

Environmental Surveillance Report

on the
U.S. Department of Energy

Rocky Flats Environmental Technology Site

Information Exchange

SECOND 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. 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.

BACKGROUND INFORMATION

MONITORING STATIONS

DECISION RULES

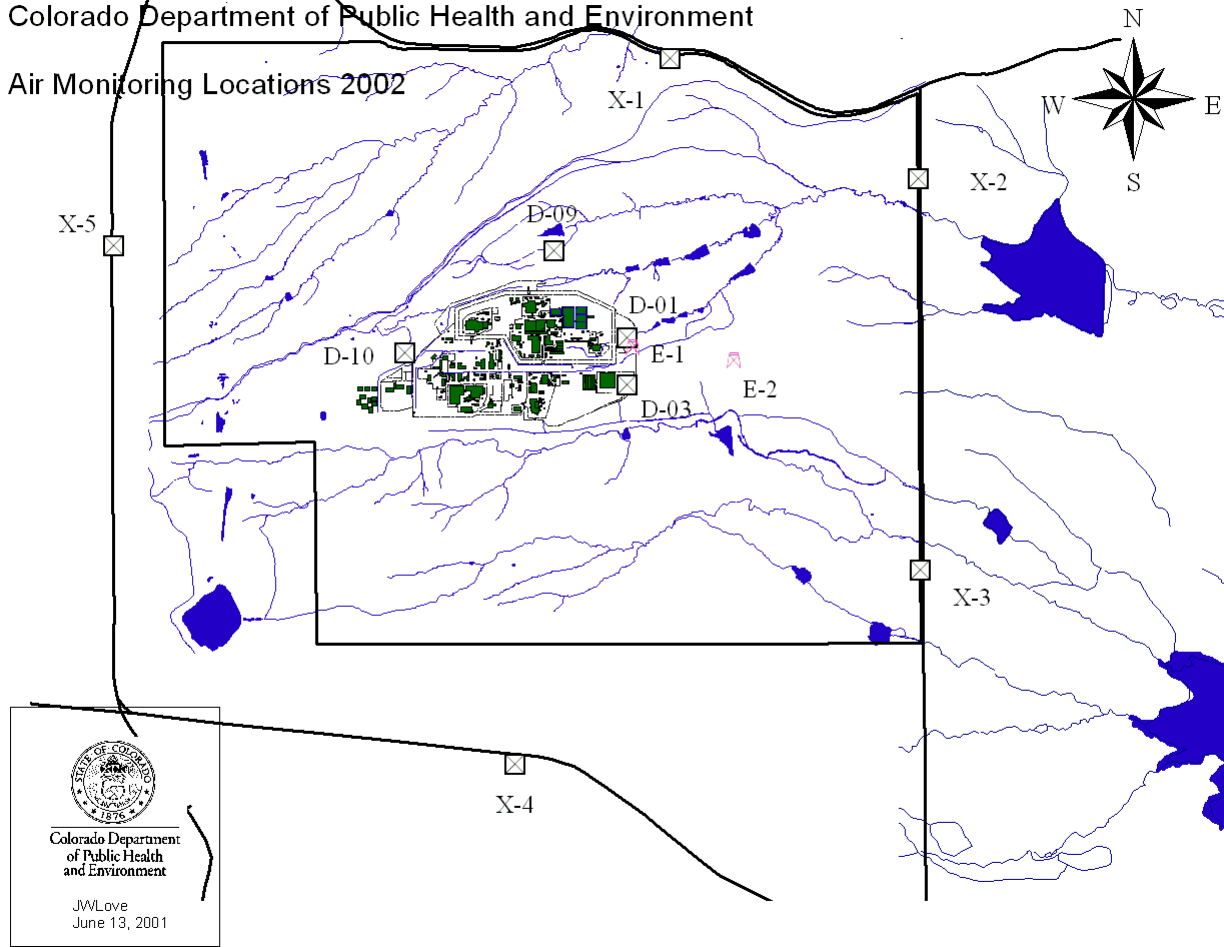
ANALYTES OF INTEREST

AIR STANDARDS

WATER STANDARDS

Colorado Department of Public Health and Environment

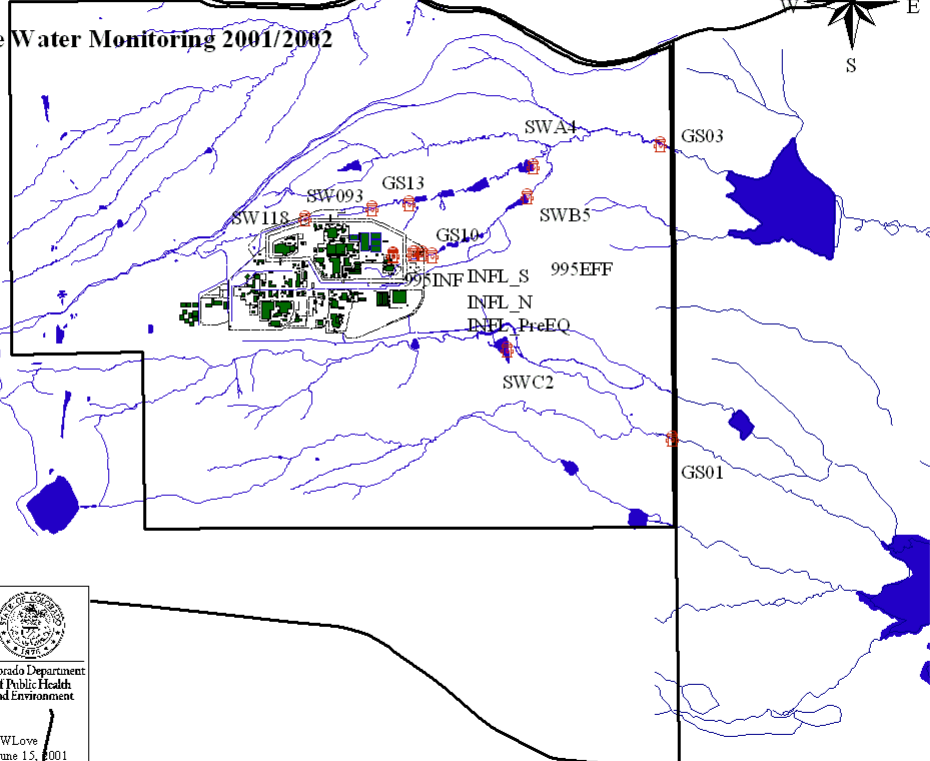
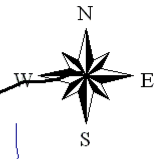
Air Monitoring Locations 2002



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Colorado Department of Public Health and Environment

Surface Water Monitoring 2001/2002



Colorado Department
of Public Health
and Environment

JWL/love
June 13, 2001

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 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 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	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.

