

# **Environmental Surveillance Report**

on the  
U.S. Department of Energy

**Rocky Flats Environmental Technology Site**

**Information Exchange**

**THIRD QUARTER 2002**



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**Colorado Department  
of Public Health  
and Environment**

This is a numerical summary of environmental surveillance measurements performed by the Department during the past quarter. Also included are additional data for earlier periods that have not been reported previously.

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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), 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**

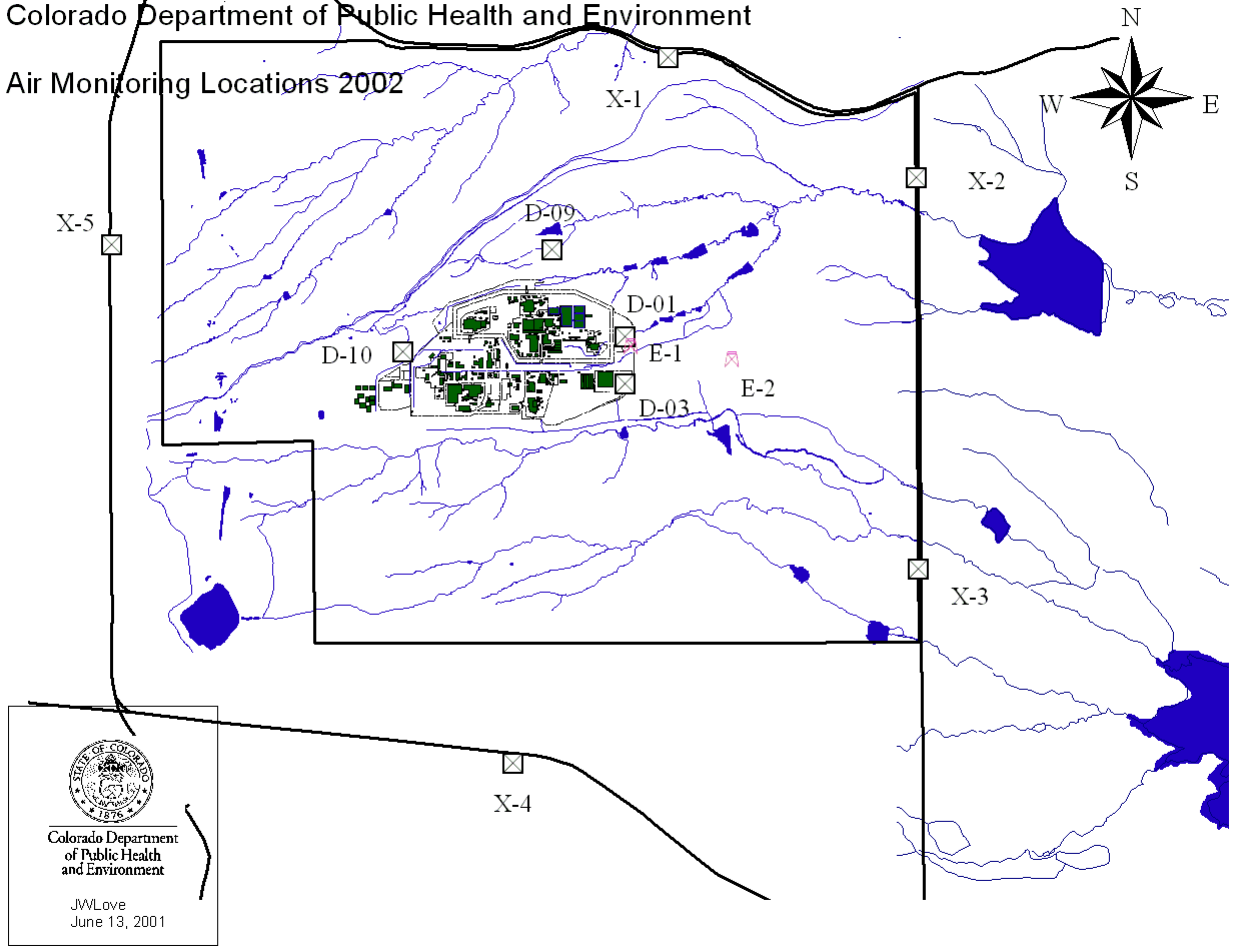
**WATER STANDARDS**

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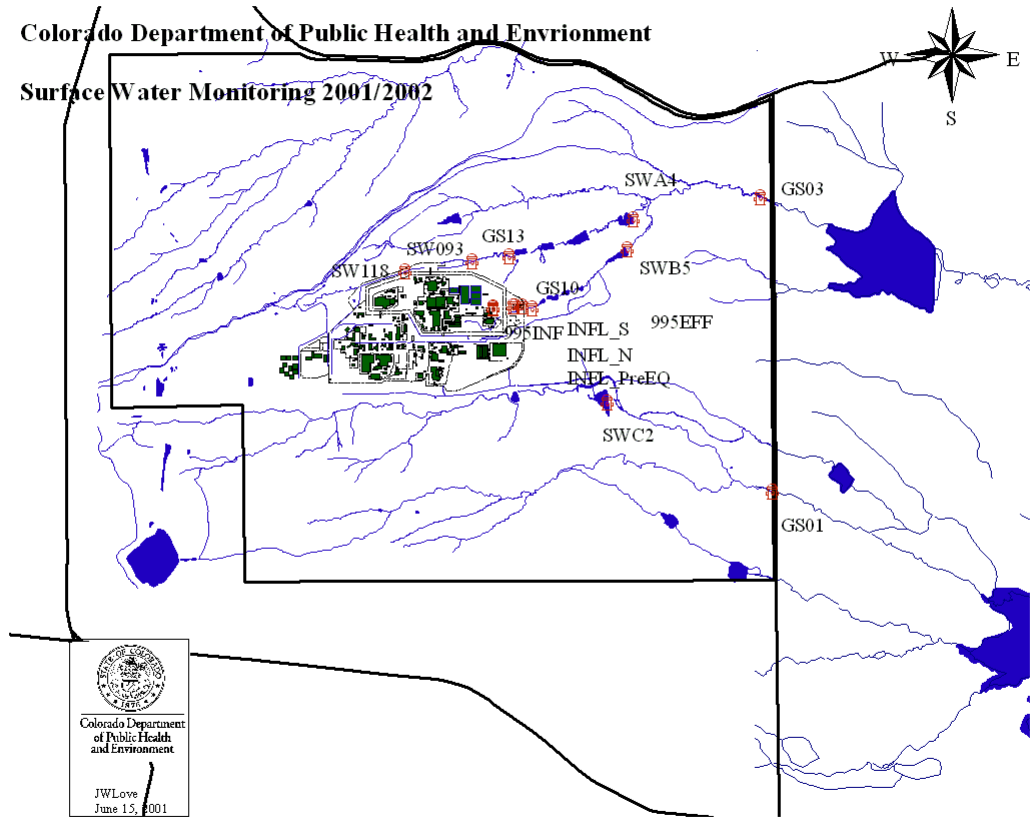
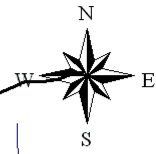
Air Monitoring Locations 2002



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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 (NO<sub>2</sub>), Ozone (O<sub>3</sub>) and particulate monitoring is performed by APCD. Particulate monitoring includes monitoring of both fine particulates (PM<sub>10</sub>) and total suspended solids (TSP).

IF: A perimeter monitor detects an NO<sub>2</sub> (annual arithmetic mean) concentration of 0.053 parts per million (ppm), an O<sub>3</sub> (1 hr av. time) concentration of 0.12 ppm, a TSP measurement of 75 micrograms per cubic meter (µg/m<sup>3</sup>) averaged over a 1 year time period or 150 µg/m<sup>3</sup> over a 24-hour time period, or a PM<sub>10</sub> concentration of 50 µg/m<sup>3</sup> annually or 150 µg/m<sup>3</sup> 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/m<sup>3</sup> 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, PM<sub>10</sub> 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 Predischarge 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: Predischarge 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 downgradient 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
Radionuclide	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 <sub>10</sub> particulates	X		Monitored to provide information on fine airborne particulate levels. Filters also used for metals and radionuclides analyses.
<b>Volatile Organic Compounds</b>	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.
<b>Real Time Monitoring of Physical and Indicator Parameters (Note A)</b>	PH		X	Toxicity to humans and ecology. Regulatory concern due to chromic 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 <sub>3</sub>		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 <sup>(a)</sup>	35 ppm
Primary Standard	8 Hour <sup>(a)</sup>	9 ppm
Ozone (O <sub>3</sub> )		
Primary and Secondary Standards (up to 1997)	1 Hour <sup>(b)</sup>	0.12 ppm
Primary and Secondary Standards (as of July 1997)	8 Hour <sup>(c)</sup>	0.08 ppm
Nitrogen Dioxide (NO <sub>2</sub> )		
Primary and Secondary Standards	Annual Arithmetic Mean	0.053 ppm
Sulfur Dioxide (SO <sub>2</sub> )		
Primary Standard	Annual Arithmetic Mean	0.030 ppm
Primary Standard	24 Hour <sup>(a)</sup>	0.14 ppm
Secondary Standard	3 Hour <sup>(a)</sup>	0.5 ppm
Particulates (PM <sub>10</sub> )		
Primary and Secondary Standards	Annual Arithmetic Mean <sup>(d)</sup>	50 µg/m <sup>3</sup>
Primary and Secondary Standards	24 Hour <sup>(b)</sup> prior to July 1997, <sup>(e)</sup> as of July	150 µg/m <sup>3</sup>
Fine Particulates (PM <sub>2.5</sub> ) (as of July 1997)		
Primary and Secondary Standards	Annual Arithmetic Mean <sup>(d)</sup>	15.0 µg/m <sup>3</sup>
Primary and Secondary Standards	24 Hour <sup>(f)</sup>	65 µg/m <sup>3</sup>
Lead (Pb)		
Primary and Secondary Standards	Calendar Quarter Average	1.5 µg/m <sup>3</sup>
Total Suspended Particulates (TSP)		
Primary Standard	Annual Geometric Mean <sup>(g)</sup>	75 µg/m <sup>3</sup>
Primary Standard	24 Hour <sup>(g)</sup>	260 µg/m <sup>3</sup>
Secondary Standard	Annual Geometric Mean <sup>(g)</sup>	60 µg/m <sup>3</sup>
Secondary Standard	24 Hour <sup>(g)</sup>	150 µg/m <sup>3</sup>

- (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 99<sup>th</sup> percentile for each year is not to exceed this level.
- (f) The three-year average of the 98<sup>th</sup> percentile for each year is not to exceed this level.
- (g) The TSP standard was replaced by the PM<sub>10</sub> 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**

	<b>SEGMENT 2</b> Standley Lake	<b>SEGMENT 3</b> Great Western Reservoir	<b>SEGMENTS</b> <b>4a and 5</b> Woman Creek	<b>SEGMENTS</b> <b>4a, 4b and 5</b> 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**

<b>Inorganic/Metal</b>	<b>SEGMENTS 4a &amp; 4b</b> <b>Standards (µg/L)</b>	<b>SEGMENT 5</b> <b>Action Levels (µg/L)</b>
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 <sup>TM</sup>
Nitrite	500	4500 <sup>TM</sup>
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-Dinitrofluorene	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	Hexachlorobutadiene	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 2002**

**Laboratory and Radiation Services Division**

**1. General Discussion**

Table A contains the complete gross alpha /gross beta results for the 3<sup>rd</sup> quarter 2002. Table B contains complete plutonium, americium and isotopic uranium results for the 2<sup>nd</sup> quarter 2002. All of these data show no obvious anomalies, compared to historical data. Plutonium and americium results (Table B) for the third quarter of 2002 are not yet available.

