File ACT/005/035 #7

ANNUAL WATER QUALITY REPORT
MONITORING PERIOD: June through December, 1993
DOGM PERMIT BOUNDARY WATER QUALTIY
MONITORING PLAN
SUNNYSIDE COGENERATION FACITY

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Prepared For:

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Salt Lake City, Utah 84124

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SUNNYSIDE COGENERATION FACITY

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Prepared By:

HUNTINGDON CHEN-NORTHERN
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HCN Job No. 5-137.4-91

February 28, 1994

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February 28, 1994

Eckhoff, Watson and Preator Engineering
1121 East 3900 South, Suite C 100
Salt Lake City, Utah 84124

Attention: Ms. Alane Boyd
Ms. Jessica Smith

Subject: Annual Water Quality Report
Monitoring Period: June through December, 1993
DOGM Permit Boundary Water Quality Monitoring Plan
Sunnyside Cogeneration Facility
HCN Job No. 5-137.4-91

Dear Ms. Boyd and Ms. Smith:

This letter report includes a summary and interpretation of water quality monitoring data collected during 1993 as part of the Sunnyside Cogeneration Facility DOGM Permit Boundary Water Quality Monitoring Plan (monitoring plan). The monitoring plan includes quarterly collection of water quality samples and monthly collection of field parameter data at five monitoring locations, and inspection and sample collection at the Sunnyside Cogeneration Facility (SCF) UPDES permit outfall locations. The monitoring locations are listed in Table 1. Huntingdon Chen-Northern (HCN) is responsible for collecting the required water quality samples and field parameter data. HCN initiated the monitoring plan in June, 1993 by collecting the first round of water quality samples. This report covers the monitoring period of June through December, 1993.

The monthly field-parameter data collected during the monitoring period is presented as Table 2. HCN collected the quarterly water-quality samples on June 29 and 30, and October 26, 1993. Immediately after collection, the water samples were filtered and preserved (when necessary), placed on ice in a cooler and delivered under chain of custody documentation to the Utah certified HCN laboratory in Billings, Montana. The analytical laboratory results are summarized in Table 3. The field-parameter data sheets, analytical laboratory reports and chain of custody documentation are included as Attachment A.

Of the UPDES permit outfalls covered under the monitoring plan, only Outfall 004 (Coal Runoff Basin) discharged effluent during the above referenced monitoring period. The field data sheets documenting the UPDES permit outfall inspections, analytical laboratory reports and chain of custody documentation are included as Attachment B.

February 28, 1994

Annual Monitoring Report
Monitoring Period: June through December, 1993
DOGM Permit Boundary Water Quality Monitoring Plan
Sunnyside Cogeneration Facility

HCN hydrogeologists reviewed the analytical laboratory data and field-parameter data obtained during 1993 to evaluate any trends or anomalies in the water chemistry at the monitoring locations. The interpretations detailed below should be considered qualitative due to the limited data set (two-quarterly water quality monitoring events, and seven-months of field parameter data collection).

The following objectives were considered during this evaluation:

- Evaluate the different water chemistry types present at the individual monitoring locations (comparing the water chemistries of Icelander Creek and the Draegerton Well locations for example);
- Determine any changes in water chemistry over time for each location (comparing the water chemistry of Icelander Creek in June and October, 1993 for example);
- Locate and define any anomalous analytical laboratory data or field parameter data; and
- Perform a quality assurance evaluation of the collected data to identify and resolve any sample collection or analytical laboratory errors.

To evaluate the different water chemistry types present at the SCF site and determine any changes in water chemistry at each location over time, major ion data for the quarterly sampling events were plotted on Stiff and Piper diagrams. Due to lack of discharge, major ion chemistry data is not available for the Coal Runoff Basin monitoring location for the June, 1993 data set. The Coal Runoff Basin major ion chemistry data for the monitoring period of April, 1993 is included in this evaluation to provide a frame of reference for this monitoring location.

Stiff plots produce a graphical representation of major ion distributions within a given sample in the form of a single polygon. Stiff plots are a useful tool in mapping different water chemistry types and identifying major changes in water chemistry by defining and evaluating water chemistry changes both over time and between different sampling points. The Stiff plots are included as Attachment C.

Piper diagrams consist of a graphic representation of major-ion distributions and combinations using combined trilinear graphs. Piper diagrams can accommodate data from an individual or large number of water samples, and can be used to determine water chemistry trends and to interpret water chemistry types. The Piper plots are included as Attachment D. The results of each water chemistry plotting method are detailed below, followed by an interpretation of the findings.

A review of the Stiff plots produced for the quarterly monitoring events indicates three groupings of water chemistry:

- Water containing a "balanced" chemistry of sodium and sulfate, and relatively moderate amounts of magnesium, associated with Icelander Creek, F-2 Spring and the Draegerton Well monitoring locations;

- Water rich in sulfate, magnesium, sodium and calcium associated with the Coarse Refuse Seep monitoring locations;

- Water deficient in magnesium and containing substantial amounts of sodium associated with the Coal Runoff Basin (UPDES Outfall 004) monitoring location.

An evaluation of the Piper diagrams reveals three clusters of data points on the cation-trilinear and diamond-graph portions of the diagram, supporting the three water chemistry groupings noted in the Stiff plots. Only the Icelander Creek and F-2 Spring monitoring locations exhibit noticeable changes in major ion chemistry between the June and October, 1993 sampling events. These chemistry changes are similar in ion chemistry and magnitude indicating a strong communication between the two monitoring locations. The changes consist of a decrease in sulfate and magnesium concentrations at both monitoring locations. The cause is unknown. The Piper diagrams indicate a consistent major-ion chemistry for each of the remaining monitoring locations over the monitoring period.

In conjunction with the three water chemistry groupings evident in the Stiff plots and Piper diagrams, an examination of the field parameter data indicates the water at the Coarse Refuse Seep monitoring locations is higher in specific conductivity and lower in dissolved oxygen than the remaining monitoring locations. In addition to the field parameter differences, the analytical laboratory results reveal the Coarse Refuse Spring monitoring locations also contain substantially higher concentrations of total dissolved solids (a direct reflection of the elevated sulfate, magnesium, sodium and calcium ion concentrations indicated earlier).

The analytical laboratory results and field parameter data further define the differences between the two Coarse Refuse Seep monitoring locations. The upstream monitoring location (Coarse Refuse Seep Source) is characterized by water temperatures consistently in excess of 23 degrees celsius, while the water temperatures of the downstream monitoring location (Coarse Refuse Seep Boundary) are consistently within the range of the remaining monitoring locations. The analytical laboratory results indicate the Coarse Refuse Seep Source monitoring location typically contains concentrations of total and dissolved iron and manganese three-orders of magnitude higher than the remaining monitoring locations. The dissolved oxygen concentrations at the Coarse Refuse Seep Source location are typically less than 50 percent of the remaining monitoring locations.

The elevated concentrations of sulfate, magnesium, sodium, calcium, total dissolved solids, and total and dissolved iron and manganese appear to be the result of leaching of the Coarse Refuse material consisting primarily of waste coal and rock in direct contact with the Mancos Shale. The elevated concentrations of iron and sulfate can likely be attributed to the oxidation of pyrite contained within the Coarse Refuse material. The elevated temperatures and low levels of dissolved oxygen at the Coarse Refuse Seep Source monitoring location are likely the result of historical coal-fires within the Coarse Refuse Pile. Oxidation of pyrite contained in the coarse refuse material would also consume oxygen present in the water, lowering the amount of dissolved oxygen.

The Coal Runoff Basin (UPDES Outfall 004) effluent is derived from the coal wash-down and de-sliming processes of the Sunnyside Coal Company mine located directly east of the Sunnyside Cogeneration Facility. The sodium concentrations contained in water at the Coal Runoff Basin monitoring location (referenced in the evaluation of the Stiff plots and Piper diagrams) are likely the result of the wash-down and desliming processes. The sodium concentrations present in the Coal Runoff Basin effluent do not appear to be of environmental concern and are merely referenced in this report as a distinguishing water chemistry feature.

Anomalous analytical laboratory data, such as the ion concentrations associated with the Coarse Refuse Seep monitoring locations, were confirmed with the HCN analytical laboratory. Two analytical laboratory data deficiencies occurred during the 1993 monitoring period:

- Potassium was not analyzed for during the October, 1993 sampling round; and
- Incorrect analyte concentrations were reported for total and dissolved iron and manganese at the Coarse Refuse Boundary monitoring location for October, 1993.

The lack of potassium analyses is the result of miscommunication between the HCN field personnel that collected the sample and HCN laboratory personnel. Although "common ions" were indicated for analysis on the monitoring plan samples collected during the October, 1993 sampling round the laboratory personnel failed to perform the potassium analyses due to an incomplete parameter list shipped with the samples. HCN apologizes for this omission, and has resolved the matter by clarifying all monitoring plan parameters with the HCN laboratory manager and all field staff associated with this project.

It should be noted that both Stiff plots and Piper diagrams consider potassium data in their function. To enable accurate comparisons of the monitoring data, and remove any bias that may be caused by omitting potassium values for one data set, all potassium concentrations were considered 0 (zero) for the purpose of Stiff plots and Piper diagrams. This decision did not affect the basic shapes of the Stiff plots or alter the patterns of the Piper diagrams, given the low concentrations of potassium present at the site (typically less than 15 mg/l)

The incorrect analyte concentrations for total and dissolved iron and manganese are the result of improper sample handling on the part of the field technician that collected the samples during the October, 1993 sampling round. The field technician was not intimately familiar with the standard operating procedures for collecting and preparing water samples for metals analysis. Unfortunately this error was not discovered until the samples had been disposed of by the HCN laboratory, and the samples could not be reanalyzed. HCN apologizes for this error. In response to this error, all field staff involved with the project have been familiarized with the standard operating procedure for collecting and preparing water samples for metals analysis.

As referenced in quarterly reports and additional correspondence with EWP personnel during 1993, the lack of accurate measuring flow devices at the Coarse Refuse Seep monitoring locations has resulted in the visual estimation of flow rates at these locations. It is our understanding that EWP is currently preparing to install weir-boxes at the Coarse Refuse Seep monitoring locations. Installation of these devices will enable HCN and EWP personnel to accurately record the flow rate at the Coarse Refuse Seep monitoring locations, and aid in future interpretations of water chemistry data. Flow rates at the remaining monitoring locations are currently obtained either using a stopwatch and calibrated container, or digital open-channel flow meter.

