Overview of the First Quarter 2010 Surveillance and Maintenance Report for the LM Rocky Flats Site

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Surface Water Monitoring and Operations

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Pond Operations – First Quarter 2010

- Terminal Pond Discharges:
  - None
- Transfers:
  - A-3 to A-4; intermittently during the quarter; total of approximately12.6 MG
- Pond Levels:
  - As of April 1, 2010, Ponds A-3, A-4, B-5, and C-2 and the Landfill Pond were holding approximately 32.6 MG (32.9 percent of capacity)

August 17, 2010, Pond Levels

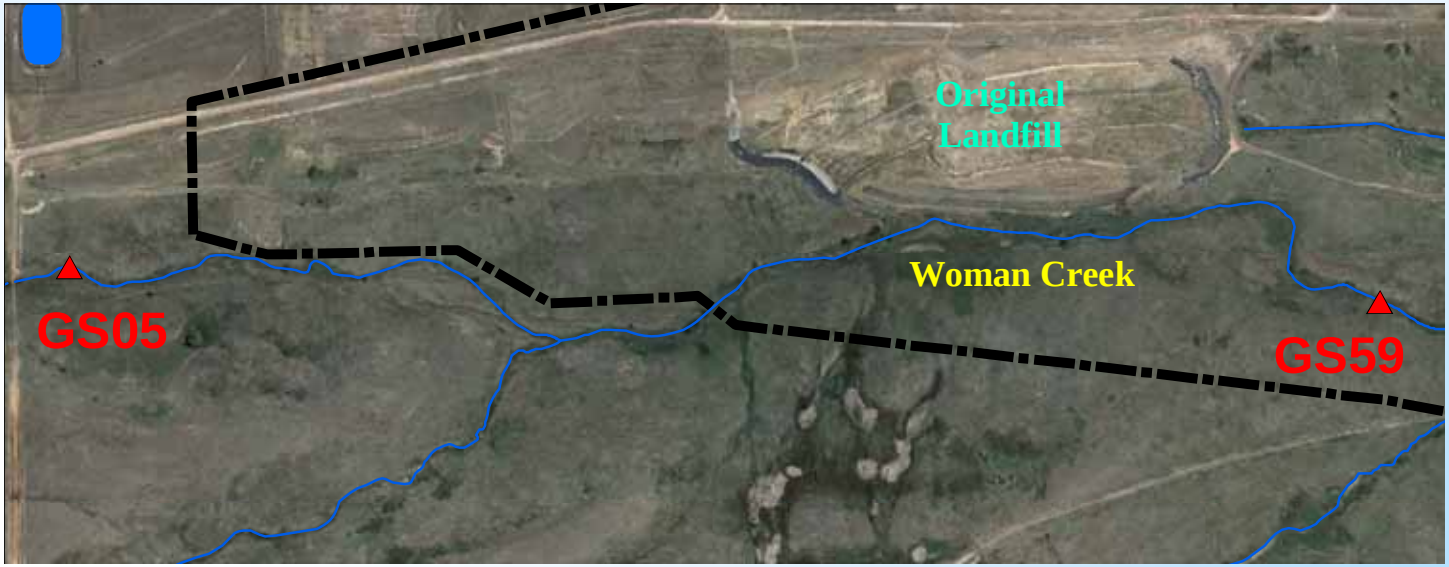
- Landfill (20.9 percent)
- A-3 (2.6 percent)
- A-4 (28.3 percent)
- B-5 (24.3 percent)
- C-2 (3.9 percent)

Hydrologic Data – First Quarter 2010

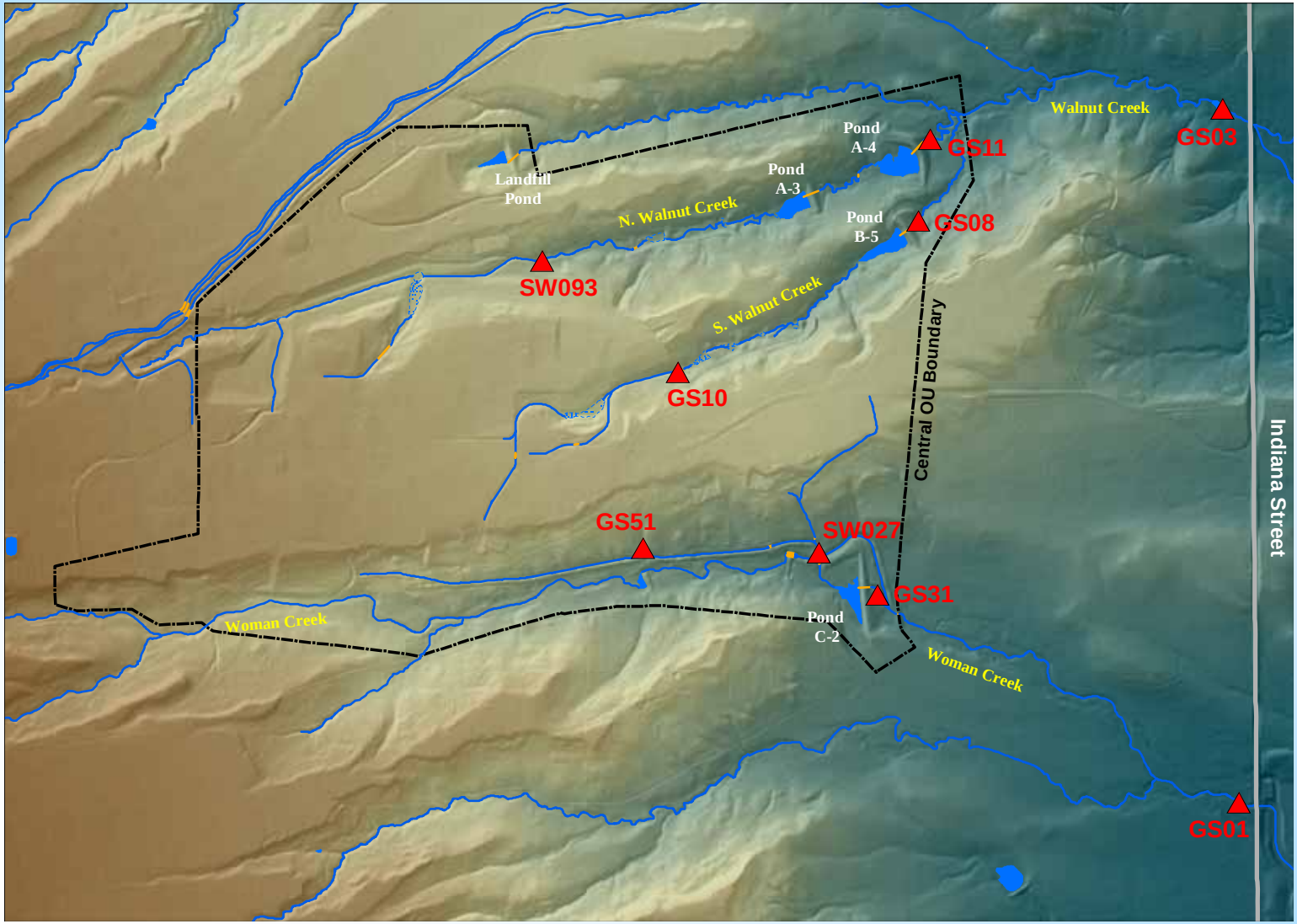
- Precipitation
  - 1.58 inches total precipitation
  - 124 percent of WY 1993–2009 average
- Flow rates (percentage of average):
  - GS01 (216 percent)
  - GS03 (58 percent)
  - GS10 (103 percent)
  - SW027 (75 percent)
  - SW093 (155 percent)

Performance Monitoring – First Quarter 2010 Original and Present Landfills

- **Original Landfill (OLF)**: Surface water quality results triggered monthly sampling for selenium; selenium was not detected in subsequent samples
- **Present Landfill (PLF)**: Surface water quality results were all below standards for the quarter

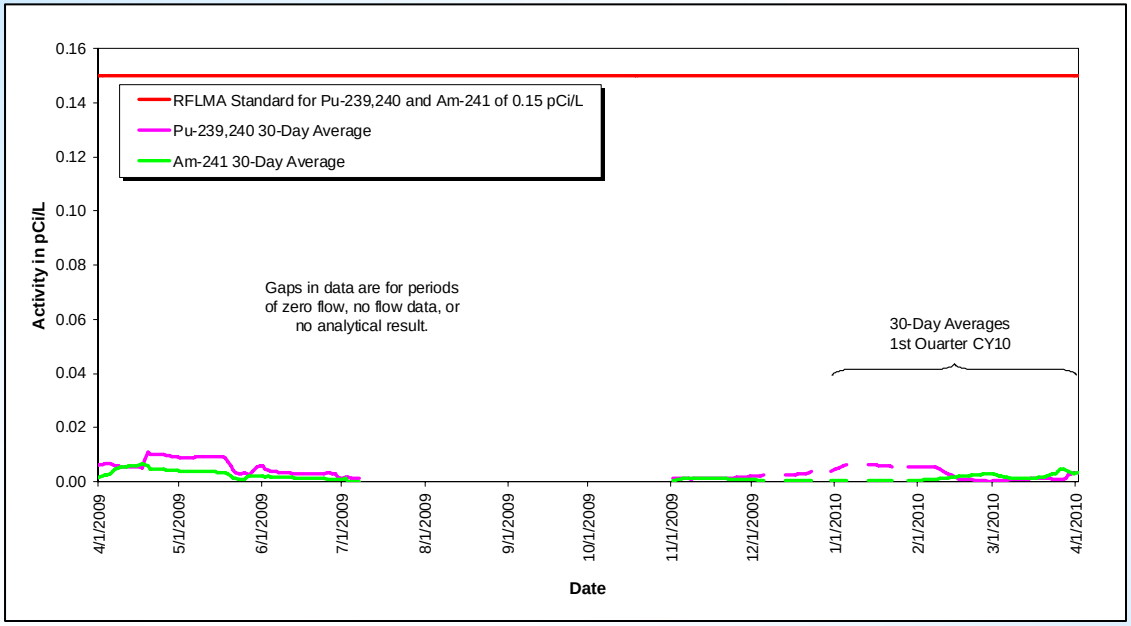


Selected Surface Water Monitoring Locations

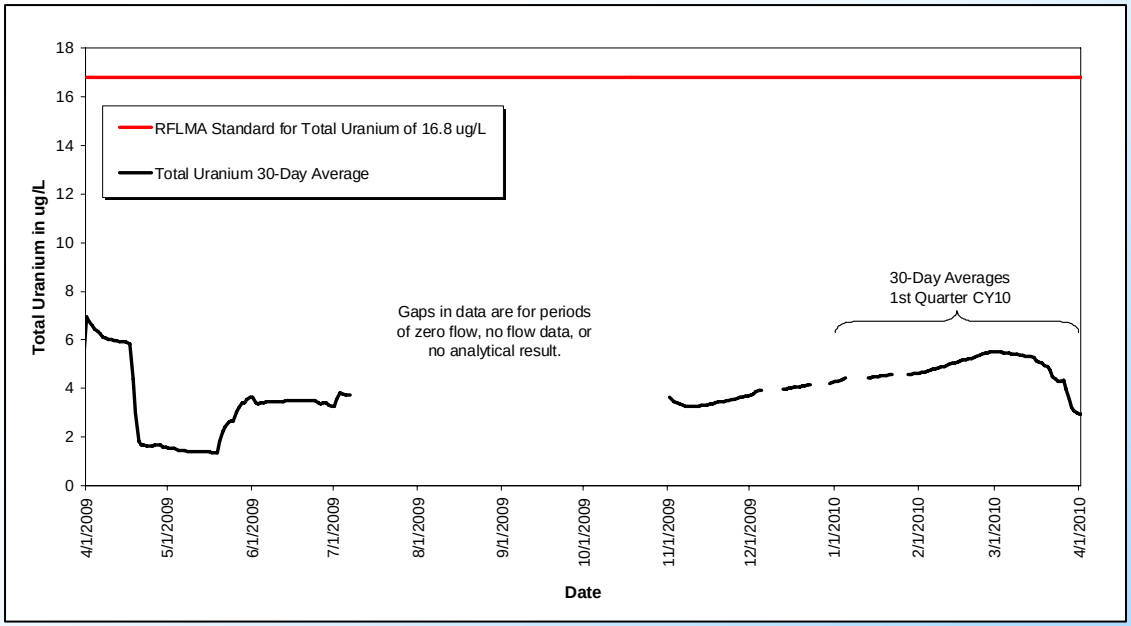


POC GS01

- Plutonium and Americium



- Total Uranium



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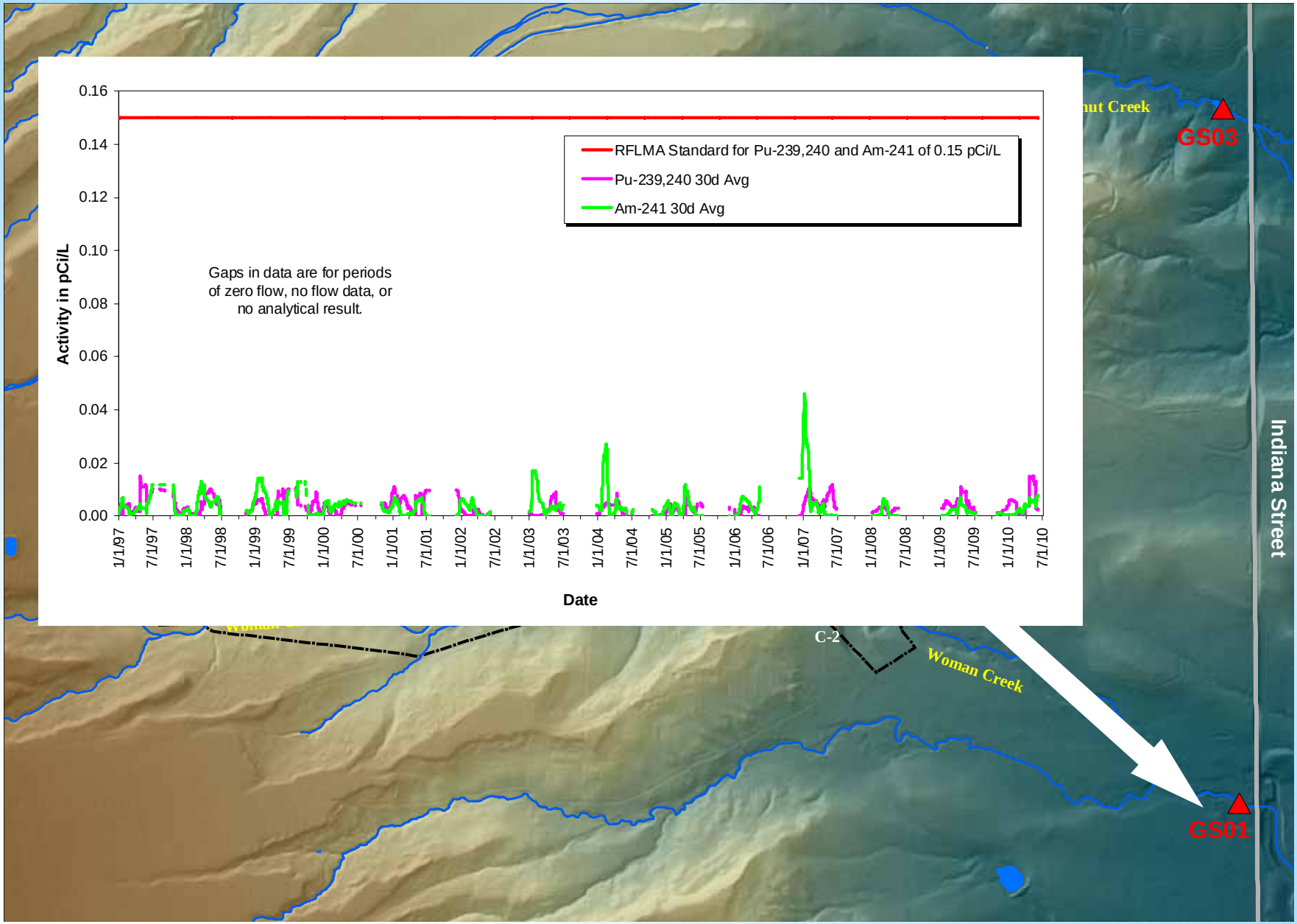
RFLMA Standard for Pu-239,240 and Am-241 of 0.15 pCi/L
Pu-239,240 30d Avg
Am-241 30d Avg
Gaps in data are for periods of zero flow, no flow data, or no analytical result.
Activity in pCi/L
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
1/1/97
7/1/97
1/1/98
7/1/98
1/1/99
7/1/99
1/1/00
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1/1/01
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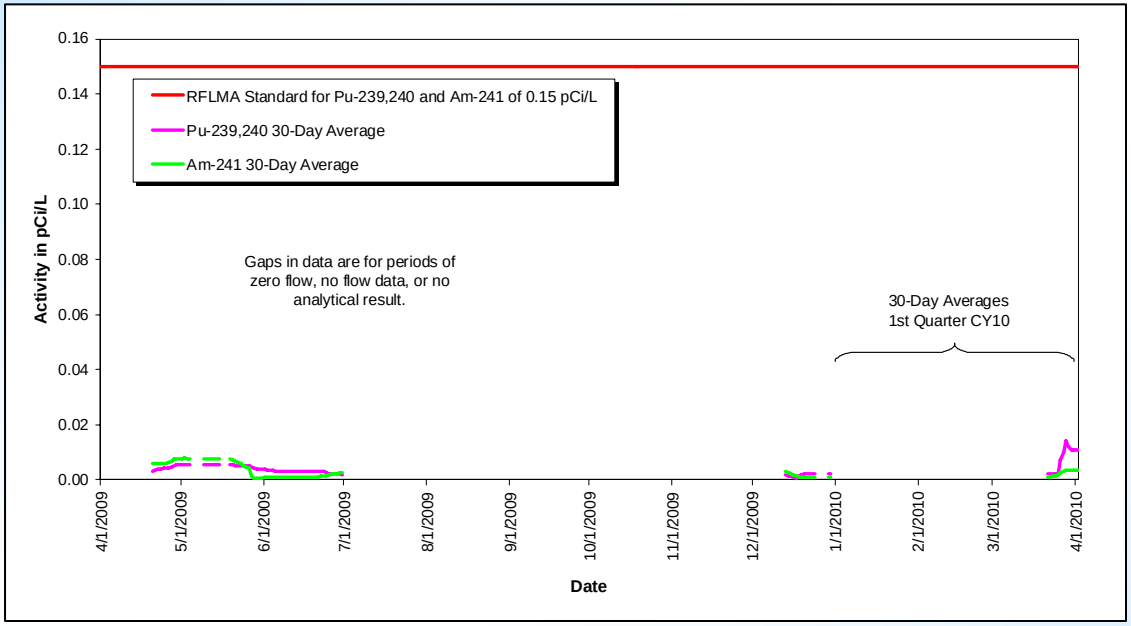
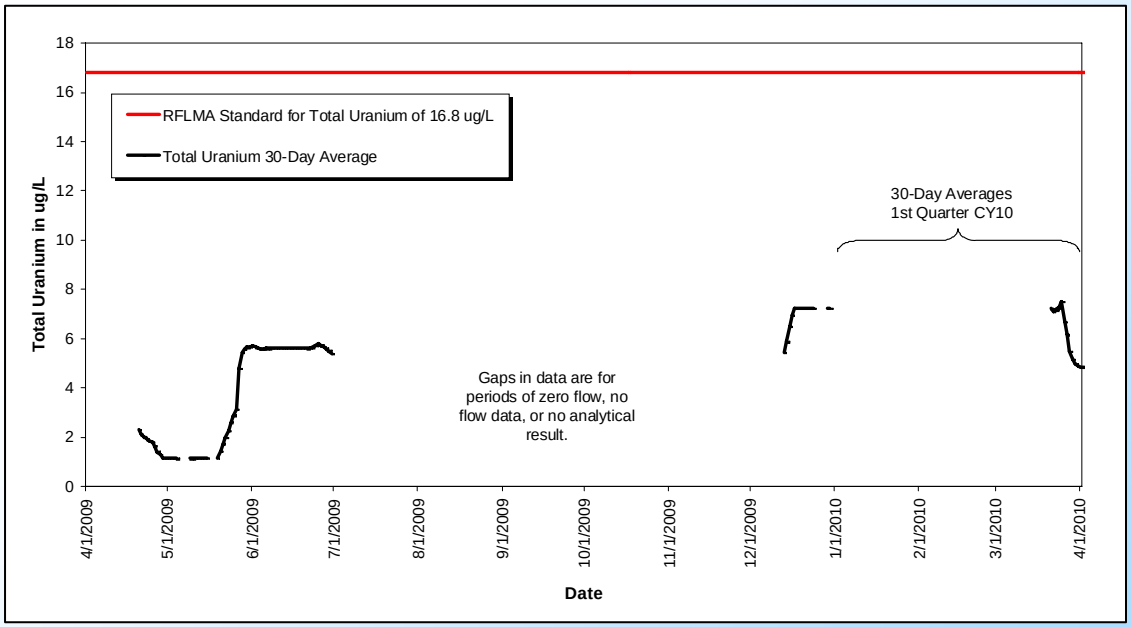
1/1/09
7/1/09
1/1/10
7/1/10
Date
GS03
GS01
C-2
Woman Creek
Indiana Street