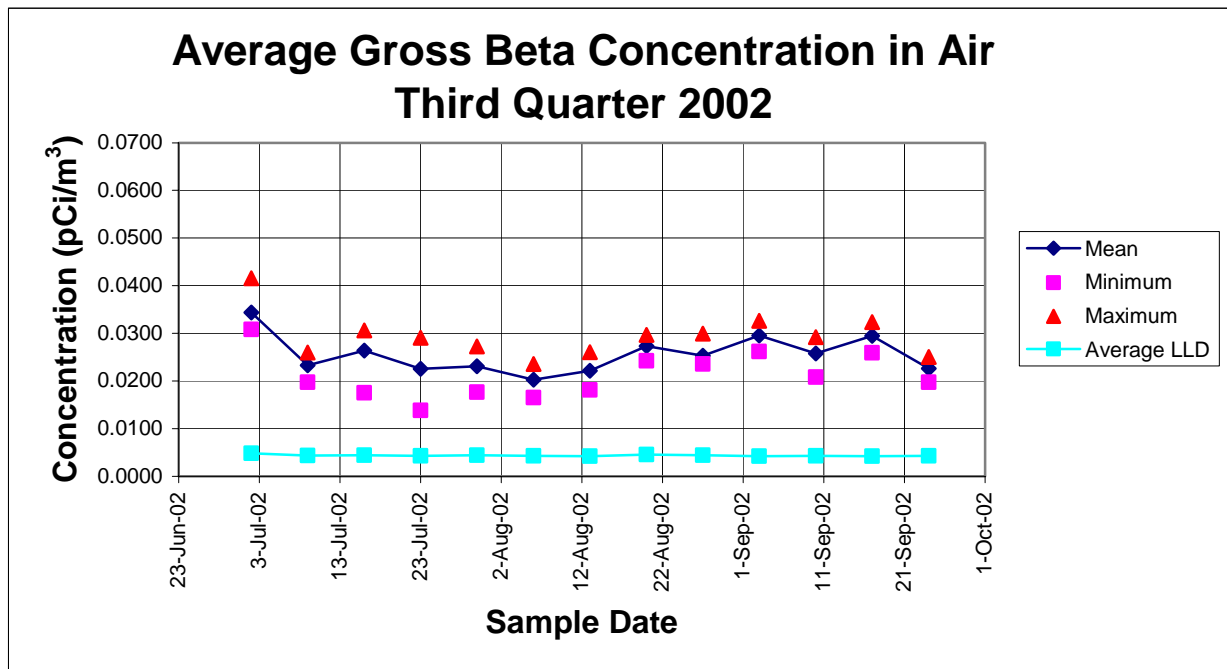
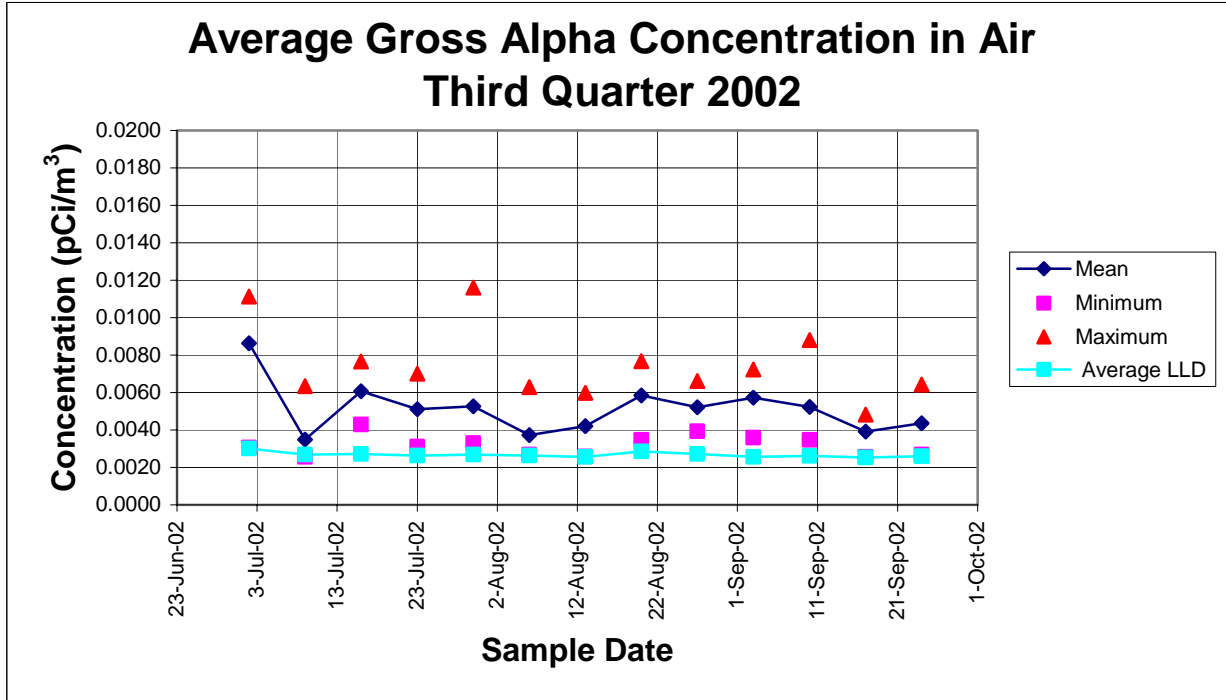
In response to high results for plutonium and americium at the S-137 location in March of 2002, ten filters from the X-3 and E-2 samplers collected from February to April were analyzed for plutonium. As shown in Table B-Special, all results were below the sample detection limits. Thus, we cannot confirm the positive result reported by the Site for this period.

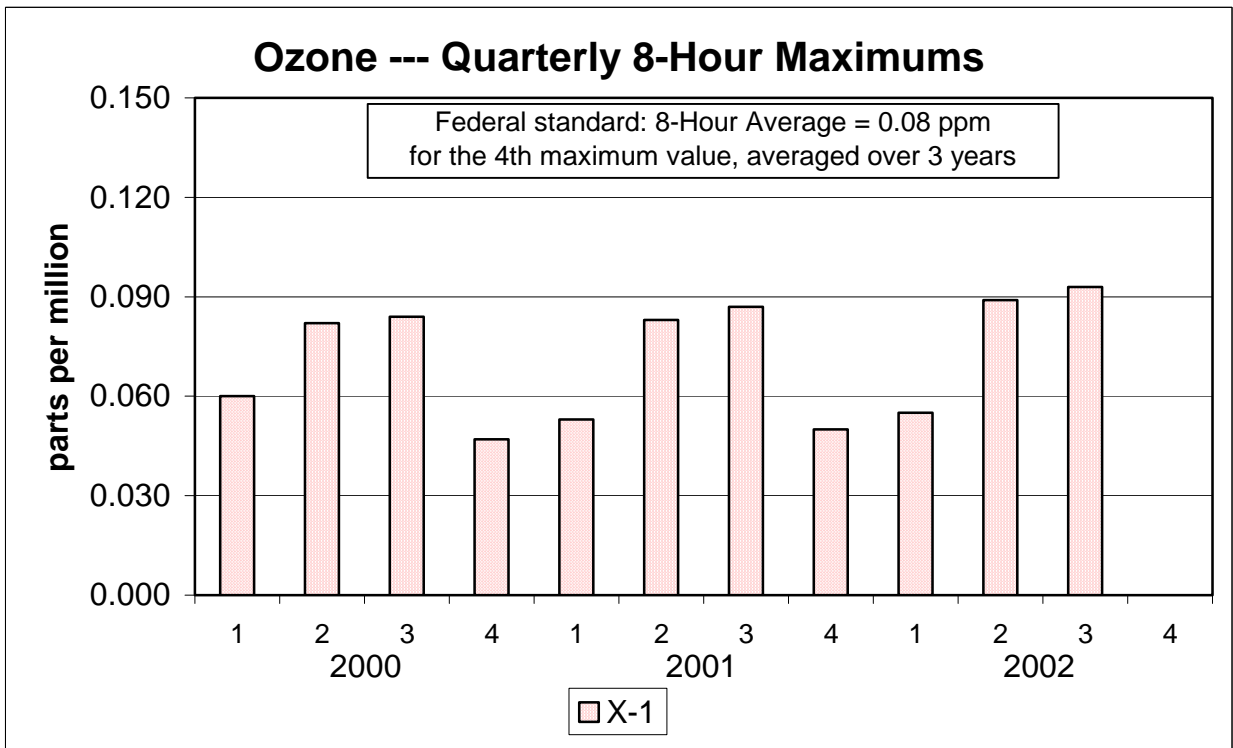
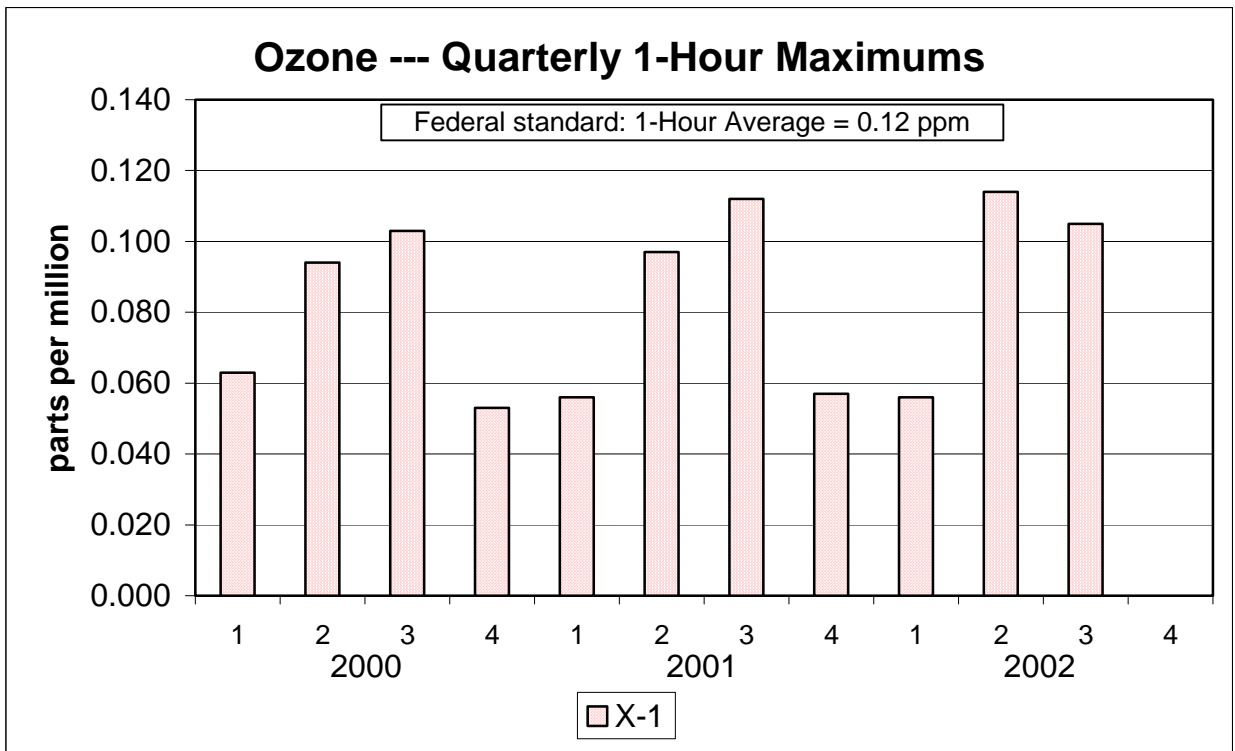
Ozone data for the third quarter of 2002 are presented in Table D. Ozone concentrations for the third quarter of 2002 are at typically high summertime levels, but are higher than previous years. This is due to the higher amount of sunlight and higher temperatures related to the drought conditions.