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

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

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

Standards for Inorganics and Metals

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

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

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

TM – Temporary Modification

EPA Method 502.2 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	1	Chloroform	none	0.5	1
1,1,1-Trichloroethane	200	0.5	1	Chloromethane	none	0.5	1
1,1,2,2-Tetrachloroethane	none	0.5	1	Dibromochloromethane	none	0.5	1
1,1,2-Trichloroethane	5	0.5	1	Dibromomethane	none	0.5	1
1,1-Dichloroethane	none	0.5	1	Dichlorodifluoromethane	none	0.5	1
1,1-Dichloroethene	7	0.5	1	Dichloromethane	5	0.5	1
1,1-Dichloropropene	none	0.5	1	Ethylbenzene	700	0.5	1
1,2,3-Trichlorobenzene	none	0.5	1	Fluorotrichloromethane	none	0.5	1
1,2,3-Trichloropropane	none	0.5	1	Hexachlorobutadiene	none	0.5	1
1,2,4-Trichlorobenzene	70	0.5	1	Isopropylbenzene	none	0.5	1
1,2,4-Trimethylbenzene	none	0.5	1	Naphthalene	none	0.5	1
1,2-Dichlorobenzene	600	0.5	1	Propylbenzene	none	0.5	1
1,2-Dichloroethane	5	0.5	1	Styrene	100	0.5	1
1,2-Dichloropropane	5	0.5	1	Tetrachloroethene	5	0.5	1
1,3,5-Trimethylbenzene	none	0.5	1	Toluene	1000	0.5	1
1,3-Dichlorobenzene	none	0.5	1	Trichloroethene	5	0.5	1
1,3-Dichloropropane	none	0.5	1	Vinyl chloride	2	0.5	1
1,4-Dichlorobenzene	75	0.5	1	Xylene, (total)	10,000	0.5	1
2,2-Dichloropropane	none	0.5	1	cis-1,2-Dichloroethene	70	0.5	1
2-Chlorotoluene	none	0.5	1	cis-1,3-Dichloropropene	none	0.5	1
4-Chlorotoluene	none	0.5	1	n-Butylbenzene	none	0.5	1
4-Isopropyltoluene	none	0.5	1	sec-Butylbenzene	none	0.5	1
Benzene	5	0.5	1	tert-Butylbenzene	none	0.5	1
Bromobenzene	none	0.5	1	trans-1,2-Dichloroethene	100	0.5	1
Chloroethane	none	0.5	1	trans-1,3-Dichloroethene	none	0.5	1

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

AIR RESULTS

**CDPHE AIR MONITORING
SECOND QUARTER 2002**

Laboratory and Radiation Services Division

1. General Discussion

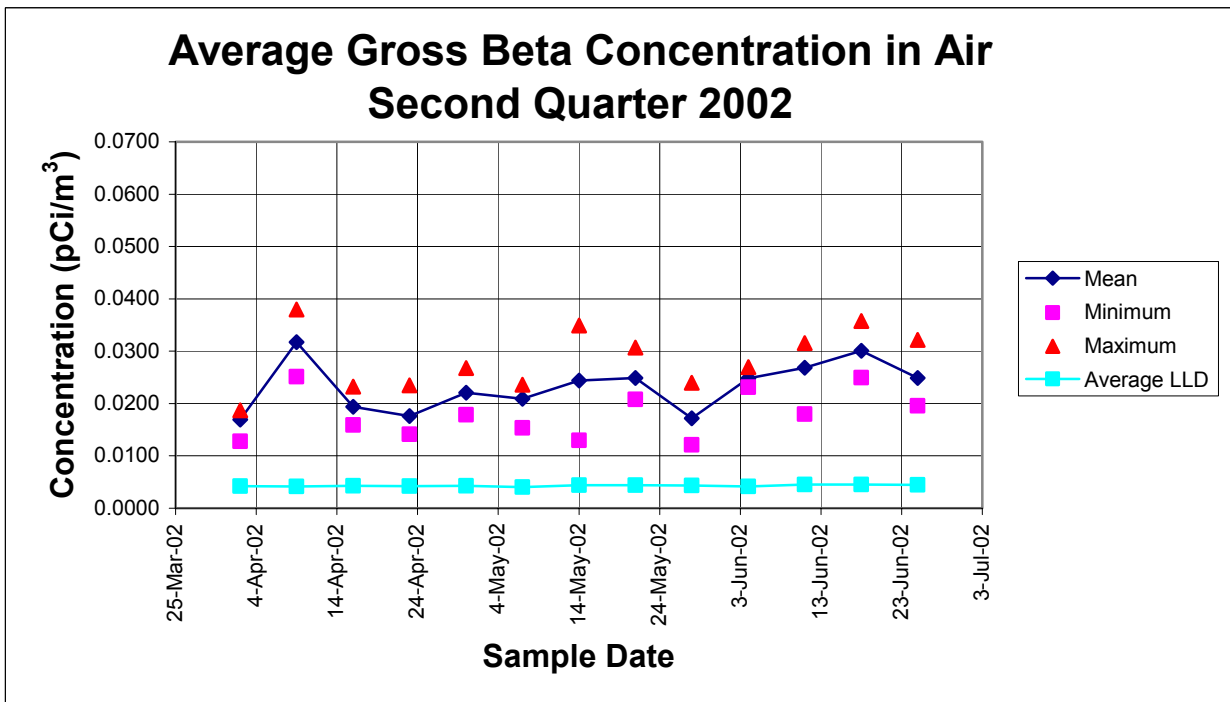
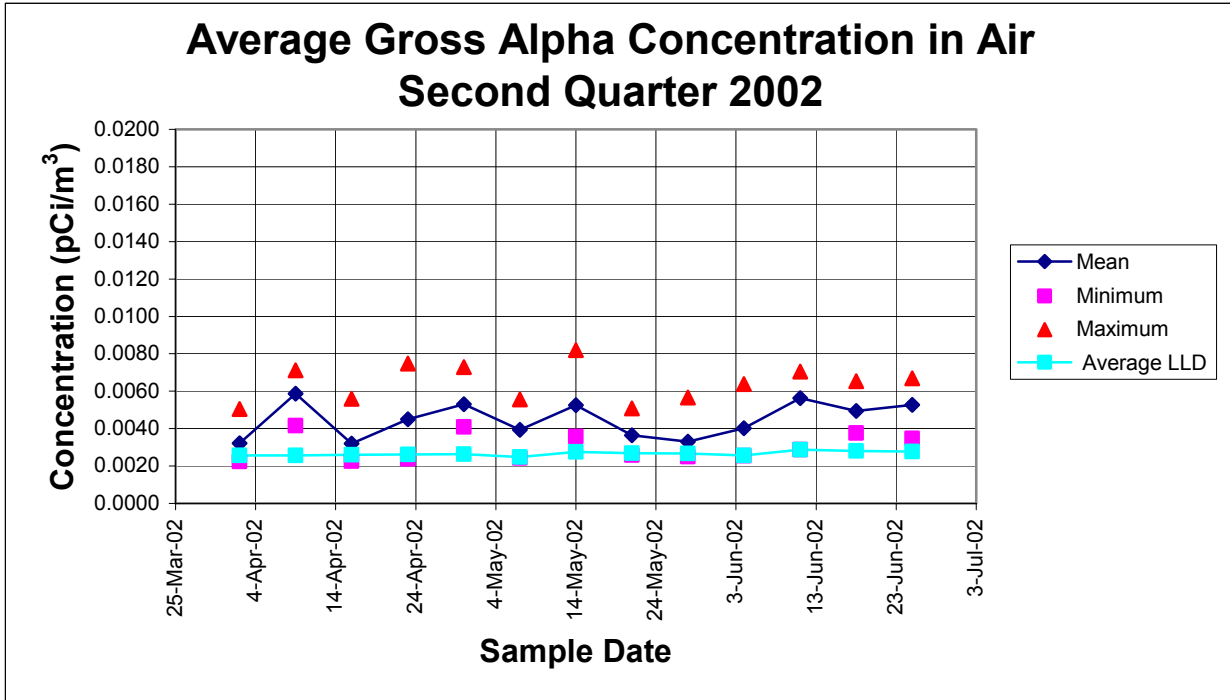
Table A contains the complete gross alpha/gross beta results for the second quarter of 2002. Table B contains complete plutonium, americium and isotopic uranium results for the first quarter of 2002. Isotopic uranium was added to the list of analytes for air filters beginning in July of 2001. All of these data show no obvious anomalies, compared to historical data.