POC GS03

- Plutonium and Americium



- Total Uranium



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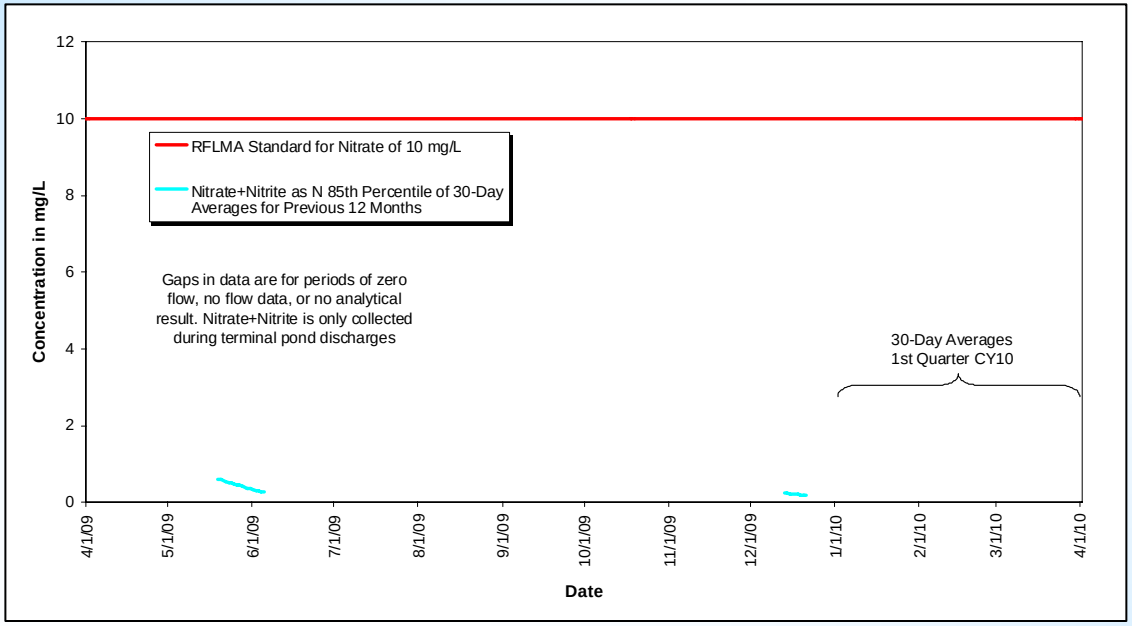
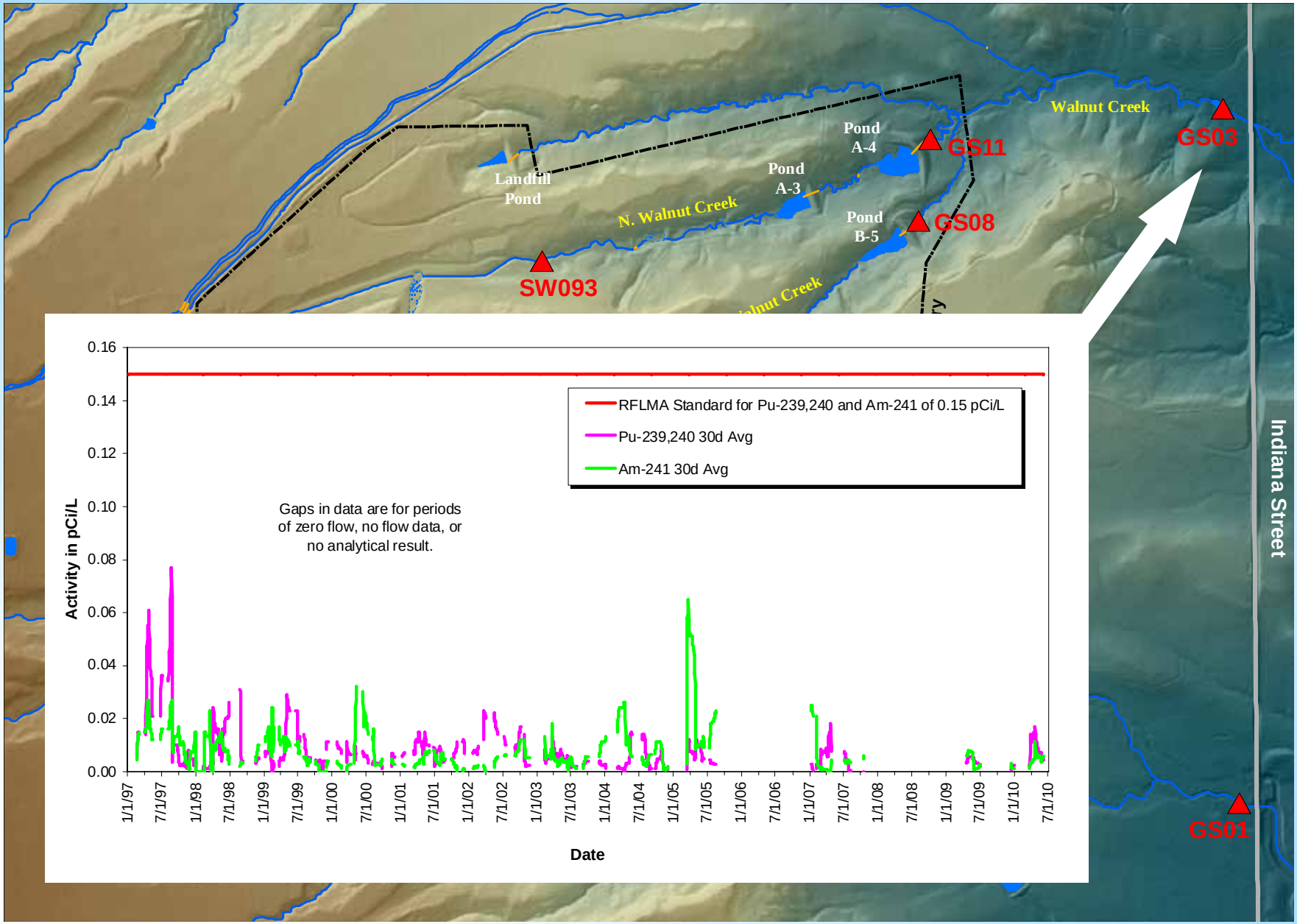
POC GS03

- Nitrate + Nitrite as Nitrogen




Walnut Creek
GS03
Pond
A-4
GS11
Landfill
Pond
Pond
A-3
N. Walnut Creek
Pond
B-5
GS08
SW093
Indiana Street
GS01
RFLMA Standard for Pu-239,240 and Am-241 of 0.15 pCi/L
Pu-239,240 30d Avg
Am-241 30d Avg
Gaps in data are for periods
of zero flow, no flow data, or
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Activity in pCi/L
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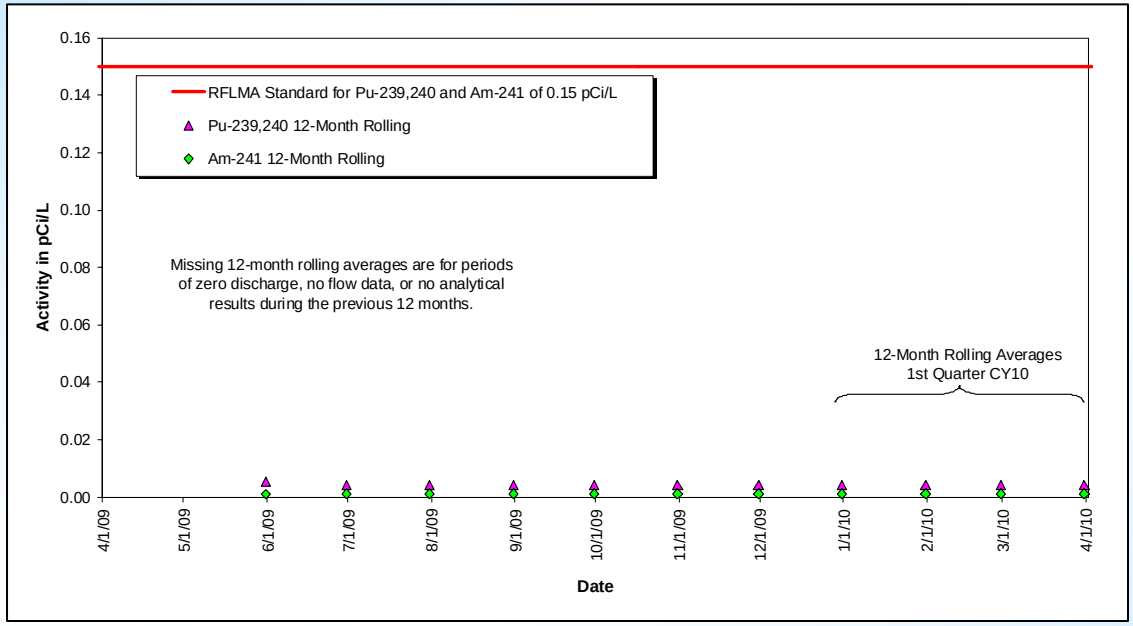
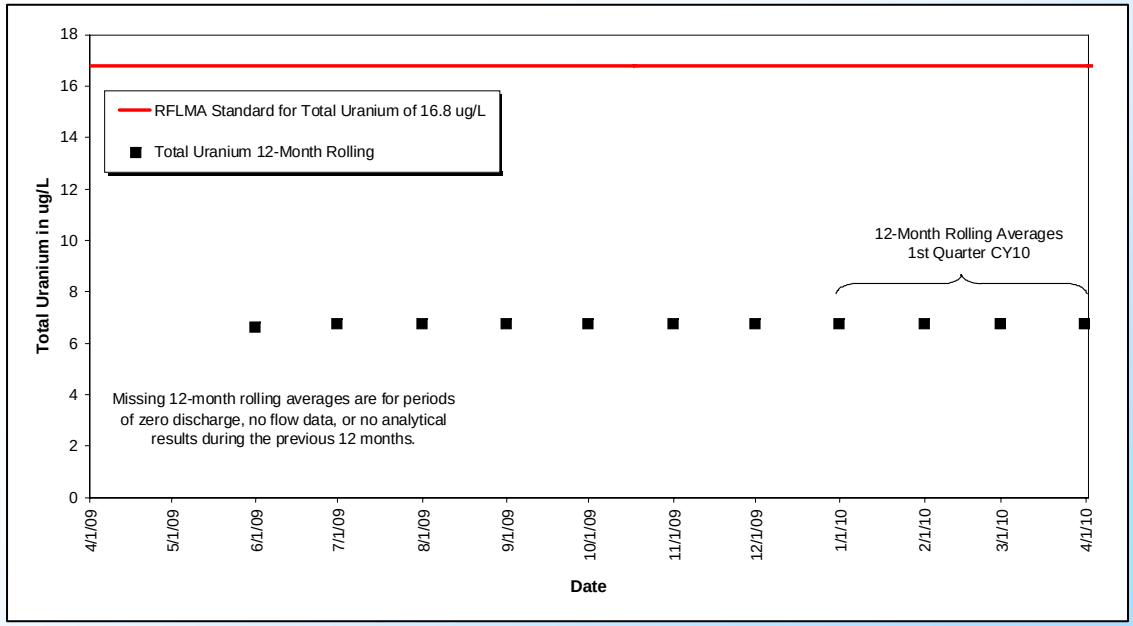
1/1/10
7/1/10
Date

POC GS08

- Plutonium and Americium



- Total Uranium



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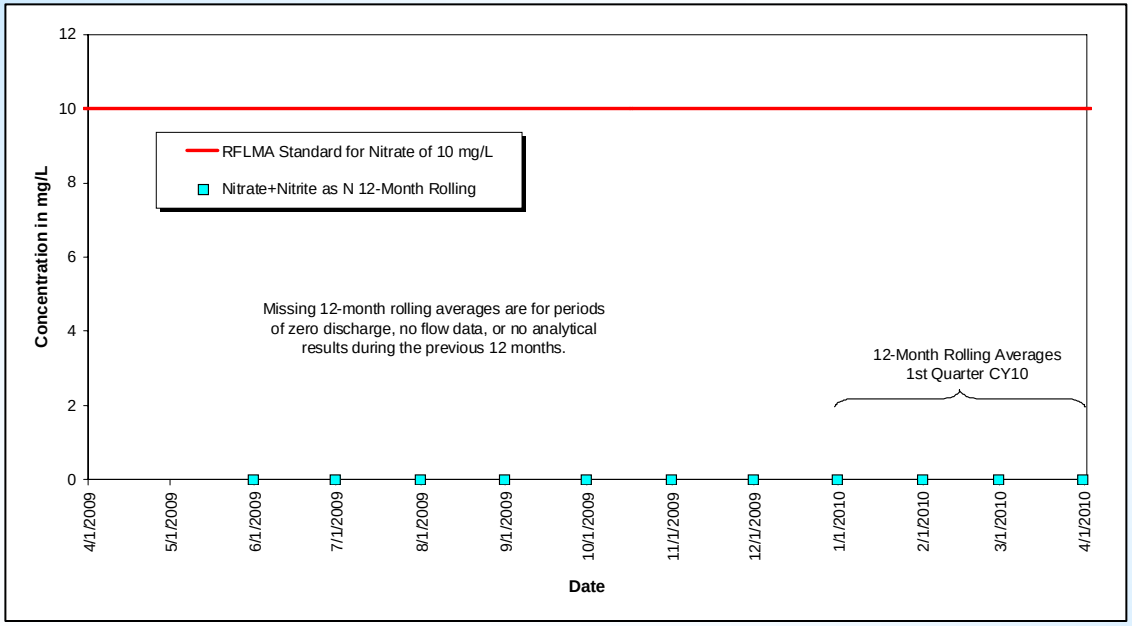
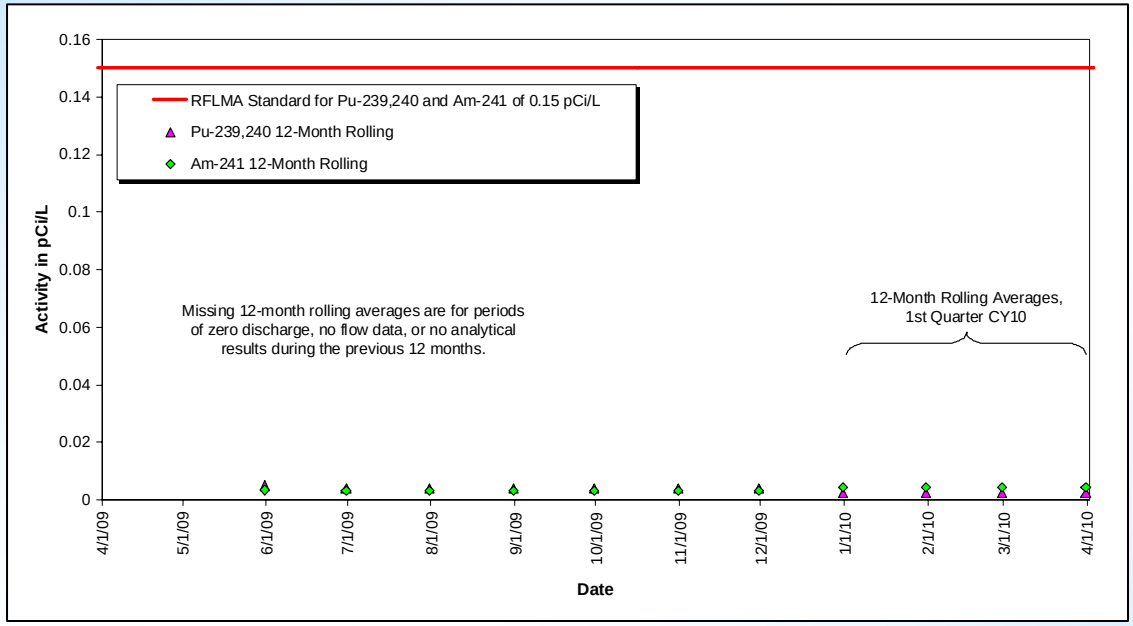
POC GS08