Speciated uranium, americium and plutonium results for the Air Pollution Control Division samplers at X-1 through X-5 for the first and second quarters of 2001 are finally complete and are presented in Table B. A number of samples had detections, but none are at levels that are very high. Quarterly composite beryllium data from X-1 through X-5 for the first and second quarters of 2001 are presented in Table F. No detections were found. This finalizes the radionuclide and metals data from the Air Pollution Control Division.

## 2. Graphical Presentation

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





### 3. Tabular Data

Tables of current data are presented in this section

## Environmental Surveillance Report

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

**THIRD QUARTER 2002**

Location	Sampler Type	Number of Samples	Gross Alpha			Gross Beta		
			Mean pCi/m <sup>3</sup>	Max pCi/m <sup>3</sup>	Min pCi/m <sup>3</sup>	Mean pCi/m <sup>3</sup>	Max pCi/m <sup>3</sup>	Min pCi/m <sup>3</sup>
<b>INDUSTRIAL AREA SAMPLERS</b>								
D-1	TSP / Continuous	12	< 0.0045	0.0065	0.0007	0.0274	0.0326	0.0213
D-3	TSP / Continuous	13	0.0055	0.0116	0.0027	0.0253	0.0315	0.0205
E-1-T	TSP / Continuous	13	< 0.0044	0.0096	0.0019	0.0236	0.0373	0.0168
<b>BUFFER ZONE SAMPLERS</b>								
D-9	TSP / Continuous	13	< 0.0048	0.0083	0.0013	0.0248	0.0329	0.0165
D-10	TSP / Continuous	13	0.0045	0.0077	0.0030	0.0260	0.0351	0.0213
E-2-T	TSP / Continuous	13	0.0054	0.0075	0.0031	0.0258	0.0322	0.0197
<b>SITE BOUNDARY SAMPLERS</b>								
X-1	TSP / Continuous	13	0.0054	0.0111	0.0029	0.0242	0.0318	0.0168
X-2	TSP / Continuous	9	0.0058	0.0103	0.0036	0.0276	0.0416	0.0163
X-3	TSP / Continuous	13	0.0050	0.0089	0.0028	0.0264	0.0327	0.0211
X-4	TSP / Continuous	13	< 0.0050	0.0080	0.0020	0.0253	0.0383	0.0139
X-5	TSP / Continuous	11	0.0064	0.0108	0.0036	0.0263	0.0337	0.0216

pCi/m<sup>3</sup> = Picocuries per cubic meter

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**

**SECOND QUARTER 2002**

Location	Sampler Type	<sup>239+240</sup> Pu pCi/m <sup>3</sup>	<sup>241</sup> Am pCi/m <sup>3</sup>	<sup>239+240</sup> Pu / <sup>241</sup> Am Ratio	Mean Gross Alpha pCi/m <sup>3</sup>
D-1	TSP / Continuous	0.000025 +/- 0.000005	<0.000008	---	0.0054
D-3	TSP / Continuous	0.000101 +/- 0.000014	< 0.000013	---	< 0.0047
X-1	TSP / Continuous	< 0.000005	< 0.000009	---	< 0.0036
X-2	TSP / Continuous	< 0.000005	< 0.000006	---	0.0047
X-3	TSP / Continuous	< 0.000003	< 0.000006	---	< 0.0040
X-4	TSP / Continuous	< 0.000008	< 0.000017	---	0.0044
X-5	TSP / Continuous	< 0.000004	< 0.000012	---	0.0045

Location	Sampler Type	<sup>234</sup> U pCi/m <sup>3</sup>	<sup>235</sup> U pCi/m <sup>3</sup>	<sup>238</sup> U pCi/m <sup>3</sup>
D-1	TSP / Continuous	0.000068	0.000005	0.000065
D-3	TSP / Continuous	0.000070	< 0.000005	0.000074
X-1	TSP / Continuous	0.000044	< 0.000007	< 0.000035
X-2	TSP / Continuous	0.000059	< 0.000005	0.000057
X-3	TSP / Continuous	0.000055	< 0.000004	0.000057
X-4	TSP / Continuous	0.000053	< 0.000006	0.000065
X-5	TSP / Continuous	0.000075	0.000006	0.000072

pCi/m<sup>3</sup> = 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**

**THIRD QUARTER 2002**

Location	Sampler Type	<sup>239+240</sup> Pu pCi/m <sup>3</sup>	<sup>241</sup> Am pCi/m <sup>3</sup>	<sup>239+240</sup> Pu / <sup>241</sup> Am Ratio	Mean Gross Alpha pCi/m <sup>3</sup>
D-1	TSP / Continuous				
D-3	TSP / Continuous				
X-1	TSP / Continuous				
X-2	TSP / Continuous				
X-3	TSP / Continuous				
X-4	TSP / Continuous				
X-5	TSP / Continuous				

**DATA NOT YET AVAILABLE**

Location	Sampler Type	<sup>234</sup> U pCi/m <sup>3</sup>	<sup>235</sup> U pCi/m <sup>3</sup>	<sup>238</sup> U pCi/m <sup>3</sup>
D-1	TSP / Continuous			
D-3	TSP / Continuous			
X-1	TSP / Continuous			
X-2	TSP / Continuous			
X-3	TSP / Continuous			
X-4	TSP / Continuous			
X-5	TSP / Continuous			

**DATA NOT YET AVAILABLE**

pCi/m<sup>3</sup> = Picocuries per cubic meter

TSP = Total Suspended Particulates

Continuous = continuous sampling



# Environmental Surveillance Report

**TABLE B – SPECIAL**  
**(In response to high Pu and Am values at S-137 in March 2002)**

## ALPHA SPECTROMETRIC ANALYSIS OF PLUTONIUM CONCENTRATIONS IN SUSPENDED AIRBORNE PARTICULATE MATERIAL

FEBRUARY – MARCH – APRIL 2002

Location	Sampler Type	Date	<sup>239+240</sup> Pu pCi/m <sup>3</sup>
X-3	TSP / Continuous	26-Feb-2002	< 0.000008
X-3	TSP / Continuous	19-Mar-2002	< 0.000008
X-3	TSP / Continuous	26-Mar-2002	< 0.000006
X-3	TSP / Continuous	02-Apr-2002	< 0.000008
X-3	TSP / Continuous	09-Apr-2002	< 0.000006
E-2	TSP / Continuous	12-Mar-2002	< 0.000006
E-2	TSP / Continuous	19-Mar-2002	< 0.000009
E-2	TSP / Continuous	26-Mar-2002	< 0.000010
E-2	TSP / Continuous	02-Apr-2002	< 0.000008
E-2	TSP / Continuous	09-Apr-2002	< 0.000008

pCi/m<sup>3</sup> = 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**

**FIRST QUARTER 2001**

Location	Sampler Type	<sup>234</sup> U pCi/m <sup>3</sup>	<sup>235</sup> U pCi/m <sup>3</sup>	<sup>238</sup> U pCi/m <sup>3</sup>	<sup>239</sup> Pu pCi/m <sup>3</sup>	<sup>241</sup> Am pCi/m <sup>3</sup>
X-1	TSP – P (1/6 day, quarterly composite)	< 0.000091	< 0.000018	< 0.000092	---	---
X-1-CL	TSP – CL (1/6 day, quarterly composite)	0.000197	< 0.000023	0.000187	---	---
X-2	TSP (1/6 day, quarterly composite)	< 0.000131	< 0.000026	< 0.000132	---	---
X-3	TSP (1/6 day, quarterly composite)	< 0.000131	< 0.000026	< 0.000132	---	---
X-4	TSP (1/6 day, quarterly composite)	< 0.000129	< 0.000026	< 0.000129	---	---
X-5	TSP (1/6 day, quarterly composite)	< 0.000341	< 0.000068	< 0.000345	< 0.000027*	< 0.000083*
X-1	PM10 (1/6 day, quarterly composite)	< 0.000067	< 0.000013	< 0.000067	---	---
X-2	PM10 – P (1/6 day, quarterly composite)	< 0.000050	< 0.000010	< 0.000051	---	---
X-2-CL	PM10 – CL (1/6 day, quarterly composite)	0.000089	< 0.000012	0.000082	---	---
X-3	PM10 (1/6 day, quarterly composite)	< 0.000125	< 0.000025	< 0.000126	---	---
X-4	PM10 (1/6 day, quarterly composite)	< 0.000079	< 0.000016	0.000079	---	---
X-5	PM10 (1/6 day, quarterly composite)	< 0.000150	< 0.000030	< 0.000151	< 0.000004	< 0.000014