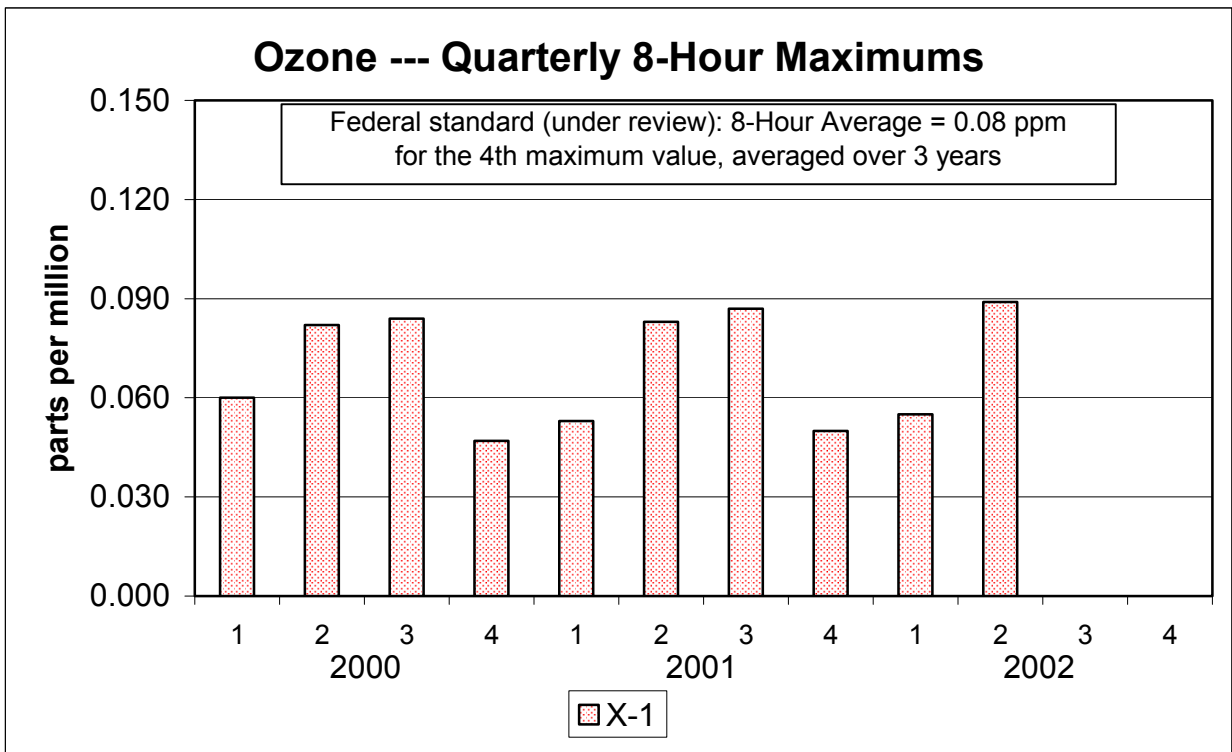
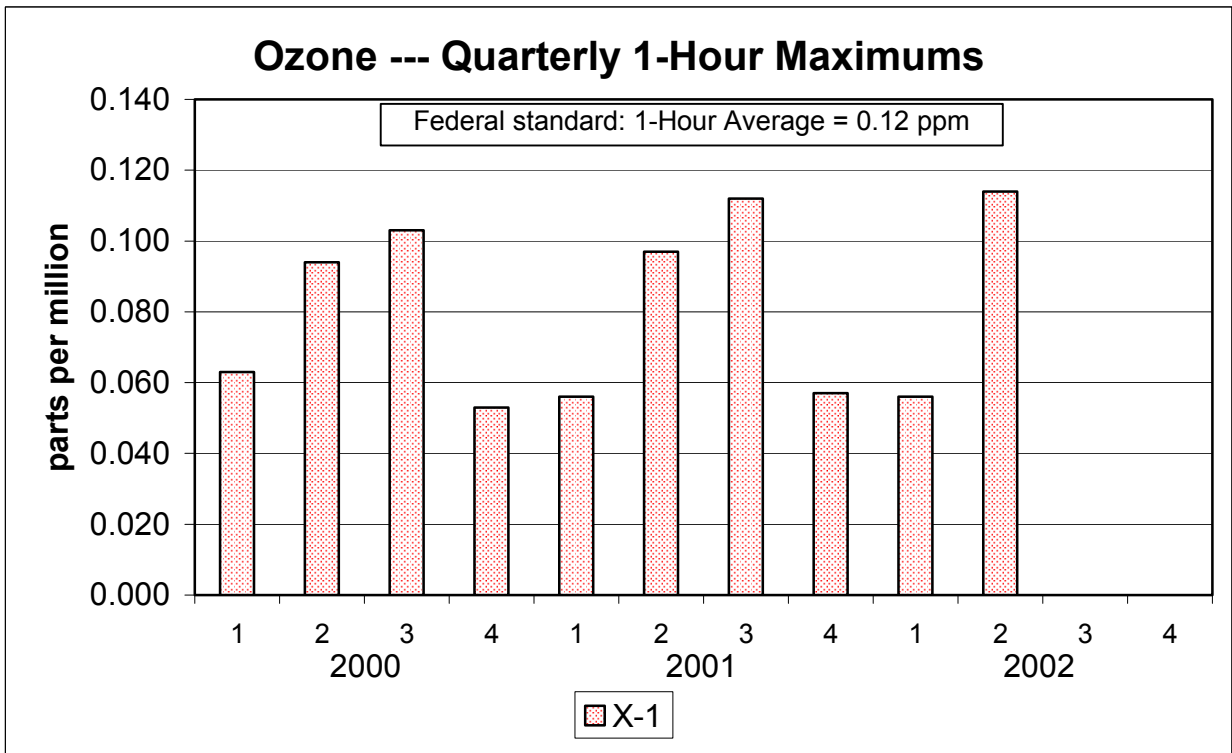
Ozone data for the second quarter of 2002 are presented in Table D. Ozone concentrations for the second quarter of 2002 have increased to typically high summertime levels.

Plutonium and americium results (Table B) for the second quarter of 2002 are not yet available. Speciated uranium, americium and plutonium results for the Air Pollution Control Division samplers at X-1 through X-5 (Table B) for the first and second quarters of 2001 are not yet available. Quarterly composite beryllium data from X-1 through X-5 (Table F) for the first and second quarters of 2001 are not yet available.

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**

SECOND 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	0.0054	0.0075	0.0032	0.0270	0.0380	0.0180
D-3	TSP / Continuous	12	< 0.0047	0.0067	0.0014	0.0249	0.0354	0.0183
E-1-T	TSP / Continuous	13	< 0.0045	0.0064	0.0020	0.0231	0.0333	0.0149
BUFFER ZONE SAMPLERS								
D-9	TSP / Continuous	12	< 0.0046	0.0082	0.0021	0.0239	0.0349	0.0172
D-10	TSP / Continuous	11	< 0.0041	0.0057	0.0007	0.0224	0.0348	0.0129
E-2-T	TSP / Continuous	13	< 0.0040	0.0063	0.0014	0.0222	0.0322	0.0121
SITE BOUNDARY SAMPLERS								
X-1	TSP / Continuous	13	< 0.0036	0.0052	0.0017	0.0214	0.0293	0.0150
X-2	TSP / Continuous	13	0.0047	0.0072	0.0027	0.0233	0.0304	0.0137
X-3	TSP / Continuous	13	< 0.0040	0.0065	0.0017	0.0225	0.0286	0.0152
X-4	TSP / Continuous	9	0.0044	0.0070	0.0025	0.0245	0.0372	0.0159
X-5	TSP / Continuous	13	0.0045	0.0064	0.0027	0.0238	0.0358	0.0128

pCi/m³ = Picocuries per cubic meter

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

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

FIRST 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	0.000005 +/- 0.000002	<0.000006	---	< 0.0042
D-3	TSP / Continuous	0.000051 +/- 0.000008	< 0.000007	---	< 0.0042
X-1	TSP / Continuous	< 0.000002	< 0.000007	---	< 0.0039
X-2	TSP / Continuous	< 0.000001	< 0.000006	---	< 0.0039
X-3	TSP / Continuous	0.000003 +/- 0.000002	< 0.000015	---	< 0.0043
X-4	TSP / Continuous	< 0.000003	< 0.000018	---	< 0.0034
X-5	TSP / Continuous	< 0.000002	< 0.000005	---	< 0.0038