- Nitrate + Nitrite as Nitrogen

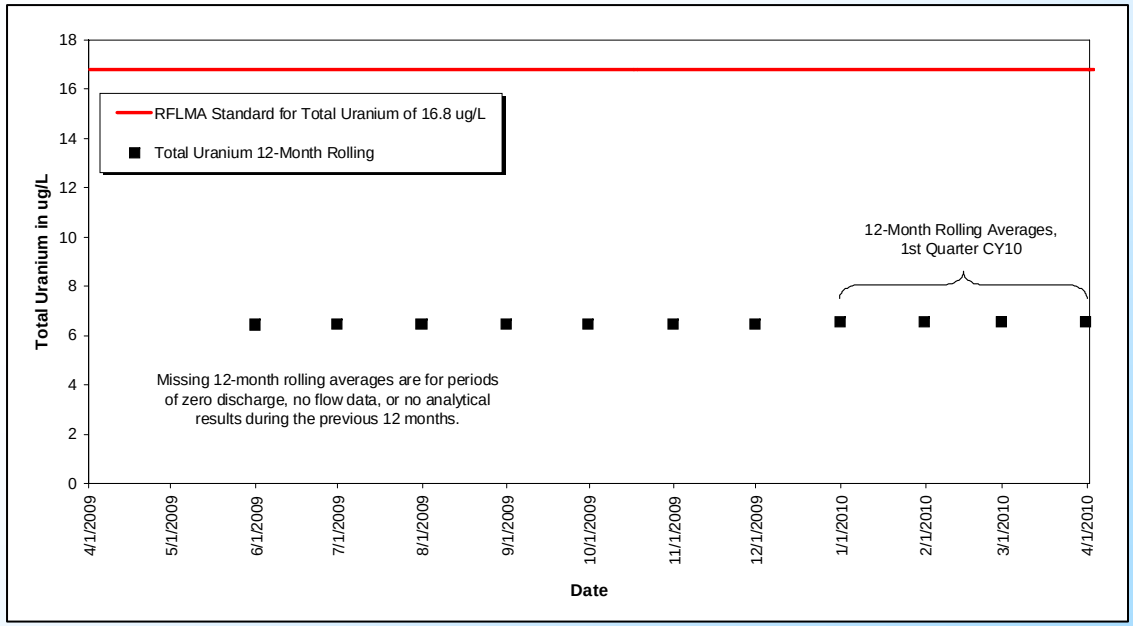


POC GS11

- Plutonium and Americium



- Total Uranium



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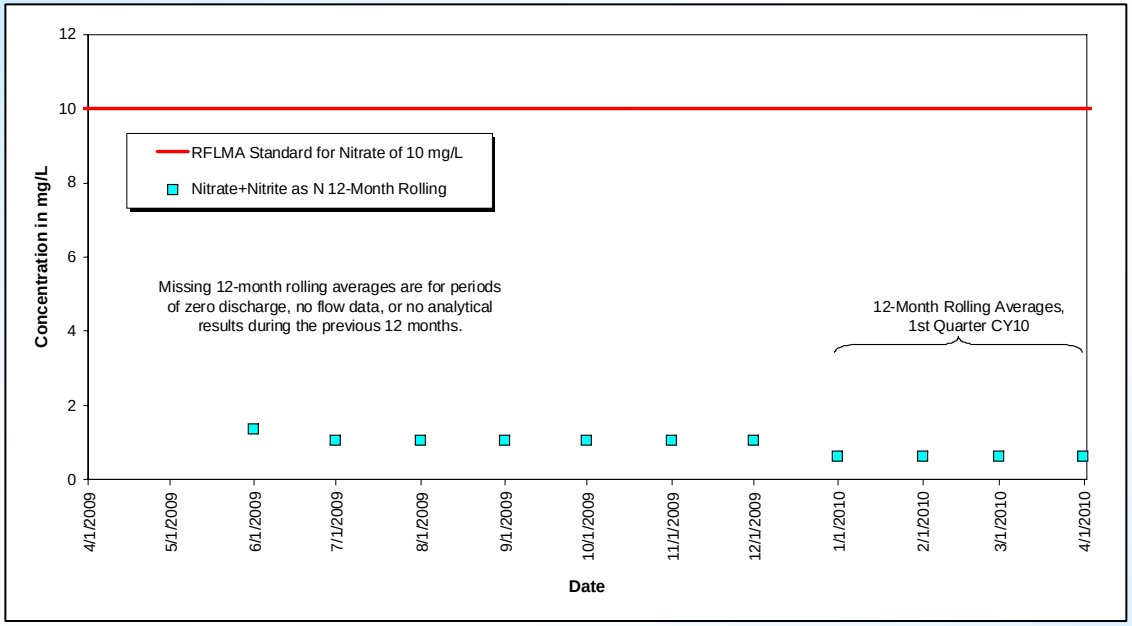
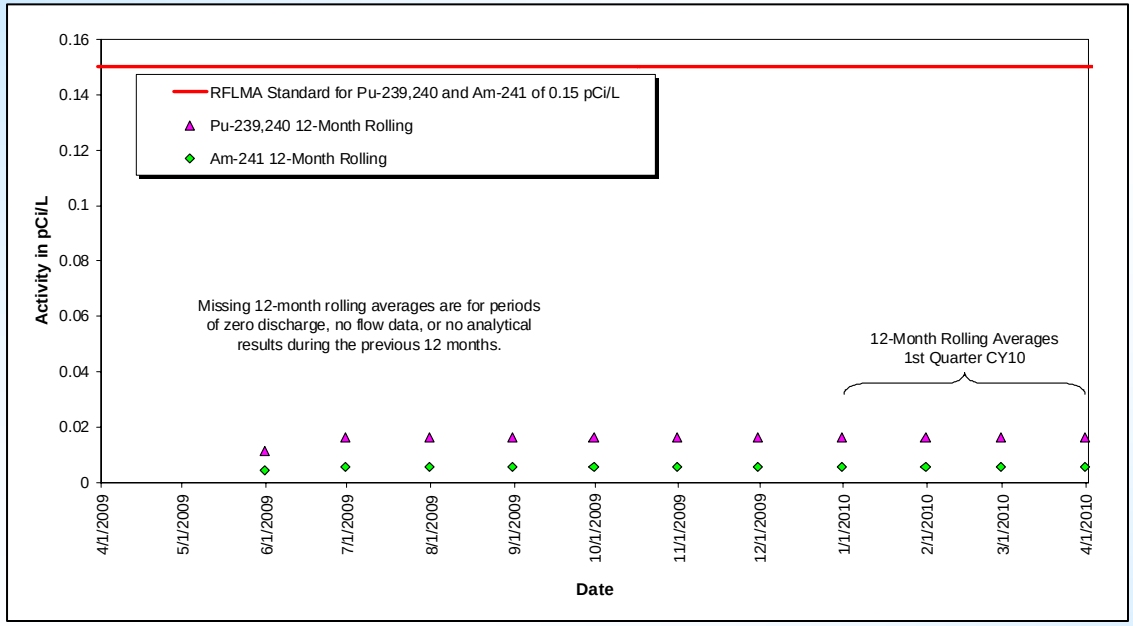
POC GS11

- Nitrate + Nitrite as Nitrogen

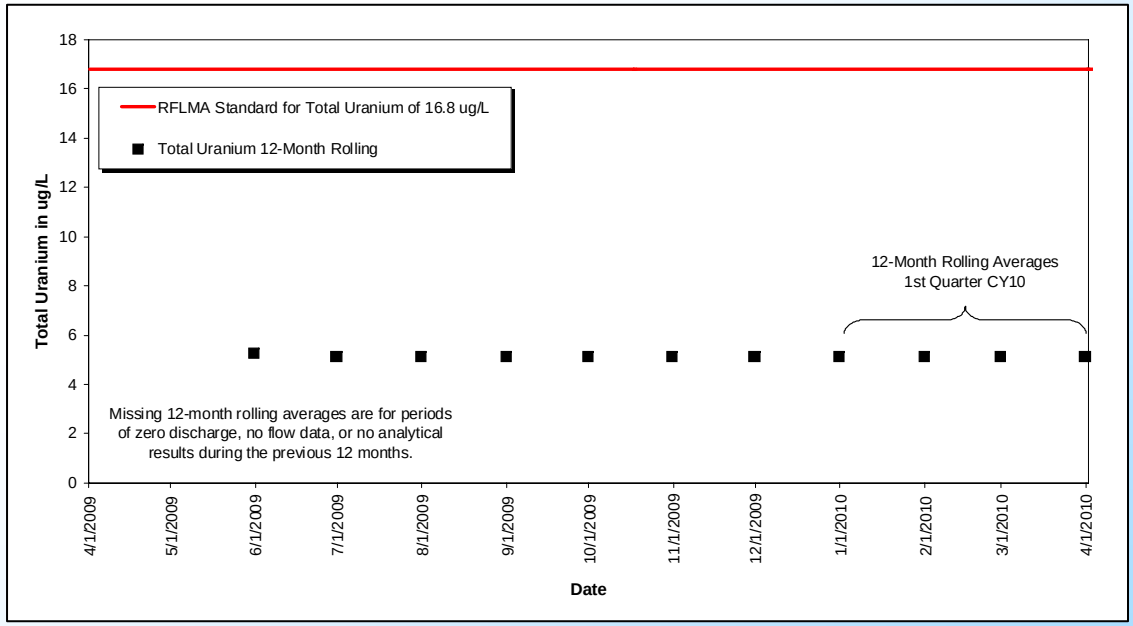


POC GS31

- Plutonium and Americium



- Total Uranium



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Point of Evaluation Monitoring – First Quarter 2010

- Water quality at all points of evaluation was below applicable standards during the quarter

Plutonium and Americium Loading Conclusions at Rocky Flats

- Postclosure concentrations remain within historic variability and have decreased significantly
- Loading has decreased significantly
- Insignificant contribution to sediment concentrations

Example Loading Figures from the 2009 Annual Report: Lower Walnut Creek

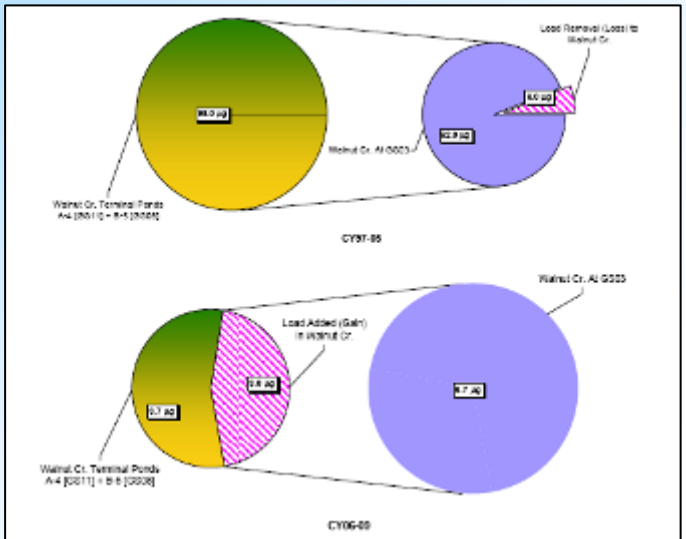

Figure 3–134. Relative Average Annual Pu Load Totals at GS03, GS08, and GS11

U.S. Department of Energy
April 2010

Rocky Flats Annual Report of Site Surveillance and Maintenance Activities—CY 2009
Doc. No. S05993
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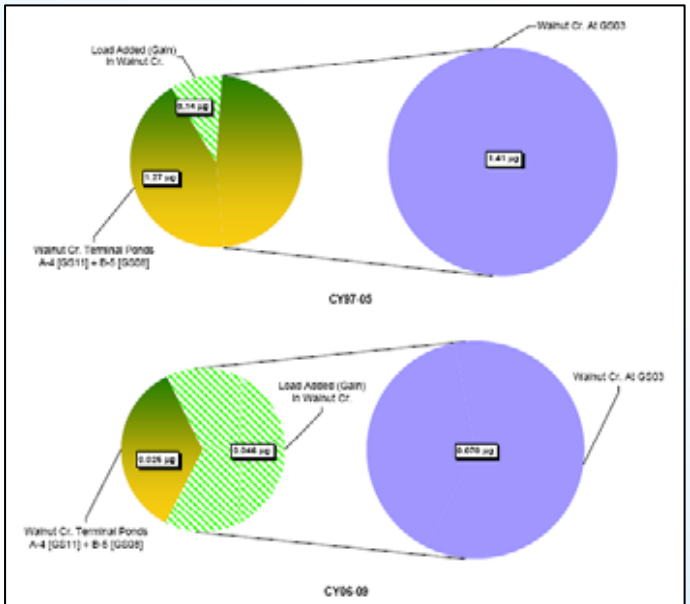