February 28, 1994

Annual Monitoring Report
Monitoring Period: June through December, 1993
DOGM Permit Boundary Water Quality Monitoring Plan
Sunnyside Cogeneration Facility

I have included a copy of the 1993 analytical laboratory data and field parameter data in LOTUS 123 format on high-density diskette. If you have any questions concerning this report contact Chuck Wemple or Greg McDonald at (801) 972-4787.

Sincerely;

Huntingdon Chen-Northern

Chuck Wemple
Hydrogeologist

cc Mr. David Pearce, Environmental Power Corporation
Mr. Ed Ghantous, Parsons MAIN
Mr. Kendall Reed, Tampella Services, Inc., Sunnyside Cogeneration Facility
Mr. Brian Burnett, Calister, Duncan and Nebeker
Mr. Ken Wyatt, State of Utah, Division of Oil, Gas and Mining

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TABLE 1

Compliance Monitoring Locations

Sunnyside Cogeneration Associates Facility
Sunnyside, Utah

DOGM Permit Boundary Water Quality Monitoring Plan

DOGM UPDES Permit Monitoring Locations
Outfall 004, Coal Runoff Basin Outfall 007, Rail Cut Pond Outfall 008, Old Coarse Refuse Pond Outfall 009, Pasture Pond Outfall 012, Coarse Refuse Toe Outfall 013, Facility Sediment Pond Outfall 014, Coal Pile Runoff Pond Outfall 015, Landfill Sediment Pond Outfall 016, Borrow Area Pond
DOGM Baseline Water Quality Monitoring Locations
ICE–1, Icelander Creek F–2, Whitmore Springs CRS, Coarse Refuse Seep–Source CRB, Coarse Refuse Seep–Boundary WELL–1, Draegerton Well

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TABLE 2

Field Parameter Data 1993

Sunnyside Cogeneration Associates Facility

Sunnyside, Utah

DOGM Permit Boundary Water Quality Monitoring Plan

		June 30, 1993					July 27, 1993					August 26, 1993				
		Field Parameters					Field Parameters					Field Parameters				
Monitoring Location	Location I.D.	Temp. (C)	pH (s.u.)	SC (umhos)	Dissolved Oxygen (ug/l)	Flow Rate (gpm)	Temp. (C)	pH (s.u.)	SC (umhos)	Dissolved Oxygen (ug/l)	Flow Rate (gpm)	Temp. (C)	pH (s.u.)	SC (umhos)	Dissolved Oxygen (ug/l)	Flow Rate (gpm)
elander Creek	ICE-1	29	8.08	2200	7.4	85	23	8.17	2300	6.2	200	16	7.18	2200	7.2	120
olumbia Dugway Spring	F-2	25	8.4	2300	7.8	100	23	8.02	1900	5.9	90	15	7.18	2150	6.2	100
oarse Refuse Seep Source	CRS	32	6.77	4600	6.2	30*	28	7.25	3200	2.4	30*	25	6.81	2800	3.4	40*
oarse Refuse Seep Boundary	CRB	26	7.6	4300	8.1	30*	21	7.87	4600	5.0	30*	18.5	6.5	2450	5.4	60*
raegerton Well	Well-1	16	7.8	1800	7.2	50	17	8.18	3100	5.8	50	12	6.77	920	4.9	50
oal Runoff Basin	Outfall 004	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ail Cut Pond	Outfall 007	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ld Coarse Refuse Pond	Outfall 008	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
asture Sediment Pond	Outfall 009	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
oarse Refuse Toe Pond	Outfall 012	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
orrow Area Pond	Outfall 016	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

		September 2, 1993					October 27, 1993					November 16, 1993				
		Field Parameters					Field Parameters					Field Parameters				
Monitoring Location	Location I.D.	Temp. (C)	pH (s.u.)	SC (umhos)	Dissolved Oxygen (ug/l)	Flow Rate (gpm)	Temp. (C)	pH (s.u.)	SC (umhos)	Dissolved Oxygen (ug/l)	Flow Rate (gpm)	Temp. (C)	pH (s.u.)	SC (umhos)	Dissolved Oxygen (ug/l)	Flow Rate (gpm)
elander Creek	ICE-1	20.0	8.23	2150	5.4	150	3.3	8.50	1200	6.0	150	5.0	8.48	1800	5.6	150
olumbia Dugway Spring	F-2	17.0	7.54	2100	6.4	100	1.5	8.30	1200	7.0	100	5.3	8.49	1300	6.2	100
oarse Refuse Seep Source	CRS	28.0	7.12	4600	1.9	40*	23.0	6.98	4700	3.5	40*	23.2	6.86	4850	2.1	50*
oarse Refuse Seep Boundary	CRB	20.0	7.92	4150	4.9	40*	8.3	7.50	3400	6.0	40*	7.9	7.10	3300	5.5	40*
raegerton Well	Well-1	15.0	7.10	1450	5.2	46	7.0	8.00	1300	4.5	50	10.0	7.27	1300	4.6	50
oal Runoff Basin	Outfall 004	12.0	8.09	2900	5.9	49	7.9	8.44	1250	6.5	97	4.2	8.90	1250	6.1	97
ail Cut Pond	Outfall 007	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ld Coarse Refuse Pond	Outfall 008	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
asture Sediment Pond	Outfall 009	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
oarse Refuse Toe Pond	Outfall 012	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
orrow Area Pond	Outfall 016	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

ote:

A. indicates that data is not available due to lack of discharge.

ow rates were measured using a calibrated container and stopwatch method, unless marked with an *.

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Consulting Engineers Environmental Scientists

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March 2, 1994

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Salt Lake City, Utah 84124

COPY

RECEIVED
MAR 4 1994
DIV. OF OIL, GAS & MINING

Attention: Ms. Alane Boyd
Ms. Jessica Smith

Subject: Additional Table
Annual Water Quality Report
Monitoring Period: June through December, 1993
DOGM Permit Boundary Water Quality Monitoring Plan
Sunnyside Cogeneration Facility
HCN Job No. 5-137.4-91

Dear Ms. Boyd and Ms. Smith:

It has been brought to my attention that the Annual Water Quality Report distributed on February 28, 1994 is missing the second page of Table 2. The second page of Table 2 contains the field parameter data for December, 1993 and is included as Attachment A. Please incorporate the additional page into your copy of the report. The diskette I included with the report contains the December, 1993 field parameter data in file D1293T2.WK3.

Please contact me at (801) 972-4787 if you have any questions.

Sincerely;

Huntingdon Chen-Northern

Chuck Wemple
Hydrogeologist

cc Mr. David Pearce, Environmental Power Corporation
Mr. Ed Ghantous, Parsons MAIN
Mr. Kendall Reed, Tampella Services, Inc., Sunnyside Cogeneration Facility
Mr. Brian Burnett, Calister, Duncan and Nebeker
Mr. Ken Wyatt, State of Utah, Division of Oil, Gas and Mining

ATTACHMENT A

TABLE 2 (continued)

Field Parameter Data 1993

Sunnyside Cogeneration Associates Facility

Sunnyside, Utah

DOGM Permit Boundary Water Quality Monitoring Plan

Monitoring Location	Location I.D.	December 9, 1993 Field Parameters				
		Temp. (C)	pH (s.u.)	SC (umhos)	Dissolved Oxygen (ug/l)	Flow Rate (gpm)
Icelander Creek	ICE-1	4.8	8.49	1800	10.3	300*
Columbia Dugway Spring	F-2	6	7.82	1800	12.7	150
Coarse Refuse Seep Source	CRS	23.2	6.93	4306	1.9	30*
Coarse Refuse Seep Boundary	CRB	5.9	7.94	3900	8.4	40*
Draegerton Well	Well-1	N.A.	N.A.	N.A.	N.A.	N.A.
Coal Runof Basin	Outfall 004	3.4	8.24	2023	7.4	148
Rail Cut Pond	Outfall 007	N.A.	N.A.	N.A.	N.A.	N.A.
Old Coarse Refuse Pond	Outfall 008	N.A.	N.A.	N.A.	N.A.	N.A.
Pasture Sediment Pond	Outfall 009	N.A.	N.A.	N.A.	N.A.	N.A.
Coarse Refuse Toe Pond	Outfall 012	N.A.	N.A.	N.A.	N.A.	N.A.
Borrow Area Pond	Outfall 016	N.A.	N.A.	N.A.	N.A.	N.A.

Note:
N.A. indicates that data is not available due to lack of discharge.
Flow rates were measured using a calibrated container and stopwatch method, unless marked with an *.
Flow rates marked with an * indicate the flow rate was estimated due to a lack of an appropriate measuring location.

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TABLE 3

DOGM Quarterly Compliance Sampling Results
Sampling Dates: June and October, 1993

Sunnyside Cogeneration Associates Facility

Sunnyside, Utah

Sample Location		Analytical Parameters															
		Metals (mg/l)													Inorganics		
		Aluminum Dissolved	Arsenic Dissolved	Boron Dissolved	Cadmium Dissolved	Copper Dissolved	Iron Dissolved	Iron Total	Lead Dissolved	Manganese Dissolved	Manganese Total	Molybdenum Dissolved	Selenium Dissolved	Zinc Dissolved	Electrical Conductivity	Oil & Grease	Sulfide as S
ICE-1	06/93	0.2	<0.002	0.3	<0.003	<0.02	<0.05	0.08	<0.01	<0.02	<0.02	<0.05	<0.002	<0.02	NA	<1	<1
	10/93	0.1	<0.002	0.3	<0.001	<0.02	<0.05	<0.05	<0.002	<0.02	<0.02	<0.05	<0.002	<0.02	2410	<1	<1
F-2	06/93	0.2	<0.002	0.3	<0.003	<0.02	<0.05	0.26	<0.01	<0.02	0.04	<0.05	<0.002	<0.02	NA	<1	<1
	10/93	0.2	<0.002	0.3	<0.001	<0.02	<0.05	0.41	<0.002	0.04	0.06	<0.05	<0.002	1.02	2240	3	<1
CRS	06/93	0.6	<0.002	1.0	<0.003	<0.02	<0.12	8.90	<0.01	1.75	1.50	<0.10	<0.002	0.08	NA	<1	<1
	10/93	0.5	<0.002	1.1	<0.001	<0.02	6.30	47	<0.002	1.35	2.2	<0.05	<0.002	0.33	5310	<1	<1
CRB	06/93	0.6	<0.002	0.7	<0.003	<0.02	<0.12	<0.12	<0.01	<0.02	<0.02	<0.10	<0.002	0.10	NA	<1	<1
	10/93	0.5	<0.002	1.0	<0.001	<0.02	*1.92	*<0.05	<0.002	*1.35	*<0.02	<0.05	<0.002	0.35	4860	1	1
WELL	06/93	<0.1	<0.002	0.2	<0.003	<0.02	<0.05	<0.05	<0.01	<0.02	<0.02	<0.05	<0.002	0.02	NA	<1	6
	10/93	<0.1	<0.002	0.3	<0.001	<0.02	<0.05	0.14	<0.002	<0.02	<0.02	<0.05	<0.002	<0.02	2100	<1	<1
004	06/93	ND	ND	ND	ND	ND	ND	0.7	ND	ND	ND	ND	ND	ND	ND	5.0	ND
	10/93	NA	<0.002	NA	<0.003	<0.02	NA	0.33	<0.01	NA	NA	NA	<0.002	0.08	NA	<1	NA