Location	Sampler Type	²³⁴ U pCi/m ³	²³⁵ U pCi/m ³	²³⁸ U pCi/m ³
D-1	TSP / Continuous	< 0.000026	< 0.000005	0.000033
D-3	TSP / Continuous	< 0.000032	< 0.000006	< 0.000032
X-1	TSP / Continuous	< 0.000019	< 0.000004	< 0.000019
X-2	TSP / Continuous	0.000027	< 0.000004	0.000024
X-3	TSP / Continuous	< 0.000024	< 0.000005	< 0.000024
X-4	TSP / Continuous	< 0.000028	< 0.000005	< 0.000028
X-5	TSP / Continuous	< 0.000025	< 0.000005	< 0.000025

pCi/m³ = Picocuries per cubic meter

TSP = Total Suspended Particulates

Continuous = continuous sampling

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

SECOND 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	<div style="border: 1px solid black; padding: 10px; display: inline-block;">DATA NOT YET AVAILABLE</div>			
X-2	TSP / Continuous	<div style="border: 1px solid black; padding: 10px; display: inline-block;">DATA NOT YET AVAILABLE</div>			
X-3	TSP / Continuous	<div style="border: 1px solid black; padding: 10px; display: inline-block;">DATA NOT YET AVAILABLE</div>			
X-4	TSP / Continuous	<div style="border: 1px solid black; padding: 10px; display: inline-block;">DATA NOT YET AVAILABLE</div>			
X-5	TSP / Continuous	<div style="border: 1px solid black; padding: 10px; display: inline-block;">DATA NOT YET AVAILABLE</div>			

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	<div style="border: 1px solid black; padding: 10px; display: inline-block;">DATA NOT YET AVAILABLE</div>		
X-2	TSP / Continuous	<div style="border: 1px solid black; padding: 10px; display: inline-block;">DATA NOT YET AVAILABLE</div>		
X-3	TSP / Continuous	<div style="border: 1px solid black; padding: 10px; display: inline-block;">DATA NOT YET AVAILABLE</div>		
X-4	TSP / Continuous	<div style="border: 1px solid black; padding: 10px; display: inline-block;">DATA NOT YET AVAILABLE</div>		
X-5	TSP / Continuous	<div style="border: 1px solid black; padding: 10px; display: inline-block;">DATA NOT YET AVAILABLE</div>		

pCi/m³ = Picocuries per cubic meter

TSP = Total Suspended Particulates

Continuous = continuous sampling

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

FIRST QUARTER 2001 – SECOND QUARTER 2001

Location	Sampler Type	²³⁴ U pCi/m ³	²³⁵ U pCi/m ³	²³⁸ U pCi/m ³	²³⁹ Pu pCi/m ³	²⁴¹ Am pCi/m ³
X-1	TSP – P (1/6 day, quarterly composite)					
X-1-CL	TSP – CL (1/6 day, quarterly composite)					
X-2	TSP (1/6 day, quarterly composite)					
X-3	TSP (1/6 day, quarterly composite)					
X-4	TSP (1/6 day, quarterly composite)					
X-5	TSP (1/6 day, quarterly composite)					
X-1	PM10 (1/6 day, quarterly composite)					
X-2	PM10 – P (1/6 day, quarterly composite)					
X-2-CL	PM10 – CL (1/6 day, quarterly composite)					
X-3	PM10 (1/6 day, quarterly composite)					
X-4	PM10 (1/6 day, quarterly composite)					
X-5	PM10 (1/6 day, quarterly composite)					

DATA NOT YET AVAILABLE

pCi/m³ = Picocuries per cubic meter

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

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

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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
		APRIL 2002		
Ozone (O ₃)	0.043	0.073	0.066	718
		<u>MAY 2002</u>		
Ozone (O ₃)	0.042	0.080	0.070	732
		<u>JUNE 2002</u>		
Ozone (O ₃)	0.056	0.114	0.089	580

ppm = Parts per million
N/A = Not available

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TABLE F: METALS IN AIR

FIRST - SECOND QUARTER 2001

	North Site (X-1) (Quarterly composites) ug/m ³	Northeast Site (X-2) (Quarterly composites) ug/m ³	Southeast Site (X-3) (Quarterly composites) ug/m ³	South Site (X-4) (Quarterly composites) ug/m ³	West Site (X-5) (Quarterly composites) ug/m ³
Metal					
First Quarter 2001	<div style="border: 1px solid black; padding: 20px; width: fit-content; margin: auto;"> <p style="margin: 0;">DATA NOT YET AVAILABLE</p> </div>				
Beryllium -- TSP-P					
Beryllium -- PM10-P					
Beryllium -- TSP-CL					
Beryllium -- PM10-CL					
Second Quarter 2001					
Beryllium -- TSP-P					
Beryllium -- PM10-P					
Beryllium -- TSP-CL					
Beryllium -- PM10-CL					

ug/m³ = 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)

WATER RESULTS

Second Quarter 2002

Surface water sampling conducted by CDPHE for the 2nd quarter of 2002, included:

- Wastewater Treatment Plant (WWTP) Influent samples were collected on 4/10/02, 5/15/02, and 6/19/02. Data for the 6/19/02 sample event remains outstanding due to poor quality control on americium.
- Pre-discharge sample was collected from Ponds A4 and B5 on 4/29/02 and Pond B5 6/24/02. Data for the 6/24/02 sample event remains outstanding due to poor quality control on americium.
- Point of Compliance - Walnut Creek at Indiana Street (SW114) sample was collected on 5/21/02 during Ponds A4 and B5 discharge.
- Nutrient sampling (nitrate and ammonia) was conducted 5/3/02 at the following locations: GS-10, WWTP effluent, Pond B3, Pond B5, SW-118, SW093, GS13 and Pond A4. SW114 was not sampled.
- Performance Monitoring for Mound/East Trench Plume was conducted 5/28/02 at the following locations: Pond B1, Pond B2, Pond B3 outfall and GS09 below Pond B4.
- Performance Monitoring for Solar Pond Plume was conducted 5/28/02 at GS13. Data for the 6/28/02 sample event remains outstanding.

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.

This quarters' WWTP Influent results exhibited detectable levels of silver 0.5 to 0.7 µg/L in each of the two 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.

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 did not exhibit any concentrations above established RFCA action levels or applicable WQCC stream standards, with the exception of:

- o Chloride detected at 590 mg/L as compared to the secondary water quality standard of 250 mg/L.

The presence of the elevated chloride may be related to use of de-icing materials, as each of the three exceedences of the 250 mg/L secondary standard occurs in the spring, possibly associated with a storm event. See figure for chloride at SWA4.

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 this quarter coincided with discharge of water from Ponds A4 and B5. During this quarters' ambient water sampling at RFETS no exceedences of an action level was observed. However, chloride exceeded the secondary water quality standard (250 mg/L) with a concentration of 410 mg/L. The City and County of Broomfield Public Works was contacted to discuss potential implications to Great Western Reservoir (given Broomfield decision to divert water from this discharge event). It was determined there would be no detrimental factor given dilution with water in the reservoir.

