

Environmental Surveillance Report

on the
U.S. Department of Energy

Rocky Flats Environmental Technology Site

Information Exchange

FOURTH QUARTER 2002



**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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TABLE OF CONTENTS

INTRODUCTION	1
Air Monitoring Stations - 2002	2
Water Monitoring Stations - 2002	3
DECISION RULES	4
ANALYTES OF INTEREST	8
AIR and WATER STANDARDS	
National Ambient Air Quality Standards	10
Colorado Water Quality Control Commission Standards for Radioactive Materials at and around RFETS	11
Sampling and Analytical Results for this Quarter	
AIR RESULTS	
Description of Air Sampling this Quarter	14
Graphs of Selected Air Results	15
Tabular Data	
Table A Gross Alpha and Gross Beta Radioactivity Suspended Airborne Particulate Material	17
Table B Alpha Spectrometric Analysis and Long-Lived Gross Alpha Radioactivity Concentrations in Suspended Airborne Particulate Material	18
Table D Inorganic Gaseous Compounds in Air	19

WATER RESULTS

Description of Precipitation and Surface Water
Sampling Done This Quarter 20

Graphs of Selected Water Results 24

Tabular Data

Table G1 CDPHE Surface Water Monitoring Program G1
Table H Inorganic Analysis of Surface Water H1
Table I Organic Analysis of Surface Water I1

