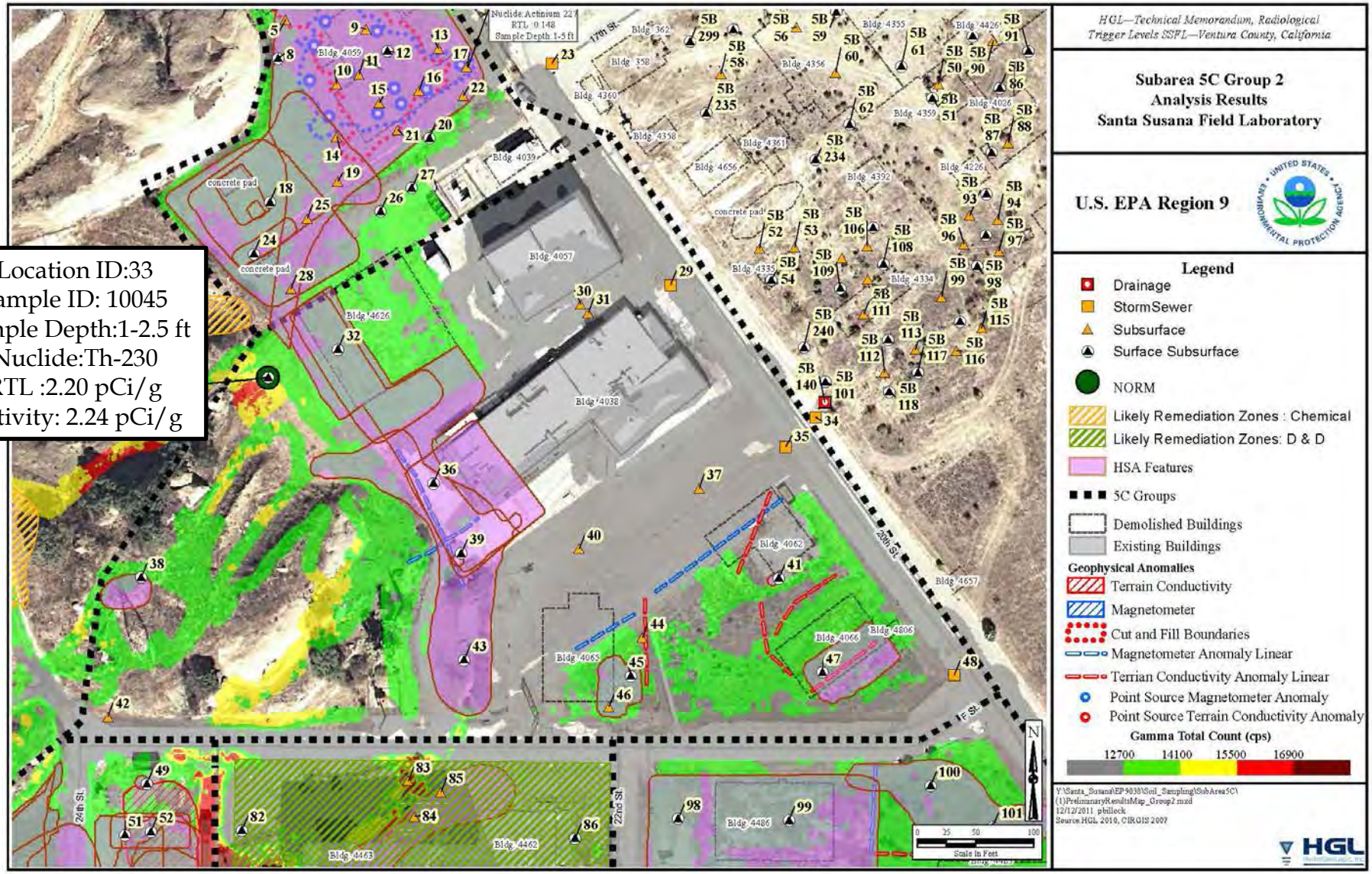
Step 3: Identify Step-outs

- Review Round 1 justification
- Is elevated location within a “likely remediation area”
- Use adjacent sample results to help “bound”
- Consider nearby gamma and geophysical anomalies
- Consider nearby results of past soil sampling
- Use HSA to identify excavations/D&Ds/removals
- Consider “protected” areas
- Field truth each location and consider drainage pattern
- Is elevated activity in surface or subsurface
- Use in-situ to help place step-outs