\* = Sample did not pass QC. Low tracer recovery.

pCi/m<sup>3</sup> = Picocuries per cubic meter

TSP = Total Suspended Particulates (P = primary, CL = collocated)

PM10 = Particulate Material < 10 microns in diameter (P = primary, CL = collocated)

## Environmental Surveillance Report

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

**SECOND QUARTER 2001**

Location	Sampler Type	<sup>234</sup> U pCi/m <sup>3</sup>	<sup>235</sup> U pCi/m <sup>3</sup>	<sup>238</sup> U pCi/m <sup>3</sup>	<sup>239</sup> Pu pCi/m <sup>3</sup>	<sup>241</sup> Am pCi/m <sup>3</sup>
X-1	TSP – P (1/6 day, quarterly composite)	< 0.000068	< 0.000014	< 0.000068	---	---
X-1-CL	TSP – CL (1/6 day, quarterly composite)	< 0.000065	< 0.000013	0.000112	---	---
X-2	TSP (1/6 day, quarterly composite)	< 0.000218	< 0.000044	< 0.000221	---	---
X-3	TSP (1/6 day, quarterly composite)	0.000104	< 0.000014	0.000091	---	---
X-4	TSP (1/6 day, quarterly composite)	< 0.000083	< 0.000017	< 0.000084	---	---
X-5	TSP (1/6 day, quarterly composite)	0.000140	< 0.000013	0.000138	< 0.000027*	< 0.000034*
X-1	PM10 (1/6 day, quarterly composite)	0.000162	< 0.000013	0.000159	---	---
X-2	PM10 – P (1/6 day, quarterly composite)	0.000152	< 0.000013	0.000182	---	---
X-2-CL	PM10 – CL (1/6 day, quarterly composite)	< 0.000058	< 0.000012	0.000061	---	---
X-3	PM10 (1/6 day, quarterly composite)	0.000086	< 0.000011	0.000091	---	---
X-4	PM10 (1/6 day, quarterly composite)	0.000112	< 0.000011	0.000090	---	---
X-5	PM10 (1/6 day, quarterly composite)	0.000067	< 0.000013	0.000070	< 0.000005	< 0.000017

\* = Sample did not pass QC. Low tracer recovery.

pCi/m<sup>3</sup> = Picocuries per cubic meter

TSP = Total Suspended Particulates (P = primary, CL = collocated)

PM10 = Particulate Material < 10 microns in diameter (P = primary, CL = collocated)

# Environmental Surveillance Report

**TABLE D: INORGANIC GASEOUS COMPOUNDS IN AIR**

**SECOND QUARTER 2002**

North Site (X-1)				
Compound	Average 1-Hour ppm	Maximum 1-Hour ppm	Maximum 8-Hour Average ppm	# Hours
		<b>JULY 2002</b>		
Ozone (O <sub>3</sub> )	0.053	0.105	0.093	737
		<b><u>AUGUST 2002</u></b>		
Ozone (O <sub>3</sub> )	0.046	0.090	0.082	737
		<b><u>SEPTEMBER 2002</u></b>		
Ozone (O <sub>3</sub> )	0.039	0.089	0.079	711

ppm = Parts per million  
N/A = Not available

# Environmental Surveillance Report

## TABLE F: METALS IN AIR

### FIRST - SECOND QUARTER 2001

		North Site (X-1) (Quarterly composites) ug/m <sup>3</sup>	Northeast Site (X-2) (Quarterly composites) ug/m <sup>3</sup>	Southeast Site (X-3) (Quarterly composites) ug/m <sup>3</sup>	South Site (X-4) (Quarterly composites) ug/m <sup>3</sup>	West Site (X-5) (Quarterly composites) ug/m <sup>3</sup>
<b>First Quarter 2001</b>	<b>Beryllium -- TSP-P</b>	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011
	<b>Beryllium -- PM10-P</b>	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011
	<b>Beryllium -- TSP-CL</b>	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011
	<b>Beryllium -- PM10-CL</b>	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011
<b>Second Quarter 2001</b>	<b>Beryllium -- TSP-P</b>	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011
	<b>Beryllium -- PM10-P</b>	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011
	<b>Beryllium -- TSP-CL</b>	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011
	<b>Beryllium -- PM10-CL</b>	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011

ug/m<sup>3</sup> = Micrograms per cubic meter

N/A = Not available

TSP = Total Suspended Particulates (P = primary, CL = collocated)

PM10 = Particulate Matter < 10 microns in diameter (P = primary, CL = collocated)

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# WATER RESULTS

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## **CDPHE Surface Water Sampling**

### **Third Quarter 2002**

Surface water sampling conducted by CDPHE for the 3rd quarter of 2002, included:

- Wastewater Treatment Plant (WWTP) Influent samples were collected on 7/17/02, 8/21/02, and 9/18/02. Influent samples were collected for the first time from B990 north and south interceptors on 9/18/02. Data for the 6/19/02 2<sup>nd</sup> quarter sample event is presented in this report.
- Pre-discharge samples were collected from Pond B5 and C2 8/19/02, and Ponds A4 and B5 on 10/8/02. Data for the 6/24/02 2<sup>nd</sup> quarter sample event for Pond B5 is presented in this report.
- Point of Compliance - Walnut Creek at Indiana Street (SW114) sample was collected on 7/17/02 during Pond B5 discharge and Woman Creek below Pond C2 (SW026) was collected on 9/10/02 during Pond C2 annual valve exercise/discharge.
- Nutrient sampling (nitrate and ammonia) was conducted 8/21/02 at the following locations: GS-10, WWTP effluent, Pond B3, Pond B5, SW-118, SW093, GS13, and Pond A4. SW114 and GS13 were not sampled due to no flow.
- Performance Monitoring for Mound/East Trench Plume was conducted 8/21/02 and 10/22/02 at the following locations: Pond B1, Pond B2, Pond B3 outfall, and GS09 below Pond B4.
- Performance Monitoring for Solar Pond Plume was attempted on 5/28/02 and 8/21/02 at GS13. There was no flow during these times so no sample was collected.

Table G provides a summary of the sample activity and parameters collected by CDPHE. Table H presents inorganic results, and Table I presents organic detections.

### **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.

During this quarter, the first samples were collected from the north and south interceptor basins at B990 (upstream of the treatment plant). The north interceptor contains discharges from the protected area (former and current) and the south interceptor contains discharges from the non-protected area (south side of the Site). There is interest to determine if differences exist between these discharge streams.

This quarters' WWTP Influent results exhibited detectable levels of silver 0.8 to 5.2 µg/L in two of the four samples, well below the Basic Standard [5 CCR 1002-31] for total silver of 100 ug/L. [The influent silver is determined by the total recoverable fraction (unfiltered) rather than the “dissolved” fraction (filtered through a 0.45-micron filter) used for ambient surface water samples.] Samples collected at locations downstream of the WWTP effluent, did not exhibit any detectable concentrations of silver.

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

The following table summarizes the detections for the influent samples collected 9/18/02 at the B990 north and south interceptors, with a comparison to the influent sample at B995 (downstream of the north and south interceptors).

Analyte	B995 Influent	B990-North	B990-South
Copper, ug/L	17	18	22
Iron, ug/L	300	250	200
Manganese, ug/L	50	27	35
Nickel, ug/L	100	< 20	< 20
Lithium, ug/L	13	9	6
Silver, ug/L	0.8	< 0.4	1.5
Gross Beta, pCi/L	16 +/- 4	15 +/- 4	25 +/- 5
Plutonium 239+240, pCi/L	< 0.008	0.005	< 0.008

Based on these results there appears to be slight differences between the south interceptor, which receives discharge from the non-protected area (or south side of the Site), when compared to the results for the north interceptor, which receives discharge from the protected area (or north side of the Site). The south interceptor exhibited the presence of silver, and higher concentration of gross beta. The north interceptor exhibited plutonium. Neither the north or south interceptor exhibited the nickel that was detected in the B995 influent sample.

With the efficacy of the WWTP the influent wastewater quality poses no real concerns either to the Plant, to effluent quality or ambient stream quality under normal conditions, which now include the decommissioning efforts to date. Decommissioning is now a routine activity, but each building has its own specific concerns and issues.

## **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) and Woman Creek (Pond C2), only when discharges are planned. 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 Pond B5 did not exhibit any concentrations above established RFCA action levels or applicable WQCC stream standards.

This quarters pre-discharge samples from Pond A4 did not exhibit any concentrations above established RFCA action levels or applicable WQCC stream standards, with the exception of:

- Chloride detected at 550 mg/L as compared to the secondary water quality standard of 250 mg/L. See figure for chloride at SWA4.

The presence of elevated chloride is being evaluated in association with the nitrate study, with the goal to determine if the chloride is associated with use of de-icing materials, naturally occurring, or as a potential indicator parameter associated with contaminant migration.

This quarters pre-discharge samples from Pond C2 did not exhibit any concentrations above established RFCA action levels or applicable WQCC stream standards, with the exception of:

- Manganese detected at 530 ug/L as compared to the water quality standard of 200 ug/L for agricultural use designation.
- Gross beta detected at 11 +/- 4 pCi/L as compared to the water quality standard of 8 pCi/L. Potassium was detected at a concentration of 7 pCi/L, which accounts for the majority of the gross beta concentration.

## **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.

The sample collected from Walnut Creek at Indiana (SW114) this quarter coincided with discharge of water from Pond B5. During this quarters' ambient water sampling at SW114 no exceedences of an action level was observed.

The sample collected from Woman Creek below Pond C2 (SW026) this quarter coincided with the discharge of water from Pond C2 during the annual valve exercise. Due to the elevated concentration of gross beta in the pre-discharge sample, radionuclides were added to the parameter list for the discharge sample event. On comparison of the pre-discharge sample to the discharge sample, there is good consistency in most concentrations. During this annual ambient water sampling for Pond C2 discharge, no exceedences of an action level was observed, with the exception of:

- Gross beta at a concentration of 13 +/- 4 pCi/L compared to the action level and stream standard of 8 pCi/L.

