

Environmental Surveillance Report

U.S. Department of Energy

Rocky Flats Environmental Technology Site

Information Exchange

THIRD QUARTER 2004



**Colorado Department
of Public Health
and Environment**

This is a numerical summary of environmental surveillance measurements performed by the Department during the past quarter.

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Introduction

The purpose of this Environmental Surveillance Report (ESR) is to provide a quarterly update on Colorado Department of Public Health and Environment (CDPHE) air and surface water monitoring data at the Rocky Flats Environmental Technology Site (RFETS).

CDPHE currently has three Divisions that conduct monitoring at RFETS including the Air Pollution Control Division (APCD), the Hazardous Materials Waste Management Division, and the Laboratory and Radiation Services Division (LARS). APCD monitors air for contaminants such as particulates, oxides of nitrogen, ozone, volatile organic compounds (VOCs), and radionuclides beryllium. The Hazardous Materials Waste Management Division conducts surface water monitoring for many parameters, including metals, inorganics and radionuclides. The Radiation Control Division performs radiological monitoring in air, and precipitation.

Under normal conditions, groundwater and soils are not monitored by Colorado Department of Public Health and Environment (CDPHE), but are monitored by DOE.

Sampling and data analysis is performed by CDPHE according to the Rocky Flats Integrated Monitoring Plan (IMP), which describes not only the monitoring done by CDPHE, but also that done by the Site and surrounding communities. It is possible that CDPHE may do some additional sampling as part of a special study or for some unusual circumstances. This report describes the results of both types of CDPHE monitoring.

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BACKGROUND INFORMATION

MONITORING STATIONS

DECISION RULES

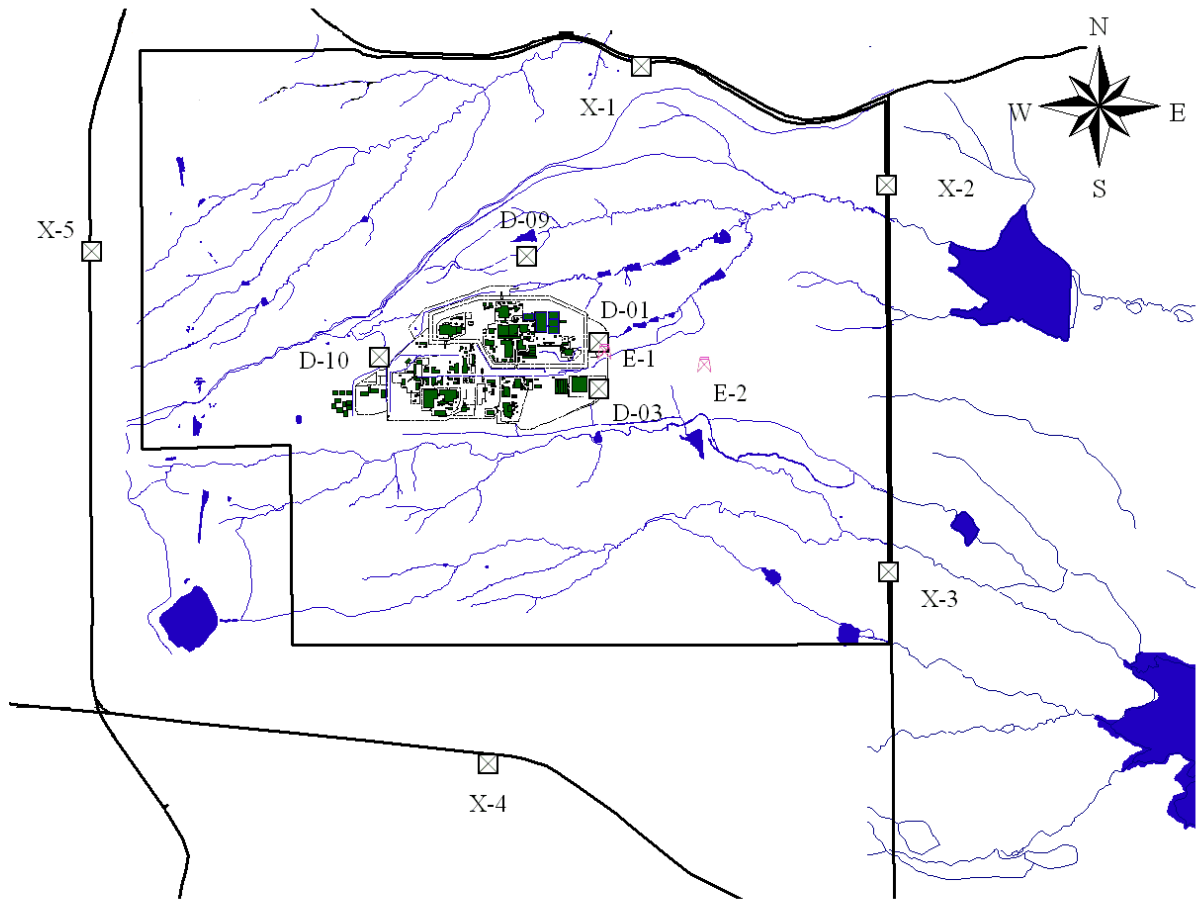
ANALYTES OF INTEREST

AIR STANDARDS

WATER STANDARDS

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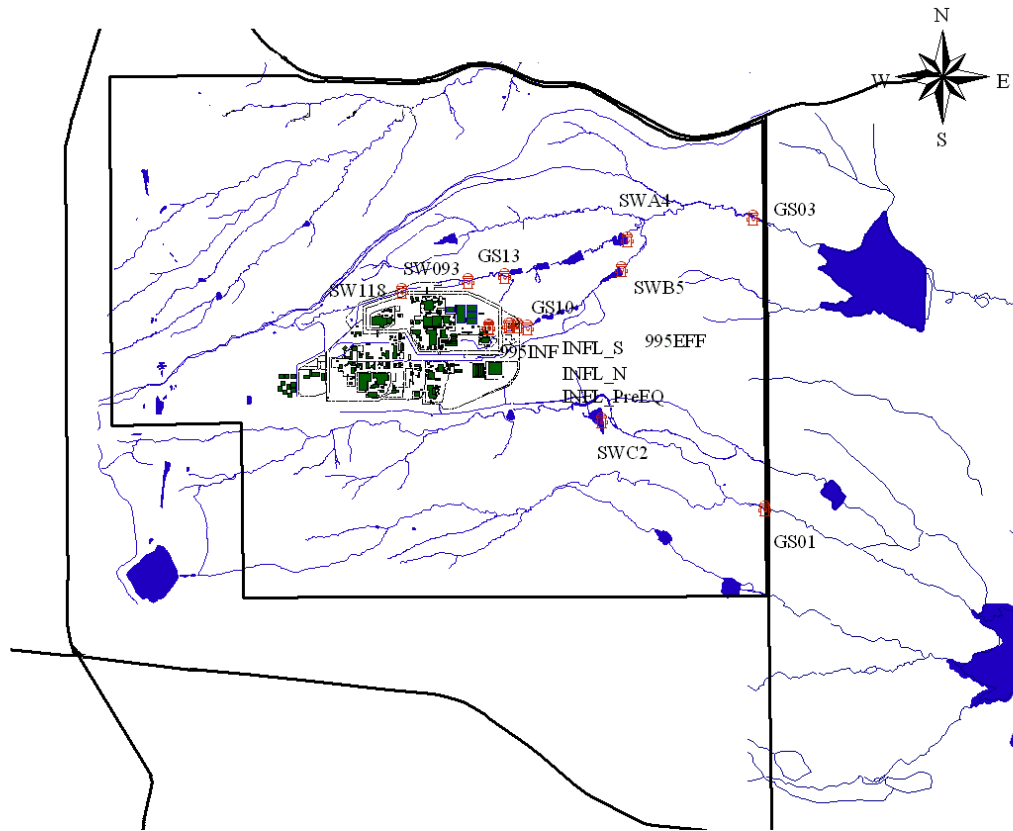
**Colorado Department of Public Health and Environment
Air Monitoring Locations 2022**



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**Colorado Department of Public Health and Environment
Surface Water Monitoring 2001/2002**



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Decision Rules

The data acquired for each quarter is examined using standard methods of evaluation that are described in the Integrated Monitoring Plan (IMP). The methods use a series of decision rules to effectively analyze the data that has been collected, and make determinations about what actions need to be taken. Decision rules are if-then statements pertaining to data quality objectives. The decision rules define, quantitatively and qualitatively, the point at which a decision should be made or action should be taken.

The decisions could involve many different actions including, but not limited to, further analysis of data, implementation of new monitoring stations for source detection, management decisions, or evaluation of remediation alternatives. Any exceedence of an action level for a surface water or air contaminant during the quarter are summarized in this report, along with any actions taken or follow up investigations that are required.

The primary decision rules that pertain to each media are outlined below:

A. Air Monitoring

1. **Ambient Air Quality Monitoring:** Nitrogen Dioxide (NO₂), Ozone (O₃) and particulate monitoring is performed by APCD. Particulate monitoring includes monitoring of both fine particulates (PM₁₀) and total suspended solids (TSP).

IF: A perimeter monitor detects an NO₂ (annual arithmetic mean) concentration of 0.053 parts per million (ppm), an O₃ (1 hr av. time) concentration of 0.12 ppm, a TSP measurement of 75 micrograms per cubic meter (µg/m³) averaged over a 1 year time period or 150 µg/m³ over a 24-hour time period, or a PM₁₀ concentration of 50 µg/m³ annually or 150 µg/m³ in a 24-hour period (Include these values in a table in the report, too confusing this way)

THEN: The Site's operating permit may potentially be revised to mitigate the exceedence.

2. **Beryllium (Be) Monitoring:** Emission points (stacks) are monitored for Be.

IF: Be emissions from a source exceed 10 g in a 24-hour period

THEN: CDPHE may take enforcement action.

IF: Ambient Be concentrations at monitoring sites exceed 0.01 µg/m³ over a 30-day Period

THEN: CDPHE may take action to identify the source.

3. Volatile Organic Compound (VOCs) Monitoring: Various VOC monitoring stations exist around the perimeter of the site and are maintained by APCD. It is possible that remediation processes could release significant levels of VOCs. VOC data does not tend to vary and the measured concentrations are generally very low. A significant increase from normal levels of any VOC at any monitoring site could indicate a potential problem.

IF: A measured value of any VOC exceeds trends in historical data

THEN: An investigation will be enacted to determine the source of the elevated VOC concentration.

4. Radiological Ambient Air Quality Monitoring: LARS and APCD air sampling locations are monitored for radiological contaminants, PM₁₀ and total suspended particulates (TSP).

IF: Measured values of radionuclides exceed typical trends existing in historical data

THEN: Any number of actions may be taken including, but not limited to, analysis of samples for verification, comparison of samples from nearest DOE monitoring sites, ComRad Program samplers, and/or APCD monitoring sites, request for investigation or explanation of elevated results from DOE, calculation of public dose/risk and/or a presentation to CDPHE management.

