March 31, 2011

Mr. Steve Tarlton, Manager
Radiation Control Program
Hazardous Materials and Waste Management Division
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Re: Semiannual Effluent Report

Dear Mr. Tarlton,

Please find enclosed the Semiannual Effluent Report for the second (2nd) half of 2010 pursuant to RH 18.7.2.

If you have any questions, please contact me.

Sincerely,

Jim Cain
Environmental Coordinator/
Radiation Safety Officer

JC: lb

Attachments

cc: Phil Egidi, CDPHE
Edgar Ethington, CDPHE
Francis Costanzi, EPA
Amory Quinn
John Hamrick

Cotter Corporation
Cañon City Mill, P.O. Box 1750, Cañon City, CO 81215-1750 USA
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COTTER CORPORATION
CANON CITY MILLING FACILITY
EFFLUENT REPORT
JULY TO DECEMBER 2010
March 31, 2011

This report provides quantitative and qualitative data for effluents released from the Canon City Milling Facility (CCMF) restricted area, which is delineated in Annex A to Colorado Radioactive Materials License 369-01.

SITE ACTIVITIES

During the second (2^{nd}) half of 2010, no milling operations were conducted. During this period mill staff and contractors worked on:

Mill Staff

- General maintenance and upkeep of site buildings and equipment
    - Pump and piping modifications at lime mix/tails tank
    - Maintenance of Primary Impoundment solution pool and evaporation cell pool pH level at four (4) or above
- Secondary Impoundment Interim Cover
    - Routine road upkeep and dust control for SI Project
    - Provide gamma scans to guide usable cover material
- Repair and maintenance of mobile equipment
- Schwartzwalder Mine support
- Primary Impoundment
    - Repaired and refurbished sprinkler system as needed
    - Ran sprinkler system as needed
- Removed and disposed zirc product and chemicals from Zirc Product Building
- Removed unneeded equipment from Zirc Product Building
- Drained Caustic Tank
- Draining and removal of oil from Zirc Sulfation Building area gearboxes in preparation for demolition
- Primary Impoundment, Secondary Impoundment, New Pond 3, and Water Distribution Pond Hypalon repairs
- Records Storage – continued records sorting, indexing and disposal
- Electrical transformers oil testing
- Movement of drums/containers Calcium Molybdate, Vanadium BH fines, and Euxenite Ore from moly SX to PI for disposal
- Relocate air compressor from Demo plant to lime mix building
- Sprayed dust binder at Secondary Impoundment and on ore pads as needed
- Rerouted Primary and Secondary Impoundment standpipe lines
- Weed mowing site areas
- Outlying property fence repairs

- Site tours
  - Local political candidates
  - Canon City Daily Record
  - One half day “shadowing” experience for local high school student
  - Dennison White Mesa Mill group
- Constructed heap leach pilot test facilities at metallurgical area of laboratory
- AED training by contractor
- Cleaned out and repaired silt fences
- Dust control watering for wood stave tank and other excavation activities
- Wood Stave Tank demolition activities support
- Drilling Support for Dam to Ditch Area investigation
- Produced and reviewed demolition plans for several buildings
- Met with new Shadow Hills Golf Course Owners
- GW/SW sampling
  - Training
  - Collected THM samples
  - Collected samples from new wells and some unused old wells in support of Dam to Ditch Area investigation
- Provided comments To ATSDR on the Lincoln Park Public Health Assessment
- Maintenance Shop and Laboratory heaters switched to propane from natural gas
- Remodeled old KPA room for installation of ICP-MS

Contractors

- Wood Stave Tank and CCD Building Demolition (Kessler Reclamation)
- Secondary Impoundment Interim Cover (Kessler Reclamation)
  - Graded for drainage
  - Covered elevated gamma areas
- Breach selected evaporation cell berms
- Baghouse, Piperack, Grizzly and Conveyor Demolition (Kessler Reclamation)
- Brine System Tank Demolition (Kessler Reclamation)
- 58” Ore Pad Area pre-excavation activities (Kessler Reclamation)
- West ore pad soil removal (RR soil ramp) (Kessler Reclamation)

Dam to Ditch Area evaluation (Site Services, Engineering Analytics, Hydrosolutions

<u>TRACKING OF RADIOACTIVE MATERIALS</u>

Ores and Materials received from July to December 2010

- Western Slope Ore (uranium-vanadium) – None

Ores and Materials processed from July to December 2010

- Western Slope Ore (uranium-vanadium) – None
- Uranium-Zirconium (U-Zr) Ore – None

Ore and Materials Inventory as of December 31, 2010

- Uranium-Zirconium (U-Zr) Ore – Approximately fifteen thousand (15,000) tons are stored on the new ore pad west of the old catalyst processing building (demonstration plant). In addition, approximately seven hundred (700) tons of U-Zr ore are in ore bins 3 & 4.
- Western Slope Ore (uranium-vanadium) – Approximately six thousand eighty (6,080) tons of SM-18, JD-6, JD-8, and JD-9 ore were stored on ore stockpile #2.
- Amazon Ore – Approximately thirty (30) tons in bulk bags were stored in two (2) sea-pack containers south of the old catalyst processing building (demonstration plant). (This material is for potential pilot process testing.)
- Euxenite Ore – Approximately twenty (20) tons in 55-gallon drums previously stored in the Old Moly SX Building (Barrel Storage) was disposed in the Primary Impoundment

Finished Product Inventory as of December 31, 2010

- Calcium Molybdate Concentrate – Approximately forty-five (45) tons in 55-gallon drums previously stored in the Moly SX Building (Barrel Storage) was disposed in the Primary Impoundment.
- Vanadium Concentrate – Approximately ninety-nine thousand nine hundred seventy (99,970) pounds of V_2O_5 were stored in 55-gallon drums inside the Product Building.
- Yellowcake Concentrate – No uranium concentrate was stored in the Product Storage Building.

Material shipped off site from July to December 2010

- Yellowcake Concentrate – None
- Vanadium Concentrate – None

STACK EMISSION MONITORING

A tabulation of the stack releases is provided in Table S0. The laboratory baghouse operated for 2+ hours in the second (2nd) half of 2010. The emissions estimate for the second (2nd) half of 2010 is based on a sample collected in March 2010. Individual stack sampling reports for 2009 data are located in Table S1. Individual stack sampling reports for 2010 data are located in Table S2. Sample results used for emission estimation for this reporting period are indicated by colored bolding or as otherwise noted on the individual location stack sampling tables. Overall hours of operation and emissions are similar for 2010 versus 2009. For perspective, the uranium emission is less than one (<1) gram per year.

Table S-0
Mill Point Release
2nd Half 2009 and 2010

Mill Point Source Release Rates For Jul. - Dec. 2009				
Source	Particulate Radionuclide Release Rate (Ci/6 months)			
	^{Nat}U	^{230}Th	^{226}Ra	^{232}Th
Secondary Crusher Feed Baghouse	*	*	*	*
Secondary Crusher Baghouse	*	*	*	*
Fine Ore Bins Blending Baghouse	*	*	*	*
Laboratory Baghouse	4.03E-07	2.06E-08	5.25E-09	1.85E-08
Calciner/Barreling Enclosure General Ventilation Baghouse	*	*	*	*
Uranium Oxide Venturi Scrubber	*	*	*	*
Decomposition/Fusion Furnace	*	*	*	*
Total Release Rates	4.03E-07	2.06E-08	5.25E-09	1.85E-08

Mill Point Source Release Rates For Jan. - Jun. 2010				
Source	Particulate Radionuclide Release Rate (Ci/6 months)			
	^{Nat}U	^{230}Th	^{226}Ra	^{232}Th
Secondary Crusher Feed Baghouse	*	*	*	*
Secondary Crusher Baghouse	*	*	*	*
Fine Ore Bins Blending Baghouse	*	*	*	*
Laboratory Baghouse	4.64E-07	1.85E-07	1.32E-07	2.11E-07
Calciner/Barreling Enclosure General Ventilation Baghouse	*	*	*	*
Uranium Oxide Venturi Scrubber	*	*	*	*
Decomposition/Fusion Furnace	*	*	*	*
Total Release Rates	4.64E-07	1.85E-07	1.32E-07	2.11E-07

Mill Point Source Release Rates For Jul. - Dec. 2010				
Source	Particulate Radionuclide Release Rate (Ci/6 months)			
	^{Nat}U	^{230}Th	^{226}Ra	^{232}Th
Secondary Crusher Feed Baghouse	*	*	*	*
Secondary Crusher Baghouse	*	*	*	*
Fine Ore Bins Blending Baghouse	*	*	*	*
Laboratory Baghouse**	2.62E-08	1.04E-08	7.43E-09	1.19E-08
Calciner/Barreling Enclosure General Ventilation Baghouse	*	*	*	*
Uranium Oxide Venturi Scrubber	*	*	*	*
Decomposition/Fusion Furnace	*	*	*	*
Total Release Rates	2.62E-08	1.04E-08	7.43E-09	1.19E-08

Table S-1
Laboratory Baghouse 2009
(AIRS#57)

2009 Month	Sampled Vol. (ml)	Flow Rate (ml/sec)	Est. Op Hours	^{Nat}U uCi/ml	^{Nat}U uCi/sec	^{230}Th uCi/ml	^{230}Th uCi/sec	^{226}Ra uCi/ml	^{226}Ra uCi/sec	^{210}Pb uCi/ml	^{210}Pb uCi/sec	^{210}Po uCi/ml	^{210}Po uCi/sec	^{232}Th uCi/ml	^{232}Th uCi/sec
Jan.	1.42E+06	2.84E+06	0	7.16E-12	2.03E-05	4.93E-13	1.40E-06	4.11E-14	1.17E-07	6.34E-13	1.80E-06	1.12E-13	3.19E-07	1.41E-13	4.00E-07
Feb.	1.42E+06	2.84E+06	0.47	7.16E-12	2.03E-05	4.93E-13	1.40E-06	4.11E-14	1.17E-07	6.34E-13	1.80E-06	1.12E-13	3.19E-07	1.41E-13	4.00E-07
Mar.	1.42E+06	2.84E+06	0.92	7.16E-12	2.03E-05	4.93E-13	1.40E-06	4.11E-14	1.17E-07	6.34E-13	1.80E-06	1.12E-13	3.19E-07	1.41E-13	4.00E-07
Apr.	1.42E+06	2.84E+06	0.13	7.16E-12	2.03E-05	4.93E-13	1.40E-06	4.11E-14	1.17E-07	6.34E-13	1.80E-06	1.12E-13	3.19E-07	1.41E-13	4.00E-07
May	1.42E+06	2.84E+06	0	7.16E-12	2.03E-05	4.93E-13	1.40E-06	4.11E-14	1.17E-07	6.34E-13	1.80E-06	1.12E-13	3.19E-07	1.41E-13	4.00E-07
Jun.	1.42E+06	2.84E+06	1.34	7.16E-12	2.03E-05	4.93E-13	1.40E-06	4.11E-14	1.17E-07	6.34E-13	1.80E-06	1.12E-13	3.19E-07	1.41E-13	4.00E-07
Jul	1.59E+06	2.72E+06	0	2.47E-12	6.71E-06	1.26E-13	3.42E-07	3.21E-14	8.73E-08	2.86E-13	7.78E-07	7.61E-14	2.07E-07	1.13E-13	3.08E-07
Aug	1.59E+06	2.72E+06	0	2.47E-12	6.71E-06	1.26E-13	3.42E-07	3.21E-14	8.73E-08	2.86E-13	7.78E-07	7.61E-14	2.07E-07	1.13E-13	3.08E-07
Sep	1.59E+06	2.72E+06	0	2.47E-12	6.71E-06	1.26E-13	3.42E-07	3.21E-14	8.73E-08	2.86E-13	7.78E-07	7.61E-14	2.07E-07	1.13E-13	3.08E-07
Oct	1.59E+06	2.72E+06	15.67	2.47E-12	6.71E-06	1.26E-13	3.42E-07	3.21E-14	8.73E-08	2.86E-13	7.78E-07	7.61E-14	2.07E-07	1.13E-13	3.08E-07
Nov	1.59E+06	2.72E+06	0.6	2.47E-12	6.71E-06	1.26E-13	3.42E-07	3.21E-14	8.73E-08	2.86E-13	7.78E-07	7.61E-14	2.07E-07	1.13E-13	3.08E-07
Dec	1.59E+06	2.72E+06	0.42	2.47E-12	6.71E-06	1.26E-13	3.42E-07	3.21E-14	8.73E-08	2.86E-13	7.78E-07	7.61E-14	2.07E-07	1.13E-13	3.08E-07
	Op. Hours	Jan. - Jun.	2.86												
		Jul. - Dec.	16.69												
		Jan. - Dec.	19.55												
Average Jan. - Jun.				7.16E-12	2.03E-05	4.93E-13	1.40E-06	4.11E-14	1.17E-07	6.34E-13	1.80E-06	1.12E-13	3.19E-07	1.41E-13	4.00E-07
Maximum Jan. - Jun.				7.16E-12	2.03E-05	4.93E-13	1.40E-06	4.11E-14	1.17E-07	6.34E-13	1.80E-06	1.12E-13	3.19E-07	1.41E-13	4.00E-07
Average Jul. - Dec.				2.47E-12	6.71E-06	1.26E-13	3.42E-07	3.21E-14	8.73E-08	2.86E-13	7.78E-07	7.61E-14	2.07E-07	1.13E-13	3.08E-07
Maximum Jul. - Dec.				2.47E-12	6.71E-06	1.26E-13	3.42E-07	3.21E-14	8.73E-08	2.86E-13	7.78E-07	7.61E-14	2.07E-07	1.13E-13	3.08E-07
Average Jan. - Dec.				3.15E-12	8.70E-06	1.80E-13	4.97E-07	3.34E-14	9.16E-08	3.37E-13	9.28E-07	8.14E-14	2.23E-07	1.17E-13	3.21E-07
Maximum Jan. - Dec.				7.16E-12	2.03E-05	4.93E-13	1.40E-06	4.11E-14	1.17E-07	6.34E-13	1.80E-06	1.12E-13	3.19E-07	1.41E-13	4.00E-07

Estimated Monthly Release Rate

2009 Month	^{Nat}U mCi	^{230}Th mCi	^{226}Ra mCi	^{232}Th mCi
Jan.	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Feb.	3.44E-05	2.37E-06	1.97E-07	6.77E-07
Mar.	6.73E-05	4.64E-06	3.86E-07	1.32E-06
Apr.	9.50E-06	6.55E-07	5.46E-08	1.87E-07
May	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Jun.	9.80E-05	6.75E-06	5.63E-07	1.93E-06
Jul	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aug	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sep	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Oct	3.79E-04	1.93E-05	4.92E-06	1.74E-05
Nov	1.45E-05	7.39E-07	1.89E-07	6.65E-07
Dec	1.02E-05	5.17E-07	1.32E-07	4.65E-07
Total Jan. - Jun.	2.09E-04	1.44E-05	1.20E-06	4.12E-06
Total Jul. - Dec.	4.03E-04	2.06E-05	5.25E-06	1.85E-05
Total Jan. - Dec.	6.13E-04	3.50E-05	6.45E-06	2.26E-05

NOTE: “<” are below detection limit and are taken as ½ that value (^{226}Ra/^{210}Po/^{210}Pb)

Table S-2
Laboratory Baghouse 2010 (AIRS#57)

2010 Month	Sampled Vol. (ml)	Flow Rate (ml/sec)	Est. Op Hours	^{Nat}U uCi/ml	^{Nat}U uCi/sec	^{230}Th uCi/ml	^{230}Th uCi/sec	^{226}Ra uCi/ml	^{226}Ra uCi/sec	^{210}Pb uCi/ml	^{210}Pb uCi/sec	^{210}Po uCi/ml	^{210}Po uCi/sec	^{232}Th uCi/ml	^{232}Th uCi/sec
Jan.	1.56E+06	2.76E+06	0	1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06
Feb.	1.56E+06	2.76E+06	0	1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06
Mar.	1.56E+06	2.76E+06	28	1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06
Apr.	1.56E+06	2.76E+06	2.5	1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06
May	1.56E+06	2.76E+06	5	1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06
Jun.	1.56E+06	2.76E+06	5.83	1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06
Jul	1.56E+06	2.76E+06	0	1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06
Aug	1.56E+06	2.76E+06	0	1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06
Sep	1.56E+06	2.76E+06	0	1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06
Oct	1.56E+06	2.76E+06	0	1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06
Nov	1.56E+06	2.76E+06	0	1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06
Dec	1.56E+06	2.76E+06	2.33	1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06
Op. Hours		Jan. - Jun.	41.33												
		Jul. - Dec.	2.33												
		Jan. - Dec.	43.66												
Average Jan. - Jun.				1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06
Maximum Jan. - Jun.				1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06
Average Jul. - Dec.				1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06
Maximum Jul. - Dec.				1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06
Average Jan. - Dec.				1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06
Maximum Jan. - Dec.				1.13E-12	3.12E-06	4.49E-13	1.24E-06	3.21E-13	8.86E-07	2.64E-13	7.29E-07	5.77E-13	1.59E-06	5.13E-13	1.42E-06

Estimated Monthly Release Rate

2010 Month	^{Nat}U mCi	^{230}Th mCi	^{226}Ra mCi	^{232}Th mCi
Jan.	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Feb.	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mar.	3.14E-04	1.25E-04	8.93E-05	1.43E-04
Apr.	2.81E-05	1.12E-05	7.97E-06	1.28E-05
May	5.61E-05	2.23E-05	1.59E-05	2.55E-05
Jun.	6.54E-05	2.60E-05	1.86E-05	2.97E-05
Jul	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aug	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sep	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Oct	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nov	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Dec	2.62E-05	1.04E-05	7.43E-06	1.19E-05
Total Jan. - Jun.	4.64E-04	1.85E-04	1.32E-04	2.11E-04
Total Jul. - Dec.	2.62E-05	1.04E-05	7.43E-06	1.19E-05
Total Jan. - Dec.	4.90E-04	1.95E-04	1.39E-04	2.23E-04

PUBLIC DOSE

Doses to an Individual Member of the Public (IMOP) from all pathways were estimated for 2009 by Tetra Tech, Inc. A report titled *ESTIMATES OF RADIATION DOSES TO MEMBERS OF THE PUBLIC FROM COTTER 2009 OPERATIONS* is Appendix D of the 2009 Annual Report. The results showed that the maximum potential dose (excluding radon) to a resident was one (**1)** mrem/year compared to the constraint level of ten (**10)** mrem/year and the regulatory limit of twenty-five (**25)** mrem/year. The maximum potential lung and bone doses were three (**3)** mrem/year and fifteen (**15)** mrem/year respectively versus the regulatory limit of twenty-five (**25)** mrem/year.

Including radon, the maximum potential dose was estimated at nine (**9)** mrem/year versus the regulatory limit of one hundred (**100)** mrem/year from mill sources. Doses to an Individual Member of the Public (IMOP) for 2010 will be provided in the annual report.

ENVIRONMENTAL AIR MONITORING

Environmental Air Samplers (Particulates)

A location map of the Environmental Air Samplers (particulates) is included as Figure EA-1. Radon Track Etch Measurement Devices and Environmental TLDs are co-located at these collection points. Annual Average Particulate Concentrations for the period 1979 through 2010 are presented in figures EA-2 (A and B) through EA-11 (A and B). Average Annual Radon and TLD measurements are shown in figures RN-2 and RN-3 and in TLD-2 and TLD-3, respectively.

The Environmental Air sampler particulate data generally indicates radionuclide concentrations which are approximately one hundred (100) times below the regulatory Effluent Concentration limits with the exception of ^{230}Th, which generally has been ten (10) times below the limit. The EA figures are divided into an A and a B figure which show the concentration history in exponential format (A) as well as percent of the regulatory limit (B).

Average particulate concentrations for the three (3) most recent semiannual periods in 2009 and 2010 are shown in Table EA-0. Results of the quarterly air sampling and percent Effluent Concentration (EC) are shown in Tables EA-1 and EA-2 for 2009 and 2010 respectively. The Effluent Concentration (EC) limits are displayed on these tables as they appear in Part 4 Appendix B Table 2 of the *Rules and Regulations*. The limits are also displayed in the heading in parentheses as compared to the highest average concentration for each radionuclide. Explanation of the solubility classification selection and use of less than LLD values in calculating averages is presented in Appendix A and B respectively.

Review and comparison of the data generally indicates typical concentrations within historical levels. Further examination of the data for the recent quarterly and semiannual periods shows steady to mostly lower concentrations except for AS-202 East Boundary and AS-212 Nearest Resident were slightly higher for ^{nat}U, some slightly higher, some slightly lower for ^{230}Th and ^{226}Ra .

- All ^{nat}U values were less than one percent (<1%), ^{230}Th less than four percent (<4%) and ^{226}Ra less than one tenth percent (<0.1%) of the limit

- Lead-210 results at all monitoring locations are controlled by global ^{222}Rn concentrations (The primary source of ^{210}Pb in air is global radon ^{222}Rn). Radon-222 emanates from the soil and is dispersed through the atmosphere. The ^{222}Rn decay products build in as the parent decays. The short–lived decay products of ^{222}Rn attach to dust particles and are carried long distances with the air. Pb-210 is the longest-lived of the ^{222}Rn decay products. The ^{210}Pb concentration in air varies with location. The average ground level concentrations in selected states are as follows (NCRP, 1992):

State	^{210}Pb concentration	
	uBq/m^3	uCi/ml
California	600	1.6 E-14
Illinois	1500	4.1 E-14
Ohio	300	8.1 E-15
Massachusetts	700	1.9 E-14

NCRP Report No. 94 (NCRP, 1992) cites a mean concentration for the north temperate latitude of 0.6 mBq/m^3 (1.5E-14 uCi/ml). The report also states that "It appears that re-suspension of soil is not a significant contributor to air concentrations since the ratio of Pb-210 to U-238 in surface soil is only about 2 … while the ratio in air is about 1000." The Pb-210 concentration in air in the vicinity of the Cotter mill is within the range of the average values reported for various locations.

Reference: *National Council on Radiation Protection and Measurements* (NCRP). 1992. NCRP Report No. 94, "Exposure of the Population in the United States and Canada from Natural Background Radiation". NCRP Bethesda, MD.

- Lead-210 results were generally lower for July to December 2010 versus January to June 2010
- Thorium-232 results for all sampling locations hover around background and the detection limit in the range of E-17 uCi/ml to E-16 uCi/ml.
- The AS-202 East Boundary location had the highest percent of the effluent concentration (EC) limits in the second (2nd) half of 2010 for ^{nat}U at zero point seven percent (0.6 %) and AS-204 West Boundary ^{230}Th at three point five percent (3.5%). All ^{226}Ra results are less than zero point one percent (0.1 %). **This means that all samplers monitored for the July to December 2010 period for the radioactive particulates excluding ^{210}Pb, which as noted above is controlled by global radon concentrations, when combined are less than five percent (<5%) of the regulatory limit.**

The outlying locations, Canon City #2, Lincoln Park #2, and OroVerde #3 are located at residences as shown on Figure EA-1 while AS-210 and AS-212 are at locations between the site boundary and actual residences. All radionuclide particulate results include background, which is viewed to be represented by Canon City #2.

Total particulate (dust loading) levels for the environmental air samplers are shown as a monthly average on Figure EA-12 for 2009 and EA-13 for 2010. The dust measurements generally indicate concentrations at the boundary locations to be lower than particulate levels in residential areas. This is likely attributable to unpaved roads without dust control and, more traffic in residential areas with subsequent re-suspension of particulate as compared to the milling facility area.

The AS-202 East Boundary Supplemental Air Sampler denoted as AS-136 showed slightly elevated levels in the first (1st) quarter 2010 and is similar to the isotopic data. Historical spikes are typically seen in wintertime and control is good the rest of the year. The Secondary Impoundment interim cover project was initiated in August 2009 and continued through the first (1st) half of 2010. An additional sampler AS-143 was co-located with AS-204 West Boundary sampler to monitor this activity. Both AS-136 and AS-143 showed a few slightly elevated readings. However, most were below ten percent (10%) of EC indicating good dust control.

The supplemental high volume air particulate sampler placed at AS-209 (designated as AS-140) showed typical results. Additional samplers were placed in the vicinity of the "58" ore pad excavation (OM-1) and the Wood Stave Tank demolition areas (AS-114 CCDW, AS-114 South MS and AS-114 Main Sub S and others in support of baghouse, piperack, grizzly and conveyor demolition). The demolition and ore pad excavation samplers show elevated levels as compared to the boundary limit (EC) yet no influence is seen at the boundary locations. Likewise these project samplers indicate good control when compared to the Occupational Limit (DAC). Gross alpha activity is measured from filter papers used at the seven (7) locations and are presented as a percentage of the Environmental Concentration (EC) limit (Figure EA-14 and EA-15) and of the Derived Air Concentration (DAC). (Figure EA-16)

Management of the tailings area dust control continued by soil covering, mulch application, application of soil binding agents, as well as covering as much of the tailings beach as possible with available water and use of a sprinkling system in accordance with the Air Permit Compliance Plan has provided sufficient dust control. The Primary Impoundment solution level was approximately 5,574 at the end of the first (1st) half of 2010. The sprinkler system that was initially installed on the tailings beach adjacent to the evaporation cells in May 2003 continues to be used and additional sprinklers have been added and/or moved as needed for dust control.

Figure EA-1
Environmental Air and Vegetation Sampling Locations

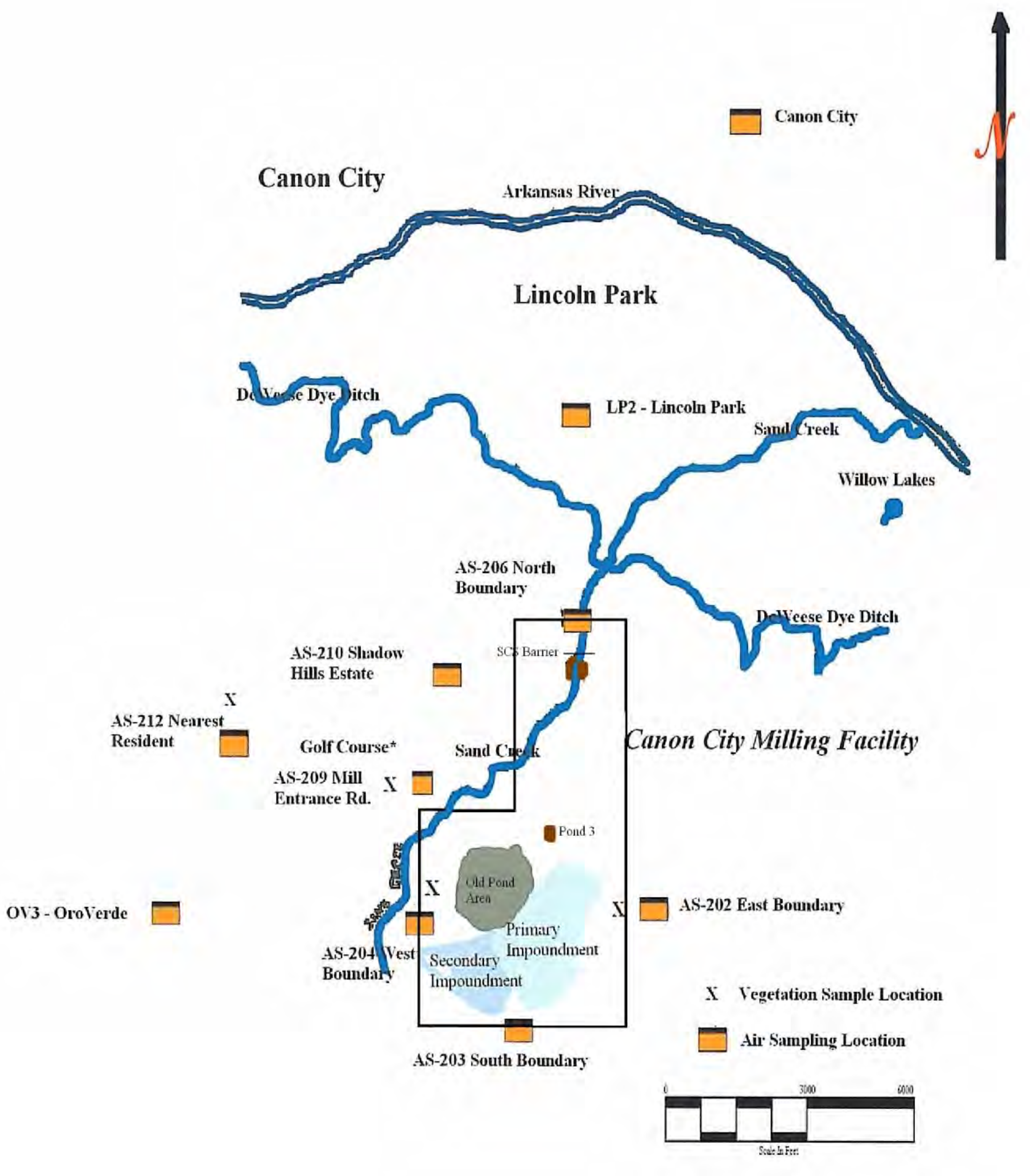


Table EA – 0
Environmental Air Monitoring
Average Concentration

Class Y ^{Nat}U (uCi/ml) EC=9E-14 (90E-15)			
Location	Jan. - Jun. 2009	Jul. Dec. 2009	Jan. - Jun. 2010
AS-202 East Boundary	1.02E-15	4.49E-16	4.79E-16
AS-203 South Boundary	2.27E-16	2.98E-16	2.90E-16
AS-204 West Boundary	3.33E-16	5.87E-16	6.43E-16
AS-206 North Boundary	2.18E-16	2.10E-16	2.05E-16
AS-209 Mill Entrance Road	4.27E-16	4.43E-16	4.94E-16
AS-210 Shadow Hills Estates	2.19E-16	2.71E-16	2.28E-16
AS-212 Nearest Resident	2.71E-16	2.78E-16	2.47E-16
Canon City #2	2.64E-16	2.13E-16	2.35E-16
Lincoln Park #2	1.90E-16	2.51E-16	2.38E-16
OroVerde #3	2.12E-16	2.21E-16	1.78E-16
QC Truck	8.33E-17	1.71E-16	1.01E-16

Class W ^{230}Th (uCi/ml)EC = 2E-14 (20E-15)			
Location	Jul. - Dec. 2009	Jan. - Jun. 2010	Jul. - Dec. 2010
AS-202 East Boundary	2.41E-16	4.84E-16	4.90E-16
AS-203 South Boundary	1.04E-16	2.31E-16	2.37E-16
AS-204 West Boundary	3.74E-16	8.15E-16	6.97E-16
AS-206 North Boundary	4.61E-17	7.55E-17	8.25E-17
AS-209 Mill Entrance Road	3.11E-16	6.98E-16	5.47E-16
AS-210 Shadow Hills Estates	1.61E-16	1.57E-16	1.85E-16
AS-212 Nearest Resident	1.43E-16	1.40E-16	1.76E-16
Canon City #2	3.13E-17	9.61E-17	7.73E-17
Lincoln Park #2	3.58E-17	1.06E-16	9.62E-17
OroVerde #3	4.81E-17	8.67E-17	7.72E-17
QC Truck	1.60E-17	2.99E-17	3.82E-17

Class W ^{226}Ra (uCi/ml) EC = 9E-13 (900E-15)			
Location	Jul. - Dec. 2009	Jan. - Jun. 2010	Jul. - Dec. 2010
AS-202 East Boundary	1.65E-16	1.57E-16	1.45E-16
AS-203 South Boundary	6.04E-17	7.54E-17	7.21E-17
AS-204 West Boundary	1.69E-16	2.93E-16	2.51E-16
AS-206 North Boundary	4.73E-17	3.42E-17	4.26E-17
AS-209 Mill Entrance Road	1.12E-16	1.27E-16	1.11E-16
AS-210 Shadow Hills Estates	6.59E-17	3.16E-17	4.21E-17
AS-212 Nearest Resident	5.25E-17	6.43E-17	7.28E-17
Canon City #2	7.00E-17	4.30E-17	4.00E-17
Lincoln Park #2	4.81E-17	3.98E-17	4.10E-17
OroVerde #3	2.56E-17	2.34E-17	2.70E-17
QC Truck	1.22E-17	2.00E-17	1.64E-17

Class D ^{210}Pb (uCi/ml) EC = 6E-13 (60E-14)			
Location	Jul. - Dec. 2009	Jan. - Jun. 2010	Jul. - Dec. 2010
AS-202 East Boundary	2.02E-14	1.89E-14	2.08E-14
AS-203 South Boundary	1.77E-14	1.54E-14	1.86E-14
AS-204 West Boundary	2.20E-14	1.78E-14	2.15E-14
AS-206 North Boundary	2.17E-14	1.82E-14	2.08E-14
AS-209 Mill Entrance Road	2.15E-14	1.72E-14	2.04E-14
AS-210 Shadow Hills Estates	2.12E-14	1.69E-14	1.96E-14
AS-212 Nearest Resident	1.97E-14	1.58E-14	1.89E-14
Canon City #2	1.89E-14	1.68E-14	1.94E-17
Lincoln Park #2	1.96E-14	1.66E-14	1.97E-14
OroVerde #3	2.00E-14	1.68E-14	2.08E-14
QC Truck	1.18E-16	1.17E-16	1.89E-15

Class Y ^{232}Th (uCi/ml)EC=4E-15(400E-17)			
Location	Jul. - Dec. 2009	Jan. - Jun. 2010	Jul. - Dec. 2010
AS-202 East Boundary	4.45E-18	3.69E-17	3.41E-17
AS-203 South Boundary	1.02E-17	2.64E-17	2.18E-17
AS-204 West Boundary	1.85E-17	3.86E-17	2.97E-17
AS-206 North Boundary	1.96E-17	3.06E-17	3.33E-17
AS-209 Mill Entrance Road	2.29E-17	2.52E-17	2.33E-17
AS-210 Shadow Hills Estates	2.28E-17	2.84E-17	3.37E-17
AS-212 Nearest Resident	1.53E-17	2.29E-17	2.19E-17
Canon City #2	1.98E-17	3.98E-17	3.64E-17
Lincoln Park #2	3.62E-17	4.83E-17	4.60E-17
OroVerde #3	1.11E-17	3.28E-17	2.61E-17
QC Truck	4.48E-18	7.58E-18	1.38E-17

Table EA-1
Environmental Air Monitoring
2009

Location	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		Average	
Class Y ^{Nat}U (uCi/ml) EC = 9E-14 (900E-16)										
		% of EC		*% of EC*		*% of EC*		*% of EC*		*% of EC*
AS-202 East Boundary	1.60E-15	1.8%	4.32E-16	0.5%	4.11E-16	0.5%	4.87E-16	0.5%	7.32E-16	0.8%
AS-203 South Boundary	2.47E-16	0.3%	2.07E-16	0.2%	3.82E-16	0.4%	2.13E-16	0.2%	2.62E-16	0.3%
AS-204 West Boundary	2.92E-16	0.3%	3.73E-16	0.4%	5.65E-16	0.6%	6.09E-16	0.7%	4.60E-16	0.5%
AS-206 North Boundary	2.30E-16	0.3%	2.06E-16	0.2%	2.75E-16	0.3%	1.45E-16	0.2%	2.14E-16	0.2%
AS-209 Mill Entrance Road	4.33E-16	0.5%	4.21E-16	0.5%	5.88E-16	0.7%	2.98E-16	0.3%	4.35E-16	0.5%
AS-210 Shadow Hills Estates	2.24E-16	0.2%	2.15E-16	0.2%	3.91E-16	0.4%	1.52E-16	0.2%	2.45E-16	0.3%
AS-212 Nearest Resident	3.23E-16	0.4%	2.18E-16	0.2%	3.91E-16	0.4%	1.64E-16	0.2%	2.74E-16	0.3%
Canon City #2	2.96E-16	0.3%	2.32E-16	0.3%	2.91E-16	0.3%	1.34E-16	0.1%	2.38E-16	0.3%
Lincoln Park #2	1.86E-16	0.2%	1.94E-16	0.2%	3.31E-16	0.4%	1.70E-16	0.2%	2.20E-16	0.2%
OroVerde #3	2.59E-16	0.3%	1.65E-16	0.2%	3.26E-16	0.4%	1.15E-16	0.1%	2.16E-16	0.2%
QC Truck	7.56E-17	0.1%	9.10E-17	0.1%	2.62E-16	0.3%	7.90E-17	0.1%	1.27E-16	0.1%

Location	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		Average	
Class W ^{230}Th (uCi/ml) EC = 2E-14 (20E-15)										
		% of EC		*% of EC*		*% of EC*		*% of EC*		*% of EC*
AS-202 East Boundary	1.54E-15	7.7%	2.78E-16	1.4%	1.29E-16	0.6%	3.54E-16	1.8%	5.74E-16	2.9%
AS-203 South Boundary	1.68E-16	0.8%	8.63E-17	0.4%	6.91E-17	0.3%	1.39E-16	0.7%	1.16E-16	0.6%
AS-204 West Boundary	2.72E-16	1.4%	3.33E-16	1.7%	4.10E-16	2.0%	3.39E-16	1.7%	3.38E-16	1.7%
AS-206 North Boundary	8.25E-17	0.4%	1.02E-16	0.5%	5.58E-17	0.3%	3.65E-17	0.2%	6.92E-17	0.3%
AS-209 Mill Entrance Road	3.66E-16	1.8%	4.89E-16	2.4%	3.53E-16	1.8%	2.69E-16	1.3%	3.69E-16	1.8%
AS-210 Shadow Hills Estates	1.55E-16	0.8%	2.60E-16	1.3%	2.43E-16	1.2%	7.90E-17	0.4%	1.84E-16	0.9%
AS-212 Nearest Resident	1.69E-16	0.8%	1.28E-16	0.6%	1.91E-16	1.0%	9.44E-17	0.5%	1.45E-16	0.7%
Canon City #2	1.85E-17	0.1%	9.25E-17	0.5%	4.64E-17	0.2%	1.62E-17	0.1%	4.34E-17	0.2%
Lincoln Park #2	5.57E-17	0.3%	1.46E-16	0.7%	6.66E-17	0.3%	4.87E-18	0.0%	6.84E-17	0.3%
OroVerde #3	2.97E-17	0.1%	1.16E-16	0.6%	5.40E-17	0.3%	4.22E-17	0.2%	6.04E-17	0.3%
QC Truck	5.75E-18	0.0%	1.17E-16	0.6%	1.85E-17	0.1%	1.35E-17	0.1%	3.87E-17	0.2%