Figure 3–136. Relative Average Annual Am Load Totals at GS03, GS08, and GS11

U.S. Department of Energy
April 2010

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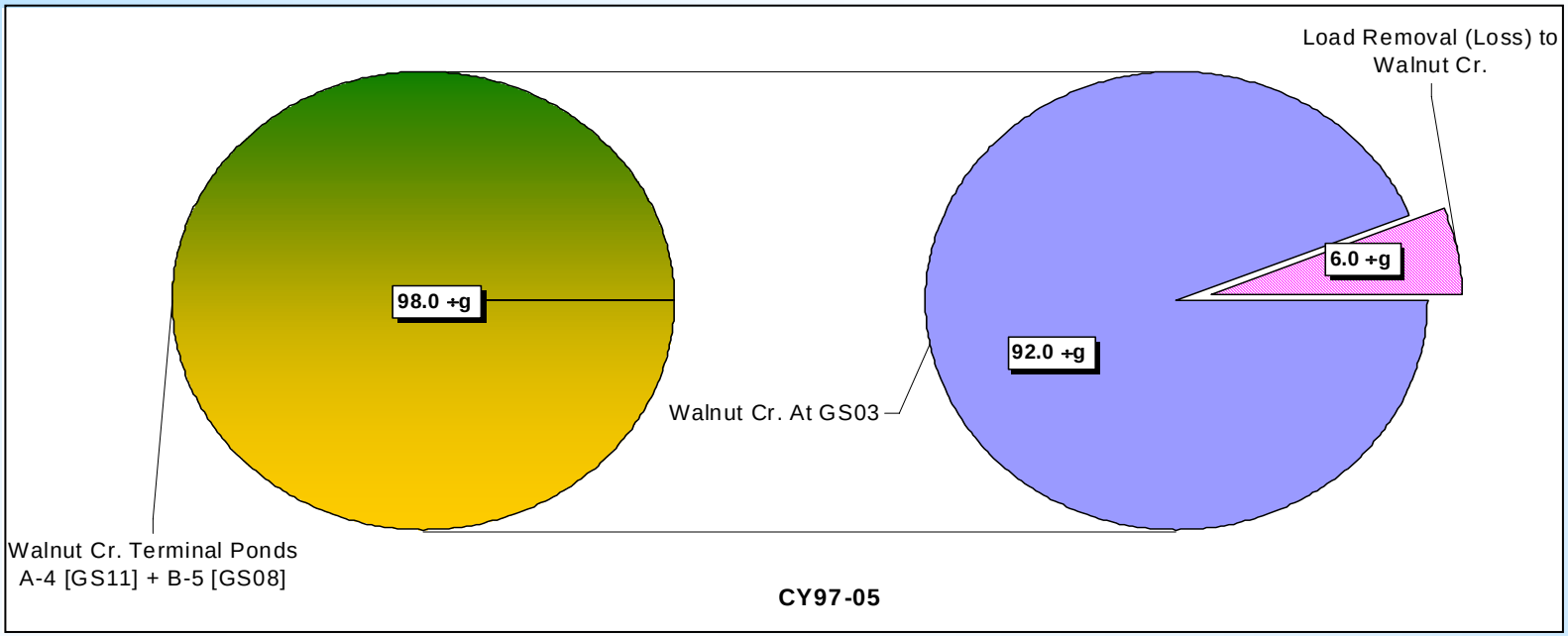
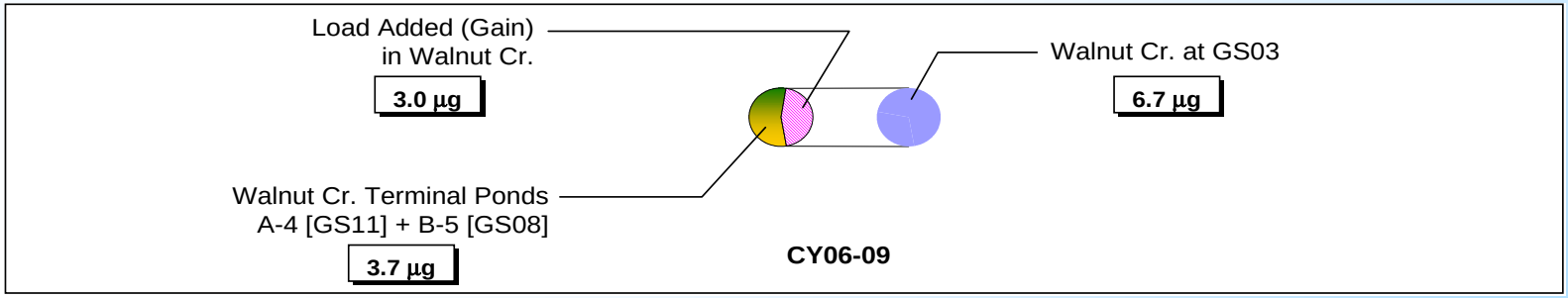
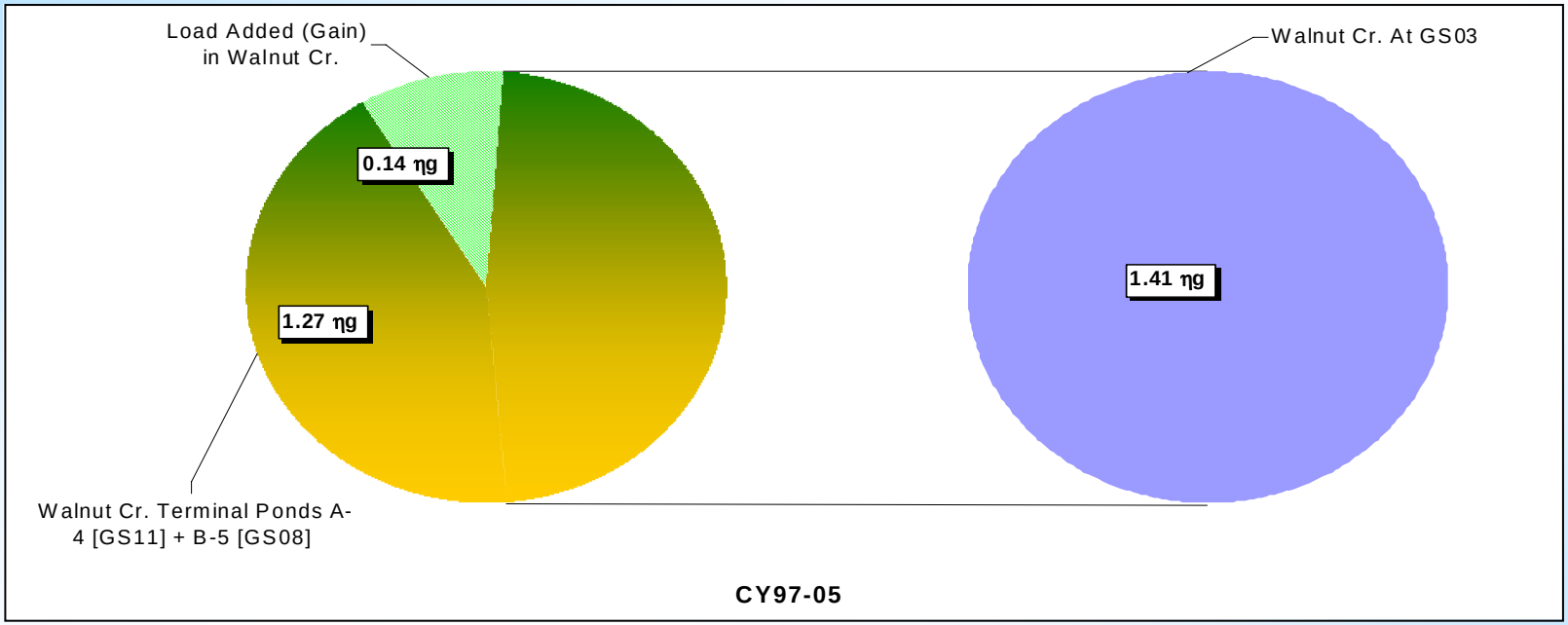
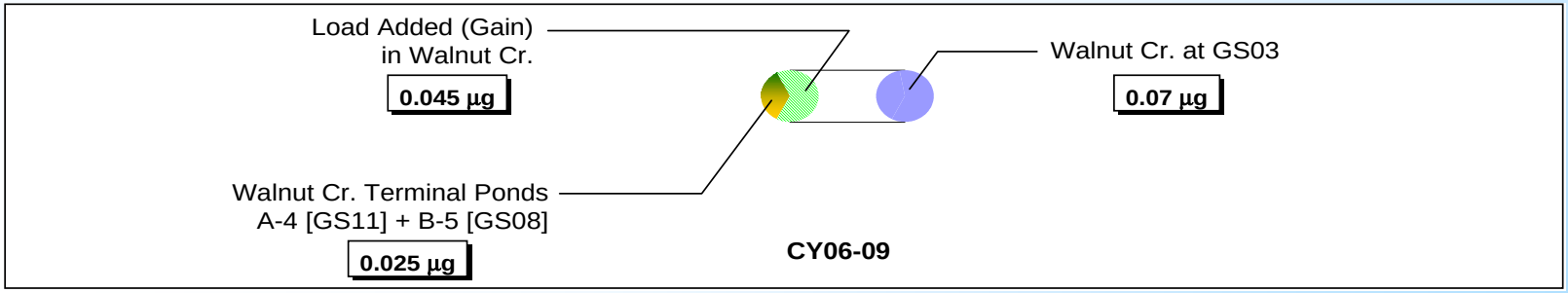
Relative Average Annual Plutonium Load Totals at GS03, GS08, and GS11
(Scaled to Show Relative Load Quantities)





Relative Average Annual Americium Load Totals at GS03, GS08, and GS11
(Scaled to Show Relative Load Quantities)





Example Loading Figure from the 2009 Annual Report: Pond C-2

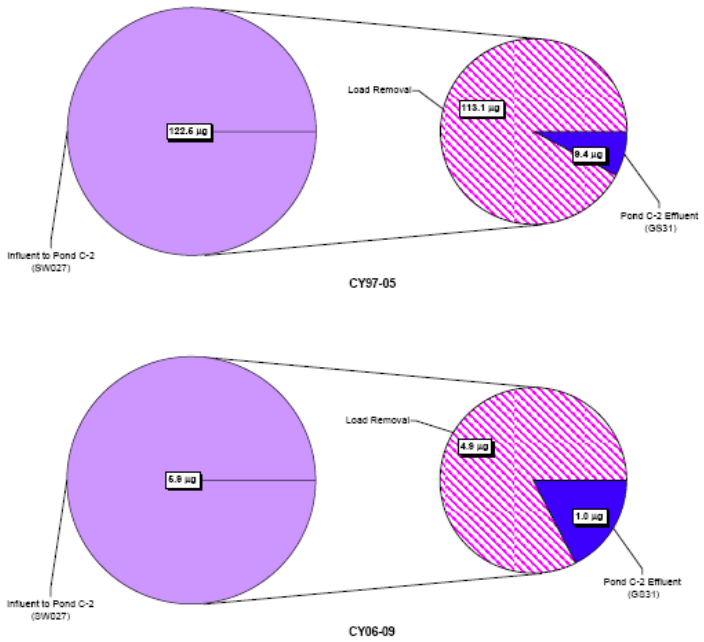
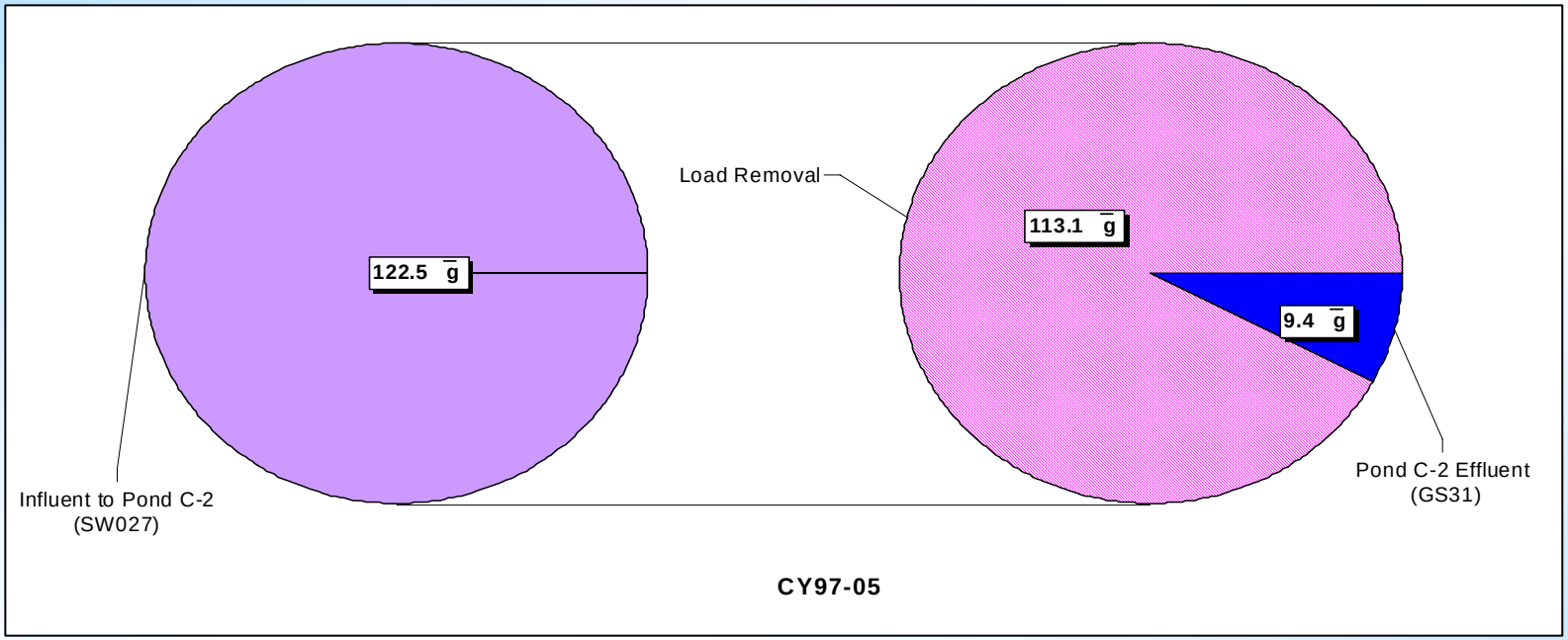
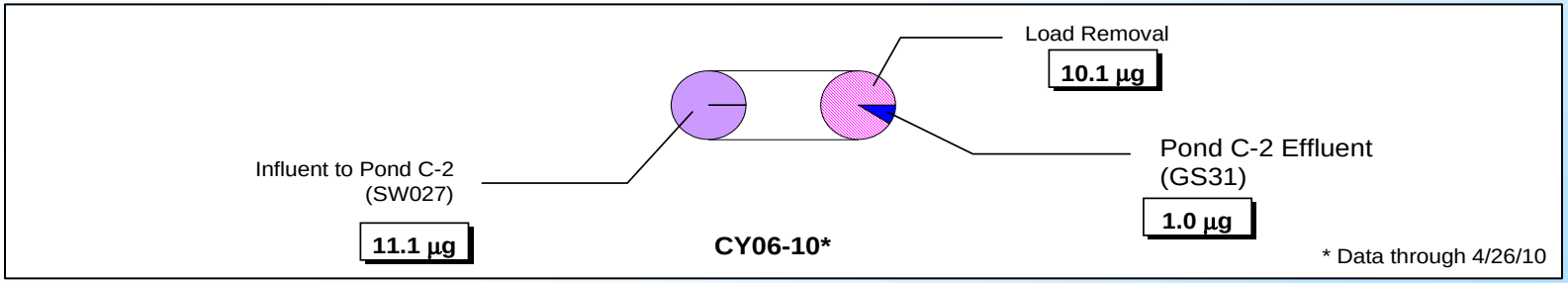


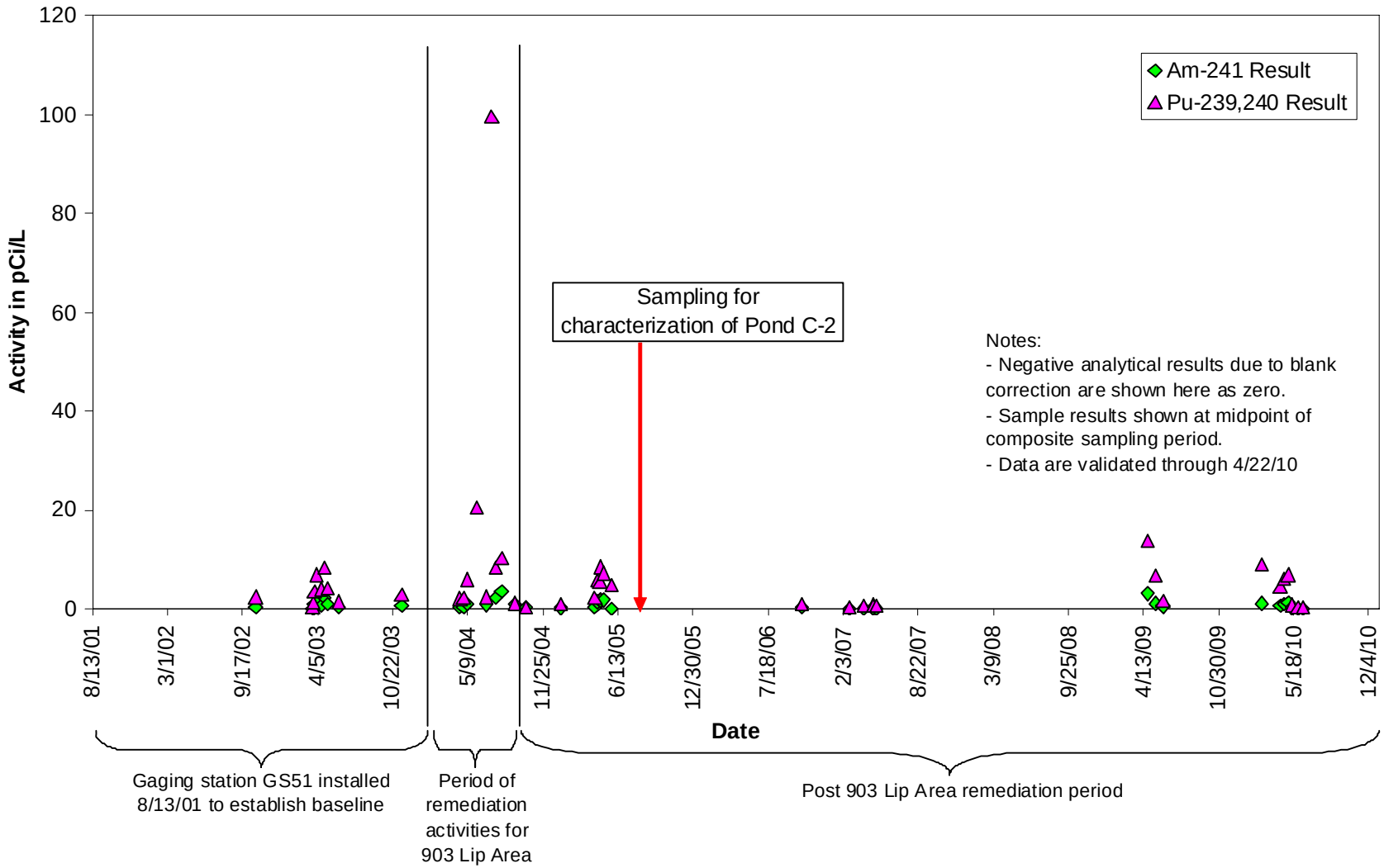
Figure 3–161. Relative Average Annual Pu Load Totals for Pond C-2

Relative Average Annual Plutonium Load Totals for Pond C-2 (Scaled to Show Relative Load Quantities and Updated with CY 2010 Data)

