United States Environmental Protection Agency (USEPA)

Radiological Study

Santa Susana Field Laboratory (SSFL)

SSFL Technical Stakeholder Group Meeting

April 22, 2010

Agenda

- Gamma Radiation Scanning Update
- Building 204 and Boeing Access Agreement Update
- Historical Site Assessment Update
- Laboratory Procurement Update
- Soil Sampling SAP Update
- Groundwater, Surface Water, and Sediment SAP Update
- Radiological Background Study Update

Gamma Radiation Scanning Status Update

Agenda

- Milestones Progress
- Equipment Update
- Preliminary Map of Surface Attributes
- Tentative Schedule

Milestones Progress

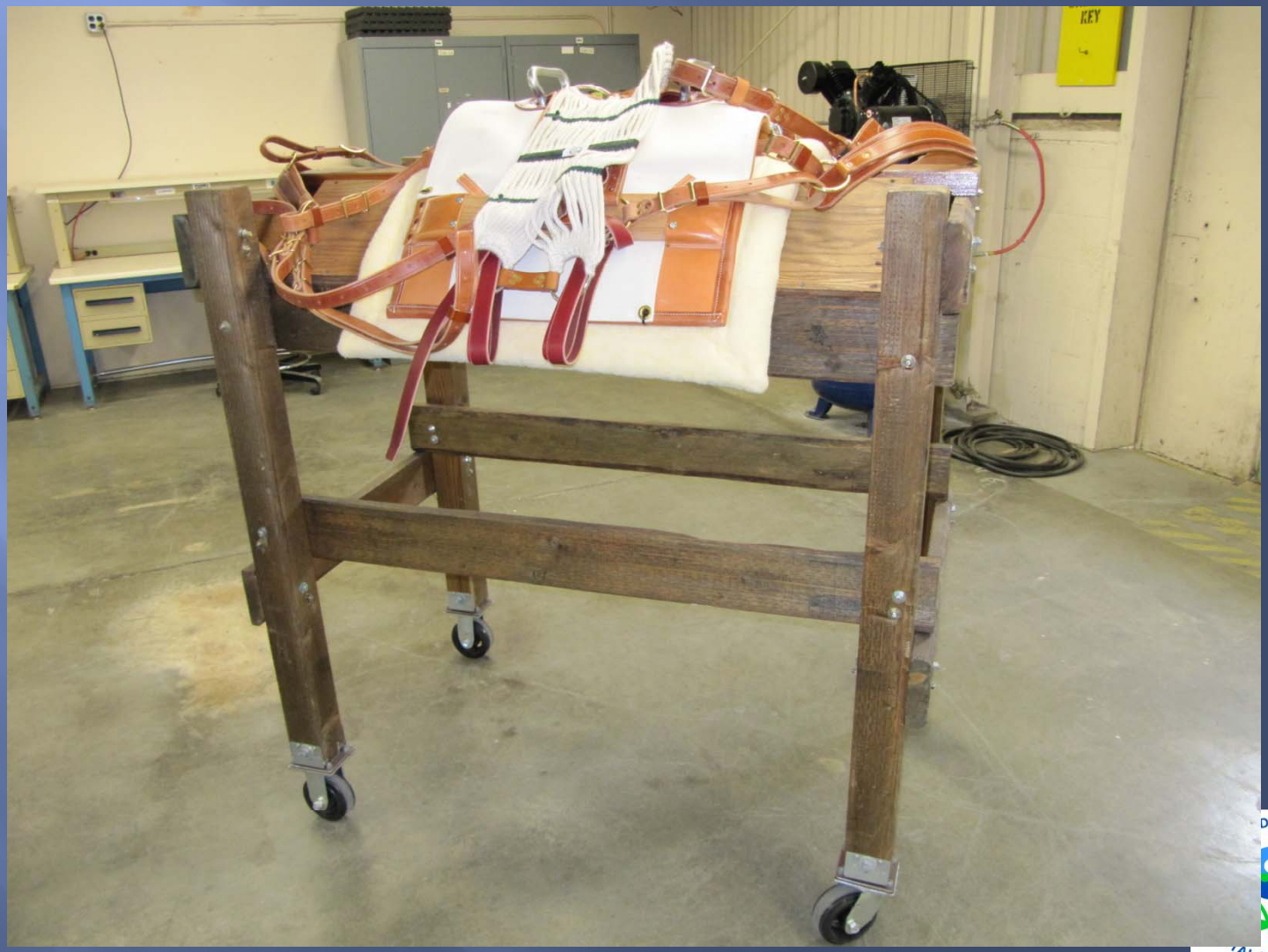
- ✓ Initial project planning
- ✓ Final Gamma Radiation Scanning SAP
- ➢ Equipment purchase/lease and preparation
- ❑ Detection system integration/testing
- ❑ RBRA data collection
- ❑ Scanning survey of Study Area
- ❑ Continuous data evaluation and analysis
- ❑ Interim report preparation
- ❑ Final report preparation