Table EA-1
Environmental Air Monitoring
2009

Location	1st Quarter	% of EC	2nd Quarter	% of EC	3rd Quarter	% of EC	4th Quarter	% of EC	Average	% of EC
Class W ^{226}Ra (uCi/ml) EC = 9E-13 (900E-15)										
AS-202 East Boundary	6.97E-16	0.1%	4.59E-17	0.0%	1.15E-16	0.0%	2.16E-16	0.0%	2.68E-16	0.0%
AS-203 South Boundary	9.34E-17	0.0%	1.09E-16	0.0%	6.24E-17	0.0%	5.85E-17	0.0%	8.08E-17	0.0%
AS-204 West Boundary	9.80E-17	0.0%	1.15E-16	0.0%	1.78E-16	0.0%	1.61E-16	0.0%	1.38E-16	0.0%
AS-206 North Boundary	7.08E-17	0.0%	5.39E-17	0.0%	7.77E-17	0.0%	1.69E-17	0.0%	5.48E-17	0.0%
AS-209 Mill Entrance Road	1.05E-16	0.0%	5.57E-17	0.0%	1.41E-16	0.0%	8.35E-17	0.0%	9.63E-17	0.0%
AS-210 Shadow Hills Estates	8.45E-17	0.0%	4.85E-17	0.0%	8.96E-17	0.0%	4.22E-17	0.0%	6.62E-17	0.0%
AS-212 Nearest Resident	5.30E-17	0.0%	5.57E-17	0.0%	7.98E-17	0.0%	2.52E-17	0.0%	5.34E-17	0.0%
Canon City #2	7.69E-17	0.0%	4.85E-17	0.0%	1.13E-16	0.0%	2.70E-17	0.0%	6.63E-17	0.0%
Lincoln Park #2	1.20E-16	0.0%	2.52E-17	0.0%	5.40E-17	0.0%	4.23E-17	0.0%	6.05E-17	0.0%
OroVerde #3	6.92E-17	0.0%	1.23E-17	0.0%	4.56E-17	0.0%	5.66E-18	0.0%	3.32E-17	0.0%
QC Truck	2.43E-17	0.0%	1.05E-17	0.0%	6.44E-18	0.0%	1.79E-17	0.0%	1.48E-17	0.0%

Location	1st Quarter	% of EC	2nd Quarter	% of EC	3rd Quarter	% of EC	4th Quarter	% of EC	Average	% of EC
Class D ^{210}Pb (uCi/ml) EC = 6E-13 (60E-14)										
AS-202 East Boundary	1.76E-14	2.9%	1.38E-14	2.3%	2.17E-14	3.6%	1.86E-14	3.1%	1.79E-14	3.0%
AS-203 South Boundary	1.52E-14	2.5%	1.20E-14	2.0%	1.92E-14	3.2%	1.62E-14	2.7%	1.56E-14	2.6%
AS-204 West Boundary	1.47E-14	2.5%	1.35E-14	2.2%	2.12E-14	3.5%	2.27E-14	3.8%	1.81E-14	3.0%
AS-206 North Boundary	1.87E-14	3.1%	1.23E-14	2.1%	2.08E-14	3.5%	2.27E-14	3.8%	1.86E-14	3.1%
AS-209 Mill Entrance Road	1.54E-14	2.6%	1.23E-14	2.1%	2.20E-14	3.7%	2.11E-14	3.5%	1.77E-14	2.9%
AS-210 Shadow Hills Estates	1.49E-14	2.5%	1.28E-14	2.1%	2.11E-14	3.5%	2.12E-14	3.5%	1.75E-14	2.9%
AS-212 Nearest Resident	1.79E-14	3.0%	1.20E-14	2.0%	2.10E-14	3.5%	1.83E-14	3.1%	1.73E-14	2.9%
Canon City #2	1.73E-14	2.9%	1.22E-14	2.0%	1.79E-14	3.0%	1.99E-14	3.3%	1.68E-14	2.8%
Lincoln Park #2	1.91E-14	3.2%	1.26E-14	2.1%	1.90E-14	3.2%	2.02E-14	3.4%	1.77E-14	3.0%
OroVerde #3	1.64E-14	2.7%	1.21E-14	2.0%	2.03E-14	3.4%	1.97E-14	3.3%	1.71E-14	2.9%
QC Truck	1.23E-16	0.0%	1.23E-14	2.1%	1.15E-16	0.0%	< 2.44E-16	0.0%	3.17E-15	0.5%

Table EA-1
Environmental Air Monitoring
2009

Location	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		Average	
Class Y ^{232}Th (uCi/ml) EC = 4E-15 (400E-17)										
		% of EC		*% of EC*		*% of EC*		*% of EC*		*% of EC*
AS-202 East Boundary	3.60E-17	0.6%	1.35E-17	0.2%	4.08E-18	0.1%	4.82E-18	0.1%	1.46E-17	0.2%
AS-203 South Boundary	2.60E-17	0.4%	1.12E-17	0.2%	1.52E-17	0.3%	5.26E-18	0.1%	1.44E-17	0.2%
AS-204 West Boundary	2.43E-17	0.4%	2.70E-17	0.4%	3.04E-17	0.5%	6.60E-18	0.1%	2.20E-17	0.4%
AS-206 North Boundary	3.14E-17	0.5%	2.32E-17	0.4%	1.44E-17	0.2%	2.49E-17	0.4%	2.35E-17	0.4%
AS-209 Mill Entrance Road	3.24E-17	0.5%	2.34E-17	0.4%	2.35E-17	0.4%	2.24E-17	0.4%	2.54E-17	0.4%
AS-210 Shadow Hills Estates	3.42E-17	0.6%	1.71E-17	0.3%	5.17E-18	0.1%	4.04E-17	0.7%	2.42E-17	0.4%
AS-212 Nearest Resident	4.67E-17	0.8%	3.68E-17	0.6%	5.38E-18	0.1%	2.52E-17	0.4%	2.85E-17	0.5%
Canon City #2	3.60E-17	0.6%	3.05E-17	0.5%	1.26E-17	0.2%	2.70E-17	0.4%	2.66E-17	0.4%
Lincoln Park #2	4.77E-17	0.8%	1.89E-17	0.3%	3.46E-17	0.6%	3.78E-17	0.6%	3.47E-17	0.6%
OroVerde #3	1.53E-17	0.3%	1.24E-17	0.2%	5.19E-18	0.1%	1.71E-17	0.3%	1.25E-17	0.2%
QC Truck	4.90E-18	0.1%	1.10E-17	0.2%	5.01E-18	0.1%	3.95E-18	0.1%	6.20E-18	0.1%

EC=Effluent Concentration
(Regulatory Limit from 6CR
Part 4, Appendix B)

“<” are below detection limit and are
taken as ½ that value when calculating
an average concentration (shown in red)

Table EA-2
Environmental Air Monitoring 2010

Location	1st Quarter	% of EC	2nd Quarter	% of EC	3rd Quarter	% of EC	4th Quarter	% of EC	Average	% of EC
Class Y ^{Nat}U (uCi/ml) EC = 9E-14 (90E-15)										
AS-202 East Boundary	6.69E-16	0.7%	2.89E-16	0.3%	5.78E-16	0.6%	5.62E-16	0.6%	5.24E-16	0.6%
AS-203 South Boundary	4.12E-16	0.5%	1.68E-16	0.2%	2.25E-16	0.3%	2.40E-16	0.3%	2.61E-16	0.3%
AS-204 West Boundary	7.30E-16	0.8%	5.57E-16	0.6%	2.20E-16	0.2%	2.94E-16	0.3%	4.50E-16	0.5%
AS-206 North Boundary	2.19E-16	0.2%	1.90E-16	0.2%	1.92E-16	0.2%	1.28E-16	0.1%	1.82E-16	0.2%
AS-209 Mill Entrance Road	4.75E-16	0.5%	5.13E-16	0.6%	4.40E-16	0.5%	2.66E-16	0.3%	4.24E-16	0.5%
AS-210 Shadow Hills Estates	3.11E-16	0.3%	1.44E-16	0.2%	2.06E-16	0.2%	1.67E-16	0.2%	2.07E-16	0.2%
AS-212 Nearest Resident	3.10E-16	0.3%	1.84E-16	0.2%	3.19E-16	0.4%	1.94E-16	0.2%	2.52E-16	0.3%
Canon City #2	3.30E-16	0.4%	1.41E-16	0.2%	1.66E-16	0.2%	1.47E-16	0.2%	1.96E-16	0.2%
Lincoln Park #2	3.00E-16	0.3%	1.77E-16	0.2%	1.71E-16	0.2%	1.94E-16	0.2%	2.10E-16	0.2%
OroVerde #3	2.62E-16	0.3%	9.43E-17	0.1%	1.65E-16	0.2%	1.01E-16	0.1%	1.56E-16	0.2%
QC Truck	1.95E-16	0.2%	7.30E-18	0.0%	5.30E-17	0.1%	2.24E-17	0.0%	6.93E-17	0.1%

Location	1st Quarter	% of EC	2nd Quarter	% of EC	3rd Quarter	% of EC	4th Quarter	% of EC	Average	% of EC
Class W ^{230}Th (uCi/ml) EC = 2E-14 (20E-15)										
AS-202 East Boundary	6.25E-16	3.1%	3.43E-16	1.7%	5.19E-16	2.6%	4.73E-16	2.4%	4.90E-16	2.4%
AS-203 South Boundary	1.77E-16	0.9%	2.86E-16	1.4%	2.23E-16	1.1%	2.64E-16	1.3%	2.37E-16	1.2%
AS-204 West Boundary	7.30E-16	3.7%	9.00E-16	4.5%	8.49E-16	4.2%	3.39E-17	0.2%	6.97E-16	3.5%
AS-206 North Boundary	1.71E-17	0.1%	1.34E-16	0.7%	8.27E-17	0.4%	9.65E-17	0.5%	8.25E-17	0.4%
AS-209 Mill Entrance Road	3.42E-16	1.7%	1.05E-15	5.3%	5.75E-16	2.9%	2.18E-16	1.1%	5.47E-16	3.5%
AS-210 Shadow Hills Estates	1.22E-16	0.6%	1.92E-16	1.0%	2.26E-16	1.1%	2.02E-16	1.0%	1.85E-16	0.8%
AS-212 Nearest Resident	7.73E-17	0.4%	2.02E-16	1.0%	2.76E-16	1.4%	1.49E-16	0.7%	1.76E-16	0.7%
Canon City #2	6.81E-17	0.3%	1.24E-16	0.6%	7.31E-17	0.4%	4.37E-17	0.2%	7.73E-17	0.5%
Lincoln Park #2	6.52E-17	0.3%	1.47E-16	0.7%	4.58E-17	0.2%	1.26E-16	0.6%	9.62E-17	0.5%
OroVerde #3	5.49E-17	0.3%	1.19E-16	0.6%	8.28E-17	0.4%	5.25E-17	0.3%	7.72E-17	0.4%
QC Truck	9.49E-18	0.0%	5.03E-17	0.3%	2.69E-17	0.1%	6.61E-17	0.3%	3.82E-17	0.1%

Table EA-2
Environmental Air Monitoring
2010

Location	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		Average	
Class W ^{226}Ra (uCi/ml) EC = 9E-13 (900E-15)										
		% of EC		*% of EC*		*% of EC*		*% of EC*		*% of EC*
AS-202 East Boundary	1.86E-16	0.0%	1.28E-16	0.0%	1.66E-16	0.0%	1.00E-16	0.0%	1.45E-16	0.0%
AS-203 South Boundary	4.92E-17	0.0%	1.02E-16	0.0%	6.25E-17	0.0%	7.50E-17	0.0%	7.21E-17	0.0%
AS-204 West Boundary	2.31E-16	0.0%	3.56E-16	0.0%	3.12E-16	0.0%	1.16E-17	0.0%	2.51E-16	0.0%
AS-206 North Boundary	2.43E-17	0.0%	4.40E-17	0.0%	6.03E-17	0.0%	4.19E-17	0.0%	4.26E-17	0.0%
AS-209 Mill Entrance Road	7.65E-17	0.0%	1.78E-16	0.0%	1.30E-16	0.0%	5.83E-17	0.0%	1.11E-16	0.0%
AS-210 Shadow Hills Estates	3.15E-17	0.0%	3.17E-17	0.0%	6.53E-17	0.0%	3.99E-17	0.0%	4.21E-17	0.0%
AS-212 Nearest Resident	8.18E-17	0.0%	4.67E-17	0.0%	1.05E-16	0.0%	5.74E-17	0.0%	7.28E-17	0.0%
Canon City #2	5.45E-17	0.0%	3.15E-17	0.0%	5.65E-17	0.0%	1.75E-17	0.0%	4.00E-17	0.0%
Lincoln Park #2	4.18E-17	0.0%	3.77E-17	0.0%	2.53E-17	0.0%	5.93E-17	0.0%	4.10E-17	0.0%
OroVerde #3	3.33E-17	0.0%	1.35E-17	0.0%	3.60E-17	0.0%	2.53E-17	0.0%	2.70E-17	0.0%
QC Truck	3.50E-17	0.0%	4.92E-18	0.0%	1.09E-17	0.0%	1.48E-17	0.0%	1.64E-17	0.0%

Location	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		Average	
Class D ^{210}Pb (uCi/ml) EC = 6E-13 (60E-14)										
		% of EC		*% of EC*		*% of EC*		*% of EC*		*% of EC*
AS-202 East Boundary	2.19E-14	3.7%	1.58E-14	2.6%	2.11E-14	3.5%	2.44E-14	4.1%	2.08E-14	3.5%
AS-203 South Boundary	1.89E-14	3.2%	1.20E-14	2.0%	1.76E-14	2.9%	2.59E-14	4.3%	1.86E-14	3.1%
AS-204 West Boundary	2.04E-14	3.4%	1.52E-14	2.5%	2.30E-14	3.8%	3.01E-15	0.5%	2.15E-14	3.6%
AS-206 North Boundary	1.81E-14	3.0%	1.82E-14	3.0%	2.19E-14	3.6%	2.50E-14	4.2%	2.08E-14	3.5%
AS-209 Mill Entrance Road	2.05E-14	3.4%	1.82E-14	3.0%	2.02E-14	3.4%	2.28E-14	3.8%	2.04E-14	3.4%
AS-210 Shadow Hills Estates	1.97E-14	3.3%	1.39E-14	2.3%	1.95E-14	3.2%	2.52E-14	4.2%	1.96E-14	3.3%
AS-212 Nearest Resident	1.71E-14	2.8%	1.40E-14	2.3%	1.97E-14	3.3%	2.47E-14	4.1%	1.89E-14	3.1%
Canon City #2	1.98E-14	3.3%	1.45E-14	2.4%	1.91E-14	3.2%	2.56E-14	4.3%	1.97E-14	3.3%
Lincoln Park #2	1.96E-14	3.3%	1.39E-14	2.3%	1.92E-14	3.2%	2.61E-14	4.3%	1.97E-14	3.3%
OroVerde #3	1.96E-14	3.3%	1.37E-14	2.3%	2.19E-14	3.7%	2.79E-14	4.7%	2.08E-14	3.5%
QC Truck	< 2.25E-16	0.0%	< 1.39E-14	2.3%	2.52E-16	0.0%	< 4.78E-16	0.1%	1.89E-15	0.3%

Table EA-2
Environmental Air Monitoring
2010

Location		1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		Average	
Class Y ^{232}Th (uCi/ml) EC = 4E-15 (400E-17)											
			% of EC		% of EC		% of EC		% of EC		% of EC
AS-202 East Boundary		3.77E-17	0.6%	3.60E-17	0.6%	3.31E-17	0.6%	2.95E-17	0.5%	3.41E-17	0.6%
AS-203 South Boundary		3.67E-17	0.6%	1.62E-17	0.3%	2.34E-17	0.4%	1.08E-17	0.2%	2.18E-17	0.4%
AS-204 West Boundary		4.49E-17	0.7%	3.24E-17	0.5%	1.88E-17	0.3%	2.46E-18	0.0%	2.97E-17	0.5%
AS-206 North Boundary		2.88E-17	0.5%	3.24E-17	0.5%	4.57E-17	0.8%	2.63E-17	0.4%	3.33E-17	0.6%
AS-209 Mill Entrance Road		2.25E-17	0.4%	2.79E-17	0.5%	2.05E-17	0.3%	2.24E-17	0.4%	2.33E-17	0.4%
AS-210 Shadow Hills Estates		2.79E-17	0.5%	2.89E-17	0.5%	4.38E-17	0.7%	3.40E-17	0.6%	3.37E-17	0.6%
AS-212 Nearest Resident		2.43E-17	0.4%	2.16E-17	0.4%	1.46E-17	0.2%	2.72E-17	0.5%	2.19E-17	0.4%
Canon City #2		4.09E-17	0.7%	3.87E-17	0.6%	4.58E-17	0.8%	2.04E-17	0.3%	3.64E-17	0.6%
Lincoln Park #2		4.18E-17	0.7%	5.48E-17	0.9%	3.21E-17	0.5%	5.54E-17	0.9%	4.60E-17	0.8%
OroVerde #3		3.87E-17	0.6%	2.70E-17	0.4%	2.24E-17	0.4%	1.65E-17	0.3%	2.61E-17	0.4%
QC Truck	<	2.09E-17	0.3%	4.72E-18	0.1%	1.85E-17	0.3%	2.14E-17	0.4%	1.38E-17	0.2%

EC=Effluent Concentration
(Regulatory Limit from 6CR
Part 4, Appendix B)

"<" are below detection limit and are
taken as ½ that value when calculating
an average concentration (shown in red)