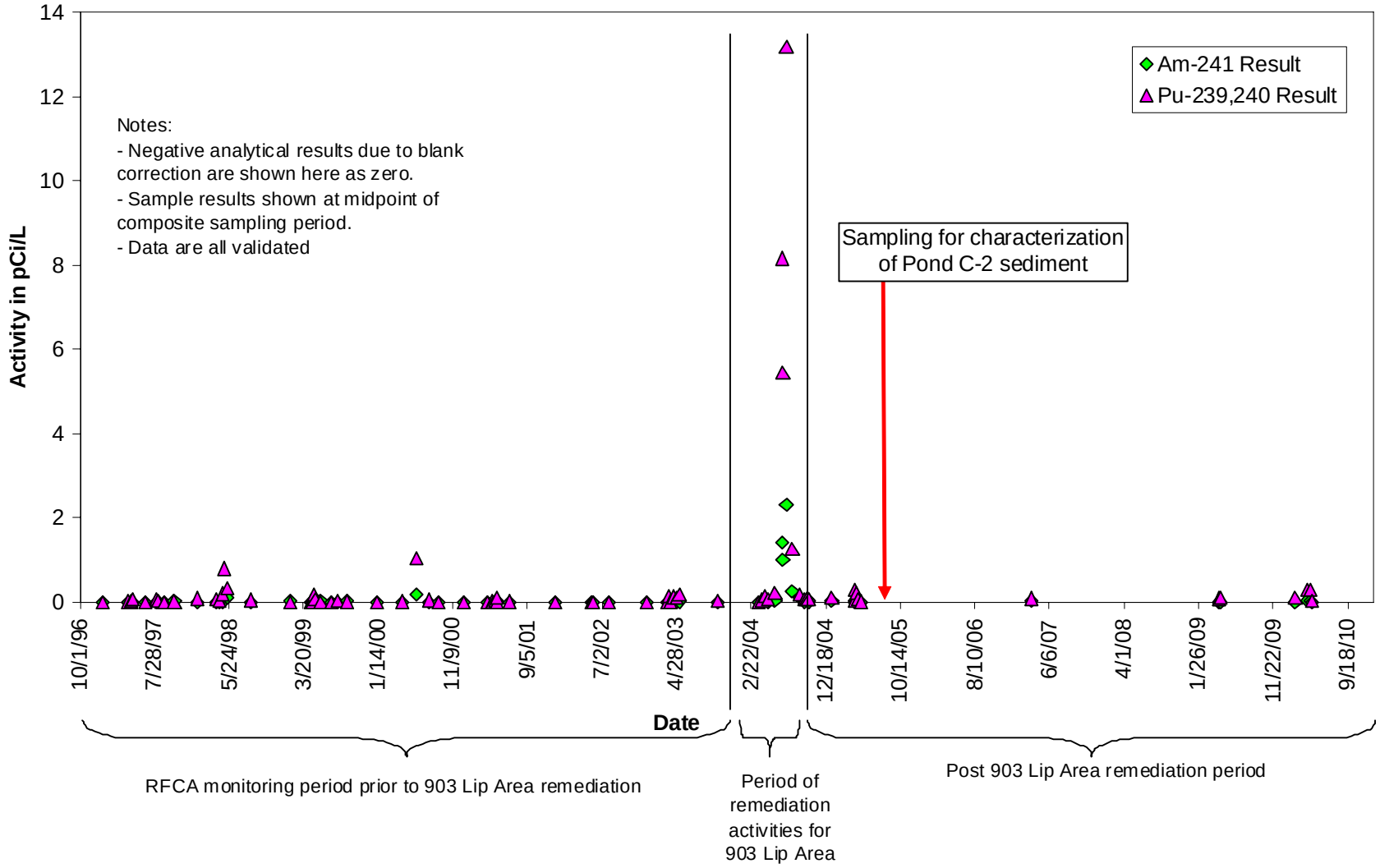




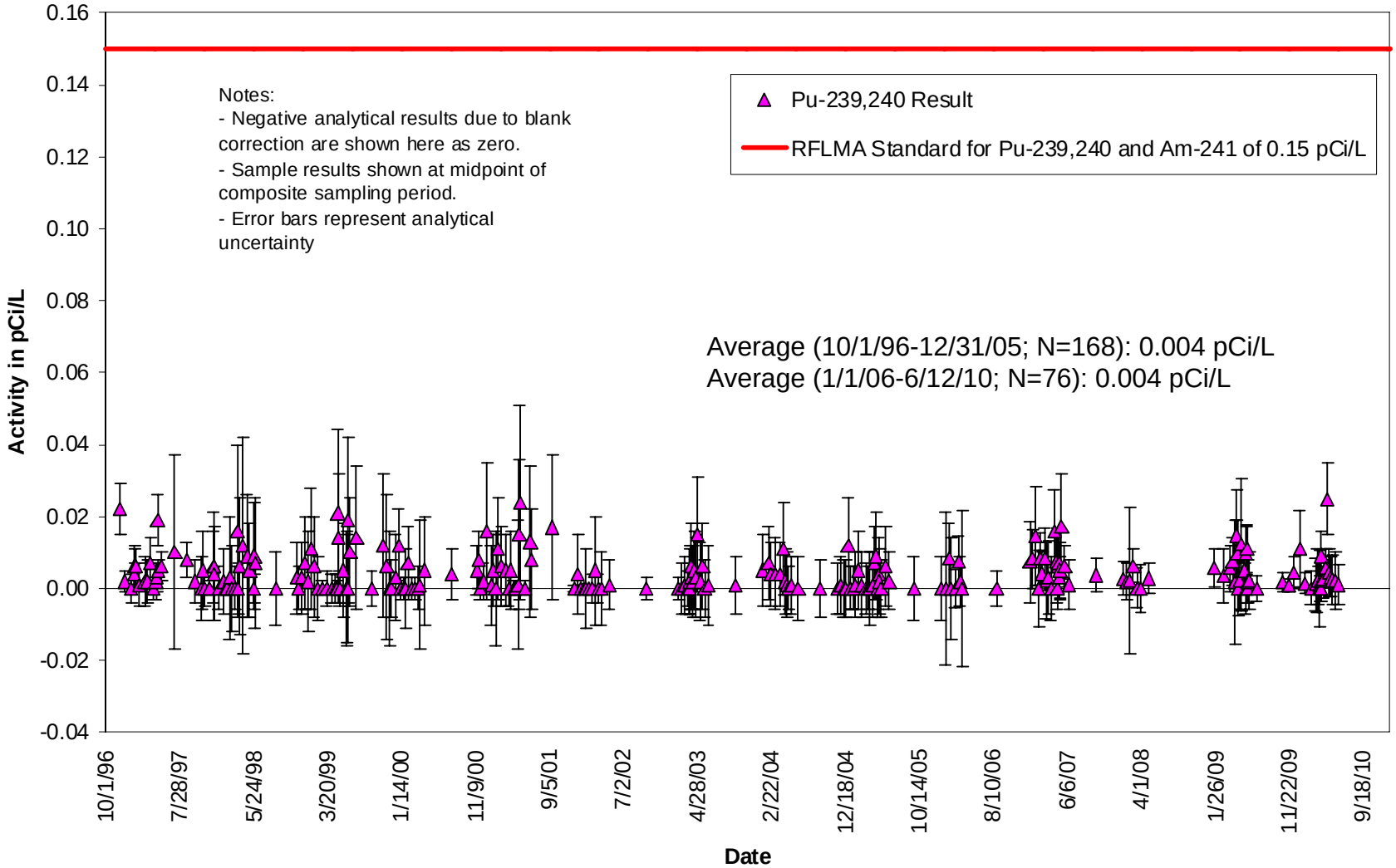
Monitoring Location GS51 (Drainage Swale Tributary to the S. Interceptor Ditch): Plutonium and Americium Results for Continuous Flow-Paced Composite Samples



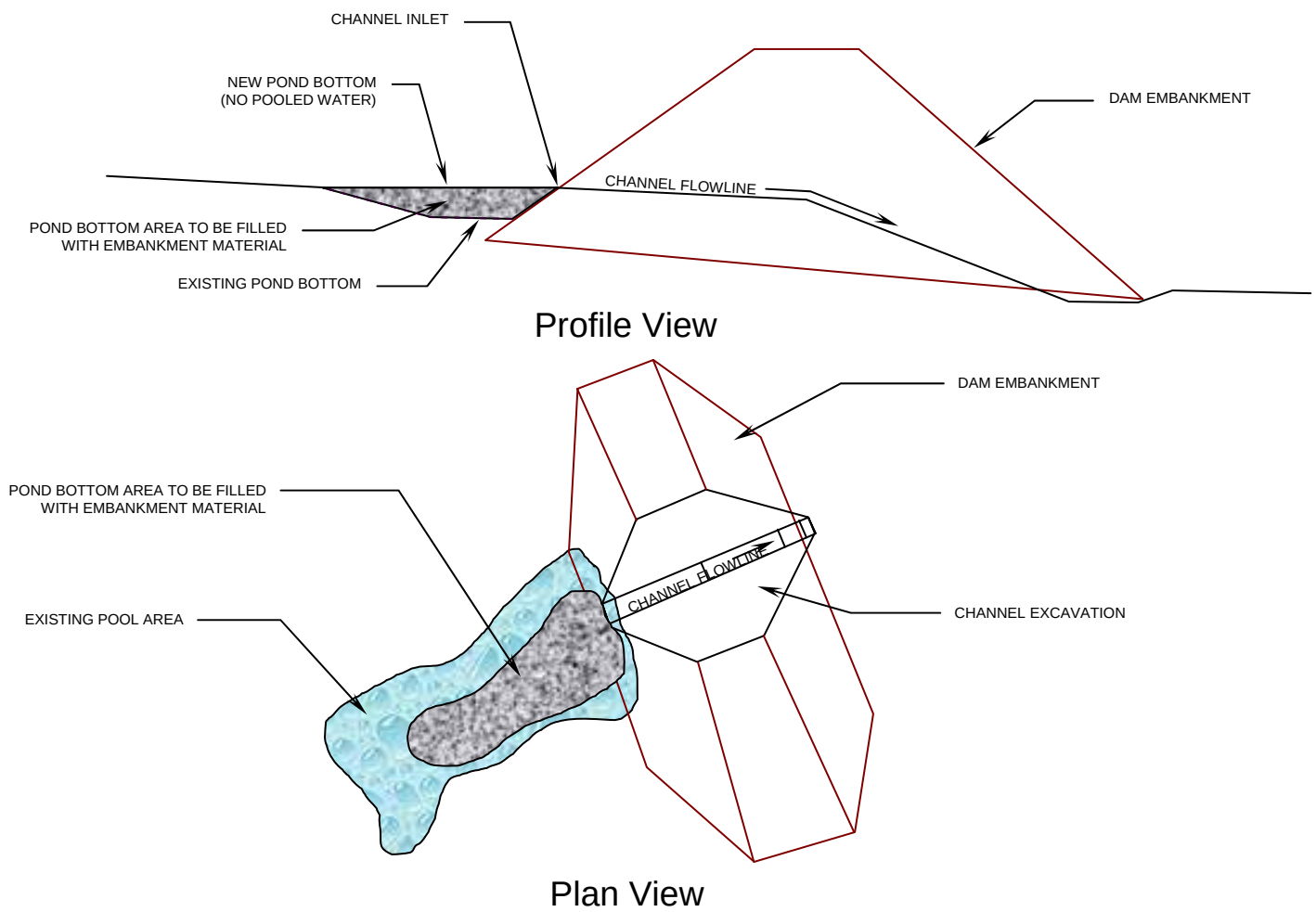
Monitoring Location SW027 (S. Interceptor Ditch upstream of Pond C-2): Plutonium and Americium Results for Continuous Flow-Paced Composite Samples



Monitoring Location GS01 (Woman Creek at Indiana St.): Plutonium Results for Continuous Flow-Paced Composite Samples



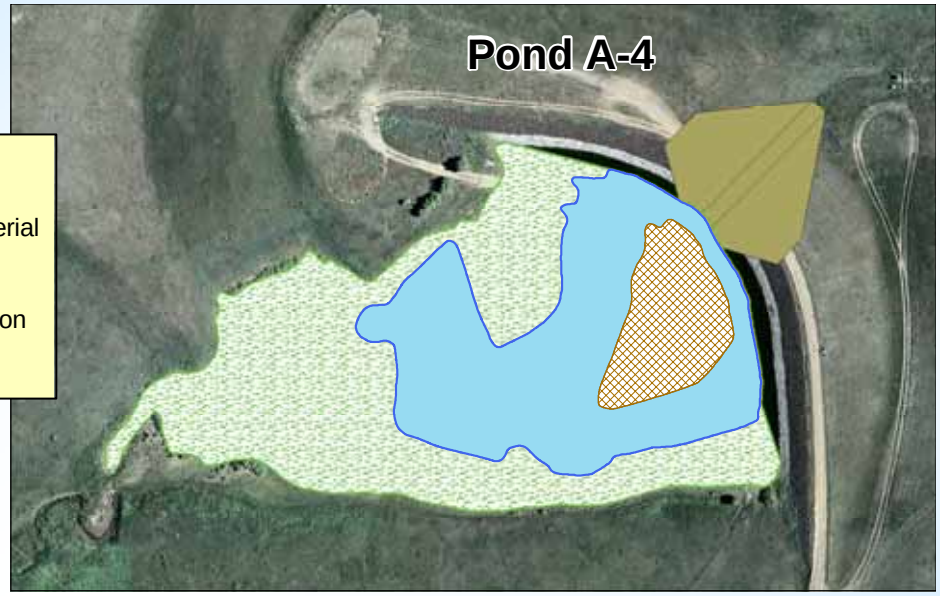
Conceptual Dam Breach Design

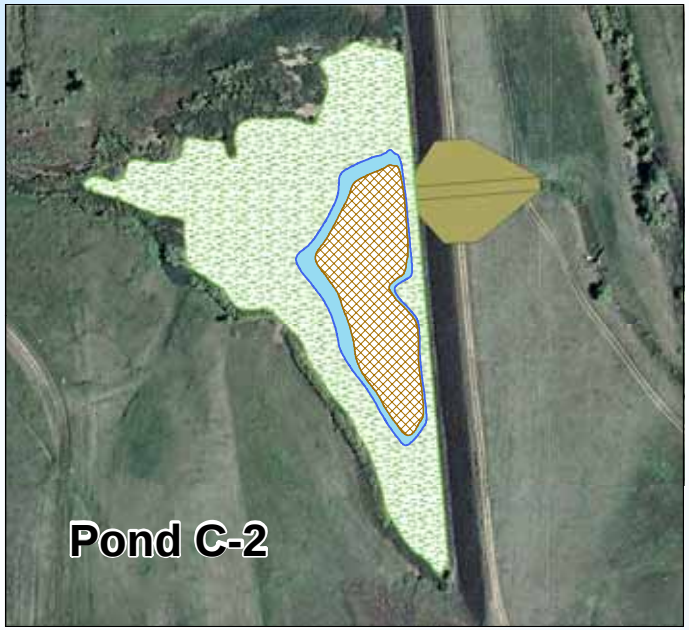


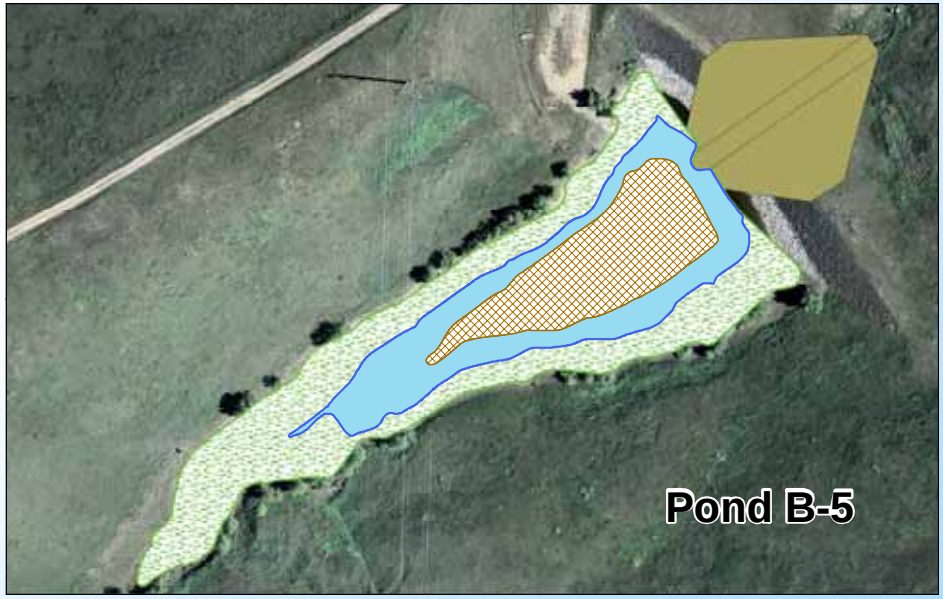
Conceptual Dam Breach Design

Legend

- Pond Bottom Area to be Filled with Embankment Material
- Pond Level During Flow Through Operation
- Area to be Revegetated During Flow Through Operation
- Breach Channel







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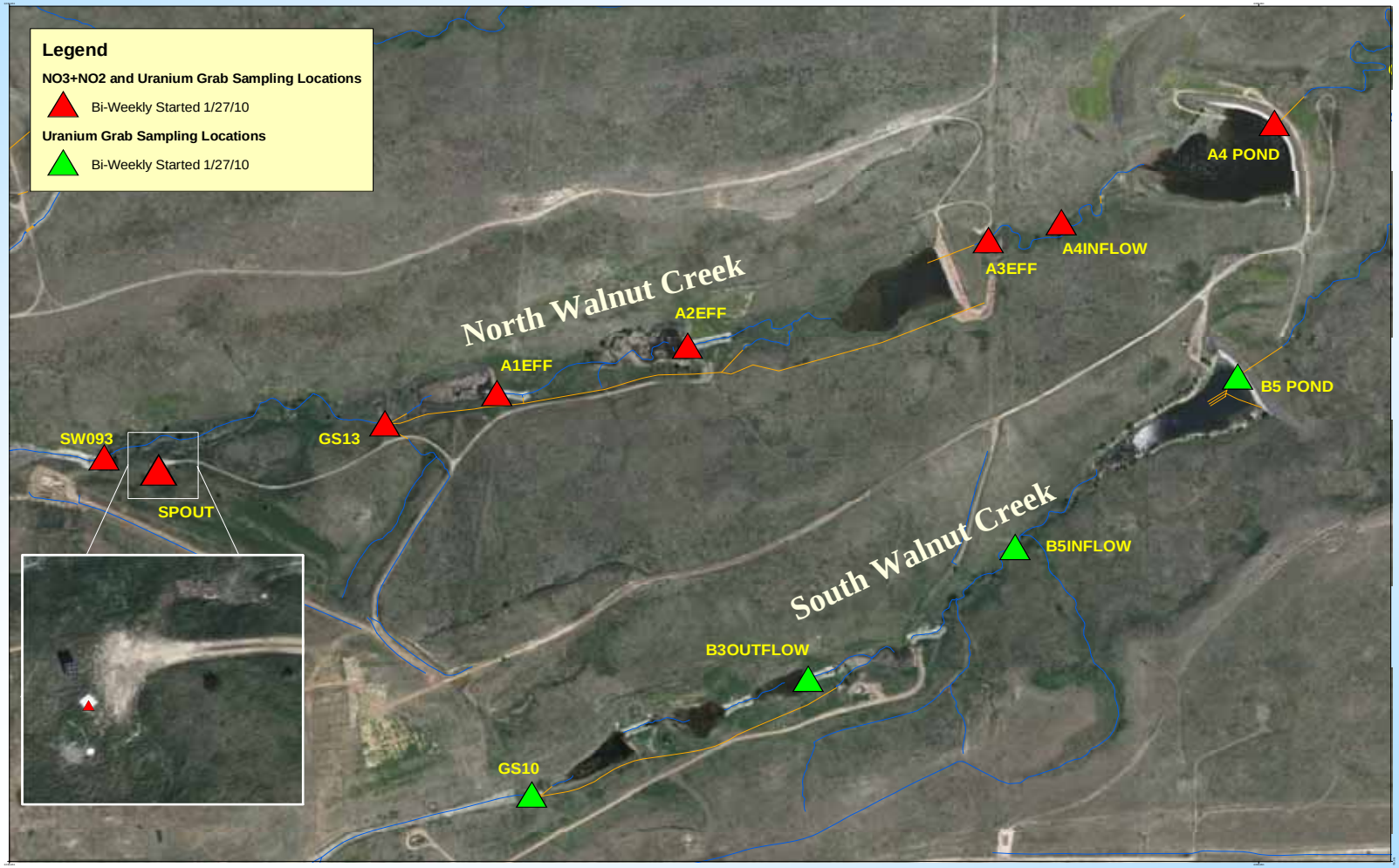
Non-RFLMA Enhanced Sampling