GLOSSARY 27

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

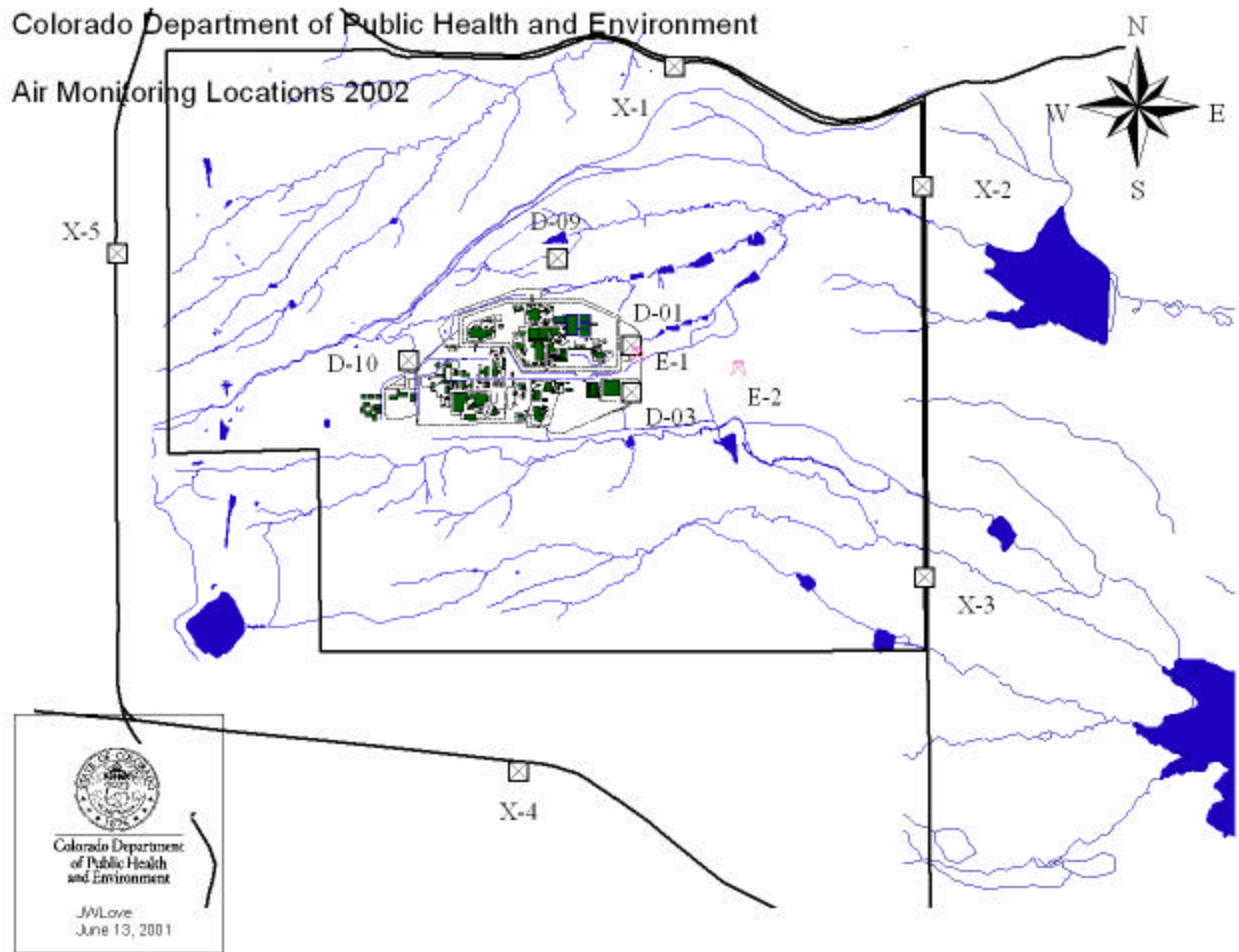
AIR STANDARDS

WATER STANDARDS

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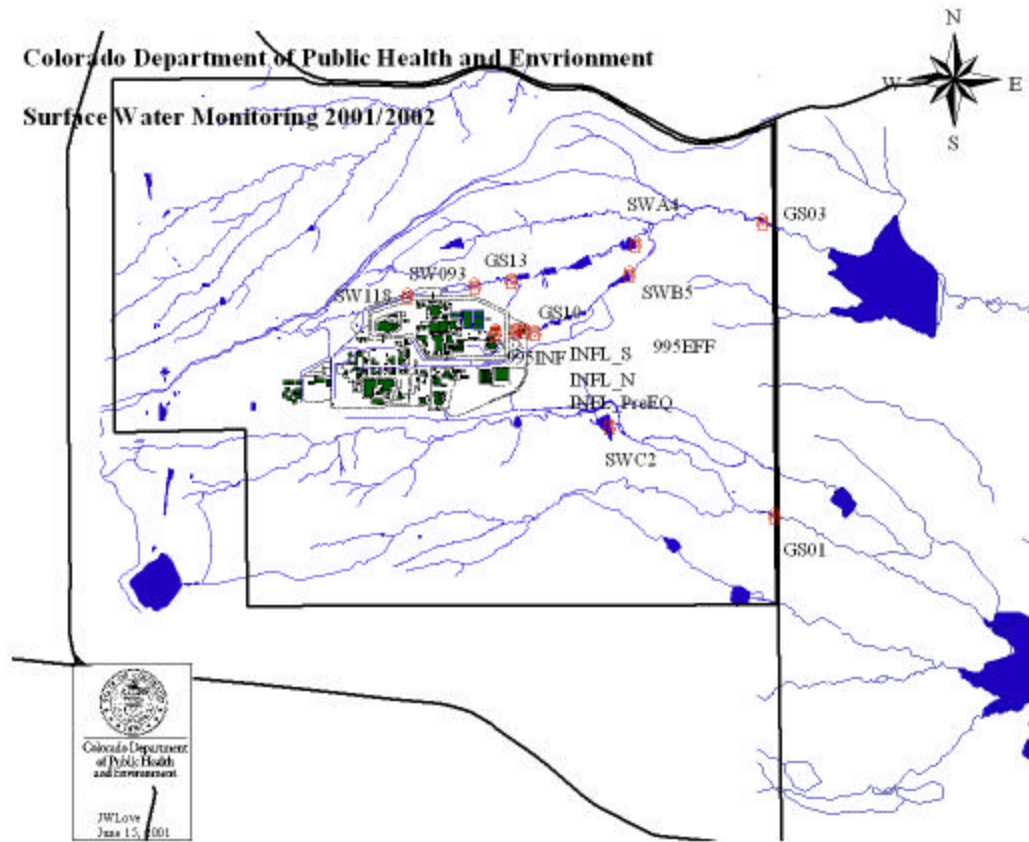
Colorado Department of Public Health and Environment

Air Monitoring Locations 2002



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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 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 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 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 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 (? g/L)	SEGMENT 5 Action Levels (? g/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 (? g/L)	MDL (? g/L)	PQL (? g/L)	VOCs	MCL (? g/L)	MDL (? g/L)	PQL (? g/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 (? g/L)	PQL (? g/L)	Contaminant	MDL (? g/L)	PQL (? g/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 (? g/L)	MDL (? g/L)	PQL (? g/L)	SVOCs	MCL (? g/L)	MDL (? g/L)	PQL (? g/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-Dinitroroluene	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-Nitoraniline	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
FOURTH QUARTER 2002**

Laboratory and Radiation Services Division

1. General Discussion

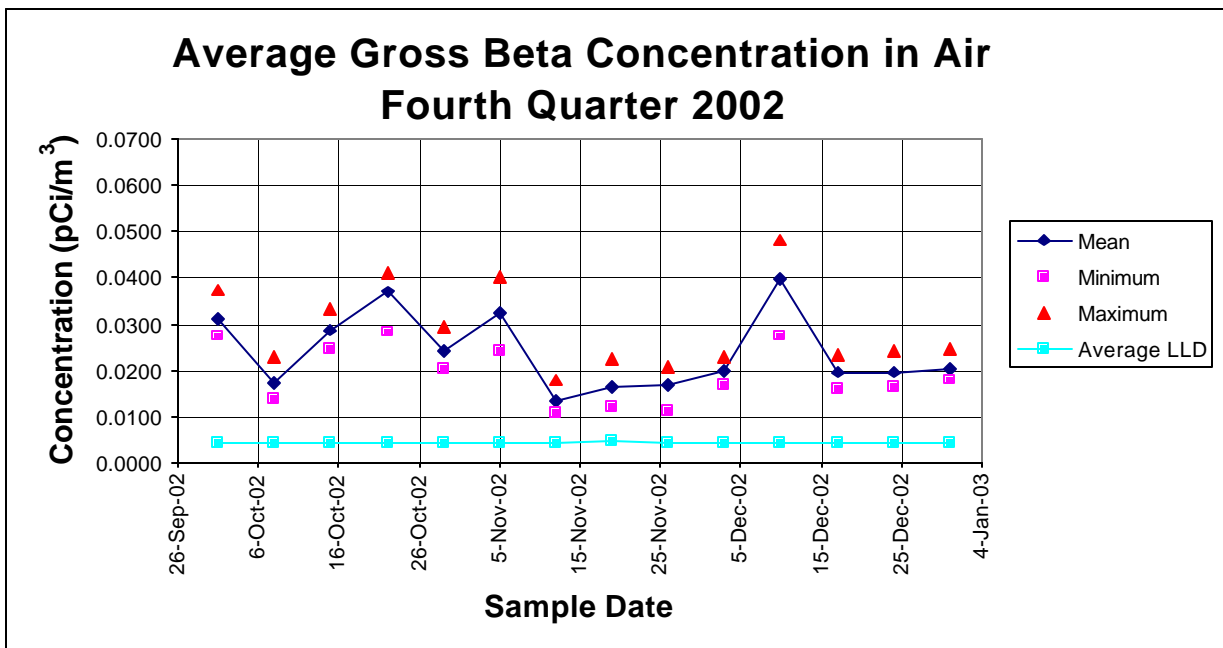
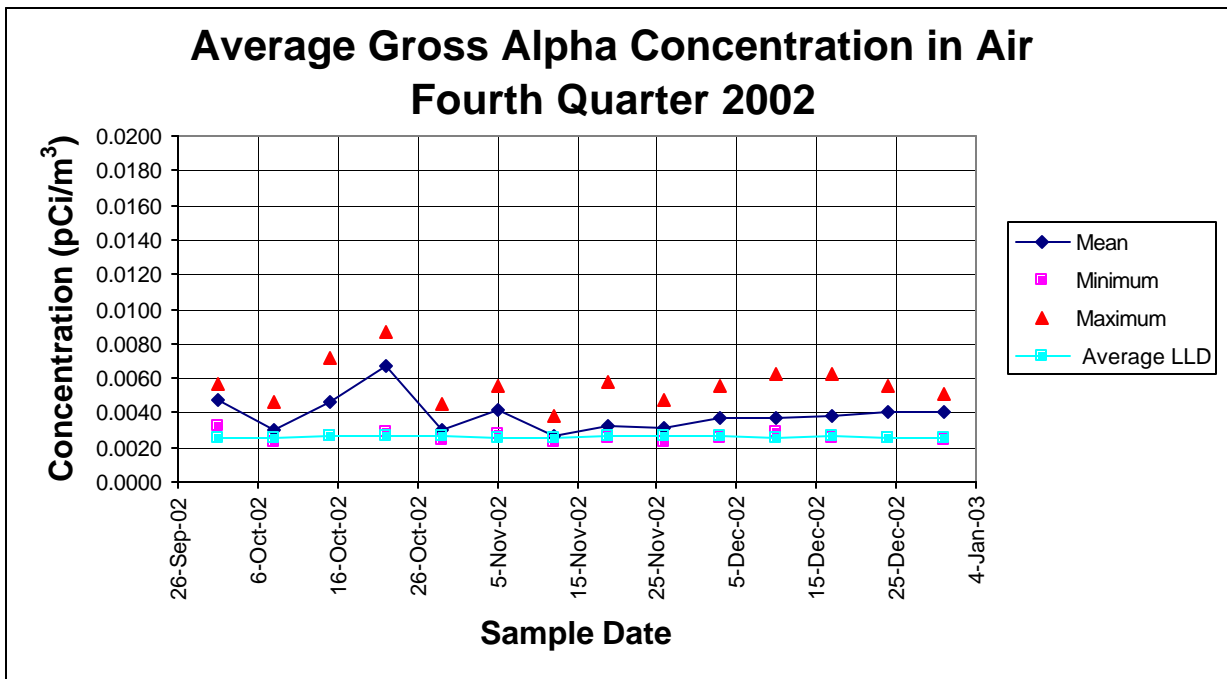
Table A contains the complete gross alpha /gross beta results for the fourth quarter of 2002.