ERGS II Detectors

ERGS II Shield

MMGS Detectors and Shields

MMGS Model



WMGS Detectors and Shields

WMGS

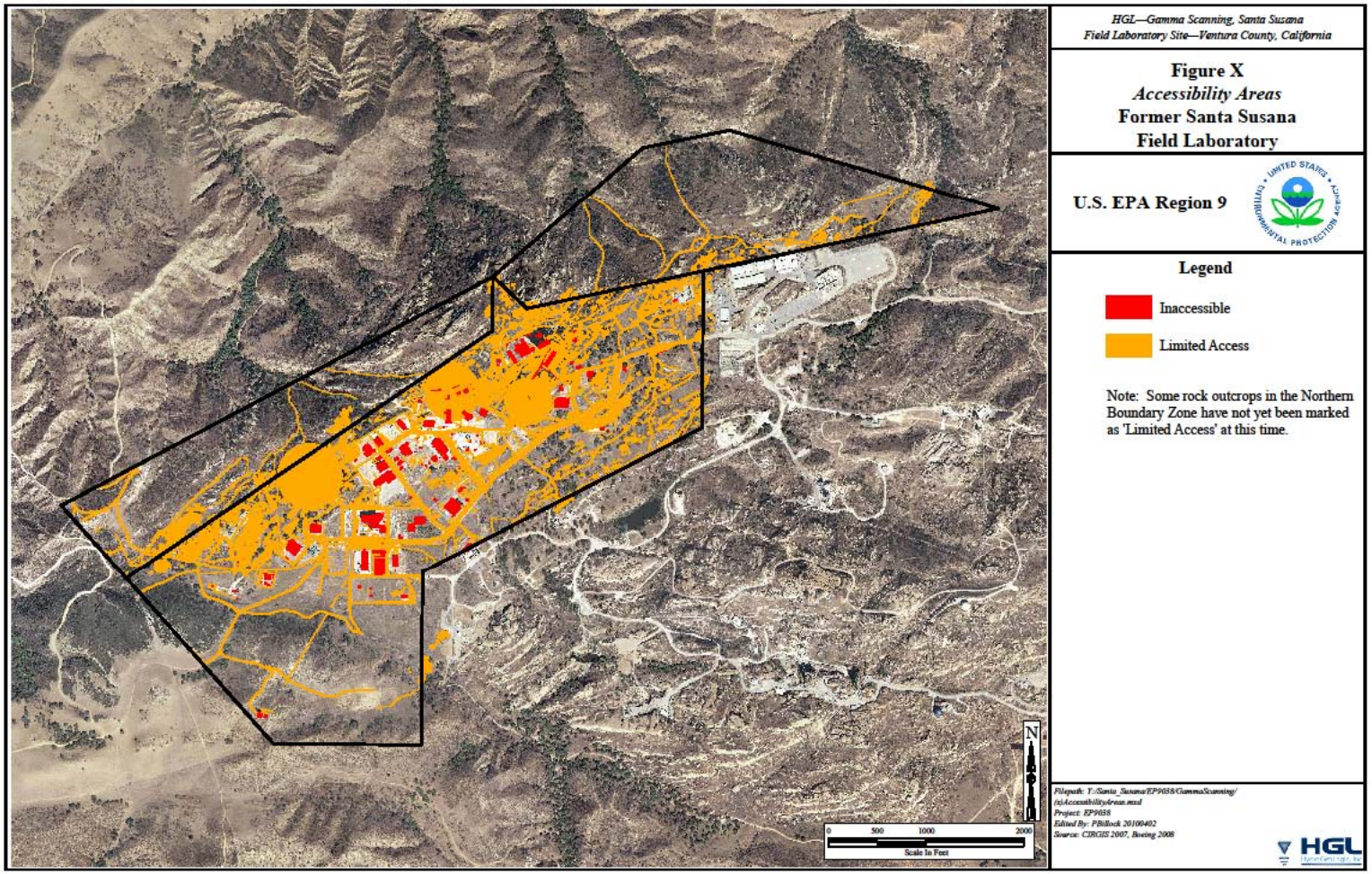
HHGS Detectors and Shields

Shields Under Construction

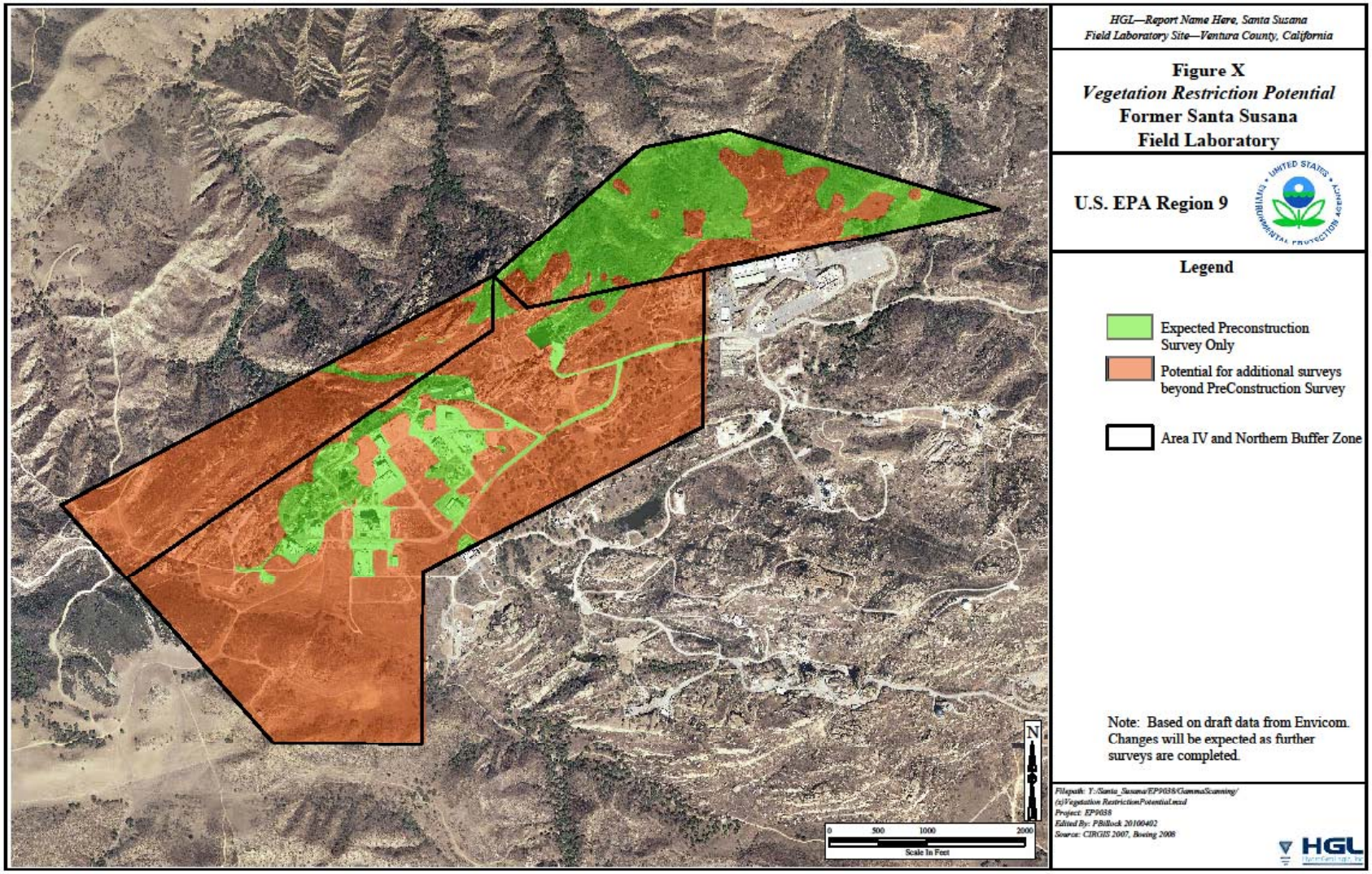
Various Radiation Detectors

Radioactive Check Sources

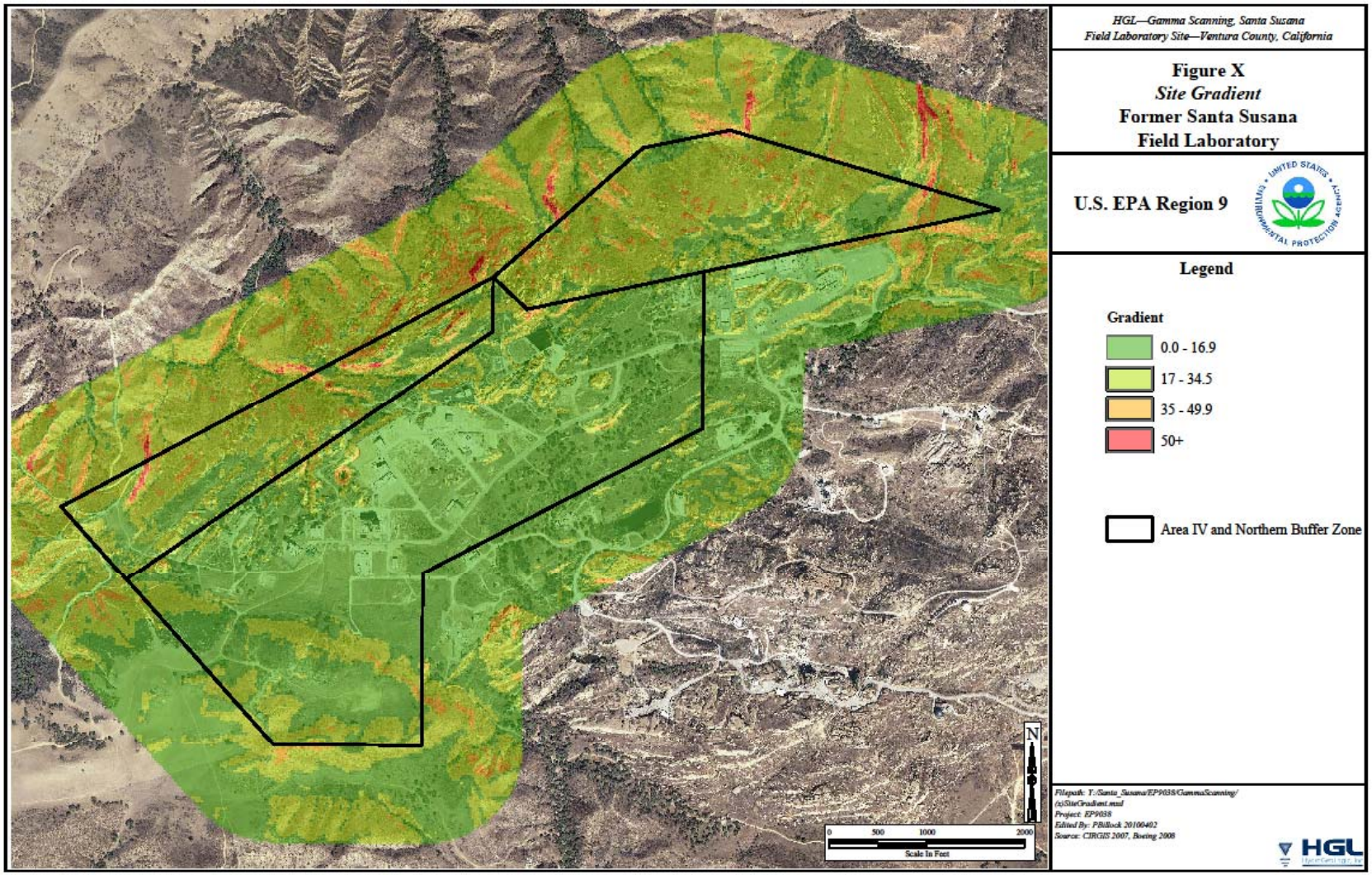
Preliminary Map of Limited Access & Inaccessible Access Area



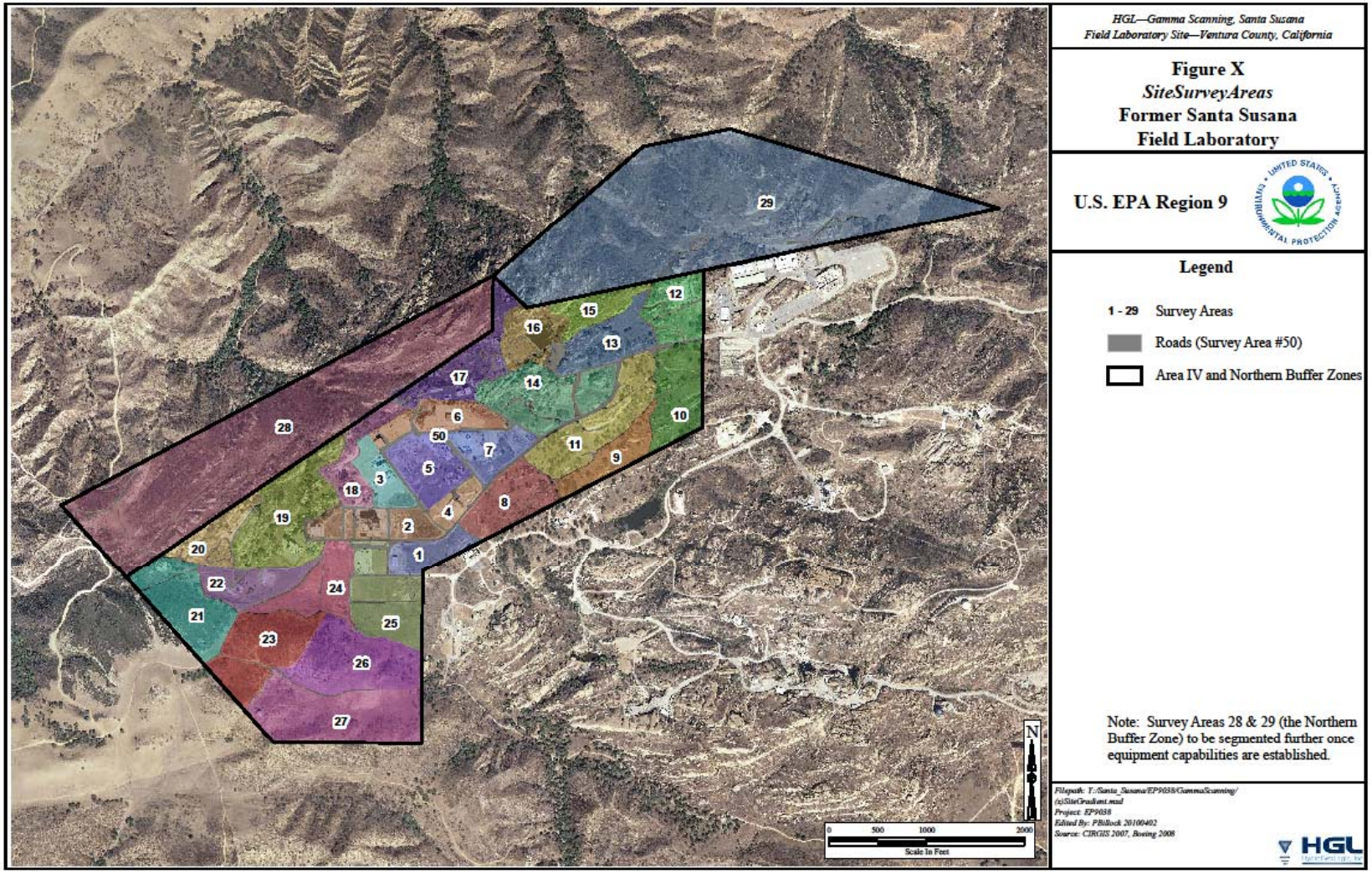
Preliminary Map of Vegetation



Preliminary Map of Gradient



Preliminary Map of Survey Area Categories



Tentative Schedule

- ✓ April: Receive RadAssist training for ERGS II, MMGS, and WMGS systems
- April: Integrate and test detector systems: detectors, GPS, computers, transportation mechanism, etc.
- May: Conduct sensitivity tests at Walker Field pads, Grand Junction, CO
- May: Conduct terrain accessibility testing

Tentative Schedule (Continued)

- May: Collect background data at RBRAs
- May: Locate Field QC Area (FQCA) in Area IV
- May: Conduct subsurface sensitivity tests in FQCA
- May: Design and install decontamination pad

Tentative Schedule (Continued)

- May: Amend EPA's Radioactive Materials License for nuclear density gauge (NDG), then lease a NDG
- June: Conduct radiation worker, general H&S, and gamma scanning training
- May/June: Preparation of survey areas

June: START SCANNING SURVEYS!

Yippee!!!

EPA Contact Information

- Mary Aycock, Remedial Project Manager
  - (415) 972-3289
- Gregg Dempsey, Technical Advisor
  - (702) 784-8232

Questions?

Access Agreements for EPA Radiological Study

Access for EPA's Field Office

- Transfer letter and Memorandum of Understanding signed in December 2009
- Parties: EPA and GSA
- Scope: Building 204 and adjacent paved areas
- Purpose: Temporary transfer and custody of Building 204 to EPA to establish and operate a field office for Area IV radiological study

Access for EPA's Field Office

- Terms: Rent free. EPA pays for building improvements.
- Status: EPA and EPA contractor staff have moved in. Field office is operational.
- Project Kick-Off Event: At EPA's Field Office, May 12, 10am

EPA Access to SSFL

- CERCLA Administrative Order on Consent signed in March 2010
- Parties: EPA and Boeing
- Scope: Provides EPA with entry and access rights to SSFL. Boeing participates and cooperates with EPA per the Order.
- Status: Final and effective.

How to Find the Access Agreements

- http://www.epa.gov/region09/SantaSusana

  (This web address is case sensitive)
- Scroll down to section called “Access Agreements”
- Please email Craig Cooper with any questions about the access agreements

Historical Site Assessment Technical Memorandum HSA-5C Status Update

Historical Site Assessment for Area IV and Northern Buffer Zone (NBZ)

- Recap - Goals of EPA's Historical Site Assessment (HSA)
- Preliminary Findings of Technical Memorandum (TM) HSA-5C
- TM Next Steps

Recap - Goals of EPA's HSA

Goals of the HSA

- Confirm list of radionuclide potential COCs.
- Aid in determining appropriate targeted soil sampling locations.
- Identify EPA's preliminary MARSSIM classifications.

MARSSIM Overview

- The Multi-Agency Radiation Surveys and Site Investigation Manual (MARSSIM) provides guidance for site classifications.
- All sites within the EPA's Area IV Study Area are considered to have a reasonable potential for residual contamination.
- MARSSIM classifies sites with a reasonable potential for residual contamination as either Class 1, 2, or 3.
  - Class 1: high potential for radioactive contamination.
  - Class 2: moderate potential for radioactive contamination.
  - Class 3: low potential for radioactive contamination.