- Grab sampling for uranium and nitrate + nitrite in North and South Walnut Creeks
- Continuous flow-paced composite sampling for uranium in North and South Walnut Creeks
- Synoptic storm-event sampling for Plutonium, Americium, and TSS in North and South Walnut Creeks
- Grab sampling at various locations for high-resolution uranium analysis at LANL

Grab Sampling for Nitrate + Nitrite and Uranium

- Designed to evaluate spatial variation of water quality
- Samples are collected biweekly during a variety of flow conditions; frequency may change based on data evaluation
- Sampling locations
  - North Walnut Creek: SW093, SPOUT, GS13, A1EFF, A2EFF, A3EFF, A4INFLOW, A4 POND
  - South Walnut Creek (uranium only): GS10, B3OUTFLOW, B5INFLOW, B5 POND
- Started sampling January 27, 2010; have conducted 17 sampling events to date

Grab Sampling for Nitrate + Nitrite and Uranium



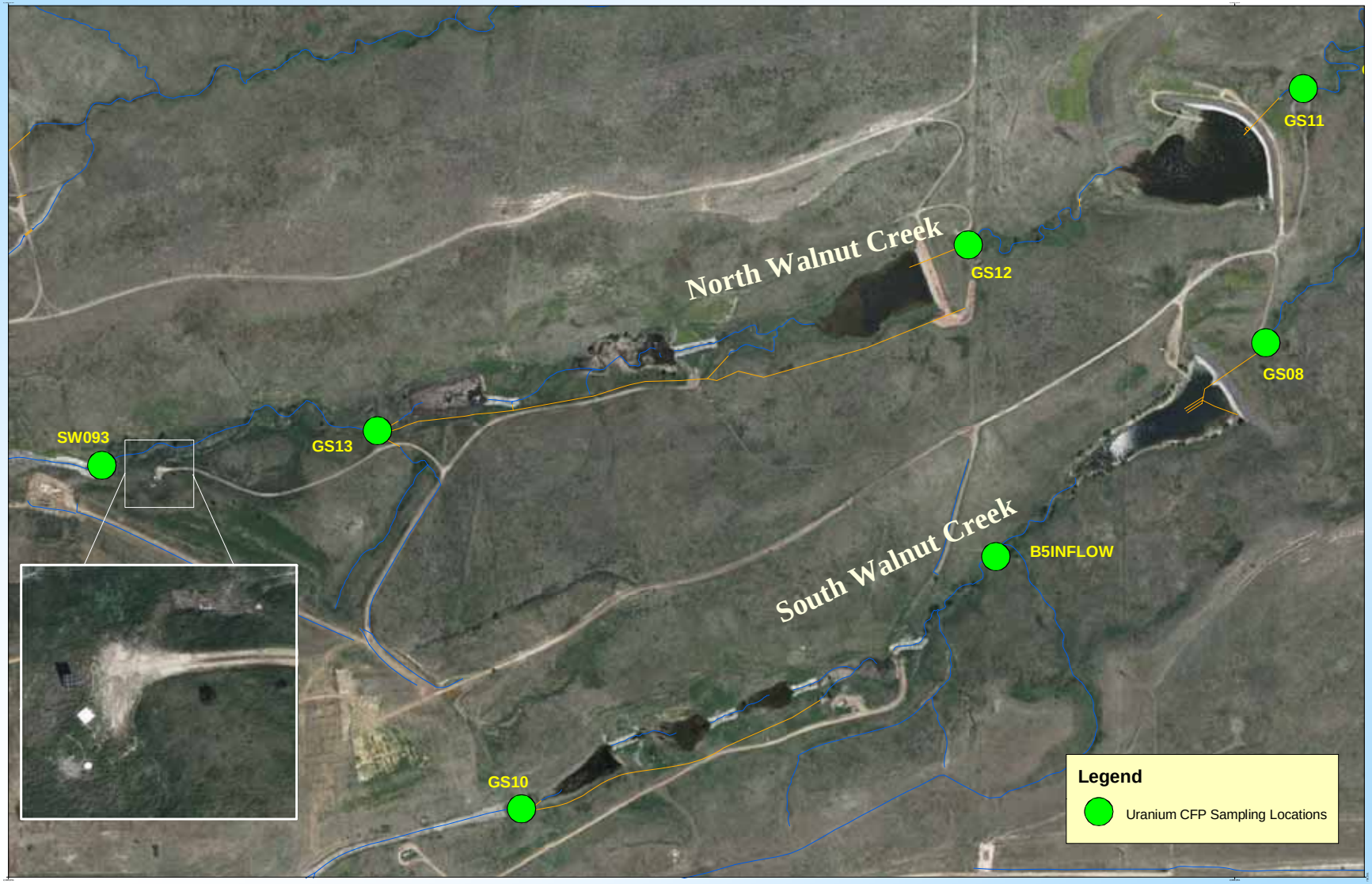
Continuous Flow-Paced Composite Sampling for Uranium

- Designed to evaluate longer-term variation of water quality (e.g., 12-month average)
- Samples are collected continuously during all flow conditions
  using automated samplers
- Sampling locations
  - North Walnut Creek: SW093*, GS13*, GS12, GS11*
  - South Walnut Creek: GS10*, B5INFLOW, GS08*
- Samples to date during CY 2010

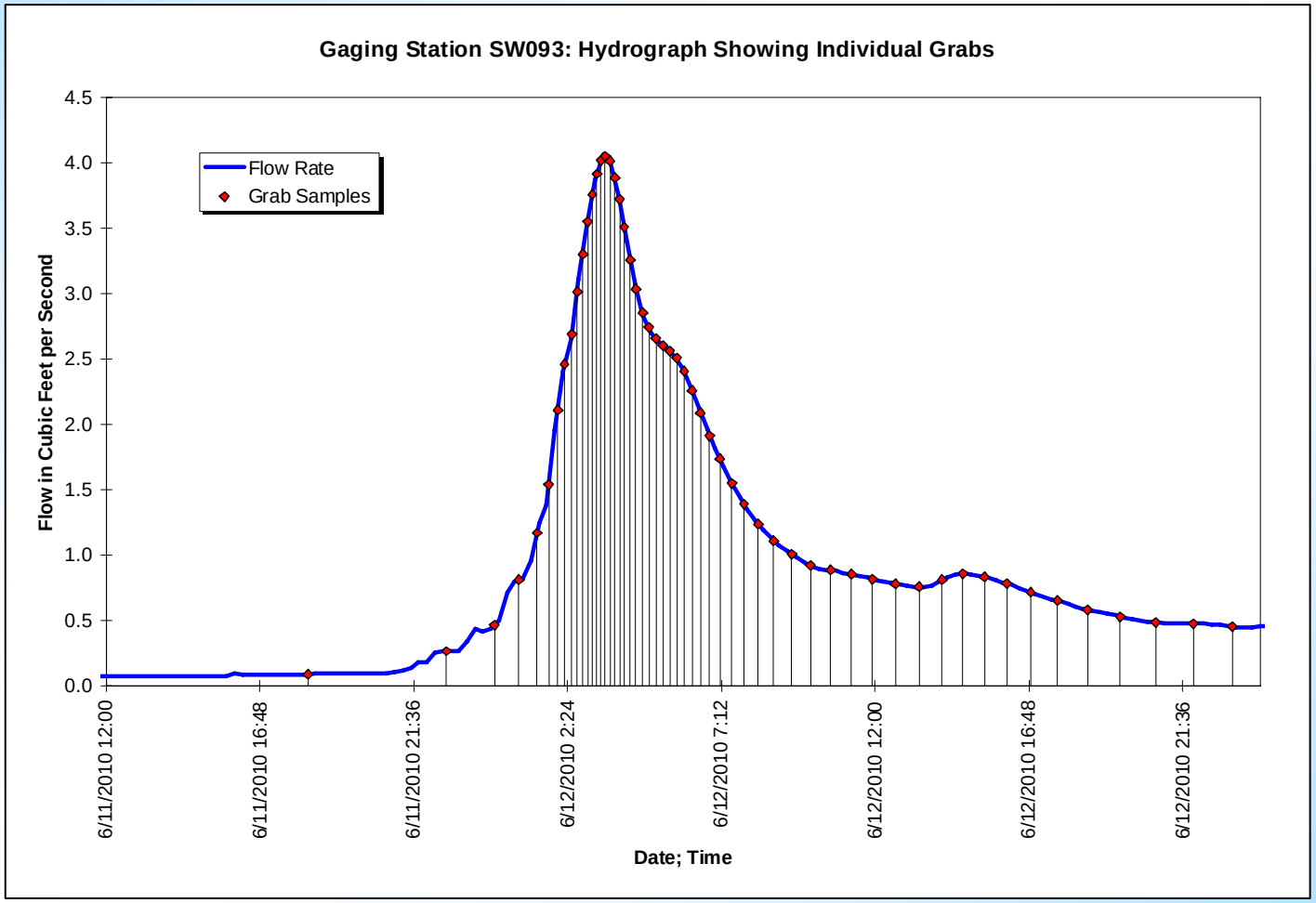
Location	Number of Composites (CY 2010)
SW093	15
GS13	15
GS12	15
GS11	9
GS10	13
B5INFLOW	2
GS08	10

* RFLMA Sampling

Automated Sampling for Uranium



Example of Continuous Flow-Paced Sample Hydrograph



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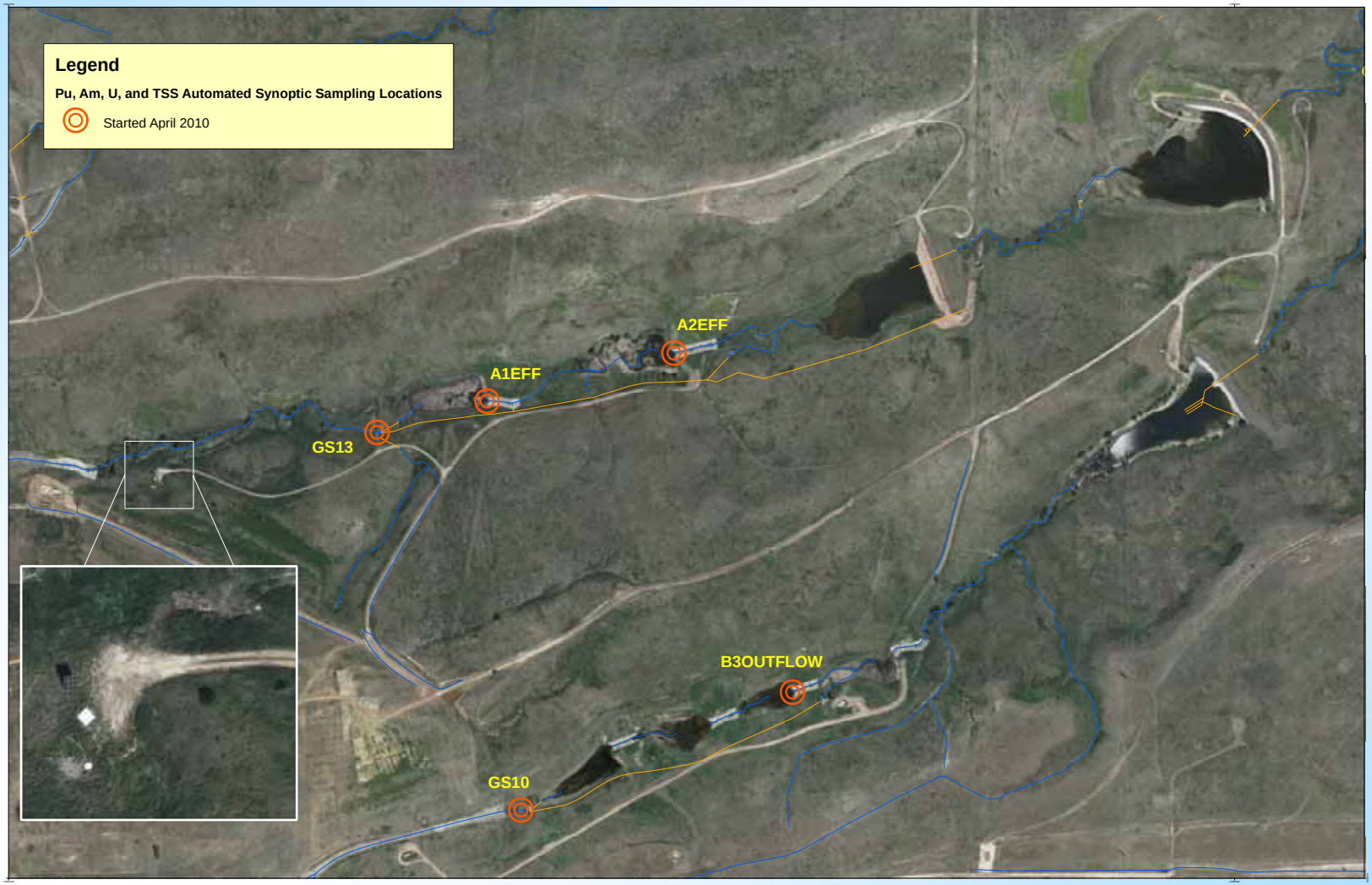
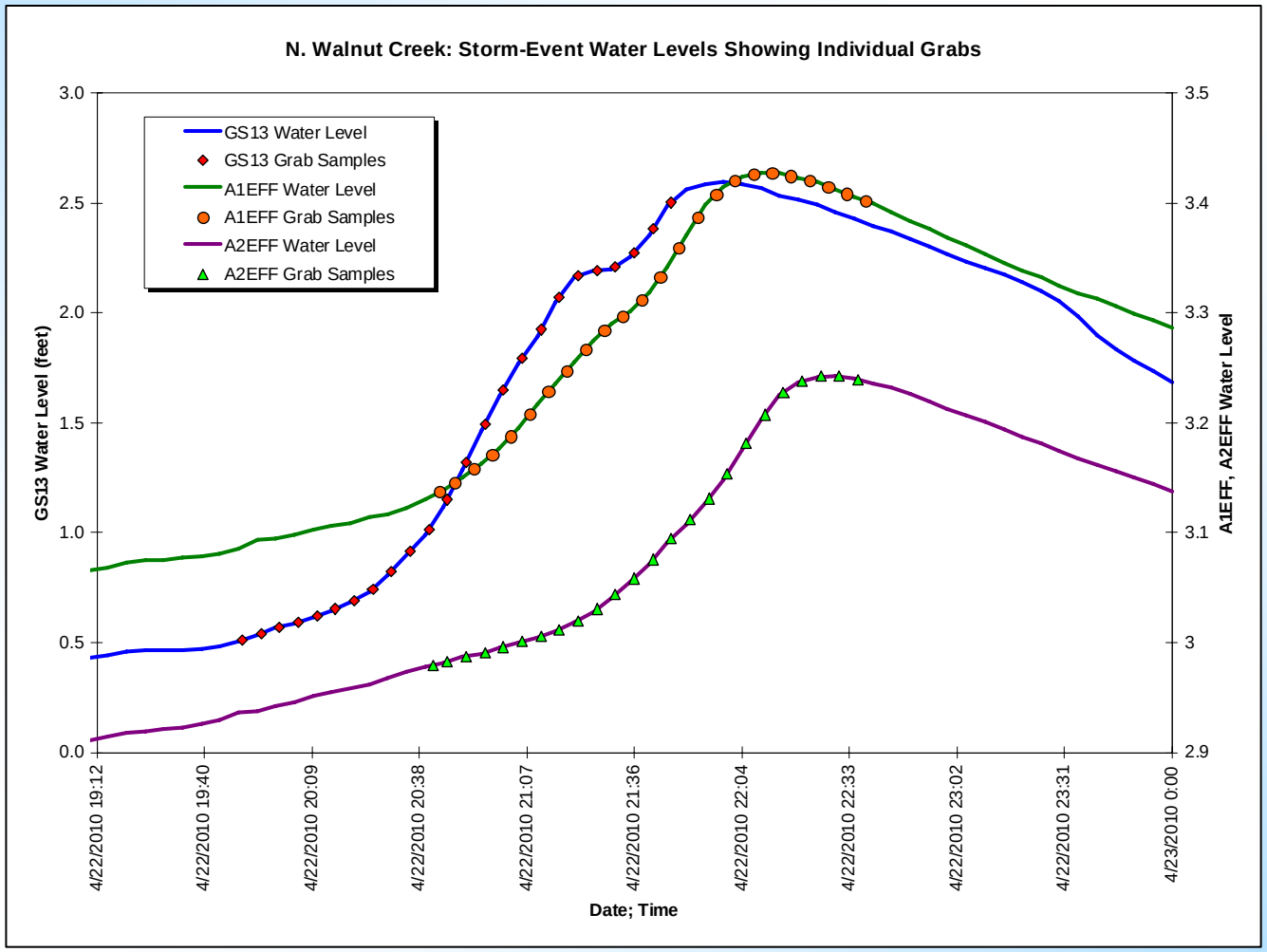
Synoptic Storm-Event Sampling