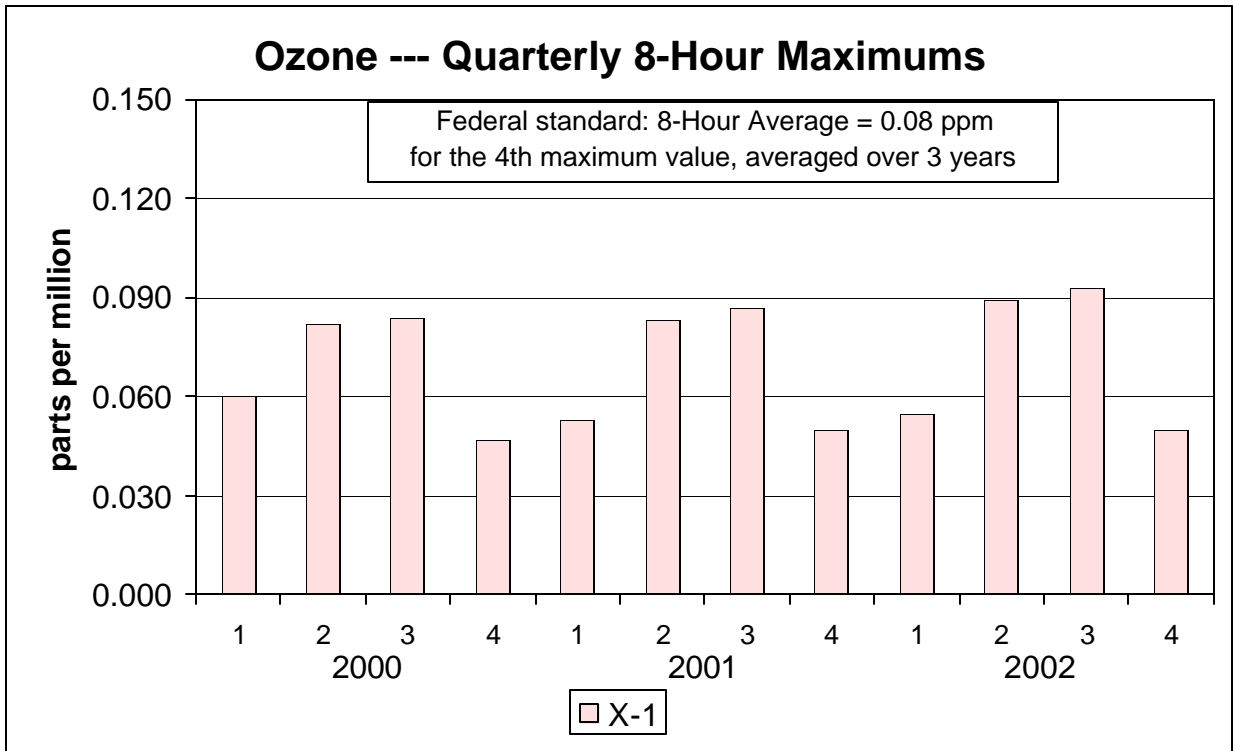
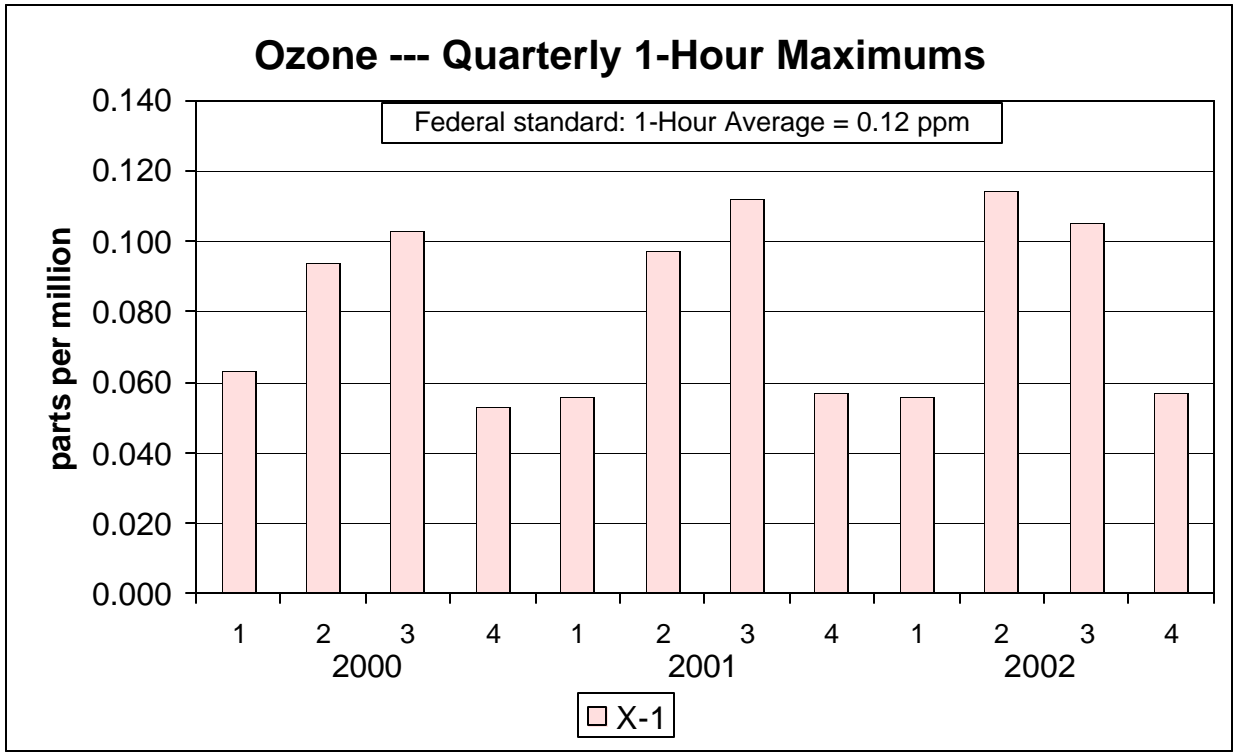
Table B-1 contains plutonium, americium and isotopic uranium results for the third quarter of 2002 for all sample locations except the D-3 sampler. Americium analysis for that location failed QC and is being repeated. All of these data show no obvious anomalies, compared to historical data.