150
Surface Subsurface
147
Surface Subsurface
148
Surface Subsurface
146
Surface Subsurface
149
Surface Subsurface
8N
127
8N
128
8N
129
57
56
58
59
60
61
70
Location ID:56
Sample ID: 10081
Sample Depth:0-0.5 ft
Nuclide:Cs-137
RTL :0.207 pCi/G
Activity: 0.818 pCi/G
Bldg. 4100
N
0
25
50
100
Scale In Feet


144
143
142
133
131
134
153
Surface Subsurface
152
Surface Subsurface
154
Surface Subsurface
141
Subsurface
151
Surface Subsurface
Location ID:141
Sample ID: 10242
Sample Depth:0-0.5 ft
Nuclide:Pu-239/Pu-240
RTL : 0.0406 pCi/G
Activity: 0.049 pCi/G
5DN
128
N
0
25
50
100
Scale In Feet

Location ID:33
Sample ID: 10045
Sample Depth:1-2.5 ft
Nuclide:Th-230
RTL :2.20 pCi/g
Activity: 2.24 pCi/g



Important Questions and Next Steps

- Co-locate step-outs in “remediation” zones ?
- Need “Likely Remediation Zones” in 5C (from DOE)
- Issue DRAFT Round 2 5C FSP Addendum to EPA on January 6

Deep Borehole FSP Addendum

- 12 Location selected
- Targeting locations of reactor vaults
- Discuss each location
- Stakeholder comments due Dec 16
- Start sampling in mid-January