B. Surface Water Monitoring

1. Pond Predischage Monitoring: Analytes of Interest (AoIs) and some VOCs are monitored in the ponds previous to pond discharge so that discharge will not result in exceedence of stream standards.

IF: Predischage monitoring indicates apparent exceedence of stream standards

THEN: CDPHE will notify the Site of additional AoIs for that discharge.

AND: The Site would then perform flow-paced POC monitoring for the additional AoIs during that discharge, as part of the Segment 4 compliance monitoring.

OR

The Site may evaluate alternative water management options, which avoid immediate discharge including, but not limited to, treatment, storage or disposal.

2. Wastewater Treatment Plant (WWTP) Influent Radiological and Metals Monitoring: The Site has made an effort to eliminate any possible connections between waste streams containing radionuclides and WWTP influent. Therefore, it is assumed that radiologic loads will not significantly increase from baseline values. Radiologic parameters include total plutonium, total americium, total uranium, tritium, as well as alpha and beta activity. Metals parameters include for the total recoverable fraction - arsenic, beryllium, cadmium, chromium (total), iron, lithium, and thallium; plus special metals (total recoverable fraction) – silver, copper, manganese, nickel and selenium. Decontamination and decommissioning (D&D) activities

could potentially introduce radiologic loads to WWTP influent. The influent is monitored to track sources of contaminants that may be introduced during the cleanup process, through evaluation of pollutant loads and concentrations coming through the WWTP collection system.

IF: Influent loading for any of the radiologic parameters exceeds baseline values determined from historical data

THEN: Evaluation will be performed to determine the source of contamination.

3. Performance Monitoring: Performance monitoring is conducted where specific D&D operations or remedial action pose a concern for a specific contaminant release that could impact surface water or groundwater. Performance monitoring is integrated with groundwater investigations and conducted to improve monitoring network resolution to isolate impacts of individual projects. CDPHE conducts performance monitoring in association with the Mound and East Trenches groundwater plume and treatment system, and Solar Pond Plume Treatment System.

a. Mound and East Trenches – VOC and metal contamination are present in the area of the Mound and East Trenches plume (south of South Walnut Creek). In order to ensure that stream standards are being attained, monitoring for VOCs and selected metals will be conducted in South Walnut Creek in the immediate vicinity where the groundwater contaminant plumes may be intersecting the stream.

IF: VOC or metal concentrations exceed stream standards

THEN: The monitoring frequency and number of sampling locations may be increased.

ELSE: VOC monitoring will be discontinued after three years and metals concentrations will be reviewed using the following Decision Rule.

IF: Metals concentrations are lower than stream standards, but significantly higher than the concentrations found at other RFETs locations.

THEN: Further investigation of in-stream concentrations and the cause of unusually high concentrations will be considered.

ELSE: Metals monitoring may be discontinued after a period of three years.

b. Solar Pond Plume Treatment System – The Solar Ponds groundwater contaminant plume contains elevated concentrations of nitrate, uranium and chloride, as well as lower concentrations of several metals. A groundwater treatment system has been installed, monitoring is being conducted to ensure that stream standards are being attained. The Site collects nitrate and uranium parameters. CDPHE collects metals and nitrate (as part of the *Ad Hoc* Nitrate Study).

IF: Metals or nitrate concentrations exceed stream standards.

THEN: The monitoring frequency and number of sampling locations may be

increased.

ELSE: Metals and nitrate monitoring will be continued until it has been demonstrated that metals concentrations at the most down gradient portion of the Solar Pond Plume are declining.

4. Ad Hoc Program: *Ad Hoc* Monitoring may be requested by DOE or the stakeholders to collect specific information related to special projects or to support decision-making processes. CDPHE has taken the responsibility for an evaluation of nitrate loading on Walnut Creek, and man-made versus natural uranium by inductively coupled plasma/mass spectrometry (ICP/MS) methodology.

a. Nitrate Loading - Nitrate from the Solar Pond Groundwater Plume and treated effluent from the on-site Sewage Treatment Plant pose potential impact to surface water in the Walnut Creek Drainage and pond system. To supplement in-place continuous performance monitoring, for more accurate evaluation of nitrate loading, CDPHE is conducting additional water quality monitoring, consisting of grab samples for nitrate and ammonia analysis.

IF: No upward trend or high variability is detected.

THEN: Monitoring will continue on a quarterly basis.

ELSE Monitoring frequency may change.

b. Uranium ICP/MS – Conducted to augment the ICP/MS evaluation of groundwater at RFETs. The Uranium ICP/MS study has been undertaken to evaluate where man-made uranium isotopes are present in groundwater versus natural uranium in groundwater. The Site is supporting CDPHE in the collection of samples and analysis by ICP/MS.

IF: Sample results indicate non-natural uranium,

THEN: Evaluate potential sources of non-natural uranium and whether loading from that source may change over time.

5. Stream Segment 4, Non-POC Monitoring – POC monitoring will be supplemented to assess the effect of reduced flows and reduced nutrient loading to the Walnut Creek drainage as a result of the Sites' closure process. Monitoring for select metals will be conducted to ensure that stream standards are attained. To assist with the assessment of loading inorganics, nutrients (nitrate and ammonia) and physical parameters (pH, dissolved oxygen, hardness, total suspended solids) are also collected.

IF: Concentrations or loadings of specified contaminants exceed their 95% upper tolerance levels (UTLs)

THEN: CDPHE will notify the Site and the Cities, and RFETS may propose a change in ambient standards.

Analytes of Interest				
Analytes		Air	Water	Purpose of Monitoring
Radio nuclide	Pu	X	X	High level of public concern. Known carcinogen. Known past releases (within the past 8 years) have exceeded RFCA stream standards and action levels. This provides reasonable cause to expect future releases in excess of RFCA Action Levels.
	U	X	X	Known renal toxicity. Past exceedances provide reasonable cause to expect future releases in excess of RFCA stream standards and action levels.
	Am	X	X	Known carcinogen. Known past exceedances provide reasonable cause to expect future releases in excess of RFCA stream standards and action levels.
	Tritium		X	Is an AOI due to past releases to drinking water supplies
Metals	Be	X	X	Known to cause berylliosis in susceptible individuals when exposed in inhalation. May also cause contact dermatitis. Will be monitored as an indicator of releases from process and waste storage areas.
	Cr		X	Physiological and dermal toxicity. High level of regulatory concern due, in part to the chromic acid of incident of 1989. Low levels can cause significant ecological damage.
	Ag		X	Highly toxic to fish at low levels, if chronic. State of Colorado has temporarily removed its stream standard for silver, while under study. The study has been completed, and the standard will be reinstated at the next triennial review of South Platte stream standards, if not before. Used at RFETS only for photographic development. Routinely accepted by POTWs as municipal waste, but discharge is regulated. May be removed from this list later if data do not support concern.
	Cd		X	Highly toxic to fish at low levels, if chronic. Known human carcinogen (prostate cancer) and depletes physiologic calcium. Used at RFETS in plating processes. Monitoring data for the Interceptor Trench System (ITS) and the proposed discharge of untreated ITS waters into Walnut Creek provide reasonable cause to expect future releases in excess of RFCA Action Levels
	Hardness		X	Required to evaluate metals analyses, due to its effect on solubility to these metals.
Particulates	Total suspended particulates	X		Monitored to provide information on total airborne particulate levels. Filters also used for metals and radionuclides analyses.

Analytes of Interest				
Analytes		Air	Water	Purpose of Monitoring
	PM ₁₀ particulates	X		Monitored to provide information on fine airborne particulate levels. Filters also used for metals and radionuclides analyses.
Volatile Organic Compounds	VOCs	X	X	A variety of volatile organic compounds, some of which are toxic to humans and ecology. Known discharges to air and water as well as groundwater infiltration.
Real Time Monitoring of Physical and Indicator Parameters (Note A)	PH		X	Toxicity to humans and ecology. Regulatory concern due to chronic acid incident. Real-time monitoring is an inexpensive and effective method of detecting acid spills such as (chromic acid or plutonium nitrate) or failure of treatment systems.
	Conductivity		X	Conductivity is an indicator of total dissolved solids, metals, anions, and pH. Real-time monitoring of conductivity is an inexpensive indicator of overall water quality.
	NO ₃		X	Past releases near RFCA stream standards and action levels upstream of ponds provide reasonable cause to expect future releases in excess of RFCA stream standards and action levels. ITS discharges are often high in nitrate, and may challenge RFCA action levels.
	Flow		X	Required to detect flow events, evaluate contaminant loads and plan pond operations and discharges. Affects nearly every decision rule, and is the most commonly discussed attribute of RFETS surface waters.
	Oxides of Nitrogen	X		Monitored due to RFETS historical use of nitric acid.
	Ozone	X		Monitored as part of the CDPHE network. Not required or part of monitoring for RFETS.
	Wind speed	X		Monitored to provide emergency response modeling information.
	Wind direction	X		Monitored to provide emergency response modeling information.
	Temperature	X		Monitored to provide emergency response modeling information.

Note A: These parameters provide real-time indication for a wide variety of regulated contaminants, and are also required component for monitoring for AoIs. They require no laboratory analysis and are the RFETS most cost effective defensive monitoring.

NATIONAL AMBIENT AIR QUALITY STANDARDS

POLLUTANT	AVERAGING TIME	STANDARD
Carbon Monoxide (CO)		
Primary Standard	1 Hour ^(a)	35 ppm
Primary Standard	8 Hour ^(a)	9 ppm
Ozone (O ₃)		
Primary and Secondary Standards (up to 1997)	1 Hour ^(b)	0.12 ppm
Primary and Secondary Standards (as of July 1997)	8 Hour ^(c)	0.08 ppm
Nitrogen Dioxide (NO ₂)		
Primary and Secondary Standards	Annual Arithmetic Mean	0.053 ppm
Sulfur Dioxide (SO ₂)		
Primary Standard	Annual Arithmetic Mean	0.030 ppm
Primary Standard	24 Hour ^(a)	0.14 ppm
Secondary Standard	3 Hour ^(a)	0.5 ppm
Particulates (PM ₁₀)		
Primary and Secondary Standards	Annual Arithmetic Mean ^(d)	50 µg/m ³
Primary and Secondary Standards	24 Hour ^(b) prior to July 1997, ^(e) as of July 1997	150 µg/m ³
Fine Particulates (PM _{2.5}) (as of July 1997)		
Primary and Secondary Standards	Annual Arithmetic Mean ^(d)	15.0 µg/m ³
Primary and Secondary Standards	24 Hour ^(f)	65 µg/m ³
Lead (Pb)		
Primary and Secondary Standards	Calendar Quarter Average	1.5 µg/m ³
Total Suspended Particulates (TSP)		
Primary Standard	Annual Geometric Mean ^(g)	75 µg/m ³
Primary Standard	24 Hour ^(g)	260 µg/m ³
Secondary Standard	Annual Geometric Mean ^(g)	60 µg/m ³
Secondary Standard	24 Hour ^(g)	150 µg/m ³

- (a) Not to be exceeded more than once per year.
- (b) Statistically estimated number of days with concentrations above this level averaged over a three-year period, is not to be more than 1 per year.
- (c) The three-year average of the fourth maximum value for each year is not to exceed this level.
- (d) The average of three years of annual averages (based on quarterly averages) is not to exceed this level.
- (e) The three-year average of the 99th percentile for each year is not to exceed this level.
- (f) The three-year average of the 98th percentile for each year is not to exceed this level.
- (g) The TSP standard was replaced by the PM₁₀ standard on July 1, 1987. TSP is now a State standard only and was temporarily suspended from 30 August 1993 to 30 October 1995 by the AQCC.