Water from the discharge event dissipated within 200 yards downstream of Pond C2, never reaching the Site boundary.

### **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.

This quarters nitrate results ranged from <0.3 mg/L to 4 mg/L at EFFL, effluent from the sewage treatment plant into Pond B3. All results were less than the temporary modification of 100 mg/L, and the underlying stream standard of 10 mg/L.

This quarters' total ammonia results ranged from <0.01 mg/L to 0.36 mg/L. Calculating for unionized ammonia exhibited concentrations ranging from <0.00004 to 0.00017 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 downgradient 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.

This quarter represents the second sample event for this performance monitoring program. VOCs were elevated above applicable segment 5 stream standards for Pond B2, summarized in the following table and shown in Table I.

Samples collected at Pond B1, B3 and B4 did not exhibit any volatile organic compounds. The monitoring program was adjusted to incorporate two locations for Pond B2, on the north shore (B2N) and the southeast corner (B2S), to determine if there is a difference in constituents across the pond. Both the B2N and B2S sample exhibited the presence of cis-1,2-dichloroethylene at 1.2 and 7.9 ug/L respectively. Trichloroethene and vinyl chloride were detected in the B2S sample. In comparison to the May 28, 2002 sample event, there are fewer volatile organic compounds detected and at lower concentrations with the exception of vinyl chloride which increased in concentration. A summary of the October and May results are provided in the following table.

Detail on actions taken are presented in the ESR for 2<sup>nd</sup> Quarter 2002. As a result of these findings the following action is being conducted:

Determination of potential sources and identification of any mitigating action requirements as outlined in the Integrated Monitoring Plan and RFCA. This Performance Monitoring location is downgradient of a POE (SW023/GS10) and well upgradient of a POC (Pond B5, SW025/GS08 – which are influenced by STP effluent). More data needs to be acquired to evaluate UTL<sub>95</sub>, which is the criteria of comparison identified in IMP for Performance Monitoring locations, to determine the type of action, if any.

To accomplish this the following activities are in progress: request historical surface water, seep and sediment data for the B-series Ponds; evaluate historical groundwater data pre and post-treatment system installation; increase frequency of sample collection at Pond B2 from semi-annual to quarterly and collect surface water samples from both the north and south side of the pond; coordinate sample efforts with routine groundwater monitoring efforts; and field map and photo document the existing extent of seeps in the area of Ponds B1, B2 and B3.

**Final Results (EPA Method 524.2) – October 22,  
2002 comparison to May 28, 2002**

Analyte	Units	B2S (south)	B2N (north)	B2S (May 28, 2002)	ALF	Reg 38 - Temp Mod	Reg 31 Basic Stds	Reg 31 Basis
cis-1,2-dichloroethene	ug/L	7.9	1.2	48	70		70	WS
1,1-dichloroethene	ug/L			<b>0.69</b>	<i>0.0057</i>	7	7	WS, W+F
chloroform	ug/L			12	100		5.7	W+F
carbon tetrachloride	ug/L			<b>10</b>	<i>0.25</i>	5	0.27	WS
trichloroethene	ug/L	2.2		<b>200</b>	2.7	5	2.7	W+F
tetrachloroethylene	ug/L			<b>31</b>	<i>0.8</i>	5	0.8	W+F
vinyl chloride	ug/L	<b>2.7</b>		0.96	2		2	WS, W+F
Temperature	°C			20.5				
pH	SU			9.41		6.5-9	6.5-9	

***denotes exceedence***

Pond B2 is an isolated Pond - no direct discharges to or from  
Pond B2 Receives overland flow and groundwater discharge from one or two GW  
plumes  
WS = water supply  
W+F = water plus fish

## **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 downgradient 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.

Attempts were made to collect samples on May 28, 2002 and August 21, 2002, however, there was no flow at the sample point.

**Pond/Seep Results - 1997**  
**Pre-Treatment System Installation**

<i>Location Description</i>			<b>B2 SWater</b>	<b>B1 Swater</b>	<b>Seeps</b>				
			<b>Southside</b>	<b>Southside</b>	<b>60195</b>	<b>60295</b>	<b>60395</b>	<b>B1</b>	<b>B2</b>
<b>Analytes</b>	<b>Units</b>	<b>ALF</b>							
cis-1,2-dichloroethene	ug/L	70	<b>94-100</b>	ND	ND	ND	ND	4	32
chloroform	ug/L	100	12-14	ND	4	13	5	1	30
carbon tetrachloride	ug/L	0.25/5	<b>16-19</b>	ND	<b>30</b>	<b>120</b>	ND	<b>13</b>	<b>98</b>
trichloroethene	ug/L	2.7/5	<b>400-420</b>	ND	<b>30</b>	<b>23</b>	ND	<b>14</b>	<b>970</b>
tetrachloroethylene	ug/L	0.8/5	<b>16</b>	ND	<b>510</b>	<b>190</b>	<b>30</b>	<b>280</b>	<b>120</b>

Data from Final PAM East Trenches Treatment System (February 1999)  
**Denotes concentration > ALF/5 CCR 1002-38 (Temporary Modification)**

**Groundwater Analytical Results - 2001**

<i>Well No.</i>			<b>95299</b>	<b>95199<sup>a</sup></b>		<b>23296<sup>a</sup></b>		<b>95099<sup>b</sup></b>
<i>Location Description</i>		<b>Tier II GW Standard</b>	<b>Upgradient of B1</b>	<b>Upgradient of B2</b>		<b>Upgradient of B3</b>		<b>Upgradient of B4</b>
<b>Analytes</b>	<b>Units</b>			4/24/2001	10/23/2001	4/24/2001	10/23/2001	
cis-1,2-dichloroethene	ug/L	70	NS	2	2.5	63	<b>150</b>	1
chloroform	ug/L	100	NS	1	1	16	10	1
carbon tetrachloride	ug/L	5	NS	1	1	<b>6</b>	<b>10</b>	0.2
trichloroethene	ug/L	5	NS	65	<b>51</b>	<b>500</b>	<b>380</b>	1
tetrachloroethylene	ug/L	5	NS	2	2	<b>17</b>	<b>12</b>	1
1,1,2,2-tetrachloroethene	ug/L	0.426	NS	1	1	<b>1</b>	<b>1</b>	<b>1</b>
cis-1,3-dichloropropene	ug/L	0.473	NS	1	1	1	1	1

NS = not sampled

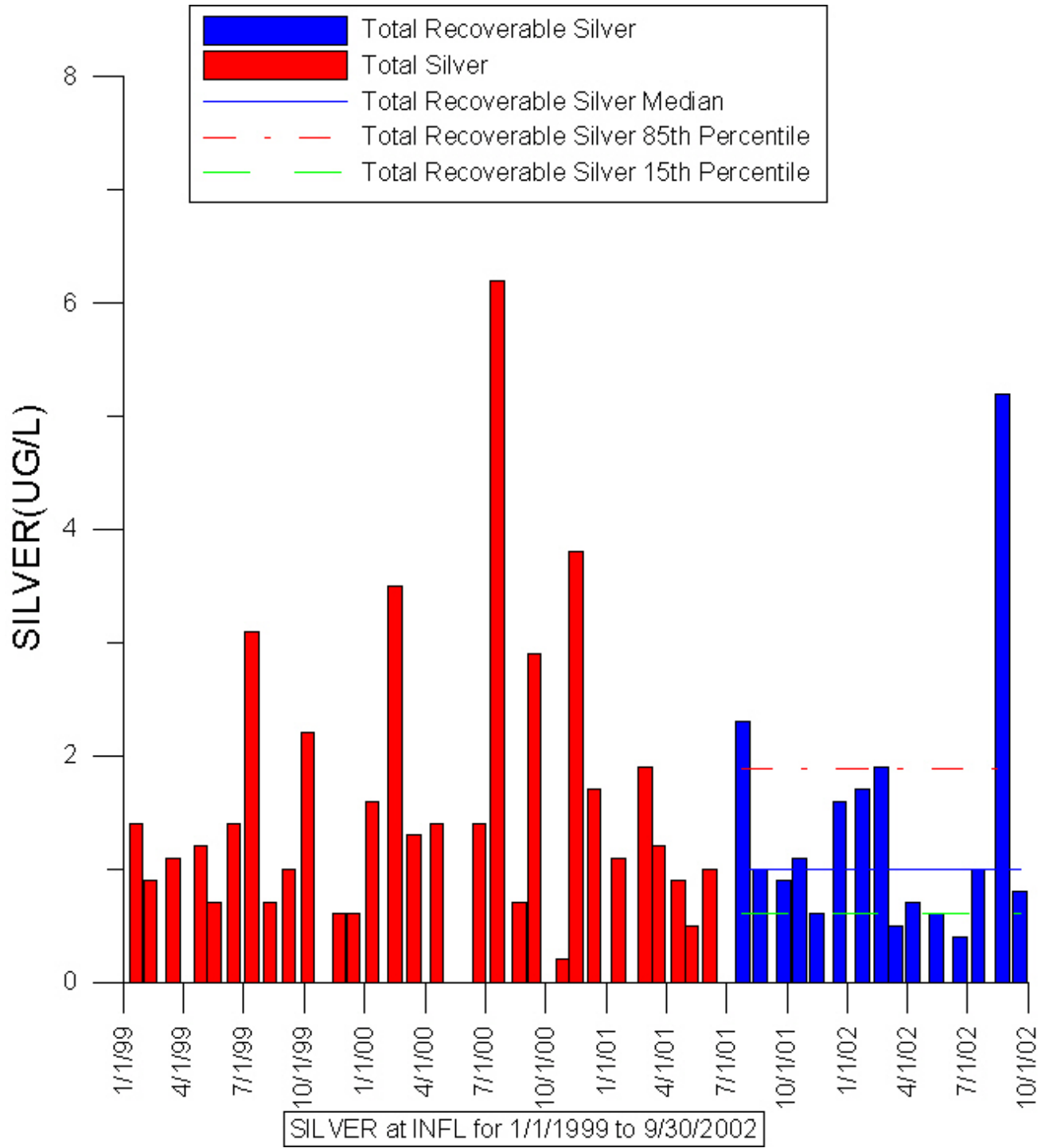
**Denotes concentration > Tier II GW Action Level**