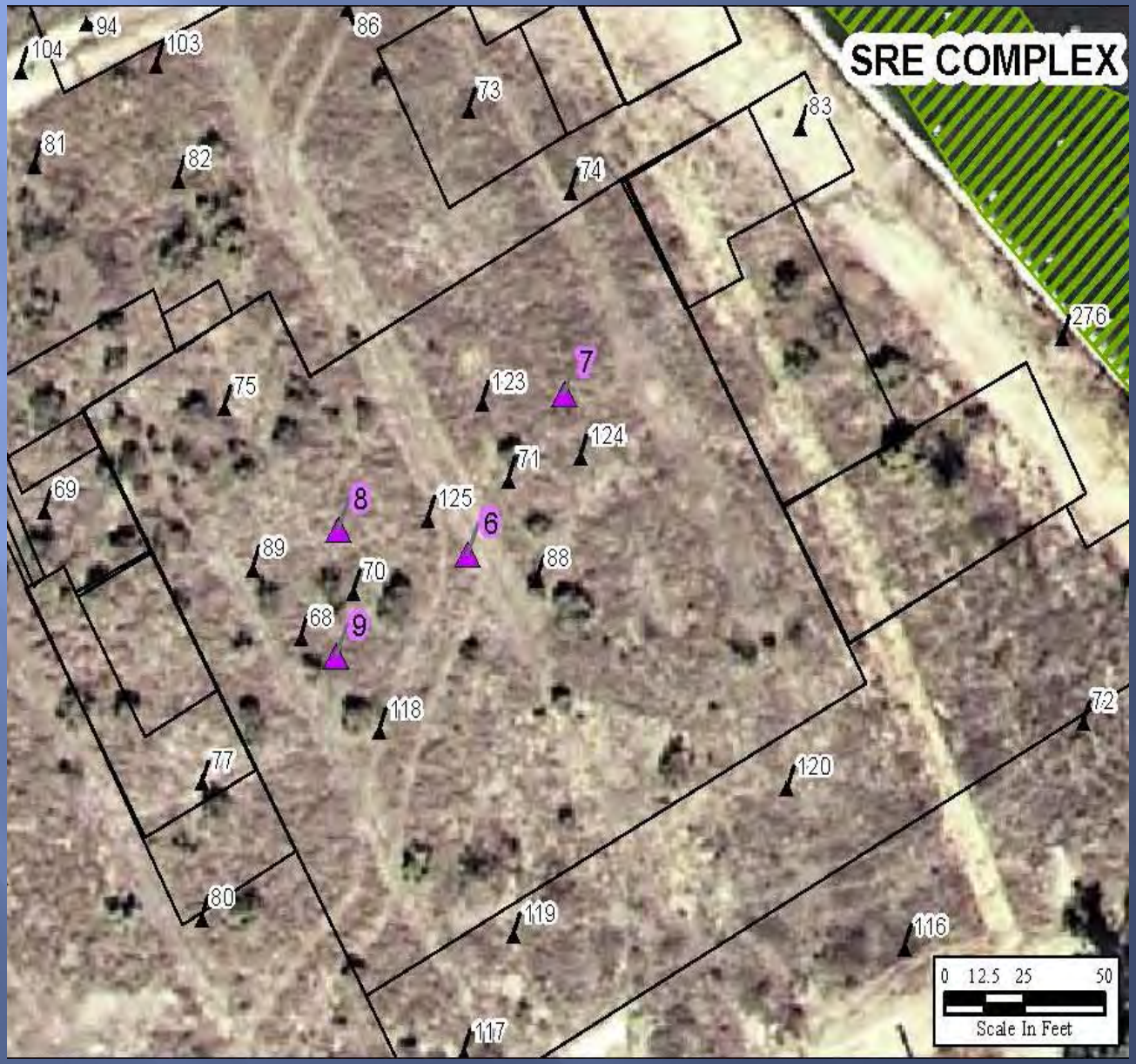
SNAP

159
123
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
25
26
27
0 10 20 40
Scale In Feet
SNAP

KEWB

129
130
128
146
5
133
4
131
134
139
132
140
142
138
135
145
137
136
KEWB
0 5 10 20
Scale In Feet

SRE COMPLEX


SRE COMPLEX
94
104
103
86
73
83
81
82
74
276
7
123
75
124
71
69
8
125
6
89
88
70
68
9
118
72
77
120
80
119
116
117
0 12.5 25 50
Scale In Feet

STIR

STIR
180
91
170
132
128
12
106
108
10
107
105
103
102
11
104
171
172
109
0 5 10 20
Scale In Feet

United States Environmental Protection Agency (USEPA)