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 exceedances 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 29 mg/L at GS13 on North Walnut Creek near the discharge gallery for the Solar Pond Plume Treatment System. All results were less than the temporary modification of 100 mg/L, but exceeded the underlying stream standard of 10 mg/L at –

- o GS13 (29 mg/L) on North Walnut Creek, and
- o South Walnut Creek at: EFL into Pond B3 (12 mg/L), and Pond B3 (11 mg/L).

See figures contained in the following section for GS13 and EFL into Pond B3, which exhibit consistency with historical results.

The downstream locations on North Walnut Creek represented by Pond A4 was 0.31 mg/L, and the downstream locations on South Walnut Creek represented by Pond B5 was 3.9 mg/L. These indicate that nitrate is degrading to acceptable concentrations.

This quarters' total ammonia results ranged from <0.01 mg/L to 5.9 mg/L. Calculating for unionized ammonia exhibited concentrations ranging from <0.01 to 0.24 mg/L, compared against the conservative unionized standard of 0.1 mg/L (segment 4a stream standard). The elevated unionized ammonia concentrations above the 0.1 mg/L standard are represented by:

- o Pond B5 pre-discharge - 0.24 mg/L
- o Pond B3 – 0.12 mg/L

The discharge sample collected at SW114 exhibited a concentration < 0.01 mg/L, indicating acceptable conditions. The elevated ammonia is likely a function of algal growth in the ponds and stagnant water.

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 instream 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 first collection 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.

May 28, 2002 Surface Water Sample

Final Results (EPA Method 524.2)

Analyte	Units	Primary sample	ALF	Reg 38 - Temp Mod	Reg 31 Basic Stds	Reg 31 Basis
cis-1,2-dichloroethene	ug/L	48	70		70	WS
1,1-dichloroethene	ug/L	0.69	0.0057	7	7	WS, W+F
chloroform	ug/L	12	100		5.7	W+F
carbon tetrachloride	ug/L	10	0.25	5	0.27	WS
trichloroethene	ug/L	200	2.7	5	2.7	W+F
tetrachloroethylene	ug/L	31	0.8	5	0.8	W+F
vinyl chloride	ug/L	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

As a result of these findings the following actions were taken:

- (1) Research historical data associated with surface water and seep evaluation pre-treatment system. Sample of surface water was collected with ice cover in 1997.
- (2) Research recent groundwater analytical results in the area of Ponds B1, B2, and B3.
- (3) Evaluate water management measures
- (4) Research information associated with treatment system decision document and Historical Release Reports.

Analytical data from previous sample events are presented in the following tables. The data indicate consistency in volatile constituents found in Pond B2 and groundwater upgradient and downgradient of Pond B2. Surface water concentrations exhibit a degradation of volatiles with the exception of tetrachloroethylene which increased from 16 ug/L and now 31 ug/L.

Water management measures -

Pond B2 located on South Walnut Creek is isolated from receiving plant site water, water in pond B2 is currently derived from overland flow and groundwater discharge. Pond B2 is not directly discharged to Walnut Creek. When the pond attains a certain water level, then water is transferred via pump and pipeline to Pond A2.

Information from the Decision Document –

Pond B2 is topographically below and downgradient of the East Trenches plume and treatment system. The passive treatment system was installed in 1999 due to the presence of chlorinated VOCs (carbon tetrachloride, trichloroethene, tetrachloroethylene, and associated degradation products) in groundwater from the East Trench area. The treatment system was installed outside of the Preble Mouse Habitat and limited by topographic conditions in the area, thus some contamination likely remains in place between the treatment system and South

Walnut Creek

Pond B2 is also located downgradient of the Mound Plume which exhibits tetrachloroethylene, trichloroethene, carbon tetrachloride, degradation products of these, and uranium. Well 15699 2001 results exhibited uranium and 1,1-DCA above Tier II GW Action Levels

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 UTL₉₅ 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.

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 instream uranium concentrations, CDPHE will perform instream 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.

The data for the sample collected on May 28, 2002 has yet to be completed.

Pond/Seep Results - 1997
Pre-Treatment System Installation

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

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>			95299	95199^a		23296^a		95099^b
<i>Location Description</i>		Tier II GW Standard	Upgradient of B1	Upgradient of B2		Upgradient of B3		Upgradient of B4
Analytes	Units			4/24/2001	10/23/2001	4/24/2001	10/23/2001	
cis-1,2-dichloroethene	ug/L	70	NS	2	2.5	63	150	1
chloroform	ug/L	100	NS	1	1	16	10	1
carbon tetrachloride	ug/L	5	NS	1	1	6	10	0.2
trichloroethene	ug/L	5	NS	65	51	500	380	1
tetrachloroethylene	ug/L	5	NS	2	2	17	12	1
1,1,2,2-tetrachloroethene	ug/L	0.426	NS	1	1	1	1	1
cis-1,3-dichloropropene	ug/L	0.473	NS	1	1	1	1	1