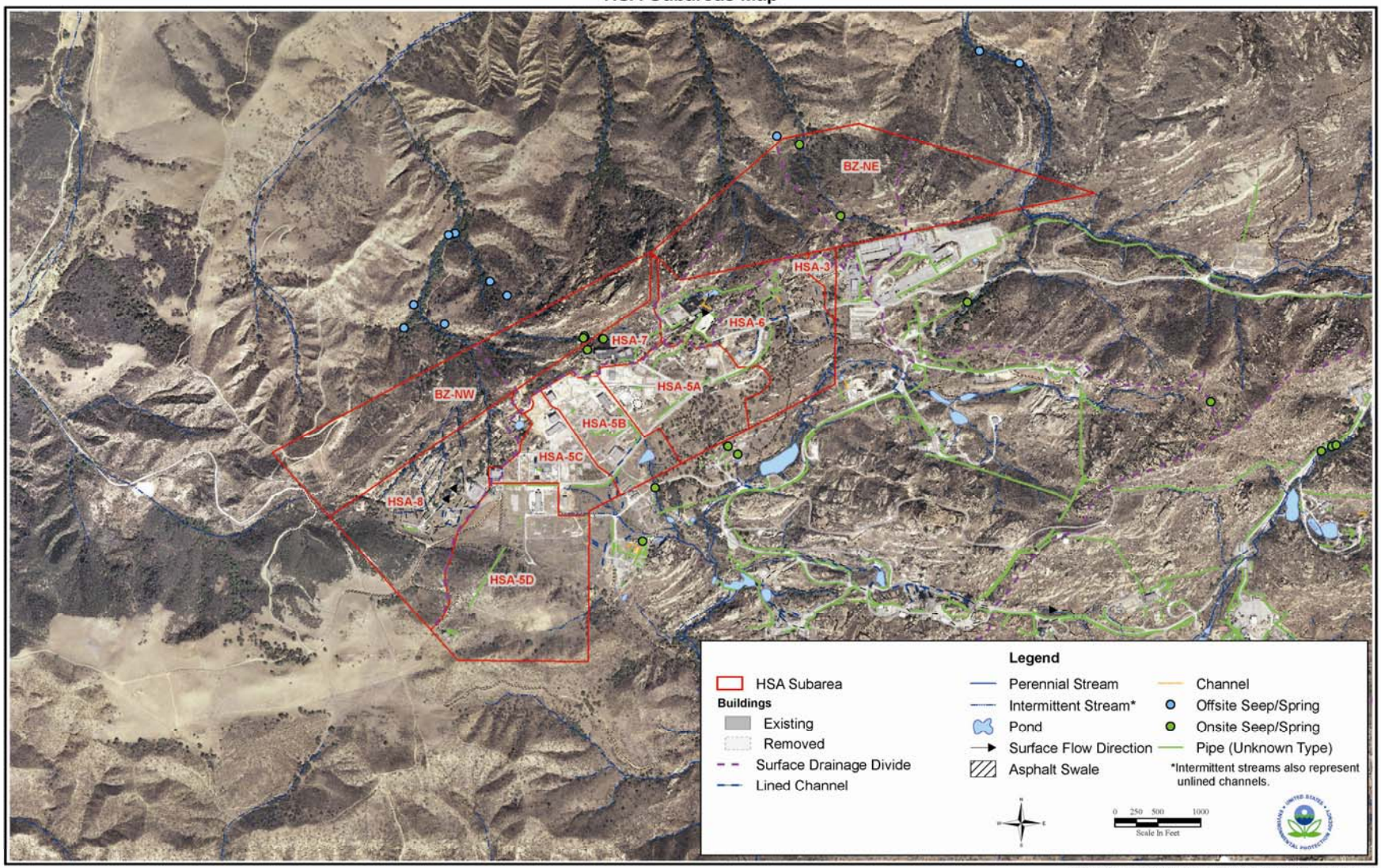
Goals of the HSA TM Strategy

- Before the HSA is prepared, technical memoranda are being produced to provide:
  - Timely information to field teams so information can be integrated into sampling plans as soon as possible.
  - A means of facilitating stakeholder feedback to refine the HSA findings.

TM HSA-5C Stakeholder Input

- Seeking a collaborative effort with stakeholders.
- TM and stakeholder comments and recommendations will aid in the design of EPA's upcoming field sampling efforts.
- Stakeholder input should focus on the scope, use, release and potential migration of radioactive substances within Subarea HSA-5C.

HSA Subareas Map



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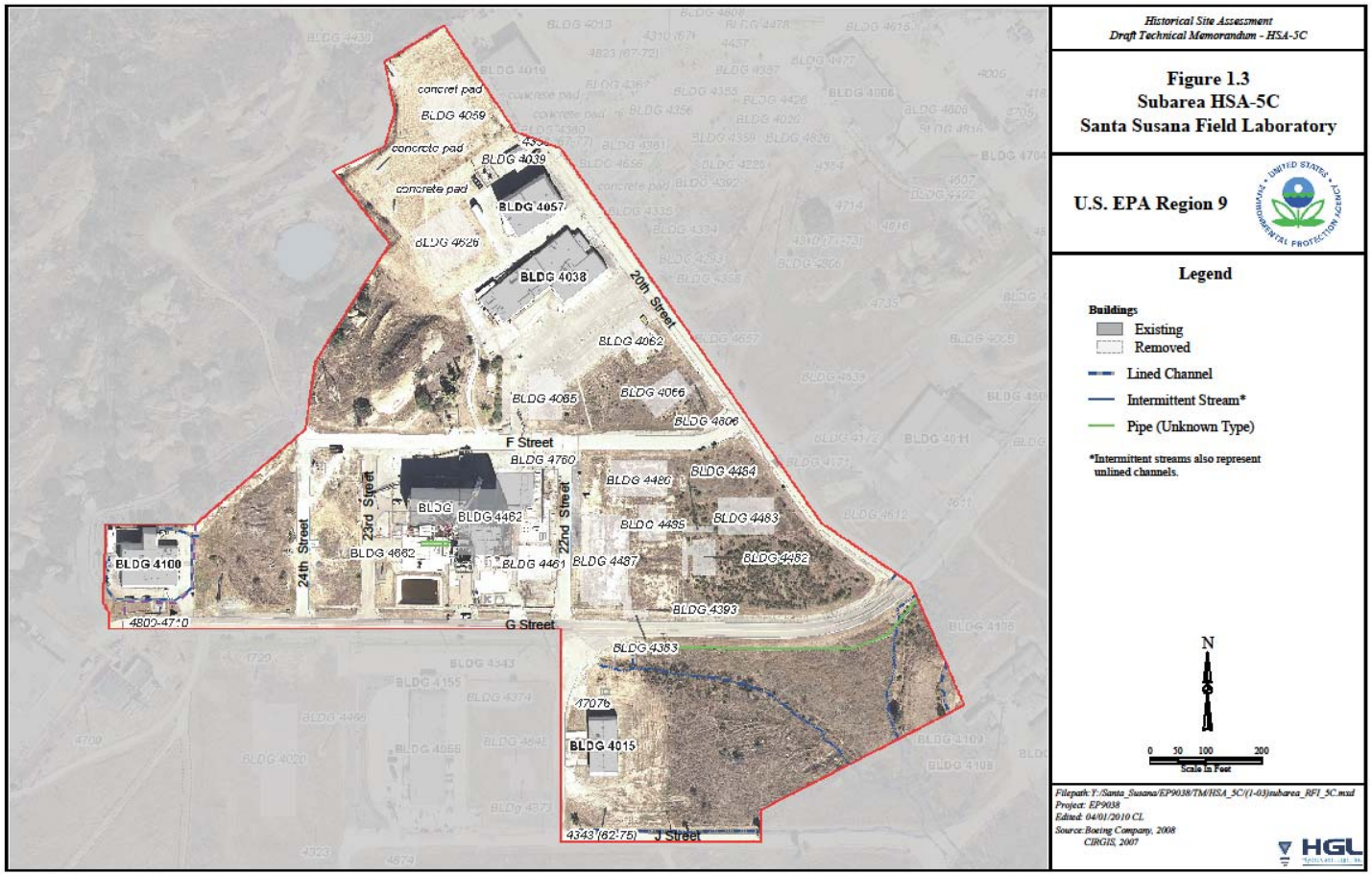
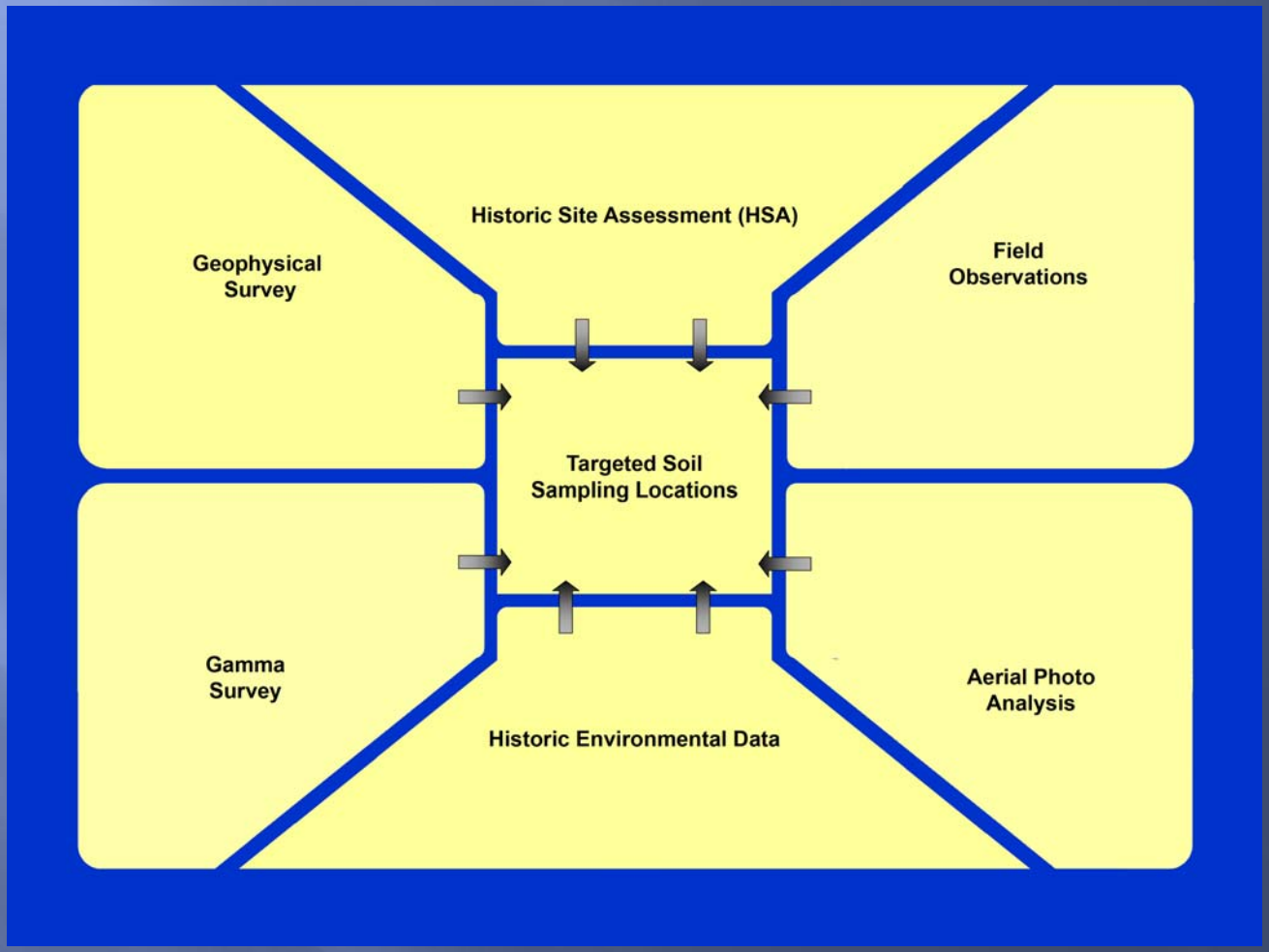
HSA-5C Subarea Outline



Inputs to EPA's Soil Sampling



Preliminary Findings of TM HSA-5C

TM HSA-5C Preliminary Findings

- HSA-5C Physical Description.
  - Approximately 21.9 acres of flat land.
  - Contained 21 buildings, 2 parking lots, and 1 concrete pad (comprising 24 sites).
  - No surface impoundments in this subarea.
  - Several areas of disturbed ground.
  - Current drainage is generally to the southeast.
  - Of the 24 sites in Subarea HSA-5C, only 6 buildings remain today.