Sample Location		Analytical Parameters															
		Inorganics (mg/l)			Anions (mg/l)					Cations (mg/l)				Nutrients (mg/l)			
		Settleable Solids	Dissolved Solids	Suspended Solids	Bicarbonate Alkalinity	Carbonate Alkalinity	Total Alkalinity	Chloride as Cl	Sulfate as SO4	Calcium as Ca	Hardness as CaCO3	Magnesium as Mg	Sodium as Na	Ammonia as N	Nitrite as N	Nitrate as N	Phosphorous Total
CE-1	06/93	<0.1	1920	8	505	0	414	66	1060	126	944	153	318	0.31	<0.05	1.72	0.02
	10/93	<0.2	1600	<2	593	0	486	65	777	90	660	105	340	<0.05	<0.05	0.77	0.05
-2	06/93	<0.1	1910	10	569	0	466	64	985	144	965	147	306	<0.05	0.06	1.54	0.02
	10/93	<0.2	1500	9	622	0	510	59	700	102	650	96	300	0.11	<0.05	0.88	0.06
RS	06/93	0.2	5210	15	553	0	453	97	3380	570	2945	370	550	1.86	<0.05	0.38	0.23
	10/93	<0.2	5200	41	548	0	449	96	2930	558	2800	342	543	1.73	<0.05	0.33	0.68
RB	06/93	<0.1	4610	<2	394	0	323	131	3010	513	2638	330	483	0.11	<0.05	1.34	<0.02
	10/93	<0.2	4700	<5	384	0	315	116	2710	550	2810	350	555	<0.05	<0.05	1.07	0.05
WELL	06/93	<0.1	1250	<2	599	0	491	34	510	93	578	84	231	<0.05	<0.05	0.90	<0.02
	10/93	<0.2	1400	<2	599	0	491	47	604	99	590	84	276	<0.05	<0.05	1.21	0.05
04	06/93	ND	1180	61.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	10/93	NA	1200	66	580	10	493	86	436	24	134	18	432	NA	NA	NA	NA

" < " sign indicates the value reported was the practical quantitation limit for this sample using the method described. Concentrations of analyte, if present, below this limit.
ere not quantifiable. These results should be considered non-detect.
Samples were reanalyzed and results verified on December 8. These appear to be different samples.
.D. = No Discharge
.A. = Not Applicable
ile: N:\WEMPLE\SCA\EWP\ANN93T3.WK3

ATTACHMENT A

SUNNYSIDE COGENERATION ASSOCIATES FACILITY

Carbon County, Utah

Groundwater Discharge Permit Number UGW070002

Surface Water and Discharge Basin Compliance Sampling

HUNTINGDON Chen-Northern

MONITORING LOCATION NUMBER: ICE-1 DOGM

Runoff Basin / Spring / Other: STREAM

Sampling Parameters:

Date	Time	Personnel	Weather	Discharge Present (yes/no)	Observations (color, sheen, odor, etc.)	Flow ~~(cfs)~~ gpm	Flow Meas. Method	Basin Water Level (feet)	Field Parameters: Temp (~~F~~C)	pH	SC (umhos)	DO ~~Meter No.~~	Collection Point	Sample Taken (yes/no)
9/30/93	1335	GMCW	Sunny/Hot	yes		185	~~Vis~~ CC		29	8.08	2200	7.4	Marked	yes
7/27	1517	GM	Sunny Hot	yes		200	~~Vis~~ CC		23	8.17	2300	6.2	"	NO
8/26/93	1103	GM	—	yes		120	CC		16	7.18	2200	7.2	"	NO
9/2/93	1700	GMCW	Slt	yes		150	CC	-	20	8.23	2150	5.4	"	~~NO~~ yes
10/27	0830	MH	Warm	yes		150	Vis		3.3	8.50	1200	6.0	"	NO
11/16	1310	MH	Cold	yes		150	Vis		5.0	8.48	1800	5.6	"	~~NO~~
12/9	1555	GM	Cold	yes	clear	300	Vis		4.8	8.49	2471	10.3	"	NO
1/13/94	1438	GM	Cold Clear	yes	Clear ICE-2 duplicate	~200	Vis		5.1	8.29	2220	6.4	"	yes

* Basin water level measurements are taken from permanent reference point at basin location.

Flow measurement methods: W = Weir, VE = Visual Estimate, CC = Calibrated Container, DF = Debris Flow Rate Estimate

SUNNYSIDE COGENERATION ASSOCIATES FACILITY

Carbon County, Utah

Groundwater Discharge Permit Number UGW070002

Surface Water and Discharge Basin Compliance Sampling

HUNTINGDON Chen – Northern

MONITORING LOCATION NUMBER: F-2 (Whit. Sp) DOGM

Runoff Basin / Spring / Other:

Sampling Parameters:

Date	Time	Personnel	Weather	Discharge Present (yes/no)	Observations (color, sheen, odor, etc.)	* gpm Flow ~~(cfs)~~	Flow Meas. Method	Basin Water Level (feet)	Field Parameters: Temp (~~F~~ C)	pH	SC (umhos)	DO ~~Meter No.~~	Collection Point	Sample Taken (yes/no)
6/30/93	1515	GMCW	Sunny/Hot	yes	Clear water	100	CC		25	8.4	2300	7.8	Marked Point	yes
7/27	1456	GM	Sunny/Hot	yes	"	~90	V.i		23	8.02	1900	5.9	"	~~yes~~
8/26/93	1058	GM	Overcast	yes	"	100	CC		15	7.18	2150	6.2	"	NO
9/2/93	1757	GMCW	SW	yes	"	100	CC		17	7.54	2100	6.4	"	yes
10/27	0730	MH	windy	yes	"	100	CC		1.5	8.3	1200	7.0	"	NO
11/16	1310	MH	Cold	yes	"	100	CC		5.3	8.49	1300	6.20	"	NO
12/9	1530	GM	Cold	yes	Grey from TSS (.004)	150	CC		6.0	7.82	1800	12.7	"	NO
1/13/94	1535	GM	Cold Clear	yes	Clear	~90	CC		5.6	8.51	1824	6.2	"	yes

* Basin water level measurements are taken from permanent reference point at basin location.

Flow measurement methods: W = Weir, VE = Visual Estimate, CC = Calibrated Container, DF = Debris Flow Rate Estimate

SUNNYSIDE COGENERATION ASSOCIATES FACILITY

Carbon County, Utah

Groundwater Discharge Permit Number UGW070002

Surface Water and Discharge Basin Compliance Sampling

HUNTINGDON Chen – Northern

MONITORING LOCATION NUMBER: CRS (source) DOGM

Runoff Basin / Spring / Other:

Sampling Parameters:

Date	Time	Personnel	Weather	Discharge Present (yes/no)	Observations (color, sheen, odor, etc.)	Flow (cfs)	Flow Meas. Method	Basin Water Level (feet)	Field Parameters: Temp (~~F~~C)	pH	SC (umhos)	DO ~~Meter No.~~	Collection Point	Sample Taken (yes/no)
6/30/93	1335	GM CW	Sunny Hot	yes	Much Rust; Warm.	~30	Vis		32	6.77	4600	6.2	Flagged Point	yes
7/27	1620	CW	Sunny Hot	yes	" "	~30	Vis		28	7.25	3200	2.4	"	NO
08/26/93	1150	GM	overcast	yes	" "	~40	VIS		25	6.81	2860	3.4	"	NO
9/2/93	1555	CW GM	SW	yes	"	~40	Vis		28	7.12	4600	1.9	"	Yes
10/26	1320	MH	windy	yes	"	40	Vis		23	6.98	4700	3.5	"	NO
11/16	1405	MH	Cold	yes	"	50	Vis		23.2	6.86	4850	2.1	"	NO
12/9	1612	GM	Cold	yes	Warmer less flow	~30	Vis		23.2	6.93	4306	1.9	"	NO
1/14/94	1011	GM	Clear Cold	yes		~100	V.S		21.2	7.08	4748	2.4	"	yes

* Basin water level measurements are taken from permanent reference point at basin location.

Flow measurement methods: W = Weir, VE = Visual Estimate, CC = Calibrated Container, DF = Debris Flow Rate Estimate

SUNNYSIDE COGENERATION ASSOCIATES FACILITY

Carbon County, Utah

Groundwater Discharge Permit Number UGW070002

Surface Water and Discharge Basin Compliance Sampling

HUNTINGDON Chen – Northern

MONITORING LOCATION NUMBER: CRB (boundary) DOGM

Runoff Basin / Spring / Other:

Sampling Parameters:

Date	Time	Personnel	Weather	Discharge Present (yes/no)	Observations (color, sheen, odor, etc.)	Flow (cfs)	Flow Meas. Method	Basin Water Level (feet)	Field Parameters: Temp (~~F~~)C	pH	SC (umhos)	DO ~~Meter No.~~	Collection Point	Sample Taken (yes/no)
6/30/93	1355	GMCW	Sunny Hot	yes	Much less FE or of cooler	~30	VIS		26	7.60	4300	8.1	Standard Point	yes
7/27	1626	GM	Sunny Hot	yes	"	~30	VIS		21	7.87	4600	5.0	"	NO
8/26/93	1159	GM	Overcast	yes	" "	~60	VIS.		18.5	6.50	2450	5.4	"	NO
9/2	1643	GMCW	SW	yes	"	~40	VIS		20	7.42	4150	4.9	"	NO
10/26	1400	MH	Windy	y	"	40	VIS		8.3	7.50	3400	6.0	"	NO
11/16	1430	MH	Cold	yes	"	40?	VIS		7.9	7.10	3300	5.5	"	NO
12/9	1627	GM	Cold	yes	Clear water	40?	VIS		5.9	7.94	3900	5.4	"	NO
1/14/94	1103	GM	Clear Cold	yes	Clear	200est	VIS		5.0	8.17	3100	6.0	"	yes

* Basin water level measurements are taken from permanent reference point at basin location.