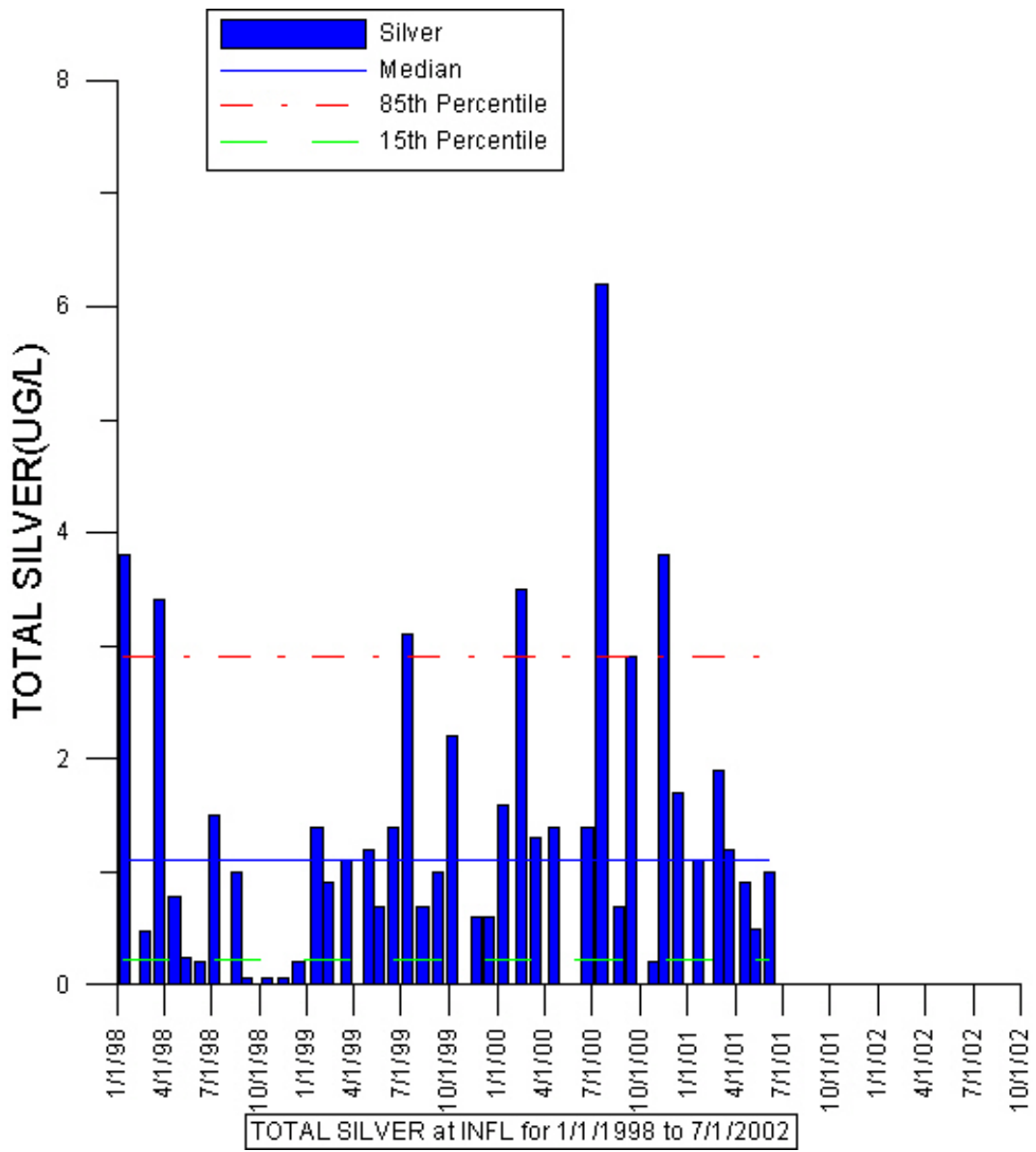
NS = not sampled

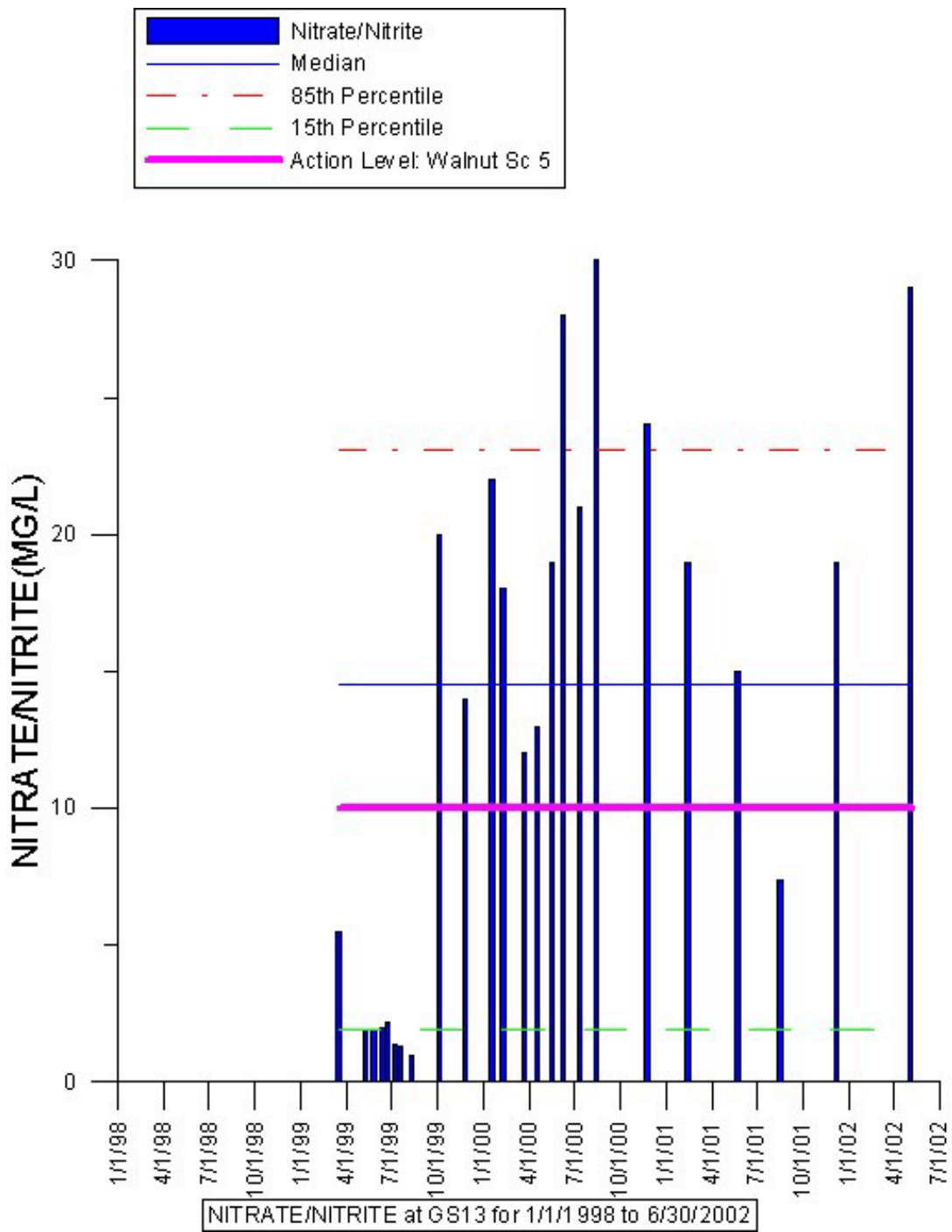
Denotes concentration > Tier II GW Action Level

^a Located in "zone of sacrifice" not intended to be treated.

^b Located east of treatment system outside of plume

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





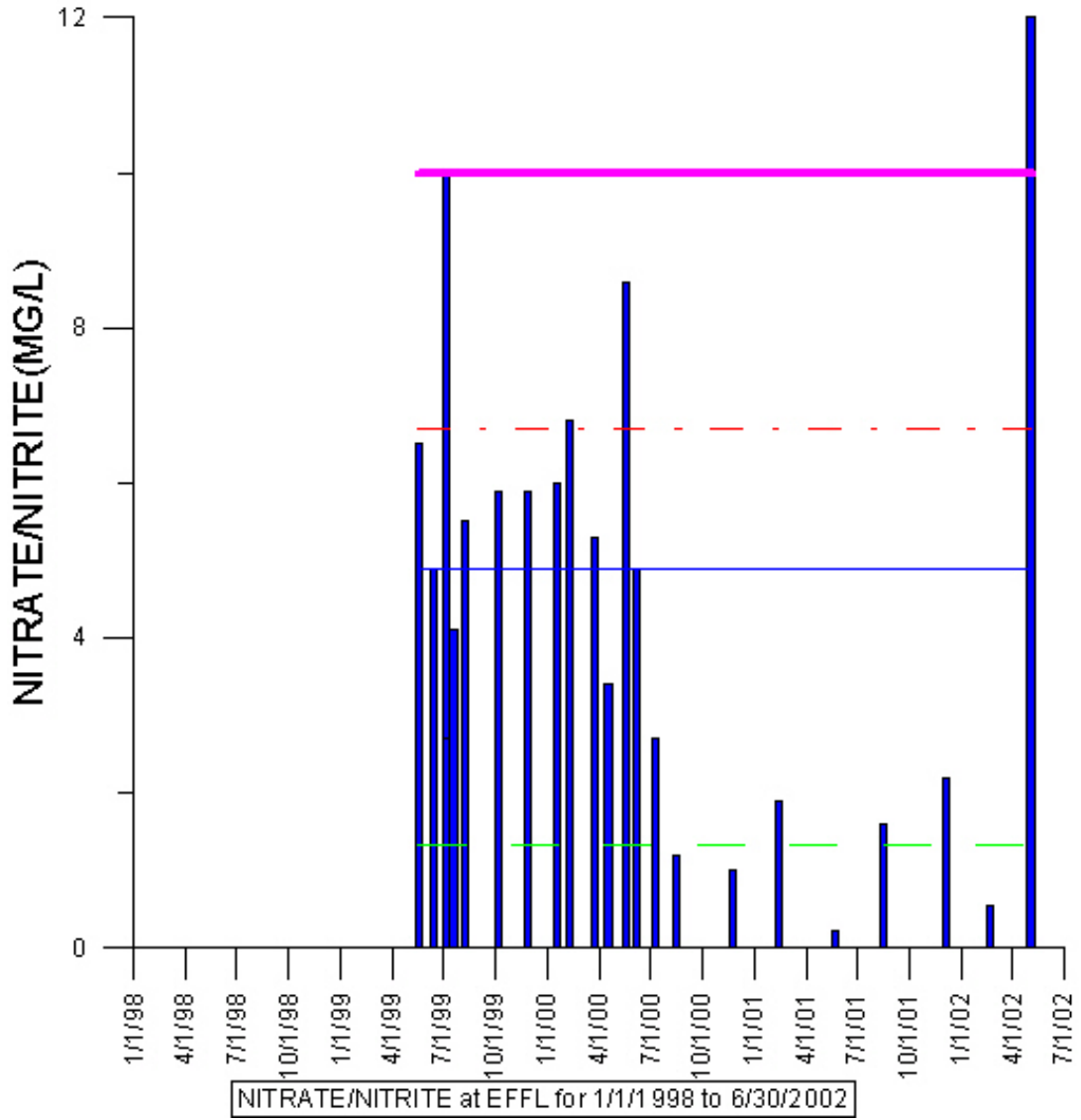
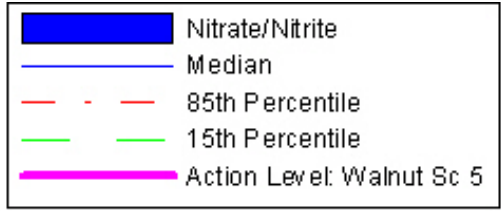