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**Colorado Water Quality Control Commission Standards for
Radioactive Materials at and around RFETS**

	SEGMENT 2 Standley Lake	SEGMENT 3 Great Western Reservoir	SEGMENTS 4a and 5 Woman Creek	SEGMENTS 4a, 4b and 5 Walnut Creek
Gross Alpha (pCi/L)	6	5	7	11
Gross Beta (pCi/L)	9	12	8	19
Plutonium (pCi/L)	0.03	0.03	0.15*	0.15 *
Americium (pCi/L)	0.03	0.03	0.15*	0.15 *
Tritium (pCi/L)	500	500	500	500
Uranium (pCi/L)	3	4	11	10

* The modification is a narrative standard requiring that the concentration of americium and plutonium be consistent with attaining the numerical water quality standard in Segment 4(b) of Big Dry Creek

Standards for Inorganics and Metals

Inorganic/Metal	SEGMENTS 4a & 4b Standards (µg/L)	SEGMENT 5 Action Levels (µg/L)
Ammonia	*	*
Beryllium, total recoverable	4	4
Cadmium, dissolved **	1.5	1.5
Cadmium, Total recoverable	5	-
Chloride	250,000	250,000
Chromium (VI), dissolved**	11	11
Copper, dissolved**	16	16
Iron, dissolved	300	-
Iron, total recoverable	1000	1000
Manganese, dissolved**	50	1000
Manganese, total recoverable	200	-
Nitrate	10,000	100,000 TM
Nitrite	500	4500 TM
Phosphate, ortho	-	-
Phosphate, total	-	-
Selenium, dissolved**	5	5
Silver, dissolved**	0.59	0.59
Sulfate	250,000	250,000
Sulfide	2	2

*There is no unionized ammonia standard for Segment 5 or Segment 4b. A standard of 0.1 mg/L applies to Segment 4a.

**The standards for these metals were calculated using a formula based on hardness. A hardness value of 143 mg/L was used because this is the average hardness found in these waters.

TM – Temporary Modification

EPA Method 524.2 for VOCs in Surface Waters

VOCs	MCL (µg/L)	MDL (µg/L)	PQL (µg/L)	VOCs	MCL (µg/L)	MDL (µg/L)	PQL (µg/L)
1,1,2-Tetrachloroethane	none	0.5	0.5	Chloroform	5.7	0.5	0.5
1,1,1-Trichloroethane	200	0.5	0.5	Chloromethane	none	0.5	0.5
1,1,2,2-Tetrachloroethane	0.18	0.5	0.5	Dibromochloromethane	none	0.5	0.5
1,1,2-Trichloroethane	3	0.5	0.5	Dibromomethane	none	0.5	0.5
1,1-Dichloroethane	none	0.5	0.5	Dichlorodifluoromethane	none	0.5	0.5
1,1-Dichloroethene	7	0.5	0.5	Ethylbenzene	700	0.5	0.5
1,1-Dichloropropene	none	0.5	0.5	Fluorotrichloromethane	none	0.5	0.5
1,2,3-Trichlorobenzene	none	0.5	0.5	Hexachlorobutadiene	14	0.5	0.5
1,2,3-Trichloropropane	none	0.5	0.5	Isopropylbenzene	none	0.5	0.5
1,2,4-Trichlorobenzene	70	0.5	0.5	Naphthalene	28	0.5	0.5
1,2,4-Trimethylbenzene	none	0.5	0.5	Propylbenzene	none	0.5	0.5
1,2-Dichlorobenzene	600	0.5	0.5	Styrene	100	0.5	0.5
1,2-Dichloroethane	0.38	0.5	0.5	Tetrachloroethene	5	0.5	0.5
1,2-Dichloropropane	0.52	0.5	0.5	Toluene	1000	0.5	0.5
1,3,5-Trimethylbenzene	none	0.5	0.5	Trichloroethene	5	0.5	0.5
1,3-Dichlorobenzene	600	0.5	0.5	Vinyl chloride	2	0.5	0.5
1,3-Dichloropropane	none	0.5	0.5	Xylene, (total)	10,000	0.5	0.5
1,4-Dichlorobenzene	75	0.5	0.5	cis-1,2-Dichloroethene	70	0.5	0.5
2,2-Dichloropropane	none	0.5	0.5	cis-1,3-Dichloropropene	none	0.5	0.5
2-Chlorotoluene	none	0.5	0.5	n-Butylbenzene	none	0.5	0.5
4-Chlorotoluene	none	0.5	0.5	sec-Butylbenzene	none	0.5	0.5
4-Isopropyltoluene	none	0.5	0.5	tert-Butylbenzene	none	0.5	0.5
Benzene	1.2	0.5	0.5	trans-1,2-Dichloroethene	100	0.5	0.5
Bromobenzene	none	0.5	0.5	trans-1,3-Dichloroethene	none	0.5	0.5
Chloroethane	none	0.5	0.5	Methylene Chloride	4.7	0.5	0.5
Bromodichloromethane	0.56	0.5	0.5				
Bromoform	4.3	0.5	0.5				
Carbon Tetrachloride	0.27	0.5	0.5				
Chlorobenzene	100	0.5	0.5				
Chloroethane	none	0.5	0.5				
1,1-Dichloropropene	none	0.5	0.5				

EPA Method 515.1 for Chlorinated Acid Herbicides

Contaminant	MDL (µg/L)	PQL (µg/L)	Contaminant	MDL (µg/L)	PQL (µg/L)
Acifluorfen	0.3	3	3,5-Dichlorobenzoic acid	0.8	8
Bentazon	0.4	4	Dichlorprop	0.3	3
Cloramben	1.2	12	Dinoseb	0.6	6
2,4-D	0.3	3	4-Nitrophenol	0.8	8
Dalapon	0.7	7	Pentachlorophenol	0.6	6
2,4-DB	0.5	5	Picloram	0.5	5
DCPA	0.4	4	2,4,5-T	0.3	3
Dicamba	0.3	3	2,4,5-TP	0.3	3

EPA Method 525.2 for SVOCs in Surface Waters

SVOCs	MCL (µg/L)	MDL (µg/L)	PQL (µg/L)	SVOCs	MCL (µg/L)	MDL (µg/L)	PQL (µg/L)
1,2,4-Trichlorobenzene	none	5	10	Benzo(a)anthracene	none	5	10
1,2-Dichlorobenzene	none	5	10	Benzo(a)anthracene	0.2	5	10
1,3-Dichlorobenzene	none	5	10	Benzo(b)fluoranthene	none	5	10
1,4-Dichlorobenzene	none	5	10	Benzo(ghi)perylene	none	5	10
2,4,5-Trichlorophenol	none	5	10	Benzo(k)fluoranthene	none	5	10
2,4,6-Trichlorophenol	none	5	10	Butyl benzyl phthalate	none	5	10
2,4-Dichlorophenol	none	5	10	Chrysene	none	5	10
2,4-Dimethylphenol	none	5	10	Di-n-butylphthalate	none	5	10
2,4-Dinitrophenol	none	25	10	Di-n-octylphthalate	none	5	10
2,4-Dinitrotoluene	none	5	10	Dibenz(a,h)anthracene	none	5	10
2-Chloronaphthalene	none	5	10	Dibenzofuran	none	5	10
2-Methyl-4,6-dinitrophenol	none	25	50	Diethyl phthalate	none	5	10
2-Chlorophenol	none	5	10	Dimethyl phthalate	none	5	10
2-Methylnaphthalene	none	5	10	Hexachlorobutadine	none	5	10
2-Methylphenol	none	5	10	Hexachlorocyclopentadiene	50	5	10
2-Nitroaniline	none	5	10	Hexachloroethane	none	5	10
2-Nitrophenol	none	5	10	Indeno(1,2,3-cd)pyrene	none	5	10
3,3-Dichlorobenzidine	none	5	10	Isophorone	none	5	10
3-Nitroaniline	none	25	50	N-Nitosodi-n-propylamine	none	5	10
4-Bromophenylphenylether	none	5	10	N-Nitrosodiphenylamine	none	5	10
4-Chloro-3-methylphenol	none	10	20	Naphthalene	none	5	10
4-Chloroaniline	none	10	20	Nitrobenzene	none	5	10
4-Chlorophenylphenylether	none	5	10	Pentachlorophenol	1	25	10
4-Methylphenol	none	5	10	Phenanthrene	none	5	10
4-Nitroaniline	none	25	50	Phenol	none	5	10
4-Nitrophenol	none	25	50	Pyrene	none	5	10
Acenaphthene	none	5	10	bis(2-Chloroethoxy)methane	none	5	10
Acenaphthylene	none	5	10	bis(2-Chloroethyl) ether	none	5	10
Anthracene	none	5	10	bis(2-Ethylhexyl) phthalate	6	5	10