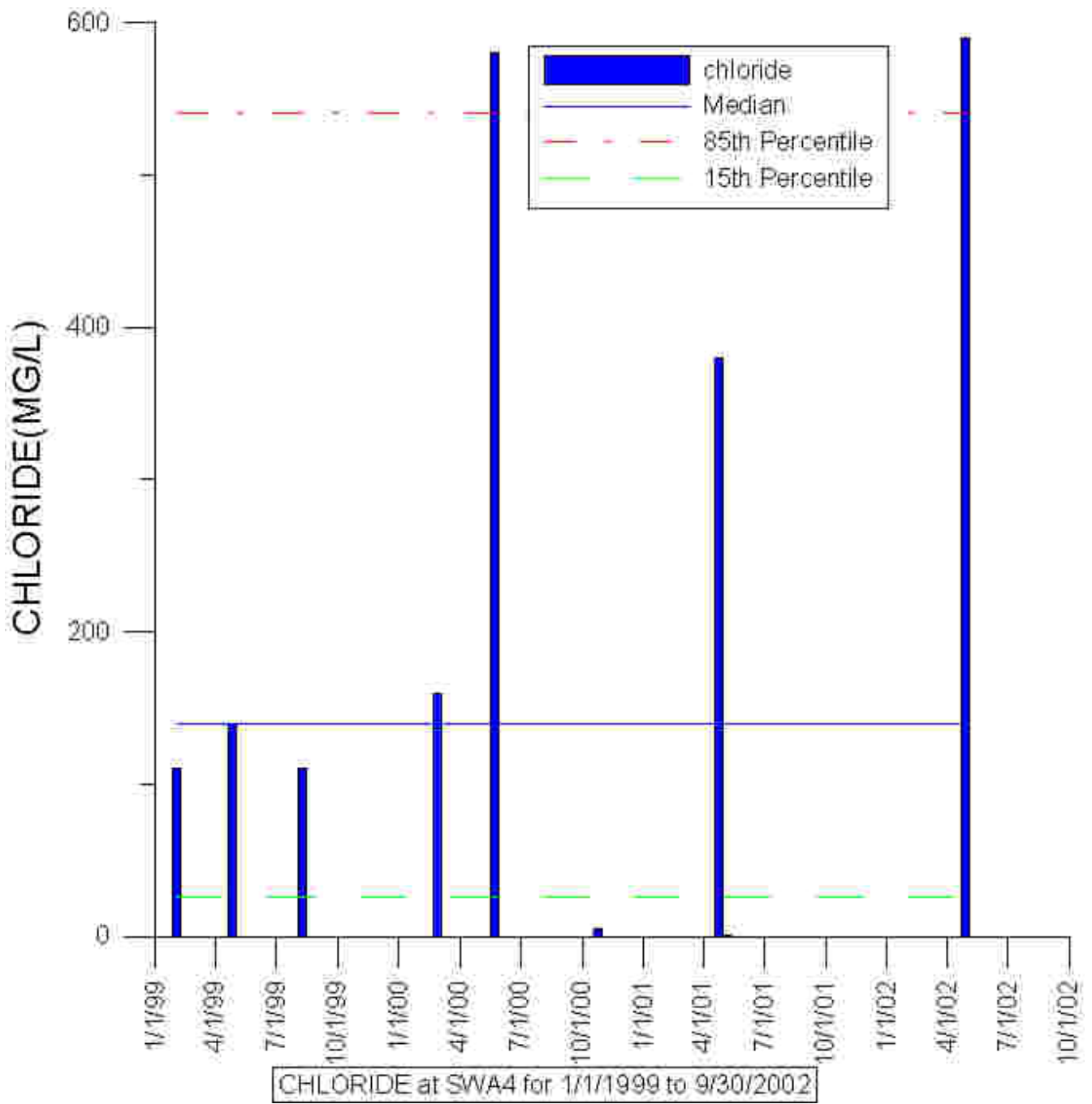
<sup>a</sup> Located in "zone of sacrifice" not intended to be treated.

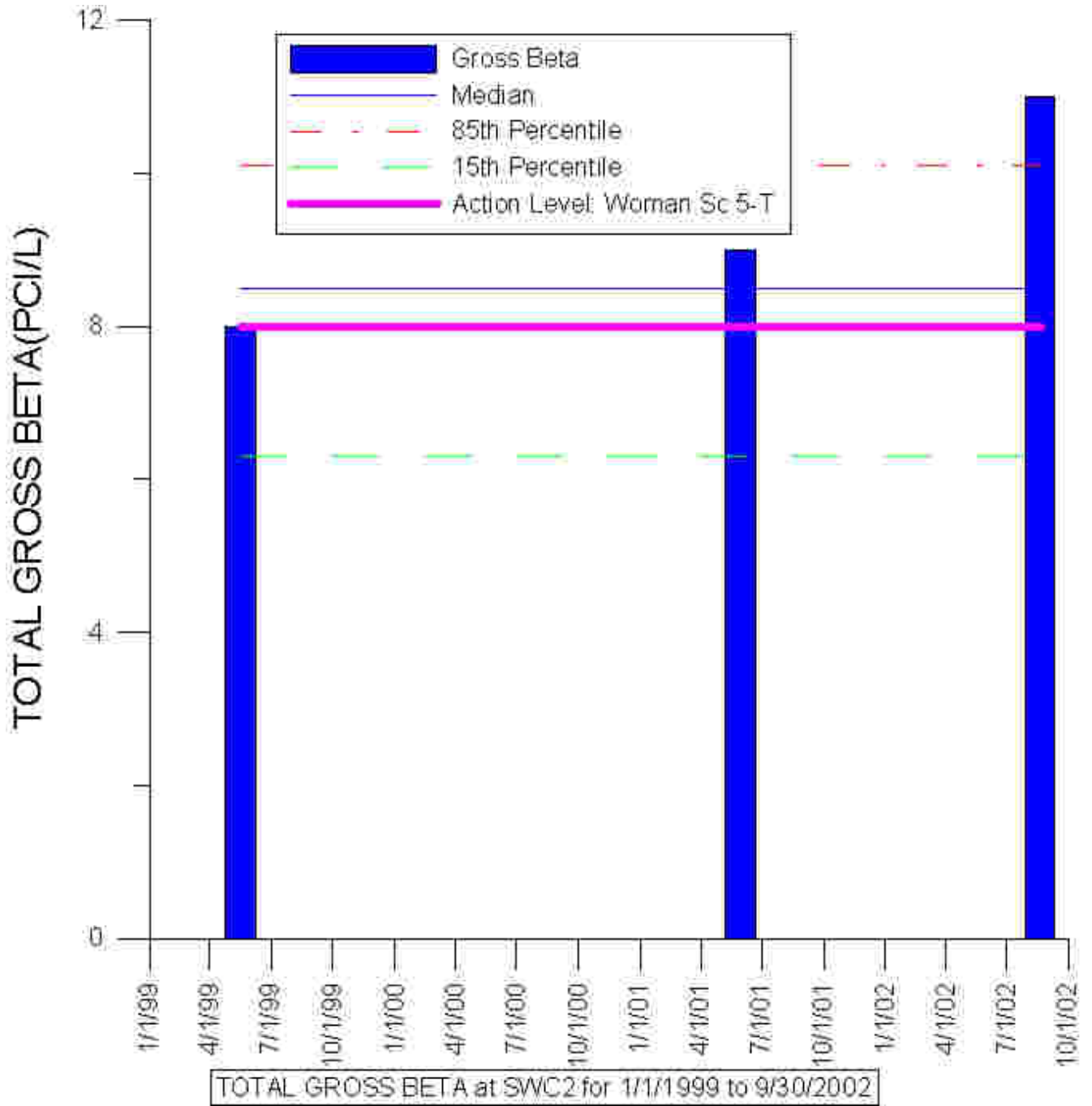
<sup>b</sup> Located east of treatment system outside of plume

Historical trend analysis of well 23296 exhibits same analytes and similar concentrations.









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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 <sup>d</sup>		
			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 <sup>1</sup>	1/yr <sup>1</sup>												
<b>RADS - Total (unfiltered), RUSH</b>																
Americium - 241	TRU SPEC	11	10/yr <sup>1</sup>	1/yr <sup>1</sup>												
Plutonium - 239/240	TRU SPEC	11	10/yr <sup>1</sup>	1/yr <sup>1</sup>												
Gross Alpha	900.0	11	10/yr <sup>1</sup>	1/yr <sup>1</sup>												
Gross Beta	900.0	11	10/yr <sup>1</sup>	1/yr <sup>1</sup>												
<b>RADS - Total (unfiltered)</b>																
Americium - 241	TRUSP EC	20			Monthly <sup>2</sup>	Quarterly <sup>1</sup>										
Plutonium - 239/240	TRUSP EC	20			Monthly <sup>2</sup>	Quarterly <sup>1</sup>										
Gross Alpha	900.0	20			Monthly <sup>2</sup>	Quarterly <sup>1</sup>										
Gross Beta	900.0	20			Monthly <sup>2</sup>	Quarterly <sup>1</sup>										
Uranium, Fluorometric	908.0	25	Quarterly <sup>1</sup>	1/yr <sup>1</sup>	Monthly <sup>2</sup>	Quarterly <sup>1</sup>										
<b>Metals - Dissolved (filtered)</b>																
Ag	200.8	22 - 26	Quarterly <sup>1</sup>	1/yr <sup>1</sup>			Quarterly <sup>1</sup>	Quarterly <sup>1</sup>		Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	
Cu	200.8	22 - 26	Quarterly <sup>1</sup>	1/yr <sup>1</sup>			Quarterly <sup>1</sup>	Quarterly <sup>1</sup>		Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	
Mn	200.7	22 - 26	Quarterly <sup>1</sup>	1/yr <sup>1</sup>			Quarterly <sup>1</sup>	Quarterly <sup>1</sup>		Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	
Ni	245.1	22 - 26	Quarterly <sup>1</sup>	1/yr <sup>1</sup>			Quarterly <sup>1</sup>	Quarterly <sup>1</sup>		Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	
Se	200.8	22 - 26	Quarterly <sup>1</sup>	1/yr <sup>1</sup>			Quarterly <sup>1</sup>	Quarterly <sup>1</sup>		Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	