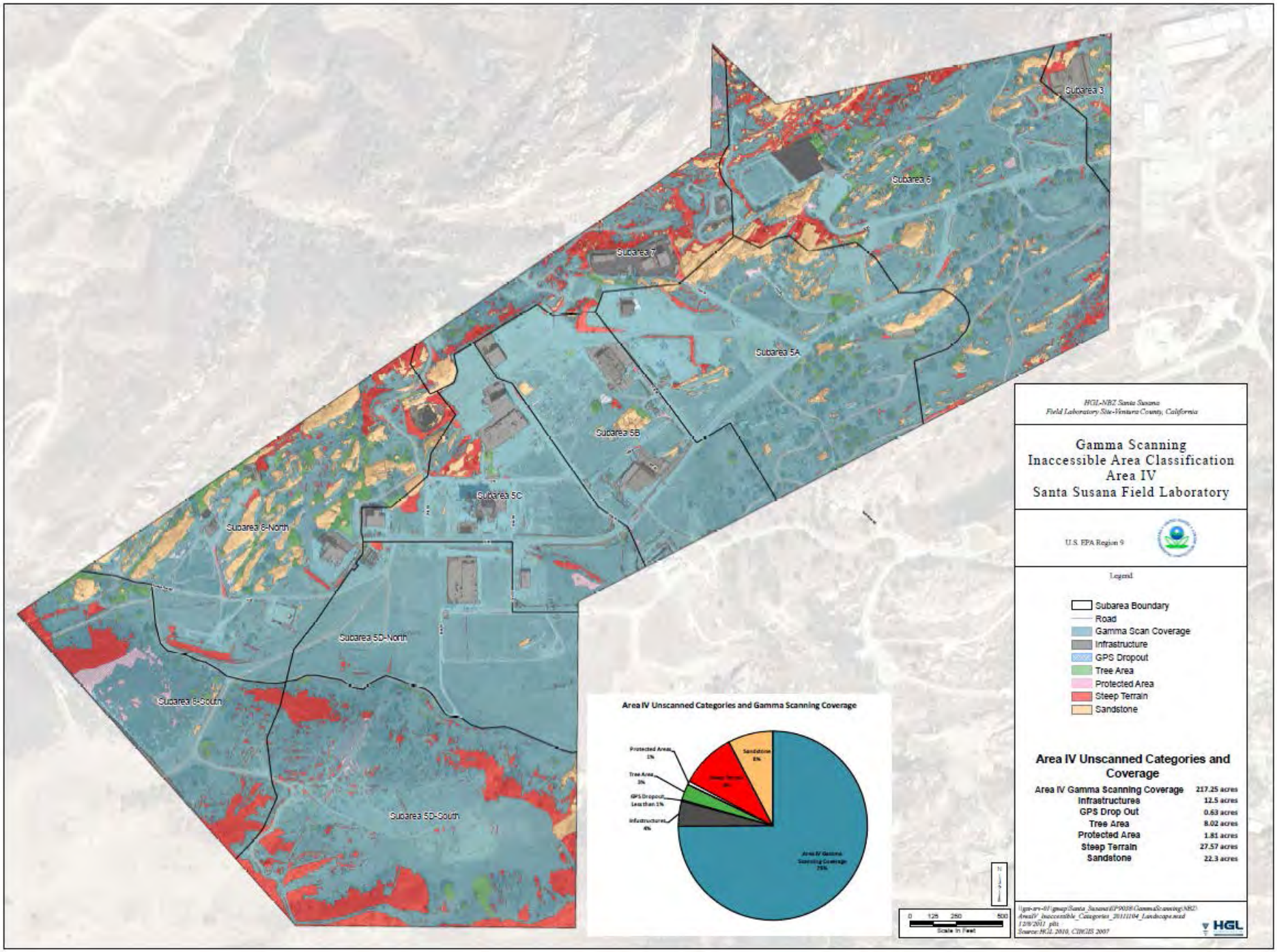
Santa Susana Field Laboratory (SSFL)