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AIR RESULTS

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CDPHE AIR MONITORING

THIRD QUARTER 2004

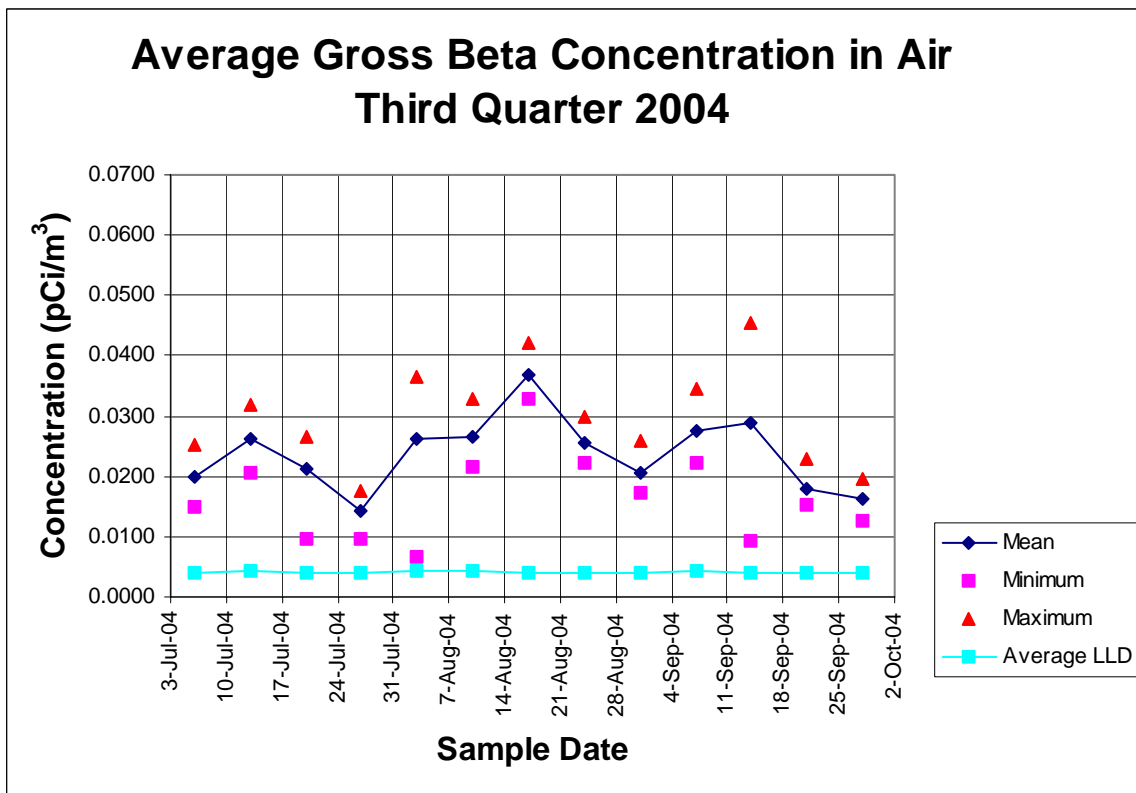
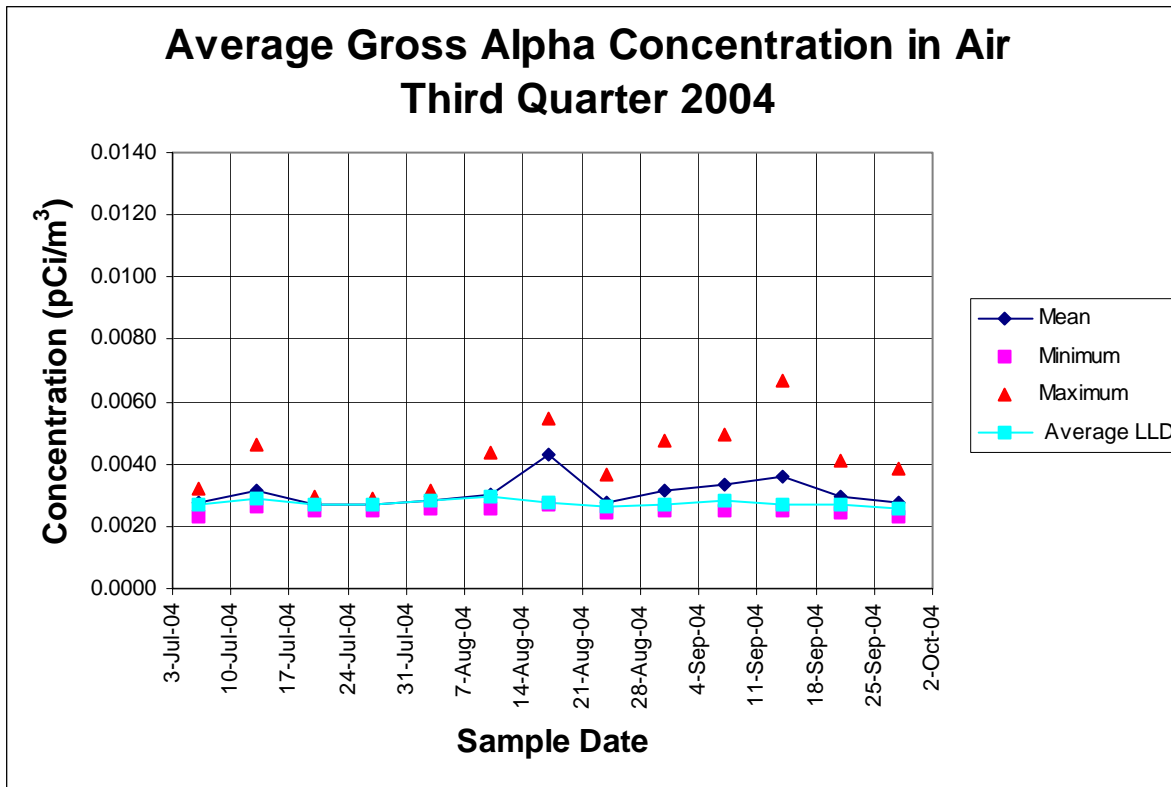
Laboratory Services Division

AIR MONITORING:

Table A contains the complete gross alpha /gross beta results for the third quarter 2004. These data show no obvious anomalies, compared to historical data. Table B contains alpha spectrometric data for both the first and second quarters of 2004. These data are all consistent with historical measurements. Table C contains final isotopic results for the filters collected during the Building 774 demolition project that showed unusually high gross alpha radioactivity. Discrepancies between the isotopic totals and gross alpha values are attributed to the relatively high uncertainties of the gross alpha measurements.

2. Graphical Presentation

Graphs of pertinent and abnormal data from air monitoring are presented in this section.



Environmental Surveillance Report

**TABLE A: GROSS ALPHA AND GROSS BETA RADIOACTIVITY CONCENTRATIONS
IN SUSPENDED AIRBORNE PARTICULATE MATERIAL**

THIRD QUARTER 2004

Location	Sampler Type	Number of Samples	Gross Alpha			Gross Beta			
			Mean pCi/m ³	Max pCi/m ³	Min pCi/m ³	Mean pCi/m ³	Max pCi/m ³	Min pCi/m ³	
INDUSTRIAL AREA SAMPLERS									
D-1	TSP	10	<	0.0024	0.0044	0.0011	0.0222	0.0310	0.0132
E-1-T	TSP	13	<	0.0021	0.0031	0.0010	0.0208	0.0328	0.0066
BUFFER ZONE SAMPLERS									
D-9	TSP	13	<	0.0018	0.0030	0.0006	0.0191	0.0233	0.0104
D-10	TSP	13	<	0.0032	0.0067	0.0001	0.0251	0.0384	0.0119
D-15	TSP	13	<	0.0024	0.0047	0.0004	0.0248	0.0364	0.0154
E-2-T	TSP	12	<	0.0023	0.0036	0.0012	0.0239	0.0333	0.0161
SITE BOUNDARY SAMPLERS									
X-1	TSP	13	<	0.0020	0.0032	0.0008	0.0239	0.0456	0.0125
X-2	TSP	13	<	0.0025	0.0055	-0.0001	0.0226	0.0408	0.0132
X-3	TSP	9	<	0.0019	0.0027	0.0011	0.0205	0.0279	0.0097
X-4	TSP	12	<	0.0026	0.0052	0.0001	0.0278	0.0422	0.0096
X-5	TSP	9	<	0.0027	0.0041	0.0013	0.0216	0.0328	0.0123

TSP = Total Suspended Particulates
PM10 = Particulate Material < 10 microns in diameter

Environmental Surveillance Report

TABLE B: ALPHA SPECTROMETRIC ANALYSIS AND LONG-LIVED GROSS ALPHA RADIOACTIVITY CONCENTRATIONS IN SUSPENDED AIRBORNE PARTICULATE MATERIAL

FIRST QUARTER 2004

								Mean
LOCATION	SAMPLER	²³⁹⁺²⁴⁰ Pu	²⁴¹ Am	²³⁹⁺²⁴⁰ Pu/ ²⁴¹ Am	²³⁴ U	²³⁵ U	²³⁸ U	Gross Alpha
	TYPE	pCi/M ³	pCi/M ³	Ratio	pCi/M ³	pCi/M ³	pCi/M ³	pCi/M ³
D-1	TSP/Continuous	0.000021 ± 0.000005	< 0.000006	---	0.000033	< 0.000004	0.000032	< 0.0017
D-15	TSP/Continuous	0.000023 ± 0.000004	< 0.000005	---	<0.000028	< 0.000006	<0.000022	< 0.0017
X-1	TSP/Continuous	< 0.000006	< 0.000003	---	0.000028	< 0.000004	0.000022	< 0.0020
X-2	TSP/Continuous	< 0.000004	< 0.000004	---	0.000034	< 0.000005	0.000034	< 0.0020
X-3	TSP/Continuous	0.000004 ± 0.000002	< 0.000004	---	0.000027	< 0.000004	<0.000018	< 0.0016
X-4	TSP/Continuous	< 0.000004	< 0.000003	---	0.000023	< 0.000004	<0.000019	< 0.0023
X-5	TSP/Continuous	< 0.000003	< 0.000007	---	0.000056	< 0.000006	0.000040	< 0.0022

pCi/m³ = Picocuries per cubic meter

TSP = Total Suspended Particulates

Continuous = continuous sampling

Environmental Surveillance Report

**TABLE B: ALPHA SPECTROMETRIC ANALYSIS AND LONG-LIVED GROSS ALPHA RADIOACTIVITY
CONCENTRATIONS IN SUSPENDED AIRBORNE PARTICULATE MATERIAL**

SECOND QUARTER 2004

								Mean
LOCATION	SAMPLER	²³⁹⁺²⁴⁰ Pu	²⁴¹ Am	²³⁹⁺²⁴⁰ Pu/ ²⁴¹ Am	²³⁴ U	²³⁵ U	²³⁸ U	Gross Alpha
	TYPE	pCi/M³	pCi/M³	Ratio	pCi/M³	pCi/M³	pCi/M³	pCi/M³
D-1	TSP/Continuous	0.000047 ± 0.000007	0.000006 ± 0.000003	7.8 ± 4.1	0.000043	< 0.000007	0.000045	< 0.0019
D-15	TSP/Continuous	0.000039 ± 0.000008	< 0.000003	---	0.000032	< 0.000006	0.000034	< 0.0020
X-1	TSP/Continuous	0.000007 ± 0.000002	< 0.000004	---	<0.000015	< 0.000003	<0.000016	< 0.0022
X-2	TSP/Continuous	< 0.000003	< 0.000003	---	0.000043	< 0.000005	0.000035	< 0.0019
X-3	TSP/Continuous	< 0.000003	< 0.000002	---	0.000028	< 0.000006	<0.000028	< 0.0017
X-4	TSP/Continuous	< 0.000005	< 0.000003	---	<0.000077	< 0.000016	<0.000078	< 0.0028
X-5	TSP/Continuous	0.000004 ± 0.000002	< 0.000004	---	0.000046	< 0.000005	0.000047	< 0.0029

pCi/m³ = Picocuries per cubic meter

TSP = Total Suspended Particulates

Continuous = continuous sampling

Environmental Surveillance Report

TABLE C: Preliminary Isotopic Results for Bldg 774 Air Samples Exceeding Detection Limits