Figure EA - 2A
Environmental Air
Average Annual ^{Nat}U Concentration
1979-2010

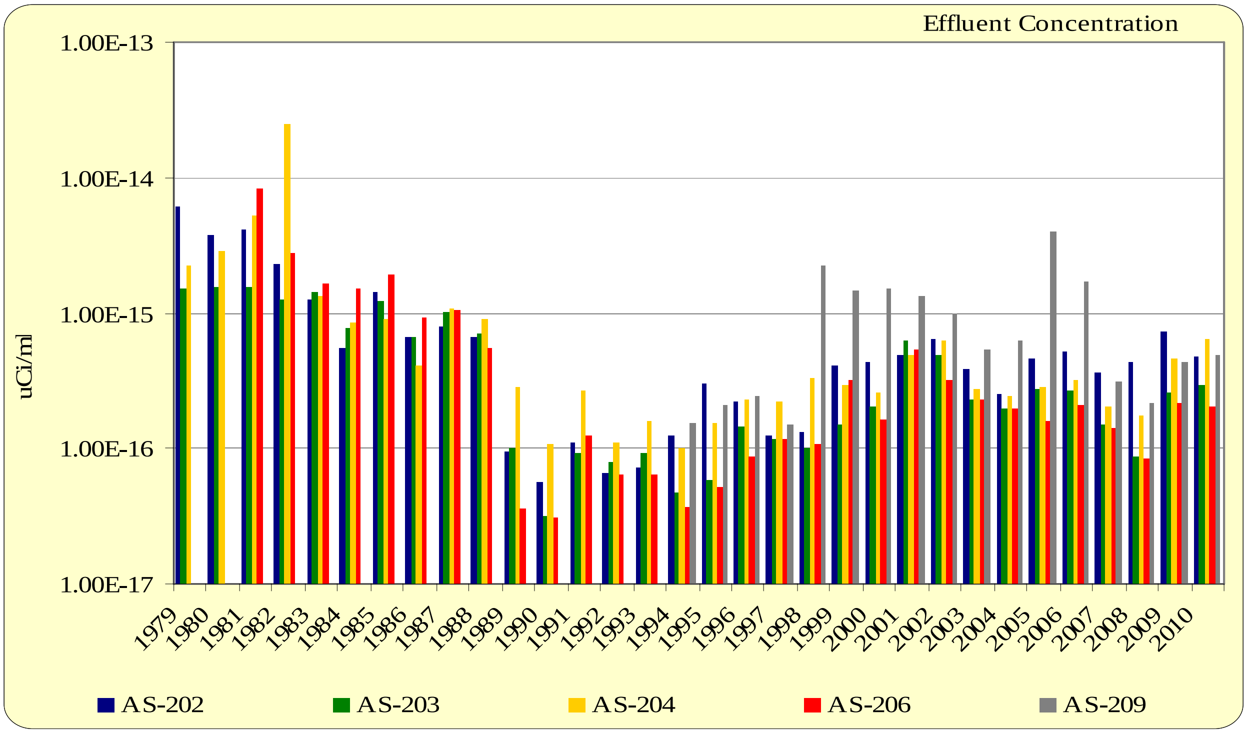


Figure EA - 2B
Environmental Air
Average Annual ^{Nat}U Concentration
1979-2010

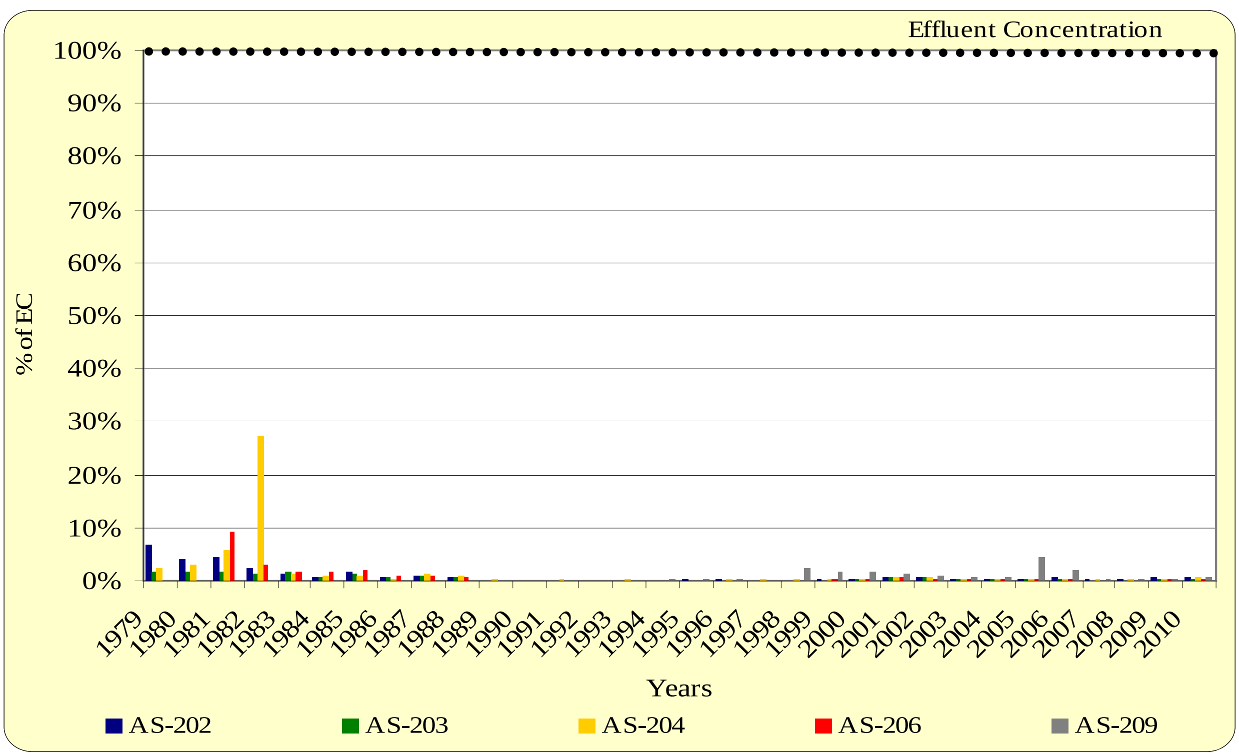


Figure EA - 3A
Environmental Air
Average Annual ^{Nat}U Concentration
1979-2010

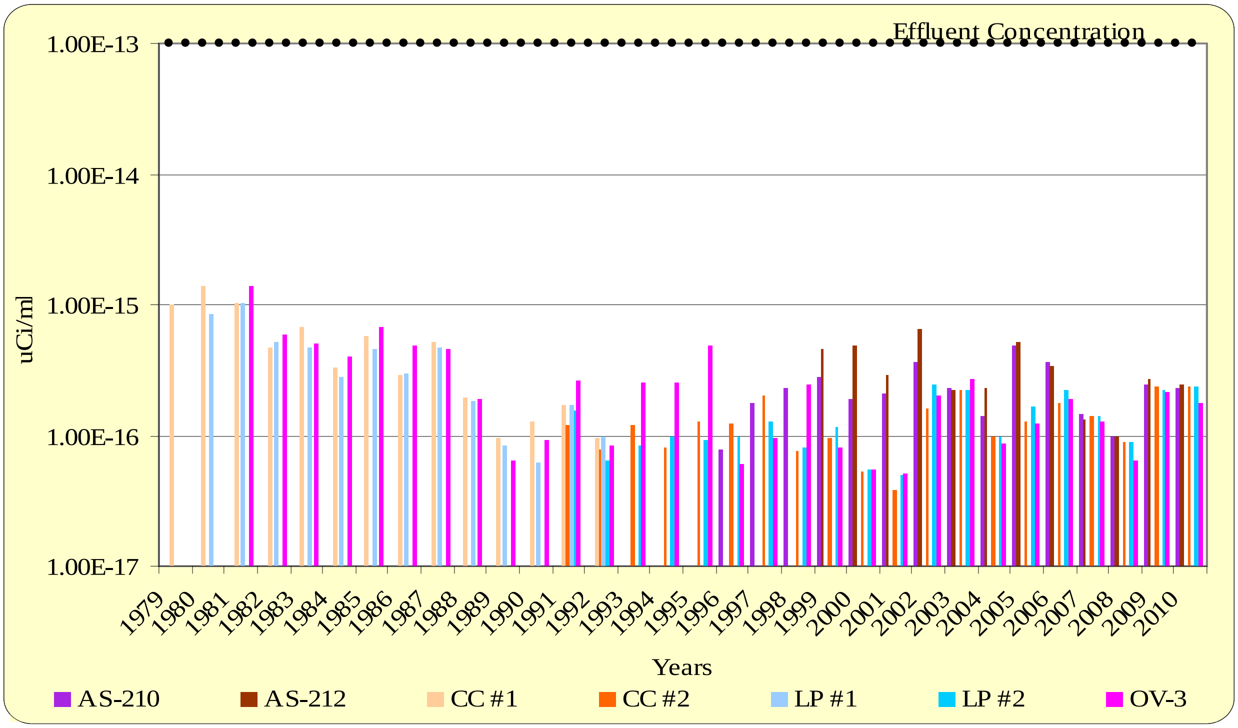


Figure EA - 3B
Environmental Air
Average Annual ^{Nat}U Concentration
1979-2010

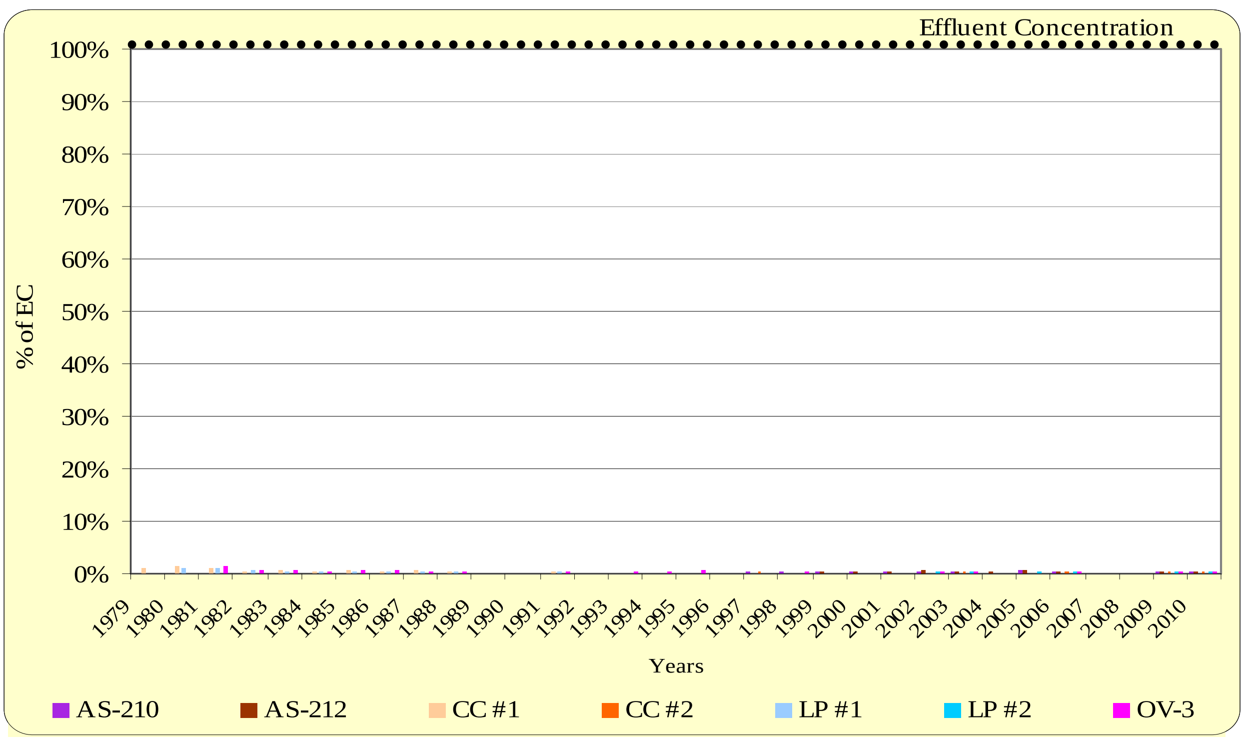


Figure EA - 4A
Environmental Air
Average Annual ^{230}Th Concentration
1979-2010

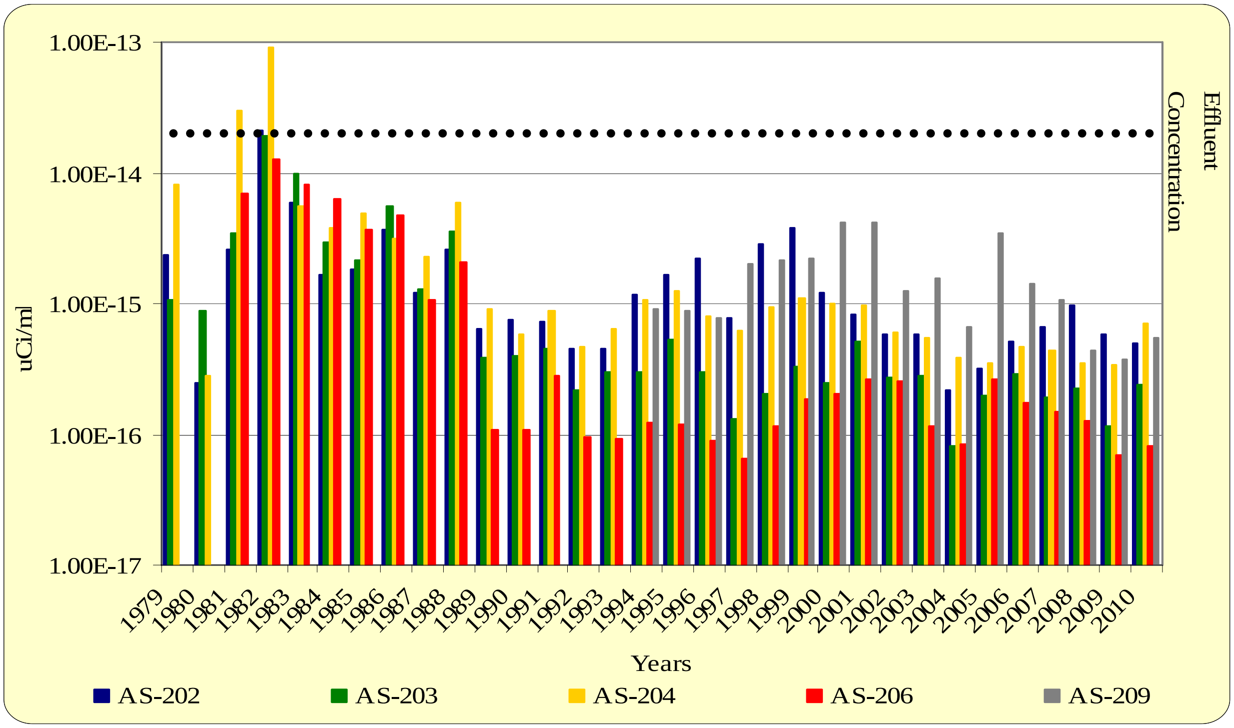


Figure EA - 4B
Environmental Air
Average Annual ^{230}Th Concentration
1979-2010

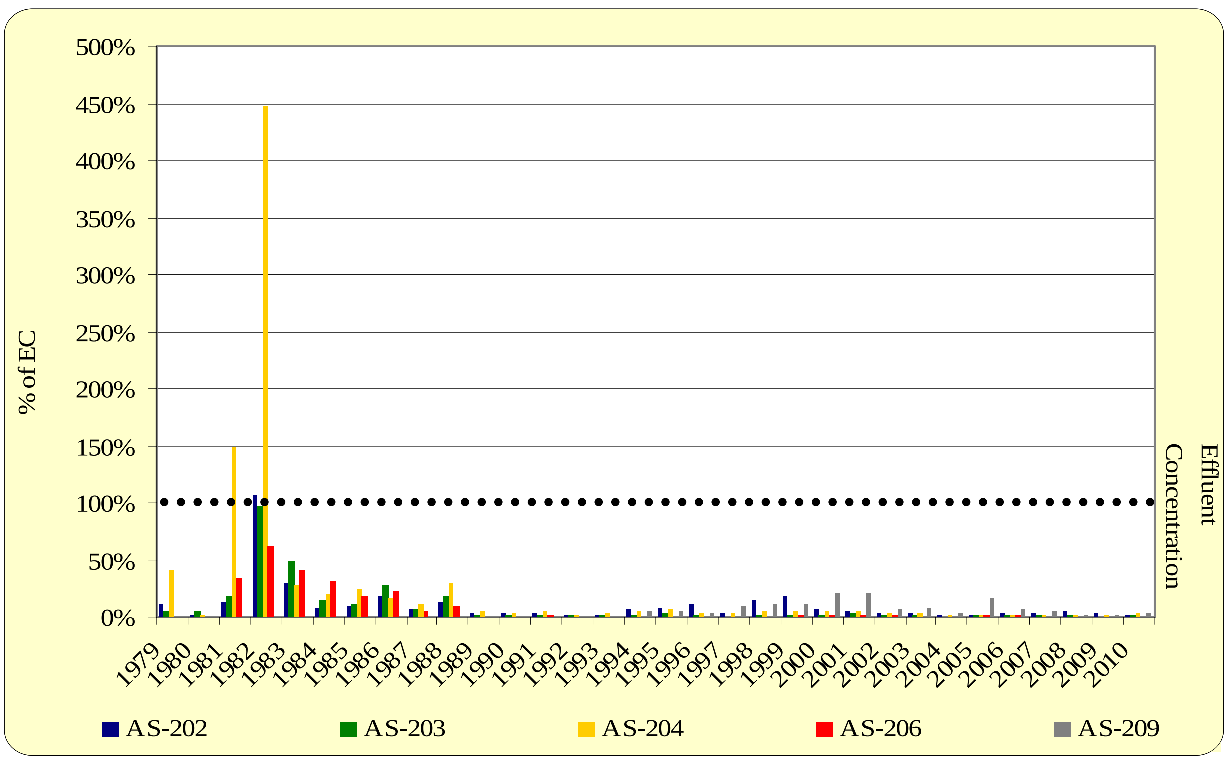


Figure EA - 5A
Environmental Air
Average Annual ^{230}Th Concentration
1979-2010

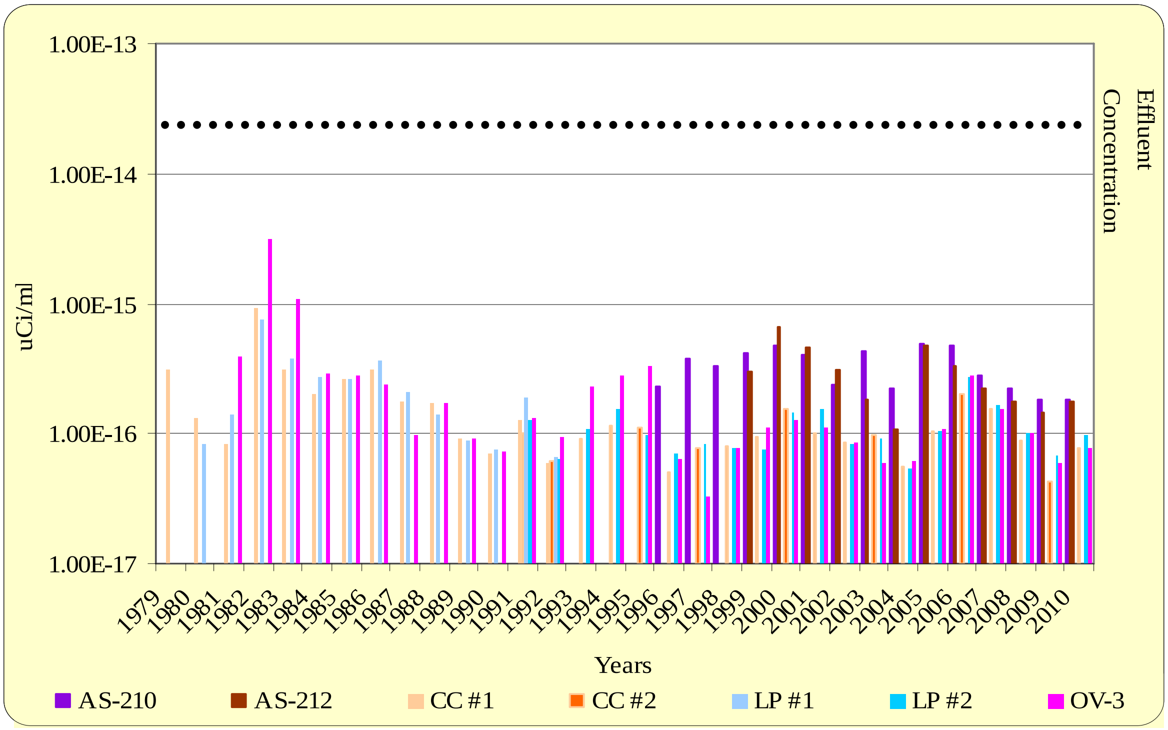


Figure EA - 5B
Environmental Air
Average Annual ^{230}Th Concentration
1979-2010

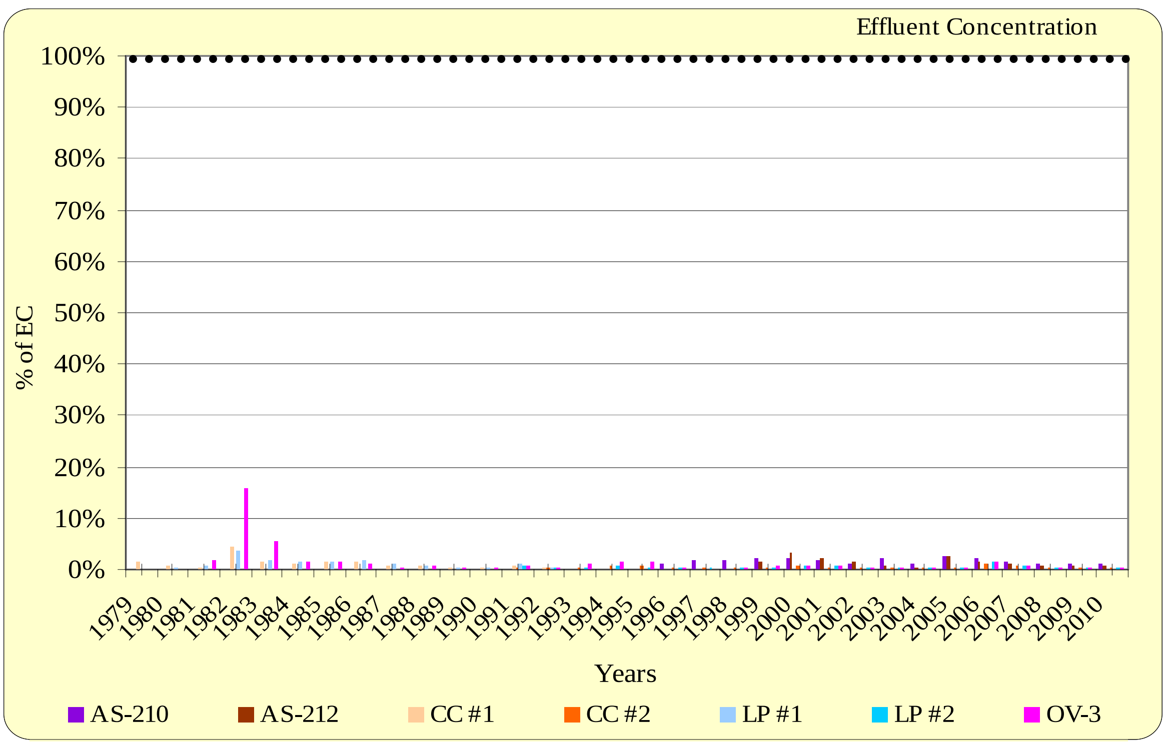


Figure EA-6A
Environmental Air
Average Annual ^{226}Ra Concentration
1979-2010

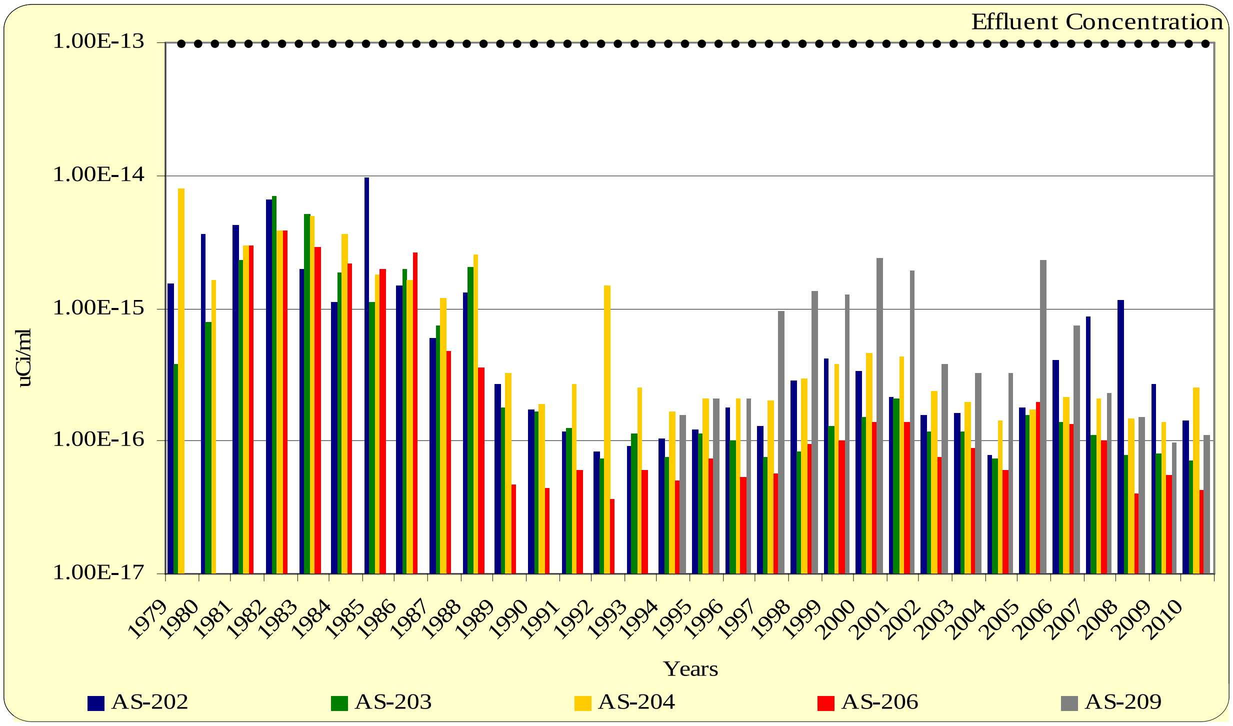


Figure EA-6B
Environmental Air
Average Annual ^{226}Ra Concentration
1979-2010

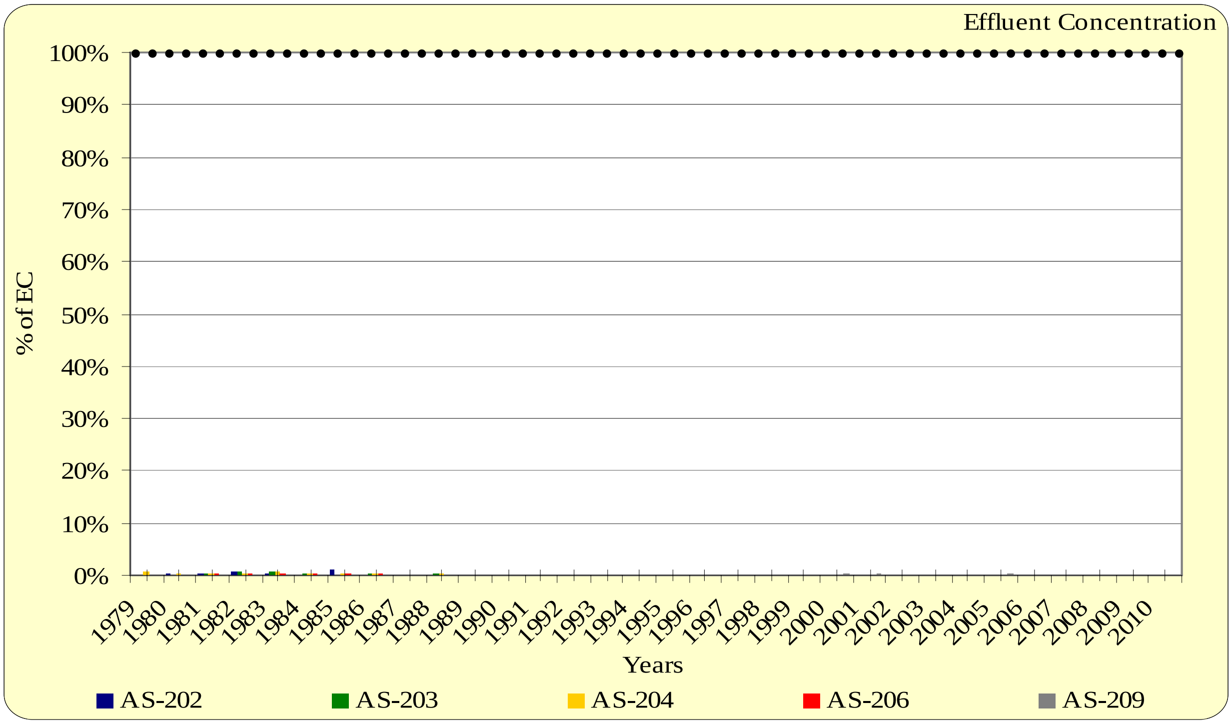


Figure EA-7A
Environmental Air
Average Annual ^{226}Ra Concentration
1979-2010

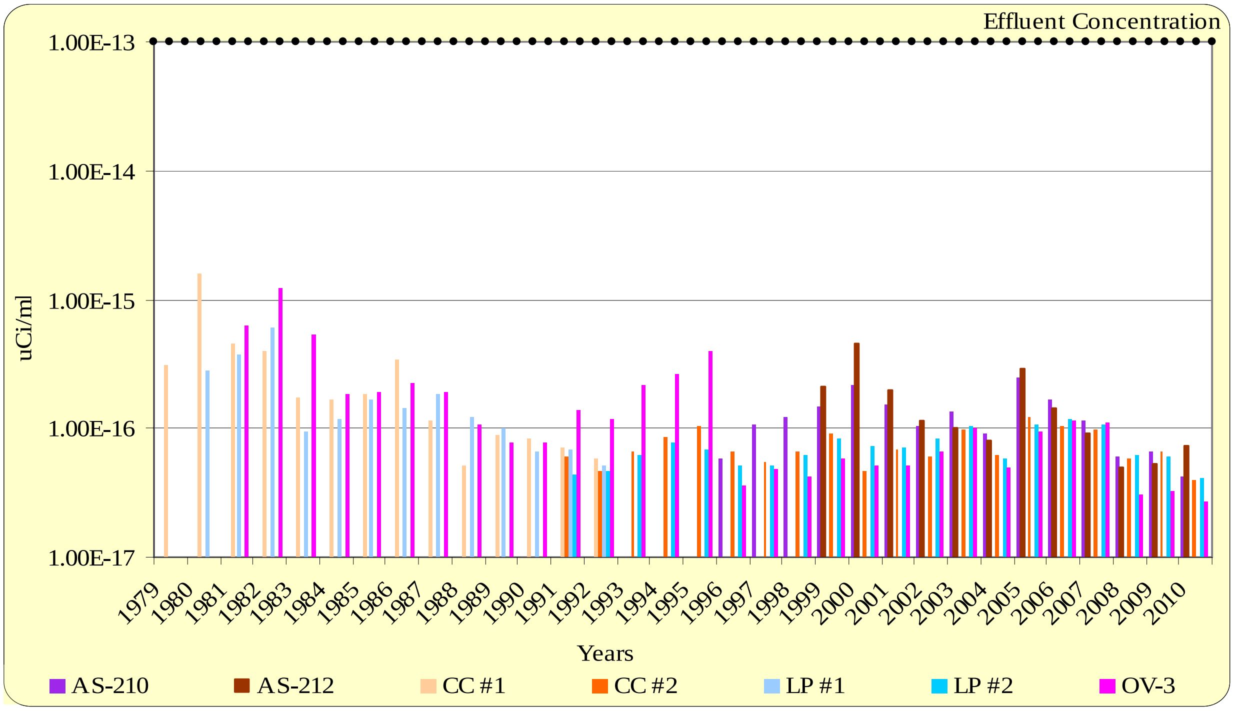


Figure EA-7B
Environmental Air
Average Annual ^{226}Ra Concentration
1979-2010

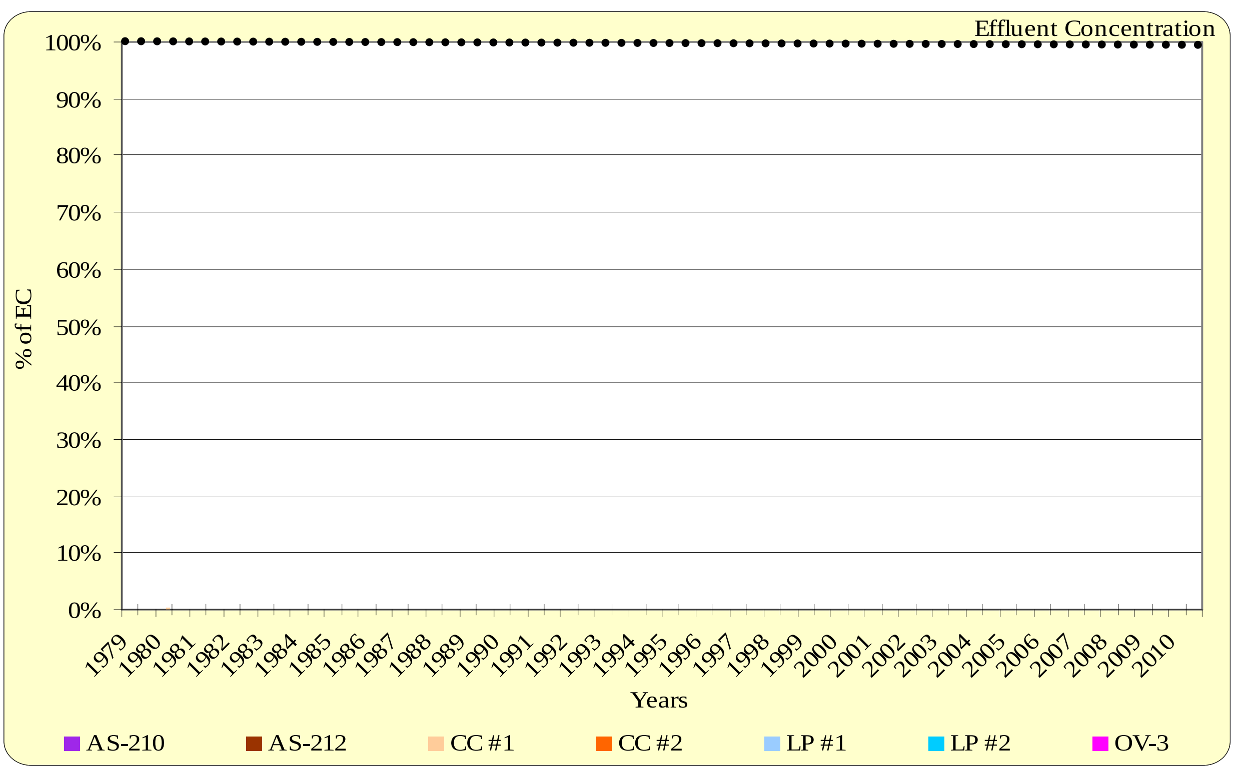


Figure EA-8A
Environmental Air
Average Annual ^{210}Pb Concentration
1979-2010

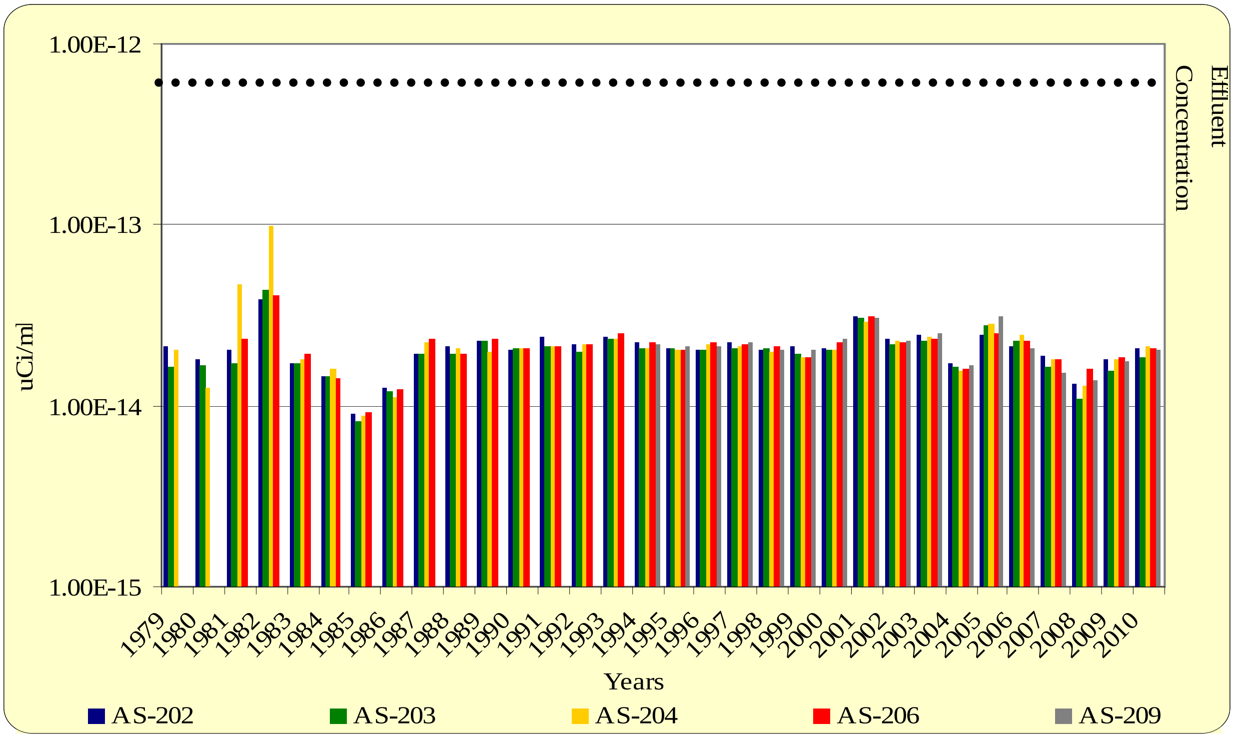


Figure EA-8B
Environmental Air
Average Annual ^{210}Pb Concentration
1979-2010

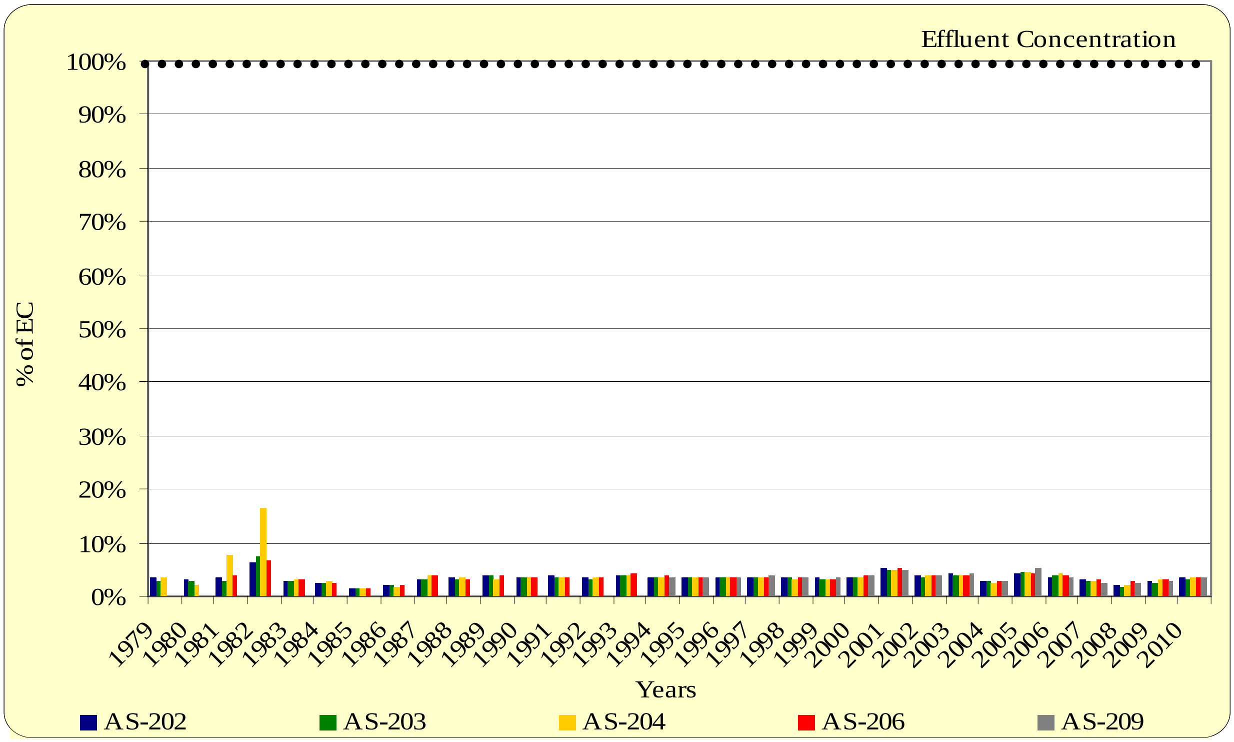


Figure EA-9A
Environmental Air
Average Annual ^{210}Pb Concentration
1979-2010

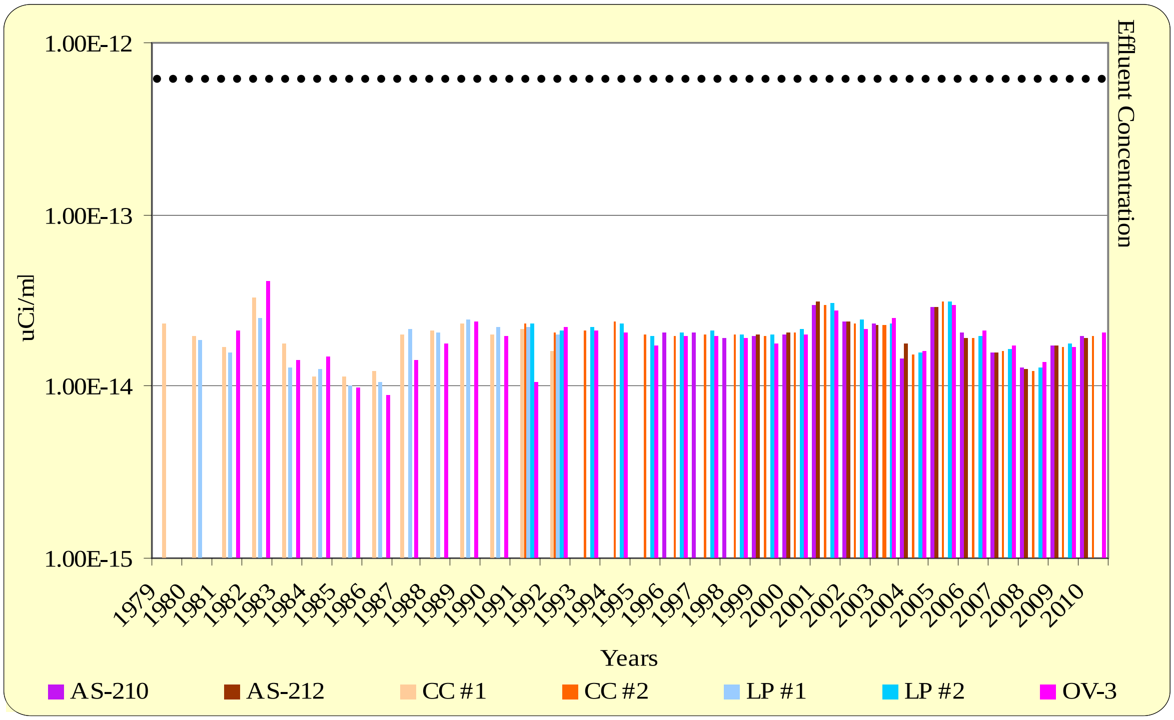


Figure EA-9B
Environmental Air
Average Annual ^{210}Pb Concentration
1979-2010

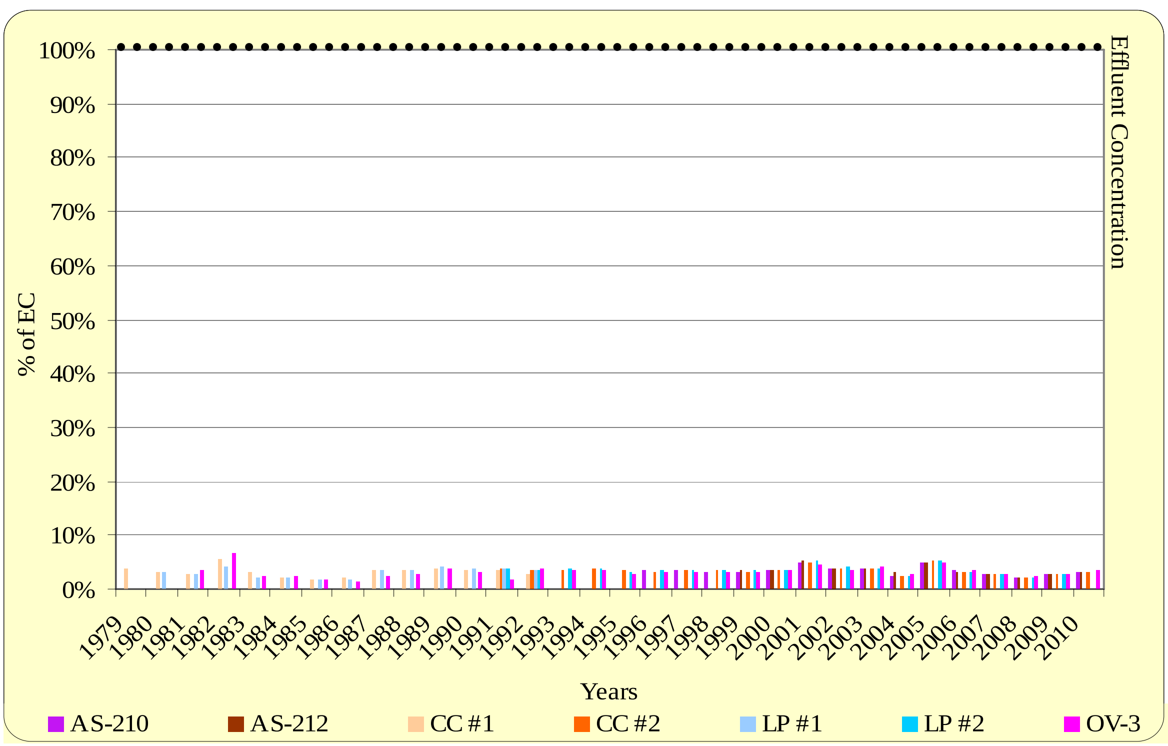


Figure EA-10A
Environmental Air
Average Annual ^{232}Th Concentration
1979-2010

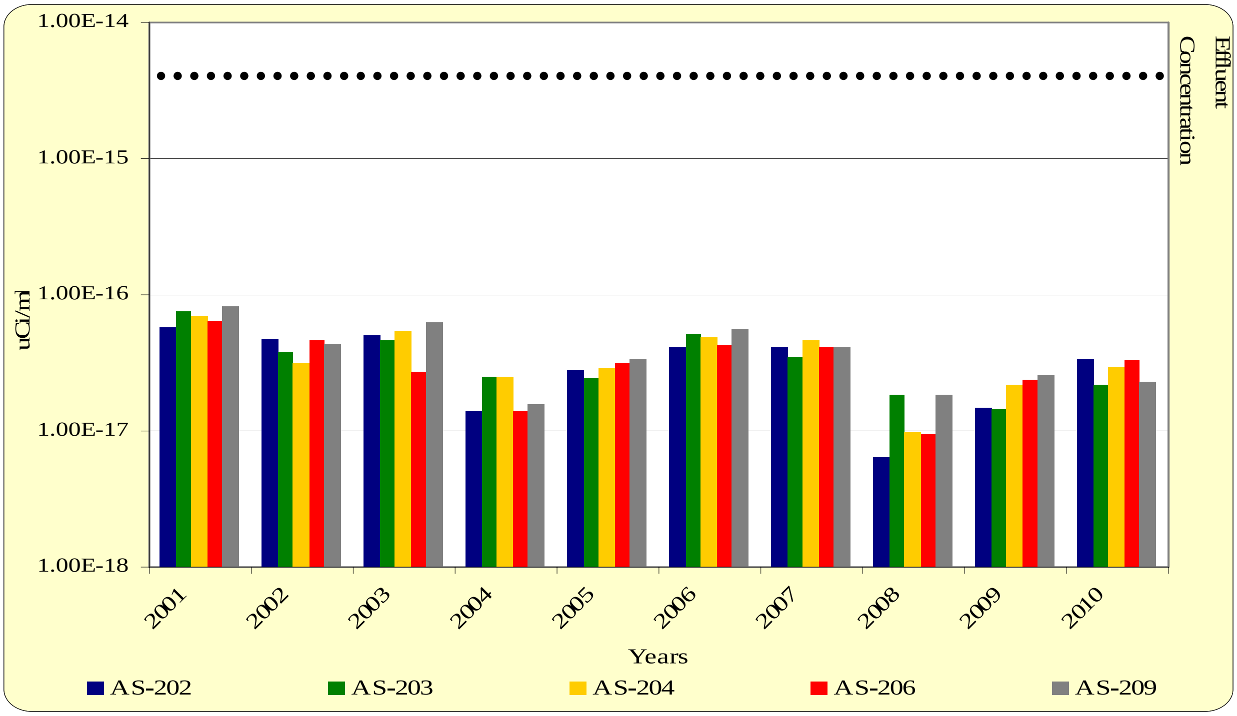


Figure EA-10B
Environmental Air
Average Annual ^{232}Th Concentration
1979-2010

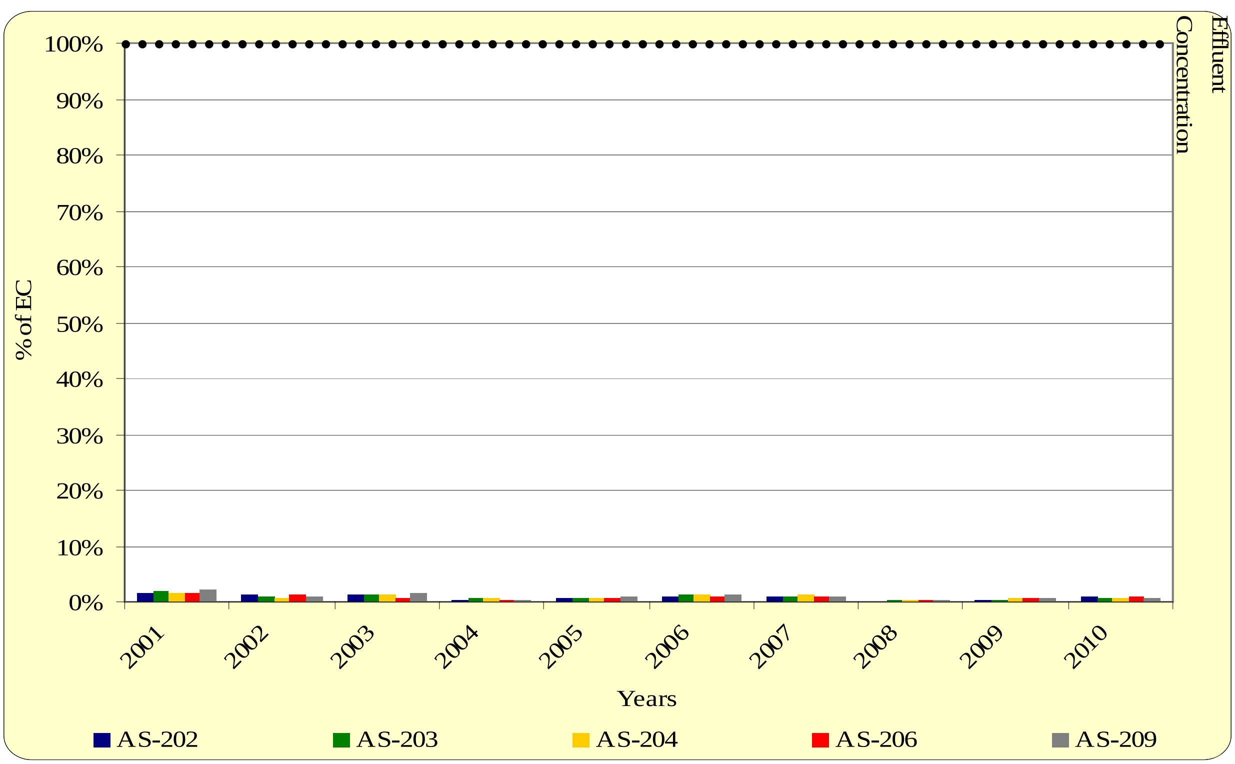


Figure EA - 11A
Environmental Air
Average Annual ^{232}Th Concentration
1979-2010

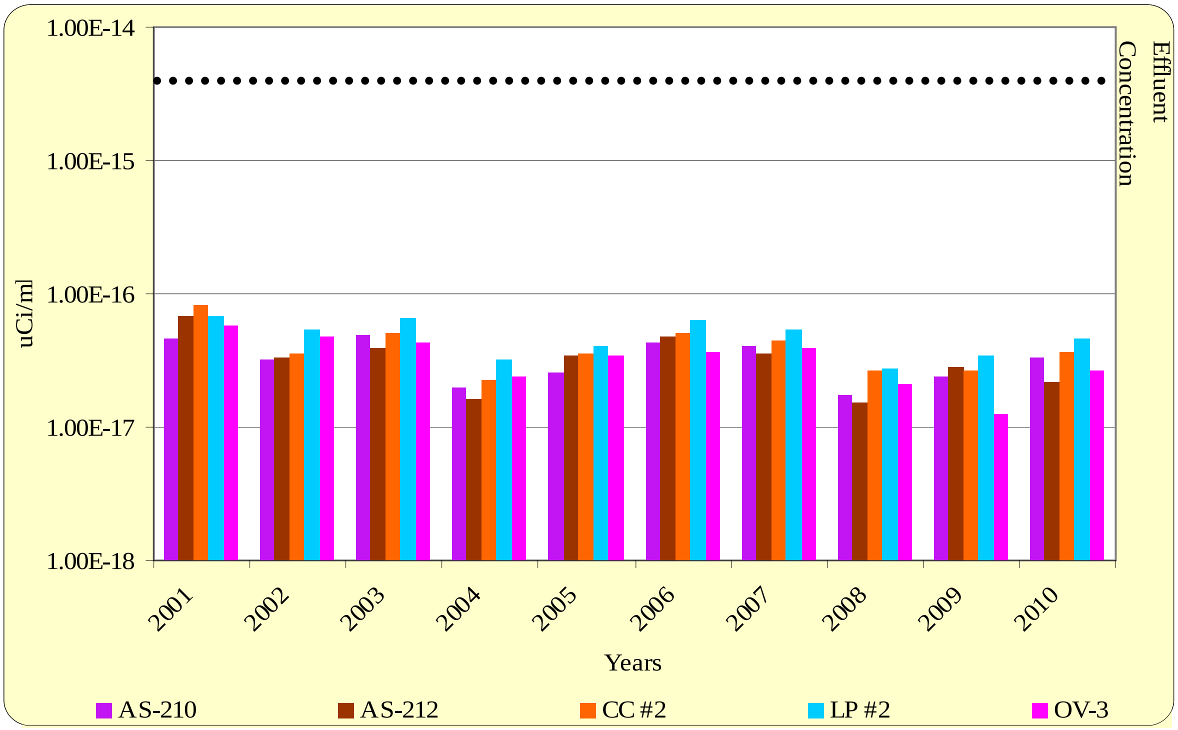


Figure EA - 11B
Environmental Air
Average Annual ^{232}Th Concentration
1979-2010

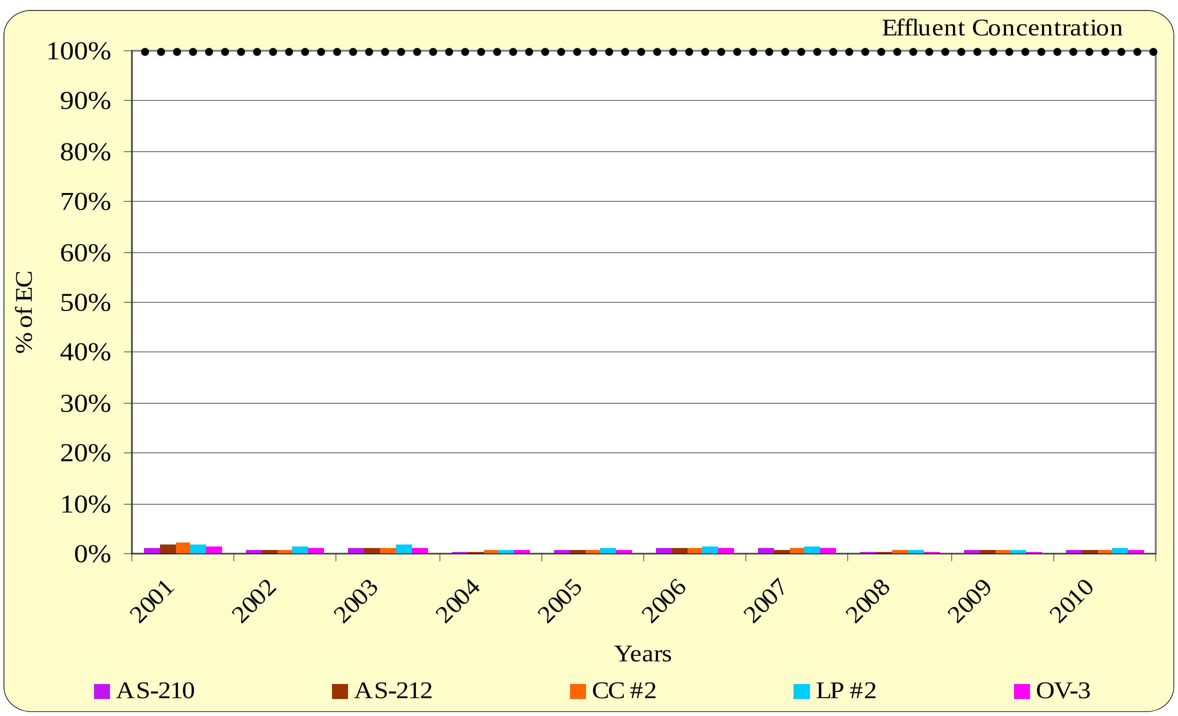
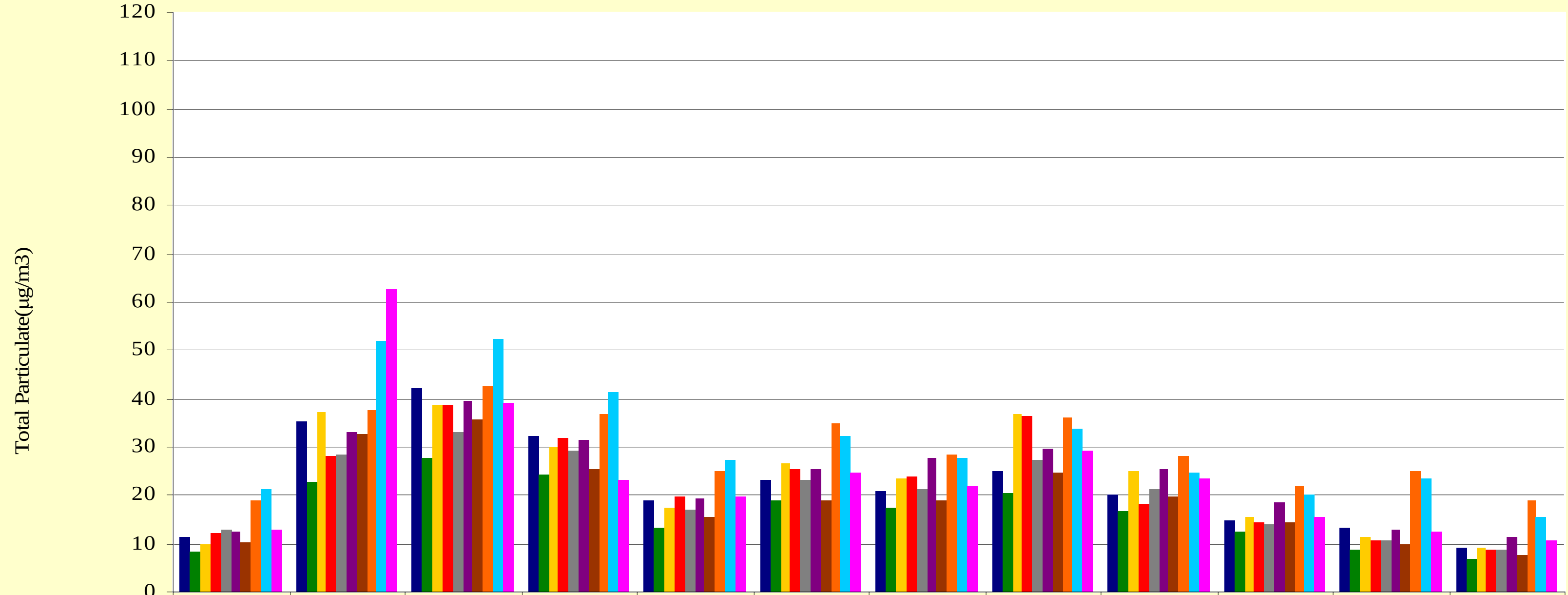