Flow measurement methods: W = Weir, VE = Visual Estimate, CC = Calibrated Container, DF = Debris Flow Rate Estimate

SUNNYSIDE COGENERATION ASSOCIATES FACILITY

Carbon County, Utah

Groundwater Discharge Permit Number UGW070002

Surface Water and Discharge Basin Compliance Sampling

HUNTINGDON Chen – Northern

MONITORING LOCATION NUMBER: WELL (E. Carbon Municipal well) DOGM

Runoff Basin / Spring / Other: Well

Sampling Parameters:

Date	Time	Personnel	Weather	Discharge Present (yes/no)	Observations (color, sheen, odor, etc.)	Flow (cfs)	Flow Meas. Method	Basin Water Level (feet)	Field Parameters: Temp (~~F~~C)	pH	SC (umhos)	DO ~~Meter No.~~	Collection Point	Sample Taken (yes/no)
6/30/93	1130	GMCW	Sunny/Hot	~~yes~~	Clear water	50 gpm	CC		16	7.8	1800	7.2	Hose	yes
7/27	1700	GM	Sunny/Hot	yes	" "	50 gpm	V.E.		17	8.18	3100	5.8	Hose	NO
8/26/93	1036	GM	Overcast	yes	" "	50 gpm	CC		12	6.77	920	4.9	"	NO
9/27/93	1436	GMCW	SW	yes	" "	46	CC		15	7.10	1450	5.2	"	yes
10/27	0915	MH	Windy	yes	" "	50	CC		7	8.00	1300	4.5	—	NO
11/16	1250	MH	Cold	yes	" "	50	CC		10.0	7.27	1300	4.6	—	NO
12/9	1514	GM	Cold	NO	Pipe from well to stand pipe is Frozen.								—	NO
1/14/94	1357	GM	Cold Clear	NO	Pipe is still Frozen.								—	NO

* Basin water level measurements are taken from permanent reference point at basin location.

Flow measurement methods: W = Weir, VE = Visual Estimate, CC = Calibrated Container, DF = Debris Flow Rate Estimate

SUNNYSIDE COGENERATION ASSOCIATES FACILITY

Carbon County, Utah

Groundwater Discharge Permit Number UGW070002

Surface Water and Discharge Basin Compliance Sampling

HUNTINGDON Chen – Northern

MONITORING LOCATION NUMBER: Coal Runoff Basin GWD

Runoff Basin / Spring / Other:

Sampling Parameters: Cations, Anions, METALS, pH, TDS

Date	Time	Personnel	Weather	Discharge Present (yes/no)	Observations (color, sheen, odor, etc.)	Flow (cfs)	Flow Meas. Method	Basin Water Level (feet)	Field Parameters: Temp (F/C)	pH	SC (umhos)	Meter No.	Collection Point	Sample Taken (yes/no)
9/4/92	1715	CW/Gm	cold/rainy	yes	no sheen, no foam, no debris	10gpm	VE	—	12	6.75	2173	1/1/1	discharge ditch	yes
10/3/92	825	GM	Clear Cool	yes		~10	VE	–	9	8.19	2897	DO 11.1	"	yes
11/5/92	1335	GM	Scattered Snow	yes		~20	VE	–	4	8.33	2400	8.6	"	yes
12/3/92	1457	GM CW	Cold Clear	yes		25	VE	–	1.5	—	2386	9.8	"	yes
* 12/3/92	1515	GM CW	"	yes	taken near res.	25	VE	–	2.0	—	2352	10.0	New Res.	yes
1/28/93	1057	GM CW	Cold Clear	yes		25	VE	–	6		.15 e4		at Outfall	yes
2/24/93	1115	GM CW	Cold Pc	yes	"	20	VE	–	4	7.90	2150	10.2	"	yes
3/23/93	1049	CW	Warm Sunny	yes	Flow Reduced Construction	15	VE	–	11.0	7.43	1920	—	"	yes
4/8/93	1510	GM CW	Clear Cold	yes	at Outflow point	20	VE	–	6	7.32	1900	10.6	"	yes
4/29	1156	GM	Clear Warm	yes		20	VE	–	13	8.59	2150	10.8	"	yes
5/21	1328	GM	" "	yes	Flow ~ Normal.	35	VE	–	17.5	8.81	1950		"	yes
6/15	1430	RG	Warm Windy	yes	Flow reduced ~½	8	Flume	–	7	8.3	1700	7.5		NO
6/29	0858	GM	Sunny Hot	NO	No Discharge, slurry water is being diverted & bypasses decanting process.									NO
7/12	1337	CW GM	SH	NO	Some Water in Basin									
7/27	1024	GM	SH	NO	1'-2' of Water									
8/12	1350	MH	SNW	NO										
8/20	1400	MH	SW	NO	Dry									

* Basin water level measurements are taken from permanent reference point at basin location.

Flow measurement methods: W = Weir, VE = Visual Estimate, CC = Calibrated Container, DF = Debris Flow Rate Estimate

* Taken downstream near reservoir; sample called 004-RES

SUNNYSIDE COGENERATION ASSOCIATES FACILITY

Carbon County, Utah
Groundwater Discharge Permit Number UGW070002
Surface Water and Discharge Basin Compliance Sampling

HUNTINGDON Chen – Northern

MONITORING LOCATION NUMBER: Coal Runoff Basin (004) GWD

Runoff Basin / Spring / Other:

Sampling Parameters: Ions, Metals, pH TDS

Date	Time	Personnel	Weather	Discharge Present (yes/no)	Observations (color, sheen, odor, etc.)	Flow (cfs)	Flow Meas. Method	Basin Water Level (feet)	Field Parameters Temp (F)	pH	SC (umhos)	Meter No.	Collection Point	Sample Taken (yes/no)
9/2	1125	CW CM	SW	NO	Dry	—	—	—	—	—	—	—	—	NO
9/30	1800	RB	Sunny	Yes		49	Flume		12	8.09	2900		Below Flume	yes
10/13	1135	MH	Cool Windy	Yes	Black High TSS	97.4	"		10.4	8.28	1300			yes
10/26	1140	MH	" "	yes			"		7.9	8.44	1250	6.5		yes
11/16	1200	MH	Cold	yes	High TSS Black	97.35	Flume		4.2	8.9	1250	6.1	"	yes
11/30	1312	CM CW	Cold	yes	High TSS Black w/ fines	107.6	"		4.9	8.78	1050	-	"	yes
12/9	1036	CM	Cold	yes	Black Light TSS	148.1	Flume		3.4	8.24	2023	7.4	"	yes
12/23	1040	CM	Cold	yes	Clear V. low flow	4.3	Flume		3.0	8.57	2676	-	"	yes
1/13/94	1345	CM	Cold Clear	NO	Slurry → SC 2 → SC-2	—	—	—	—	—	—	—	—	NO

* Basin water level measurements are taken from permanent reference point at basin location.
Flow measurement methods: W = Weir, VE = Visual Estimate, CC = Calibrated Container, DF = Debris Flow Rate Estimate

Huntingdon
Chen-Northern, Inc.
600 SOUTH 25TH STREET
P.O. BOX 30615
BILLINGS, MT 59107
(406) 248-9161
FAX (406) 248-9282

TECHNICAL REPORT

REPORT TO: ATTN: MR. CHUCK WEMPLE
CHEN-NORTHERN, INC.
1127 WEST 2320 SOUTH, SUITE B
SALT LAKE CITY, UT 84119

DATE: August 3, 1993
JOB NUMBER: 87-927
SHEET: 1 of 11
INVOICE NO.: 23900

REPORT OF: Water Analysis - SCA/DOGM (5-137.3-91)

SAMPLE IDENTIFICATION:

On July 3, 1993, these water samples (laboratory numbers 142325 through 142329) were delivered to our laboratory for analysis. Tests were conducted in accordance with the U.S. Environmental Protection Agency Manual EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".

The test results are shown on the following pages.

A < sign indicates the value reported was the practical quantitation limit for this sample using the method described. Concentrations of analyte, if present, below this were not quantifiable.

Reviewed by David Connell

rmr

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF OUR CLIENTS AND AUTHORIZATION FOR

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Project Name: SCA/DOGM 5-137.3-91

Laboratory No.: 142325
Sample Name: DS-WELL/063093
Sample Date: 06/30/93
Collected by: CHUCK WEMPLE/GREG McDONALD
Time Sampled: 1145
Sample Type: WATER

PARAMETER	CATION ANION BALANCE	MEASURED VALUE		METHOD DETECTION LIMIT	DATE OF ANALYSIS	TIME OF ANALYSIS	ANALYST
ANIONS:							
Alkalinity Bicarbonate as HCO_3	9.82 meq/l	599	mg/l	1.02	07/13/93	1400	DD
Alkalinity Carbonate as CO_3	0 meq/l	0	mg/l	-	07/13/93	1400	DD
Alkalinity Total as $CaCO_3$	9.82 meq/l	491	mg/l	0.84	07/13/93	1400	DD
Chloride as Cl	0.96 meq/l	34	mg/l	1.41	07/08/93	1500	DD
Fluoride as F	0.01 meq/l	0.28	mg/l	0.03	07/23/93	1430	HB
Sulfate as SO_4	10.62 meq/l	510	mg/l	1.83	07/13/93	1000	CC
Total Anions	21.41 meq/l						
CATIONS:							
Calcium as Ca	4.64 meq/l	93	mg/l	0.39	07/19/93	1200	NH
Hardness as $CaCO_3$	11.55 meq/l	578	mg/l	2.25	07/19/93	1200	NH
Magnesium as Mg	6.91 meq/l	84	mg/l	0.31	07/19/93	1200	NH
Potassium as K	0.13 meq/l	5	mg/l	0.18	07/13/93	1630	NH
Sodium as Na	10.05 meq/l	231	mg/l	0.81	07/19/93	1200	NH
Total Cations	21.73 meq/l						
Difference	0.32 meq/l						
Allowable	0.89 meq/l						
INORGANICS:							
Oil & Grease		<1	mg/l	0.9	07/16/93	1600	DD
Settleable Solids		<0.1	ml/l	-	07/03/93	0900	DD
Sulfide as S		6	mg/l	0.61	07/07/93	1530	DD
Total Dissolved Solids		1250	mg/l	11.7	07/06/93	1730	CC
Total Suspended Solids		<2	mg/l	3.5	07/06/93	1630	CC
METALS:							
Aluminum as Al (Dissolved)		<0.1	mg/l	0.023	07/21/93	1130	NH
Aluminum as Al (Total)		<0.1	mg/l	0.023	07/21/93	1130	NH
Arsenic as As (Dissolved)		<0.002	mg/l	0.0014	07/08/93	1300	PB
Arsenic as As (Total)		<0.002	mg/l	0.0014	07/22/93	1400	AH