SECOND QUARTER 2004

Date	Sample r Type	Gross Alpha Activity	²³⁹⁺²⁴⁰ Pu pCi/M ³	²⁴¹ Am pCi/M ³	²³⁴ U pCi/M ³	²³⁵ U pCi/M ³	²³⁸ U pCi/M ³
2-Apr-04	B1	0.045 ± 0.019	0.024 ± 0.003	0.008 ± 0.001			
24-Apr-04	B3(Hot Particle)	0.083 ± 0.031	0.080 ± 0.020	0.020 ± 0.009	<0.2	<0.04	<0.2
26-Apr-04	B3	0.47 ± 0.06	0.24 ± 0.02	0.04 ± 0.01	<0.00019	<0.00004	<0.00019
27-Apr-04	B1	0.23 ± 0.04	0.33 ± 0.06	0.06 ± 0.01	<0.0002	<0.00004	0.0003
27-Apr-04	B2	0.43 ± 0.06	0.16 ± 0.02	0.10 ± 0.01	0.0002	<0.00004	0.0002

pCi/m³ = Picocuries per cubic meter

TSP = Total Suspended Particulates

Continuous = continuous sampling

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WATER RESULTS

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CDPHE Surface Water Sampling

Third Quarter 2004

Surface water sampling conducted by CDPHE for the Third Quarter 2004, included:

- Wastewater Treatment Plant (WWTP) influent samples from Building 995 and from the north and south parts of the sewer system were collected from Building 990 on September 22, 2004. Samples from WWTP influent samples from Building 995 were also taken on July 14, 2004 and August 17, 2004.
- Pre-discharge samples were collected from Pond A-4 on July 21, 2004, and from Pond B-5 on August 31, 2004, and from Pond C-2 on July 21, 2004 and August 10, 2004.
- Nitrate and performance monitoring samples were taken from North and South Walnut Creek on September 24, 2004. Ponds B-1 and B2 were not sampled on September 24, 2004 because the pond were unsafe to approach. A VOC sample was taken from GS-09. Nitrate samples were taken at SW-093, GS-13, A3, A4, B-3, B5, SW-118, B-3 (EFFL) GS-10, and SW-114. Chloride samples were taken at SW-093, GS-13, A3, B-3 (EFFL), GS-10, and SW-114. Metals samples were taken at GS-9, GS-13, and SW-114. Property boundary sample point GS-01 was dry.

Table G provides a summary of the sample activity and parameters collected by CDPHE. Table H presents inorganic results and Table I presents VOC results. Several samples from this quarter await analysis.

Wastewater Treatment Plant Influent

WWTP Influent is monitored to evaluate routine and non-routine discharges to the WWTP. The CDPHE sampling supplements sampling conducted by the Site for WWTP operational evaluations and permit requirements. Only the CDPHE results are presented in this document. Reference Table G for monitoring specifics.

Copper, arsenic, chromium, iron, manganese, lithium, selenium, gross alpha, gross beta, plutonium, and uranium were detected in influent samples during this quarter. None of the detections exceeded the respective effluent limit or stream standard

Pre-Discharge Monitoring

The Pre-Discharge sampling program is conducted for compliance evaluation of the Site's ability to discharge storm water and treated wastewater to the Big Dry Creek drainage. Pre-Discharge Monitoring is conducted at the terminal ponds on Walnut Creek (Pond A4 and Pond B5). Typically the

Walnut Creek Ponds A4 and B5 are discharged 8-10 times per years and Woman Creek Pond C2 once a year. Sampling is conducted by both the Site and CDPHE. Only the CDPHE results are presented in

this document. Reference Table G for monitoring specifics.

This quarters' pre-discharge samples from Ponds A-4 and B-5 did not exhibit any concentrations above established RFCA action levels or applicable WQCC stream standards. However, pre-discharge sample analysis from Pond C-2 showed elevated gross beta. The concentrations were measured at 10 ± 4 pCi/Liter in July and August. The standard is 8 pCi/Liter. No elevated plutonium or americium concentrations were observed.

Point of Compliance - Surface Water Results

Point of Compliance monitoring is conducted below the terminal ponds and at the Site boundary along Indiana Street, on both Walnut and Woman Creek. Point of Compliance monitoring is conducted to evaluate Site compliance with WQCC stream standards and RFCA action levels, as appropriate. Point of Compliance monitoring activities are shared between CDPHE and the Site. Only the CDPHE monitoring results are presented in this document. Reference Table G for monitoring specifics. Samples from SW-114 did not exhibit any concentrations above established RFCA action levels or applicable WQCC stream standards.

Nutrient Sampling - North Walnut Creek

This *Ad Hoc* program conducted by CDPHE monitors nutrient concentrations related to nitrate and ammonia in the North and South Walnut Creek drainages as a result of Sewage Treatment Plant Operations and Solar Pond Groundwater Plume. The nitrate profile in the Walnut Creek drainages exhibits a pattern of elevated levels in excess of the underlying standard, since the time the French drain and active treatment system for the solar pond area was dismantled and discontinued, and the installation of the passive solar pond plume passive treatment project. Historically the highest exceedences are at GS-13, which more represent the full impact of the solar pond nitrate plume into North Walnut Creek.

These quarters' nitrate results ranged from <0.3 mg/L to 60 mg/L. All results were less than the temporary modification of 100 mg/L. The normal Colorado standard for nitrate is 10 mg/L.

These quarters' total ammonia results ranged from 0.04 mg/L to 0.48 mg/L. Calculating for unionized ammonia exhibited concentrations ranging from 0.0011 to 0.009 mg/L, compared against the conservative unionized standard of 0.1 mg/L (segment 4a stream standard), no samples exceed the stream standard.

Performance Monitoring – Mound/East Trench Plume

The Mound and East Trenches groundwater contaminant plumes contain volatile organic compounds (VOCs) and select metals. Groundwater collection and treatment systems are in place and appear to be effective. However, it is possible that some contaminated groundwater either was down gradient of the collection systems before installation, or that some groundwater may be by-passing the collection trenches. There is no in-stream monitoring specified in the Decision Documents for these systems that can either verify or disprove this. In order to ensure that stream standards are being attained, monitoring for VOCs and selected metals was commenced during second quarter 2002 in South

Walnut Creek in the immediate vicinity of where the groundwater contamination plumes may be intersecting the stream.

Water levels in Ponds B-1 and B-2 were too low to sample this quarter. Springs were visible on the south side of Pond B-2. A trace amount of toluene was found in Pond B-4.

Performance Monitoring – Solar Pond Plume

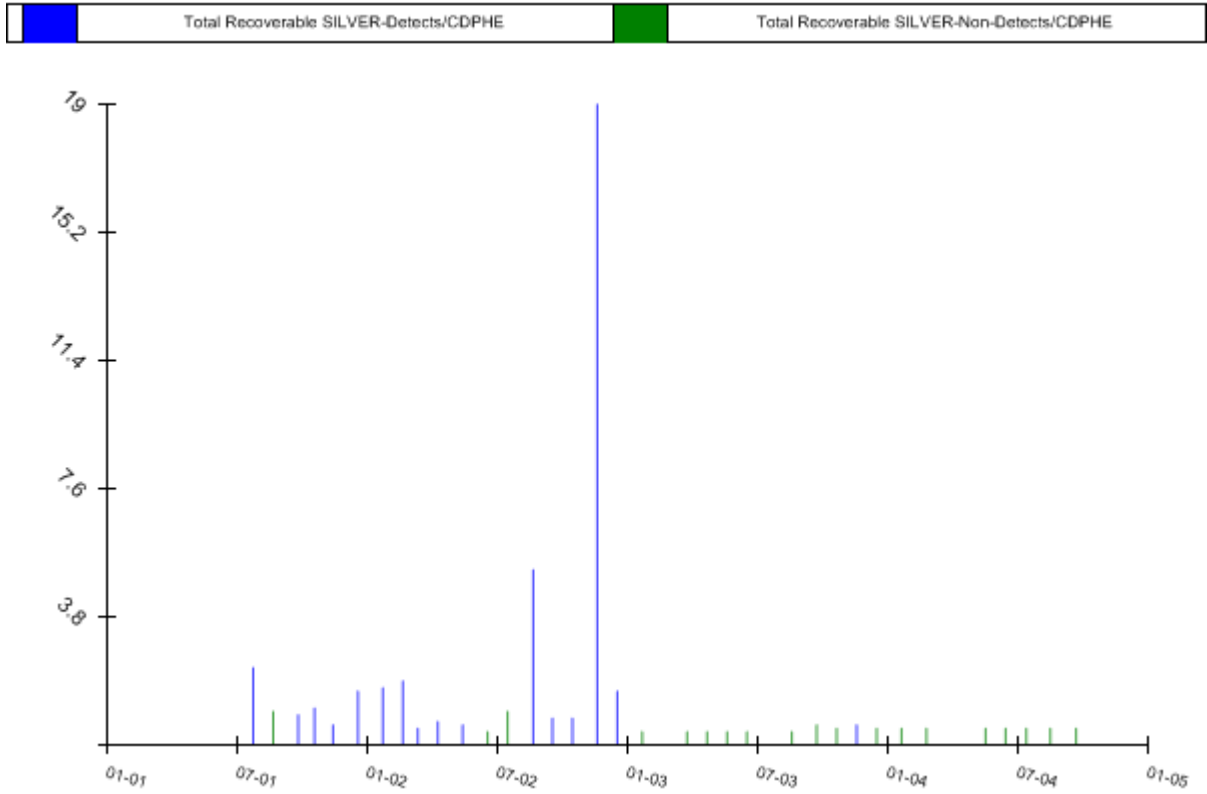
The Solar Ponds groundwater contaminant plume contains high levels of nitrates and uranium, and lower concentrations of several other metals. Groundwater collection and treatment systems have been installed, and the treatment appears to be effective. However, it is possible that some contaminated groundwater either was already down gradient of the collection system before it was installed, or, that some groundwater may be bypassing the collection trench.

While the Site monitors in-stream uranium concentrations, CDPHE will perform in-stream monitoring for metals. This data will be used in order to ensure that stream standards are being attained. It should be noted that both the Site and CDPHE monitor nitrate concentrations at this location, and the CDPHE nitrate monitoring is described in the ad-hoc section of this ESR.