Figure EA-12
Environmental Air
Monthly Average Total Particulate
January through December 2009

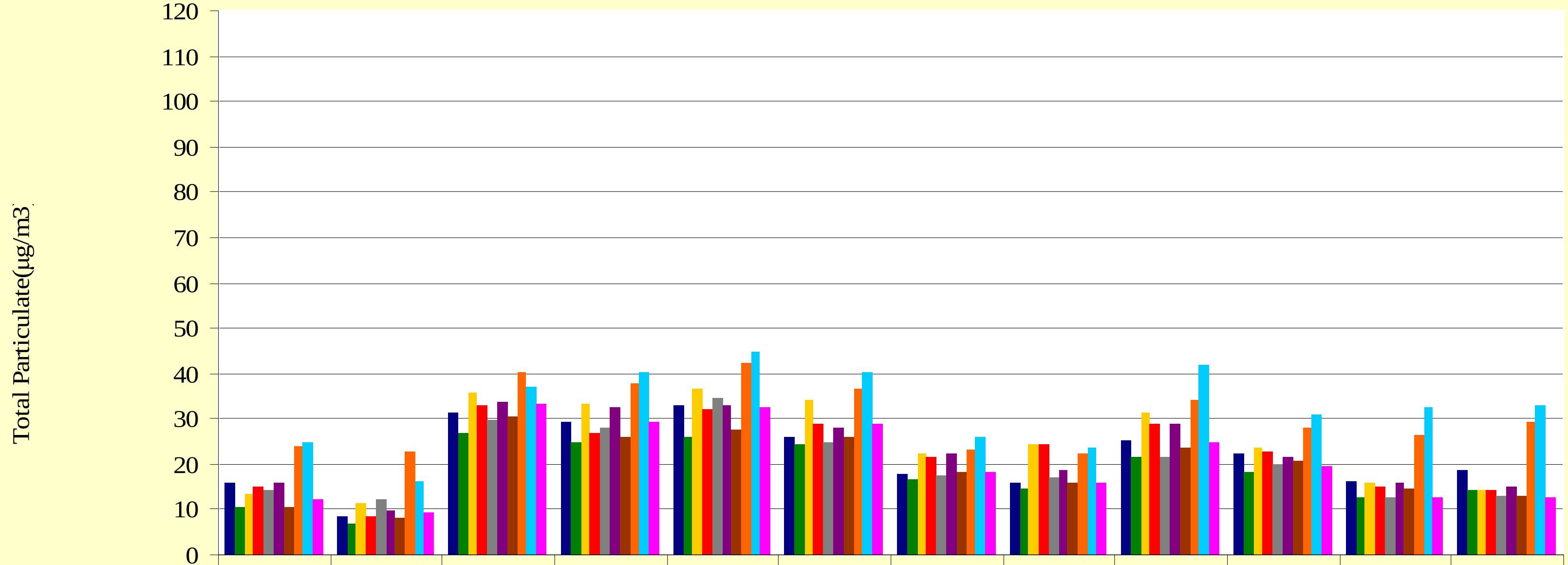


	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AS-202 East Boundary	11.36	35.32	42.03	32.11	19.13	23.10	20.70	25.08	20.19	14.92	13.32	8.94
AS-203 South Boundary	8.50	22.95	27.75	24.15	13.13	18.82	17.42	20.39	16.80	12.54	8.65	6.97
AS-204 West Boundary	9.89	37.18	38.86	29.89	17.43	26.39	23.46	36.68	24.89	15.63	11.47	9.15
AS-206 North Boundary	12.21	28.27	38.80	31.87	19.89	25.56	23.87	36.31	18.14	14.55	10.77	8.60
AS-209 Mill Entrance Rd.	13.09	28.34	33.16	29.06	16.95	23.23	21.10	27.30	21.33	14.23	10.69	8.56
AS-210 Shadow Hills Estates	12.49	32.92	39.58	31.51	19.52	25.34	27.57	29.48	25.28	18.67	12.90	11.41
AS-212 Nearest Resident	10.28	32.70	35.57	25.37	15.54	19.09	18.81	24.55	19.81	14.50	9.69	7.52
CC2 Canon City	19.15	37.48	42.44	36.66	25.14	34.78	28.54	36.22	28.01	22.18	24.90	19.05
LP2 Lincoln Park	21.16	51.87	52.50	41.29	27.18	32.09	27.78	33.98	24.70	20.19	23.39	15.47
OV3 OroVerde	13.04	62.69	39.25	23.30	19.67	24.85	21.87	29.08	23.46	15.74	12.39	10.50

Month

NOTES:
OV3 - same filter used 04/03/09 - 04/17/09; Week of 04/09/09 includes extra day due to holiday

Figure EA-13
Environmental Air
Monthly Average Total Particulate
January through December 2010



	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AS-202 East Boundary	15.67	8.58	31.31	29.41	33.08	25.86	17.95	15.87	25.21	22.50	16.47	18.66
AS-203 South Boundary	10.48	6.83	26.95	24.61	26.04	24.24	16.57	14.71	21.65	18.50	12.66	14.15
AS-204 West Boundary	13.32	11.56	35.65	33.24	36.54	34.05	22.28	24.46	31.36	23.48	15.96	14.32
AS-206 North Boundary	14.96	8.67	33.11	27.03	32.17	28.73	21.67	24.55	28.83	22.59	14.94	14.33
AS-209 Mill Entrance Rd.	14.35	12.07	29.67	27.94	34.56	24.99	17.49	17.14	21.44	19.75	12.44	12.83
AS-210 Shadow Hills Estates	16.05	9.58	33.57	32.54	32.78	28.15	22.23	18.88	29.07	21.74	15.81	14.88
AS-212 Nearest Resident	10.72	8.10	30.52	26.01	27.73	26.21	18.25	15.86	23.61	20.86	14.56	13.19
CC2 Canon City	23.92	22.62	40.41	37.74	42.35	36.46	23.14	22.48	34.28	28.03	26.33	29.22
LP2 Lincoln Park	24.83	16.42	37.21	40.11	44.66	40.17	25.83	23.64	41.74	30.99	32.38	32.94
OV3 Oro Verde	12.12	9.31	33.34	29.10	32.72	28.78	18.41	15.84	24.92	19.46	12.56	12.46

Month

Figure EA - 14
Supplemental Environmental Air Samplers
2008 - 2010

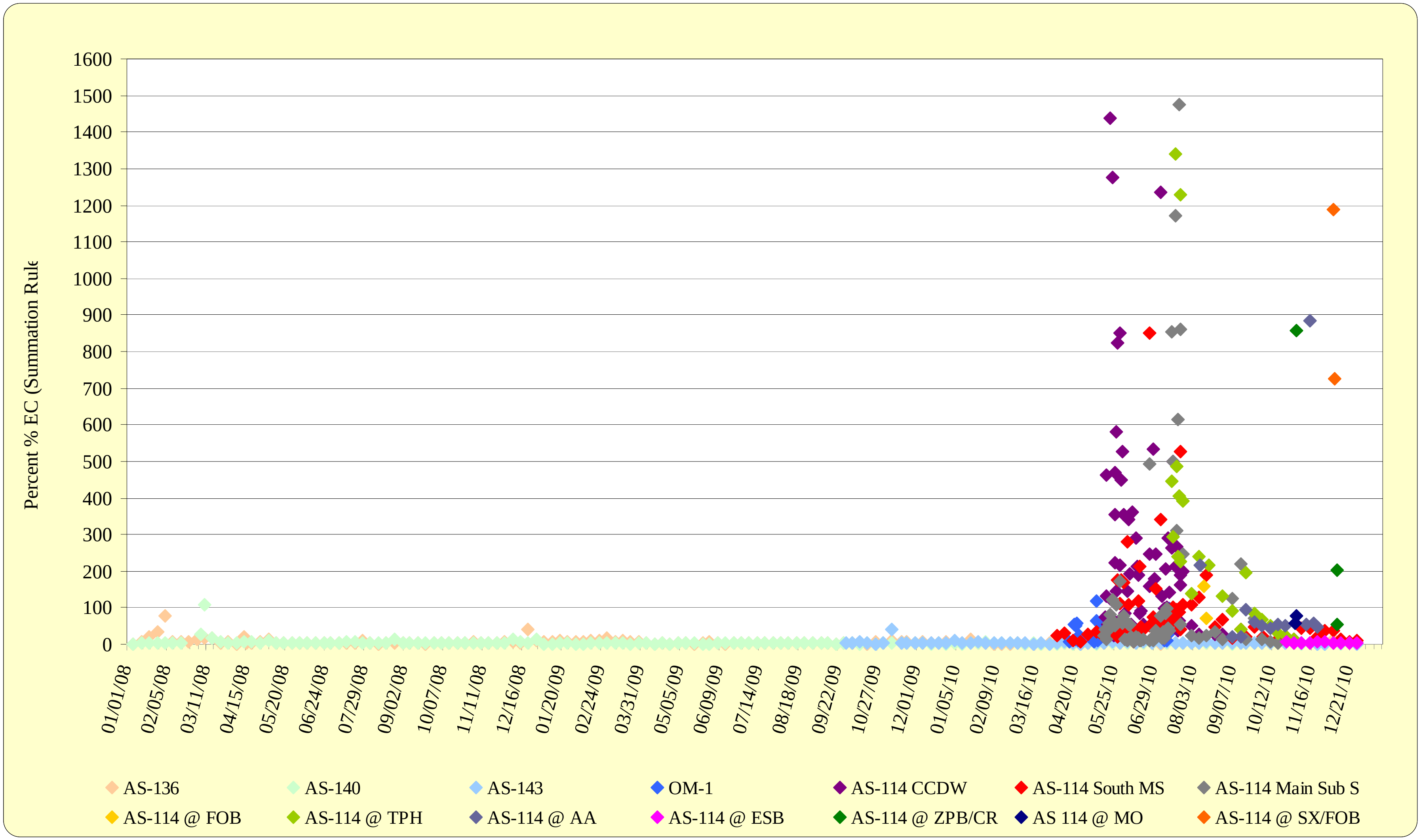


Figure EA - 15
Supplemental Environmental Air Samplers
(%EC)
2008 – 2010

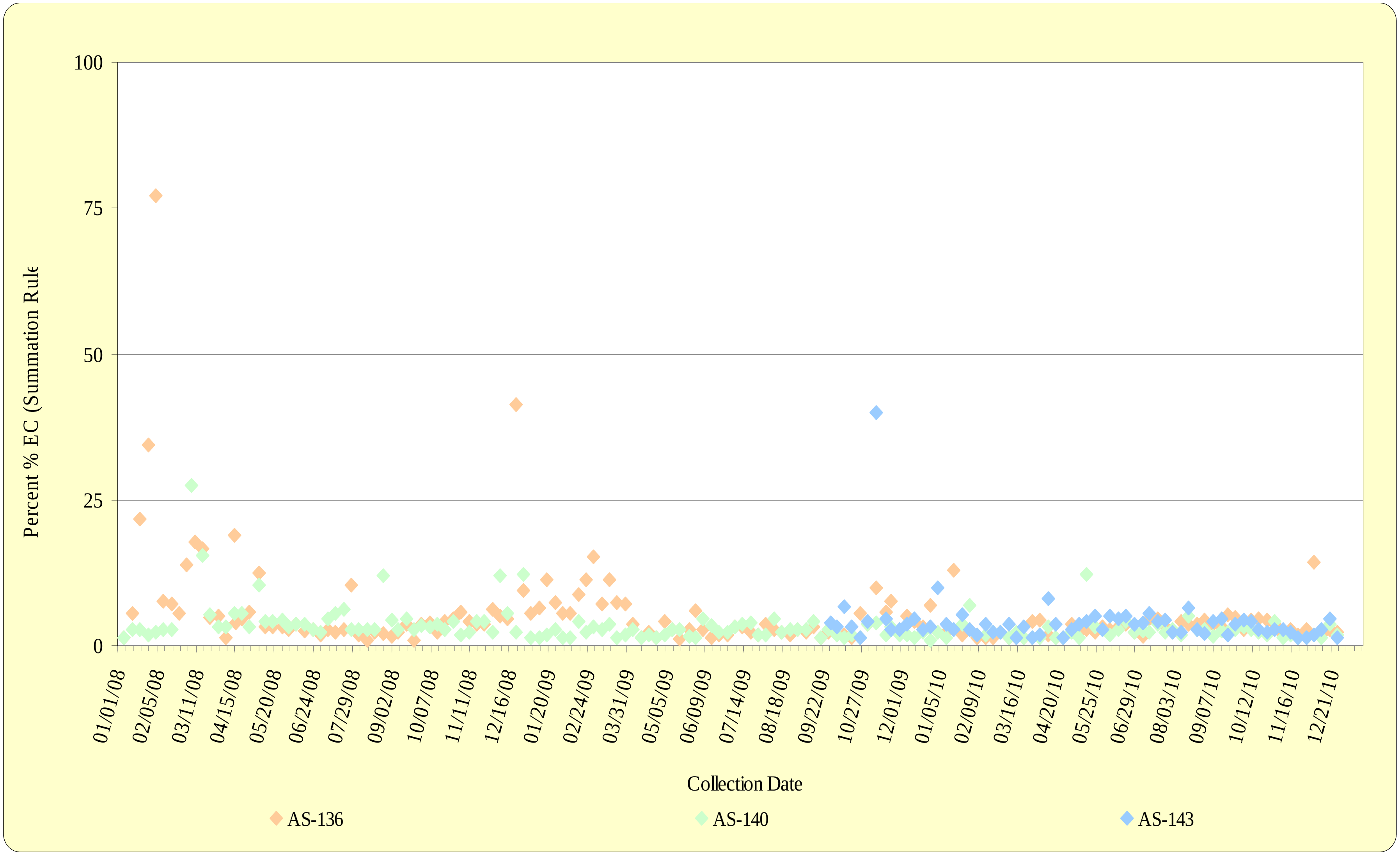
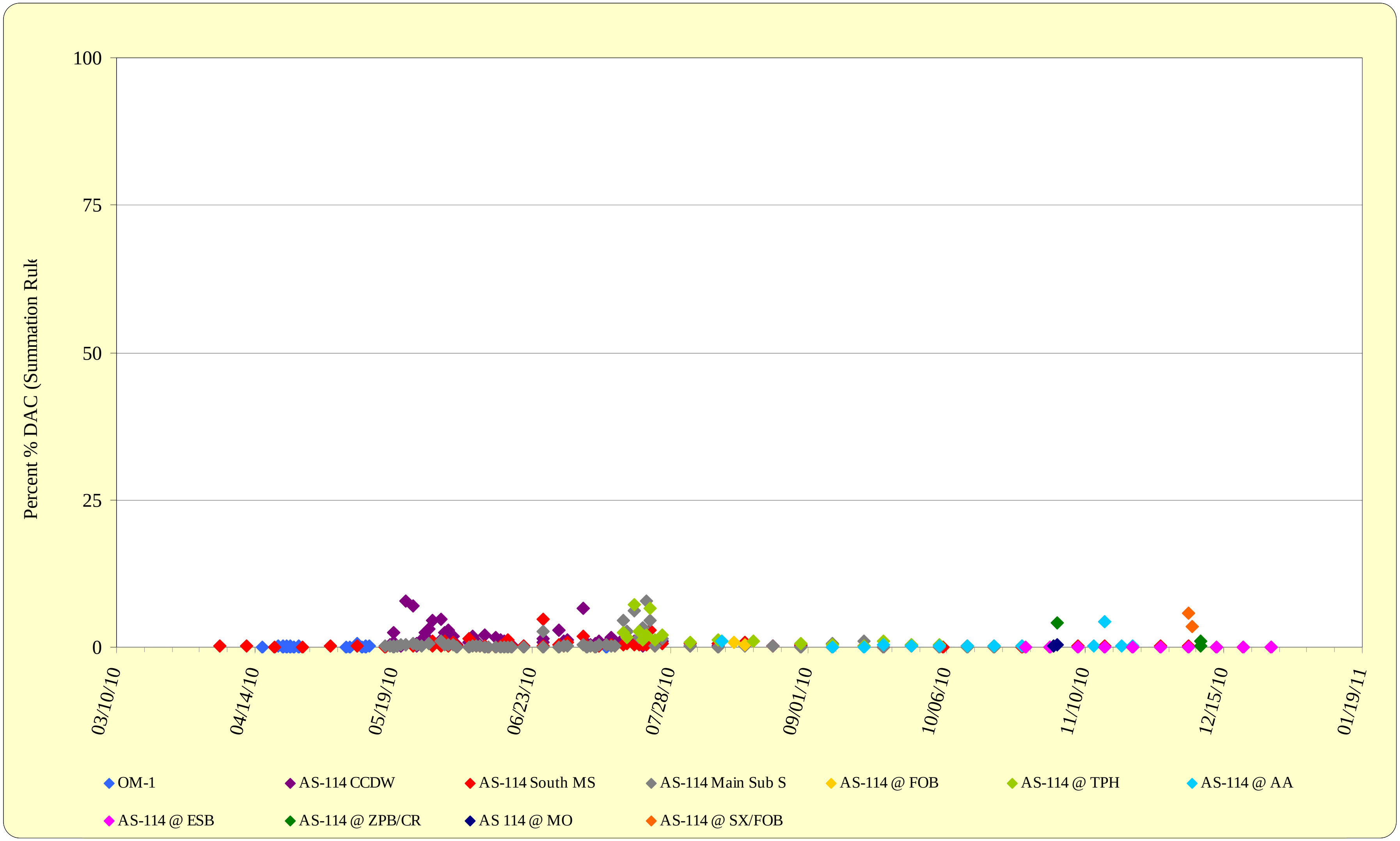


Figure EA - 16
Supplemental Environmental Air Samplers
(% DAC)
2010



Thermoluminescent Dosimeters (TLDs)

Thermoluminescent Dosimeters (TLDs) readings for the three (3) most recent semiannual periods are shown in Table TLD-1 and Figure TLD-1 respectively. All locations showed a mild uptrend over the three (3) semiannual monitoring periods. Table TLD-2 displays the quarterly results for 2009 and 2010 along with the result of a quality control badge co-located at the location shown in the same color. All locations showed a marked uptrend for the fourth quarter with the reason not explained. However the QC TLD shows a reading consistent with recent readings yet a 25 % difference with the "reported reading." As expected, the 1979 data through 2010 data (Figures TLD-2 and TLD-3) demonstrates slightly elevated readings at boundary locations with readings in residential areas at background levels.

Table TLD-1
Environmental TLD
Semiannual Average Exposure Rate
(uR/hr)

Location	Jul. - Dec. 2009	Jan. - Jun. 2010	Jul. - Dec. 2010
AS-202 East Boundary	14.4	13.3	15.4
AS-203 South Boundary	14.6	13.5	15.8
AS-204 West Boundary	16.7	14.9	17.7
AS-206 North Boundary	16.1	14.6	16.2
AS-209 Mill Entrance Road	19.6	17.5	20.3
AS-210 Shadow Hills Estates	14.0	12.8	15.0
AS-212 Nearest Resident	10.5	9.7	10.9
Canon City #2	11.3	10.6	11.9
Lincoln Park #2	12.8	11.5	13.4
OroVerde #3	13.8	12.1	14.3

Figure TLD-1
Environmental TLD Data
Semiannual Average Exposure Rate

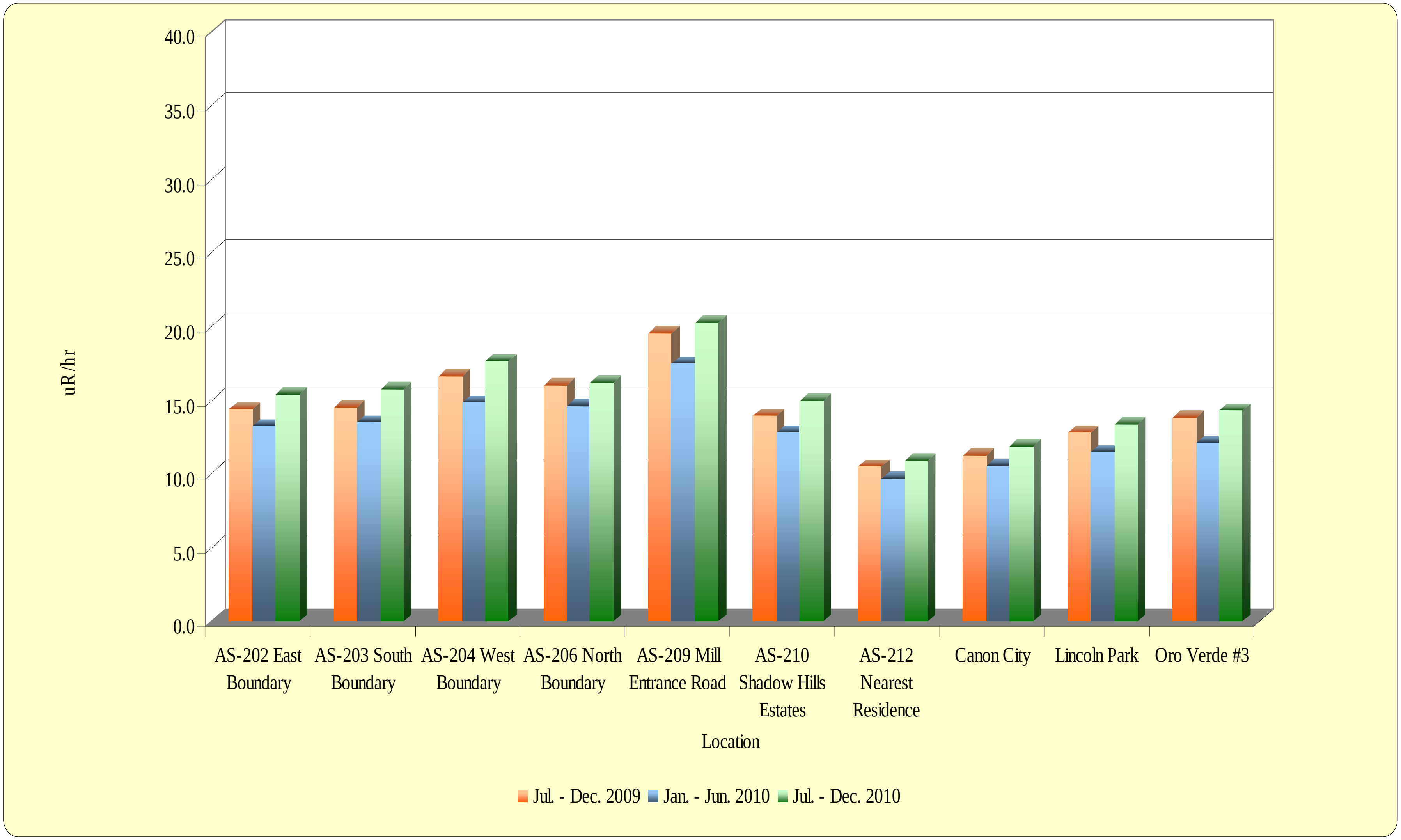


Table TLD-2
Environmental TLD
Annual Average Gamma Exposure Rate

	Location	1st	2nd	3rd	4th	AVG.
2010	AS-202 East Boundary	13.6	12.9	13.7	17.1	14.3
	AS-203 South Boundary	13.7	13.3	13.8	17.7	14.6
	AS-204 West Boundary	15.3	14.4	16.5	18.8	16.3
	AS-206 North Boundary	15.4	13.8	14.6	17.8	15.4
	AS-209 Mill Entrance Rd.	17.9	17.1	18.2	22.3	18.9
	AS-210 Shadow Hills Estate	12.9	12.7	13.8	16.1	13.9
	AS-212 Nearest Residence	9.8	9.5	9.4	12.4	10.3
	CC Canon City #2	10.9	10.2	11.3	12.5	11.2
	LP Lincoln Park #2	12.0	11.0	12.1	14.7	12.5
	OV OroVerde #3	12.6	11.6	13.0	15.6	13.2
	Secondary Impoundment	N/A	n/a	N/A	N/A	N/A
	Quality Control (QC)	10.2	16.0	9.9	17.3	

Figure TLD-2
Environmental TLD Data
Annual Average Gamma Exposure Rate
1979-2010

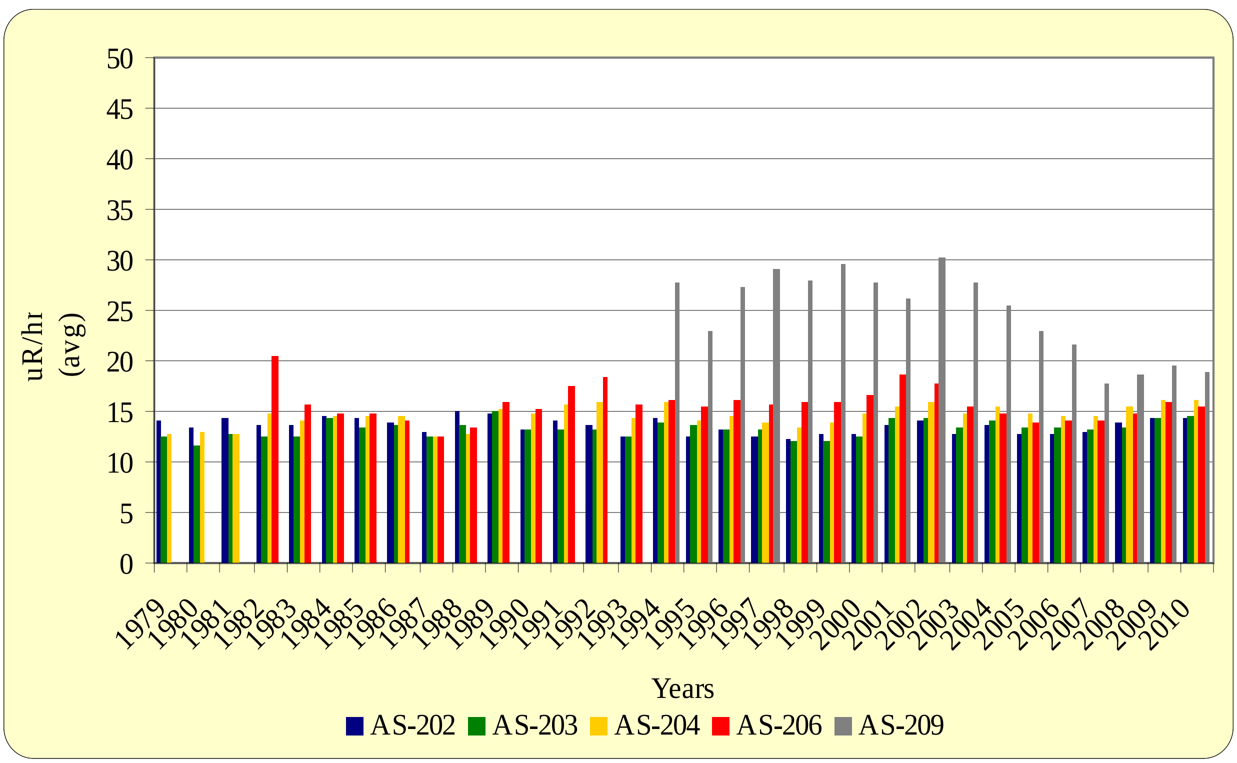
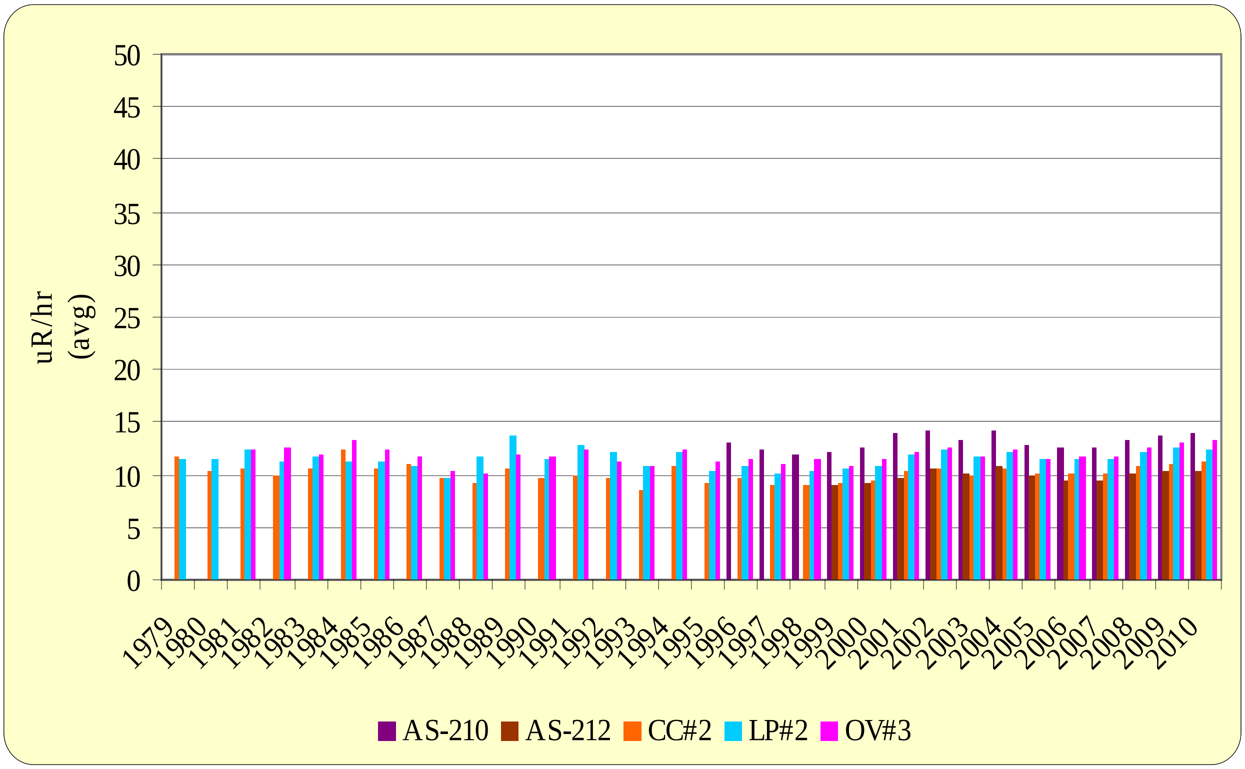


Figure TLD-3
Environmental TLD Data
Annual Average Gamma Exposure Rate
1979-2010



Radon

Radon concentrations for the three (3) most recent semiannual periods are shown in Table RN-1 and Figure RN-1 respectively. Table RN-2 displays the 2009 and 2010 quarterly results. Figure RN-2 displays the 2009 and 2010 annual average by location. As expected, 1979 through 2010 data (tables and figures RN-2 and RN-3) demonstrate slightly elevated readings at boundary locations with readings in residential areas at background levels. Comparison to the CDPHE required equilibrium factors and effluent concentration limits per the CDPHE letter of June 24, 2004 is shown in Table RN-3. Background mean is calculated for the three (3) most recent semiannual periods in 2009 and 2010 as specified in CDPHE letter of June 24, 2004. The Background Mean plus two (2) standard deviations of the Background Mean is added to the Alternate Effluent Limit and compared to the semiannual average results.

All locations showed compliance at less than the Effective Effluent Limit (EEL) for the Julyy to December 2010 reporting period. Note that this is an annual limit. First (1st) quarter 2010 data was particularly unusual in that two (2) community locations and one (1) boundary monitor were reported at less than the detection limit. Several other boundary monitors had very low results compared to historical values and to nearby supplemental monitors. Three (3) separate QA assessments were performed by the vendor and the results were not changed. However, for all locations in the second (2nd) quarter, the data are similar. No reason is known for this difference between quarterly data. The Quality Control data show exact correspondence.

Due to concerns raised by CDPHE in early July 2009 when the Secondary Impoundment was allowed to dry in anticipation of starting the initial cover, five (5) additional radon monitors were deployed starting in August and co-located at AS-202, AS-203 and AS-204 as well as new monitors located between AS-202 and AS-203 as well as between AS-203 and AS-204. These results are reported in Table RN-3.