- Designed to evaluate spatial variation of water quality during storm events – specifically targeted at previously breached Dams A-1, A-2, B-1, B-2, and B-3
- Samples analyzed for plutonium, americium, uranium, and total suspended solids
- Samples are collected using automated samplers that trigger during the rising limb of a runoff hydrograph as the event moves down a drainage – opportunistic
- Sampling locations
  - North Walnut Creek: GS13, A1EFF, A2EFF
  - South Walnut Creek: GS10, B3OUTFLOW
- Sampling events to date during CY 2010
  - North Walnut Creek: two events
  - South Walnut Creek: one event

Synoptic Storm-Event Sampling



Example of Synoptic Storm-Event Sample Period



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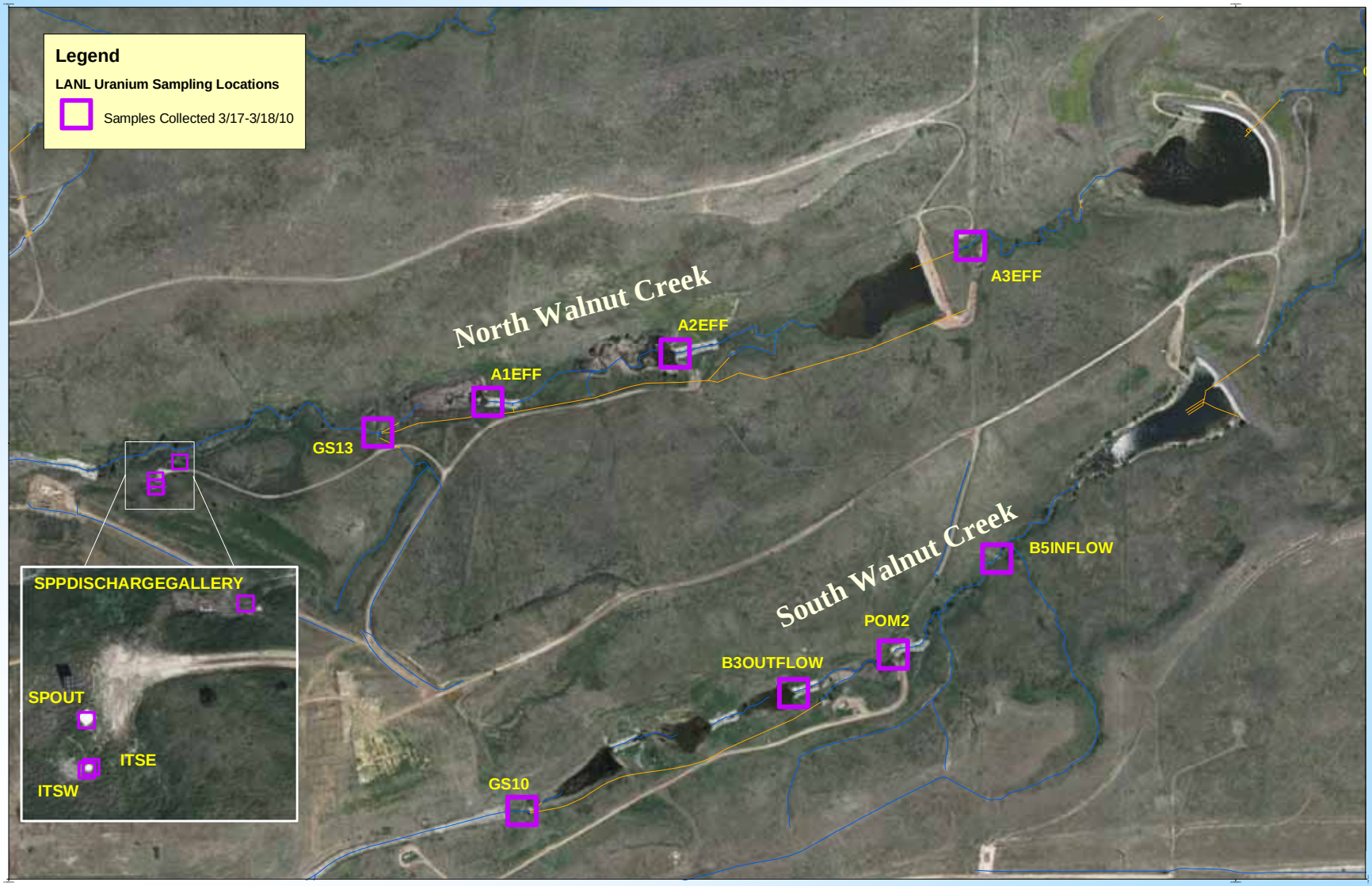
LANL High-Resolution Uranium Sampling

- Designed to evaluate spatial variation of uranium isotopic signatures – anthropogenic (site-related) vs. naturally occurring
- Samples are collected as grabs; targeted to baseflow periods to avoid dilution from runoff
- Sampling locations
  - North Walnut Creek: ITSW, ITSE, SPOUT, SPPDG, GS13, A1EFF, A2EFF, A3EFF
  - South Walnut Creek: GS10, B3OUTFLOW, POM2, B5INFLOW
- Sampling events to date during CY 2010: March 17 and 18, 2010
- Planning an additional round of samples during CY 2010

LANL High-Resolution Uranium Sampling



Enhanced Sampling: Preliminary Results

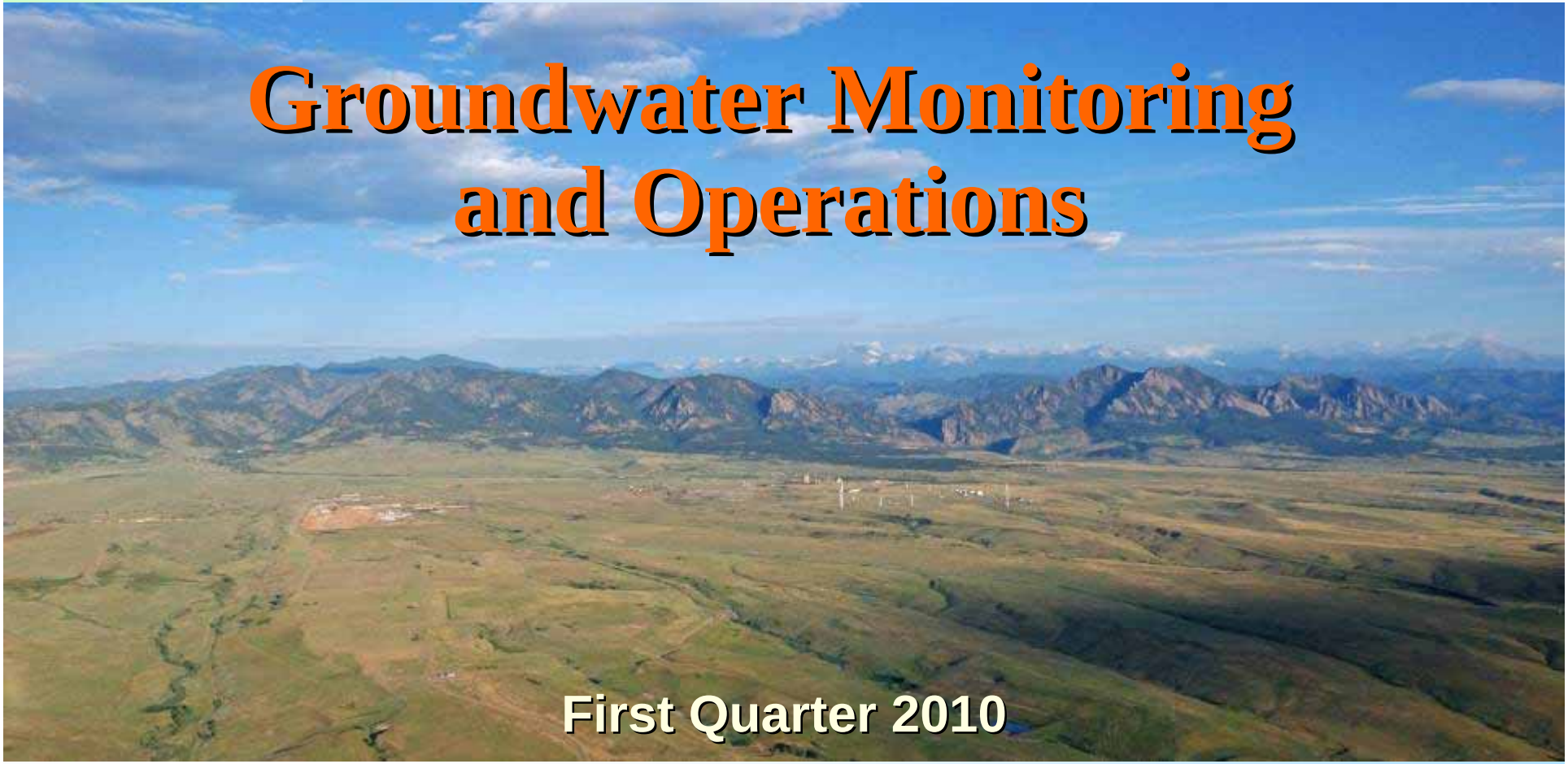
- Uranium: results show expected variability
  - Higher concentrations during baseflow periods
  - North Walnut Creek: concentrations increase in Pond A-2 and decrease further downstream; SPPTS effluent not a major contributor
  - South Walnut Creek: concentrations decrease upstream to downstream
- Nitrate + Nitrite
  - SPPTS effluent not a major contributor
  - Concentrations decrease upstream to downstream; natural degradation especially during warmer periods
- Synoptic storm-event sampling
  - Previously breached dams not contributing Plutonium, Americium, or TSS

LANL High-Resolution Uranium Sampling Results

- Results showed predominantly natural uranium at each surface water location
- Results for locations sampled previously are generally consistent with the earlier data
- Highlights of special interest discussed with SPPTS content

Questions?

Groundwater Monitoring and Operations



First Quarter 2010

U.S. DEPARTMENT OF ENERGY | Legacy Management

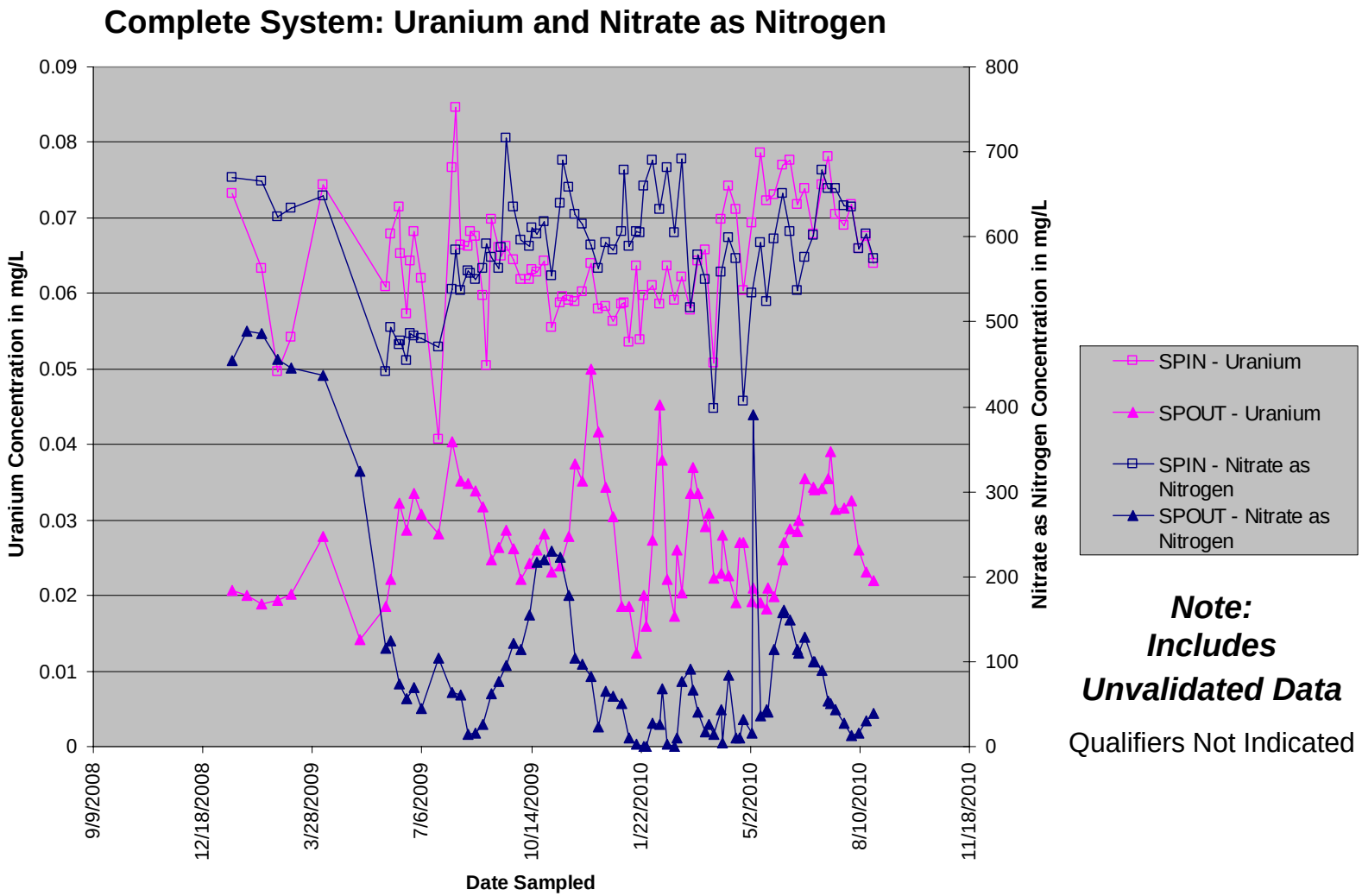
RFLMA Monitoring

- First quarter is a light sampling quarter
  - All RCRA wells (six at PLF, four at OLF)
- Results reviewed in accordance with the RFLMA Attachment 2 decision flowcharts
  - Generally consistent with past results
- Results will be evaluated in the 2010 annual report

SPPTS Update

- Continue to collect samples at least weekly
  - Sample locations to support evaluation of Phase II, III, and entire system
  - Most analyzed by ESL; not validated
  - Splits collected periodically for contract lab analysis
  - Support optimization efforts
- Evaluated treatment by entire system, Phases II, III
  - Cell A dosing (carbon, phosphorous)
  - Varied flow rates
- Flow conditions in original cells

SPPTS Update



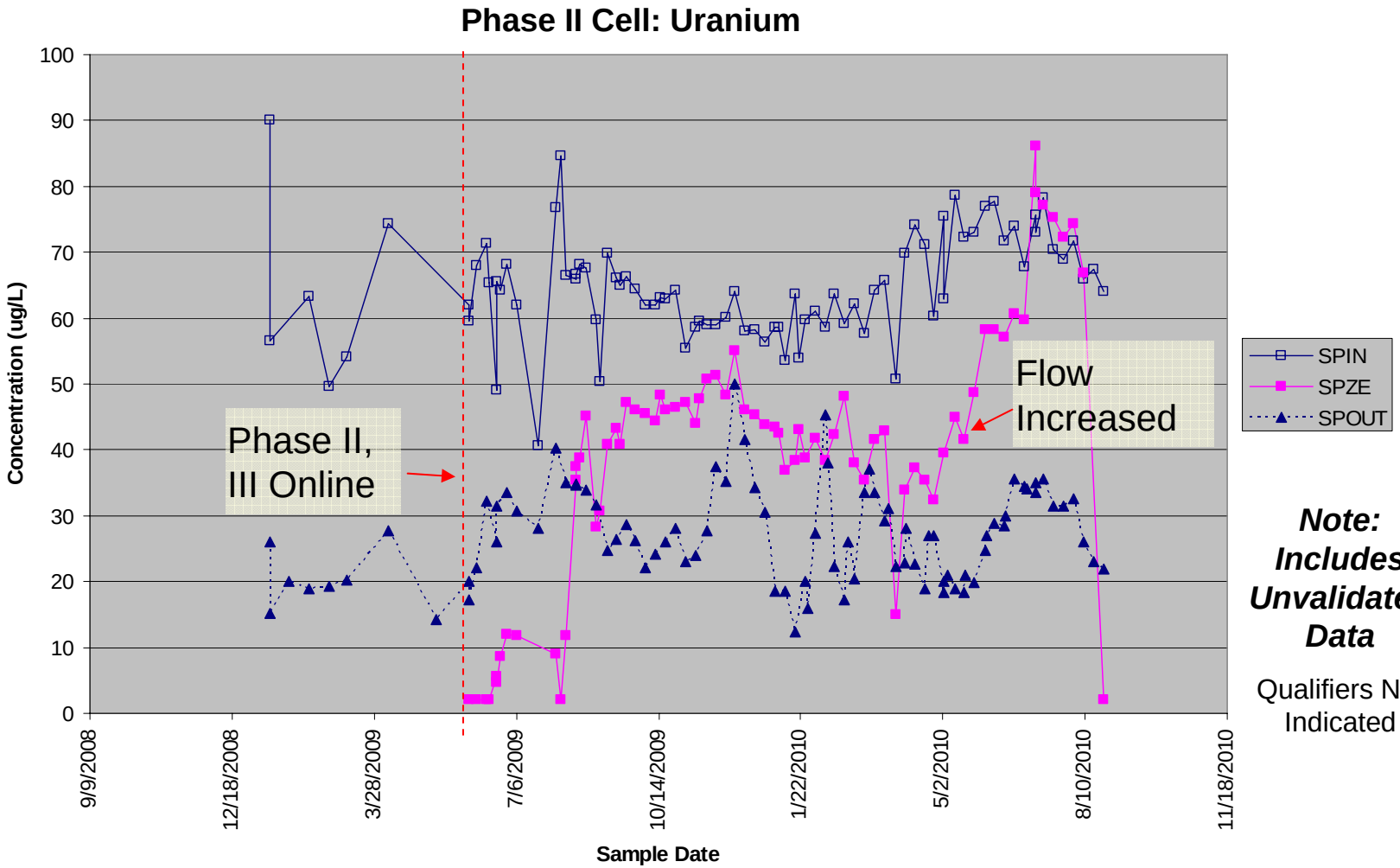
Note: Includes Unvalidated Data

Qualifiers Not Indicated

SPPTS Update

- Phase II cell
  - Uranium removal decreased when flow rates increased to manage spring 2010 moisture
  - Uranium removal essentially ceased in July 2010
  - Media replaced in August 2010
  - Treatment effectiveness restored