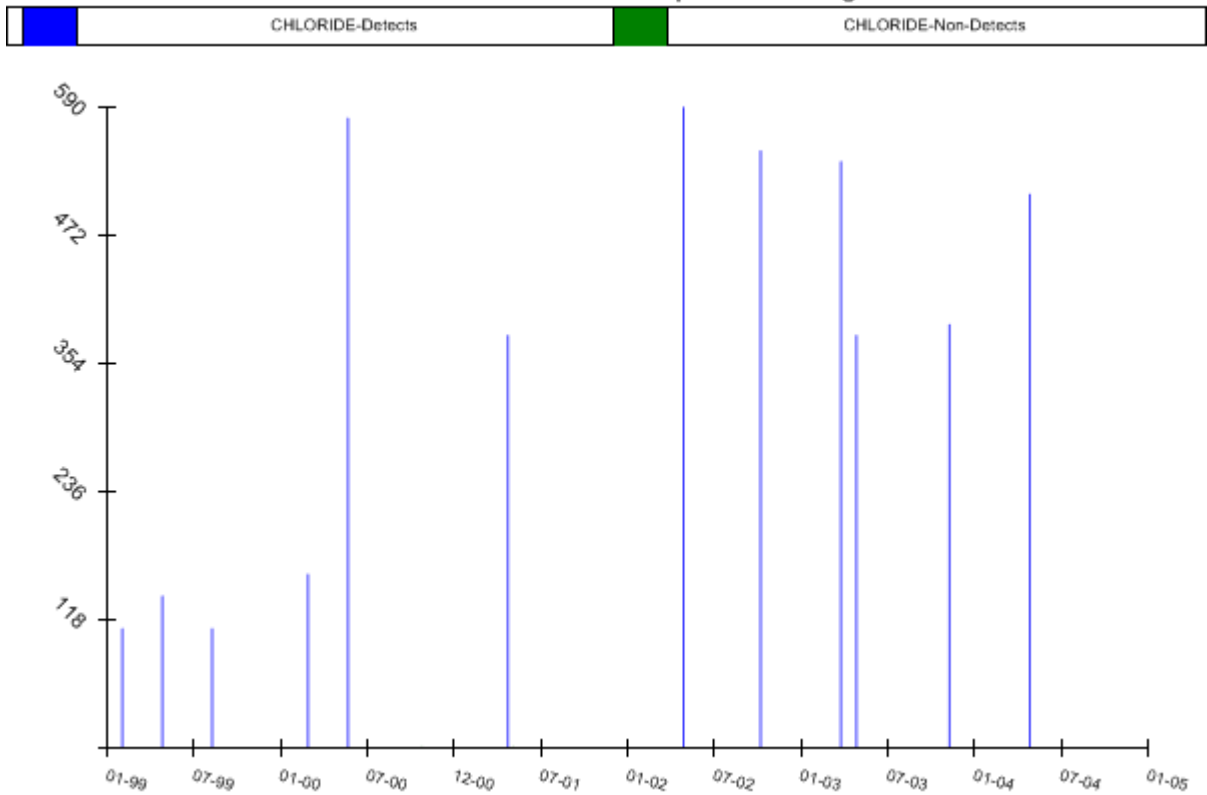
No exceedance of nitrate or metal surface water standards were found this quarter.

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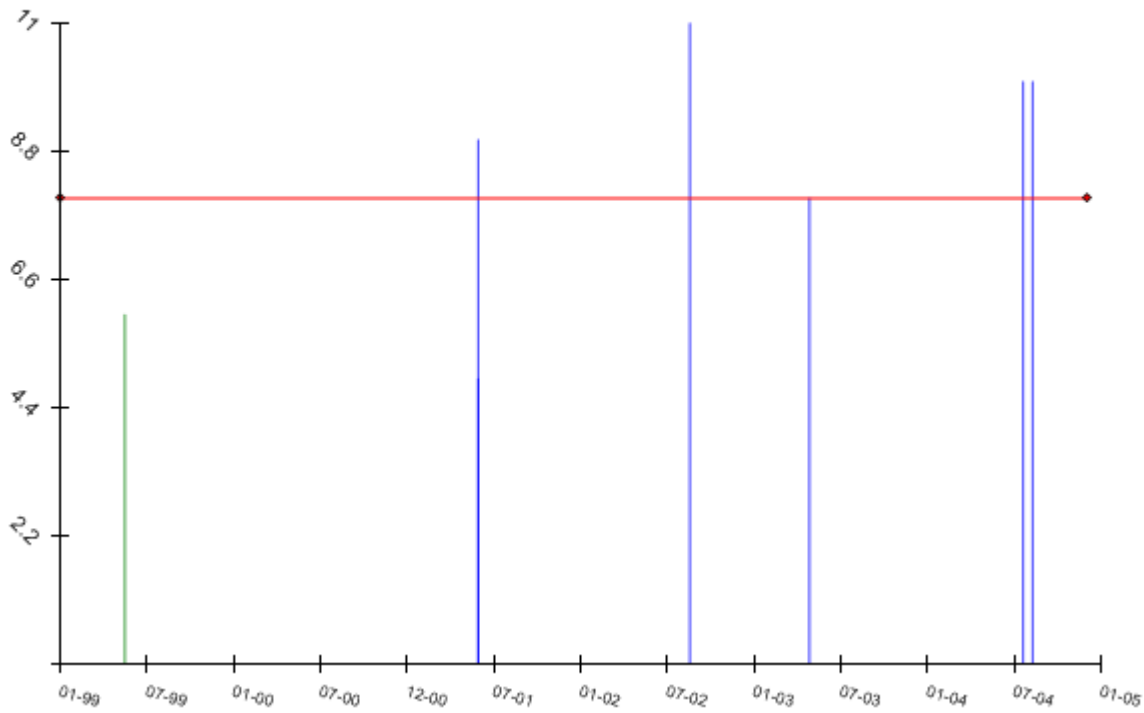
Total Recoverable SILVER at 995INF reported in UG/L



CHLORIDE at SWA4 reported in mg/L



Total GROSS BETA at SWC2 reported in PCI/L



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TABLE G – CDPHE SURFACE WATER MONITORING PROGRAM

Sampling Frequencies for Listed Locations & Parameters			Pre Discharge		Treatment Plant Influent		Performance Monitoring		Ad Hoc Program	Stream Segment 4, POC Monitoring, Non-POC Monitoring at Indiana					
Parameter or Method	Method	Total # Analyses Per Year All Sites	Pond A4 or Pond B5	Pond C2	Bldg 995 Following Equalization Basin	: Bldg 990 N. & S. Interceptors Prior to Equalization Basin	Mound/ East Trenches Plume (footnote a)	Solar Pond Plume	Nitrate Study 8 Stations (footnote b)	During Pond Releases (footnote c)		Dry Weather Flow - No Pond Release		Following Storm Events - No Pond Release ^d	
			SWA4 or SWB5	SWC2	INFL	990 INFL_N 990 INFL_S	SWB1, SWB2, SWB3, GS09	GS13	various	SW114 (GS03) Walnut Ck	SW001 (GS01) Woman Ck	SW114 (GS03) Walnut Ck	SW001 (GS01) Woman Ck	SW114 (GS03) Walnut Ck	SW001 (GS01) Woman Ck
Field pH		na	Field pH and Temperature Will be Collected for All Samples >>>>>>>>												
Field Temp, C		na	Field pH and Temperature Will be Collected for All Samples >>>>>>>>												
Field DO		na	10/yr ¹	1/yr ¹											
RADS - Total (unfiltered), RUSH															
Americium - 241	TRU SPEC	11	10/yr ¹	1/yr ¹											
Plutonium - 239/240	TRU SPEC	11	10/yr ¹	1/yr ¹											
Gross Alpha	900.0	11	10/yr ¹	1/yr ¹											
Gross Beta	900.0	11	10/yr ¹	1/yr ¹											
RADS - Total (unfiltered)															
Americium - 241	TRUSP EC	20			Monthly ²	Quarterly ¹									
Plutonium - 239/240	TRUSP EC	20			Monthly ²	Quarterly ¹									
Gross Alpha	900.0	20			Monthly ²	Quarterly ¹									
Gross Beta	900.0	20			Monthly ²	Quarterly ¹									
Uranium, Fluorometric	908.0	25	Quarterly ¹	1/yr ¹	Monthly ²	Quarterly ¹									
Metals - Dissolved (filtered)															
Ag	200.8	22 - 26	Quarterly ¹	1/yr ¹			Quarterly ¹	Quarterly ¹		Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹
Cu	200.8	22 - 26	Quarterly ¹	1/yr ¹			Quarterly ¹	Quarterly ¹		Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹
Mn	200.7	22 - 26	Quarterly ¹	1/yr ¹			Quarterly ¹	Quarterly ¹		Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹
Ni	245.1	22 - 26	Quarterly ¹	1/yr ¹			Quarterly ¹	Quarterly ¹		Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹
Se	200.8	22 - 26	Quarterly ¹	1/yr ¹			Quarterly ¹	Quarterly ¹		Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹

Metals - Total Recoverable

TABLE G – CDPHE SURFACE WATER MONITORING PROGRAM

Sampling Frequencies for Listed Locations & Parameters			Pre Discharge		Treatment Plant Influent		Performance Monitoring		Ad Hoc Program	Stream Segment 4, POC Monitoring, Non-POC Monitoring at Indiana					
Parameter or Method	Method	Total # Analyses Per Year All Sites	Pond A4 or Pond B5	Pond C2	Bldg 995 Following Equalization Basin	: Bldg 990 N. & S. Interceptors Prior to Equalization Basin	Mound/ East Trenches Plume (footnote a)	Solar Pond Plume	Nitrate Study 8 Stations (footnote b)	During Pond Releases (footnote c)		Dry Weather Flow - No Pond Release		Following Storm Events - No Pond Release ^d	
			SWA4 or SWB5	SWC2	INFL	990 INFL_N 990 INFL_S	SWB1, SWB2, SWB3, GS09	GS13	various	SW114 (GS03) Walnut Ck	SW001 (GS01) Woman Ck	SW114 (GS03) Walnut Ck	SW001 (GS01) Woman Ck	SW114 (GS03) Walnut Ck	SW001 (GS01) Woman Ck
(unfiltered)															
As	200.8	42 - 46	Quarterly ¹	1/yr ¹	Monthly ²	Quarterly ¹	Quarterly ¹	Quarterly ¹		Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹
Be	200.8	42 - 46	Quarterly ¹	1/yr ¹	Monthly ²	Quarterly ¹	Quarterly ¹	Quarterly ¹		Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹
Cd	200.8	42 - 46	Quarterly ¹	1/yr ¹	Monthly ²	Quarterly ¹	Quarterly ¹	Quarterly ¹		Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹
Cr(VI) dslvd??	200.8	42 - 46	Quarterly ¹	1/yr ¹	Monthly ²	Quarterly ¹	Quarterly ¹	Quarterly ¹		Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹
Fe	200.7	42 - 46	Quarterly ¹	1/yr ¹	Monthly ²	Quarterly ¹	Quarterly ¹	Quarterly ¹		Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹
Lithium	200.8	42 - 46	Quarterly ¹	1/yr ¹	Monthly ²	Quarterly ¹	Quarterly ¹	Quarterly ¹		Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹
Thallium	200.8	42 - 46	Quarterly ¹	1/yr ¹	Monthly ²	Quarterly ¹	Quarterly ¹	Quarterly ¹		Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹
Special TR Metals (unfiltered) For STP Influent - until domestic sewage contributions are discontinued:															
Ag	200.8	20			Monthly ²	Quarterly ¹									
Cu	200.7	20			Monthly ²	Quarterly ¹									
Mn dslvd??	200.7	20			Monthly ²	Quarterly ¹									
Ni	245.1	20			Monthly ²	Quarterly ¹									
Se	200.8	20			Monthly ²	Quarterly ¹									
Hardness as CaCO3	130.2	22-26	Quarterly ¹	1/yr ¹			Quarterly ¹	Quarterly ¹		Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹
Organic Analyses															
VOCs	502.2	8					Semi-Annual ¹								