Ozone data for the fourth quarter of 2002 are presented in Table D. Ozone concentrations for the fourth quarter of 2002 are at typically low wintertime levels.

2. Graphical Presentation

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





• **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**

FOURTH QUARTER 2002

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 / Continuous	13	<	< 0.0043	0.0079	0.0019	0.0255	0.0415	0.0164
D-3	TSP / Continuous	13	<	< 0.0034	0.0053	0.0019	0.0250	0.0442	0.0108
E-1-T	TSP / Continuous	12	<	< 0.0039	0.0055	0.0024	0.0228	0.0369	0.0126
BUFFER ZONE CAMPT EDC									
D-9	TSP / Continuous	13	<	< 0.0037	0.0084	0.0011	0.0231	0.0406	0.0108
D-10	TSP / Continuous	12	<	< 0.0037	0.0072	0.0009	0.0229	0.0362	0.0157
E-2-T	TSP / Continuous	12	<	< 0.0039	0.0087	0.0012	0.0249	0.0473	0.0131
SITE BOUNDARY CAMPT EDC									
X-1	TSP / Continuous	13	<	< 0.0030	0.0053	0.0016	0.0237	0.0388	0.0149
X-2	TSP / Continuous	13	<	< 0.0038	0.0060	0.0015	0.0261	0.0480	0.0120
X-3	TSP / Continuous	12	<	< 0.0038	0.0087	0.0016	0.0226	0.0334	0.0120
X-4	TSP / Continuous	13	<	< 0.0033	0.0075	0.0005	0.0242	0.0416	0.0112
X-5	TSP / Continuous	9	<	< 0.0029	0.0041	0.0012	0.0227	0.0406	0.0151

pCi/m³ = 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**

FOURTH QUARTER 2002

Location	Sampler Type	²³⁹⁺²⁴⁰ Pu pCi/m ³	²⁴¹ Am pCi/m ³	²³⁹⁺²⁴⁰ Pu / ²⁴¹ Am Ratio	Mean Gross Alpha pCi/m ³
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				

Location	Sampler Type	²³⁴ U pCi/m ³	²³⁵ U pCi/m ³	²³⁸ U pCi/m ³
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

DATA NOT YET AVAILABLE

pCi/m³ = Picocuries per cubic meter

TSP = Total Suspended Particulates

Continuous = continuous sampling

X-4	TSP (1/6 day, quarterly composite)	< 0.000129	< 0.000026	< 0.000129	---	---
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Environmental Surveillance Report

TABLE D: INORGANIC GASEOUS COMPOUNDS IN AIR

FOURTH QUARTER 2002

North Site (X-1)				
Compound	Average 1-Hour ppm	Maximum 1-Hour ppm	Maximum 8-Hour Average ppm	# Hours
		<u>OCTOBER 2002</u>		
Ozone (O ₃)	0.028	0.057	0.050	740
		<u>NOVEMBER 2002</u>		
Ozone (O ₃)	0.031	0.051	0.049	718
		<u>DECEMBER 2002</u>		
Ozone (O ₃)	0.028	0.052	0.049	735

ppm = Parts per million
N/A = Not available

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WATER RESULTS

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CDPHE Surface Water Sampling

Fourth Quarter 2002

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

- Wastewater Treatment Plant (WWTP) Influent samples were collected on October 16, November 20, and December 18, 2002. Samples taken in November and December are still being analyzed.
- Pre-discharge samples were collected from Pond B5 and A4 on October 8, 2002.
- Point of Compliance - Walnut Creek at Indiana Street (SW114) sample was collected on October 29, 2002.
- Nutrient sampling (nitrate and ammonia) was conducted November 11, 2002 at the following locations: GS-10, WWTP effluent, Pond A3, Pond A4, Pond B5, SW-118, SW093, and GS13.
- Performance Monitoring for Mound/East Trench Plume was conducted on October 22, 2002 below Pond B4.
- Performance Monitoring for Solar Pond Plume was attempted on November 11, 2002 above Pond A1 at GS13.