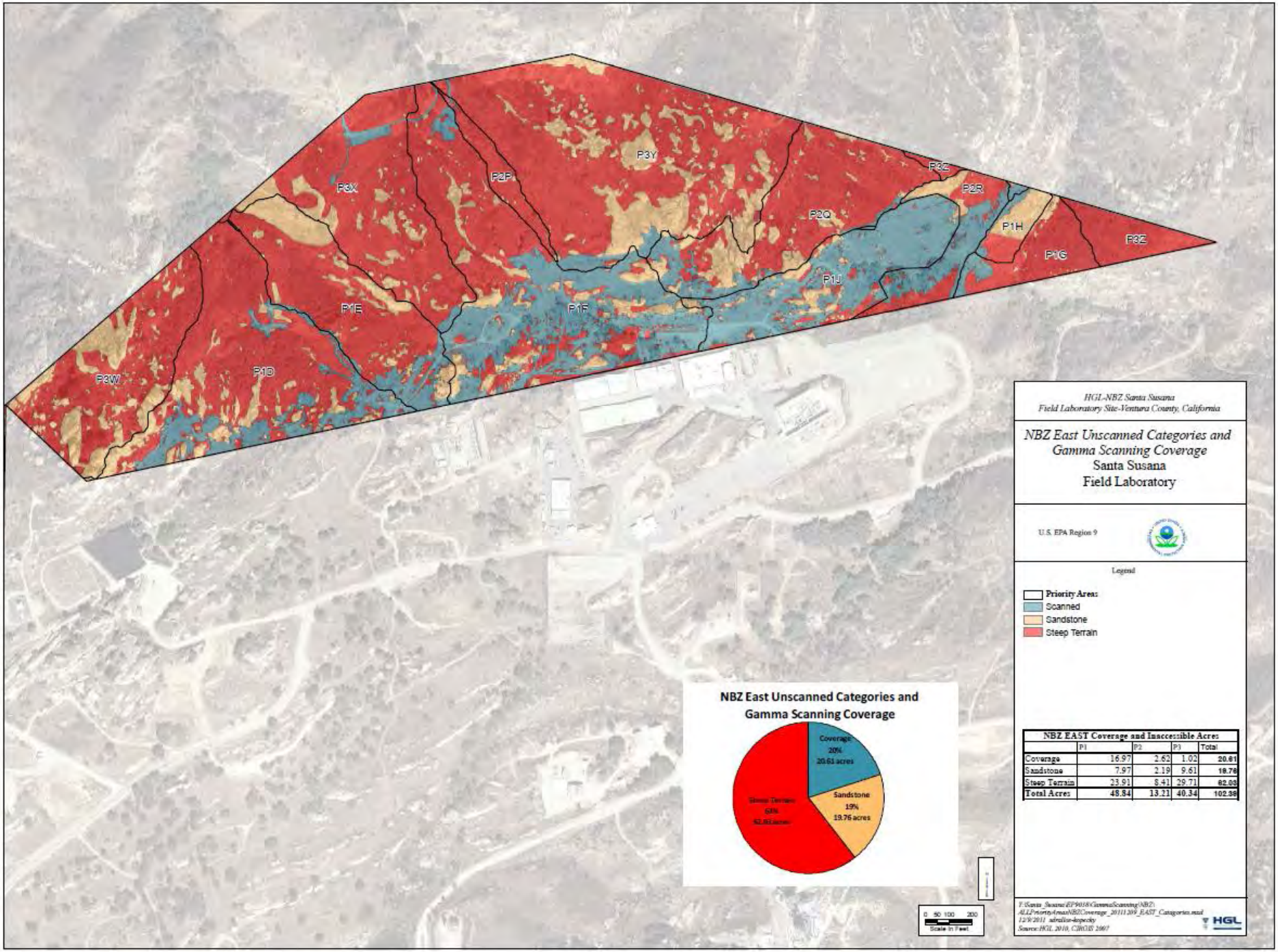
Project Update

December 14, 2011

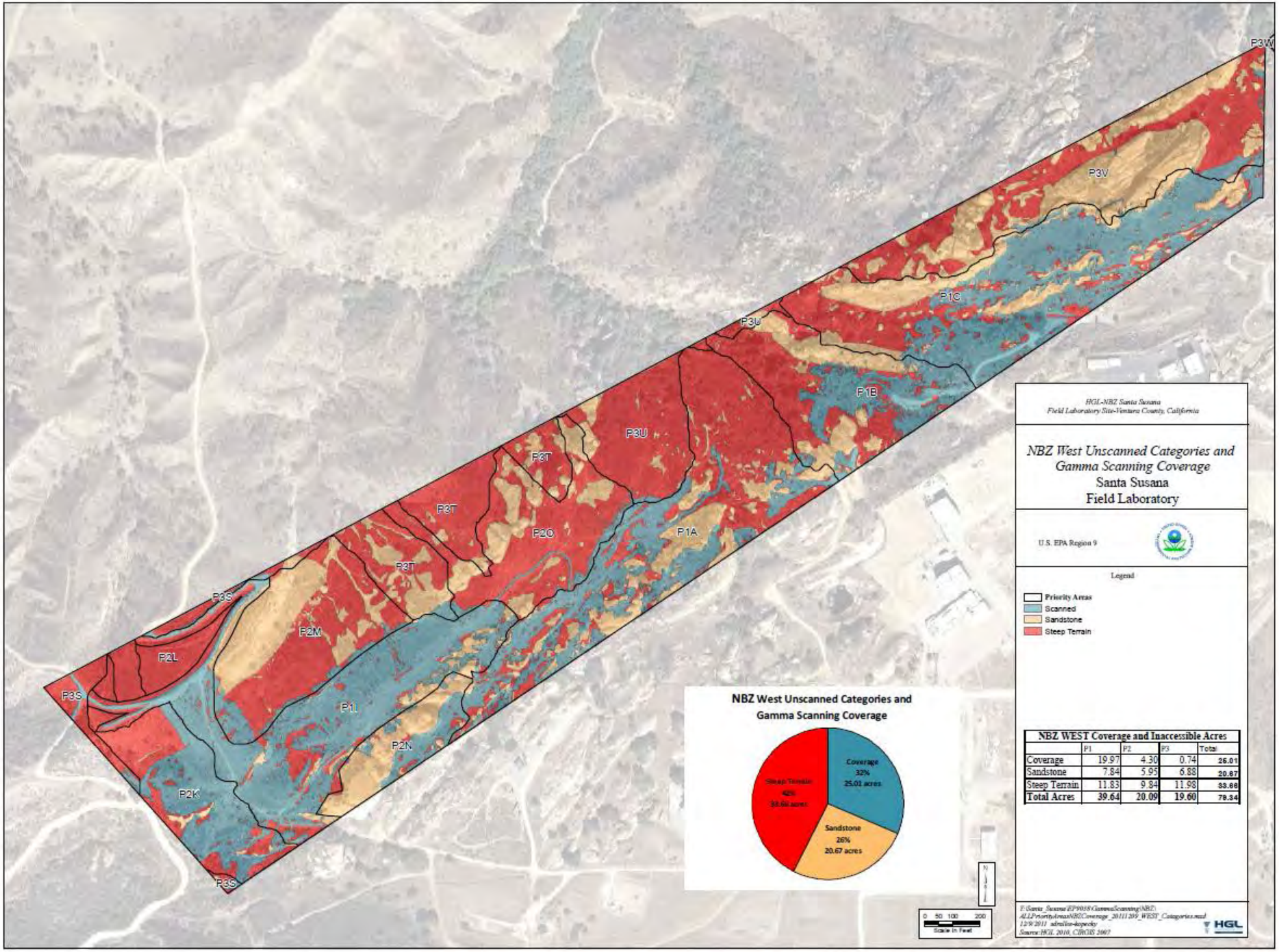
Gamma Scanning Statistics

	Area IV (ac.)	NBZ West (ac.)	NBZ East (ac.)
Scanned	217.25	25.01	20.61
Sandstone	22.3	20.67	19.76
Inaccessible	72.83	54.33	81.79
PGRAY	129	25	TBD
GRAY	61	TBD	TBD


Subarea 3
Subarea 6
Subarea 7
Subarea 5A
Subarea 5B
Subarea 5C
Subarea 8-North
Subarea 5D-North
Subarea 8-South
Subarea 5D-South
Area IV Unscanned Categories and Gamma Scanning Coverage
Protected Area 1%
Tree Area 3%
GPS Dropout Less than 1%
Infrastructures 6%
Sandstone 8%
Steep Terrain 8%
Area IV Gamma Scanning Coverage 73%
0 125 250 500
Scale in Feet
HGL-NBZ Santa Susana
Field Laboratory Site-Ventura County, California
Gamma Scanning
Inaccessible Area Classification
Area IV
Santa Susana Field Laboratory
U.S. EPA Region 9
Legend
Subarea Boundary
Road
Gamma Scan Coverage
Infrastructure
GPS Dropout
Tree Area
Protected Area
Steep Terrain
Sandstone
Area IV Unscanned Categories and Coverage
Area IV Gamma Scanning Coverage 217.25 acres
Infrastructures 12.5 acres
GPS Drop Out 0.63 acres
Tree Area 8.02 acres
Protected Area 1.81 acres
Steep Terrain 27.57 acres
Sandstone 22.3 acres
HGL



NBZ EAST Coverage and Inaccessible Acres				
	P1	P2	P3	Total
Coverage	16.97	2.62	1.02	20.61
Sandstone	7.97	2.19	9.61	19.76
Steep Terrain	23.91	8.41	29.71	62.03
Total Acres	48.84	13.21	40.34	102.39