TM HSA-5C Preliminary Findings (Cont.)

- Radiological Operations.
  - Of the 24 sites in HSA 5C, 2 were reactor buildings and 3 housed other operations involving radioactive materials.
  - At these 5 sites, radiological operations were related to the Systems for Auxiliary Nuclear Power (SNAP) and SNAP 8 programs as well as to the Advanced Epithermal Thorium Reactor.
  - No evidence was found to indicate that operations in the remaining 19 sites included radioactive materials.
- Examples from a non-reactor building and a reactor building follow.

Building 4487 Site Plan

Building 4487 Preliminary Findings

- Site Description.
  - The Building 4487 area comprised Building 4487 and the land surrounding it located on 22nd Street.
- Building Features.
  - Building had a septic tank that was later excavated and removed.
- Former Use.
  - Office building for Energy Technology Engineering Center (ETEC) Engineering, and Safety Health and Environmental Affairs (SHEA).

Building 4487 Preliminary Findings (Cont.)

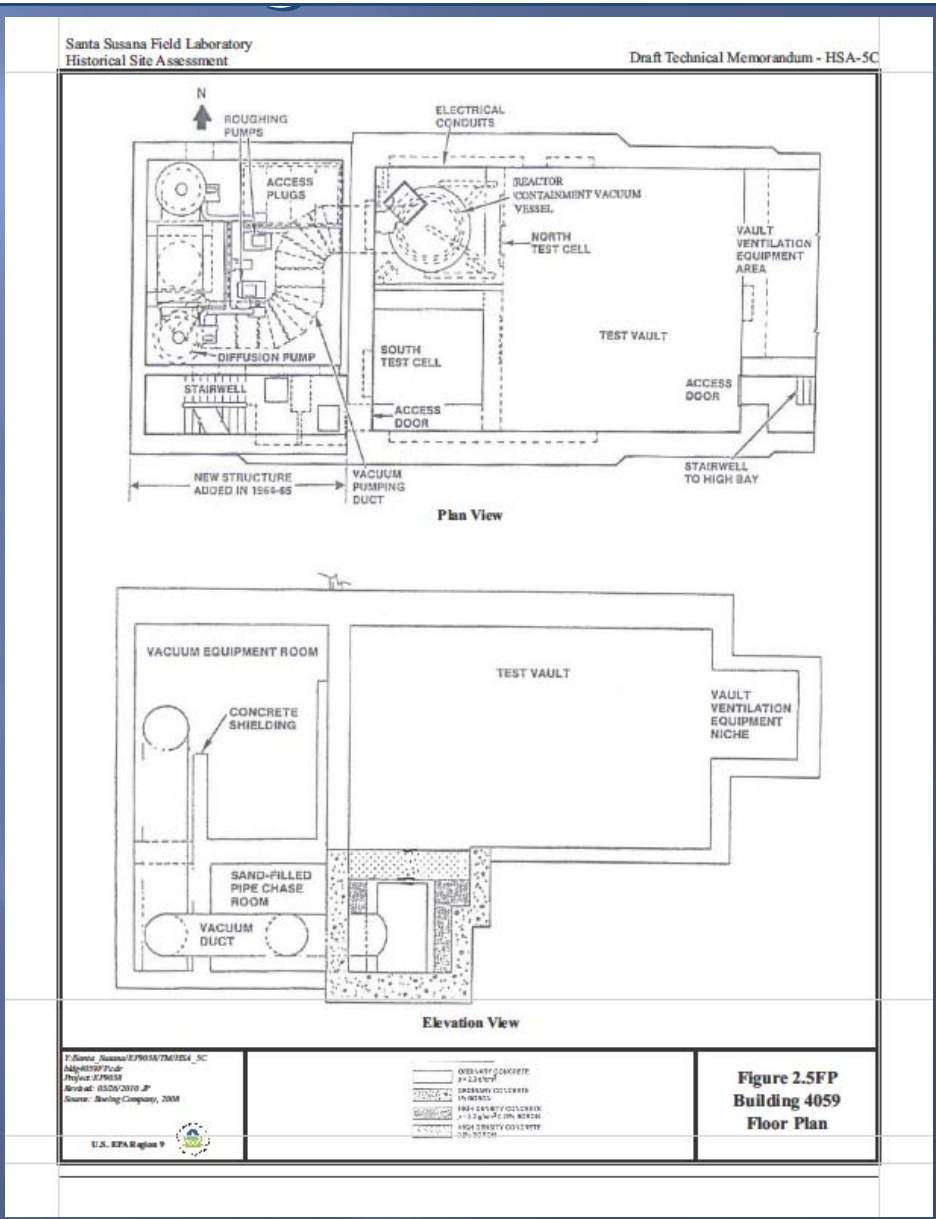
- Current Use.
  - Demolished in 2004.
  - Based on available information, the dimensions of the excavation made during building demolition are unknown.
- Drainage Pathways.
  - South of Building 4487, a drainage channel carries surface water southeast of the site.
  - In 1965, the drainage channel collected drainage from Buildings 4009, 4020, and 4100 where radioactive materials were used.

Building 4487 Preliminary Findings (Cont.)

- Radiological Use Authorizations/Incident Reports.
  - None.
- Preliminary MARSSIM Classification: Class 3.

Building 4059 Site Plan

Building 4059 Floor Plan



Building 4059 Preliminary Findings

- Site Description.
  - The Building 4059 area comprised Building 4059, substation Building 4759, and the land surrounding these two buildings located on 20th Street.
  - Building 4059 was constructed in 1962/63 and was modified in 1964 to provide a simulated space environment for ground-testing the Systems for Auxiliary Nuclear Power (SNAP) prototype reactor, S8DR.
- Building Features.
  - Building 4059 had a below-ground reactor test vault 28 by 39 feet in area and 32 feet deep.

Building 4059 Preliminary Findings (Cont.)

- Building Features (Cont.).
  - The building had a radiological liquid waste system and a separate radioactive gas holdup system that discharged through a stack.
- Former Use.
  - Building 4059 housed the SNAP 8 prototype reactor, S8DR, Large Leak Test Rig, and Ground Prototype Test Facility.
- Current Use.
  - Building 4059 was demolished in 2004.
- Former Radiological Burial or Disposal Locations.
  - In 1964, a French drain was installed before reactor testing commenced. No construction details or information pertaining to discharge to the drain were found.

Building 4059 Preliminary Findings (Cont.)

- Radiological Use Authorizations/Incident Reports.
  - Several incidents with varying severity.
  - TM contains a listing of incidents.
  - Examples include:
    - Fuel elements leaking hydrogen and fission products.
    - Filter on a vacuum cleaner filter ruptured.
    - A sodium/potassium (NaK) fire broke out in the Pipe Chase Room; subsequent inspection of the exhaust duct filter revealed no airborne radioactivity.
    - An open box of filters was dropped while changing the exhaust system filters.

TM HSA-5C Preliminary Findings (Cont.)

Summary of Subarea HSA-5C Sites

Site No.	Use(s)	Current Status	Potential Radiological Contaminants of Concern	MARSSIM Class
4015	Construction Material Storage	Standing	None specifically identified.	2
4038	Systems for Nuclear Auxiliary Power (SNAP) Office Building	Standing	Activation products of europium (primarily Eu-152), and cobalt-60 (Co-60).	2
4039	SNAP Administration Building, Liquid Metal Engineering Center (LMEC) Office Building, Health Physics Counting Laboratory	Demolished	Natural and enriched uranium (U-238, U-234, U-235), isotopes of plutonium (Pu-238, Pu-239, Pu-240, Pu-241), americium -241 (Am-241), fission products (cesium-137 (Cs-137), strontium-90 (Sr-90)), and activation products (tritium (H-3), iron-55 (Fe-55), Co-58, Co-60, nickel-63 (Ni-63), barium-133 (Ba-133), Eu-152, Eu-154, Eu-155, promethium-147 (Pm-147), tantalum-182 (Ta-182))	1
4057	Launch Handling and Mobile Equipment Development Building, LMEC Laboratory	Boeing Records Room	Natural and enriched uranium (U-238, U-234, U-235), isotopes of plutonium (Pu-238, Pu-239, Pu-240, Pu-241), Am-241, fission products (Cs-137, Sr-90), and activation products (H-3, Fe-55, Co-58, Co-60, Ni-63, Ba-133, Eu-152, Eu-154, Eu-155, Pm-147, Ta-182)	1
4059	SNAP 8 Development Reactor, Large leak Test Rig, Ground Prototype Test Facility	Demolished	Natural and enriched uranium (U-238, U-234, U-235), isotopes of plutonium (Pu-238, Pu-239, Pu-240, Pu-241), Am-241, fission products (Cs-137, Sr-90), and activation products (H-3, Fe-55, Co-58, Co-60, Ni-63, Ba-133, Eu-152, Eu-154, Eu-155, Pm-147, Ta-182).	1
4062	Energy Technology Engineering Center (ETEC) Instrumentation Operations Building, Storage Facility for Instrument Calibration	Demolished	None specifically identified.	2
4065	SNAP Thermoelectric Converter Test Building, LMEC Chemical Laboratory	Demolished	Tritiated titanium (Ti, H-3), irradiated SNAP-8 fuel oxide (Natural and enriched uranium (U-238, U-234, U-235), isotopes of plutonium (Pu-238, Pu-239, Pu-240, Pu-241), Am-241, fission products (Cs-137, Sr-90), and activation products (H-3, Fe-55, Co-58, Co-60, Ni-63, Ba-133, Eu-152, Eu-154, Eu-155, Pm-147, Ta-182)).	2
4066	Instrumentation Repair and Calibration Building, Instrument Laboratory	Demolished	Natural and enriched uranium (U-238, U-234, U-235).	2
4100	Advanced Epithermal Thorium Reactor, (AETR), Fast Critical Experiment Laboratory (FCEL), Radiation Safety and Computed Tomography	Standing	Enriched uranium (U-234, U-235, U-238), thorium-232 (Th-232), isotopes of plutonium (Pu-238, Pu-239, Pu-240, Pu-241), fission products (Cs-137, Sr-90), activation products (H-3, Fe-55, Co-58, Co-60, Ni-63, Ba-133, Eu-152, Eu-154, Eu-155, Pm-147, Ta-182).	1
4383	Instrumentation Building, LMEC Assembly and Test Building	Demolished	None.	3

Technical Memoranda Next Steps

Technical Memoranda Rollout

- A total of eight TMs will be produced.
- Up next: HSA-5B or HSA-5A.
- Approximately one TM per month.

TM HSA-5C Comments Process

- Stakeholder input.
  - Seeking a collaborative effort with stakeholders.
  - TM and stakeholder comments and recommendations will aid in the design of EPA's upcoming field sampling efforts.
  - Stakeholder input should focus on the scope, use, release and potential migration of radioactive substances within Subarea HSA-5C.
  - EPA will provide a general response to each comment received.
  - Send comments to Craig Cooper, EPA Project Manager, by May 7, 2010.

End of Presentation

Thank You

Analytical Laboratory Procurement Update

Objectives of the Analytical Procurement

Contract radiological laboratories that demonstrate:

- Ability to achieve SB 990 compliance to the extent possible
- Reliability and verifiable competence
- Capacity and through-put to meet project schedule
- Reasonable prices

Procurement Mechanism

- Best-value procurement
- Request for proposals (RFP)
- Weighted selection criteria published with the RFP
- Selection board with a selection authority
- EPA Review Team providing input on the procurement
  - Craig Cooper
  - Nicole Moutoux
  - Mary Aycock
  - Gregg Dempsey
  - USEPA NAREL (National Air and Radiation Environmental Laboratory)
- Pre-award audits of potential laboratories
- Performance Evaluation samples will be analyzed by potential laboratories.