**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 Equalizati on 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 <sup>d</sup>	
			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
<b>Metals - Total Recoverable (unfiltered)</b>															
As	200.8	42 - 46	Quarterly <sup>1</sup>	1/yr <sup>1</sup>	Monthly <sup>2</sup>	Quarterly <sup>1</sup>	Quarterly <sup>1</sup>	Quarterly <sup>1</sup>		Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>
Be	200.8	42 - 46	Quarterly <sup>1</sup>	1/yr <sup>1</sup>	Monthly <sup>2</sup>	Quarterly <sup>1</sup>	Quarterly <sup>1</sup>	Quarterly <sup>1</sup>		Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>
Cd	200.8	42 - 46	Quarterly <sup>1</sup>	1/yr <sup>1</sup>	Monthly <sup>2</sup>	Quarterly <sup>1</sup>	Quarterly <sup>1</sup>	Quarterly <sup>1</sup>		Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>
Cr(VI) dslvd??	200.8	42 - 46	Quarterly <sup>1</sup>	1/yr <sup>1</sup>	Monthly <sup>2</sup>	Quarterly <sup>1</sup>	Quarterly <sup>1</sup>	Quarterly <sup>1</sup>		Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>
Fe	200.7	42 - 46	Quarterly <sup>1</sup>	1/yr <sup>1</sup>	Monthly <sup>2</sup>	Quarterly <sup>1</sup>	Quarterly <sup>1</sup>	Quarterly <sup>1</sup>		Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>
Lithium	200.8	42 - 46	Quarterly <sup>1</sup>	1/yr <sup>1</sup>	Monthly <sup>2</sup>	Quarterly <sup>1</sup>	Quarterly <sup>1</sup>	Quarterly <sup>1</sup>		Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>
Thallium	200.8	42 - 46	Quarterly <sup>1</sup>	1/yr <sup>1</sup>	Monthly <sup>2</sup>	Quarterly <sup>1</sup>	Quarterly <sup>1</sup>	Quarterly <sup>1</sup>		Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr	2 / yr	2 / yr
<b>Special TR Metals (unfiltered) For STP Influent - until domestic sewage contributions are discontinued:</b>															
Ag	200.8	20			Monthly <sup>2</sup>	Quarterly <sup>1</sup>									
Cu	200.7	20			Monthly <sup>2</sup>	Quarterly <sup>1</sup>									
Mn dslvd??	200.7	20			Monthly <sup>2</sup>	Quarterly <sup>1</sup>									
Ni	245.1	20			Monthly <sup>2</sup>	Quarterly <sup>1</sup>									
Se	200.8	20			Monthly <sup>2</sup>	Quarterly <sup>1</sup>									
<b>Hardness as CaCO3</b>	130.2	22-26	Quarterly <sup>1</sup>	1/yr <sup>1</sup>				Quarterly <sup>1</sup>	Quarterly <sup>1</sup>		Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>
<b>Organic Analyses</b>															
VOCs	502.2	8						Semi-Annual <sup>1</sup>							

**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 <sup>d</sup>	
			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
<b>Nutrients/Inorganics</b>															
Ammonia as N	350.2	52 - 56	10/yr <sup>1</sup>	1/yr <sup>1</sup>					Quarterly <sup>1</sup>	Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>
Nitrite/Nitrate as N	353.2	52 - 56	10/yr <sup>1</sup>	1/yr <sup>1</sup>					Quarterly <sup>1</sup>	Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>
Phosphate, T	365.1	20 - 24	10/yr <sup>1</sup>	1/yr <sup>1</sup>						Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>
Orthophosphate	365.2	20 - 24	10/yr <sup>1</sup>	1/yr <sup>1</sup>						Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>
Solids, total suspended	160.1	40 - 44	10/yr <sup>1</sup>	1/yr <sup>1</sup>	Monthly <sup>2</sup>	Quarterly <sup>1</sup>				Quarterly <sup>1</sup>	1/yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>	2 / yr <sup>1</sup>
Chloride	325.3	5	Quarterly <sup>1</sup>	1/yr <sup>1</sup>											

<sup>a</sup> 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

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

<sup>c</sup> 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.

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

<sup>1</sup> Grab Sample

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**Environmental Surveillance Report**  
**TABLE H - INORGANIC ANALYSIS OF SURFACE WATER**  
**THIRD QUARTER 2002**

Location	Sample	Parameter	Analysis Level	*Analysis*					
	Date			Units	1st	2nd	3rd		
Effluent from Sewage Treatment Plant(EFFL)	8/22/2002	Field pH	7.01	Standard	Units				
		Temperature	21.8		°C				
		Ammonia as N	0.36		mg/L				
		Chloride	32		mg/L				
		Nitrate/Nitrite	4		mg/L				
South Walnut Creek above B-Series Bypass(GS10)	8/22/2002	Field pH	7.4	Standard	Units				
		Temperature	18.2		°C				
		Ammonia as N	< 0.01		mg/L				
		Chloride	< 2		mg/L				
		Nitrate/Nitrite	2.4		mg/L				
Influent to Sewage Treatment Plant(INFL)	6/19/2002	Field pH	7.31	Standard	Units				
		Temperature	20.5		°C				
		Americium-241, Total	< 0.016		pCi/L				
		Arsenic, Total Recoverable	< 1		µg/L				
		Beryllium, Total Recoverable	< 1		µg/L				
		Cadmium, Total Recoverable	< 0.3		µg/L				
		Chromium, Total Recoverable	< 3		µg/L				
		Copper, Total Recoverable	48		µg/L				
		Gross Alpha	< 4		pCi/L				
		Gross Beta	9 +/-	4	pCi/L				
		Iron, Total Recoverable	690		µg/L				
		Lithium, Total Recoverable	4		µg/L				
		Manganese, Total Recoverable	49		µg/L				
		Nickel, Total Recoverable	< 20		µg/L				
		Plutonium 239+240, Total	0.018 +/-	0.005	pCi/L				
		Selenium, Total Recoverable	< 1		µg/L				
		Silver, Total Recoverable	< 0.4		µg/L				
		Thallium, Total Recoverable	< 1		µg/L				
		Total Suspended Solids	120		mg/L				
		Uranium, Total	< 3		pCi/L				
			7/17/2002	Field pH	7.3	Standard	Units		
				Temperature	23		°C		
				Americium-241, Total	< 0.013		pCi/L		
Arsenic, Total Recoverable	< 1				µg/L				
Beryllium, Total Recoverable	< 1				µg/L				

Cadmium, Total Recoverable	< 0.3	µg/L
Chromium, Total Recoverable	< 3	µg/L
Copper, Total Recoverable	< 3	µg/L
Gross Alpha	< 3	pCi/L
Gross Beta	12	pCi/L
Iron, Total Recoverable	200	µg/L
Lithium, Total Recoverable	67	µg/L
Manganese, Total Recoverable	30	µg/L
Nickel, Total Recoverable	< 20	µg/L
Plutonium 239+240, Total	0.008 +/- 0.004	pCi/L
Selenium, Total Recoverable	< 1	µg/L
Silver, Total Recoverable	< 0.4	µg/L
Thallium, Total Recoverable	< 1	µg/L
Total Suspended Solids	60	mg/L
Uranium, Total	< 3	pCi/L

8/22/2002

Field pH	7.39	Standard Units
Temperature	21.1	°C
Americium-241, Total	< 0.014	pCi/L
Arsenic, Total Recoverable	< 1	µg/L
Beryllium, Total Recoverable	< 1	µg/L
Cadmium, Total Recoverable	< 0.3	µg/L
Chromium, Total Recoverable	< 3	µg/L
Copper, Total Recoverable	15	µg/L U
Gross Alpha	< 5	pCi/L
Gross Beta	13 +/- 4	pCi/L
Iron, Total Recoverable	510	µg/L
Lithium, Total Recoverable	8	µg/L
Manganese, Total Recoverable	31	µg/L
Nickel, Total Recoverable	100	µg/L U
Plutonium 239+240, Total	0.022 +/- 0.008	pCi/L
Selenium, Total Recoverable	< 1	µg/L
Silver, Total Recoverable	5.2	µg/L
Thallium, Total Recoverable	< 1	µg/L
Total Suspended Solids	55	mg/L
Uranium, Total	< 3	pCi/L

9/18/2002

Field pH	7.45	Standard Units
Temperature	17.1	°C
Americium-241, Total	< 0.008	pCi/L
Arsenic, Total Recoverable	< 1	µg/L
Beryllium, Total Recoverable	< 1	µg/L
Cadmium, Total Recoverable	< 0.3	µg/L
Chromium, Total Recoverable	< 3	µg/L
Copper, Total Recoverable	17	µg/L
Gross Alpha	< 4	pCi/L
Gross Beta	16 +/- 4	pCi/L
Iron, Total Recoverable	300	µg/L
Lithium, Total Recoverable	13	µg/L
Manganese, Total Recoverable	50	µg/L
Nickel, Total Recoverable	100	µg/L U

Plutonium 239+240, Total	< 0.009	pCi/L
Selenium, Total Recoverable	< 1	µg/L
Silver, Total Recoverable	0.8	µg/L
Thallium, Total Recoverable	< 1	µg/L
Total Suspended Solids	30	mg/L
Uranium, Total	< 3	pCi/L

North Influent to Sewage Treatment Plant(INFL-N)

9/18/2002

Field pH	7.51	Standard Units
Temperature	21.4	°C
Americium-241, Total	< 0.013	pCi/L
Arsenic, Total Recoverable	< 1	µg/L
Beryllium, Total Recoverable	< 1	µg/L
Cadmium, Total Recoverable	< 0.3	µg/L
Chromium, Total Recoverable	< 3	µg/L
Copper, Total Recoverable	18	µg/L
Gross Alpha	< 4	pCi/L
Gross Beta	15 +/- 4	pCi/L
Iron, Total Recoverable	250	µg/L
Lithium, Total Recoverable	9	µg/L
Manganese, Total Recoverable	27	µg/L
Nickel, Total Recoverable	< 20	µg/L
Plutonium 239+240, Total	0.005 +/- 0.003	pCi/L
Selenium, Total Recoverable	< 1	µg/L
Silver, Total Recoverable	< 0.4	µg/L
Thallium, Total Recoverable	< 1	µg/L
Total Suspended Solids	75	mg/L
Uranium, Total	< 3	pCi/L

South Influent to Sewage Treatment Plant(INFL-S)

9/18/2002

Field pH	7.81	Standard Units
Temperature	18.9	°C
Americium-241, Total	< 0.008	pCi/L
Arsenic, Total Recoverable	< 1	µg/L
Beryllium, Total Recoverable	< 1	µg/L
Cadmium, Total Recoverable	< 0.3	µg/L
Chromium, Total Recoverable	< 3	µg/L
Copper, Total Recoverable	22	µg/L
Gross Alpha	< 4	pCi/L
Gross Beta	25 +/- 5	pCi/L
Iron, Total Recoverable	200	µg/L
Lithium, Total Recoverable	6	µg/L
Manganese, Total Recoverable	35	µg/L
Nickel, Total Recoverable	< 20	µg/L
Plutonium 239+240, Total	< 0.005	pCi/L
Selenium, Total Recoverable	< 1	µg/L
Silver, Total Recoverable	1.5	µg/L
Thallium, Total Recoverable	< 1	µg/L
Total Suspended Solids	170	mg/L