TABLE G – CDPHE SURFACE WATER MONITORING PROGRAM

Sampling Frequencies for Listed Locations & Parameters			Pre Discharge		Treatment Plant Influent		Performance Monitoring		Ad Hoc Program	Stream Segment 4, POC Monitoring, Non-POC Monitoring at Indiana					
Parameter or Method	Method	Total # Analyses Per Year All Sites	Pond A4 or Pond B5	Pond C2	Bldg 995 Following Equalization Basin	: Bldg 990 N. & S. Interceptors Prior to Equalization Basin	Mound/ East Trenches Plume (footnote a)	Solar Pond Plume	Nitrate Study 8 Stations (footnote b)	During Pond Releases (footnote c)		Dry Weather Flow - No Pond Release		Following Storm Events - No Pond Release ^d	
			SWA4 or SWB5	SWC2	INFL	990 INFL_N 990 INFL_S	SWB1, SWB2, SWB3, GS09	GS13	various	SW114 (GS03) Walnut Ck	SW001 (GS01) Woman Ck	SW114 (GS03) Walnut Ck	SW001 (GS01) Woman Ck	SW114 (GS03) Walnut Ck	SW001 (GS01) Woman Ck
Nutrients/Inorganics															
Ammonia as N	350.2	52 - 56	10/yr ¹	1/yr ¹					Quarterly ¹	Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹
Nitrite/Nitrate as N	353.2	52 - 56	10/yr ¹	1/yr ¹					Quarterly ¹	Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹
Phosphate, T	365.1	20 - 24	10/yr ¹	1/yr ¹						Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹
Orthophosphate	365.2	20 - 24	10/yr ¹	1/yr ¹						Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹
Solids, total suspended	160.1	40 - 44	10/yr ¹	1/yr ¹	Monthly ¹	Quarterly ¹				Quarterly ¹	1/yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹	2 / yr ¹
Chloride	325.3	5	Quarterly ¹	1/yr ¹											

^a Metals and hardness monitoring will be conducted at GS09, below Pond B4. VOC monitoring will be conducted in Ponds B-1 and B-2 from the surface, and at the outfall from Ponds B-3 and below B-4 at GS09. VOC monitoring will be conducted in late fall

^b Nitrate Special Study Stations: SW118, SW093, GS13, Pond A-4, GS10, EFFL, Pond B-5, SW114. Station EFFL is the outfall from the STP.

^c Metals monitoring at Indiana Street "During Pond Releases", will be conducted for those pond discharges where metals monitoring was done for the Pre-Discharge sample.

^d "Storm Event / No Pond Release" related monitoring may be conducted by the Site as part of its Buffer Zone Hydrologic Monitoring Program. If not, the State will attempt to schedule grab sample collection.

¹ Grab Sample

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Environmental Surveillance
TABLE H - INORGANIC ANALYSIS OF SURFACE WATER
THIRD QUARTER 2004

Location	Sample Date	Parameter	Analysis	Units	*Analysis*	
					1st	2nd
	7/14/2004					
		pH	7.74	Standard Units		
		Temperature	17.5	°C		
		Americium ²⁴¹	< 0.005	pCi/L		
		Gross Alpha	< 5	pCi/L		
		Gross Beta	15 +/- 4	pCi/L		
		Plutonium ²³⁹⁺²⁴⁰	< 0.004	pCi/L		
		Uranium, Total	< 1	ug/L		
		Arsenic, Total Recoverable	0.001	mg/L		
		Beryllium, Total Recoverable	< 0.001	mg/L		
		Cadmium, Total Recoverable	< 0.0006	mg/L		
		Chromium, Total Recoverable	0.006	mg/L		
		Copper, Dissolved	26	ug/L		
		Iron, Total Recoverable	450	ug/L		
		Lithium, Total Recoverable	0.013	mg/L		
		Manganese, Total Recoverable	59	ug/L		
		Nickel, Total Recoverable	< 150	ug/L		
		Selenium, Total Recoverable	0.002	mg/L		
		Silver, Total Recoverable	< 0.0005	mg/L		
		Thallium, Total Recoverable	< 0.001	mg/L		
		Total Suspended Solids	100	mg/L		
	8/17/2004					
		pH	7.48	Standard Units		
		Temperature	19.8	°C		
		Americium ²⁴¹	< 0.007	pCi/L		
		Gross Alpha	< 5	pCi/L		
		Gross Beta	18 +/- 5	pCi/L		
		Plutonium ²³⁹⁺²⁴⁰	< 0.010	pCi/L		
		Uranium, Total	1	ug/L		
		Arsenic, Total Recoverable	0.002	mg/L		
		Beryllium, Total Recoverable	< 0.001	mg/L		
		Cadmium, Total Recoverable	< 0.0006	mg/L		
		Chromium, Total Recoverable	< 0.003	mg/L		
		Copper, Dissolved	< 25	ug/L		
		Iron, Total Recoverable	600	ug/L		
		Lithium, Total Recoverable	0.013	ug/L		
		Manganese, Total Recoverable	0.063	mg/L		
		Nickel, Total Recoverable	< 0.15	mg/L		
		Selenium, Total Recoverable	< 0.001	mg/L		
		Silver, Total Recoverable	< 0.0005	mg/L		
		Thallium, Total Recoverable	< 0.001	mg/L		
		Total Suspended Solids	59	mg/L		
	9/22/2004					
		Americium ²⁴¹	< 0.006	pCi/L		
		Gross Alpha	8 +/- 4	pCi/L		
		Gross Beta	25 +/- 5	pCi/L		
		Plutonium ²³⁹⁺²⁴⁰	0.007 +/- 0.004	pCi/L		
		Uranium, Total	2	ug/L		
		Arsenic, Total Recoverable	< 0.001	mg/L		
		Beryllium, Total Recoverable	< 0.001	mg/L		

Environmental Surveillance
TABLE H - INORGANIC ANALYSIS OF SURFACE WATER
THIRD QUARTER 2004

Location	Sample Date	Parameter	Analysis	Units	*Analysis*	
					1st	2nd
		Cadmium, Total Recoverable	< 0.0006	mg/L		
		Chromium, Total Recoverable	< 0.003	mg/L		
		Copper, Dissolved	< 25	ug/L		
		Iron, Total Recoverable	740	ug/L		
		Lithium, Total Recoverable	0.009	mg/L		
		Manganese, Total Recoverable	66	ug/L		
		Nickel, Total Recoverable	< 150	ug/L		
		Selenium, Total Recoverable	0.0014	mg/L		
		Silver, Total Recoverable	< 0.0005	mg/L		
		Thallium, Total Recoverable	< 0.001	mg/L		
		Total Suspended Solids	62	mg/L		
North Influent to Sewage Treatment Plant (INFL)						
9/22/2004						
		pH	8.36	Standard Units		
		Americium ²⁴¹	< 0.006	pCi/L		
		Gross Alpha	13 +/- 4	pCi/L		
		Gross Beta	28 +/- 5	pCi/L		
		Plutonium ²³⁹⁺²⁴⁰	0.012 +/- 0.005	pCi/L		
		Uranium, Total	< 1	ug/L		
		Arsenic, Total Recoverable	0.021	mg/L		
		Beryllium, Total Recoverable	< 0.001	mg/L		
		Cadmium, Total Recoverable	< 0.0006	mg/L		
		Chromium, Total Recoverable	0.005	mg/L		
		Copper, Dissolved	44	ug/L		
		Iron, Total Recoverable	410	ug/L		
		Lithium, Total Recoverable	0.005	mg/L		
		Manganese, Total Recoverable	60	ug/L		
		Nickel, Total Recoverable	< 150	ug/L		
		Selenium, Total Recoverable	< 0.001	mg/L		
		Silver, Total Recoverable	< 0.0005	mg/L		
		Thallium, Total Recoverable	< 0.001	mg/L		
		Total Suspended Solids	290	mg/L		
South Influent to Sewage Treatment Plant (INFL)						
9/22/2004						
		pH	7.52	Standard Units		
		Americium ²⁴¹	< 0.006	pCi/L		
		Gross Alpha	5 +/- 3	pCi/L		
		Gross Beta	22 +/- 5	pCi/L		
		Plutonium ²³⁹⁺²⁴⁰	< 0.004	pCi/L		
		Uranium, Total	< 1	ug/L		
		Arsenic, Total Recoverable	< 0.001	mg/L		
		Beryllium, Total Recoverable	< 0.001	mg/L		
		Cadmium, Total Recoverable	0.0008	mg/L		
		Chromium, Total Recoverable	< 0.003	mg/L		
		Copper, Dissolved	29	ug/L		
		Iron, Total Recoverable	930	ug/L		
		Lithium, Total Recoverable	0.015	mg/L		
		Manganese, Total Recoverable	72	ug/L		
		Nickel, Total Recoverable	< 150	ug/L		

Environmental Surveillance
TABLE H - INORGANIC ANALYSIS OF SURFACE WATER
THIRD QUARTER 2004