NBZ WEST Coverage and Inaccessible Acres				
	P1	P2	P3	Total
Coverage	19.97	4.30	0.74	25.01
Sandstone	7.84	5.95	6.88	20.67
Steep Terrain	11.83	9.84	11.98	33.66
Total Acres	39.64	20.09	19.60	79.34

Round 1 Soil Sampling Area IV

- 2,643 soil samples proposed
- 207 soil samples could not be collected (i.e. shallow refusal, archeological zones)
- 2,436 soil samples collected (+ 5% duplicates)
  - Subarea 5C – 198
  - Subarea 5B – 447
  - Subarea 5A – 334
  - Subarea 5DN – 404
  - Subarea 8N – 237
  - Subarea 6 - 440
  - Subarea 7 - 257
  - Subarea 3 - 13
  - Subarea 5DS - 60
  - Subarea 8S - 46

SRE Deep Borehole

- Four borings completed November 30, 2011
- Depths of the borings were 4, 7, 19 and 20 feet below ground surface
- 11 soil samples were collected
  - 4 surface
  - 3 subsurface
  - 4 bedrock/soil interface
- Samples were shipped to the laboratory on December 1, 2011

SRE Pond
282
283
284
285
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123
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124
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77
118
120
72
80
119
116
76
112
114
17
6
20
18
24
36
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32
38
35
31
65
7

Laboratory Analysis and Data Validation

	Submitted	Analyzed	Validated
Groundwater	186	186	186 (-LSC)
Sediment	42	42	42
Surface Water	38	38	0
Soil	1920	1361	566

Recent Accomplishments

- Background Study Report
- Geophysical Final Report
- Interview Summary Report (report will be included with HSA Final Report)

Remaining Field Work

- Gamma Scanning
  - NBZ Priority 1 & 2 areas complete Dec 31, 2011
  - Subsurface sensitivity test
- Soil Sampling
  - Deep soil borings at select locations
  - NBZ soil sampling
  - Round 2 soil sampling
- Phase 2 Sediment Sampling

Key Milestones

REPORTS

Deep Borehole FSP Addendum	December 2011
HSA Final Report	January2012
Groundwater Final Report	March 2012
Gamma Scanning Final Report	May 2012

FIELD

Gamma Scanning	December 2011
Area IV Rd 1 Soil Sampling	December 2011
Phase 2 Sediment Sampling	June 2012
Rd 2 Soil Sampling	July 2012

United States Environmental Protection Agency (USEPA)

Santa Susana Field Laboratory (SSFL)

Project Completion Plan

December 14, 2011

Project Completion Plan

- On track to complete current contract by December 2012
- Use existing ARRA funding to complete the radiological study of Area IV and support AOC cleanup goal of 2017
- Unanticipated cost has forced EPA to re-evaluate approach and budget

Unanticipated Costs

- Gamma Scanning
  - Vegetation removal
  - Difficult terrain /Safety issues
  - Research and development
- Cultural and biological monitoring
  - SHPO required archeological and Native American monitors present during all ground disturbing activities
  - Fish & Wildlife required a Biological Opinion and monitoring
- Co-located sampling
  - Requires additional soil volume for chemical analysis
- Laboratory procurement
  - Low MDCs
  - Multiple laboratories

Summary of Current Expenditures

	Millions
Project Planning	$1.8
Historical Site Assessment	$1.6
Operations	$1.6
Community Relations	$0.2
Field	
Cultural/Natural Resources	$2.2
Vegetation Clearing	$1.7
Geophysics	$1.1
Gamma Scanning	$5.0
Soil Sampling	$2.7
Groundwater/Surface Water/Sed	$0.7
Lab Management & Analysis	$2.8
Reporting and Data Evaluation	$1.0

Completion Approach

- Complete gamma scanning by December 31, 2011
- Reallocate unused soil samples to help offset increased costs (~800-900 samples)
- Complete Round 2 sampling in Area IV
- Limited NBZ soil sampling (50 samples)
- Limited random soil samples if budget allows
- Look for additional cost savings

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