TABLE G – CDPHE SURFACE WATER MONITORING PROGRAM

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 ^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	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	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	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	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	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	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	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
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 ²	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

Environmental Surveillance Report

TABLE H-INORGANIC ANALYSIS OF SURFACE WATER

SECOND QUARTER 2002

Denotes exceedence of applicable standard

Location	Sample Date	Parameter	Analysis Level	Units	*Analysis*		
					1st	2nd	3rd
WWTP Influent Sampling							
Influent to Wastewater Treatment Plant							
	3/13/2002						
		pH	7.9	SU			
		Temperature	13.5	deg C			
		Total Suspended Solids	58	mg/L			
		Americium ²⁴¹	< 0.012	pCi/L			
		Plutonium ²³⁹⁺²⁴⁰	< 0.019	pCi/L			
		Uranium	< 2	pCi/L			
		Gross Alpha	< 5	pCi/L			
		Gross Beta	16 +/-	4 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	23	ug/L			
		Iron, Total Recoverable	330	ug/L			
		Lithium, Total Recoverable	5	ug/L			
		Manganese, Total Recoverable	34	ug/L			
		Nickel, Total Recoverable	< 20	ug/L			
		Selenium, Total Recoverable	1	ug/L			
		Silver, Total Recoverable	0.5	ug/L			
		Thallium, Total Recoverable	< 1	ug/L			
	4/10/2002						
		pH	7.6	SU			
		Temperature	14.2	deg C			
		Americium ²⁴¹	< 0.012	pCi/L			
		Plutonium ²³⁹⁺²⁴⁰	< 0.007	pCi/L			
		Uranium	< 2	pCi/L			
		Gross Alpha	< 4	pCi/L			
		Gross Beta	< 6	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	18	ug/L			
		Iron, Total Recoverable	320	ug/L			
		Lithium, Total Recoverable	5	ug/L			
		Manganese, Total Recoverable	28	ug/L			
		Nickel, Total Recoverable	< 20	ug/L			

Environmental Surveillance Report
TABLE H-INORGANIC ANALYSIS OF SURFACE WATER

SECOND QUARTER 2002

Denotes exceedence of applicable standard

Location	Sample Date	Parameter	Analysis Level	Units	*Analysis*		
					1st	2nd	3rd
WWTP Influent Sampling (con't)							
		Selenium, Total Recoverable	< 1	ug/L			
		Silver, Total Recoverable	0.7	ug/L			
		Thallium, Total Recoverable	< 1	ug/L			
	5/15/2002						
		pH	9.1	SU			
		Temperature	15.7	deg C			
		Total Suspended Solids	62	mg/L			
		Americium ²⁴¹	< 0.007	pCi/L			
		Plutonium ²³⁹⁺²⁴⁰	< 0.003	pCi/L			
		Uranium	4	pCi/L			
		Gross Alpha	4	pCi/L			
		Gross Beta	11 +/-	4 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	24	ug/L			
		Iron, Total Recoverable	350	ug/L			
		Lithium, Total Recoverable	5	ug/L			
		Manganese, Total Recoverable	31	ug/L			
		Nickel, Total Recoverable	< 20	ug/L			
		Selenium, Total Recoverable	< 1	ug/L			
		Silver, Total Recoverable	0.6	ug/L			
		Thallium, Total Recoverable	< 1	ug/L			
	6/19/2002 data not yet available						

Pre-Discharge Monitoring

Pond A4	4/29/2002						
		pH	9.02	SU			
		Temperature	13.9	Deg C			
		Dissolved Oxygen	9.47	mg/L			
		Hardness as CaCO3	240	mg/L			
		Total Suspended Solids	22	mg/L			
		Ammonia as N	< 0.01	mg/L			
		Ammonia, unionized	0.02	mg/l			
		Chloride	590	mg/L			
		Nitrate/Nitrite	0.55	mg/L			

Environmental Surveillance Report

TABLE H-INORGANIC ANALYSIS OF SURFACE WATER

SECOND QUARTER 2002

Denotes exceedence of applicable standard

Location	Sample Date	Parameter	Analysis Level	Units	*Analysis*		
					1st	2nd	3rd
Pre-Discharge Monitoring (con't)							
Pond A4							
		Total Orthophosphate	< 0.02	mg/L			
		Total Phosphate	< 0.03	mg/L			
		Americium ²⁴¹	< 0.012 +/-	0.004 pCi/L			
		Plutonium ²³⁹⁺²⁴⁰	< 0.004 +/-	0.003 pCi/L			
		Uranium	3	pCi/L			
		Gross Alpha	< 11 +/-	3 pCi/L			
		Gross Beta	16 +/-	4 pCi/L			
		Arsenic, Total Recoverable	< 1	ug/L			
		Beryllium, Dissolved	< 1	ug/L			
		Cadmium, Dissolved	< 0.3	ug/L			
		Chromium, Total	< 3	ug/L			
		Copper, Dissolved	< 3	ug/L			
		Iron, Total Recoverable	160	ug/L			
		Lithium, Total	21	ug/L			
		Manganese, Total Recoverable	5	ug/L			
		Nickel, Dissolved	< 20	ug/L			
		Selenium, Dissolved	2.1	ug/L			
		Silver, Dissolved	0.4	ug/L			
		Thallium, Total	< 1	ug/L			
Pond B5							
	4/29/2002	pH	9.94	SU			
		Temperature	13.5	Deg C			
		Dissolved Oxygen	10.55	mg/L			
		Hardness as CaCO3	160	mg/L			
		Total Suspended Solids	24	mg/L			
		Ammonia as N	0.35	mg/L			
		Ammonia, unionized	0.24	mg/l			
		Chloride	190	mg/L			
		Nitrate/Nitrite	3.4	mg/L			
		Total Orthophosphate	0.64	mg/L			
		Total Phosphate	0.9	mg/L			
		Americium ²⁴¹	< 0.023	pCi/L			
		Plutonium ²³⁹⁺²⁴⁰	< 0.006	pCi/L			
		Uranium	3	pCi/L			
		Gross Alpha	5	pCi/L			
		Gross Beta	16 +/-	5 pCi/L			
		Arsenic, Total Recoverable	< 1	ug/L			
		Beryllium, Dissolved	< 1	ug/L			