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Project Name: SCA/DOGM 5-137.3-91

August 3, 1993

Laboratory No.: 142325
Sample Name: DS-WELL/063093
Sample Date: 06/30/93
Collected by: CHUCK WEMPLE/GREG McDONALD
Time Sampled: 1145
Sample Type: WATER

PARAMETER	MEASURED VALUE		METHOD DETECTION LIMIT	DATE OF ANALYSIS	TIME OF ANALYSIS	ANALYST
METALS (cont.):						
Barium as Ba (Dissolved)	<0.1	mg/l	0.031	07/21/93	0900	NH
Barium as Ba (Total)	<0.1	mg/l	0.031	07/21/93	0900	NH
Boron as B (Dissolved)	0.2	mg/l	0.045	07/21/93	0900	NH
Boron as B (Total)	0.2	mg/l	0.045	07/21/93	0900	NH
Cadmium as Cd (Dissolved)	<0.003	mg/l	0.0002	07/20/93	1300	AH
Cadmium as Cd (Total)	<0.003	mg/l	0.0002	07/23/93	1300	AH
Chromium as Cr (Total)	<0.02	mg/l	0.009	07/21/93	0900	NH
Chromium as Cr (Dissolved)	<0.02	mg/l	0.009	07/21/93	0900	NH
Copper as Cu (Dissolved)	<0.02	mg/l	0.005	07/21/93	0900	NH
Copper as Cu (Total)	<0.02	mg/l	0.005	07/21/93	0900	NH
Iron as Fe (Dissolved)	<0.05	mg/l	0.008	07/21/93	0900	NH
Iron as Fe (Total)	<0.05	mg/l	0.008	07/21/93	0900	NH
Lead as Pb (Dissolved)	<0.01	mg/l	0.0012	07/13/93	1330	NH
Lead as Pb (Total)	<0.01	mg/l	0.0012	07/27/93	1000	NH
Manganese as Mn (Dissolved)	<0.02	mg/l	0.003	07/21/93	0900	NH
Manganese as Mn (Total)	<0.02	mg/l	0.003	07/21/93	0900	NH
Mercury as Hg (Dissolved)	<0.0005	mg/l	0.0002	07/19/93	0940	AH
Mercury as Hg (Total)	<0.0005	mg/l	0.0002	07/19/93	0940	AH
Molybdenum as Mo (Dissolved)	<0.05	mg/l	0.023	07/21/93	0900	NH
Molybdenum as Mo (Total)	<0.05	mg/l	0.023	07/21/93	0900	NH
Nickel as Ni (Dissolved)	<0.02	mg/l	0.011	07/21/93	0900	NH
Nickel as Ni (Total)	<0.02	mg/l	0.011	07/21/93	0900	NH
Selenium as Se (Dissolved)	<0.002	mg/l	0.0011	07/12/93	1540	AH
Selenium as Se (Total)	<0.002	mg/l	0.0011	07/16/93	1320	AH
Zinc as Zn (Dissolved)	0.02	mg/l	0.008	07/21/93	0900	NH
Zinc as Zn (Total)	0.04	mg/l	0.008	07/21/93	0900	NH
NUTRIENTS:						
Ammonia Nitrogen as N	<0.05	mg/l	0.034	07/20/93	1330	BH
Nitrite as N	<0.05	mg/l	0.005	07/08/93	1400	BH
Phosphorous Total	<0.02	mg/l	0.002	07/15/93	1600	CC
Nitrate as N	0.90	mg/l	0.005	07/09/93	1115	BH

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Project Name: SCA/DOGM 5-137.3-91

Laboratory No.: 142326
Sample Name: ICE/063093
Sample Date: 06/30/93
Collected by: CHUCK WEMPLE/GREG McDONALD
Time Sampled: 1335
Sample Type: WATER

PARAMETER	CATION ANION BALANCE	MEASURED VALUE	METHOD DETECTION LIMIT	DATE OF ANALYSIS	TIME OF ANALYSIS	ANALYST
ANIONS:						
Alkalinity Bicarbonate as HCO_3	8.28 meq/l	505 mg/l	1.02	07/13/93	1400	DD
Alkalinity Carbonate as CO_3	0 meq/l	0 mg/l	-	07/13/93	1400	DD
Alkalinity Total as $CaCO_3$	8.28 meq/l	414 mg/l	0.84	07/13/93	1400	DD
Chloride as Cl	1.86 meq/l	66 mg/l	1.41	07/08/93	1500	DD
Fluoride as F	0.02 meq/l	0.32 mg/l	0.03	07/23/93	1430	HB
Sulfate as SO_4	22.07 meq/l	1060 mg/l	1.83	07/28/93	1100	CC
Total Anions	32.23 meq/l					
CATIONS:						
Calcium as Ca	6.29 meq/l	126 mg/l	0.39	07/19/93	1200	NH
Hardness as $CaCO_3$	18.88 meq/l	944 mg/l	2.25	07/19/93	1200	NH
Magnesium as Mg	12.59 meq/l	153 mg/l	0.31	07/19/93	1200	NH
Potassium as K	0.23 meq/l	9 mg/l	0.18	07/13/93	1630	NH
Sodium as Na	13.83 meq/l	318 mg/l	0.81	07/19/93	1200	NH
Total Cations	32.94 meq/l					
Difference	0.71					
Allowable	1.23					
INORGANICS:						
Oil & Grease		<1 mg/l	0.9	07/16/93	1600	DD
Settleable Solids		<0.1 ml/l	-	07/03/93	0900	DD
Sulfide as S		<1 mg/l	0.61	07/07/93	1530	DD
Total Dissolved Solids		1920 mg/l	11.7	07/06/93	1730	CC
Total Suspended Solids		8 mg/l	3.5	07/06/93	1630	CC
METALS:						
Aluminum as Al (Dissolved)		0.2 mg/l	0.023	07/21/93	1130	NH
Aluminum as Al (Total)		0.2 mg/l	0.023	07/21/93	1130	NH
Arsenic as As (Dissolved)		<0.002 mg/l	0.0014	07/08/93	1300	PB
Arsenic as As (Total)		<0.002 mg/l	0.0014	07/22/93	1400	AH

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Project Name: SCA/DOGM 5-137.3-91

August 3, 1993

Laboratory No.: 142326
Sample Name: ICE/063093
Sample Date: 06/30/93
Collected by: CHUCK WEMPLE/GREG McDONALD
Time Sampled: 1335
Sample Type: WATER

PARAMETER	MEASURED VALUE		METHOD DETECTION LIMIT	DATE OF ANALYSIS	TIME OF ANALYSIS	ANALYST
METALS (cont.):						
Barium as Ba (Dissolved)	<0.1	mg/l	0.031	07/21/93	0900	NH
Barium as Ba (Total)	<0.1	mg/l	0.031	07/21/93	0900	NH
Boron as B (Dissolved)	0.3	mg/l	0.045	07/21/93	0900	NH
Boron as B (Total)	0.3	mg/l	0.045	07/21/93	0900	NH
Cadmium as Cd (Dissolved)	<0.003	mg/l	0.0002	07/20/93	1300	AH
Cadmium as Cd (Total)	<0.003	mg/l	0.0002	07/23/93	1300	AH
Chromium as Cr (Total)	<0.02	mg/l	0.009	07/21/93	0900	NH
Chromium as Cr (Dissolved)	<0.02	mg/l	0.009	07/21/93	0900	NH
Copper as Cu (Dissolved)	<0.02	mg/l	0.005	07/21/93	0900	NH
Copper as Cu (Total)	<0.02	mg/l	0.005	07/21/93	0900	NH
Iron as Fe (Dissolved)	<0.05	mg/l	0.008	07/21/93	0900	NH
Iron as Fe (Total)	0.08	mg/l	0.008	07/21/93	0900	NH
Lead as Pb (Dissolved)	<0.01	mg/l	0.0012	07/13/93	1330	NH
Lead as Pb (Total)	<0.01	mg/l	0.0012	07/27/93	1000	NH
Manganese as Mn (Dissolved)	<0.02	mg/l	0.003	07/21/93	0900	NH
Manganese as Mn (Total)	<0.02	mg/l	0.003	07/21/93	0900	NH
Mercury as Hg (Dissolved)	<0.0005	mg/l	0.0002	07/19/93	0940	AH
Mercury as Hg (Total)	<0.0005	mg/l	0.0002	07/19/93	0940	AH
Molybdenum as Mo (Dissolved)	<0.05	mg/l	0.023	07/21/93	0900	NH
Molybdenum as Mo (Total)	<0.05	mg/l	0.023	07/21/93	0900	NH
Nickel as Ni (Dissolved)	<0.02	mg/l	0.011	07/21/93	0900	NH
Nickel as Ni (Total)	<0.02	mg/l	0.011	07/21/93	0900	NH
Selenium as Se (Dissolved)	<0.002	mg/l	0.0011	07/12/93	1540	AH
Selenium as Se (Total)	<0.002	mg/l	0.0011	07/16/93	1320	AH
Zinc as Zn (Dissolved)	<0.02	mg/l	0.008	07/21/93	0900	NH
Zinc as Zn (Total)	0.04	mg/l	0.008	07/21/93	0900	NH
NUTRIENTS:						
Ammonia Nitrogen as N	0.31	mg/l	0.034	07/20/93	1330	BH
Nitrite as N	<0.05	mg/l	0.005	07/08/93	1400	BH
Phosphorous Total	0.02	mg/l	0.002	07/15/93	1600	CC
Nitrate as N	1.72	mg/l	0.005	07/09/93	1115	BH

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Project Name: SCA/DOGM 5-137.3-91

August 3, 1993

Laboratory No.: 142327
Sample Name: F-2/063093
Sample Date: 06/30/93
Collected by: CHUCK WEMPLE/GREG McDONALD
Time Sampled: 1515
Sample Type: WATER