SPPTS Update



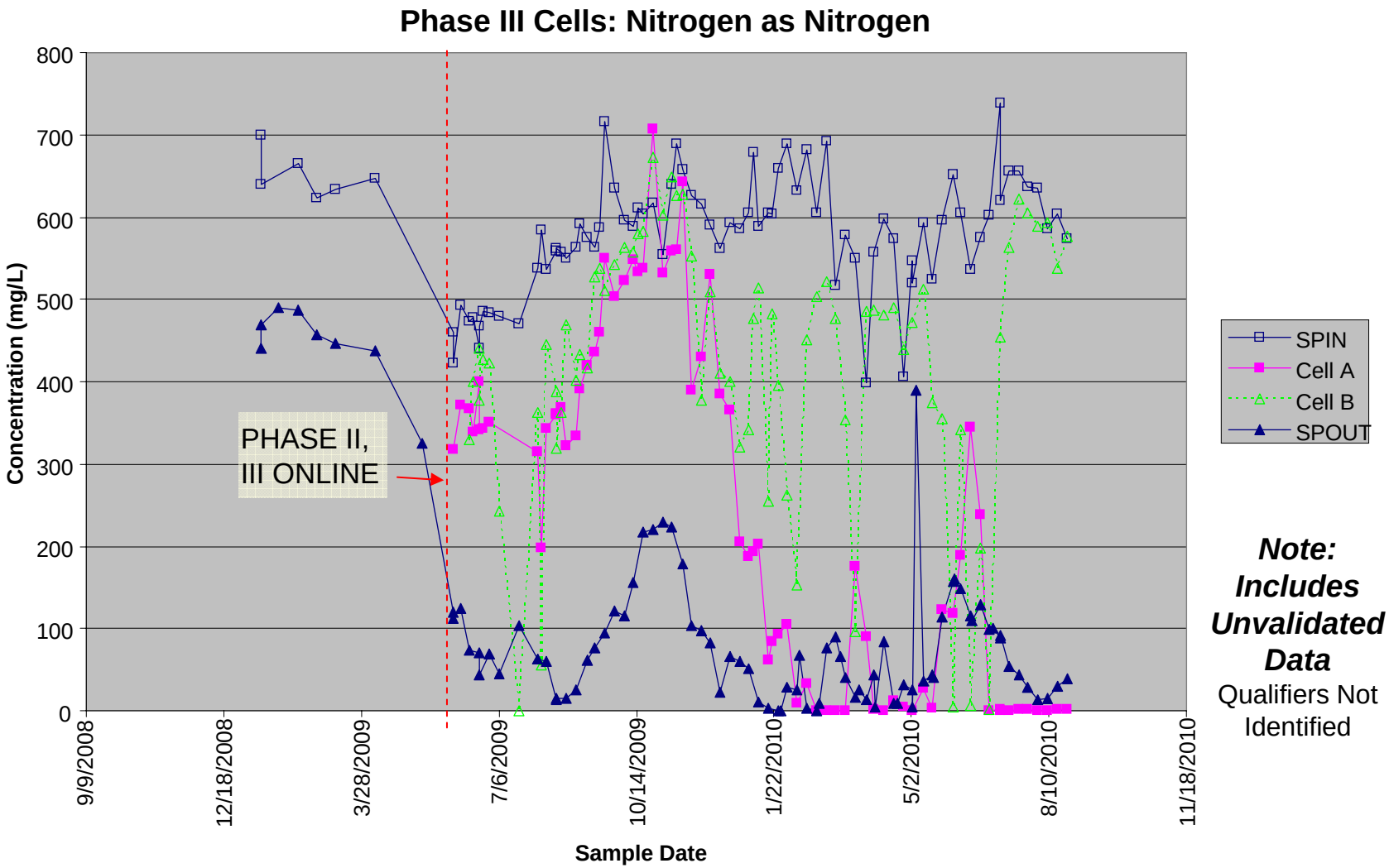
Note: Includes Unvalidated Data

Qualifiers Not Indicated

SPPTS Update

- Phase III pilot studies
  - Cell A (inert media) testing completed
  - Cell B (organic media) testing completed
  - Inert media selected for Phase IV alternative development

SPPTS Update



Note: Includes Unvalidated Data

Qualifiers Not Identified

SPPTS Update

- LANL high-resolution uranium sampling
  - ITSS, the sump installed as part of SPPTS Phase I
    - Both east and west drains feeding sump sampled
    - West drain 50 to 51 percent anthropogenic uranium
    - East drain 99 percent natural
  - SPP discharge gallery
    - Preclosure, predominantly natural
    - Postclosure, pre-Phase I, predominantly anthropogenic
    - Result this spring: predominantly natural
    - Shows Phase I is capturing, and SPPTS is treating, more anthropogenic uranium

SPPTS Update

- Ongoing activities
  - Conceptualizing and costing Phase IV alternatives (full-scale nitrate treatment)
  - Operating Phase III to support nitrate treatment
  - Installed auxiliary flow distribution piping in original Cell 1 to address biofouled piping; adding associated plumbing

MSPTS, ETPTS Update

- Effluent includes constituents above RFLMA values
- Treatment effectiveness corresponds to residence time (how long the water is in contact with treatment media), media condition, and specific contaminants
  - Spring moisture presented high flow rates (less treatment)
  - MSPTS due for media replacement (coming fall 2010)
  - MSPTS now treating high concentrations of breakdown products (take longer residence time to treat)
- Consulted CDPHE; consultation continues
- Performed additional sampling in June, July, August
  - RFLMA locations and additional locations between effluent and surface water performance locations
  - More to come in second quarter and annual reports

Questions?

Site Operations

First Quarter 2010

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OLF Inspections

- Monthly inspections at the OLF were completed on January 28, February 25, and March 30
- A vegetation inspection was completed on February 16

OLF Seeps

- Seep 4 had some surface expression, but did not show any surface flow; this is due to the rock drain that was installed in 2009
- Seep 8 flowed at a rate of 2 to 5 gpm throughout the first quarter
- The rock drain located at the base of the West Perimeter Channel was flowing at a rate of 0.5 gpm during the January inspection; flow increased to 2 to 4 gpm during the February and March inspections

OLF Seeps (continued)

- Seep 7 showed a surface flow of approximately 0.5 gpm during the January inspection; flow increased to 2 to 4 gpm during the February and March inspections
- Increased seep flow rates in February and March were due to the melting of recent snow events

OLF Settlement Monuments and Inclinometers

- Settlement monuments were surveyed on March 26; data are within the expected range per the *Original Landfill Monitoring and Maintenance Plan*, which is between 1.34 and 2.86 feet depending on the location
- Inclinometers were measured on January 26, February 24, and March 30, 2010
  - March readings indicated deflection for inclinometers between Berm 1 and Berm 3
  - Surface cracking in vicinity of Berm 1 appears consistent with inclinometer indications
  - Also consistent with findings of 2008 geotechnical investigation

OLF Slumps

- A small hairline crack that ran through the top and south face of Berm 1 was noted on March 30; the crack was filled and compacted with Rocky Flats alluvium the same day
- The end of Berm 7 was observed as having slumped into the Eastern Perimeter Channel during the March 30 inspection; the area was too wet to perform any immediate repairs
- Berm 7 repair completed in June 2009

OLF Observed Crack Location

OLF Berm 7 Slump

PLF Inspections and Surveys

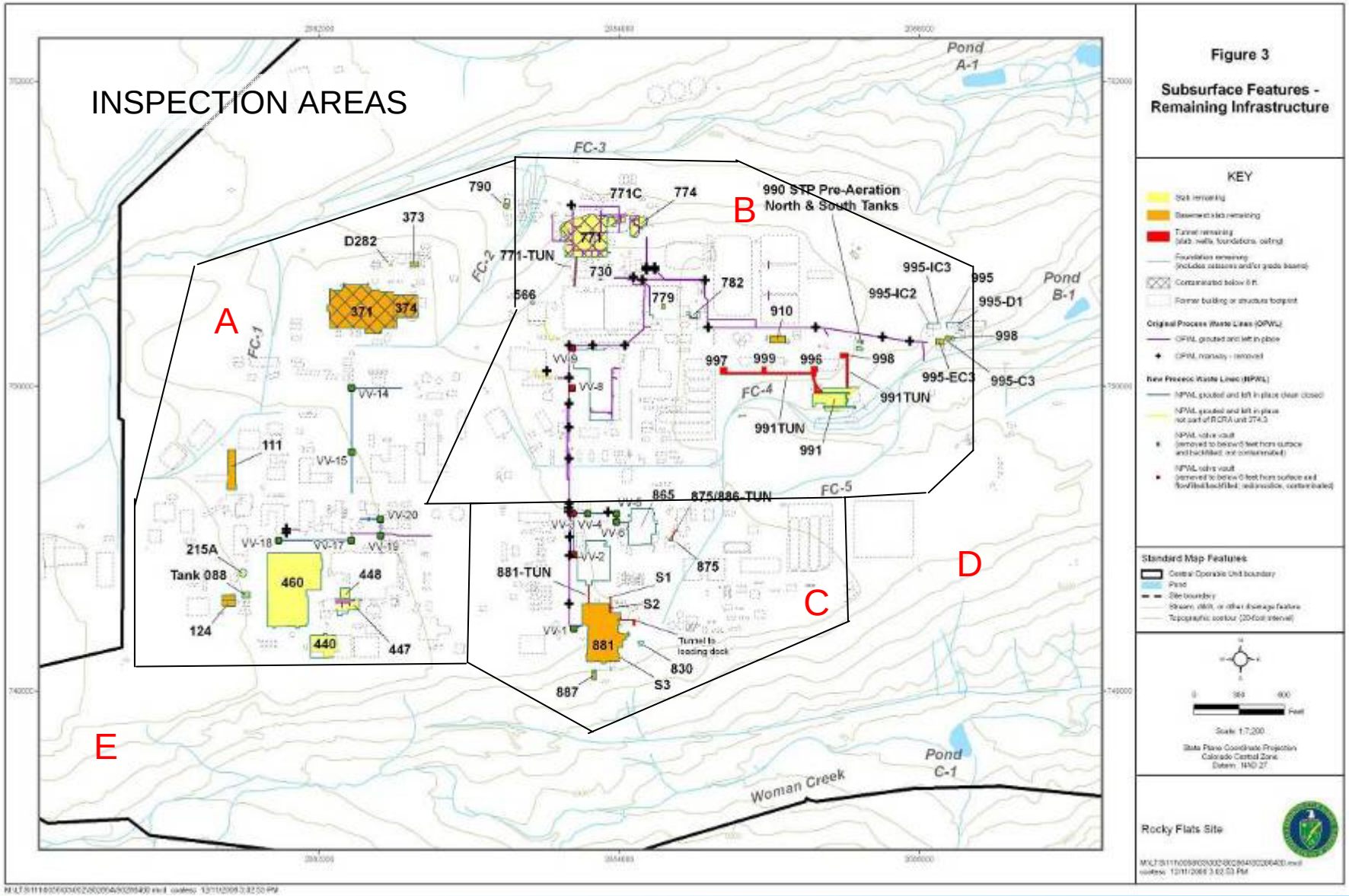
- The quarterly inspection was completed on February 25
- No areas of concern were observed
- The vegetation inspection was completed on February 17

Annual Site (COU) Inspection – March 17, 2010

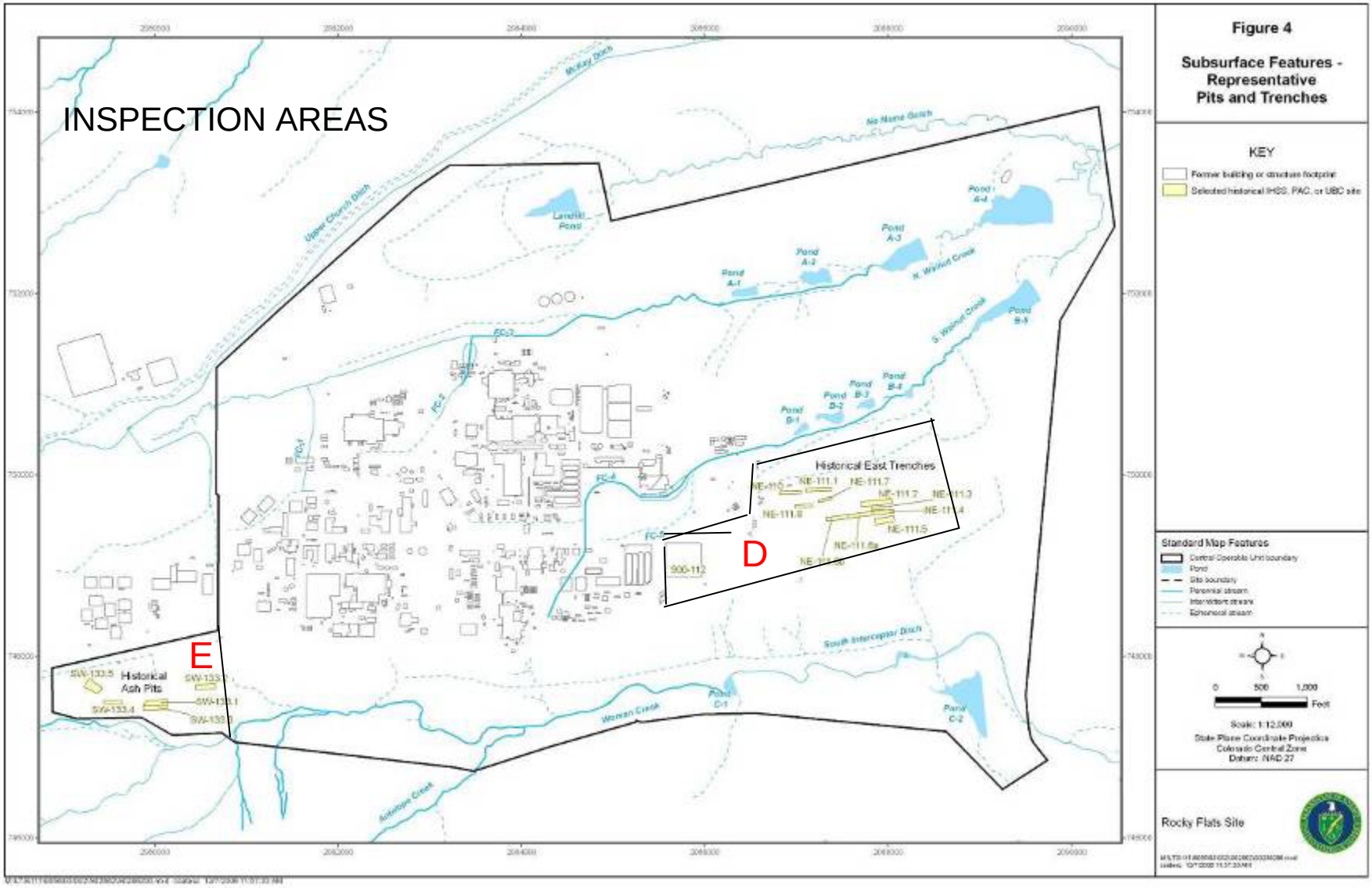
- Inspection and monitoring for evidence of significant erosion
  - Conduct visual observation for precursors of significant erosion
  - Evaluate proximity of any significant erosion to subsurface features
- Inspect effectiveness of institutional controls (ICs)
  - Determine effectiveness by any evidence of violation of ICs and determine whether required signs are in place
  - Verify that Environmental Covenant is in Administrative Record and on file with Jefferson County (verified March 19, 2010)
- Evidence of any adverse biological conditions observed during inspection

Annual Inspection (continued)

- COU divided into five areas:
  - A – Former 300 and 400 Areas
  - B – Former 700 and 991 Areas
  - C – Former 800 Area
  - D – Former 903 Pad and East Trenches Area
  - E – Former Ash Pits Area
- Landfills, treatment systems, and water monitoring stations inspected during the year on a routine basis
- Team walked down surface of each area (A–E) to observe conditions


INSPECTION AREAS
A
B
C
D
E
Figure 3
Subsurface Features - Remaining Infrastructure
KEY
Pond A-1
Pond B-1
Pond C-1
Woman Creek
FC-1
FC-2
FC-3
FC-4
FC-5
990 STP Pre-Aeration North & South Tanks
771C
774
771
771-TUN
730
782
779
790
373
D282
371
374
566
910
995-IC3
995-IC2
995
995-D1
998
995-EC3
995-C3
997
999
996
991TUN
991
VV-9
VV-8
VV-14
VV-15
111
VV-20
VV-18
VV-17
VV-19
215A
Tank 088
460
448
124
440
447
865
875/886-TUN
VV-5
VV-4
VV-6
VV-2
881-TUN
S1
S2
875
VV-1
881
Tunnel to loading dock
830
S3
887
Standard Map Features
Rocky Flats Site

INSPECTION AREAS



Annual Inspection

- No significant erosion noted – minor holes and surface debris
  - Very limited aerial extent – holes filled in
  - Debris and trash collected or flagged for pick up
- No adverse biological conditions noted
- No evidence of IC violations
- Signs in place

Questions?