Table RN-1
Semiannual Average ^{222}Rn Concentration
(pCi/m^3)

Location	Jul. - Dec. 2009	Jan. - Jun. 2010	Jul. - Dec. 2010
AS-202 East Boundary	850	1250	700
AS-203 South Boundary	900	485	850
AS-204 West Boundary	1000	500	1100
AS-206 North Boundary	800	1000	700
AS-209 Mill Entrance Road	1100	450	1000
AS-210 Shadow Hills Estates	1000	335	650
AS-212 Nearest Resident	900	300	450
Canon City #2	950	385	550
Lincoln Park #2	1050	400	700
OroVerde #3	950	335	450
Secondary Impoundment	1250	1150	1350

Figure RN-1
Environmental Air
Semiannual Average ^{222}Rn Concentration

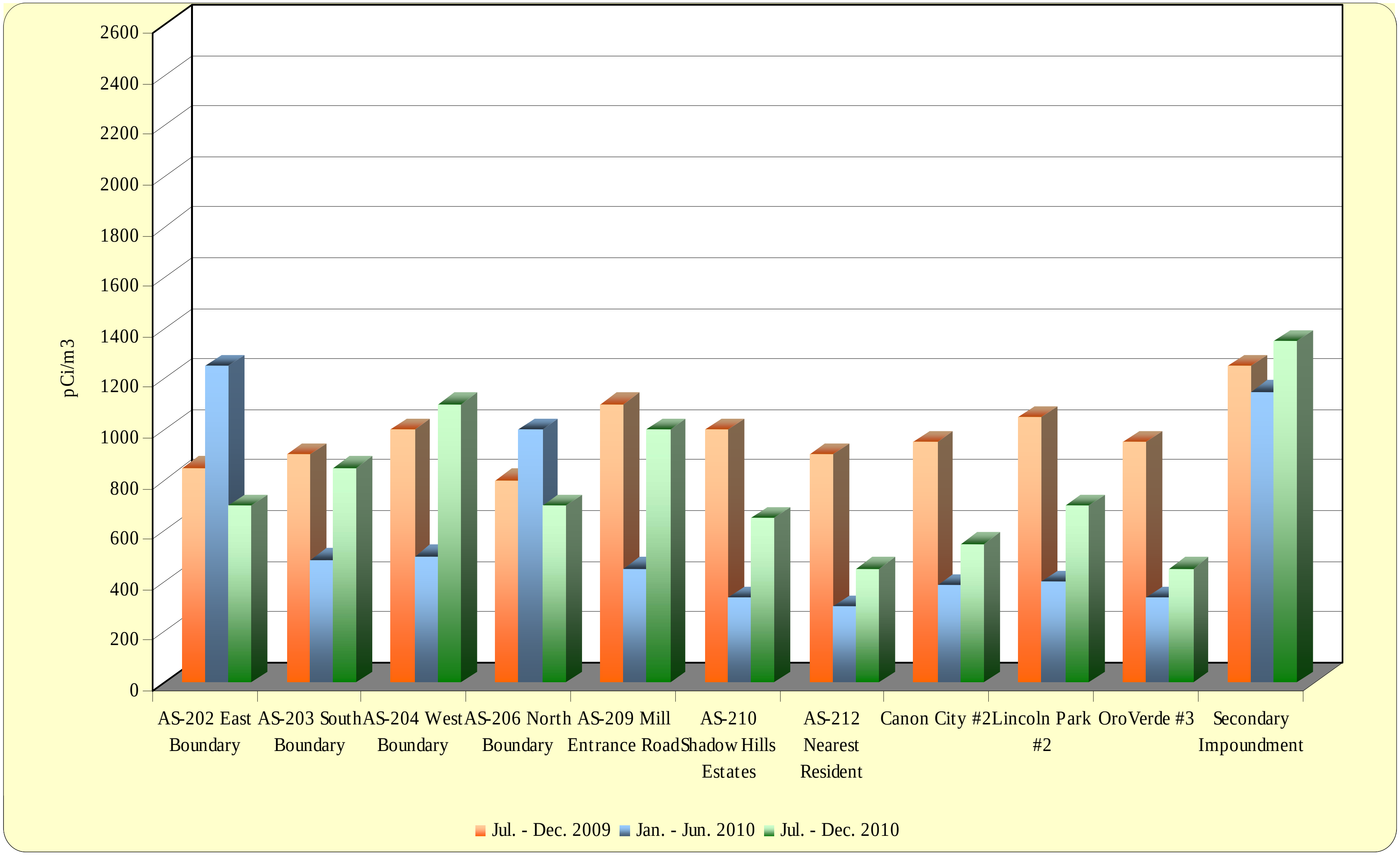


Table RN-2
Annual Average ^{222}Rn Concentration
(pCi/m^3)

	Location	1ST	2ND	3RD	4TH	AVG
2010	AS-202 East Boundary	1500	1000	900	500	975
	AS-203 South Boundary	70	900	1000	700	668
	AS-204 West Boundary	100	900	1200	**1000**	800
	AS-206 North Boundary	1200	800	600	700	825
	AS-209 Mill Entrance Road	200	**700**	900	800	650
	AS-210 Shadow Hills Estates	210	600	500	600	478
	AS-212 Nearest Resident	**100**	500	**400**	500	375
	Canon City #2	70	700	600	500	457
	Lincoln Park #2	100	700	600	800	467
	OroVerde #3	70	600	400	500	357
	Secondary Impoundment	600	1700	1400	1300	1250
	QC	**100**	**700**	**^7300**	**900**	**2700**

Note: Orange denotes QC location for the quarter
^Fell out of cup and laying on ground

Table RN-3
Average ^{222}Rn Concentration Special Locations
(pCi/m^3)

	Location	1ST	2ND	3RD	4TH	AVG
2010	AS-202 East Boundary	700	1000	800	600	775
	AS-203 South Boundary	900	900	800	700	825
	AS-204 West Boundary	800	1100	900	700	875
	Fence South (N3823.543 W 105 14.092)	700	700	600	700	675
	Fence South (N38 23.428 W 105 13.932)	700	900	800	700	775

Figure RN-2
Environmental Air
Average Annual ^{222}Rn Concentration

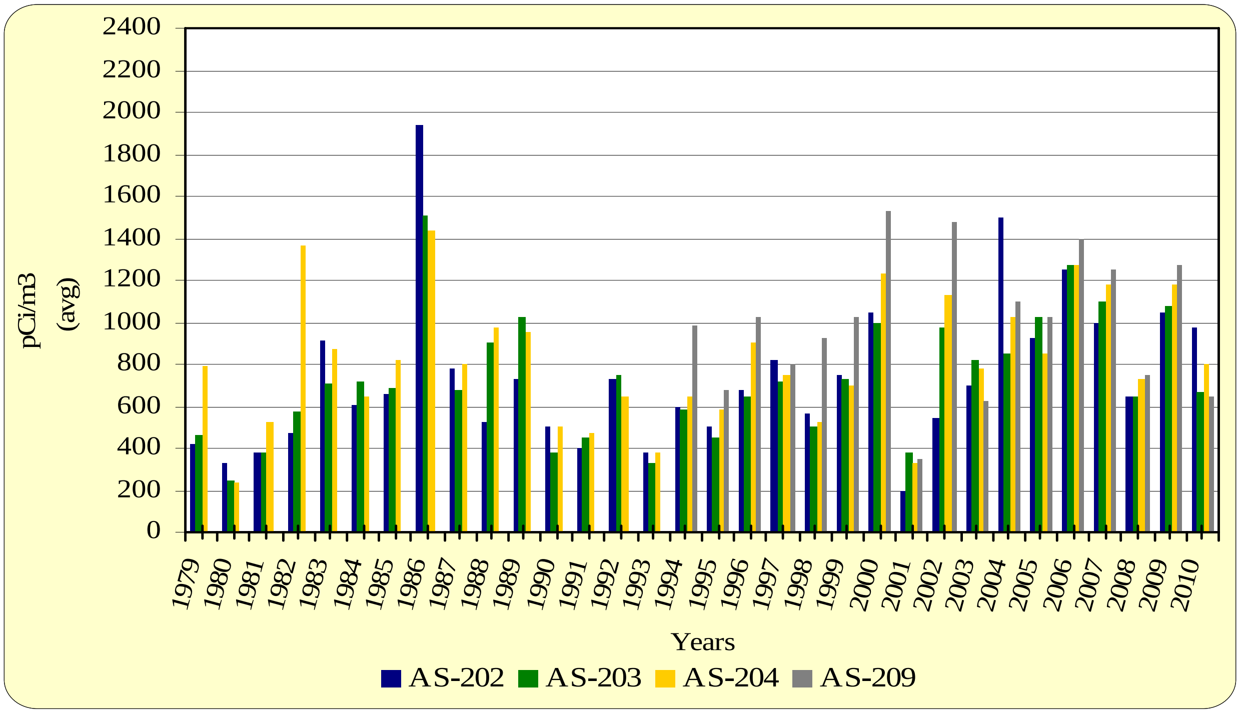


Figure RN-3
Environmental Air
Average Annual ^{222}Rn Concentration

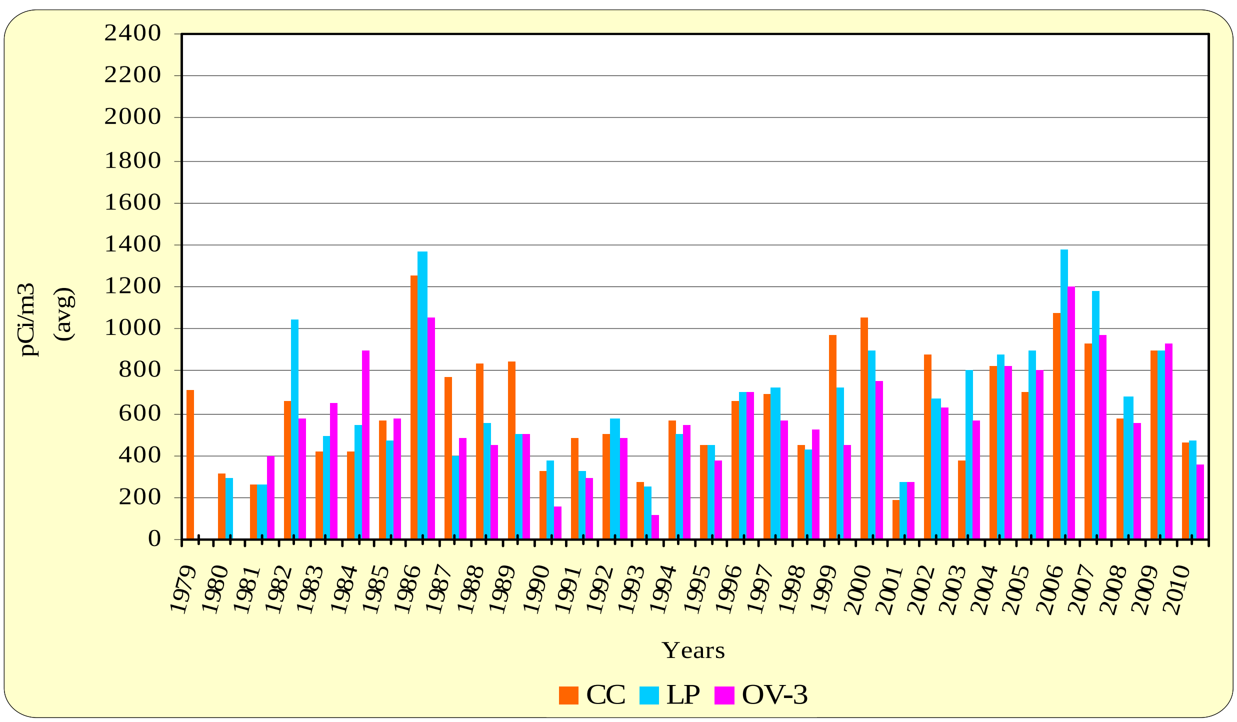


Figure RN-4
Environmental Air
Average Annual ^{222}Rn Concentration

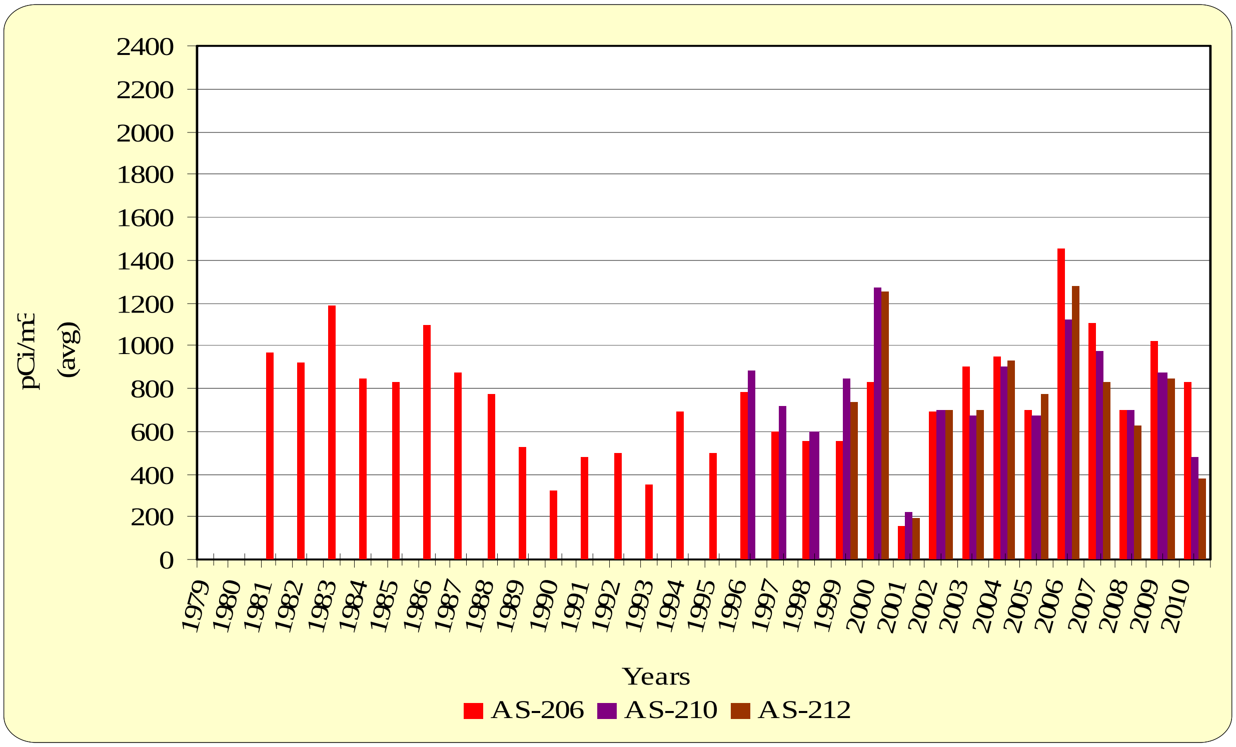


Table RN-4

Alternate Effluent Limit Comparison for ^{222}Rn

Background Concentrations (pCi/m^3)

	CC	LP	OV3	Background (BKG) MEAN	Standard Deviation of MEAN	BKG + 2 Standard Deviations of MEAN
20102nd half						
Q1	N/A	N/A	N/A			
Q2	N/A	N/A	N/A			
Q3	600	600	400			
Q4	500	800	500	567	39	646
20101st half						
Q1	70	100	70			
Q2	700	700	600			
Q3	N/A	N/A	N/A			
Q4	N/A	N/A	N/A	373	94	560
2009 2nd half						
Q1	N/A	N/A	N/A			
Q2	N/A	N/A	N/A			
Q3	1000	1000	1000			
Q4	900	1100	900	983	22	1027

Year	Sampler Location	Assumed Equilibrium Fraction (pCi/m^3)	Alternate Effluent Limit (pCi/m^3)	Effective Effluent Limit = Alternate Effluent Limit + BKG + 2 Standard Deviations of MEAN (pCi/m^3)	Average Radon (including BKG) (pCi/m^3)	> Effluent Limit?
2010 2nd half	AS 202	0.2	500	1146	700	no
	AS 203	0.2	500	1146	850	no
	AS 204	0.2	500	1146	1100	no
	AS 206	0.4	250	896	700	no
	AS 209	0.2	500	1146	1000	no
	AS 210	0.4	250	896	650	no
	AS 212	0.4	250	896	450	no
2010 1st half	AS 202	0.2	500	1060	1250	yes
	AS 203	0.2	500	1060	485	no
	AS 204	0.2	500	1060	500	no
	AS 206	0.4	250	810	1000	yes
	AS 209	0.2	500	1060	450	no
	AS 210	0.4	250	810	335	no
	AS 212	0.4	250	810	300	no
2009 2nd half	AS 202	0.2	500	1527	850	no
	AS 203	0.2	500	1527	900	no
	AS 204	0.2	500	1527	1175	no
	AS 206	0.4	250	1277	800	no
	AS 209	0.2	500	1527	1100	no
	AS 210	0.4	250	1277	800	no
	AS 212	0.4	250	1277	1000	no

Radon Flux Measurements

Cotter submitted a letter to CDPHE on June 30, 2010, indicating that the Primary and Secondary Impoundments would be closed as soon as reasonably achievable. Subsequently Cotter notified EPA that Radon Flux measurements for the Primary Impoundment would no longer be done.

PERMEABLE REACTIVE TREATMENT WALL (PRTW)

The solidified, impermeable, upgradient face of the PRTW continues to prevent the flow of groundwater off-site. Groundwater is collected and pumped to the primary impoundment, consistent with the past five (5) years.

Recognizing the importance of groundwater flow to effective groundwater remediation in Lincoln Park, it was concluded that restoring the PRTW may benefit groundwater conditions downgradient. Recall that the PRTW did effectively remove target contaminants U and Mo from the groundwater for almost three (3) years.

Laboratory experiments performed in December 2009 indicated increased availability of ferrous and ferric ions when groundwater pH is maintained near neutral (pH of 7 to 8). More ferrous and ferric ions dissolved in groundwater provide more opportunity for remediation of target contaminants U and Mo. Maintaining a neutral pH of groundwater through the PRTW, therefore, would improve remediation capability of the barrier.

Due to pressing mill activity during the fall of 2010, laboratory experiments scheduled for the fall of 2010 were postponed until 2011. Experimental procedures are being designed to also determine the fate of Mo, the seemingly resilient groundwater contaminant. (Figures PRTW 1A and B through PRTW 5A and B)

Cotter completed the Dam to Ditch Area Investigation the fall of 2010 with the exception of the leaching evaluation. The field investigation included the following:

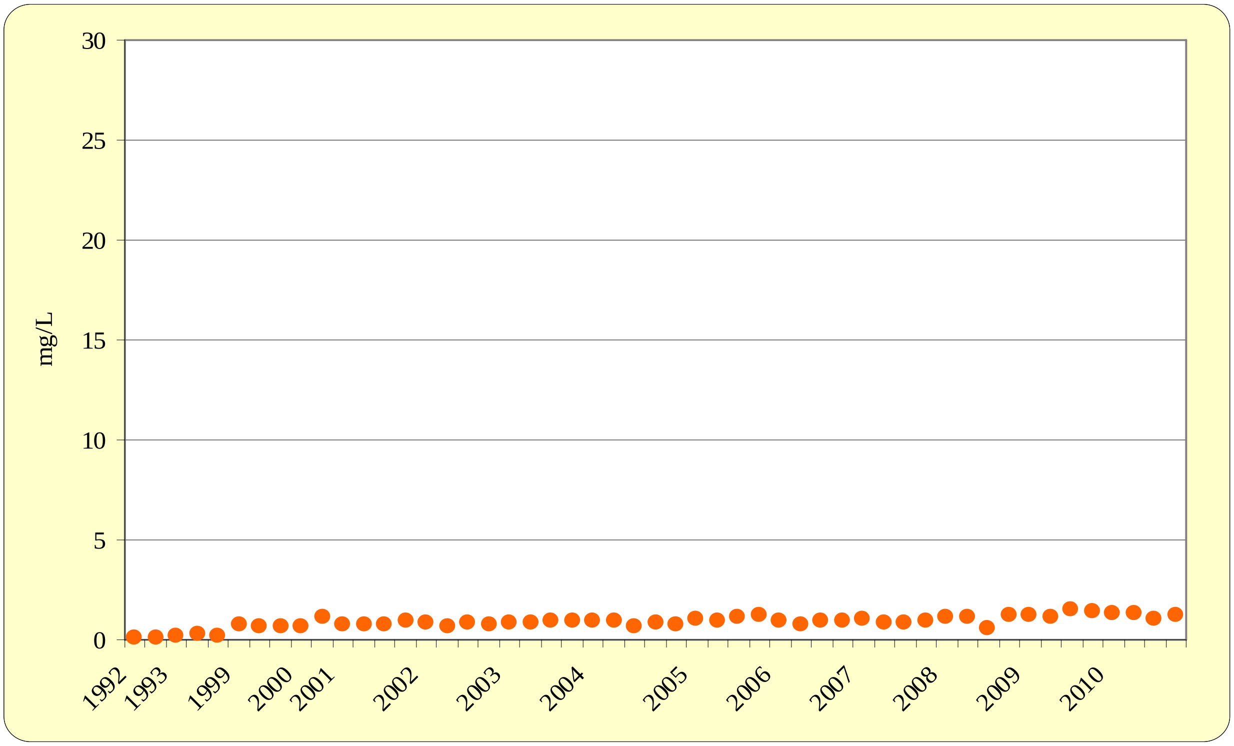
- drilling and coring of thirteen boreholes within the Restricted Area, north of the SCS Dam.
- completion of two of those boreholes as monitor wells;
- drilling, coring and installation of two monitor wells on private property north of the Restricted Area;
- collection of groundwater samples from three of the four newly installed monitor wells (one well was dry) for water quality analysis;
- collection of water quality samples from two private wells that were not sampled during the 2009 Lincoln Park Water Use Survey; and
- performance of short-term pumping tests at three of the newly installed monitor wells.

Results of the drilling and sampling activities were used to update the Site Conceptual Model (SCM) with respect to geologic, hydrologic and water quality conditions within and around the DDA. The data collected during the field investigation and the updated site conceptual model are presented in this technical memorandum. Select core samples collected from the boreholes and monitor wells will be utilized in leachability tests to further evaluate the role of sorption/desorption as a mechanism of uranium and molybdenum migration and distribution. The leachability testing program is fully described in *Scope of Work to Evaluate Leaching of Uranium and Molybdenum from Geologic Materials for the Dam to Ditch Area Investigation* prepared by AMEC in November 2010.

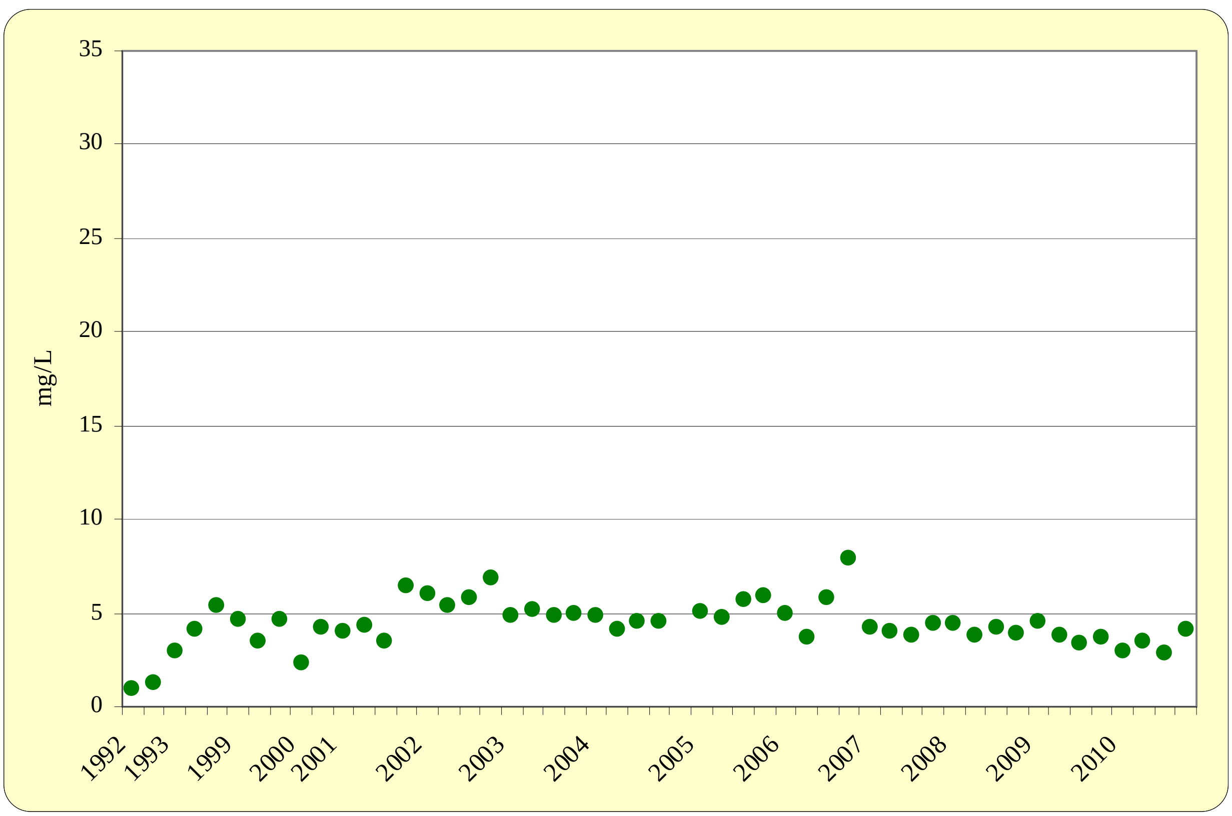
Key findings of the investigation included the following:

- Geology and hydrogeology within the Cotter facility downgradient of the SCS Dam was essentially unchanged
  - No additional channeling was identified other than what was previously interpreted
  - A bedrock low is present in the vicinity of Monitor Wells 328 and 052
  - The water table is generally close to the alluvium/ bedrock contact throughout much of the area, resulting in a very thin saturated zone within the alluvium
  - The bedrock aquifer has a low hydraulic conductivity, and probably cannot sustain a pumping rate of more than 1 gpm per well
- Offsite geology and hydrogeology was revised based on the reinterpretation of boring logs for Well 006 and the shallow depth to bedrock at location 049.
  - No groundwater was encountered at Well 049 even though the well penetrates more 50 feet into bedrock
  - This may be an indication of extremely low transmissivity (very tight bedrock)at that location
- Water quality data from two offsite wells (one dry) indicates the northwest uranium plume identified at Well 043 does not extend an appreciable distance beyond the Cotter property boundary
- Onsite water quality indicates limited lateral flare of the uranium and molybdenum plumes immediately downgradient of the SCS Dam
  - This may be an indication that if an active pathway exists beneath the SCS Dam, it may be relatively narrow
- Analysis of a groundwater sample from offsite well 117 modifies the extent of the uranium and molybdenum plumes slightly further to the northwest than previously recognized.

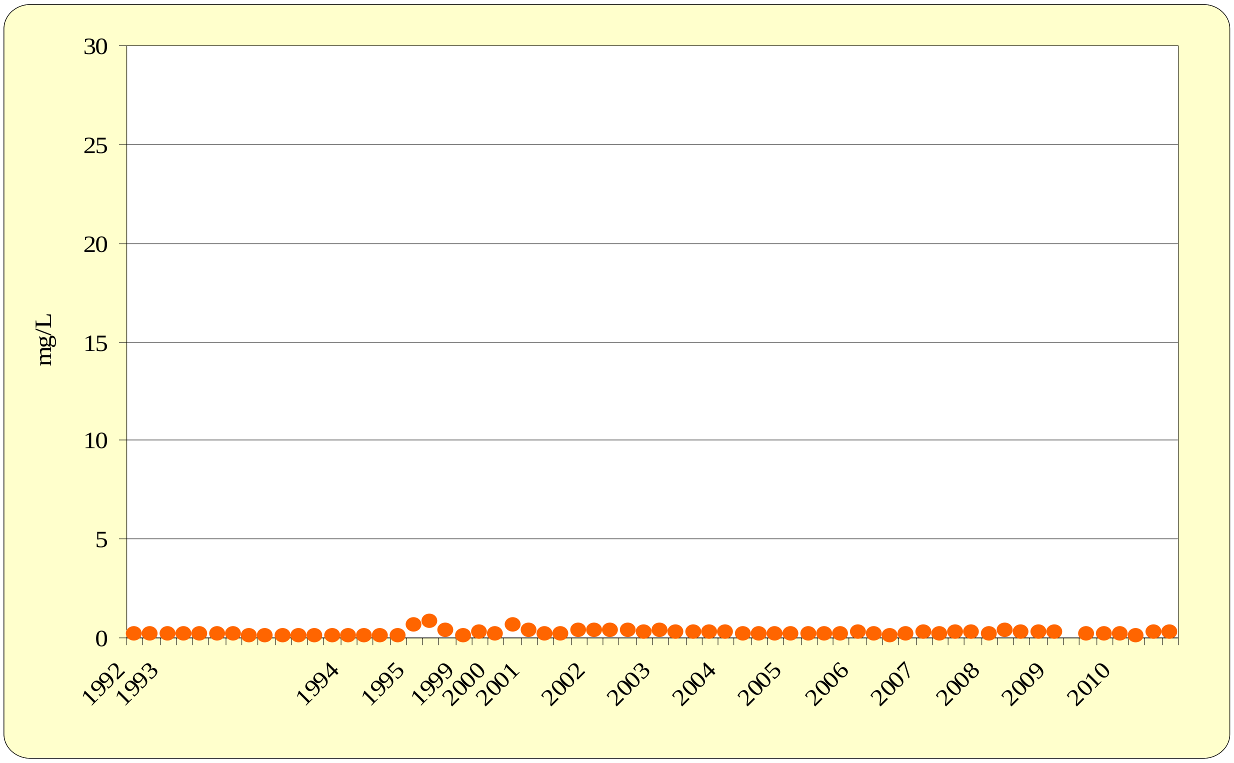
PRTW – 1A
Location 814 Uranium
1992-2010



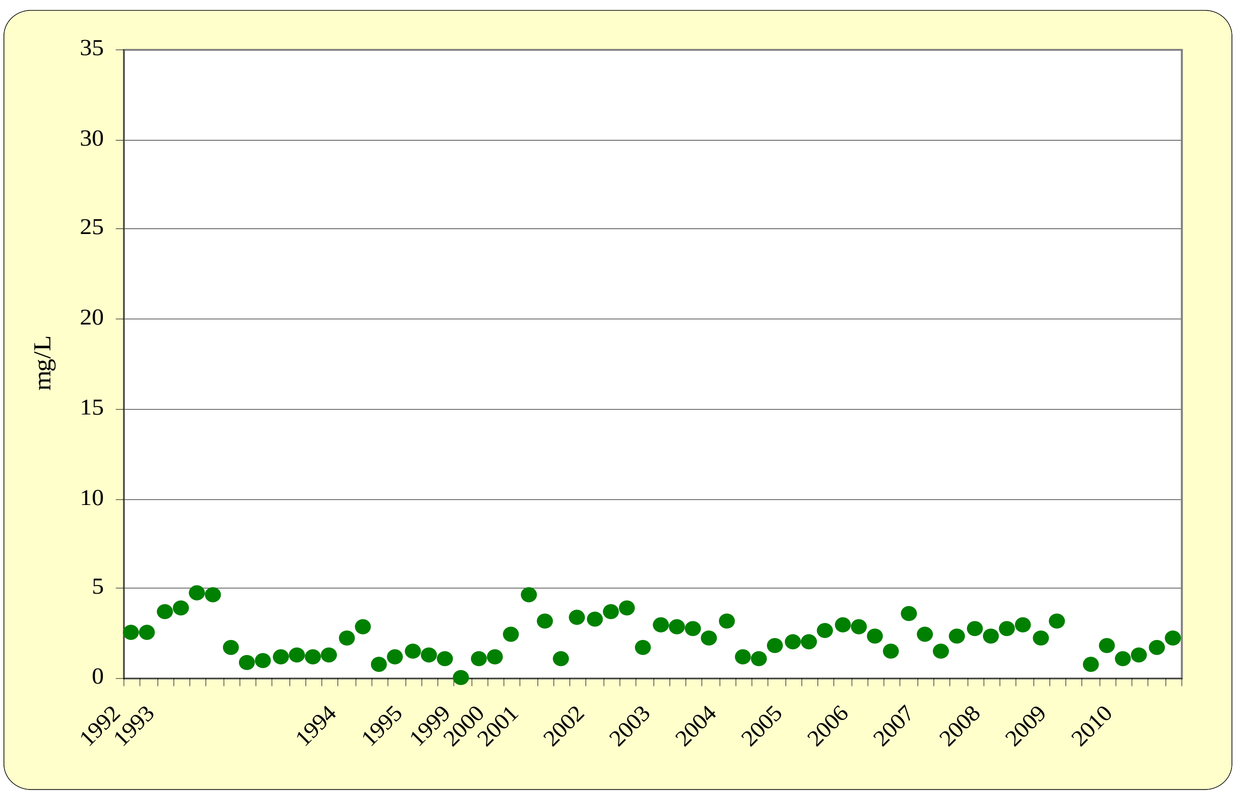
PRTW – 1B
Location 814 Molybdenum
1992-2010



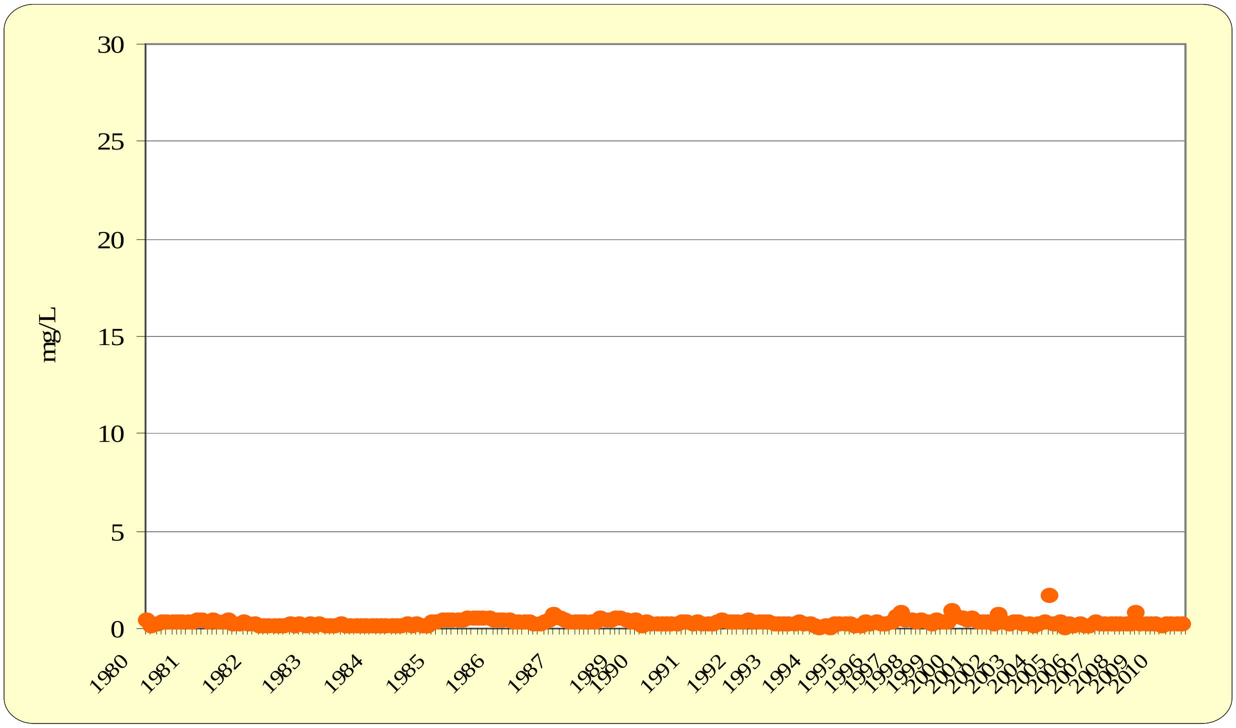
PRTW – 2A
Location 815 Uranium
1992-2010



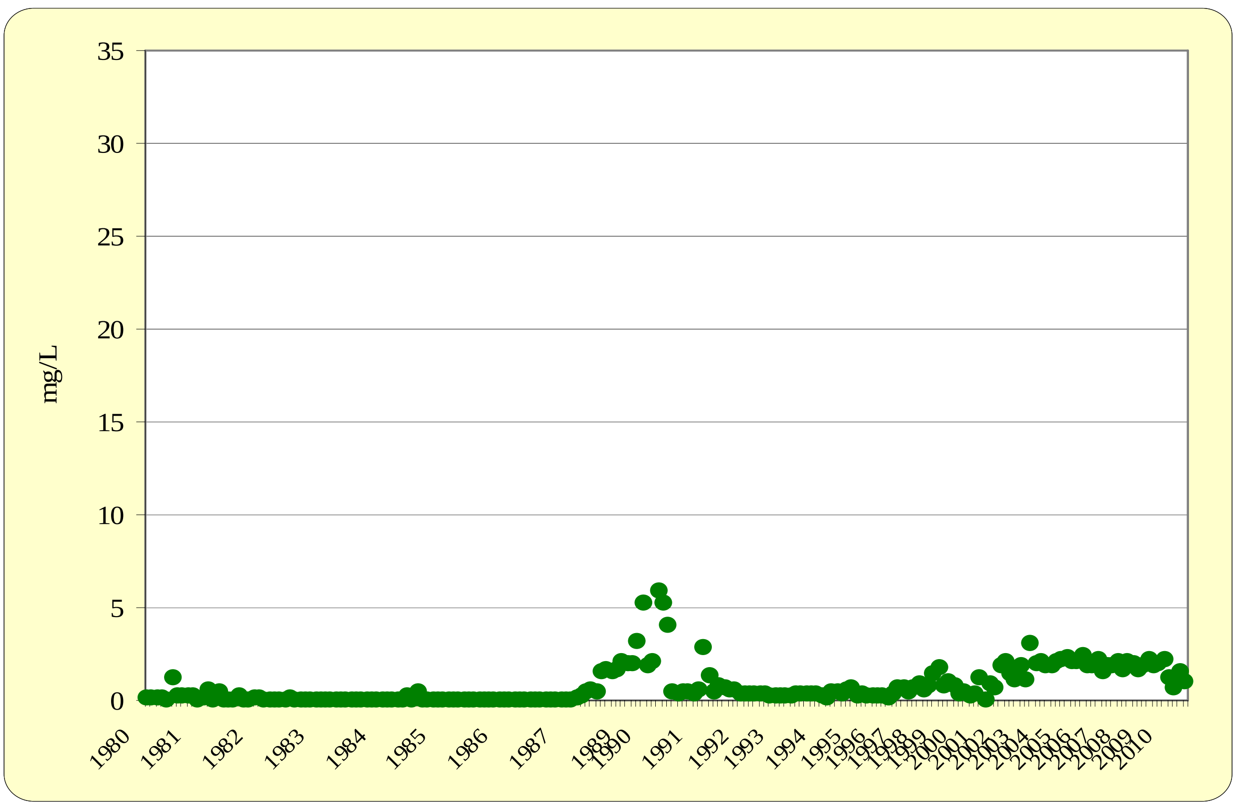
PRTW – 2B
Location 815 Molybdenum
1992-2010



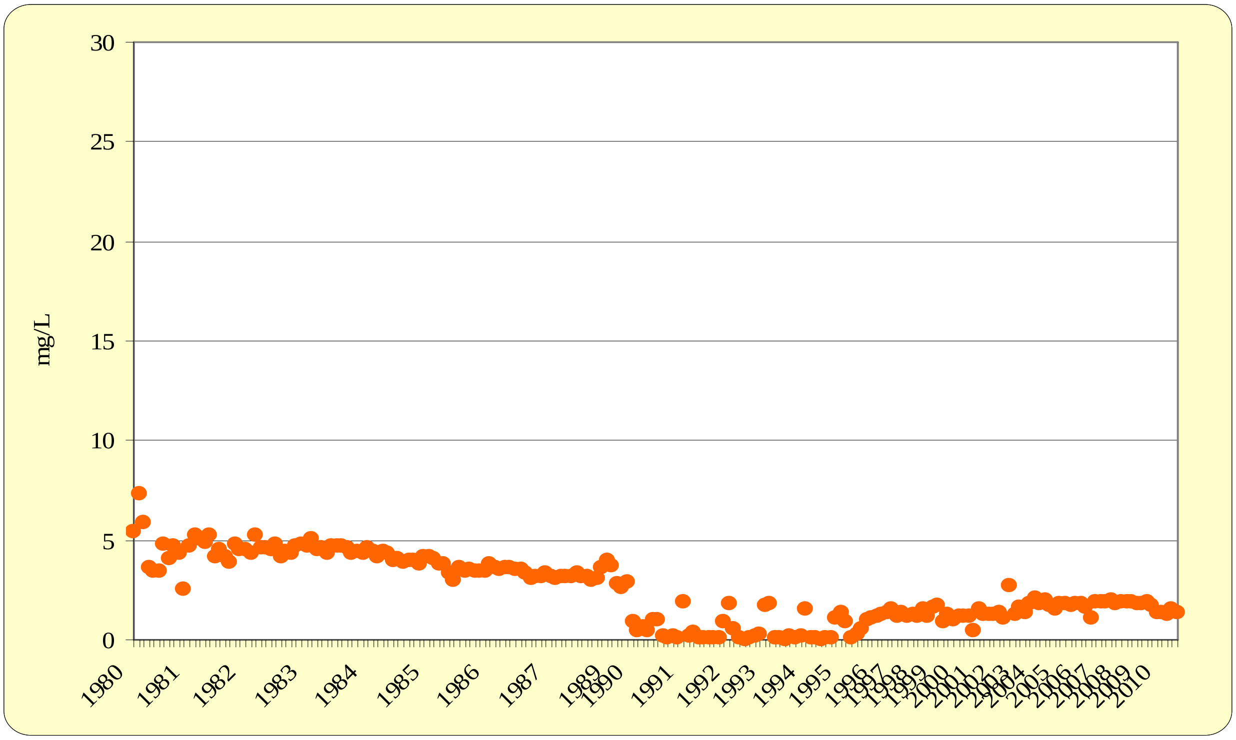
PRTW – 3A
Location 329 Uranium
1980-2010