Scope of Work

- Indefinite quantity/fixed-unit price
- Analyte list with both required and preferred sensitivities and uncertainties.
- Quality control requirements
- Electronic deliverable requirements.

Proposal Evaluation Factors

- In accordance with the Federal Acquisition Regulations (FAR) bidders should be evaluated based on....
  - Price or cost to the Government
  - Quality of the product or service
    - Past performance
    - Compliance with solicitation requirements
    - Technical excellence
    - Management capability
    - Personnel qualifications
    - Prior experience

Data Quality Control

- Identification of data quality objectives (DQOs) and measurement quality objectives (MQOs) that represent the best balance of analytical cost, technical feasibility, and sensitivity requirements.
- Sensitivity requirements
  - Preferable to meet the Agricultural PRG 10^{-6} risk level.
  - Required to meet the Agricultural PRG 10^{-4} risk level.

Procurement Schedule

- RFP release: May 2010
- Proposals due: June 2010.
- Performance Evaluation sample analysis requires 60 days.
- Audits conducted during the PE analyses.
- Target selection date: October 2010
- First samples ship: November 2010.

Soil Sampling Update

Presentation Outline

- Soil Sampling Objectives
- Technical Considerations
- Soil Sampling Location Selection
- Allocation of Soil Samples
- Next Steps

Objectives

- Primary Objective: Define the nature and extent of radiological soil contamination (above background or agricultural PRGs)
- Potential Secondary Objectives
  - Collect data of sufficient quality that could be used to support the following
    - Screening-level ecological risk assessment
    - Human health risk assessment
    - Development and evaluation of remedial alternatives
  - Provide data that can be used for a MARSSIM final status survey

Considerations

- The budget for soil sampling is fixed
- Reducing the cost of each sample increases the number of samples
- Potential cost reduction options include prioritizing the list of radionuclides and application of field screening methods
- Targeted and random samples shall be collected

Considerations, cont.

- Two rounds of sampling will be required to allow EPA to further investigate contamination detected in soil (called step-out sampling)
- Portion of budget must be held in reserve to allow for additional sampling
- The soil sampling must be completed within a very aggressive schedule to meet DOE requirements
- The selection of sampling locations will be based on the results of other portions of the radiological study – sequencing of work is critical!

Data Integration to Select Targeted Soil Sampling Locations

Geophysical Survey

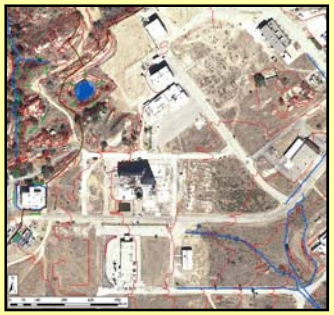
- Utilities
- Former excavation areas
- Areas of soil disturbance

Historic Site Assessment (HSA)

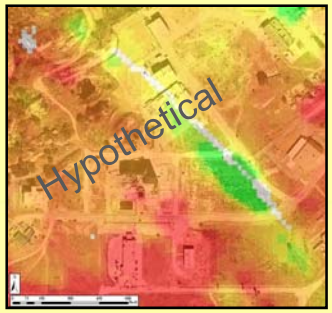
- Drains, septic beds & historic buildings
- Former worker interviews

Field Observations

- Drainage
- Topography
- Deposition or erosion areas



Targeted Soil Sample Locations

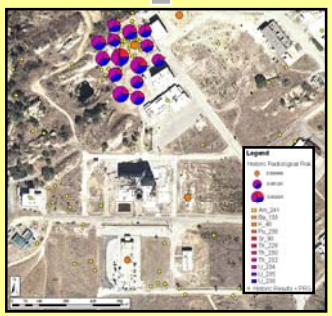


Hypothetical Gamma Survey Results

- Gamma radiation anomalies

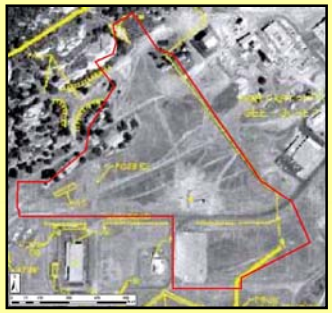
Gamma Survey

- X,Y plots
- Remediation areas
- Historic sample concentrations



Historic Environmental Data

1959 Aerial Photo Analysis



- Physical land forms
- Potential waste storage areas

Aerial Photo Analysis

Random Sampling Approach

- Design of random sampling following MARSSIM guidance
- Class 1
  - Survey unit size is 1 acre
  - Grid with random start location
- Class 2 –
  - Survey unit size is 5 acres
  - Grid with random start location
- Class 3
  - Survey unit size is 10 acres
  - All randomly located (no grid)

Total Soil Sample Budget

The total number of soil samples will be based on analytical costs and prioritization of analytical list.

Both surface and subsurface soils samples will be collected in targeted and random locations

Sample Budget, Density, and Allocation

Current Sample Budget: $16M

Estimated Sample Density

Class 1: 50 samples/acre

Class 2: 10 samples/acre

Class 3: 5 samples/acre)

Sampling Strategy - First Round

Class 1:

Collect 50% of the estimated number of samples

Class 2:

Collect 100% of the estimated number of samples

Class 3:

Collect 100% of the estimated number of samples.

Sampling Strategy - Second Round

Remaining budget will be based on the laboratory results from the first round of sampling.

Next Steps

- Issue Draft Soil Field Sampling Plan (FSP) in June
- Determine targeted soil sampling locations based on:
  - HSA Technical Memorandum
  - Gamma Scanning
  - Historical Data
  - Geophysics
  - Field Observations
  - Aerial Photo Analysis
- Issue First Draft FSP Addendum
- Begin Sampling

Groundwater, Surface Water, and Sediment Sampling Update

Groundwater, Surface Water, and Sediment Sampling Objectives

- Confirm the results of data previously collected by others;
- Provide data on radionuclides not previously assessed; and
- Provide data for areas that may require additional assessment, if identified.

Activities

- Groundwater Sampling On-site (2 events)
- Groundwater Sampling Off-site (1 event)
- Surface Water Sampling (2 events)
- Spring/Seep Sampling (at flowing locations during wet periods)
- Sediment Sampling (up to 2 events)

On-Going Activities

- Finalization of the Field Sampling Plan (FSP).
  - Finalization of Sampling Locations and Analyte List for Water.
  - Integrate Stakeholder input for FSP.
- Finalization of the QAPP for Water and Sediment Media.
- Coordination with DTSC and Boeing.

Groundwater Sampling

- Scheduled to take place in two events
  - 1st May/June
  - 2nd wet season – (Winter 2011)
- May/June event conducted before some wells are retrofitted with permanent low-flow pumps by Boeing.
- Only on-site wells to be sampled during first event.
- Second event to include off-site locations.

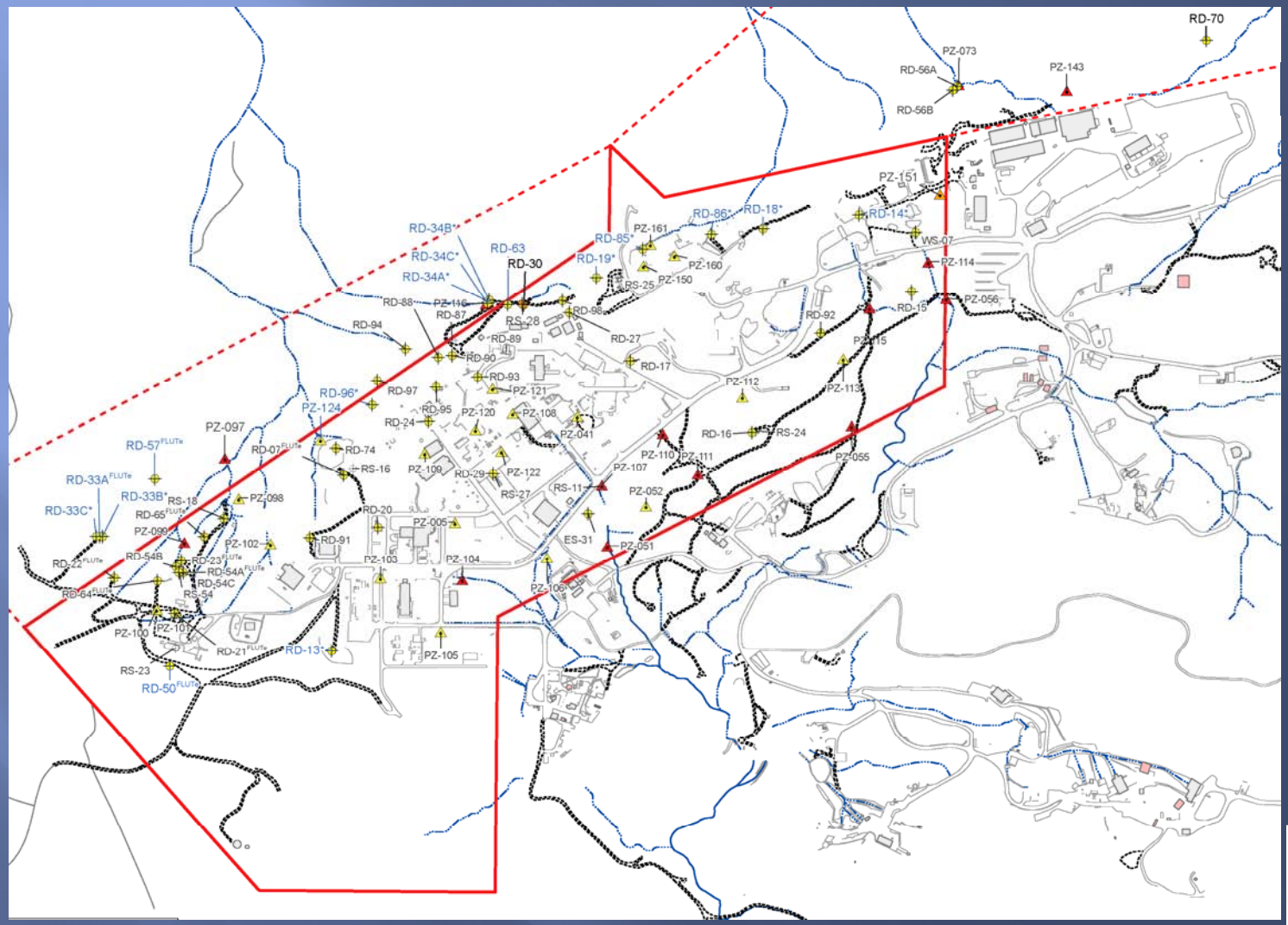
CHALLENGE FOR FIRST EVENT

- Budget – $100,000 limitation for laboratory.

On-Site Groundwater Sampling Locations

- Objectives
  - Test all wells except abandoned, damaged, or dry.
  - Confirm the results of data previously collected by others.
  - Provide data for radionuclides not previously tested.
- Well Reconnaissance performed in March 2010
  - Findings:
    - 11 wells and piezometers damaged or abandoned.
    - 16 locations dry (more anticipated as we move into dry season)
- 70 – Potential locations identified.