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

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, iron, silver, manganese, lithium, nickel, gross beta, and americium 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) 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:

- o Chloride detected at 550 mg/L as compared to the 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.

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.

A sample was collected from Walnut Creek at Indiana (SW114) on October 29, 2002. During this quarters' ambient water sampling at SW114 no exceedences of an action level was observed.

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 19 mg/L. The highest result was from the sample

collected above Pond A-1. All results were less than the temporary modification of 100 mg/L. The Colorado standard for nitrate is 10 mg/L.

This quarters' total ammonia results ranged from <0.01 mg/L to 1.6 mg/L. Calculating for unionized ammonia exhibited concentrations ranging from <0.0000 to 0.0151 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.

VOC samples were not taken this quarter. Iron, lithium, and manganese were found in the October 22, 2002 sample taken below Pond B4. No exceedence of an action level was observed.

Performance Monitoring – Solar Pond 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.

VOC samples were not taken this quarter. Iron, lithium, and manganese were found in the October 22, 2002 sample taken below Pond B4. No exceedences of an action level was observed.

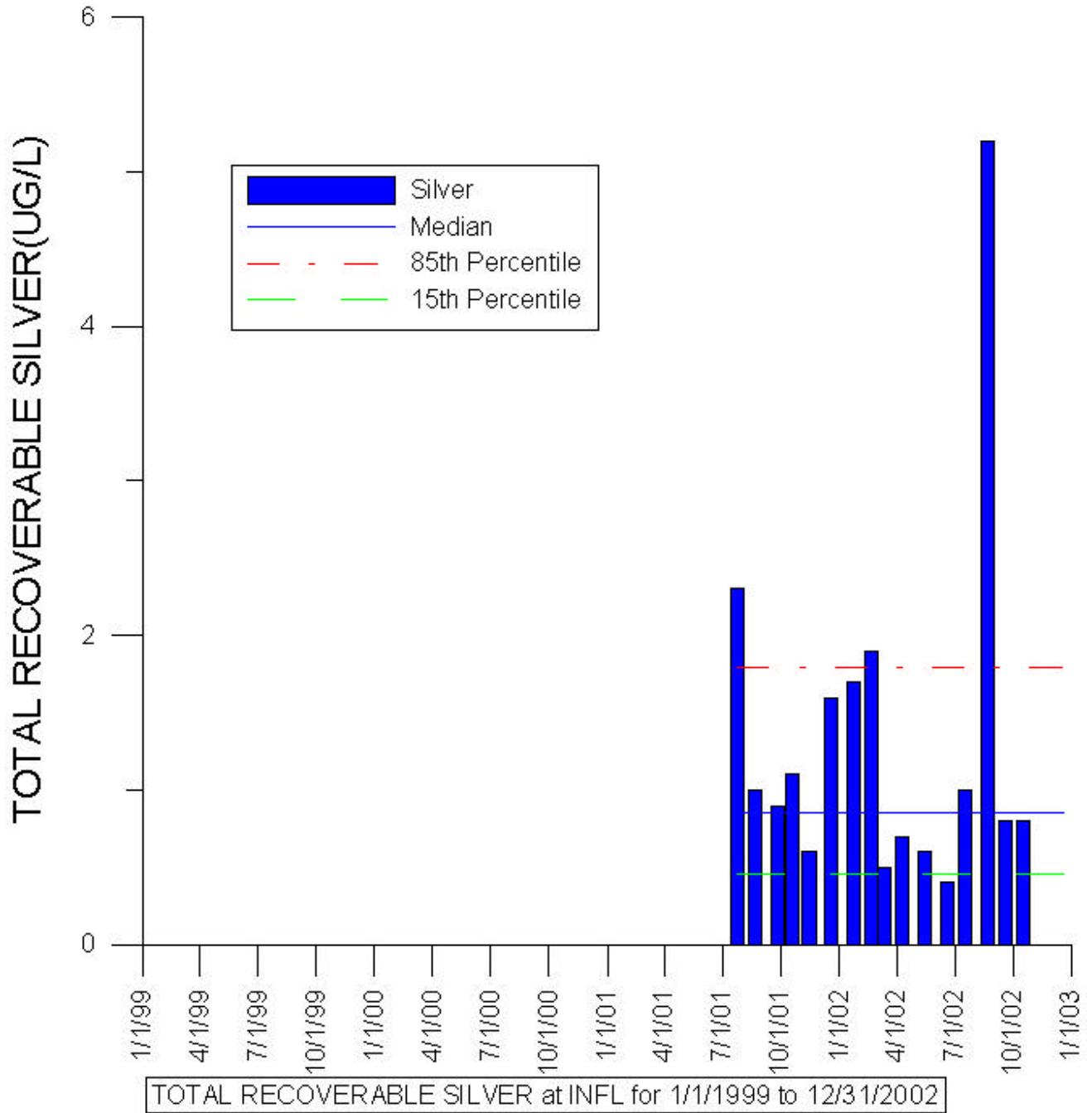
Performance Monitoring – Solar Pond Plume