PARAMETER	CATION ANION BALANCE	MEASURED VALUE	METHOD DETECTION LIMIT	DATE OF ANALYSIS	TIME OF ANALYSIS	ANALYST
ANIONS:						
Alkalinity Bicarbonate as HCO_3	9.32 meq/l	569 mg/l	1.02	07/13/93	1400	DD
Alkalinity Carbonate as CO_3	0 meq/l	0 mg/l	-	07/13/93	1400	DD
Alkalinity Total as $CaCO_3$	9.32 meq/l	466 mg/l	0.84	07/13/93	1400	DD
Chloride as Cl	1.81 meq/l	64 mg/l	1.41	07/08/93	1500	DD
Fluoride as F	0.02 meq/l	0.30 mg/l	0.03	07/23/93	1430	HB
Sulfate as SO_4	20.51 meq/l	985 mg/l	1.83	07/28/93	1100	CC
Total Anions	31.66 meq/l					
CATIONS:						
Calcium as Ca	7.19 meq/l	144 mg/l	0.39	07/19/93	1200	NH
Hardness as $CaCO_3$	19.29 meq/l	965 mg/l	2.25	07/19/93	1200	NH
Magnesium as Mg	12.10 meq/l	147 mg/l	0.31	07/19/93	1200	NH
Potassium as K	0.18 meq/l	7 mg/l	0.18	07/13/93	1630	NH
Sodium as Na	13.31 meq/l	306 mg/l	0.81	07/19/93	1200	NH
Total Cations	32.78 meq/l					
Difference	1.12 meq/l					
Allowable	1.23 meq/l					
INORGANICS:						
Oil & Grease		<1 mg/l	0.9	07/16/93	1600	DD
Settleable Solids		<0.1 ml/l	-	07/03/93	0900	DD
Sulfide as S		<1 mg/l	0.61	07/07/93	1530	DD
Total Dissolved Solids		1910 mg/l	11.7	07/06/93	1730	CC
Total Suspended Solids		10 mg/l	3.5	07/06/93	1630	CC
METALS:						
Aluminum as Al (Dissolved)		0.2 mg/l	0.023	07/21/93	1130	NH
Aluminum as Al (Total)		0.2 mg/l	0.023	07/21/93	1130	NH
Arsenic as As (Dissolved)		<0.002 mg/l	0.0014	07/08/93	1300	PB
Arsenic as As (Total)		<0.002 mg/l	0.0014	07/22/93	1400	AH

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Project Name: SCA/DOGM 5-137.3-91

Laboratory No.: 142327
Sample Name: F-2/063093
Sample Date: 06/30/93
Collected by: CHUCK WEMPLE/GREG McDONALD
Time Sampled: 1515
Sample Type: WATER

PARAMETER	MEASURED VALUE		METHOD DETECTION LIMIT	DATE OF ANALYSIS	TIME OF ANALYSIS	ANALYST
METALS (cont.):						
Barium as Ba (Dissolved)	<0.1	mg/l	0.031	07/21/93	0900	NH
Barium as Ba (Total)	<0.1	mg/l	0.031	07/21/93	0900	NH
Boron as B (Dissolved)	0.3	mg/l	0.045	07/21/93	0900	NH
Boron as B (Total)	0.2	mg/l	0.045	07/21/93	0900	NH
Cadmium as Cd (Dissolved)	<0.003	mg/l	0.0002	07/20/93	1300	AH
Cadmium as Cd (Total)	<0.003	mg/l	0.0002	07/23/93	1300	AH
Chromium as Cr (Total)	<0.02	mg/l	0.009	07/21/93	0900	NH
Chromium as Cr (Dissolved)	<0.02	mg/l	0.009	07/21/93	0900	NH
Copper as Cu (Dissolved)	<0.02	mg/l	0.005	07/21/93	0900	NH
Copper as Cu (Total)	<0.02	mg/l	0.005	07/21/93	0900	NH
Iron as Fe (Dissolved)	<0.05	mg/l	0.008	07/21/93	0900	NH
Iron as Fe (Total)	0.26	mg/l	0.008	07/21/93	0900	NH
Lead as Pb (Dissolved)	<0.01	mg/l	0.0012	07/13/93	1330	NH
Lead as Pb (Total)	<0.01	mg/l	0.0012	07/27/93	1000	NH
Manganese as Mn (Dissolved)	<0.02	mg/l	0.003	07/21/93	0900	NH
Manganese as Mn (Total)	0.04	mg/l	0.003	07/21/93	0900	NH
Mercury as Hg (Dissolved)	<0.0005	mg/l	0.0002	07/19/93	0940	AH
Mercury as Hg (Total)	<0.0005	mg/l	0.0002	07/19/93	0940	AH
Molybdenum as Mo (Dissolved)	<0.05	mg/l	0.023	07/21/93	0900	NH
Molybdenum as Mo (Total)	<0.05	mg/l	0.023	07/21/93	0900	NH
Nickel as Ni (Dissolved)	*<0.04	mg/l	0.011	07/21/93	0900	NH
Nickel as Ni (Total)	*<0.04	mg/l	0.011	07/21/93	0900	NH
Selenium as Se (Dissolved)	<0.002	mg/l	0.0011	07/12/93	1540	AH
Selenium as Se (Total)	<0.002	mg/l	0.0011	07/16/93	1320	AH
Zinc as Zn (Dissolved)	<0.02	mg/l	0.008	07/21/93	0900	NH
Zinc as Zn (Total)	0.03	mg/l	0.008	07/21/93	0900	NH
NUTRIENTS:						
Ammonia Nitrogen as N	<0.05	mg/l	0.034	07/20/93	1330	BH
Nitrite as N	0.06	mg/l	0.005	07/08/93	1400	BH
Phosphorous Total	0.02	mg/l	0.002	07/15/93	1600	CC
Nitrate as N	1.54	mg/l	0.005	07/09/93	1115	BH

* Higher detection limit due to background interference.

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Project Name: SCA/DOGM 5-137.3-91

August 3, 1993

Laboratory No.: 142328
Sample Name: CRB/063093
Sample Date: 06/30/93
Collected by: CHUCK WEMPLE/GREG McDONALD
Time Sampled: 1405
Sample Type: WATER

PARAMETER	CATION ANION BALANCE	MEASURED VALUE	METHOD DETECTION LIMIT	DATE OF ANALYSIS	TIME OF ANALYSIS	ANALYST
ANIONS:						
Alkalinity Bicarbonate as HCO_3	6.46 meq/l	394 mg/l	1.02	07/13/93	1400	DD
Alkalinity Carbonate as CO_3	0 meq/l	0 mg/l	-	07/13/93	1400	DD
Alkalinity Total as $CaCO_3$	6.46 meq/l	323 mg/l	0.84	07/13/93	1400	DD
Chloride as Cl	3.70 meq/l	131 mg/l	1.41	07/08/93	1500	DD
Fluoride as F	0.04 meq/l	0.75 mg/l	0.03	07/23/93	1430	HB
Sulfate as SO_4	62.67 meq/l	3010 mg/l	1.83	07/28/93	1100	CC
Total Anions	72.87 meq/l					
CATIONS:						
Calcium as Ca	25.60 meq/l	513 mg/l	0.39	07/19/93	1200	NH
Hardness as $CaCO_3$	52.76 meq/l	2638 mg/l	2.25	07/19/93	1200	NH
Magnesium as Mg	27.16 meq/l	330 mg/l	0.31	07/19/93	1200	NH
Potassium as K	0.82 meq/l	32 mg/l	0.18	07/13/93	1630	NH
Sodium as Na	21.01 meq/l	483 mg/l	0.81	07/19/93	1200	NH
Total Cations	74.59 meq/l					
Difference	1.72 meq/l					
Allowable	2.53 meq/l					
INORGANICS:						
Oil & Grease		<1 mg/l	0.9	07/16/93	1600	DD
Settleable Solids		<0.1 ml/l	-	07/03/93	0900	DD
Sulfide as S		<1 mg/l	0.61	07/07/93	1530	DD
Total Dissolved Solids		4610 mg/l	11.7	07/06/93	1730	CC
Total Suspended Solids		<2 mg/l	3.5	07/06/93	1630	CC
METALS:						
Aluminum as Al (Dissolved)		0.6 mg/l	0.023	07/21/93	1130	NH
Aluminum as Al (Total)		0.4 mg/l	0.023	07/21/93	1130	NH
Arsenic as As (Dissolved)		<0.002 mg/l	0.0014	07/08/93	1300	PB
Arsenic as As (Total)		<0.002 mg/l	0.0014	07/22/93	1400	AH

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Project Name: SCA/DOGM 5-137.3-91

Laboratory No.: 142328
Sample Name: CRB/063093
Sample Date: 06/30/93
Collected by: CHUCK WEMPLE/GREG McDONALD
Time Sampled: 1405
Sample Type: WATER

PARAMETER	MEASURED VALUE		METHOD DETECTION LIMIT	DATE OF ANALYSIS	TIME OF ANALYSIS	ANALYST
METALS (cont.):						
Barium as Ba (Dissolved)	<0.1	mg/l	0.031	07/21/93	0900	NH
Barium as Ba (Total)	<0.1	mg/l	0.031	07/21/93	0900	NH
Boron as B (Dissolved)	0.7	mg/l	0.045	07/21/93	0900	NH
Boron as B (Total)	0.8	mg/l	0.045	07/21/93	0900	NH
Cadmium as Cd (Dissolved)	<0.003	mg/l	0.0002	07/20/93	1300	AH
Cadmium as Cd (Total)	<0.003	mg/l	0.0002	07/23/93	1300	AH
Chromium as Cr (Total)	*<0.05	mg/l	0.009	07/21/93	0900	NH
Chromium as Cr (Dissolved)	*<0.05	mg/l	0.009	07/21/93	0900	NH
Copper as Cu (Dissolved)	<0.02	mg/l	0.005	07/21/93	0900	NH
Copper as Cu (Total)	<0.02	mg/l	0.005	07/21/93	0900	NH
Iron as Fe (Dissolved)	*<0.12	mg/l	0.008	07/21/93	0900	NH
Iron as Fe (Total)	*<0.12	mg/l	0.008	07/21/93	0900	NH
Lead as Pb (Dissolved)	<0.01	mg/l	0.0012	07/13/93	1330	NH
Lead as Pb (Total)	<0.01	mg/l	0.0012	07/27/93	1000	NH
Manganese as Mn (Dissolved)	<0.02	mg/l	0.003	07/21/93	0900	NH
Manganese as Mn (Total)	<0.02	mg/l	0.003	07/21/93	0900	NH
Mercury as Hg (Dissolved)	<0.0005	mg/l	0.0002	07/19/93	0940	AH
Mercury as Hg (Total)	<0.0005	mg/l	0.0002	07/19/93	0940	AH
Molybdenum as Mo (Dissolved)	*<0.10	mg/l	0.023	07/21/93	0900	NH
Molybdenum as Mo (Total)	*<0.10	mg/l	0.023	07/21/93	0900	NH
Nickel as Ni (Dissolved)	*<0.10	mg/l	0.011	07/21/93	0900	NH
Nickel as Ni (Total)	*<0.10	mg/l	0.011	07/21/93	0900	NH
Selenium as Se (Dissolved)	<0.002	mg/l	0.0011	07/12/93	1540	AH
Selenium as Se (Total)	0.008	mg/l	0.0011	07/16/93	1320	AH
Zinc as Zn (Dissolved)	0.10	mg/l	0.008	07/21/93	0900	NH
Zinc as Zn (Total)	0.06	mg/l	0.008	07/21/93	0900	NH
NUTRIENTS:						
Ammonia Nitrogen as N	0.11	mg/l	0.034	07/20/93	1330	BH
Nitrite as N	<0.05	mg/l	0.005	07/08/93	1400	BH
Phosphorous Total	<0.02	mg/l	0.002	07/15/93	1600	CC
Nitrate as N	1.34	mg/l	0.005	07/09/93	1115	BH

* Higher detection limit due to background interference.