Environmental Surveillance Report
TABLE H-INORGANIC ANALYSIS OF SURFACE WATER

SECOND QUARTER 2002

Denotes exceedence of applicable standard

Location	Sample Date	Parameter	Analysis Level	Units	*Analysis*		
					1st	2nd	3rd
Pre-Discharge Monitoring (con't)							
Pond B5							
		Cadmium, Dissolved	< 0.3	ug/L			
		Chromium, Total	3	ug/L			
		Copper, Dissolved	< 3	ug/L			
		Iron, Total Recoverable	88	ug/L			
		Lithium, Total	< 7	ug/L			
		Manganese, Total Recoverable	9	ug/L			
		Nickel, Dissolved	< 20	ug/L			
		Selenium, Dissolved	< 1	ug/L			
		Silver, Dissolved	0.4	ug/L			
		Thallium, Total	< 1	ug/L			
	6/24/2002	Data outstanding					
		Plutonium ²³⁹⁺²⁴⁰	< 0.006	pCi/L			

POC Monitoring - Pond A4/B5 Discharge

SW114 - Walnut Creek at Indiana Ave.

5/21/2002	pH	8.92	su
	Temperature	15.6	c
	Hardness as CaCO3	190	mg/L
	Total Suspended Solids	52	mg/L
	Ammonia as N	< 0.04	mg/L
	Ammonia, unionized	< 0.01	mg/l
	Chloride	410	mg/L
	Nitrate/Nitrite	1.4	mg/L
	Total Orthophosphate	< 0.04	mg/L
	Total Phosphate	0.19	mg/L
	Arsenic, Total Recoverable	< 1	ug/L
	Beryllium, Dissolved	< 1	ug/L
	Cadmium, Dissolved	< 0.3	ug/L
	Chromium, Total	3	ug/L
	Copper, Dissolved	7	ug/L
	Iron, Total Recoverable	300	ug/L
	Lithium, Total	12	ug/L
	Manganese, Total Recoverable	9	ug/L
	Nickel, Dissolved	< 20	ug/L
	Selenium, Dissolved	< 1.3	ug/L
	Silver, Dissolved	0.4	ug/L
	Thallium, Total	< 1	ug/L

Environmental Surveillance Report
TABLE H-INORGANIC ANALYSIS OF SURFACE WATER

SECOND QUARTER 2002

Denotes exceedence of applicable standard

Location	Sample		Analysis Level	Units	*Analysis*		
	Date	Parameter			1st	2nd	3rd
Nitrate Study							
GS10 - South Walnut Creek above B-Series Bypass	5/3/2002	N-Ammonia	0.2	mg/L			
		Ammonia, unionized	0.02	mg/l			
		Nitrate/Nitrite	3.3	mg/L			
		pH	8.58	SU			
		Temperature	13.6	deg C			
EFFL - Effluent from Wastewater Treatment Plant	5/3/2002	N-Ammonia	5.2	mg/L			
		Ammonia, unionized	0.02	mg/L			
		Nitrate/Nitrite	12	mg/L			
		pH	7	SU			
		Temperature	15.4	deg C			
Pond B3	5/3/2002	N-Ammonia	5.9	mg/L			
		Ammonia, unionized	0.12	mg/L			
		Nitrate/Nitrite	11	mg/L			
		pH	7.91	SU			
		Temperature	14	deg C			
Pond B5	5/3/2002	N-Ammonia	0.18	mg/L			
		Ammonia, unionized	0.06	mg/L			
		Nitrate/Nitrite	3.9	mg/L			
		pH	9.33	SU			
		Temperature	13.7	deg C			
SW118 - North Walnut Creek Upstream of Portal 3	5/3/2002	N-Ammonia	< 0.01	mg/L			
		Ammonia, unionized	< 0.01	mg/L			
		Nitrate/Nitrite	< 0.3	mg/L			
		pH	7.68	SU			
		Temperature	13.8	deg C			

Environmental Surveillance Report
TABLE H-INORGANIC ANALYSIS OF SURFACE WATER

SECOND QUARTER 2002

Denotes exceedence of applicable standard

Location	Sample		Analysis Level	Units	*Analysis*		
	Date	Parameter			1st	2nd	3rd
Nitrate Study (con't)							
SW093 - North Walnut Creek below Portal 3	5/3/2002	N-Ammonia	0.03	mg/L			
		Ammonia, unionized	< 0.01	mg/L			
		Nitrate/Nitrite	0.98	mg/L			
		pH	7.81	SU			
		Temperature	10.1	deg C			
GS13 - North Walnut Creek above the Pond A1	5/3/2002	N-Ammonia	< 0.01	mg/L			
		Ammonia, unionized	< 0.01	mg/L			
		Nitrate/Nitrite	29	mg/L			
		pH	7.65	SU			
		Temperature	16	deg C			
Pond A4	5/3/2002	N-Ammonia	0.09	mg/L			
		Ammonia, unionized	< 0.01	mg/L			
		Nitrate/Nitrite	0.31	mg/L			
		pH	8.55	SU			
		Temperature	12.6	deg C			
Performance Monitoring - Mound/East Trench Plume							
South Walnut Creek below Pond B-4 (GS09)	5/28/2002	pH	7.85	SU			
		Temperature	18.6	deg C			
		Hardness as CaCO3	240	mg/L			
		Arsenic, Total Recoverable	< 1	ug/L			
		Beryllium, Total Recoverable	< 1	ug/L			
		Cadmium, Total Recoverable	< 0.3	ug/L			
		Chromium, Total	< 3	ug/L			
		Copper, Dissolved	5	ug/L			
		Iron, Total Recoverable	150	ug/L			
		Lithium, Total Recoverable	9	ug/L			
		Manganese, Dissolved	43	ug/L			
		Nickel, Dissolved	< 20	ug/L			
		Silver, Dissolved	0.4	ug/L			
		Thallium, Total Recoverable	< 1	ug/L			

Environmental Surveillance Report
TABLE H-INORGANIC ANALYSIS OF SURFACE WATER

SECOND QUARTER 2002

Denotes exceedence of applicable standard

Location	Sample		Analysis Level	Units	*Analysis*		
	Date	Parameter			1st	2nd	3rd
Performance Monitoring - Solar Pond Plume							
GS13	5/28/2002	Data not yet available					

Environmental Surveillance Report
TABLE I-ORGANIC ANALYSIS OF SURFACE WATER

SECOND QUARTER 2002

Location	Sample Date	Parameter	Result	Units	*Analysis*		
					1st	2nd	3rd
Performance Monitoring - Mound/East Trench Plume							
Pond B1							
	5/28/2002	pH	7.96	SU			
		Temperature	20	deg C			
Pond B2							
	5/28/2002	pH	9.41	SU			
		Temperature	20.5	deg C			
		1,1-Dichloroethylene	0.69	ug/L			
		Carbon Tetrachloride	10	ug/L			
		cis-1,2-Dichloroethylene	48	ug/L			
		trans-1,2-Dichloroethylene	0.72	ug/L	Q		
		tetrachloroethene	31	ug/L			
		Trichloroethylene	200	ug/L			
		Vinyl Chloride	0.96	ug/L			
		Chloroform	12	ug/L			
Pond B3 Outfall							
	5/28/2002	pH	8.62	SU			
		Temperature	16.8	deg C			
		Toluene	0.78	ug/L			
		Chloroform	1.4	ug/L			
Pond B4 at GS09							
	5/28/2002	pH	7.95	SU			
		Temperature	18.3	deg C			
		Chloroform	0.81	ug/L			

Denotes exceedence of applicable standard

GLOSSARY

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

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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