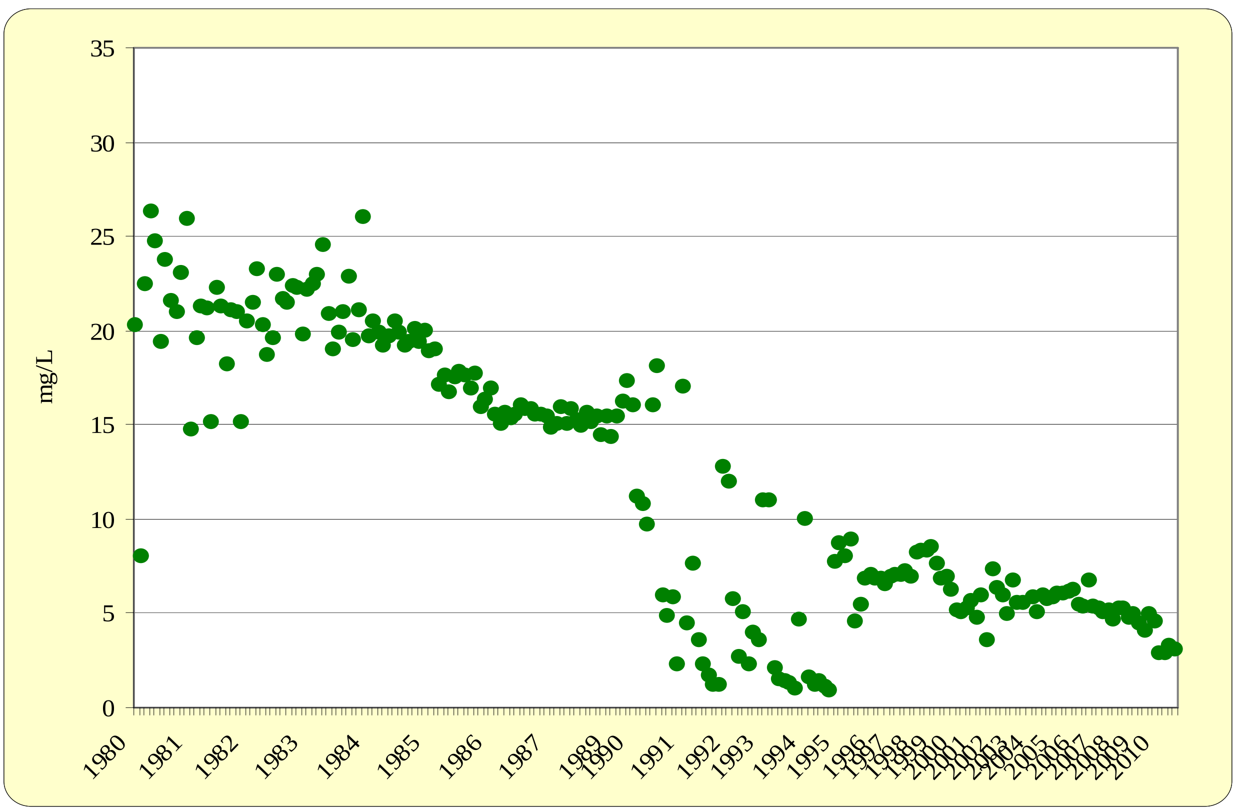
PRTW – 3B
Location 329 Molybdenum
1980-2010



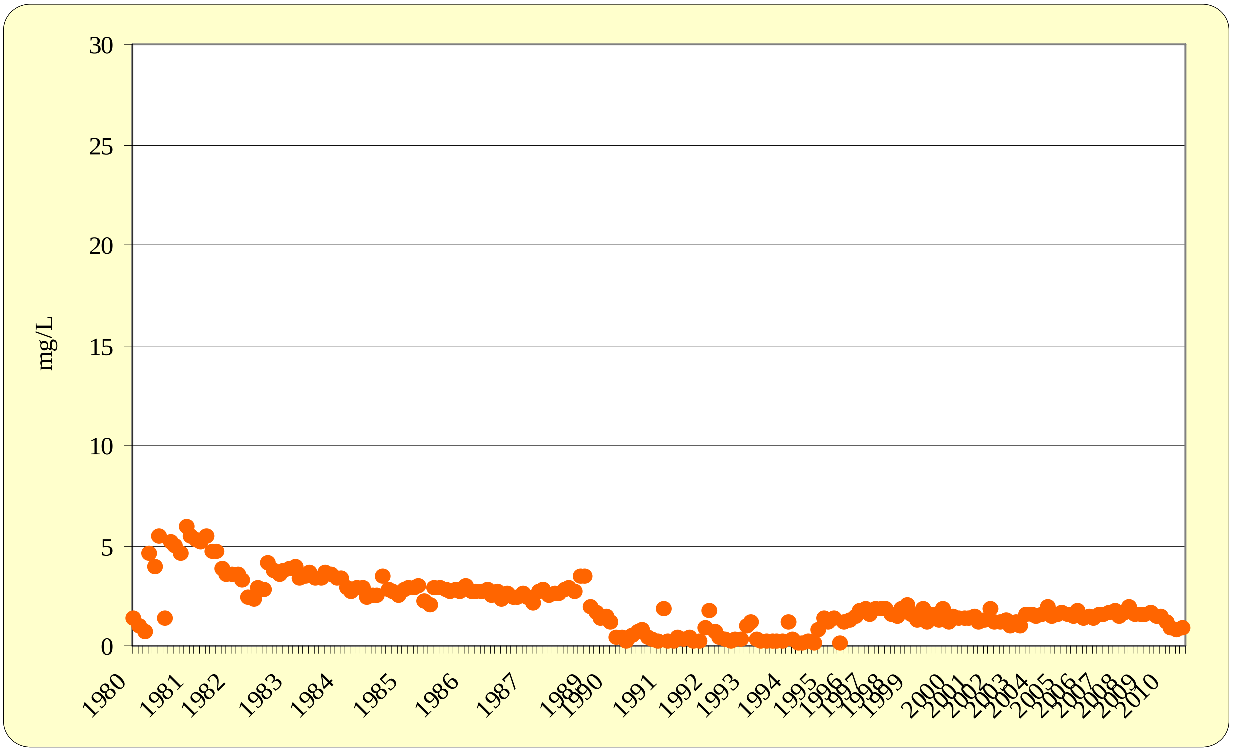
PRTW – 4A
Location 330 Uranium
1980-2010



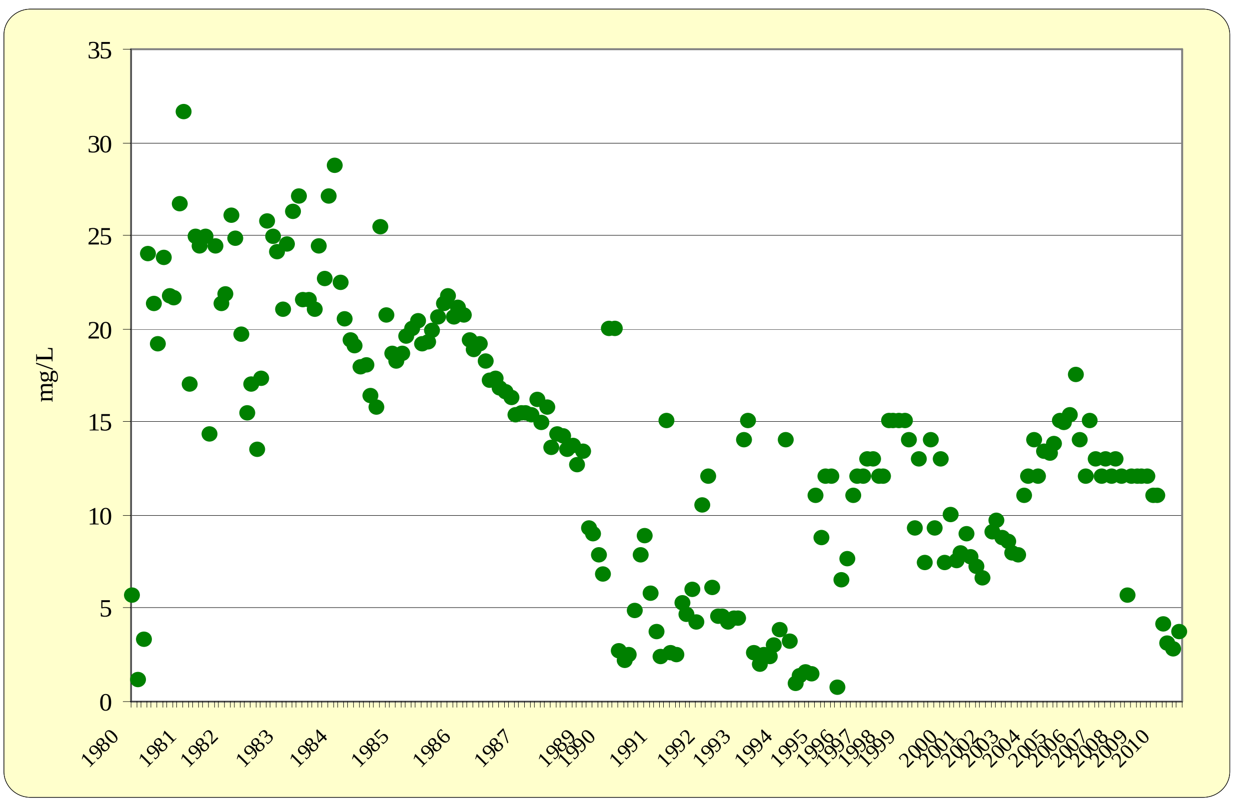
PRTW – 4B
Location 330 Molybdenum
1980-2010



PRTW – 5A
Location 331 Uranium
1980-2010



PRTW – 5B
Location 331 Molybdenum
1980-2010



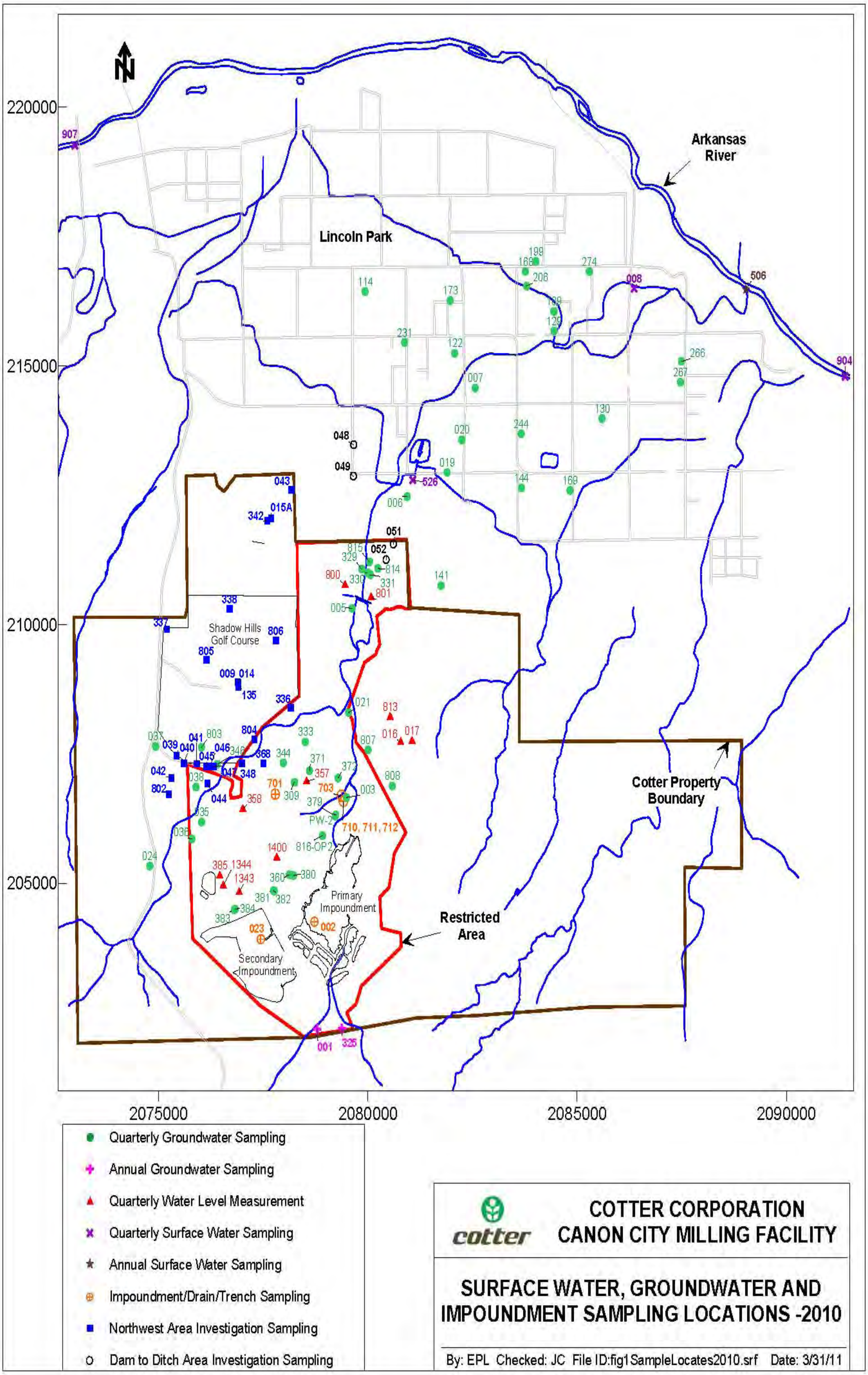
GOLF COURSE (GC)

As a result of the Environmental Protection Agency's five (5) year review, completed in September 2007, Cotter was asked to re-evaluate the potential for a groundwater plume near the Shadow Hills Golf Course. The monitoring program was expanded to collect samples from locations along the boundary of Cotter and Shadow Hills Golf Course as well as locations on the golf course. In addition, two (2) new monitoring wells were added on Cotter property, one (1) at the northwest entrance and one (1) near a historical ore pad west of Sand Creek. These locations are designated 037 and 038 respectively. Monitoring data indicates that uranium is present in wells on the golf course at levels above the groundwater standards that went into effect May 31, 2008.

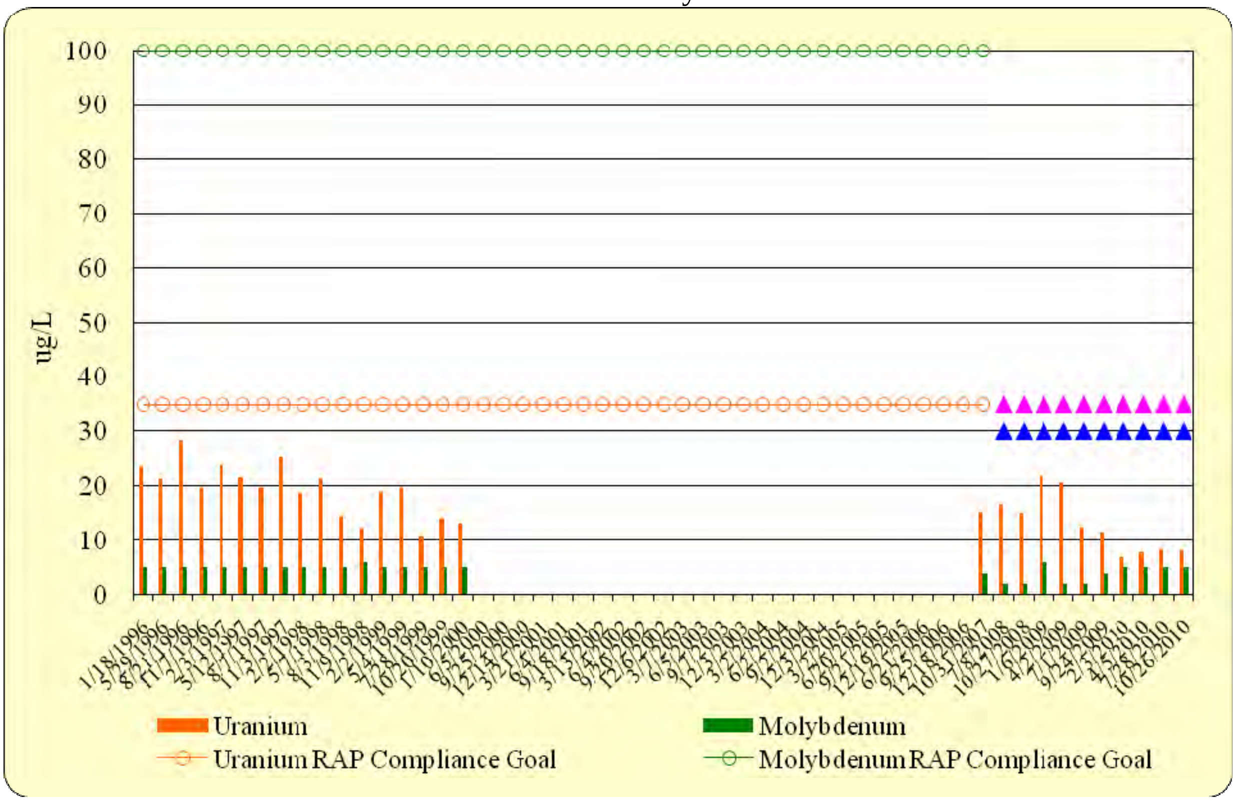
A significant amount of investigation including historical, aerial, geologic, geochemical, and trend analysis has been performed to characterize the source and pathways to guide the corrective action. Various field investigations have been performed including additional monitoring well installation in September for three (3) wells (039, 040 and 041) along the northern boundary of the Cotter restricted area. Well 042 was placed north of well 802 and approximately halfway between well 802 and 039. This investigation did not define a migration pathway for uranium. Well 043 was placed at the northeast corner of Cotter property north of the golf course to act as a sentinel well in the expanded monitoring network. Wells 044 to 047 were constructed in January 2010. Well 044 is south of the railroad berm and Wells 045-047 are east of 039-041. Well 044 showed results consistent with the legacy plume. Wells 045-047 showed uranium concentrations below the groundwater standard. A summary report of the Golf Course Investigation was provided in May 2010. Further investigation of the 043 area was included in the June 2010 Dam to Ditch Area Investigation Plan. As noted in the PRTW section the field investigation indicated that "Water quality data from two offsite wells (one dry) indicates the northwest uranium plume identified at Well 043 does not extend an appreciable distance beyond the Cotter property boundary."

In addition the activity ratio (AR) for natural uranium was determined for wells on and in the vicinity of the golf course. The activity ratio (AR) for natural waters tend to have a ratio greater than one (>1) while waters impacted by processing typically have ARs of one (1). Wells on the golf course and nearby the west limb of Sand Creek have ARs of approximately one point five (1.5) while wells in the Old Pond Area vicinity have ARs near one (1). This suggests that the uranium in these waters may be natural. (Figures GC-1 through GC-31)

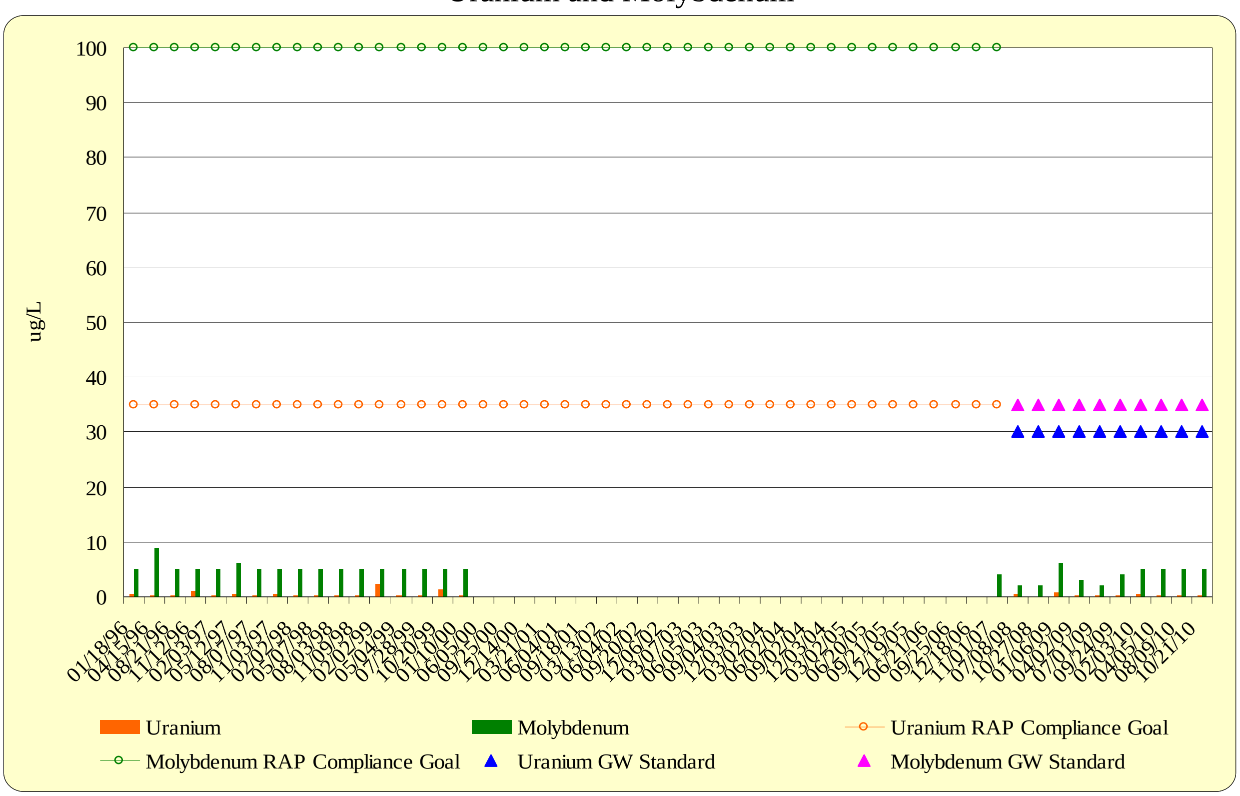
Figure GC – 0
Surface Water, Groundwater,
and Impoundment Sampling Locations
2010



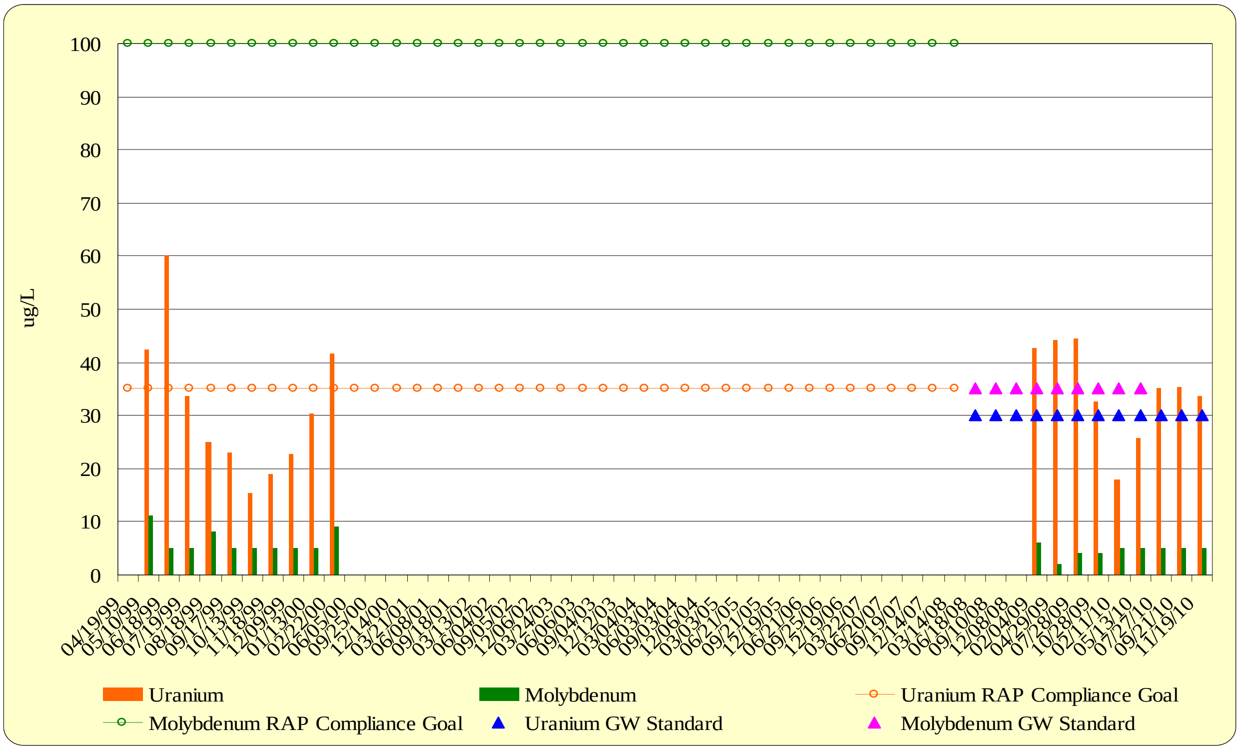
GC-1
Location 009
Uranium and Molybdenum



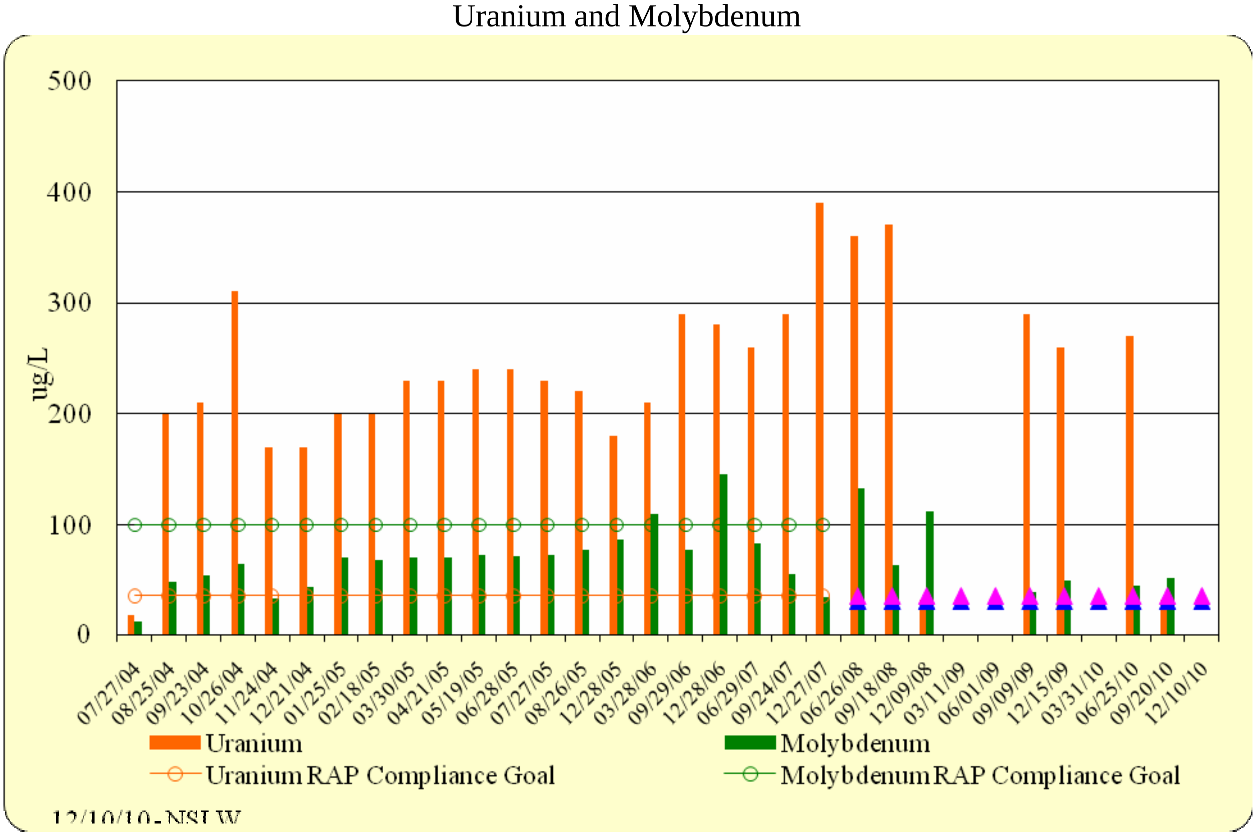
GC-2
Location 014
Uranium and Molybdenum



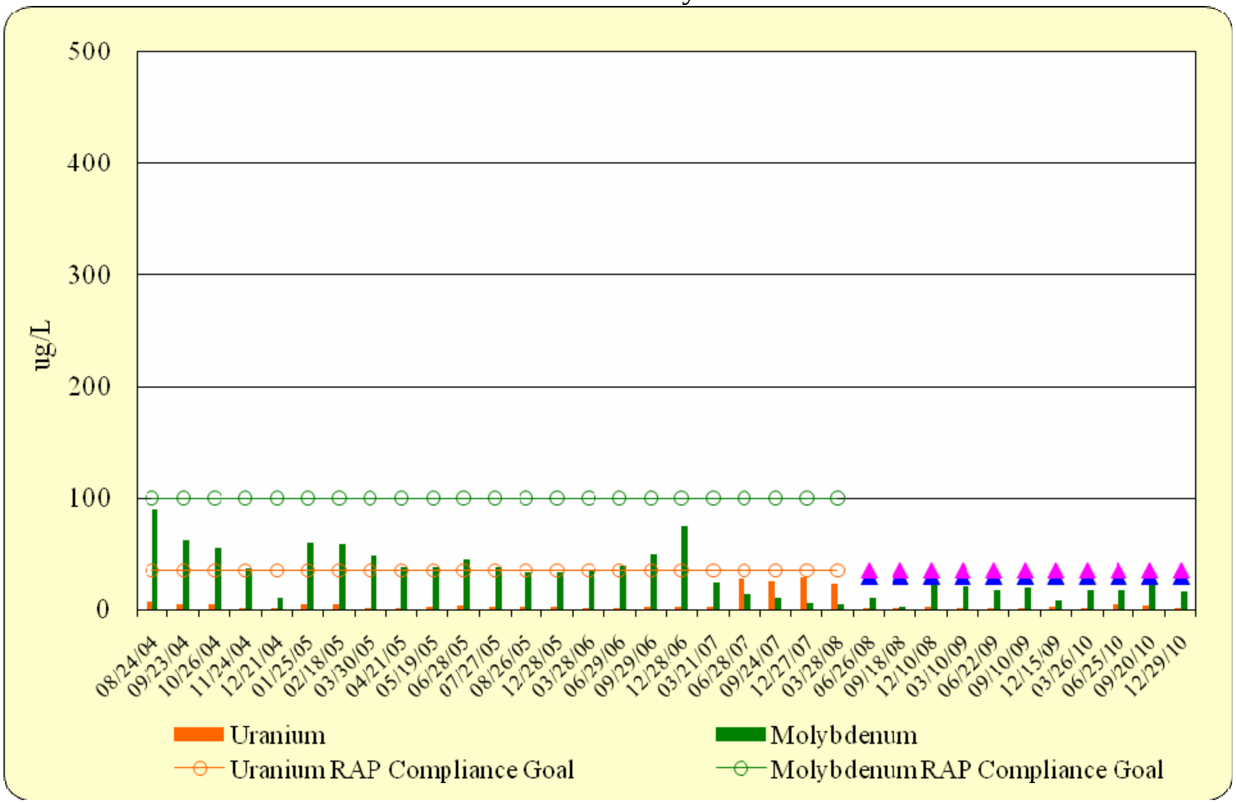
GC-3
Location 015A
Uranium and Molybdenum



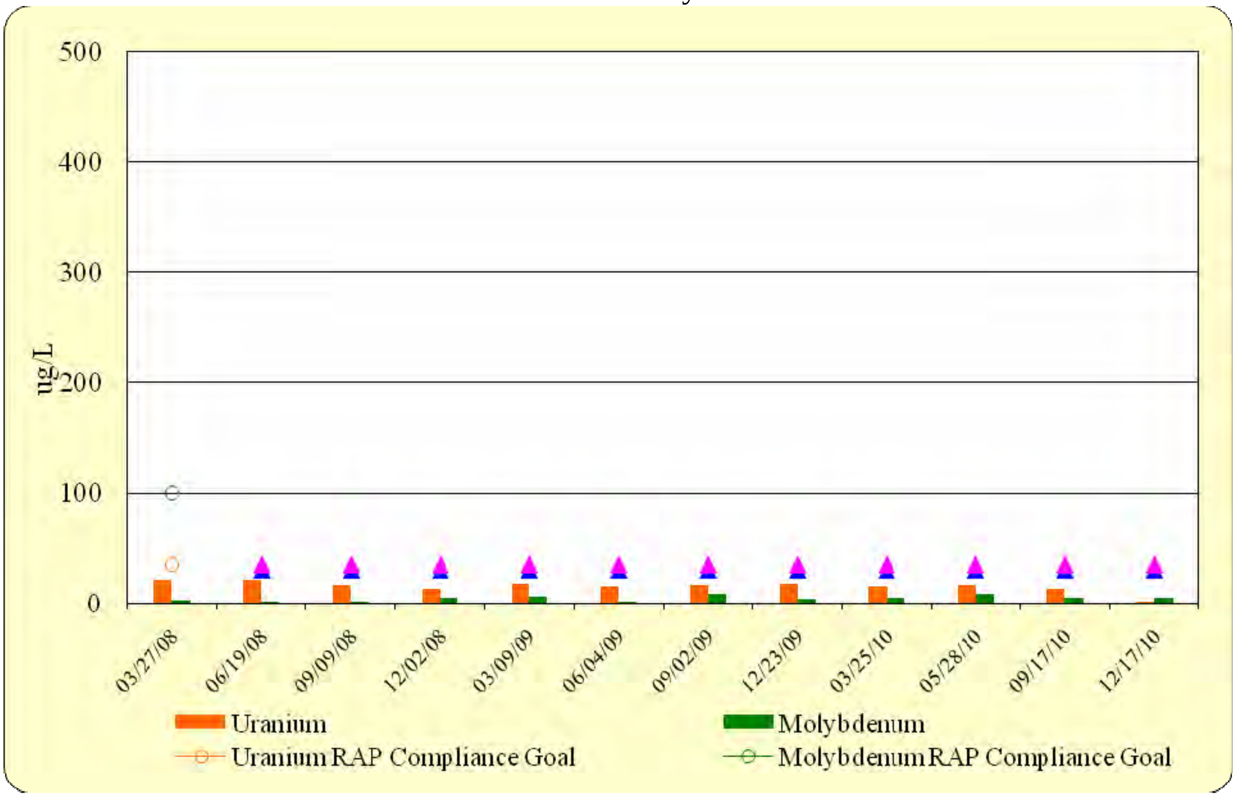
GC-4
Location 035
Uranium and Molybdenum



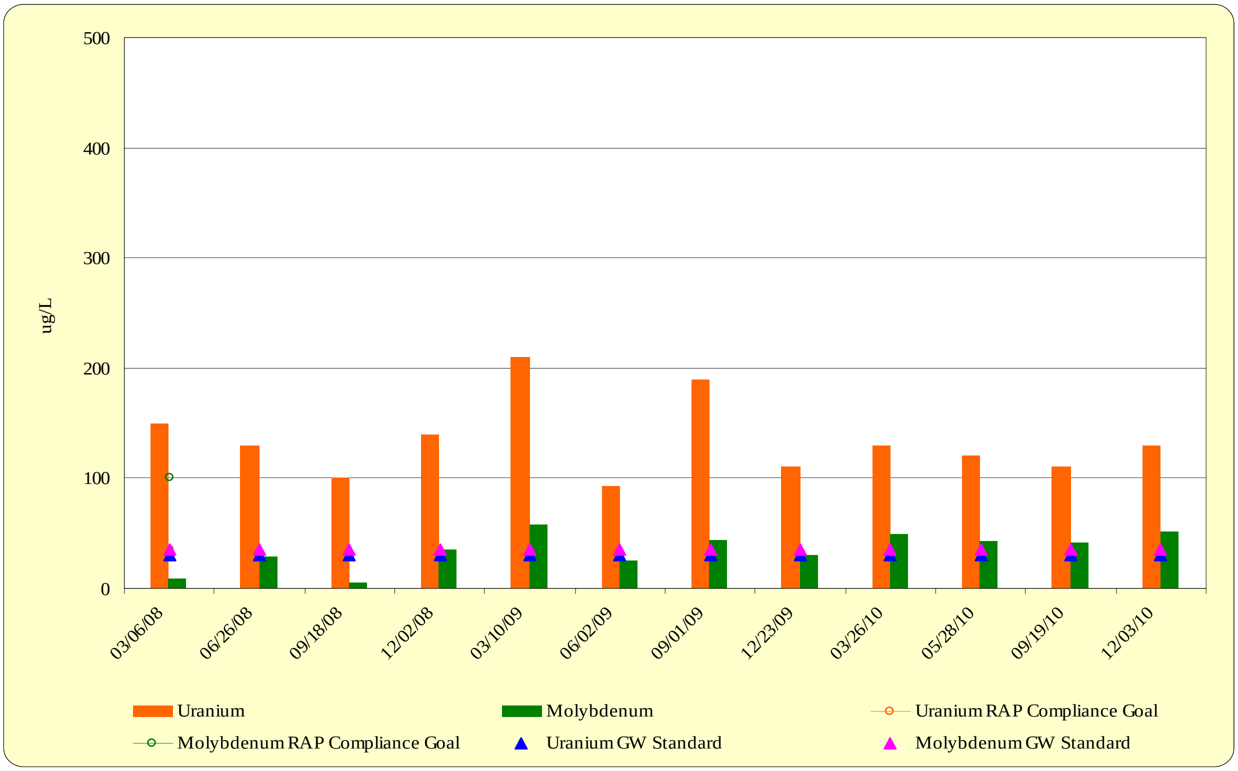
GC-5
Location 036
Uranium and Molybdenum