On-Site Groundwater Sampling Locations (Continued)



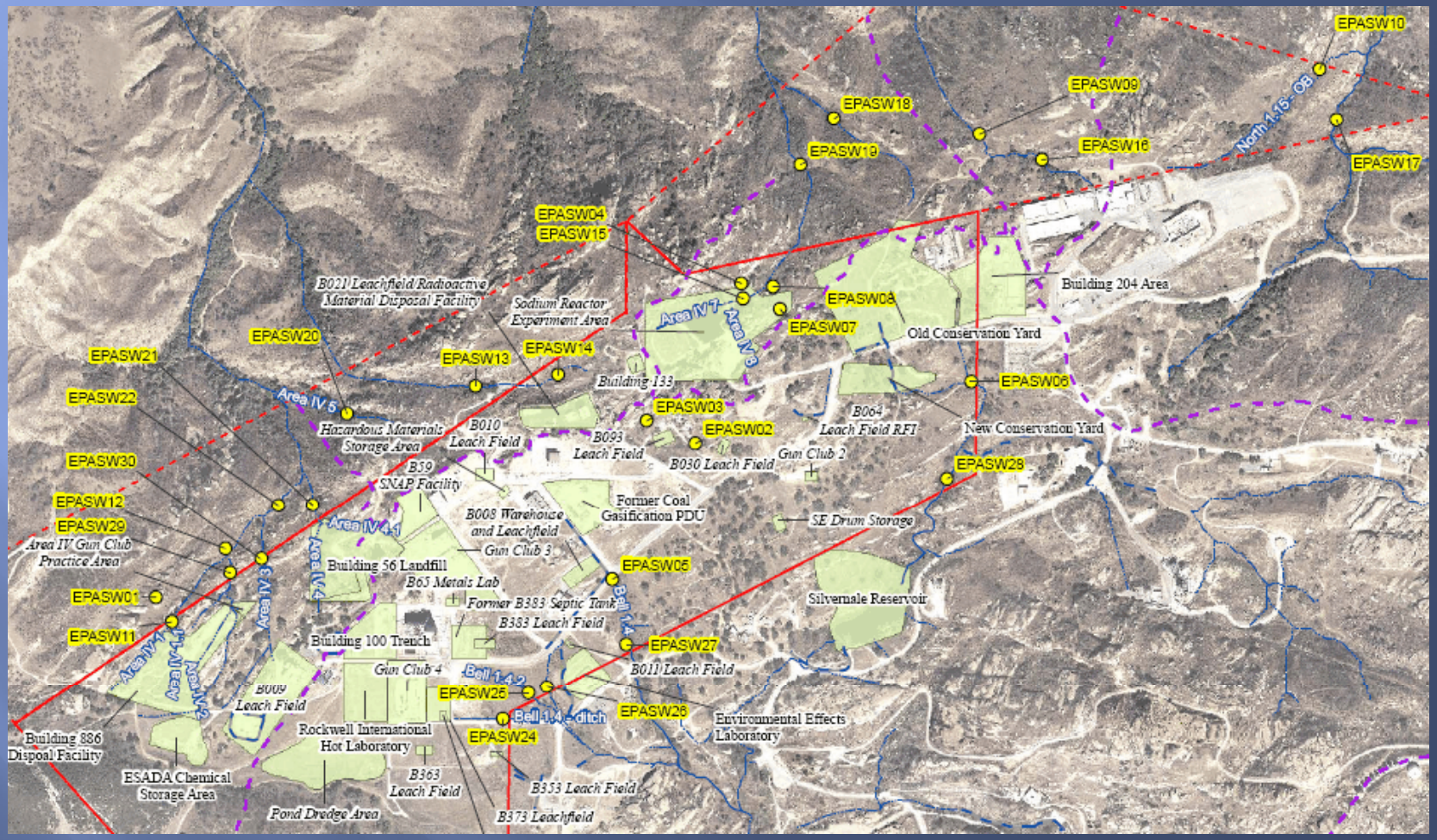
Off-Site Groundwater Sampling Locations

- Objectives
  - Provide best coverage within budget.
- Approach
  - Sample wells off site that are in current SSFL monitoring network.
  - Sample additional wells identified by MWH (2007) within one-mile of SSFL boundary.
  - 17 potential locations identified in FSP.
  - Access agreements are needed.

Surface Water Sampling Locations

- Objectives
  - Provide best coverage within the budgetary and time constraints for this project.
  - 20 locations – 2 events.
- Approach
  - Placed samples at all major drainages leading from Area IV and Drainages in NBZ.

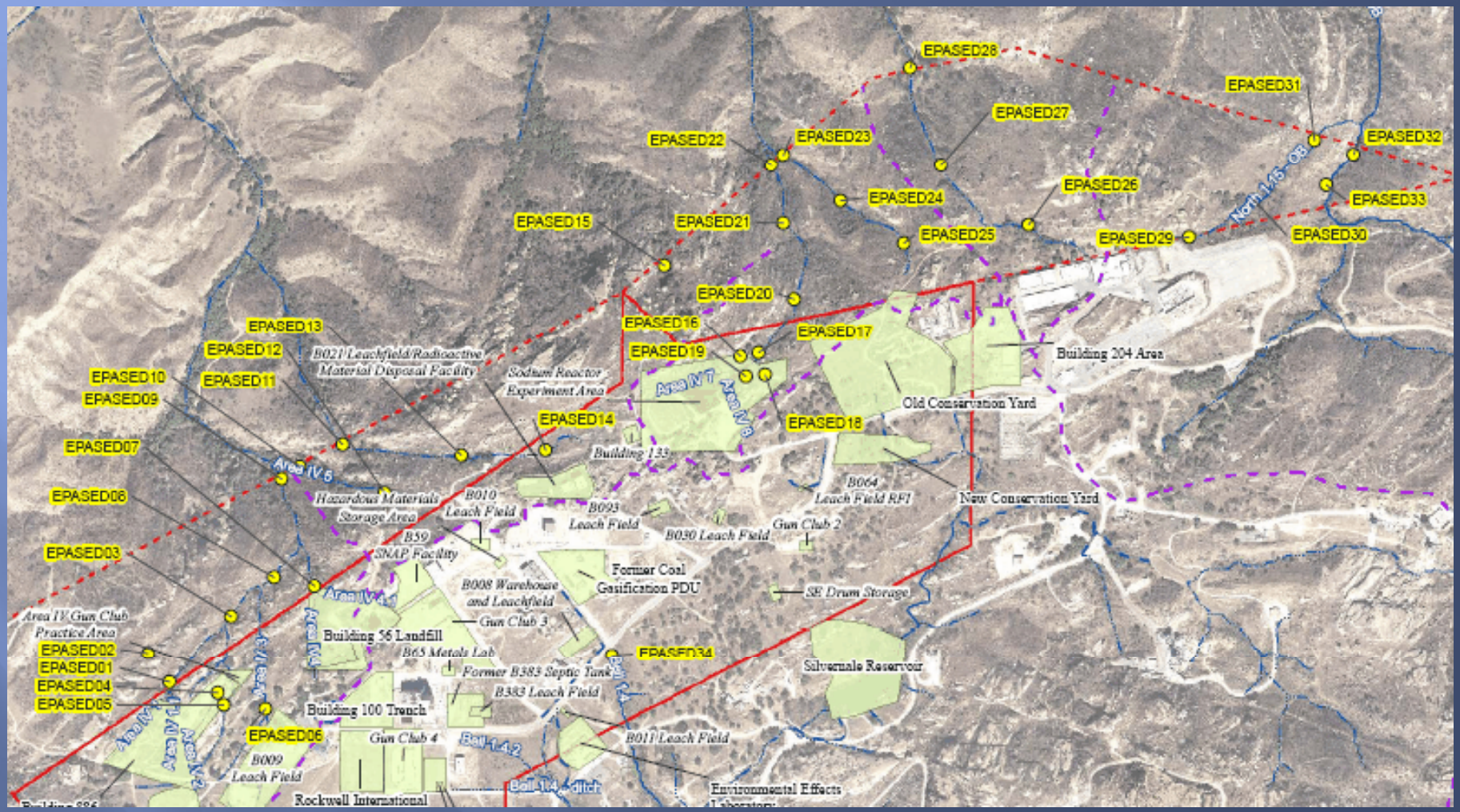
Surface Water Sampling Locations



Sediment Sampling Locations

- Objectives
  - Provide best coverage within the budgetary and time constraints for this project.
  - 40 locations up to 2 events.
- Approach
  - Primary drainages targeted.
  - Attempted to place samples at major drainages leading from Area IV and NBZ.
  - Southwestern portion of Area IV will be covered during soil sampling program.
  - Sample additional downstream locations based on results of :
    - initial sampling,
    - gamma scanning data, and
    - soil sampling program.

Sediment Sampling Locations



Spring/Seep Sampling

- Objectives
  - Characterize radiological contamination within the budgetary and time constraints.
  - 10 samples budgeted .
- Approach
  - Select samples where:
    1) Flowing water is observed .
    2) Sampled previously.
    3) Other opportunistic sampling locations (focus on NBZ).
  - Flowing springs and seeps will be identified during or immediately after significant rainfall events and surveyed.

Analyte List

- Sediment samples - analyzed same list of radionuclides used for soil.
- Water samples - more limited group of radionuclides.
  - Priority Water Analyte List – Development
    - Tritium (^{3}H) and strontium-90 (^{90}Sr) represent specific contaminants of interest and are included.
    - Uranium isotopes (mobile, previously reported) included.
    - Gamma spectroscopy analytes are included.
    - Gross alpha and gross beta analyses included.
- Additional radionuclides possible - budget and water volume are limitations.
  - Criteria for selecting additional radionuclides include:
    - Mobility in groundwater,
    - Federal maximum contaminant levels (MCL) or Tap Water preliminary remediation goals.

Detection Limits for Water

- Laboratory reporting limits to the level of Tap Water preliminary remediation goals (PRGs) are difficult to achieve.
- EPA is in the process of developing the RFP for the water analyses.
- Similar to soil, sensitivity requirements will be:
  - Preferable to meet the AgPRG 10^{-6} risk level.
  - Required to meet the AgPRG 10^{-4} risk level.

Analytical Priority Based on Sample Volume Limitations

- **Sample fractions collected in the following order:**
  - Tritium.
  - Gamma spectroscopy analytes.
  - Uranium isotopes.
  - Strontium-90.
  - Additional analyses (based on mobility and MCL/PRG criteria).

Tritium Disposal Proposal

- In 2007 DTSC indicated their opinion that evaporation of tritium-contaminated water is not allowed under a May 2, 2007 federal district court order.
- EPA plans on sampling the tritium contaminated wells.
- EPA is evaluating three options for disposal of water from these wells:
  1. Off-site disposal through licensed facility.
  2. On-site evaporation.
  3. Off-site solidification in cement and disposal.
- EPA will transmit a proposal to DTSC when available.

Next Steps/Schedule

- Review FSP and Receive Comments
- Comments due April 30, 2010
  - EPA will provide a general response to each comment received.
- First Round Groundwater Sampling (May/June 2010) – Second Round – Winter 2011
- Off-site well sampling – During Second Event.
- Sediment Sampling (TBD, coordinating with soil sampling program)
- Surface water and seep/spring sampling (precipitation-dependent).

Radiological Background Study

Agenda

- Technical Memo General Outline
- Data Validation Discussion

Technical Memo General Outline

1. Introduction
2. Site Summaries
3. Soil Sampling Methodology
4. Gamma Scanning Methodology
5. **Data Validation** – Additional Discussion
6. **Analytical Data** – Additional Discussion
7. **Path Forward** – Additional Discussion

Data Validation

A systematic, technically-based evaluation process to determine:

- *Presence or absence of the analytes of interest*
- *Uncertainty of the measurement process*
- *Technical reliability or degree of confidence in data results*

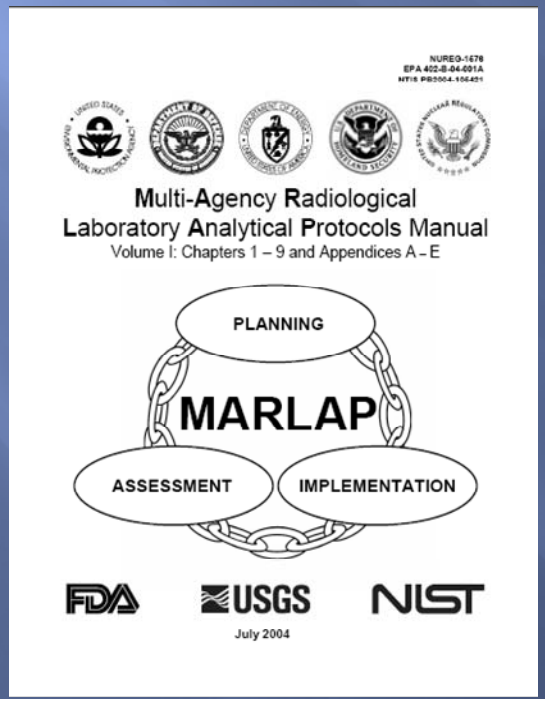
Data Validation

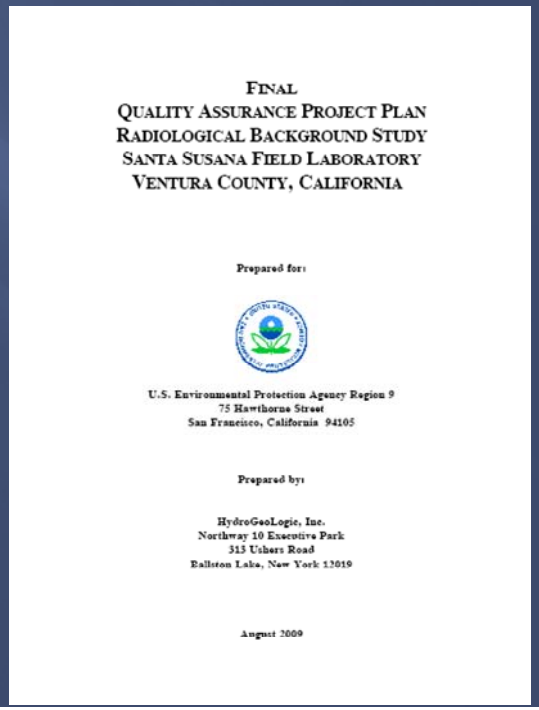
- Scientifically based.
- Independent of the data generator (laboratory).
- Extends beyond method or contractual compliance.
- Applies performance-based criteria to the data.
- Occurs prior to drawing conclusions from the body of data.