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Project Name: SCA/DOGM 5-137.3-91

August 3, 1993

Laboratory No.: 142329
Sample Name: CRS/063093
Sample Date: 06/30/93
Collected by: CHUCK WEMPLE/GREG McDONALD
Time Sampled: 1335
Sample Type: WATER

PARAMETER	CATION ANION BALANCE	MEASURED VALUE	METHOD DETECTION LIMIT	DATE OF ANALYSIS	TIME OF ANALYSIS	ANALYST
ANIONS:						
Alkalinity Bicarbonate as HCO_3	9.06 meq/l	553 mg/l	1.02	07/13/93	1400	DD
Alkalinity Carbonate as CO_3	0 meq/l	0 mg/l	-	07/13/93	1400	DD
Alkalinity Total as $CaCO_3$	9.06 meq/l	453 mg/l	0.84	07/13/93	1400	DD
Chloride as Cl	2.74 meq/l	97 mg/l	1.41	07/08/93	1500	DD
Fluoride as F	0.07 meq/l	1.31 mg/l	0.03	07/23/93	1430	HB
Sulfate as SO_4	70.37 meq/l	3380 mg/l	1.83	07/28/93	1100	CC
Total Anions	82.24 meq/l					
CATIONS:						
Calcium as Ca	28.44 meq/l	570 mg/l	0.39	07/27/93	1100	NH
Hardness as $CaCO_3$	58.89 meq/l	2945 mg/l	2.25	07/27/93	1100	NH
Magnesium as Mg	30.45 meq/l	370 mg/l	0.31	07/27/93	1100	NH
Potassium as K	1.25 meq/l	49 mg/l	0.18	07/13/93	1630	NH
Sodium as Na	23.92 meq/l	550 mg/l	0.81	07/19/93	1200	NH
Total Cations	84.06 meq/l					
Difference	1.82 meq/l					
Allowable	2.82 meq/l					
INORGANICS:						
Oil & Grease		<1 mg/l	0.9	07/16/93	1600	DD
Settleable Solids		0.2 ml/l	-	07/03/93	0900	DD
Sulfide as S		<1 mg/l	0.61	07/07/93	1530	DD
Total Dissolved Solids		5210 mg/l	11.7	07/06/93	1730	CC
Total Suspended Solids		15 mg/l	3.5	07/06/93	1630	CC
METALS:						
Aluminum as Al (Dissolved)		0.6 mg/l	0.023	07/21/93	1130	NH
Aluminum as Al (Total)		0.4 mg/l	0.023	07/21/93	1130	NH
Arsenic as As (Dissolved)		<0.002 mg/l	0.0014	07/08/93	1300	PB
Arsenic as As (Total)		0.002 mg/l	0.0014	07/22/93	1400	AH

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Project Name: SCA/DOGM 5-137.3-91

Laboratory No.: 142329
Sample Name: CRS/063093
Sample Date: 06/30/93
Collected by: CHUCK WEMPLE/GREG McDONALD
Time Sampled: 1335
Sample Type: WATER

PARAMETER	MEASURED VALUE		METHOD DETECTION LIMIT	DATE OF ANALYSIS	TIME OF ANALYSIS	ANALYST
METALS (cont.):						
Barium as Ba (Dissolved)	<0.1	mg/l	0.031	07/21/93	0900	NH
Barium as Ba (Total)	<0.1	mg/l	0.031	07/21/93	0900	NH
Boron as B (Dissolved)	1.0	mg/l	0.045	07/21/93	0900	NH
Boron as B (Total)	1.0	mg/l	0.045	07/21/93	0900	NH
Cadmium as Cd (Dissolved)	<0.003	mg/l	0.0002	07/20/93	1300	AH
Cadmium as Cd (Total)	<0.003	mg/l	0.0002	07/23/93	1300	AH
Chromium as Cr (Total)	*<0.05	mg/l	0.009	07/21/93	0900	NH
Chromium as Cr (Dissolved)	*<0.05	mg/l	0.009	07/21/93	0900	NH
Copper as Cu (Dissolved)	<0.02	mg/l	0.005	07/21/93	0900	NH
Copper as Cu (Total)	<0.02	mg/l	0.005	07/21/93	0900	NH
Iron as Fe (Dissolved)	*<0.12	mg/l	0.008	07/21/93	0900	NH
Iron as Fe (Total)	8.90	mg/l	0.008	07/21/93	0900	NH
Lead as Pb (Dissolved)	<0.01	mg/l	0.0012	07/13/93	1330	NH
Lead as Pb (Total)	<0.01	mg/l	0.0012	07/27/93	1000	NH
Manganese as Mn (Dissolved)	1.75	mg/l	0.003	07/21/93	0900	NH
Manganese as Mn (Total)	1.50	mg/l	0.003	07/21/93	0900	NH
Mercury as Hg (Dissolved)	<0.0005	mg/l	0.0002	07/19/93	0940	AH
Mercury as Hg (Total)	<0.0005	mg/l	0.0002	07/19/93	0940	AH
Molybdenum as Mo (Dissolved)	*<0.10	mg/l	0.023	07/21/93	0900	NH
Molybdenum as Mo (Total)	*<0.10	mg/l	0.023	07/21/93	0900	NH
Nickel as Ni (Dissolved)	*<0.10	mg/l	0.011	07/21/93	0900	NH
Nickel as Ni (Total)	*<0.10	mg/l	0.011	07/21/93	0900	NH
Selenium as Se (Dissolved)	<0.002	mg/l	0.0011	07/12/93	1540	AH
Selenium as Se (Total)	<0.002	mg/l	0.0011	07/16/93	1320	AH
Zinc as Zn (Dissolved)	0.08	mg/l	0.008	07/21/93	0900	NH
Zinc as Zn (Total)	0.04	mg/l	0.008	07/21/93	0900	NH
NUTRIENTS:						
Ammonia Nitrogen as N	1.86	mg/l	0.034	07/20/93	1330	BH
Nitrite as N	<0.05	mg/l	0.005	07/08/93	1400	BH
Phosphorous Total	0.23	mg/l	0.002	07/15/93	1600	CC
Nitrate as N	0.38	mg/l	0.005	07/09/93	1115	BH

* Higher detection limit due to background interference.

CHAIN OF CUSTODY RECORD

Huntingdon
Consulting Engineers Environmental Scientists

SCA/DOGM
Project or Site Name

5-737.3-91
Project Number

Chuck Wample/Greg McDonald
Sampler Name (Printed)

☒ Chen-Northern, Inc., Division
☐ Thomas-Hartig & Associates, Inc., Division
☐ Schaefer Dixon Associates, Inc., Division
☐ Herzog Associates, Inc., Division

CW/GM
Contact or Report to

SLC, UT
Contact Address or Location

Sampler Signature

DATE COLLECTED	TIME COLLECTED	SAMPLE LOCATION OR DESCRIPTION	COMP OR GRAB	SAMPLE MATRIX	NO. OF CONTAINERS	624/8.1	5+10 Lit	Total Metals	Dissolved Metals	TSS	Settleable Solids	Common Ions	NOTES	LAB NUMBER
6/30/93	1145	DS-WELL/063093	Grab	Water	8	X	X	X	X	X	X	X		142325
6/30/93	1335	ICE/063093	Grab	Water	8	X	X	X	X	X	X	X		142326
6/30/93	1525	F-2/063093	Grab	Water	8	X	X	X	X	X	X	X		142327
6/30/93	1405	CRB/063093	Grab	Water	8	X	X	X	X	X	X	X		142328
6/30/93	1335	CRS/063093	Grab	Water	8	X	X	X	X	X	X	X		142329

Relinquished by: — Date 7/3/93 Time 1600 Received by: D. Willy 7/3/93

Relinquished by: — Date — Time — Received by:

Relinquished by: — Date — Time — Received by:

Relinquished by: — Date — Time — Received by:

Remarks: Attn: David Council
See attached list for complete parameter listing.

Page 1 of 2

Huntingdon
Chen-Northern, Inc.
600 SOUTH 25TH STREET
P.O. BOX 30615
BILLINGS, MT 59107
(406) 248-9161
FAX (406) 248-9282

TECHNICAL REPORT

REPORT TO: ATTN: CHUCK WEMPLE
CHEN-NORTHERN, INC.
1127 WEST 2320 SOUTH, SUITE B
SALT LAKE CITY UT 84119

DATE: December 9, 1993
JOB NUMBER: 87-927
SHEET: 1 of 11
INVOICE NO.: 003917

REPORT OF: Water Analysis - SCA-DOGM 5-137.3-91

SAMPLE IDENTIFICATION:

On November 1, 1993, these water samples (our laboratory numbers 146281 through 146287) were received in our laboratory for analysis. Tests were conducted in accordance with the U.S. Environmental Protection Agency Manual EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes."

The results of the analysis are shown on the following pages.

A < sign indicates the value reported was the practical quantitation limit for this sample using the method described. Concentrations of analyte, if present, below this were not quantifiable.