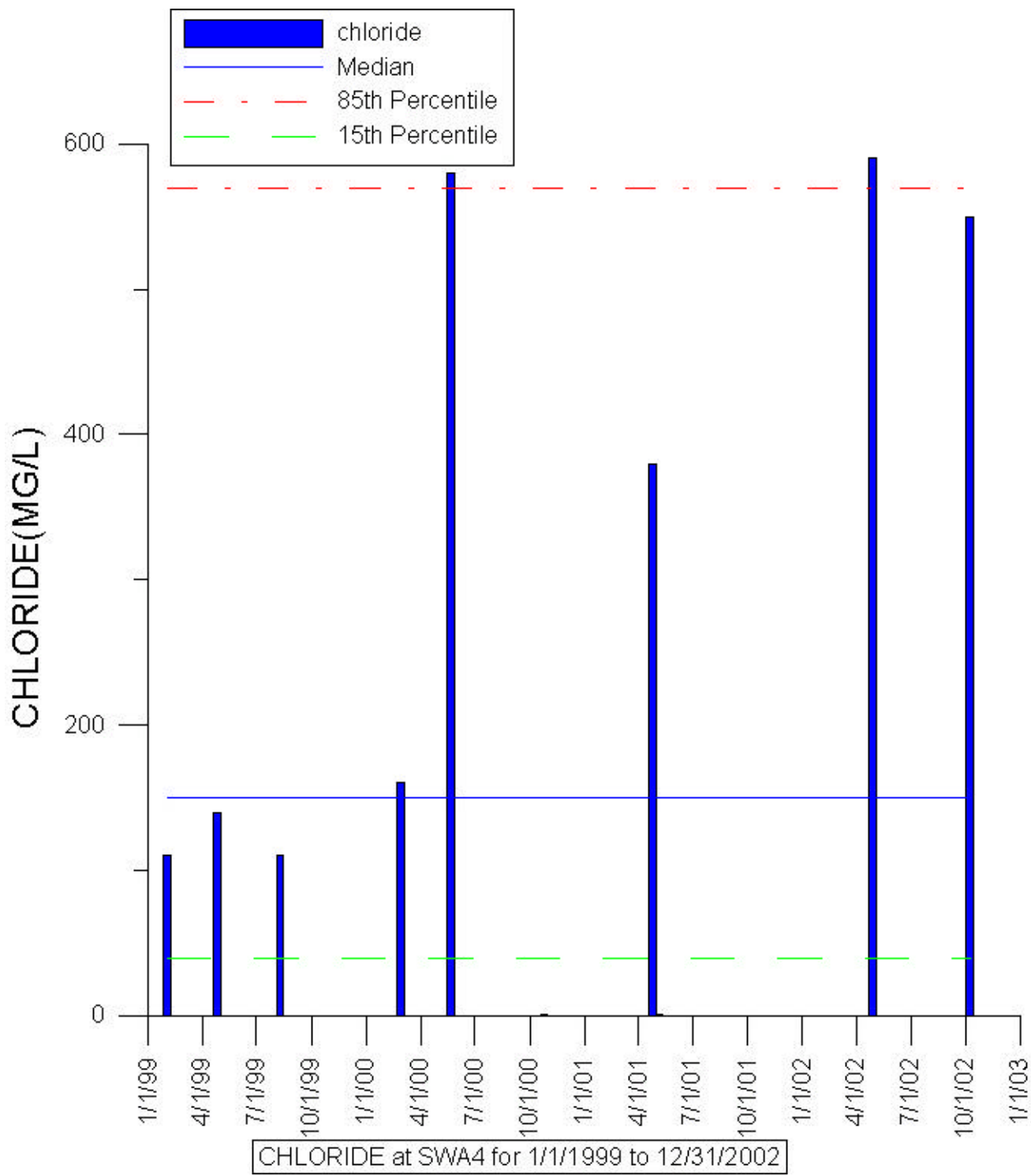
The Solar Ponds groundwater contaminant plume contains high levels of nitrates and uranium, and lower concentrations of several other metals. Groundwater collection and treatment systems have been installed, and the treatment appears to be effective. However, it is possible that some contaminated groundwater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

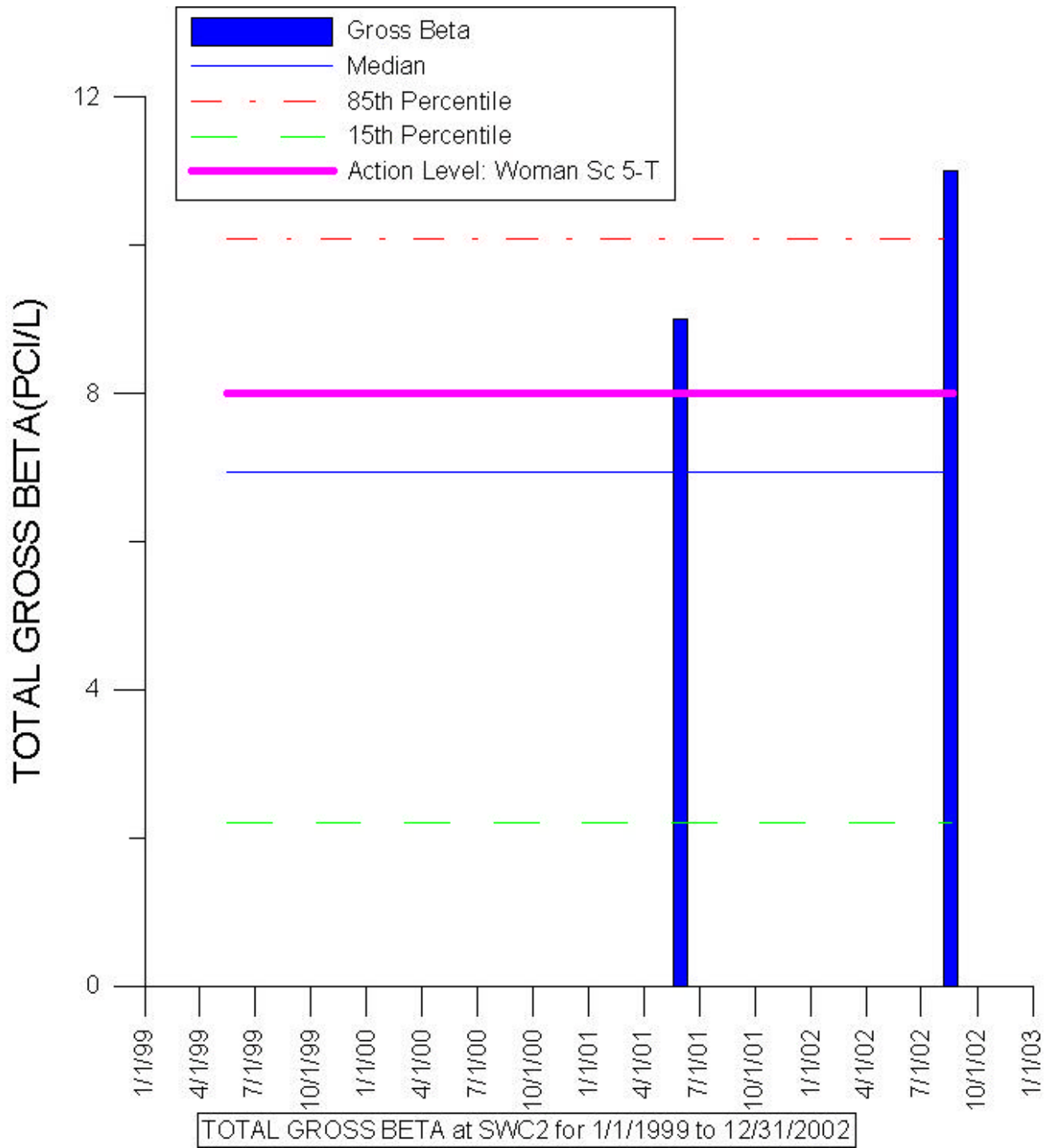
While the Site monitors in-stream uranium concentrations, CDPHE will perform in-stream monitoring for metals. This data will be used in order to ensure that stream standards are being attained. It should be noted that both the Site and CDPHE monitor nitrate concentrations at this location, and the CDPHE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