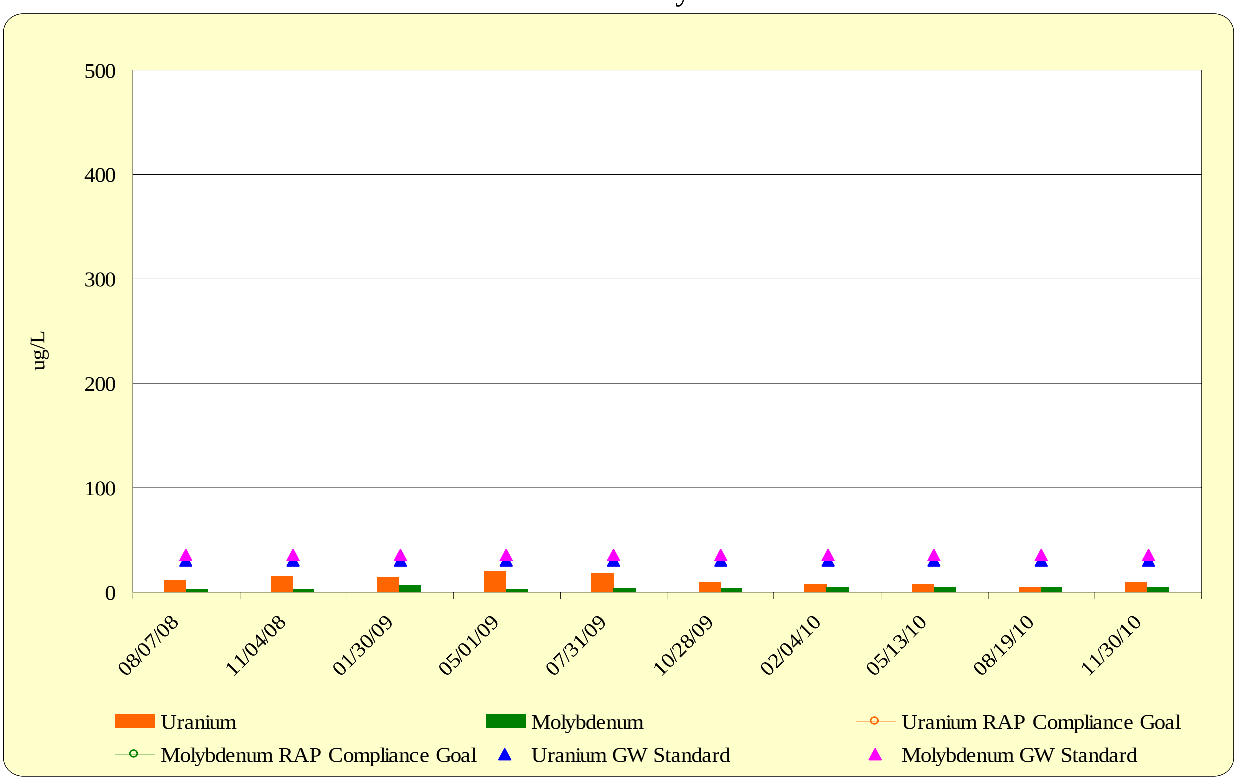
GC-6
Location 037
Uranium and Molybdenum



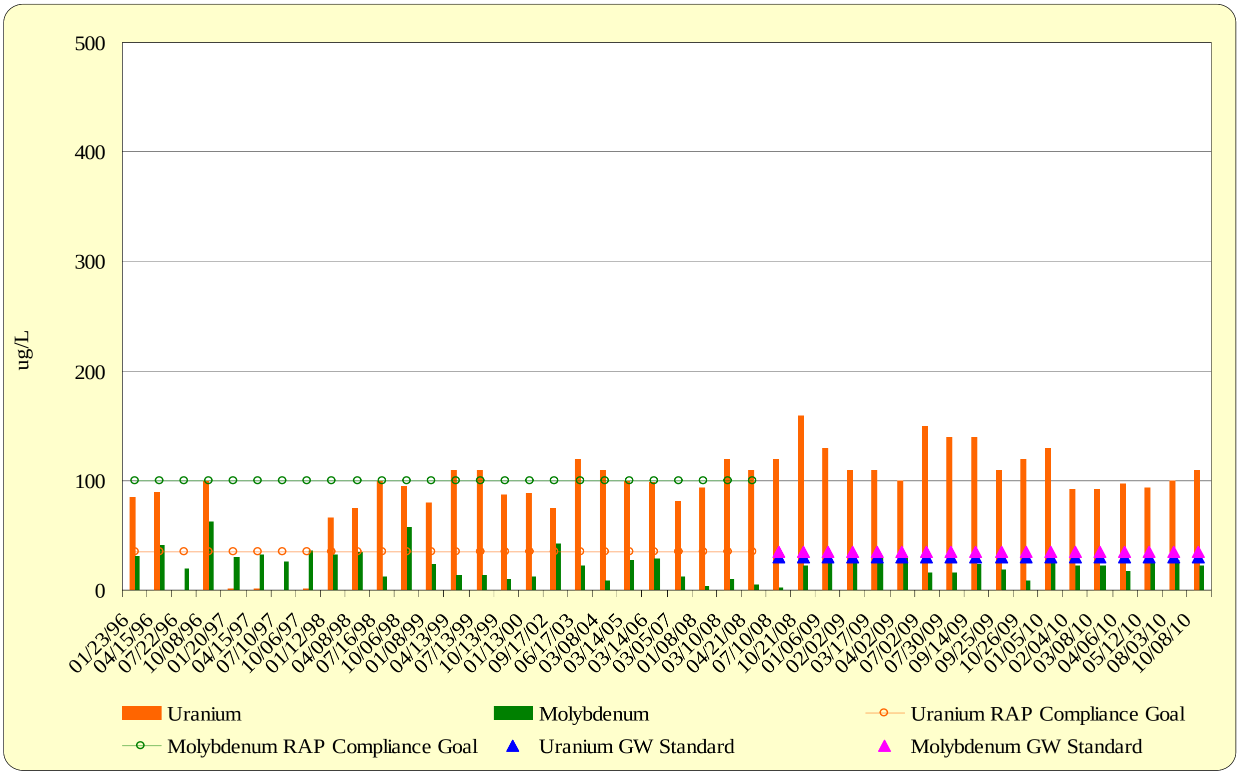
GC-7
Location 038
Uranium and Molybdenum



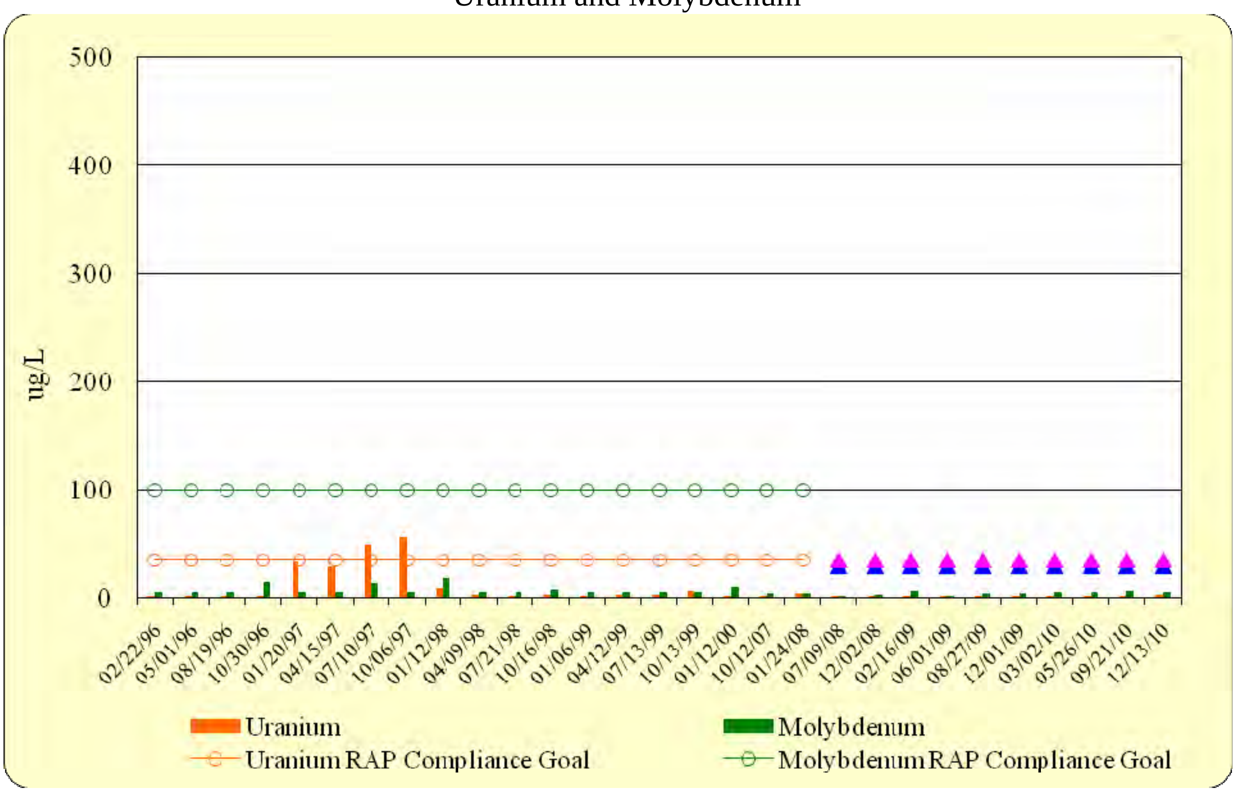
GC-8
Location 135
Uranium and Molybdenum



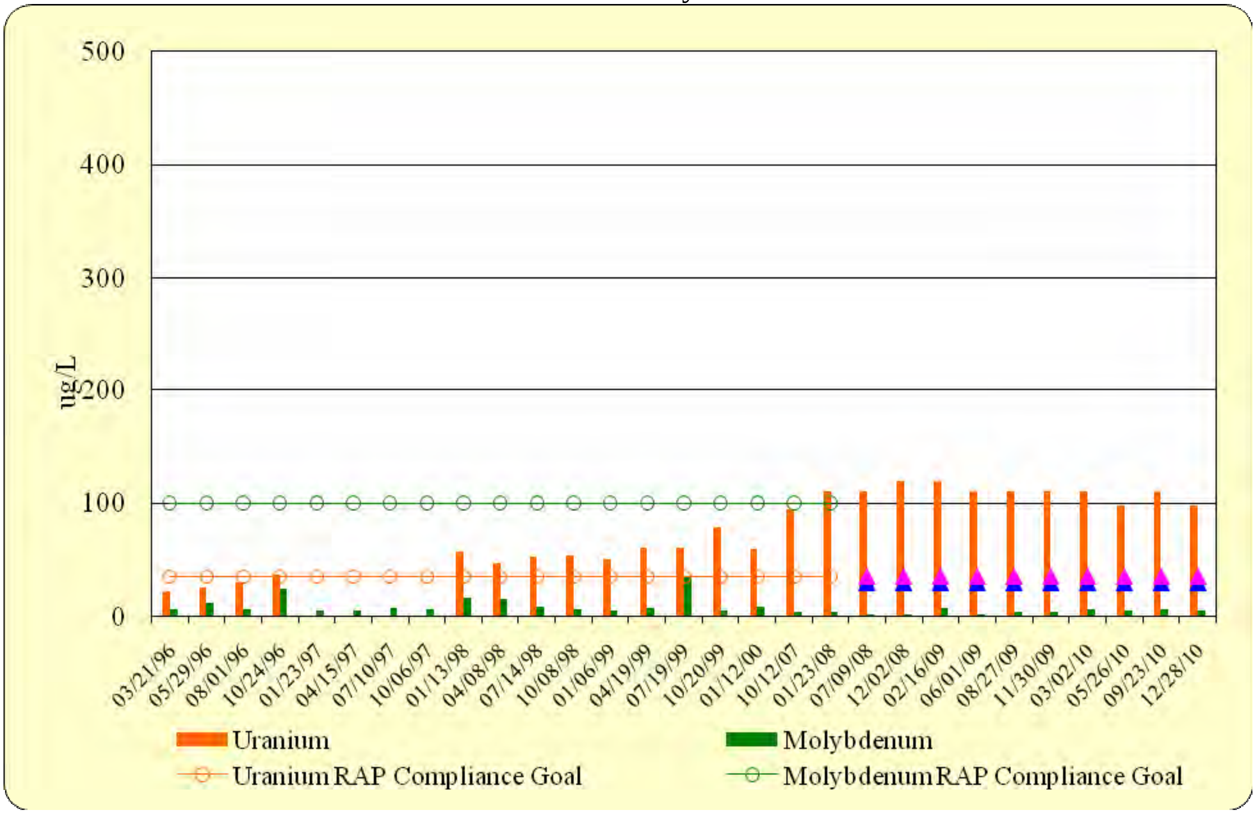
GC-9
Location 336
Uranium and Molybdenum



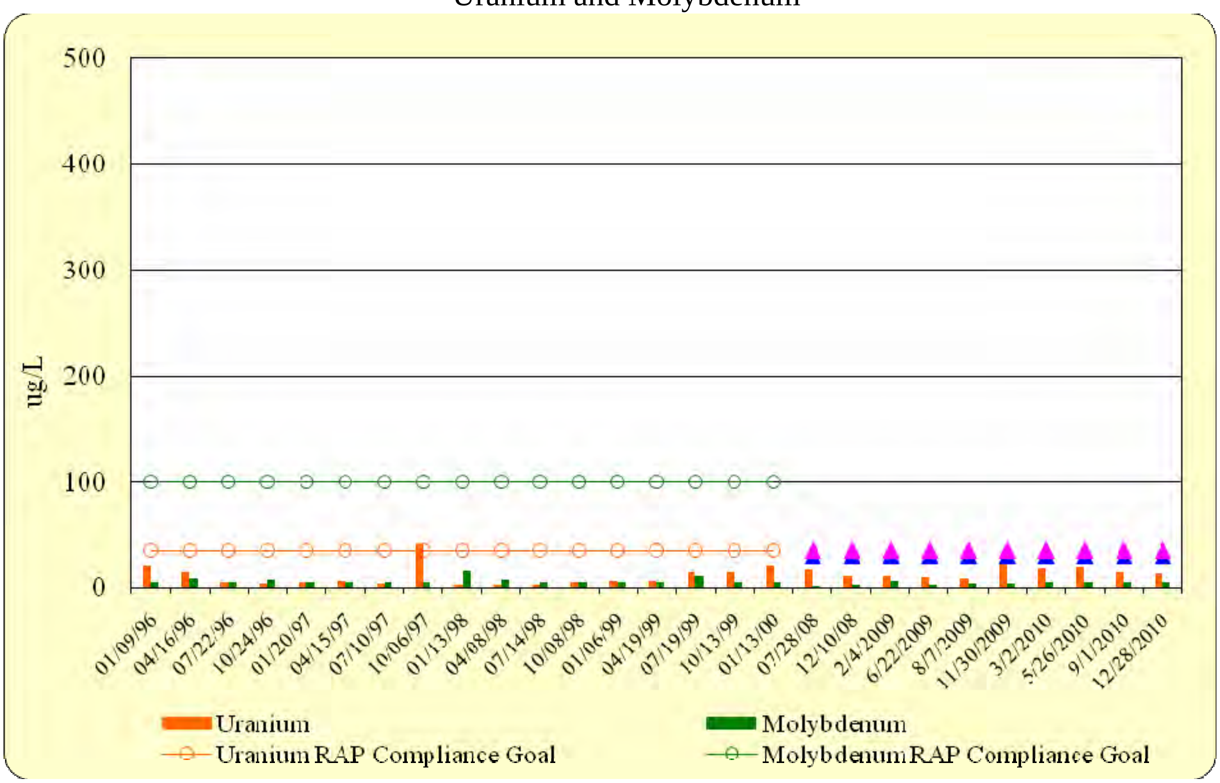
GC-10
Location 337
Uranium and Molybdenum



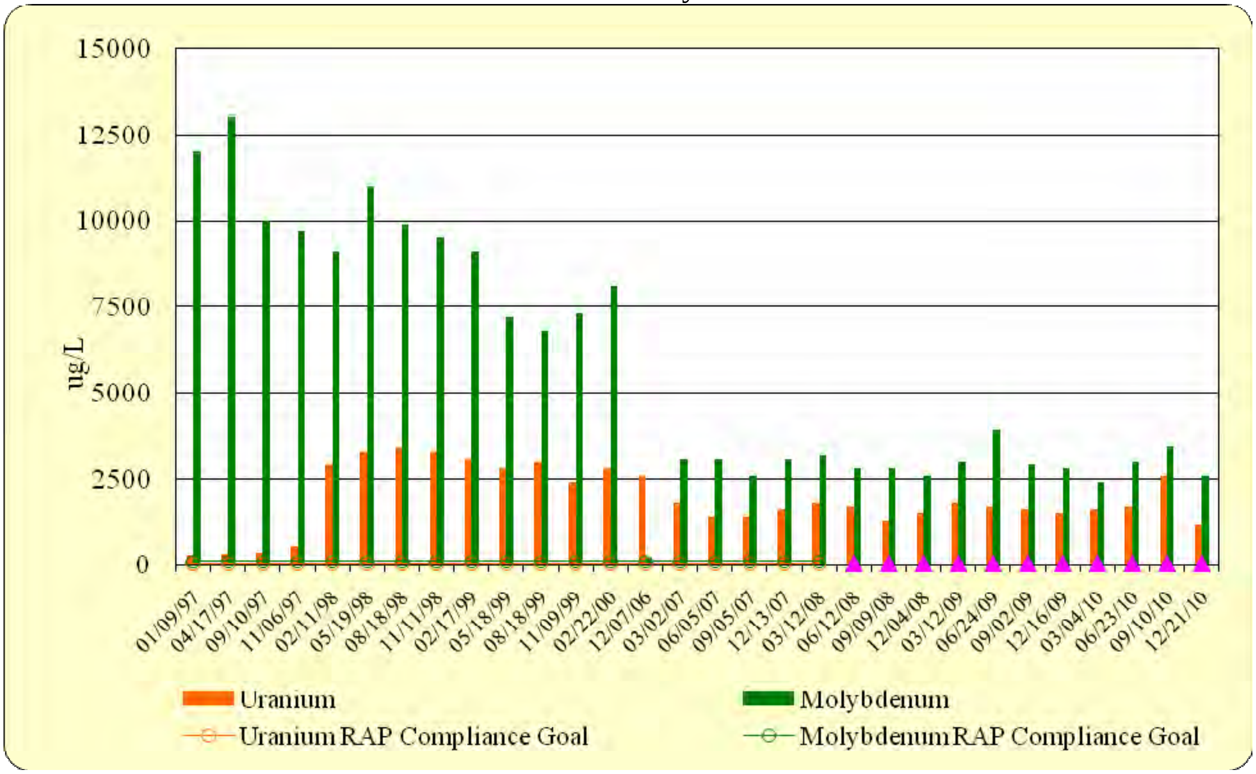
GC-11
Location 338
Uranium and Molybdenum



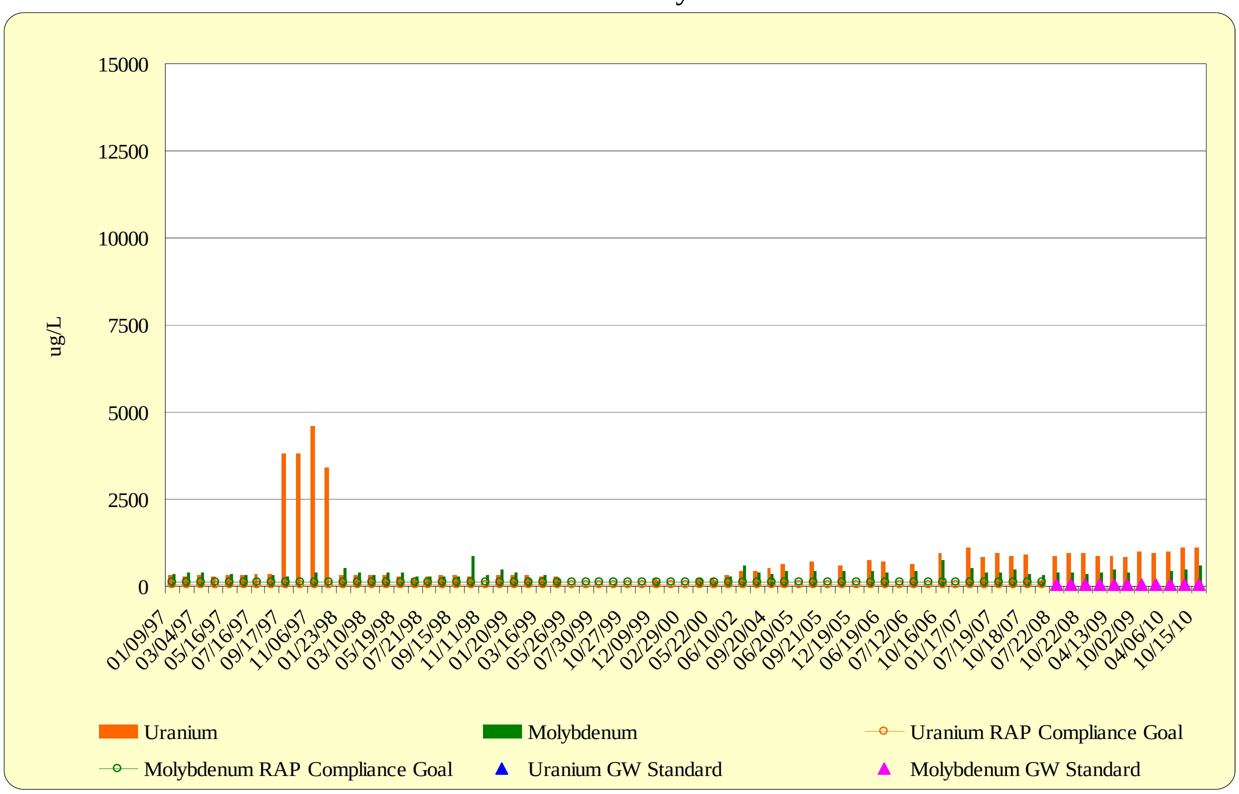
GC-12
Location 342
Uranium and Molybdenum



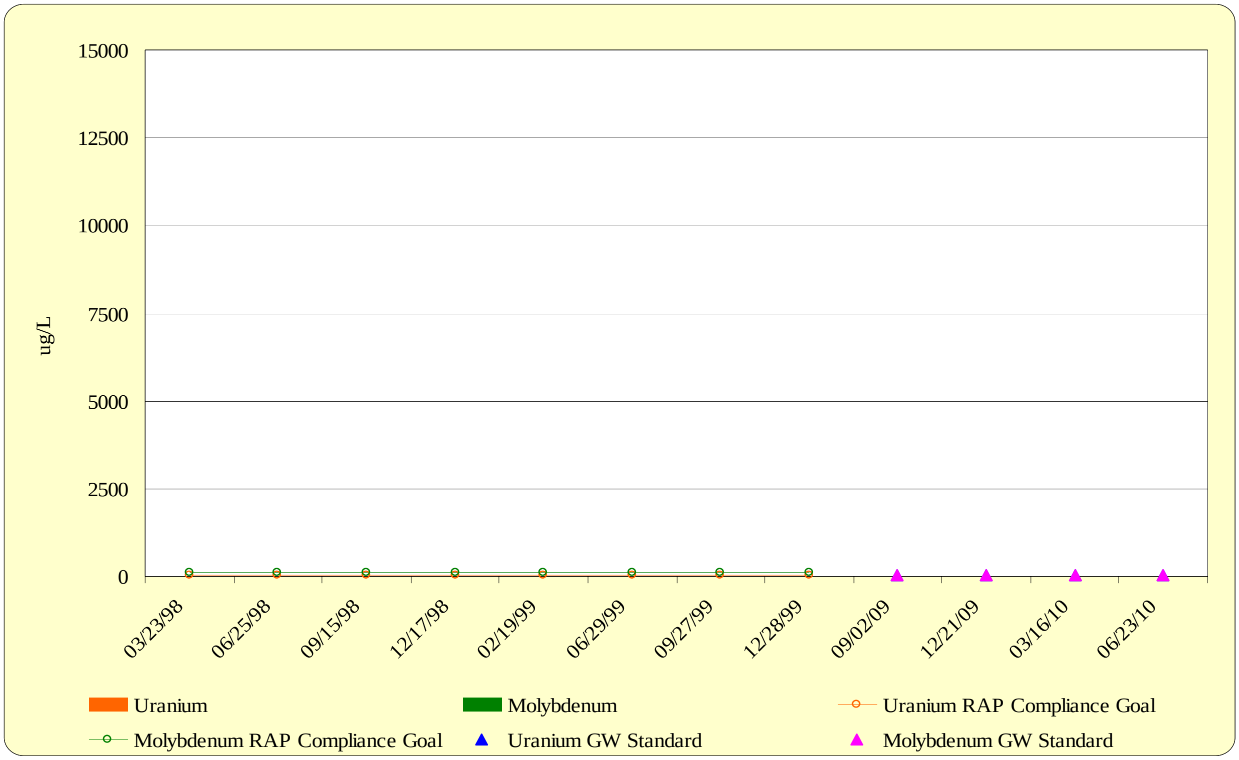
GC-13
Location 344
Uranium and Molybdenum



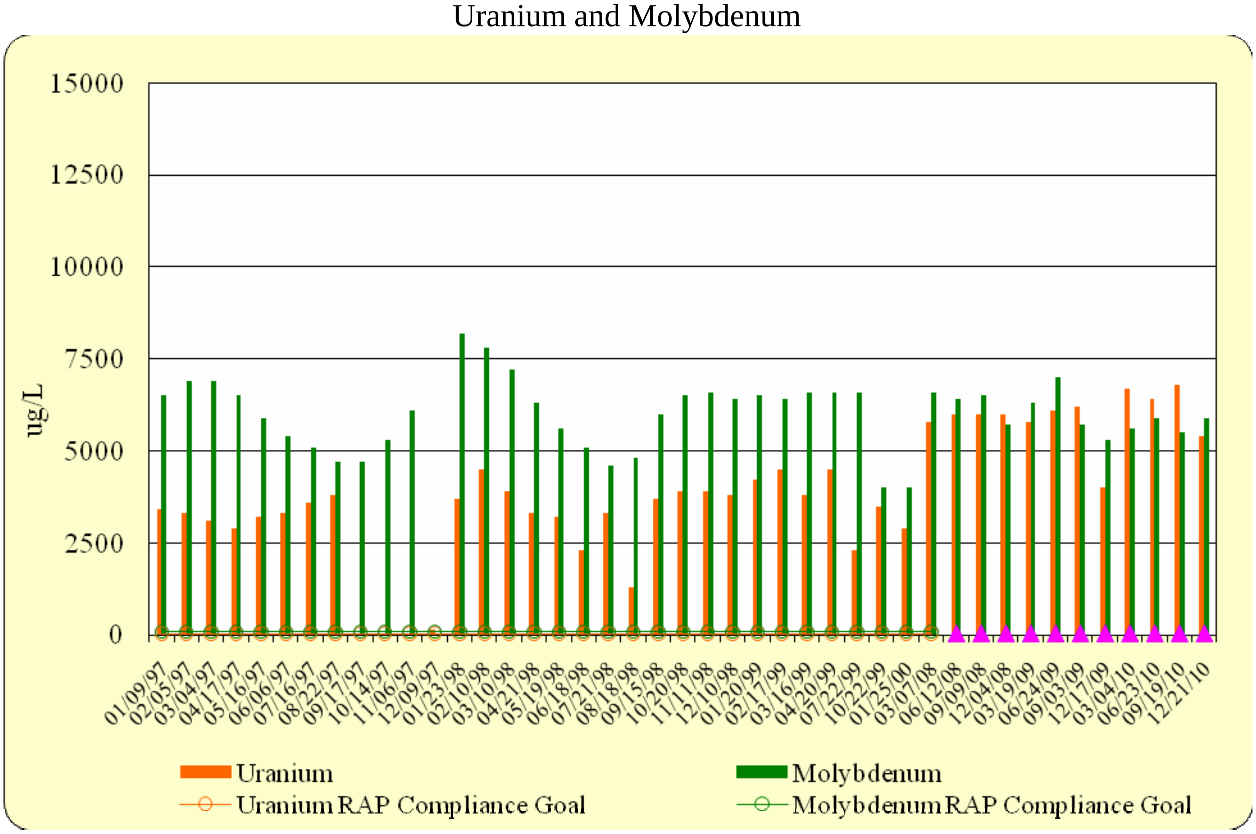
GC-14
Location 346
Uranium and Molybdenum



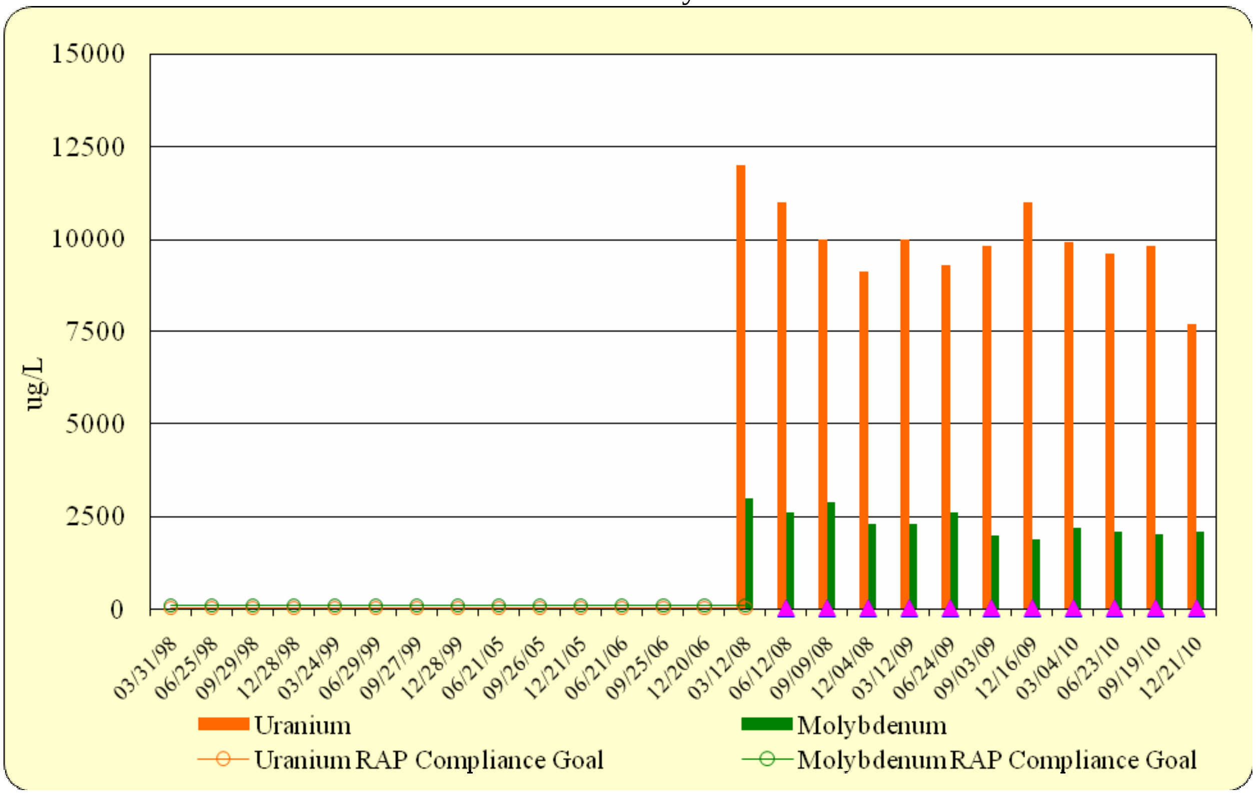
GC-15
Location 347
Uranium and Molybdenum



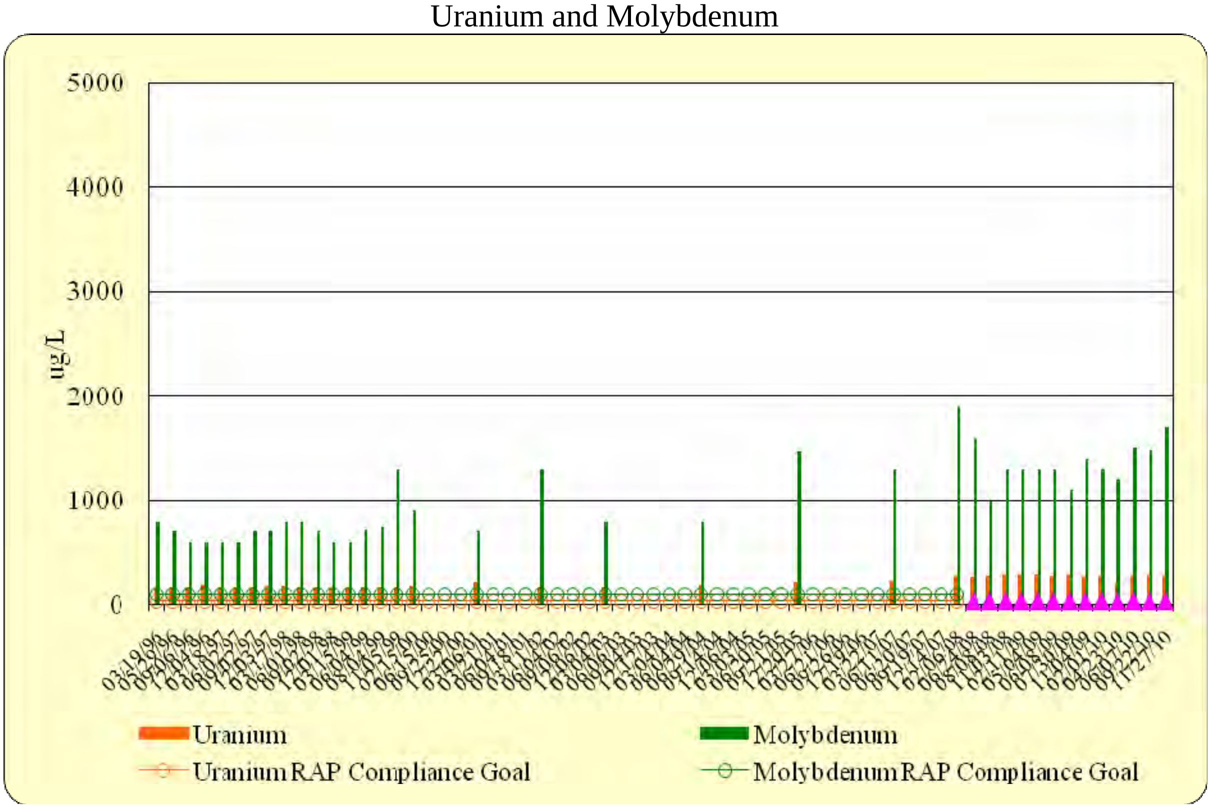
GC-16
Location 348
Uranium and Molybdenum



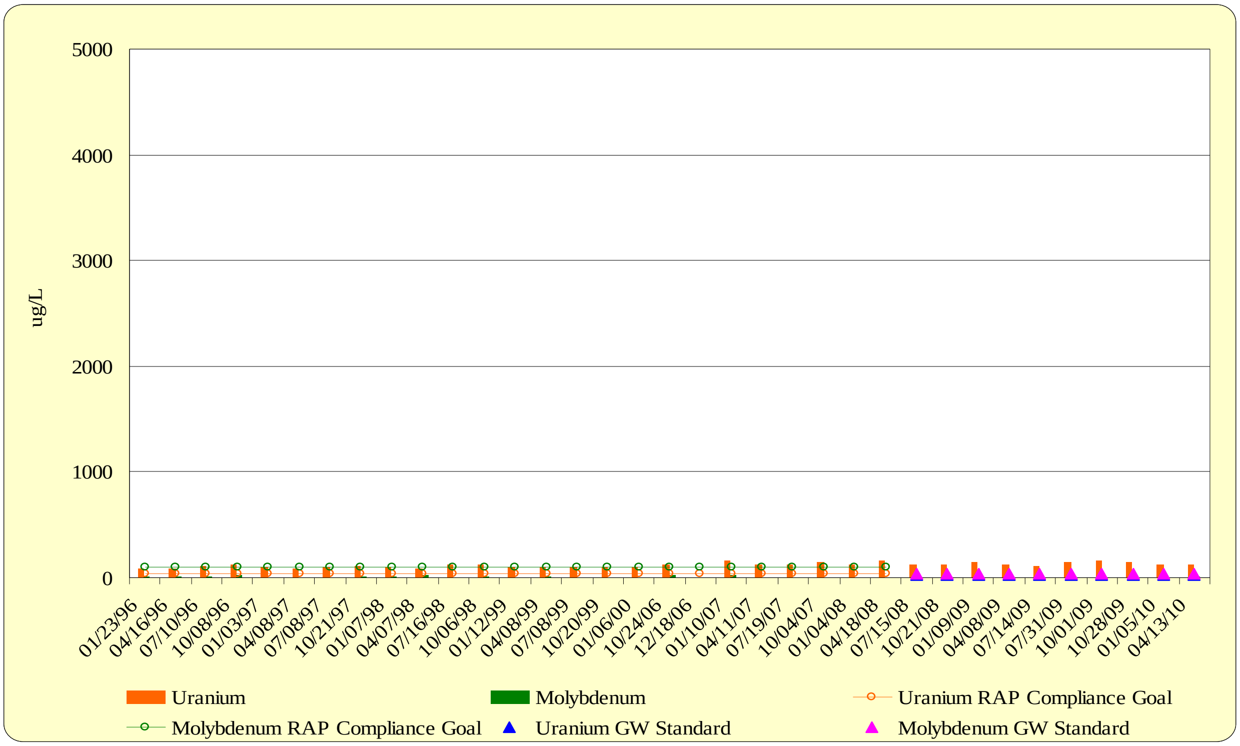
GC-17
Location 368
Uranium and Molybdenum