Uranium, Total < 3 pCi/L

Pond C2 - Outfall(SW026)

9/10/2002

Dissolved Oxygen	7.13		mg/L
Field pH	7.62		Standard Units
Temperature	17.6		°C
Americium-241, Total	< 0.019		pCi/L
Ammonia as N	0.07		mg/L
Arsenic, Total Recoverable	5		µg/L
Beryllium, Dissolved	< 1		µg/L
Cadmium, Dissolved	< 0.3		µg/L
Chromium, Total	< 3		µg/L
Copper, Dissolved	15		µg/L
Gross Alpha	< 5		pCi/L
Gross Beta	13 +/-	4	pCi/L
Hardness as CaCO3	220		mg/L
Iron, Total Recoverable	250		µg/L
Lithium, Total	19		µg/L
Manganese, Total Rrcoverable	600		µg/L
Nickel, Total	< 100		µg/L
Nitrate/Nitrite	1.9		mg/L
Orthophosphate	0.03		mg/L
Phosphate, Total	0.1		mg/L
Plutonium 239+240, Total	0.032 +/-	0.01	pCi/L
Selenium, Dissolved	1.9		µg/L
Silver, Dissolved	< 0.4		µg/L
Thallium, Total	< 1		µg/L
Total Suspended Solids	50		mg/L
Tritium, Total	< 140		pCi/L
Uranium, Total	< 3		pCi/L

Walnut Creek Below Portal 3(SW093)

8/22/2002

Field pH	7.19		Standard Units
Temperature	14.2		°C
Ammonia as N	< 0.01		mg/L
Chloride	< 2		mg/L
Nitrate/Nitrite	0.81		mg/L

Walnut Creek at Indiana St.(SW114)

7/17/2002

Dissolved Oxygen	19.75		mg/L
Field pH	9.12		Standard Units
Temperature	21.7		°C
Ammonia as N	0.03		mg/L
Arsenic, Total Recoverable	2		µg/L
Beryllium, Dissolved	< 1		µg/L
Cadmium, Dissolved	< 0.3		µg/L
Chromium, Total	< 3		µg/L
Copper, Dissolved	< 3		µg/L

Hardness as CaCO3	160	mg/L
Iron, Total Recoverable	40	µg/L
Lithium, Total	39	µg/L
Manganese, Total Rrcoverable	20	µg/L
Nickel, Total	< 20	µg/L
Nitrate/Nitrite	< 0.3	mg/L
Orthophosphate	0.21	mg/L
Phosphate, Total	0.3	mg/L
Selenium, Dissolved	< 1	µg/L
Silver, Dissolved	< 0.4	µg/L
Thallium, Total	< 1	µg/L
Total Suspended Solids	< 10	mg/L

North Walnut Creek Upstream of Portal 3(SW118)

8/22/2002

Field pH	6.97	Standard Units
Temperature	19.6	°C
Ammonia as N	0.02	mg/L
Nitrate/Nitrite	< 0.3	mg/L

Pond A4(SWA4)

8/22/2002

Field pH	7.18	Standard Units
Temperature	21.1	°C
Ammonia as N	< 0.01	mg/L
Nitrate/Nitrite	< 0.3	mg/L

10/8/2002

Dissolved Oxygen	7.17	mg/L
Field pH	8.82	Standard Units
Temperature	14.3	°C
Americium-241, Total	< 0.004	pCi/L
Ammonia as N	< 0.01	mg/L
Arsenic, Total Recoverable	2	µg/L
Beryllium, Dissolved	< 1	µg/L
Cadmium, Dissolved	< 0.3	µg/L
Chloride	550	mg/L
Chromium, Total	< 20	µg/L
Copper, Dissolved	< 5	µg/L
Gross Alpha	< 5	pCi/L
Gross Beta	< 8 +/-	8 pCi/L
Hardness as CaCO3	260	mg/L
Iron, Total Recoverable	15	µg/L
Manganese, Total Recoverable	61	µg/L
Nickel, Total	< 20	µg/L
Nitrate/Nitrite	< 0.3	mg/L
Orthophosphate	0.03	mg/L
Phosphate, Total	0.053	mg/L
Plutonium 239+240, Total	< 0.009	pCi/L Q
Selenium, Dissolved	< 1	µg/L
Silver, Dissolved	< 0.4	µg/L
Thallium, Total	< 1	µg/L

Total Suspended Solids	36		mg/L
Uranium, Total	< 3		pCi/L

Pond B5(SWB5)

6/24/2002

Dissolved Oxygen	6.57		mg/L
Field pH	10.23		Standard Units
Temperature	21		°C
Americium-241, Total	< 0.014		pCi/L
Ammonia as N	< 0.01		mg/L
Arsenic, Total Recoverable	< 1		µg/L
Beryllium, Dissolved	< 1		µg/L
Cadmium, Dissolved	< 0.3		µg/L
Chloride	40		mg/L
Chromium, Total	< 3		µg/L
Copper, Dissolved	6		µg/L
Gross Alpha	< 3		pCi/L
Gross Beta	9 +/-	4	pCi/L
Hardness as CaCO3	160		mg/L
Iron, Total Recoverable	< 10		µg/L
Lithium, Total	7		µg/L
Manganese, Total Recoverable	< 2		µg/L
Nickel, Total	< 20		µg/L
Nitrate/Nitrite	< 0.3		mg/L
Orthophosphate	0.15		mg/L
Phosphate, Total	0.5		mg/L
Plutonium 239+240, Total	< 0.006		pCi/L
Selenium, Dissolved	< 1		µg/L
Silver, Dissolved	< 0.4		µg/L
Thallium, Total	< 1		µg/L
Total Suspended Solids	20		mg/L
Uranium, Total	< 3		pCi/L

8/19/2002

Americium-241, Total	< 0.011		pCi/L
Ammonia as N	< 0.01		mg/L
Arsenic, Total Recoverable	< 1		µg/L
Beryllium, Dissolved	< 1		µg/L
Cadmium, Dissolved	< 0.3		µg/L
Chloride	40		mg/L
Chromium, Total	< 3		µg/L
Copper, Dissolved	< 3		µg/L
Gross Alpha	< 4		pCi/L
Gross Beta	6 +/-	4	pCi/L
Hardness as CaCO3	160		mg/L
Iron, Total Recoverable	30		µg/L
Lithium, Total	43		µg/L
Manganese, Total Recoverable	18		µg/L
Nickel, Total	< 20		µg/L
Nitrate/Nitrite	< 0.3		mg/L
Orthophosphate	0.13		mg/L
Phosphate, Total	0.51		mg/L

Plutonium 239+240, Total	0.005 +/- 0.003	pCi/L
Selenium, Dissolved	< 1	µg/L
Silver, Dissolved	< 0.4	µg/L
Thallium, Total	< 1	µg/L
Total Suspended Solids	13	mg/L H
Uranium, Total	< 3	pCi/L
10/8/2002		
Dissolved Oxygen	9.86	mg/L
Field pH	9.4	Standard Units
Temperature	12.8	°C
Americium-241, Total	0.013 +/- 0.006	pCi/L
Ammonia as N	0.05	mg/L
Arsenic, Total Recoverable	< 1	µg/L
Beryllium, Dissolved	< 1	µg/L
Cadmium, Dissolved	< 0.3	µg/L
Chloride	130	mg/L
Chromium, Total	< 20	µg/L
Copper, Dissolved	< 3	µg/L
Gross Alpha	< 4	pCi/L
Gross Beta	8 +/- 4	pCi/L
Hardness as CaCO3	140	mg/L
Iron, Total Recoverable	< 10	µg/L
Lithium, Total		µg/L
Manganese, Total Recoverable	4	µg/L
Nickel, Total	< 20	µg/L
Nitrate/Nitrite	0.89	mg/L
Orthophosphate	< 0.02	mg/L
Phosphate, Total	1.6	mg/L
Plutonium 239+240, Total	0.013 +/- 0.008	pCi/L Q
Selenium, Dissolved	< 1	µg/L
Silver, Dissolved	< 0.4	µg/L
Thallium, Total	< 1	µg/L
Total Suspended Solids	20	mg/L
Uranium, Total	< 3	pCi/L

Pond C2(SWC2)

8/19/2002

Dissolved Oxygen	6.38	mg/L
Field pH	8.98	Standard Units
Temperature	20.8	°C
Americium-241, Total	< 0.018	pCi/L
Ammonia as N	0.02	mg/L
Arsenic, Total Recoverable	5	µg/L
Beryllium, Dissolved	< 1	µg/L
Cadmium, Dissolved	< 0.3	µg/L
Chloride	< 2	mg/L
Chromium, Total	< 3	µg/L
Copper, Dissolved	< 3	µg/L
Gross Alpha	< 5	pCi/L
Gross Beta	11 +/- 4	pCi/L
Hardness as CaCO3	210	mg/L

Iron, Total Recoverable	170	µg/L
Lithium, Total	11	µg/L
Manganese, Total Recoverable	530	µg/L
Nickel, Total	< 20	µg/L
Nitrate/Nitrite	< 0.3	mg/L
Orthophosphate	< 0.02	mg/L
Phosphate, Total	0.06	mg/L
Plutonium 239+240, Total	0.017 +/- 0.005	pCi/L
Selenium, Dissolved	< 1	µg/L
Silver, Dissolved	< 0.4	µg/L
Thallium, Total	< 1	µg/L
Total Suspended Solids	20	mg/L H
Uranium, Total	< 3	pCi/L



**Environmental Surveillance Report**  
**TABLE I - ORGANIC ANALYSIS OF SURFACE WATER**  
**THIRD QUARTER 2002**

Location	Sample Date	Parameter	Analysis Level	*Analysis*		
				Units	1st	2nd
Pond B2 North(SWB2N)	10/22/2002					
		cis-1,2-Dichloroethylene	1.2	µg/L		
Pond B2 South(SWB2S)	10/22/2002					
		cis-1,2-Dichloroethylene	7.9	µg/L		
		Trichloroethylene	2.2	µg/L		
		Vinyl Chloride	2.7	µg/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 <sub>3</sub>	nitrate
pCi/L	picocuries per liter
pCi/m <sup>3</sup>	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	<b>Total Suspended Solids</b>
µg/L	microgram per liter
µg/m <sup>3</sup>	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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If you have questions or comments about this report, or if you would like to be placed on the mailing or email list to receive copies of this report in the future, please write to:

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