Data Validation

Guidance Documents

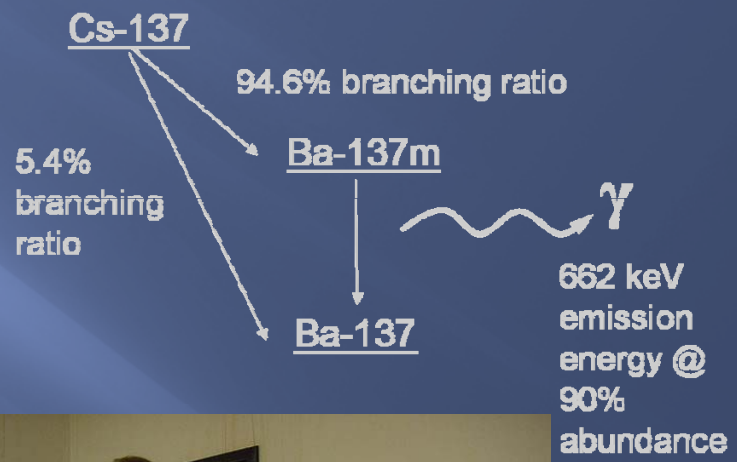
- Multi-Agency Radiological Laboratory Analytical Protocols Manual (MARLAP); *EPA, 2004*
- Evaluation of Radiochemical Data Usability; *DOE, 1997*.
- SSFL Radiological Background Study Quality Assurance Project Plan, *2009*.





DataValidation Procedure

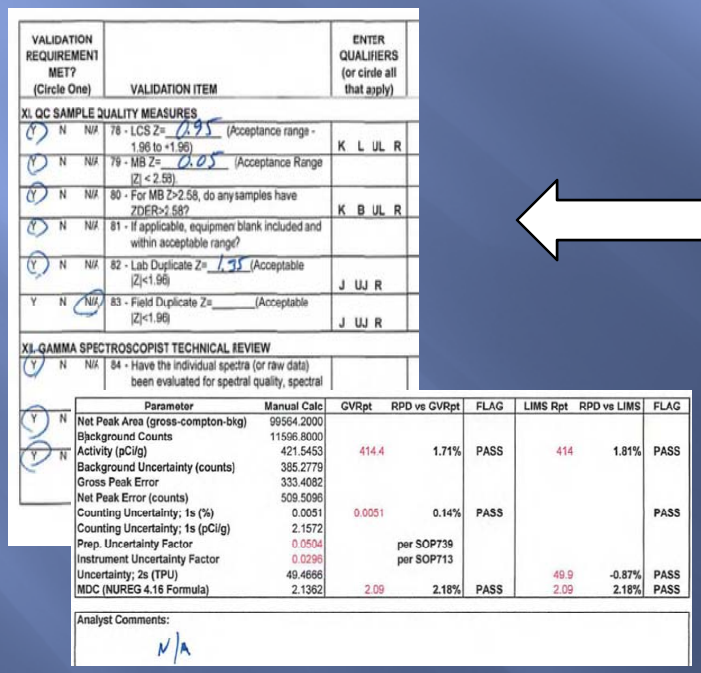
- Step 1: Understand the Science



$$\frac{3.29\sqrt{CalBCPM * \left(\frac{1}{T_S}+\frac{1}{T_B}\right)} + 2.71 * \left(\frac{1}{T_S}+\frac{1}{T_B}\right)}{k}$$

Data Validation Procedure

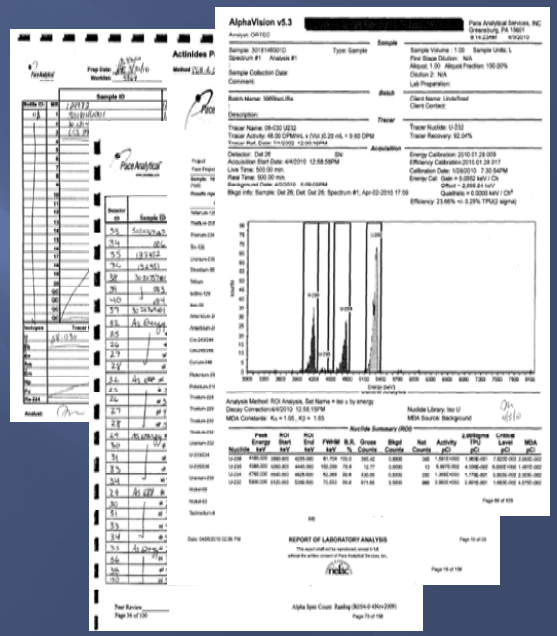
- Step 1: Understand the Science
- Step 2: Review the Laboratory Data Against Established Data Quality Objectives



VALIDATION REQUIREMENT MET? (Circle One)	VALIDATION ITEM	ENTER QUALIFIERS (or circle all that apply)
XI. QC SAMPLE QUALITY MEASURES		
(Y) N N/A	78 - LCS Z= 0.95 (Acceptance range - 1.96 to +1.96)	K L UL R
(Y) N N/A	79 - MB Z= 0.05 (Acceptance Range |Z| < 2.58)	
(Y) N N/A	80 - For MB Z>2.58, do any samples have ZDER>2.58?	K B UL R
(Y) N N/A	81 - If applicable, equipment blank included and within acceptable range?	
(Y) N N/A	82 - Lab Duplicate Z= 1.35 (Acceptable |Z|<1.96)	J UJ R
Y N (N/A)	83 - Field Duplicate Z=_____(Acceptable |Z|<1.96)	J UJ R
XII. GAMMA SPECTROSCOPIST TECHNICAL REVIEW		
(Y) N N/A	84 - Have the individual spectra (or raw data) been evaluated for spectral quality, spectral	

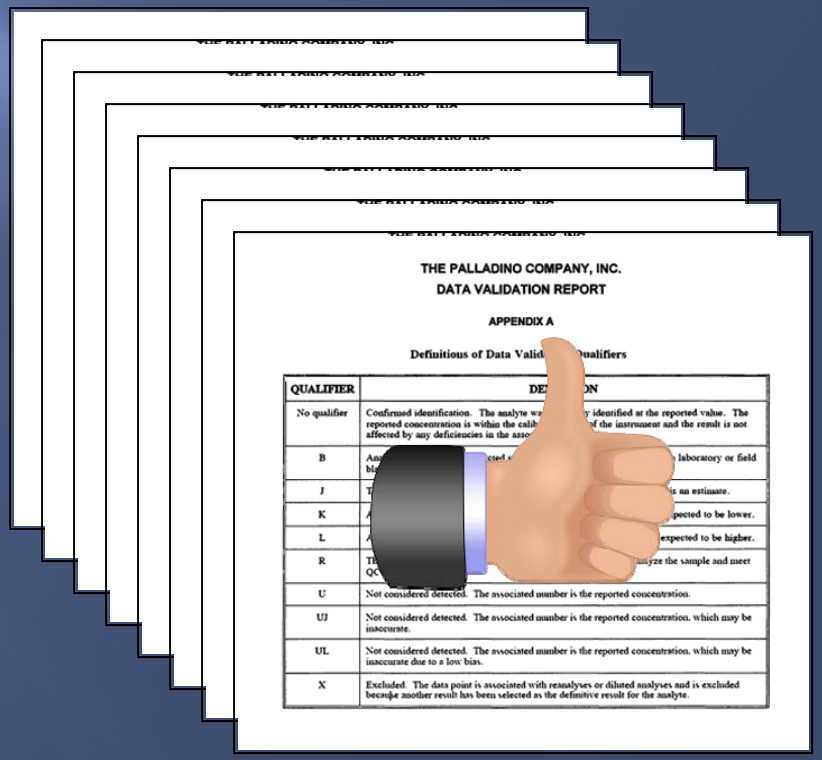
Parameter	Manual Calc	GVRpt	RPD vs GVRpt	FLAG	LIMS Rpt	RPD vs LIMS	FLAG
Net Peak Area (gross-compton-bkg)	99564.2000						
Background Counts	11596.8000						
Activity (pCi/g)	421.5453	414.4	1.71%	PASS	414	1.81%	PASS
Background Uncertainty (counts)	385.2779						
Gross Peak Error	333.4082						
Net Peak Error (counts)	509.5096						
Counting Uncertainty; 1s (%)	0.0051	0.0051	0.14%	PASS			PASS
Counting Uncertainty; 1s (pCi/g)	2.1572						
Prep. Uncertainty Factor	0.0504		per SOP739				
Instrument Uncertainty Factor	0.0296		per SOP713				
Uncertainty; 2s (TPU)	49.4666				49.9	-0.87%	PASS
MDC (NUREG 4.16 Formula)	2.1362	2.09	2.18%	PASS	2.09	2.18%	PASS

Analyst Comments:
N/A



DataValidation Procedure

- Step 1: Understand the Science
- Step 2: Review the Laboratory Data Against Established Data Quality Objectives
- Step 3: Qualify the Data



DataValidation Procedure

- Step 1: Understand the Science
- Step 2: Review the Laboratory Data Against Established Data Quality Objectives
- Step 3: Qualify the Data
- Step 4: Complete the Validation Report

The Palladino Company, Inc.
Data Validation Report

REPORT DATE: November 27, 2008 Project No.: SSFL-RBS
PROJECT ID: Santa Susana Field Laboratory - Radiological Background Field Study
SAMPLING DATES: July 21, 2008 through August 14, 2008
SAMPLE DELIVERY GROUP: 2008G15-3-1752.0

LABORATORY ID: ABC Laboratories, Inc., Fort Collins, CO
ANALYSIS DATES: October 1, 2008 through October 14, 2008
ANALYTICAL METHOD: Gamma Spectrometry
ANALYTICAL BATCH ID: 03D0001127-02ANA

The following Data Validation Report and the associated Laboratory Radioanalytical Data Report has been reviewed by the personnel shown below. The Palladino Company, Inc., certifies that the Data Validation Report has been completed in accordance with applicable contractual requirements, and is true, complete, and correct, within the limits of the information provided by the laboratory.

Data Validation Analyst Date

Report Review Date

EXAMPLE REPORT ONLY – DO NOT CITE OR QUOTE

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EXAMPLE REPORT ONLY – DO NOT CITE OR QUOTE

EXAMPLE REPORT ONLY – DO NOT CITE OR QUOTE

1. DataVerification

2. Data Validation Procedure

3. Statistical Data Assessment

Radiochemistry Data Validation Terminology

Results are reported as:

- Activity
- Uncertainty
- Minimum Detectable Concentration

Sample ID	Analyte	Results (pCi/g)	Uncertainty (pCi/g)	MDC (pCi/g)
NW-1-SUR (SP-5)	Cs-137	9.76E-02	1.17E-02	6.00E-03

Table above is an example and does not represent actual SSFL data.