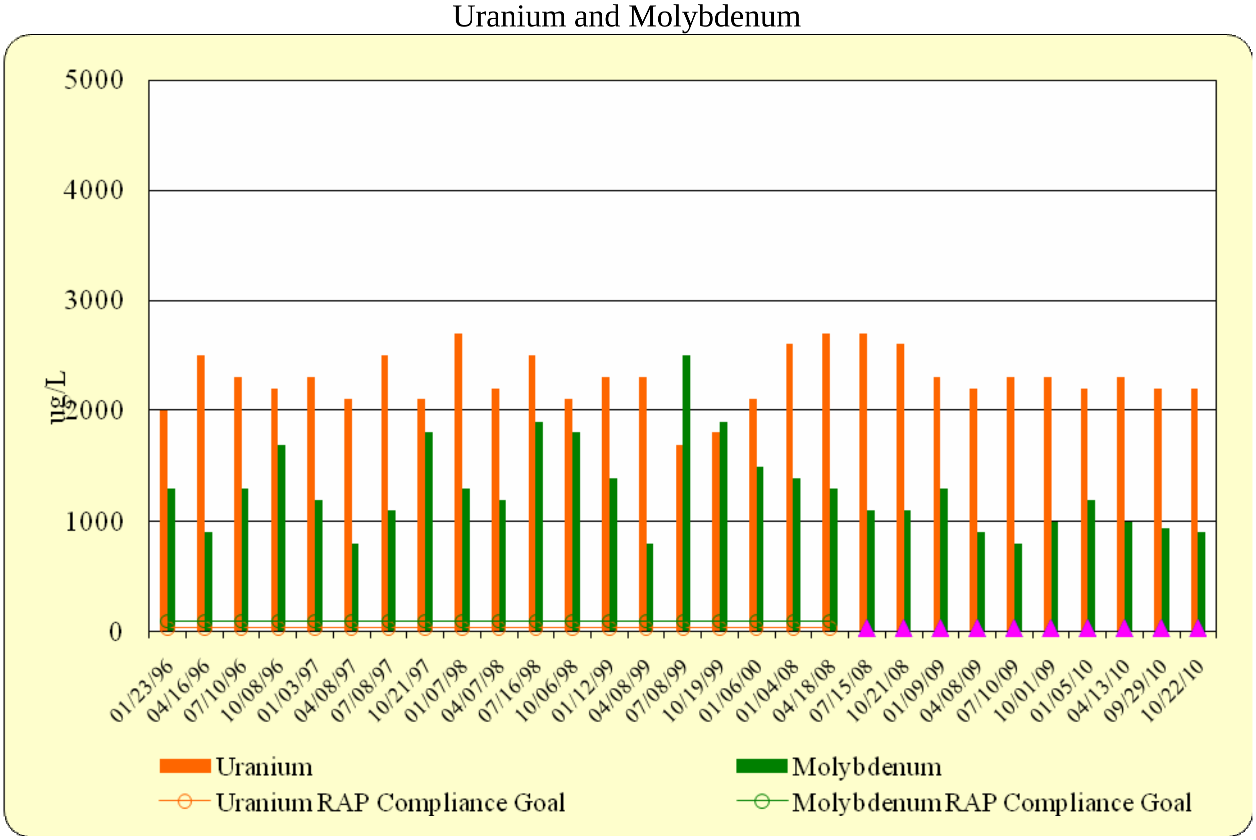
GC-18
Location 802
Uranium and Molybdenum



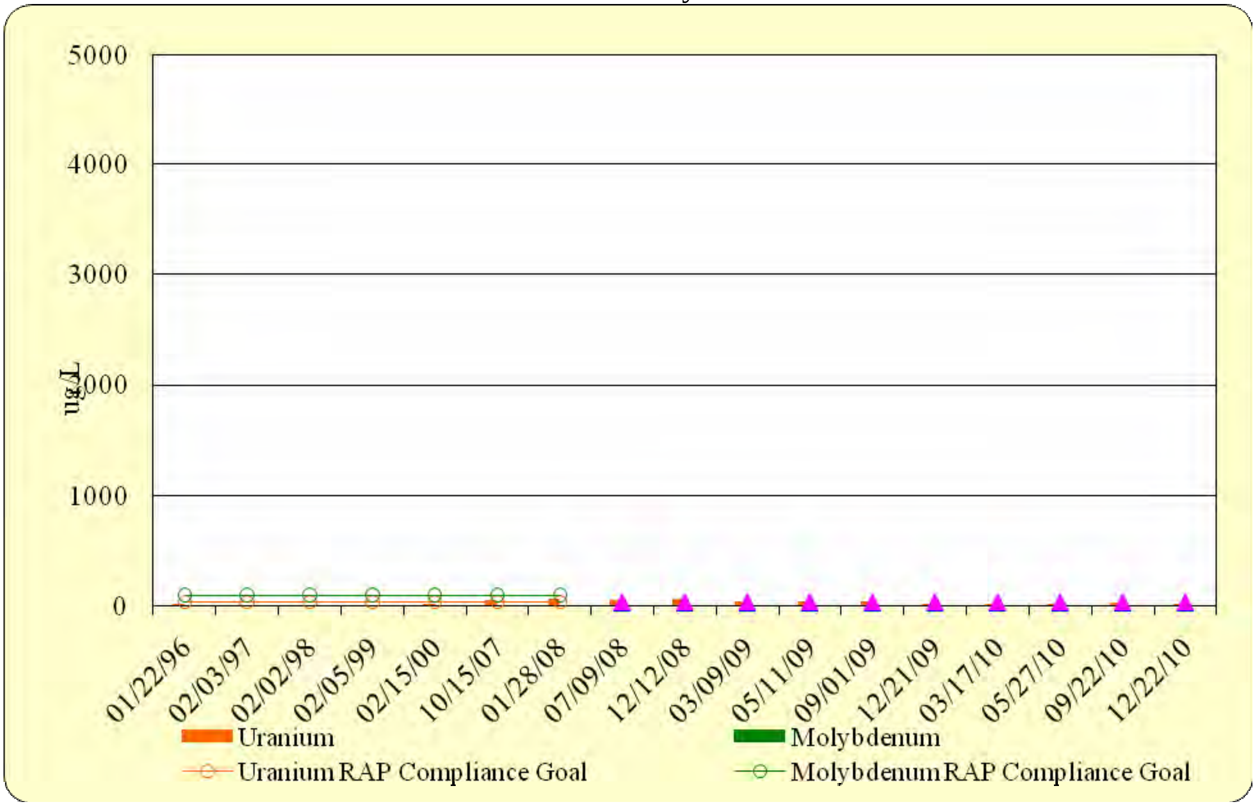
GC-19
Location 803
Uranium and Molybdenum



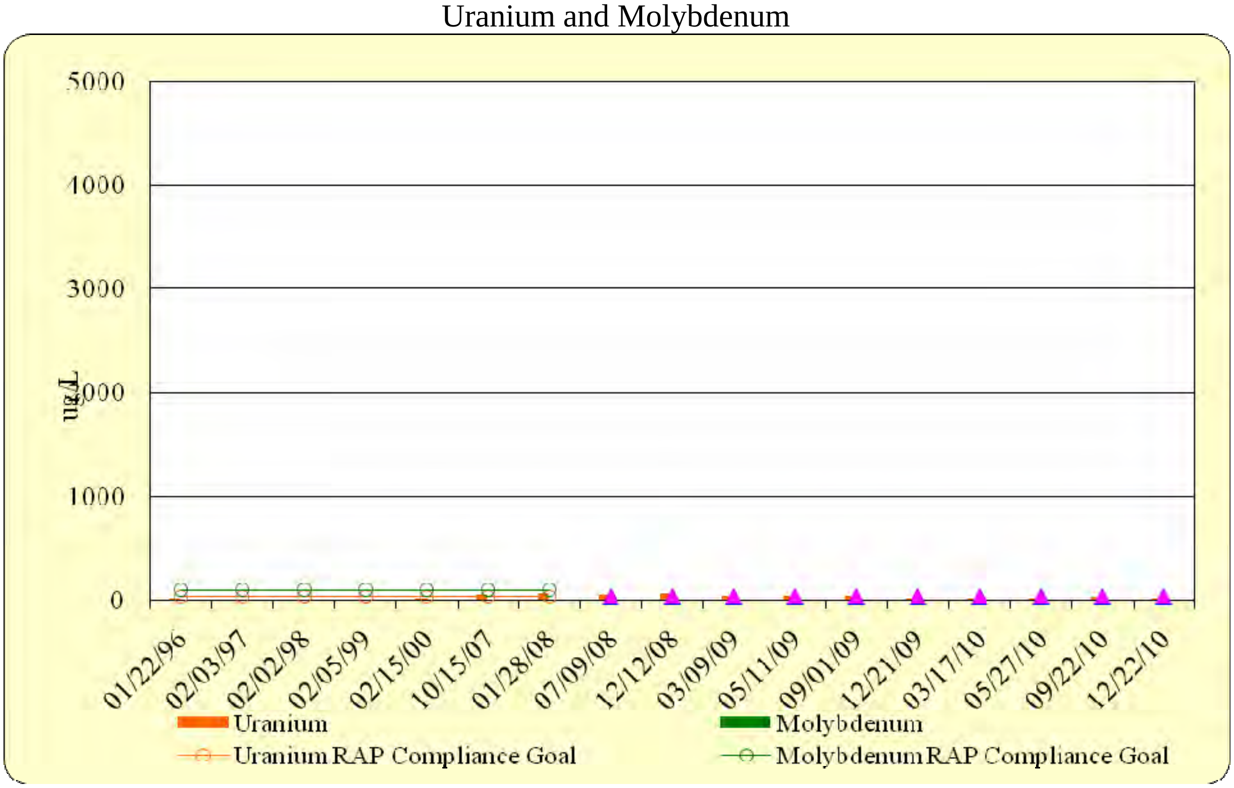
GC-20
Location 804
Uranium and Molybdenum



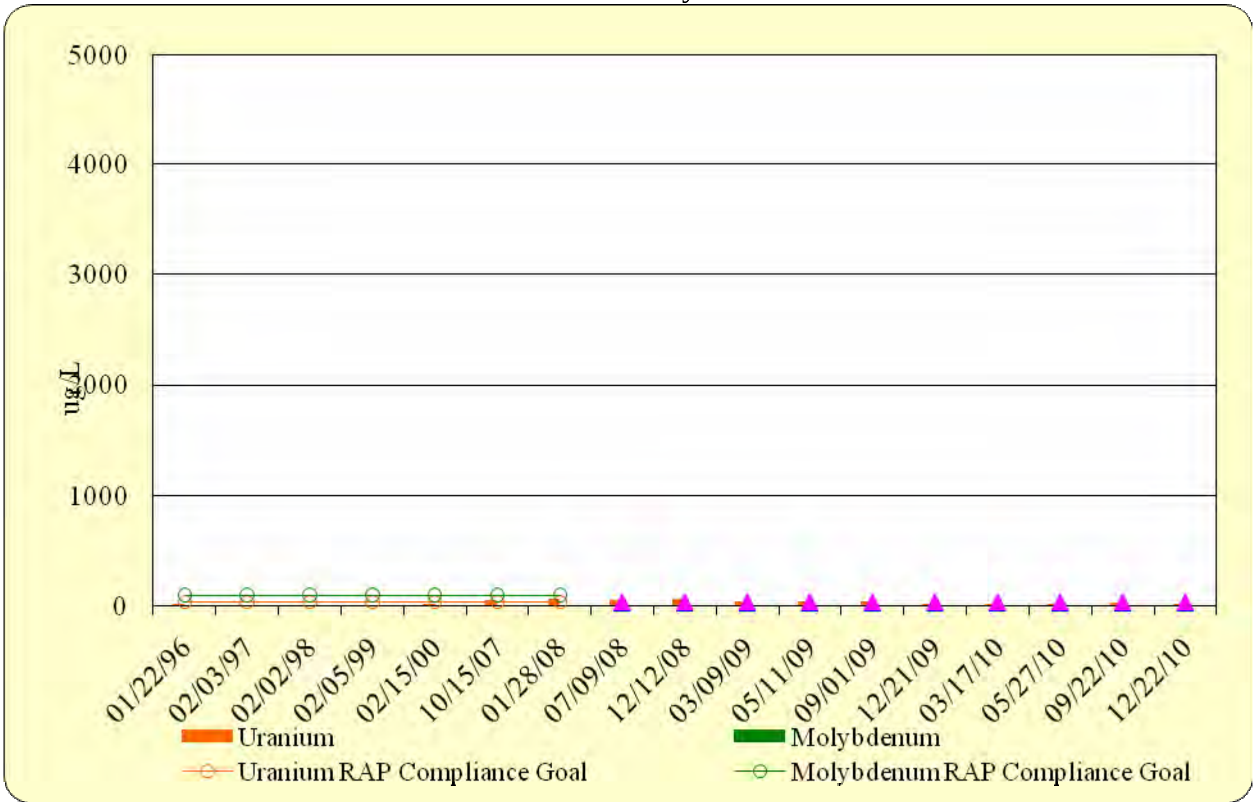
GC-21
Location 805
Uranium and Molybdenum



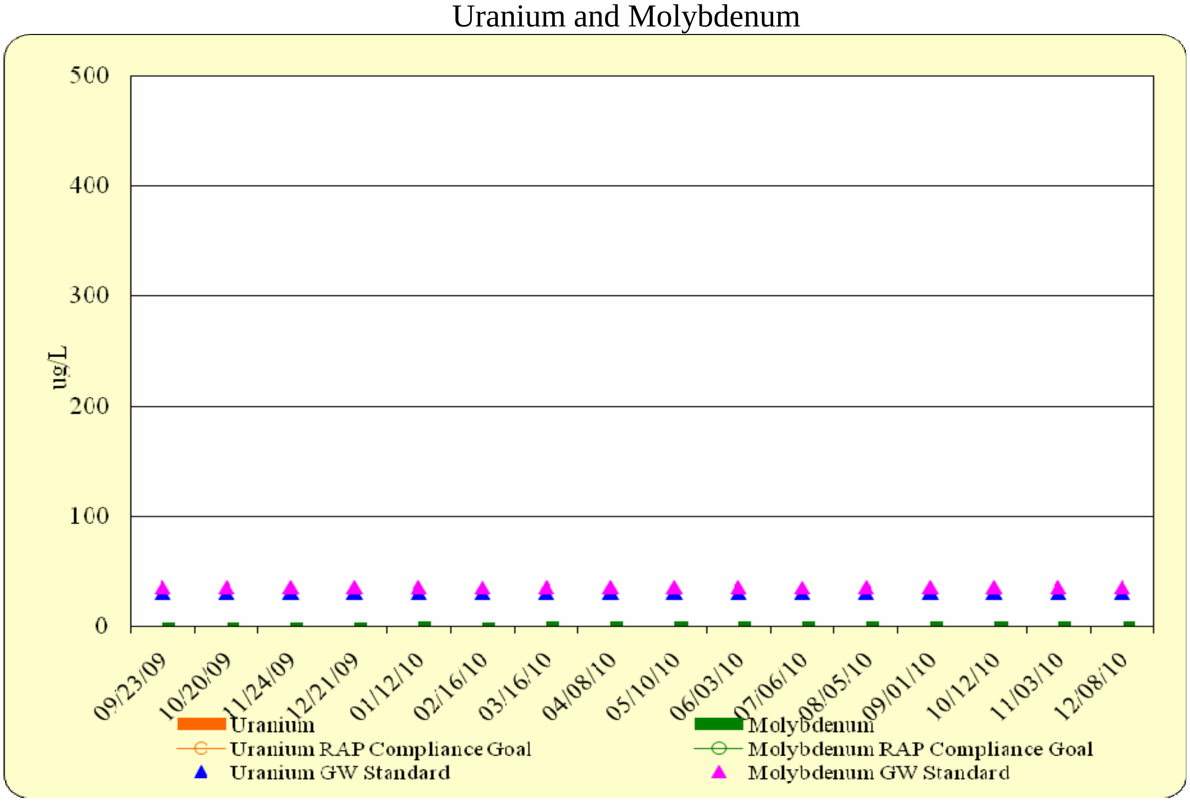
GC-22
Location 806
Uranium and Molybdenum



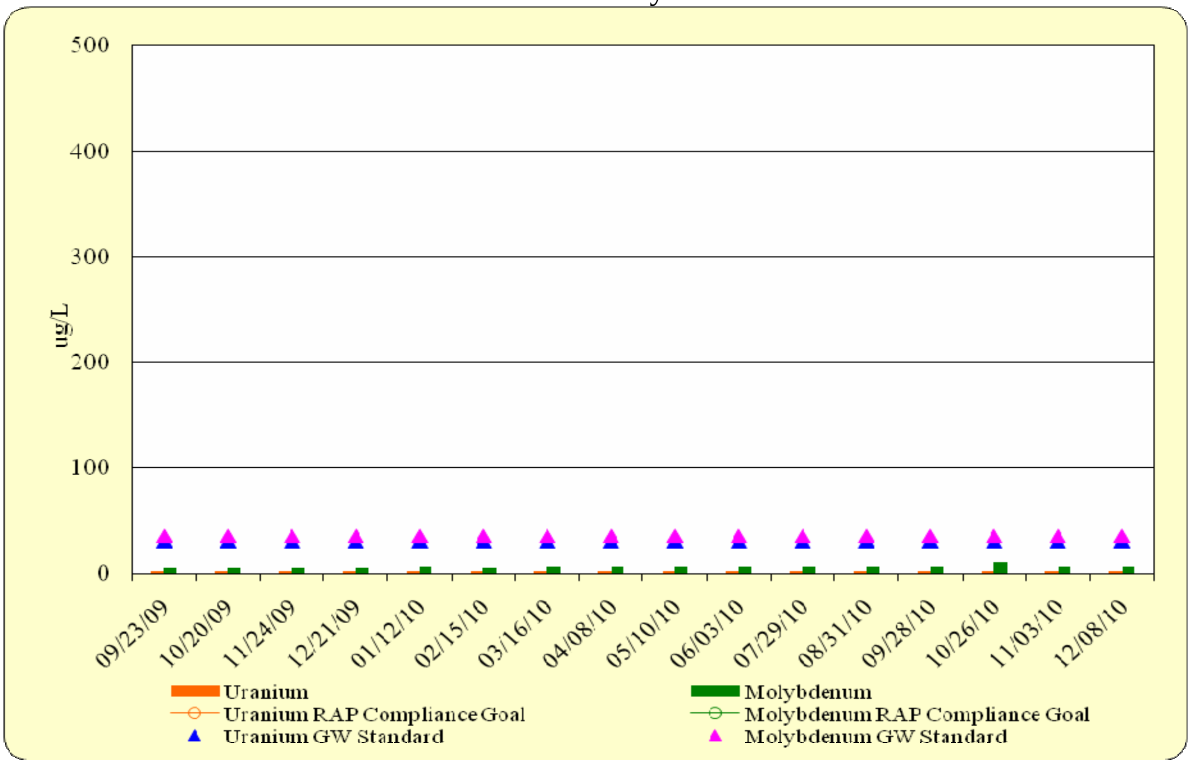
GC-23
Location 039
Uranium and Molybdenum



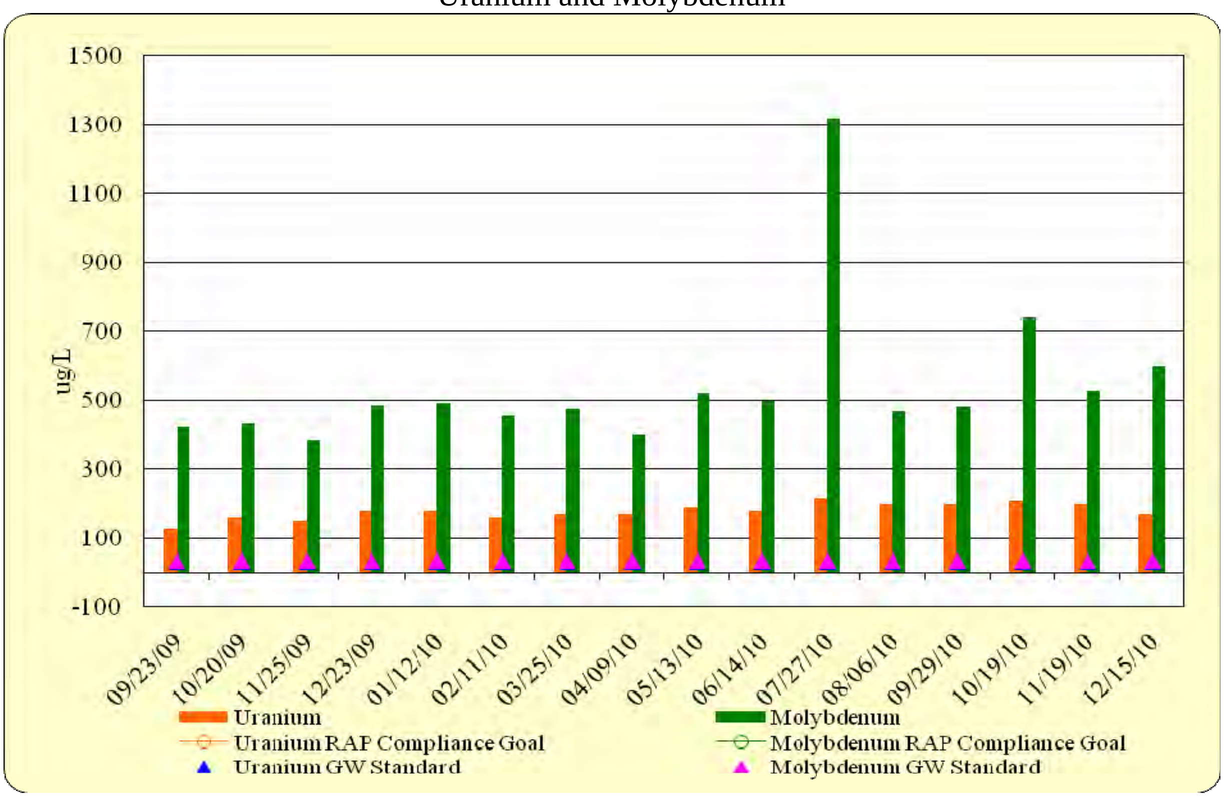
GC-24
Location 040
Uranium and Molybdenum



GC-25
Location 041
Uranium and Molybdenum

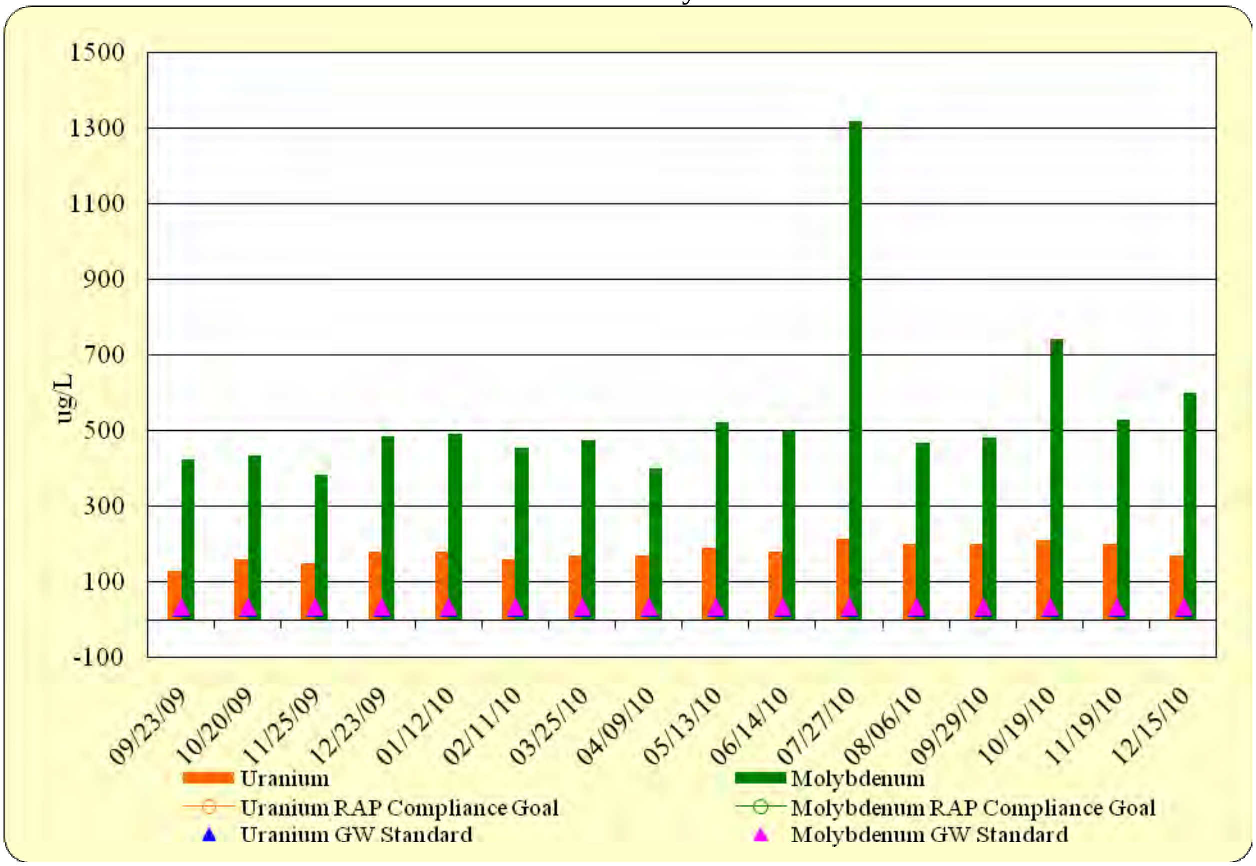


GC-26
Location 042
Uranium and Molybdenum

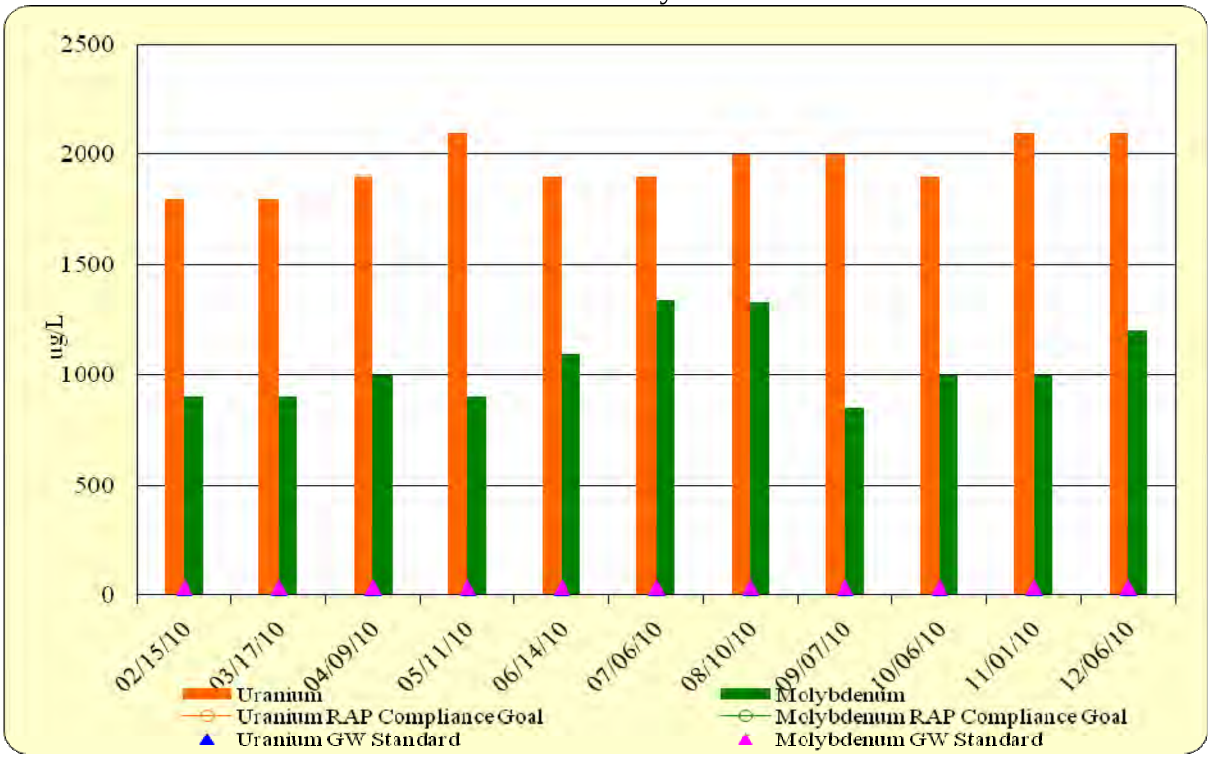


GC-27

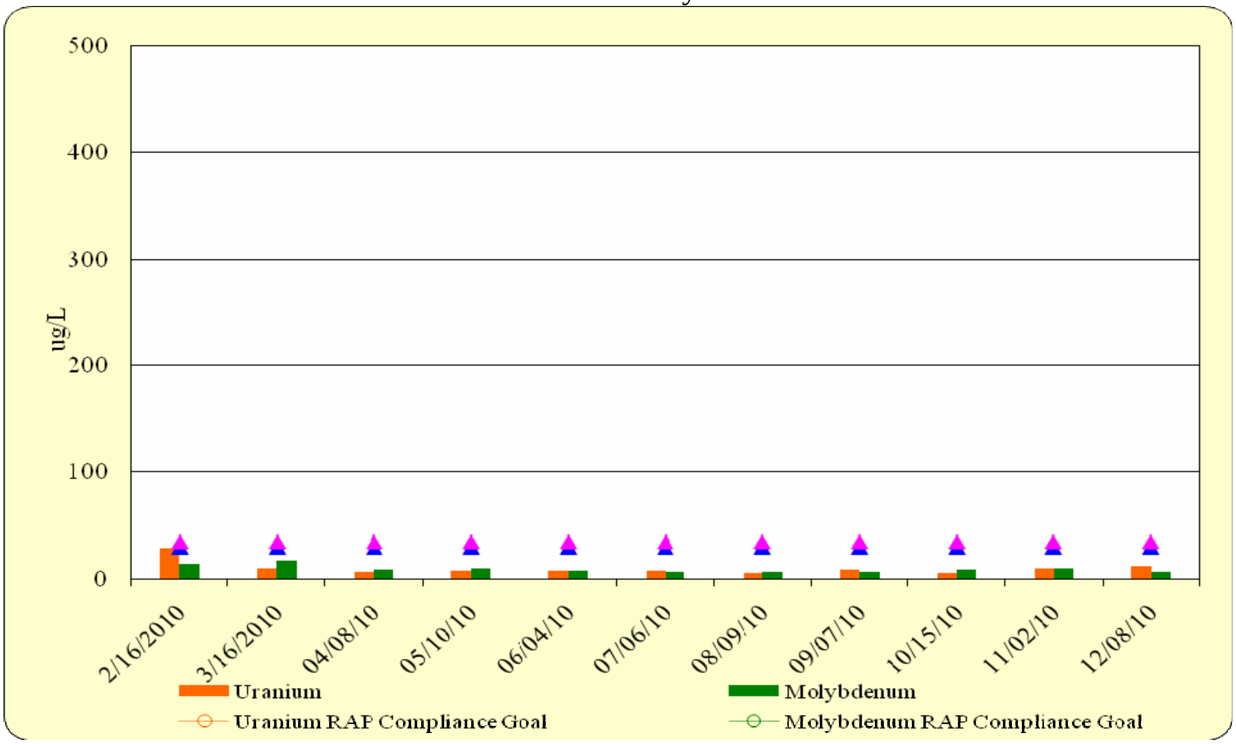
Location 043
Uranium and Molybdenum



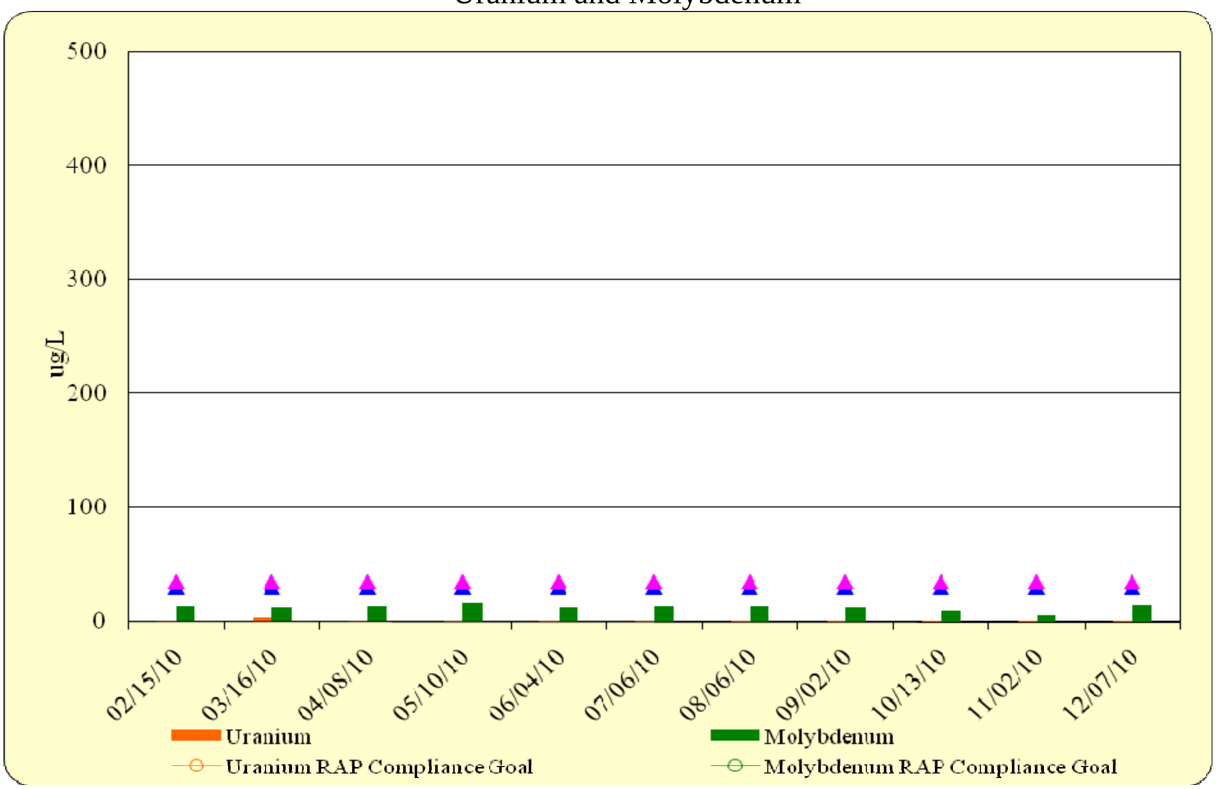
GC-28
Location 044
Uranium and Molybdenum



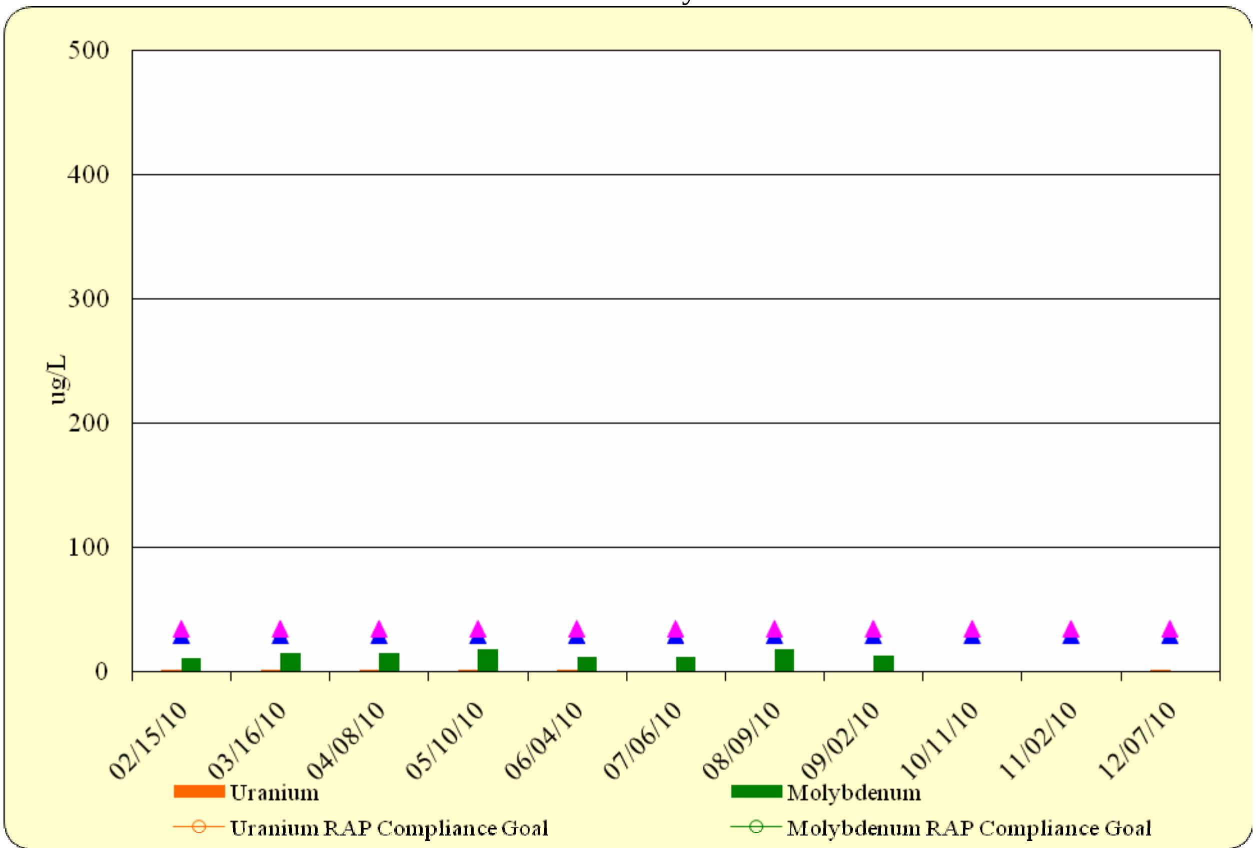
GC-29
Location 045
Uranium and Molybdenum



GC-30
Location 046
Uranium and Molybdenum



GC-31
Location 047
Uranium and Molybdenum



COTTER CORPORATION
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SEMIANNUAL EFFLUENT REPORT
Appendix A
Solubility Classification for Environmental Air Samples

The solubility classifications used for comparison of Environmental Air Samples are taken from the Rules and Regulations pertaining to Radiation Control of the Colorado Department of Public Health and Environment, Part 4, Appendix B, Table 2 Effluent Concentrations.

For ^{nat}U, we use Class Y as recommended in *Nuclear Regulatory Guide 4.14 Section 4 Page 4-14.5*.

For ^{232}Th, we use Class Y since the uranium-zirconium ore is refractory and natural thorium would be considered an oxide.

For ^{230}Th, we use Class W for conservatism since alkaline tailings have been reported in Department of Energy sponsored research to be approximately thirty percent (30%) Class W and seventy percent (70%) Class Y.

For ^{226}Ra, use Class W since all forms are considered Class W.

For ^{210}Pb, we use Class D since all forms are considered Class D.

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Appendix B
Lower Limit of Detection Usage for Environmental Air Samples

Calculation of average radionuclide concentrations of quarterly composites of Environmental Air Samples is performed by using one-half (½) the (Lower Limit of Detection) LLD concentration.

This was done according to protocol established by the *Environmental Protection Agency Quality Assurance Procedures*.