One sample was collected above Pond A-1 on November 11, 2002. Chromium, copper, iron, lithium, manganese, and selenium were detected in this sample. All concentrations are below Colorado Surface Water Standards.

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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

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
Metals - Total Recoverable (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	2 / yr	2 / yr
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
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 Report
TABLE H - INORGANIC ANALYSIS OF SURFACE WATER
FOURTH QUARTER 2002

Sample Date	Parameter	Analysis Level	*Analysis*			
			Units	1st	2nd	3rd
wage Treatment Plant (INFL)						
10/16/200						
2						
	pH	7.59				Standard Units
	Temperature	17.1				°C
	Americium ²⁴¹	0.016	+/-	0.008		pCi/L
	Gross Alpha	< 4				pCi/L
	Gross Beta	17	+/-	4		pCi/L
	Plutonium ²³⁹⁺²⁴⁰	< 0.005				pCi/L
	Uranium, Total	< 3				pCi/L
	Arsenic, Total Recoverable	< 1				ug/L
	Beryllium, Total Recoverable	< 1				ug/L
	Cadmium, Total Recoverable	< 0.3				ug/L
	Chromium, Total Recoverable	< 3				ug/L
	Copper, Total Recoverable	8				ug/L
	Iron, Total Recoverable	360				ug/L
	Lithium, Total Recoverable	6				ug/L
	Manganese, Total Recoverable	36				ug/L
	Nickel, Total Recoverable	< 30				ug/L
	Selenium, Total Recoverable	1.0				ug/L
	Silver, Total Recoverable	0.8				ug/L
	Thallium, Total Recoverable	< 1				ug/L
	Total Suspended Solids	50				mg/L

ge Monitoring

10/8/2002	Americium ²⁴¹	< 0.009				pCi/L
	Gross Alpha	< 4				pCi/L
	Gross Beta	8	+/-	4		pCi/L

Plutonium ²³⁹⁺²⁴⁰	<	0.005		pCi/L
Uranium, Total	<	3		pCi/L
Arsenic, Total Recoverable		1		ug/L
Beryllium, Dissolved	<	1		ug/L
Cadmium, Dissolved	<	0.3		ug/L
Chromium, Total	<	20		ug/L
Copper, Dissolved	<	3		ug/L
Iron, Total Recoverable		10		ug/L
Lithium		28		ug/L
Manganese, Total Recoverable		4		ug/L
Nickel, Dissolved	<	20		ug/L
Selenium, Dissolved	<	1.0		ug/L
Silver, Dissolved	<	0.4		ug/L
Thallium	<	1		ug/L
Ammonia as N		0.05		mg/L
Chloride		130		mg/L
Hardness as CaCO ₃		140		mg/L
Nitrate/Nitrite		0.89		mg/L
Orthophosphate		0.02		mg/L
Phosphate, Total		1.6		mg/L
Total Suspended Solids		20		mg/L
Unionized Ammonia		2.2013		mg/L

10/8/2002

Americium ²⁴¹	<	0.008		pCi/L
Gross Alpha	<	5		pCi/L
Gross Beta		8	+/- 8	pCi/L
Plutonium ²³⁹⁺²⁴⁰		0.007	+/- 0.003	pCi/L
Uranium, Total	<	3		pCi/L
Arsenic, Total Recoverable		2		ug/L
Beryllium, Dissolved	<	1		ug/L
Cadmium, Dissolved	<	0.3		ug/L
Chromium, Total	<	20		ug/L
Copper, Dissolved		5		ug/L
Iron, Total Recoverable		15		ug/L
Lithium		17		ug/L
Manganese, Total Recoverable		61		ug/L

Nickel, Dissolved	<	20	ug/L
Selenium, Dissolved		1.0	ug/L
Silver, Dissolved	<	0.4	ug/L
Thallium	<	1	ug/L
Ammonia as N	<	0.01	mg/L
Chloride		550	mg/L
Hardness as CaCO3		260	mg/L
Nitrate/Nitrite	<	0.3	mg/L
Orthophosphate		0.03	mg/L
Phosphate, Total		0.053	mg/L
Total Suspended Solids		36	mg/L
Unionized Ammonia	<	0.7384	mg/L

Compliance

Location: at Indiana St. (SW114)