Activity

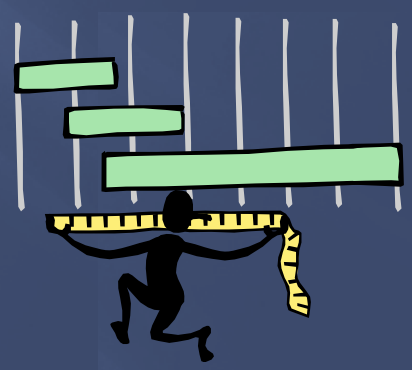
- The rate of radioactive decay occurring in the sample.
- Activity concentration is expressed in units of picocuries per gram (pCi/g).

Uncertainty

ALL MEASUREMENTS HAVE UNCERTAINTY !

(whether the person doing the measuring wants to admit it or not!)

1.23 ± 0.43



Total Propagated Uncertainty (TPU)

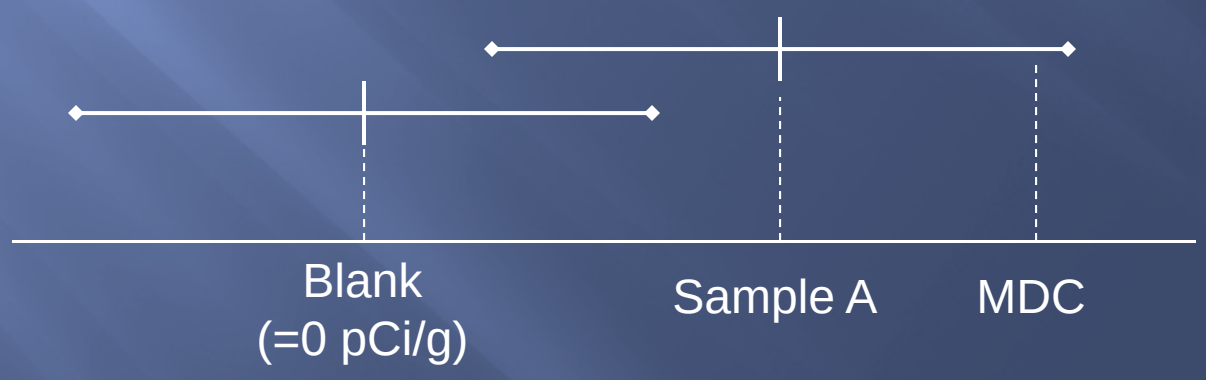
- The overall potential error in the measurement result.
- Expressed at a pre-determined confidence level, e.g. 2 standard deviations (σ) or 95 percent (%).
- 1.23 ± 0.45 pCi/g means "*there is a 95% probability that the true value for this sample is between 0.78 and 1.68 pCi/g.*"

Minimum Detectable Concentration (MDC)

- The theoretical amount of activity that would have to be in a sample, in order to be distinguishable from a sample with no activity.
- Used as a sample-specific quality indicator.

Minimum Detectable Concentration (MDC)

- If the reported activity is less than the MDC, that DOES NOT MEAN that the sample is "blank".



Data Quality Objectives (DQOs)

- Performance criteria for project data.
- Also called Measurement Quality Objectives (MQOs) when discussing laboratory results.
- *Achieving a pre-determined MDC is a MQO!*

Negative Sample Activity

-0.56 ± 0.78 pCi/g

- Technically possible measurement result!
- Due to "paired observations;" i.e. comparison to background.
- Result shouldn't be "too negative".

Negative Sample Activity

-0.56 ± 0.78 pCi/g

$$\frac{(\text{Activity})}{(1\sigma\ \text{TPU})} > -3$$

Data Qualifiers

- Associated with analytical results after the quality assessment is performed.
- "Qualify" data that may not meet all the required MQOs, but may still be usable under certain conditions.

Sample ID	Analyte	Results (pCi/g)	Uncertainty (pCi/g)	MDC (pCi/g)	Qualifier
NW-1-SUR (SP-5)	Cs-137	9.76E-02	1.17E-02	6.00E-03	J

Table above is an example and does not represent actual SSFL data.

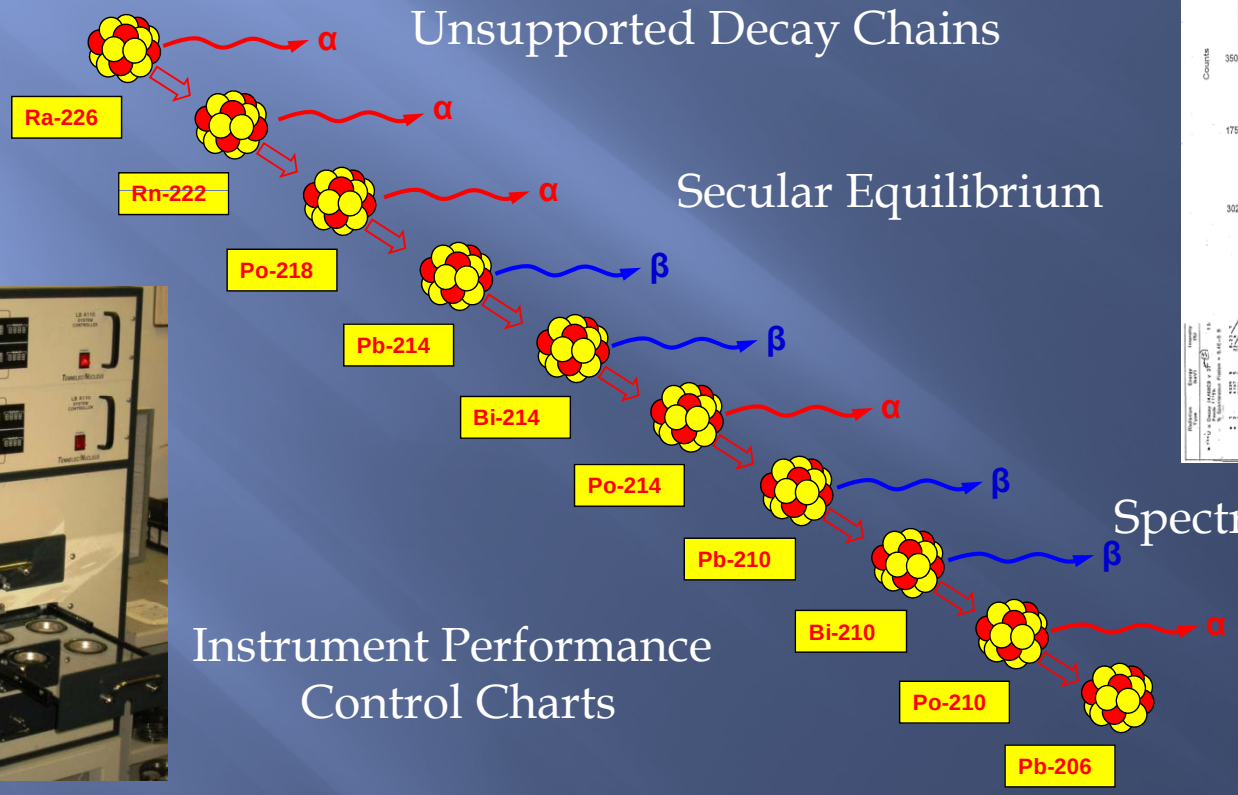
Data Qualifiers

QUALIFIER	DEFINITION
No qualifier	Confirmed identification. The analyte was positively identified at the reported value. The reported concentration is within the calibrated range of the instrument and the result is not affected by any deficiencies in the associated QC criteria.
B	Analyte present, but not detected substantially above the level reported in laboratory or field blanks.
J	The analyte was detected at the reported concentration; the quantitation is an estimate.
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
R	The result is rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria.
U	Not considered detected. The associated number is the reported concentration.
UJ	Not considered detected. The associated number is the reported concentration, which may be inaccurate.
UL	Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.
X	Excluded. The data point is associated with reanalyses or diluted analyses and is excluded because another result has been selected as the definitive result for the analyte.

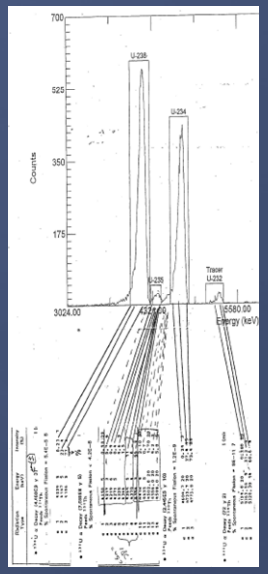
Other Technical Assessments

Serial Decay Chains

Unsupported Decay Chains



Secular Equilibrium



Spectral Interference

Instrument Performance
Control Charts

Cross-Method Comparisons

Analytical Data

- Discussion of Analytical Results Currently Available
  - Minimum Detectable Concentrations (MDCs)
  - Surface soil data
    - Distance Test Locations (DTLs)
    - Radiological Background Reference Areas (RBRAs)
  - Subsurface soil data from RBRAs (if available)
  - Example of typical data table on next slide

Analytical Data

Sample ID	Analyte	Results (pCi/g)	Uncertainty (+/- pCi/g)*	MDC (pCi/g)	Agricultural 10-6 PRG (pCi/g)	Agricultural 10-4 PRG (pCi/g)	Residential 10-6 PRG (pCi/g)
NW-1-SUR (SP-5)	Cs-137	9.76E-02	1.17E-02	6.00E-03	1.20E-03	1.20E-01	3.88E+00
	Co-60	1.04E-02	5.42E-03	5.16E-03	9.01E-04	9.01E-02	3.61E-02
	Sr-90	-2.45E-02	5.86E-02	6.99E-03	1.39E-03	1.39E-01	3.31E-01
	Pu-238	5.68E-01	2.58E-02	4.78E-03	7.31E-03	7.31E-01	2.97E+00
	Pu-239/240	2.58E-03	6.98E-03	2.34E-03	6.09E-03	6.09E-01	2.59E+00
SW-3-SUR (Z-4)	Cs-137	5.26E-02	1.27E-02	5.89E-03	1.20E-03	1.20E-01	3.88E+00
	Co-60	-1.14E-02	6.42E-02	4.26E-03	9.01E-04	9.01E-02	3.61E-02
	Sr-90	3.45E-02	6.76E-03	6.56E-03	1.39E-03	1.39E-01	3.31E-01
	Pu-238	5.58E-02	2.88E-02	9.88E-03	7.31E-03	7.31E-01	2.97E+00
	Pu-239/240	-4.58E-02	7.48E-02	6.94E-03	6.09E-03	6.09E-01	2.59E+00

Notes:

Negative values indicate sample measurement results less than the calibrated instrument background and our acceptable under certain conditions

pCi/g - Picocuries per gram

MDC - Minimum Detectable Concentration

PRG - Preliminary Remediation Goal

* This represents the 95% confidence interval uncertainty for this particular sample

Table above is an example and does not represent actual SSFL data.

Path Forward

- Initial Conclusions
- Path Forward for Background Study
- Schedule for:
  - Remaining sample analyses
  - Background Study Report

Project Schedule

Activity	Planned Date
Lab results for DTLs	May 2010
Lab results for Chatsworth Surface samples	May 2010
Lab results for Chatsworth Subsurface samples	May 2010
Lab results for all samples	June 2010
Validated results for DTLs	June 2010
Validated results for Chatsworth Surface samples	June 2010
Validated results for Chatsworth Subsurface samples	June 2010
Validated results for all samples	July 2010
Technical Memo	June 2010
Data Evaluation and Stakeholder Meetings	July 2010 – September 2010
Draft Final Report	October 2010
Final Report	December 2010

Questions?

Upcoming Meetings

- May 12, 10:00 am: Project Kick-Off/Field Office Open House
- May 12, 6:00 pm: EPA Public Meeting
- May 13, 6:30 pm: Interagency Workgroup Meeting
- Next Technical Stakeholder Group Meeting (June 1, 2 or 3)