Location	Sample Date	Parameter	Analysis	Units	*Analysis*	
					1st	2nd
		Selenium, Total Recoverable	< 0.001	mg/L		
		Silver, Total Recoverable	< 0.0005	mg/L		
		Thallium, Total Recoverable	< 0.001	mg/L		
		Total Suspended Solids	120	mg/L		
Pre-Discharge Monitoring						
		Pond A-4				
	7/21/2004	pH	7.79	Standard Units		
		Temperature	23	°C		
		Americium ²⁴¹	< 0.005	pCi/L		
		Gross Alpha	< 5	pCi/L		
		Gross Beta	< 7	pCi/L		
		Plutonium ²³⁹⁺²⁴⁰	< 0.005	pCi/L		
		Uranium, Total	3	ug/L		
		Arsenic, Total Recoverable	0.001	mg/L		
		Beryllium, Total Recoverable	< 0.001	mg/L		
		Cadmium, Total Recoverable	< 0.0006	mg/L		
		Chromium, Total Recoverable	< 0.003	mg/L		
		Copper, Dissolved	< 5	ug/L		
		Iron, Total Recoverable	48	ug/L		
		Lithium, Total Recoverable	0.016	mg/L		
		Manganese, Dissolved	< 0.03	ug/L		
		Nickel, Dissolved	< 0.03	ug/L		
		Selenium, Dissolved	< 0.001	mg/L		
		Silver, Dissolved	< 0.0005	mg/L		
		Thallium, Total Recoverable	< 0.001	mg/L		
		Ammonia as N	0.20	mg/L		
		Chloride	460	mg/L		
		Hardness as CaCO3	190	mg/L		
		Nitrate/Nitrite	0.89	mg/L		
		Orthophosphate	0.03	mg/L		
		Phosphate, Total	0.054	mg/L		
		Total Suspended Solids	21	mg/L		
		Unionized Ammonia	0.0059	mg/L		
	9/24/2004	Nitrate/Nitrite	< 0.3	mg/L		
Pond B-5						
	8/31/2004	Americium ²⁴¹	0.006 +/- 0.003	pCi/L		
		Gross Alpha	< 4	pCi/L		
		Gross Beta	6 +/- 4	pCi/L		
		Plutonium ²³⁹⁺²⁴⁰	0.006 +/- 0.003	pCi/L		
		Uranium, Total	1	ug/L		
		Arsenic, Total Recoverable	2	ug/L		
		Beryllium, Total Recoverable	1	ug/L		
		Cadmium, Total Recoverable	< 0.6	ug/L		
		Chromium, Total Recoverable	< 3	ug/L		
		Copper, Dissolved	< 5	ug/L		

Environmental Surveillance
TABLE H - INORGANIC ANALYSIS OF SURFACE WATER
THIRD QUARTER 2004

Location	Sample Date	Parameter	Analysis	Units	*Analysis*	
					1st	2nd
		Iron, Total Recoverable	50	ug/L		
		Lithium, Total Recoverable	11	ug/L		
		Manganese, Dissolved	8	ug/L		
		Nickel, Dissolved	< 30	ug/L		
		Selenium, Dissolved	< 1.0	ug/L		
		Silver, Dissolved	< 0.5	ug/L		
		Thallium, Total Recoverable	< 1	ug/L		
		Ammonia as N	0.25	mg/L		
		Chloride	200	mg/L		
		Hardness as CaCO3	150	mg/L		
		Nitrate/Nitrite	< 0.3	mg/L		
		Orthophosphate	0.30	mg/L		
		Phosphate, Total	0.72	mg/L		
		Total Suspended Solids	16	mg/L		
Pond C-2						
	7/21/2004					
		Americium ²⁴¹	< 0.006	pCi/L		
		Gross Alpha	< 5	pCi/L		
		Gross Beta	10 +/- 4	pCi/L		
		Plutonium ²³⁹⁺²⁴⁰	< 0.007	pCi/L		
		Uranium, Total	2	ug/L		
		Arsenic, Total Recoverable	0.003	mg/L		
		Beryllium, Total Recoverable	< 0.001	mg/L		
		Cadmium, Total Recoverable	< 0.0006	mg/L		
		Chromium, Total Recoverable	0.005	mg/L		
		Copper, Dissolved	< 5	ug/L		
		Iron, Total Recoverable	210	ug/L		
		Lithium, Total Recoverable	0.013	mg/L		
		Manganese, Dissolved	81	ug/L		
		Nickel, Dissolved	< 0.03	ug/L		
		Selenium, Dissolved	< 0.001	mg/L		
		Silver, Dissolved	< 0.0005	mg/L		
		Thallium, Total Recoverable	< 0.001	mg/L		
		Ammonia as N	0.04	mg/L		
		Chloride	270	mg/L		
		Hardness as CaCO3	230	mg/L		
		Nitrate/Nitrite	< 0.3	mg/L		
		Orthophosphate	0.03	mg/L		
		Phosphate, Total	0.053	mg/L		
		Total Suspended Solids	< 10	mg/L		
	8/10/2004					
		Gross Alpha	< 5	pCi/L		
		Gross Beta	10 +/- 4	pCi/L		
Creek Sampling						
North Walnut Creek above Pond A-1 (GS13)						
	9/24/2004					
		Arsenic, Total Recoverable	< 0.001	mg/L		
		Beryllium, Total Recoverable	< 0.001	mg/L		
		Cadmium, Total Recoverable	< 0.0006	mg/L		

Environmental Surveillance
TABLE H - INORGANIC ANALYSIS OF SURFACE WATER
THIRD QUARTER 2004

Location	Sample Date	Parameter	Analysis	Units	*Analysis*	
					1st	2nd
		Chromium, Total Recoverable	0.007	mg/L		
		Copper, Dissolved	< 5	ug/L		
		Iron, Total Recoverable	23	ug/L		
		Lithium, Total Recoverable	0.044	mg/L		
		Manganese, Dissolved	16	ug/L		
		Nickel, Dissolved	< 0.03	ug/L		
		Selenium, Dissolved	9.1	ug/L		
		Silver, Dissolved	< 0.5	ug/L		
		Thallium, Total Recoverable	< 0.001	mg/L		
		Ammonia as N	0.06	mg/L		
		Chloride	450	mg/L		
		Hardness as CaCO ₃	630	mg/L		
		Nitrate/Nitrite	60	mg/L		
		Orthophosphate	< 0.02	mg/L		
		Phosphate, Total	0.04	mg/L		
		Total Suspended Solids	< 10	mg/L		
South Walnut Creek below Pond B-4 (GS09)						
	9/24/2004					
		Sodium, Total	79000	ug/L		
		Arsenic, Total Recoverable	0.002	mg/L		
		Beryllium, Total Recoverable	< 0.001	mg/L		
		Cadmium, Total Recoverable	< 0.0006	mg/L		
		Chromium, Total Recoverable	0.004	mg/L		
		Copper, Dissolved	< 5	ug/L		
		Iron, Total Recoverable	290	ug/L		
		Lithium, Total Recoverable	0.010	mg/L		
		Manganese, Dissolved	60	ug/L		
		Nickel, Dissolved	< 0.03	ug/L		
		Selenium, Dissolved	< 1.0	ug/L		
		Silver, Dissolved	< 0.5	ug/L		
		Thallium, Total Recoverable	< 0.001	mg/L		
		Ammonia as N	No Sample	mg/L		
		Hardness as CaCO ₃	280	mg/L		
		Nitrate/Nitrite	No Sample	mg/L		
		Orthophosphate	No bottle	mg/L		
		Total Suspended Solids	< 10	mg/L		
Walnut Creek at Indiana St. (SW114)						
	9/24/2004					
		Arsenic, Total Recoverable	0.002	mg/L		
		Beryllium, Total Recoverable	< 0.001	mg/L		
		Cadmium, Total Recoverable	< 0.0006	mg/L		
		Chromium, Total Recoverable	0.004	mg/L		
		Copper, Dissolved	< 5	ug/L		
		Iron, Total Recoverable	360	ug/L		
		Lithium, Total Recoverable	0.013	mg/L		
		Manganese, Dissolved	30	ug/L		
		Nickel, Dissolved	< 0.03	ug/L		
		Selenium, Dissolved	1.2	ug/L		

Environmental Surveillance
TABLE H - INORGANIC ANALYSIS OF SURFACE WATER
THIRD QUARTER 2004

Location	Sample Date	Parameter	Analysis	Units	*Analysis*	
					1st	2nd
		Silver, Dissolved	< 0.5	ug/L		
		Thallium, Total Recoverable	< 0.001	mg/L		
		Ammonia as N	0.48	mg/L		
		Chloride	200	mg/L		
		Hardness as CaCO3	200	mg/L		
		Nitrate/Nitrite	0.63	mg/L		
		Orthophosphate	0.59	mg/L		
		Phosphate, Total	1.3	mg/L		
		Total Suspended Solids	25	mg/L		
Nutrient Monitoring						
South Walnut Creek above B-Series Bypass (GS10)						
	9/24/2004					
		Ammonia as N	0.07	mg/L		
		Chloride	360	mg/L		
		Nitrate/Nitrite	3.3	mg/L		
Effluent from Sewage Treatment Plant (EFFL)						
	9/24/2004					
		Ammonia as N	0.10	mg/L		
		Chloride	160	mg/L		
		Nitrate/Nitrite	13.2	mg/L		
N Walnut Creek Upstream Of Portal 3 (SW118)						
	9/24/2004					
		Nitrate/Nitrite	< 0.3	mg/L		
Walnut Creek below Portal 3 (SW093)						
	9/24/2004					
		Ammonia as N	0.08	mg/L		
		Chloride	440	mg/L		
		Nitrate/Nitrite	2.8	mg/L		
N. Walnut Cr. At Flume 55 Ft Downstream Of Pond A3 Outfall						
	9/24/2004					
		Ammonia as N	0.07	mg/L		
		Chloride	370	mg/L		
		Nitrate/Nitrite	2.2	mg/L		

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Environmental Surveillance
TABLE I – VOLATILE ORGANIC ANALYSIS OF SURFACE WATER
THIRD QUARTER 2004

Location	Sample Date	Parameter	Analysis Level	Units	*Analysis*	
					1st	2nd
Pond A-4	7/21/2004	Toluene	0.89	ug/L		

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GLOSSARY

Ag	silver
Am	americium
AOI	analyte of interest
APCD	Air Pollution Control Division
AQCC	Air Quality Control Commission
ALF	action level framework
B	found in blank
Be	beryllium
CAS	chemical abstracts service number
Cd	cadmium
CDPHE	Colorado Department of Public Health and Environment
Cr	chromium
D&D	decontamination and decommissioning
DOE	Department of Energy
EPA	Environmental Protection Agency
ESR	Environmental Surveillance Report
H	exceeds holding time
IMP	Integrated Monitoring Plan
J	detected but below practical quantitative limit
LARS	Laboratory and Radiation Services
mg/L	Milligram per liter
MCL	Maximum Contaminant Level (below MCL is safe)
MDL	minimum detection level
Nd	not detected
NO ₃	nitrate
pCi/L	picocuries per liter
pCi/m ³	picocuries per cubic meter
PM	particulate material
ppb	parts per billion
ppm	parts per million
PQL	practical quantitative level
Pu	plutonium
QNS	quantity not sufficient
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
TLV	ACGIH Threshold limit value
TSP	Total Suspended Particulate
TSS	Total Suspended Solids
µg/L	microgram per liter
µg/m ³	micrograms per cubic meter
U	uranium
VOCs	volatile organic compounds
WQCC	Water Quality Control Commission
WQCD	Water Quality Control Division
WWTP	wastewater treatment plan

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