Date: 10/29/200

2

Arsenic, Total Recoverable		2	ug/L
Beryllium, Dissolved	<	1	ug/L
Cadmium, Dissolved	<	0.3	ug/L
Chromium, Total	<	3	ug/L
Copper, Dissolved	<	5	ug/L
Iron, Total Recoverable		14	ug/L
Lithium		22	ug/L
Manganese, Total Recoverable		36	ug/L
Nickel, Dissolved	<	30	ug/L
Selenium, Dissolved	<	1.0	ug/L
Silver, Dissolved	<	0.4	ug/L
Thallium	<	1	ug/L
Ammonia as N		0.44	mg/L
Hardness as CaCO3		210	mg/L
Nitrate/Nitrite		0.39	mg/L
Orthophosphate		0.81	mg/L
Phosphate, Total		1.0	mg/L
Total Suspended Solids		20	mg/L

Monitoring

Creek above B-Series Bypass (GS10)

11/11/200

2

pH	8.07	Standard Units
Temperature	5.6	°C
Ammonia as N	0.01	mg/L
Chloride	810	mg/L
Nitrate/Nitrite	2.1	mg/L
Unionized Ammonia	0.0002	mg/L

Sewage Treatment Plant (EFFL)

11/11/200

2

pH	7.94	Standard Units
Temperature	12.7	°C
Ammonia as N	0.24	mg/L
Chloride	480	mg/L
Nitrate/Nitrite	0.90	mg/L
Unionized Ammonia	0.0047	mg/L

: below Portal 3 (SW093)

11/11/200

2

Dissolved Oxygen	19.12	mg/L
pH	8.13	Standard Units
Temperature	5.6	°C
Ammonia as N	< 0.01	mg/L
Chloride	910	mg/L
Nitrate/Nitrite	0.63	mg/L
Unionized Ammonia	< 0.0002	mg/L

Creek above Pond A-1 (GS13)

11/11/200

2

pH	7.88	Standard Units
Temperature	2.2	°C
Ammonia as N	< 0.01	mg/L
Chloride	1100	mg/L
Nitrate/Nitrite	19	mg/L
Unionized Ammonia	< 0.0001	mg/L

11/11/200
2

Dissolved Oxygen		13.27	mg/L
pH		7.45	Standard Units
Temperature		1.1	°C
Ammonia as N	<	0.01	mg/L
Nitrate/Nitrite	<	0.3	mg/L
Unionized Ammonia	<	0.0000	mg/L

11/11/200
2

pH		7.7	Standard Units
Temperature		3.3	°C
Ammonia as N		0.14	mg/L
Chloride		1400	mg/L
Nitrate/Nitrite		2.7	mg/L
Unionized Ammonia		0.0008	mg/L

11/11/200
2

pH		7.94	Standard Units
Temperature		3	°C
Ammonia as N		0.99	mg/L
Nitrate/Nitrite	<	0.3	mg/L
Unionized Ammonia		0.0090	mg/L

11/11/200
2

pH		7.92	Standard Units
Temperature		4	°C
Ammonia as N		1.6	mg/L
Nitrate/Nitrite		1.2	mg/L
Unionized Ammonia		0.0151	mg/L

at Indiana St. (SW114)

11/11/200
2

Ammonia as N		1.3	mg/L
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Chloride		360	mg/L
Nitrate/Nitrite	<	0.3	mg/L

10/22/200

2

Arsenic, Total Recoverable	<	1	ug/L
Beryllium, Dissolved	<	1	ug/L
Cadmium, Dissolved	<	0.3	ug/L
Chromium, Total	<	3	ug/L
Copper, Dissolved	<	5	ug/L
Iron, Total Recoverable		270	ug/L
Lithium		7	ug/L
Manganese, Total Recoverable		36	ug/L
Nickel, Dissolved	<	30	ug/L
Selenium, Dissolved	<	1.0	ug/L
Silver, Dissolved	<	0.4	ug/L
Thallium, Total Recoverable	<	1	ug/L
Hardness as CaCO ₃		170	mg/L

Creek above Pond A-1 (GS13)

11/11/200

2

pH		7.88	Standard Units
Temperature		2.2	°C
Arsenic, Total Recoverable	<	1	ug/L
Beryllium, Dissolved	<	1	ug/L
Cadmium, Dissolved	<	0.3	ug/L
Chromium, Total		3	ug/L
Copper, Dissolved		8	ug/L
Iron, Total Recoverable		51	ug/L
Lithium		27	ug/L
Manganese, Total Recoverable		140	ug/L
Nickel, Dissolved	<	30	ug/L
Selenium, Dissolved		5.6	ug/L
Silver, Dissolved	<	0.4	ug/L
Thallium	<	1	ug/L
Hardness as CaCO ₃		650	mg/L

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

Station	Sample Date	Parameter	Analysis Level	Units	*Analysis*		
					1st	2nd	3rd
1 North(SWB2N)	N/A						
				µg/L			
2 South(SWB2S)	N/A			µg/L			
				µg/L			
				µg/L			

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GLOSSARY

silver
americium
analyte of interest
Air Pollution Control Division
Air Quality Control Commission
action level framework
found in blank
beryllium
chemical abstracts service number
cadmium
Colorado Department of Public Health and Environment
chromium
decontamination and decommissioning
Department of Energy
Environmental Protection Agency
Environmental Surveillance Report
exceeds holding time
Integrated Monitoring Plan
detected but below practical quantitative limit
Laboratory and Radiation Services
Milligram per liter
Maximum Contaminant Level (below MCL is safe)
minimum detection level
not detected
nitrate
picocuries per liter
picocuries per cubic meter
particulate material
parts per billion
parts per million
practical quantitative level
plutonium
quantity not sufficient
Rocky Flats Cleanup Agreement
Rocky Flats Environmental Technology Site

ACGIH Threshold limit value
Total Suspended Particulate

Total Suspended Solids

microgram per liter
micrograms per cubic meter
uranium
volatile organic compounds
Water Quality Control Commission
Water Quality Control Division
wastewater treatment plan

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ve questions or comments about this report, or if you would like to be placed on the mailing or email list to receive
this report in the future, please write to:

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