Reviewed by David Connell

rmr

Client Name: **CHEN-NORTHERN, INC. SALT LAKE CITY, UT**
Project No.: 87-927
Laboratory No.: 146281
Sample Name: CRS-102693
Sample Date: 10/26/93
Collected by: G. HOWELL
Time Sampled: 1320
Sample Type: WATER

PARAMETER	MEASURED VALUE	METHOD DETECTION LIMIT	TIME OF ANALYSIS	DATE OF ANALYSIS	ANALYST
***ANIONS**					
Alkalinity Bicarbonate as HCO3	548 mg/l	1.02	0900	11/09/93	BH
Alkalinity Carbonate as CO3	0 mg/l	-	0900	11/09/93	BH
Alkalinity Total as CaCO3	449 mg/l	0.84	0900	11/09/93	BH
Chloride as Cl	96 mg/l	0.24	1300	11/09/93	BH
Sulfate as SO4	2930 mg/l	2.29	1345	11/10/93	CC
***CATIONS**					
Calcium as Ca	558 mg/l	0.39	1130	11/15/93	NH
Hardness as CaCO3	2800 mg/l	-	1130	11/15/93	NH
Magnesium as Mg	342 mg/l	0.31	1130	11/15/93	NH
Sodium as Na	543 mg/l	0.81	1130	11/15/93	NH
INORGANICS					
Electrical Conductivity	5310 umhos/cm	5.1	1500	11/12/93	BH
Oil & Grease	<1 mg/l	1	1130	11/05/93	CC
Settleable Solids	<0.2 ml/l	0.2	1510	11/01/93	CC
Sulfide as S	<1 mg/l	0.61	1500	11/02/93	DD
Total Dissolved Solids	5200 mg/l	11.7	1605	11/02/93	CC
Total Suspended Solids	41 mg/l	3.5	1525	11/02/93	CC
METALS					
Aluminum as Al (Dissolved	0.5 mg/l	0.023	1100	11/17/93	NH
Arsenic as As (Dissolved)	<0.002 mg/l	0.0014	1300	11/08/93	AH
Boron as B (Dissolved)	1.1 mg/l	0.045	1100	11/17/93	NH
Cadmium as Cd (Dissolved)	<0.001 mg/l	0.0002	1130	11/30/93	AH
Copper as Cu (Dissolved)	<0.02 mg/l	0.005	1100	11/17/93	NH
Iron as Fe (Dissolved)	6.30 mg/l	0.008	1100	11/17/93	NH
Iron as Fe (Total)	47 mg/l	0.008	1330	12/01/93	BH
Lead as Pb (Dissolved)	<0.002 mg/l	0.0012	1400	11/22/93	NH
Manganese as Mn (Dissolved)	1.35 mg/l	0.003	1100	11/17/93	NH

* The cation-anion analysis does not meet our quality assurance requirements. However, the values reported herein were verified by duplicate analysis. This indicates there are other unmeasured cations or anions present in the sample.

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Laboratory No.: 146281
Sample Name: CRS-102693
Sample Date: 10/26/93
Collected by: G. HOWELL
Time Sampled: 1320
Sample Type: WATER

PARAMETER	MEASURED VALUE		METHOD DETECTION LIMIT	TIME OF ANALYSIS	DATE OF ANALYSIS	ANALYST
METALS (cont)						
Manganese as Mn (Total)	2.2	mg/l	0.003	1330	12/01/93	BH
Molybdenum as Mn (Total)	<0.05	mg/l	0.023	1100	11/17/93	NH
Selenium as Se (Dissolved	<0.002	mg/l	0.0011	1400	11/10/93	AH
Zinc as Zn (Dissolved)	0.33	mg/l	0.008	1100	11/17/93	NH
NUTRIENTS						
Ammonia Nitrogen as N	1.73	mg/l	0.034	1130	11/12/30	DD
Nitrite as N	<0.05	mg/l	0.005	1130	11/02/93	DD
Phosphorous Total	0.68	mg/l	<0.002	1330	11/18/93	CC
Nitrate as N	0.33	mg/l	0.005	1130	11/03/93	DD

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Laboratory No.: 146282
Sample Name: CRB-102693
Sample Date: 10/26/93
Collected by: G. HOWELL
Time Sampled: 1400
Sample Type: WATER

PARAMETER	MEASURED VALUE	METHOD DETECTION LIMIT	TIME OF ANALYSIS	DATE OF ANALYSIS	ANALYST
ANIONS**					
Alkalinity Bicarbonate as HCO3	384 mg/l	1.02	0900	11/09/93	BH
Alkalinity Carbonate as CO3	0 mg/l	-	0900	11/09/93	BH
Alkalinity Total as CaCO3	315 mg/l	0.84	0900	11/09/93	BH
Chloride as Cl	116 mg/l	0.24	1300	11/09/93	BH
Sulfate as SO4	2710 mg/l	2.29	1345	11/10/93	CC
CATIONS**					
Calcium as Ca	550 mg/l	0.39	1130	11/15/93	NH
Hardness as CaCO3	2810 mg/l	-	1130	11/15/93	NH
Magnesium as Mg	350 mg/l	0.31	1130	11/15/93	NH
Sodium as Na	555 mg/l	0.81	1130	11/15/93	NH
INORGANICS					
Electrical Conductivity	4860 umhos/cm	5.1	1500	11/12/93	BH
Oil & Grease	1 mg/l	1	1130	11/05/93	CC
Settleable Solids	<0.2 ml/l	0.2	1615	11/01/93	CC
Sulfide as S	1 mg/l	0.61	1500	11/02/93	DD
Total Dissolved Solids	4700 mg/l	11.7	1605	11/02/93	CC
Total Suspended Solids	<5 mg/l	3.5	1525	11/02/93	CC
METALS					
Aluminum as Al (Dissolved	0.5 mg/l	0.023	1100	11/17/93	NH
Arsenic as As (Dissolved)	<0.002 mg/l	0.0014	1300	11/08/93	AH
Boron as B (Dissolved)	1.0 mg/l	0.045	1100	11/17/93	NH
Cadmium as Cd (Dissolved)	<0.001 mg/l	0.0002	1130	11/30/93	AH
Copper as Cu (Dissolved)	<0.02 mg/l	0.005	1100	11/17/93	NH

** The cation-anion analysis does not meet our quality assurance requirements. However, the values reported herein were verified by duplicate analysis. This indicates there are other unmeasured cations or anions present in the sample.

Client Name: **CHEN-NORTHERN, INC. SALT LAKE CITY, UT**
Project No.: 87-927
Laboratory No.: 146282
Sample Name: CRB-102693
Sample Date: 10/26/93
Collected by: G. HOWELL
Time Sampled: 1400
Sample Type: WATER

PARAMETER	MEASURED VALUE		METHOD DETECTION LIMIT	TIME OF ANALYSIS	DATE OF ANALYSIS	ANALYST
Iron as Fe (Dissolved)	*19.2	mg/l	0.008	1100	11/17/93	NH
Iron as Fe (Total)	*<0.05	mg/l	0.008	1330	12/01/93	BH
Lead as Pb (Dissolved)	<0.002	mg/l	0.0012	1400	11/22/93	NH
Manganese as Mn (Dissolved)	*1.35	mg/l	0.003	1100	11/17/93	NH
Manganese as Mn (Total)	*<0.02	mg/l	0.003	1330	12/01/93	BH
Molybdenum as Mn (Total)	<0.05	mg/l	0.023	1100	11/17/93	NH
Selenium as Se (Dissolved	<0.002	mg/l	0.0011	1400	11/10/93	AH
Zinc as Zn (Dissolved)	0.35	mg/l	0.008	1100	11/17/93	NH
NUTRIENTS						
Ammonia Nitrogen as N	<0.05	mg/l	0.034	1130	11/12/30	DD
Nitrite as N	<0.05	mg/l	0.005	1130	11/02/93	DD
Phosphorous Total	0.05	mg/l	<0.002	1330	11/18/93	CC
Nitrate as N	1.07	mg/l	0.005	1130	11/03/93	DD

* Samples were reanalyzed and results verified on December 8. These appear to be different samples.

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Laboratory No.: 146283
Sample Name: F-Z/102793
Sample Date: 10/27/93
Collected by: G. HOWELL
Time Sampled: 0730
Sample Type: WATER

PARAMETER	MEASURED VALUE	METHOD DETECTION LIMIT	TIME OF ANALYSIS	DATE OF ANALYSIS	ANALYST
ANIONS					
Alkalinity Bicarbonate as HCO3	622 mg/l	1.02	0900	11/09/93	BH
Alkalinity Carbonate as CO3	0 mg/l	-	0900	11/09/93	BH
Alkalinity Total as CaCO3	510 mg/l	0.84	0900	11/09/93	BH
Chloride as Cl	59 mg/l	0.24	1300	11/09/93	BH
Sulfate as SO4	700 mg/l	2.29	1145	11/09/93	CC
CATIONS					
Calcium as Ca	102 mg/l	0.39	1000	11/05/93	NH
Hardness as CaCO3	650 mg/l	-	1000	11/05/93	NH
Magnesium as Mg	96 mg/l	0.31	1000	11/05/93	NH
Sodium as Na	300 mg/l	0.81	1000	11/05/93	NH
INORGANICS					
Electrical Conductivity	2240 umhos/cm	5.1	1500	11/12/93	BH
Oil & Grease	3 mg/l	1	1130	11/05/93	CC
Settleable Solids	<0.2 ml/l	0.2	1615	11/01/93	CC
Sulfide as S	<1 mg/l	0.61	1500	11/02/93	DD
Total Dissolved Solids	1500 mg/l	11.7	1605	11/02/93	CC
Total Suspended Solids	9 mg/l	3.5	1525	11/02/93	CC
METALS					
Aluminum as Al (Dissolved	0.2 mg/l	0.023	1100	11/17/93	NH
Arsenic as As (Dissolved)	<0.002 mg/l	0.0014	1300	11/08/93	AH
Boron as B (Dissolved)	0.3 mg/l	0.045	1100	11/17/93	NH
Cadmium as Cd (Dissolved)	<0.001 mg/l	0.0002	1130	11/30/93	AH
Copper as Cu (Dissolved)	<0.02 mg/l	0.005	1100	11/17/93	NH
Iron as Fe (Dissolved)	<0.05 mg/l	0.008	1100	11/17/93	NH
Iron as Fe (Total)	0.41 mg/l	0.008	1330	12/01/93	BH
Lead as Pb (Dissolved)	<0.002 mg/l	0.0012	1400	11/22/93	NH
Manganese as Mn (Dissolved)	0.04 mg/l	0.003	1100	11/17/93	NH
Manganese as Mn (Total)	0.06 mg/l	0.003	1330	12/01/93	BH
Molybdenum as Mn (Total)	<0.05 mg/l	0.023	1100	11/17/93	NH
Selenium as Se (Dissolved	<0.002 mg/l	0.0011	1400	11/10/93	AH
Zinc as Zn (Dissolved)	1.02 mg/l	0.008	1100	11/17/93	NH
NUTRIENTS					
Ammonia Nitrogen as N	0.11 mg/l	0.034	1130	11/12/30	DD
Nitrite as N	<0.05 mg/l	0.005	1130	11/02/93	DD
Phosphorous Total	0.06 mg/l	<0.002	1330	11/18/93	CC
Nitrate as N	0.88 mg/l	0.005	1130	11/03/93	DD

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Laboratory No.: 146284
Sample Name: ICE-1/102693
Sample Date: 10/27/93
Collected by: G. HOWELL
Time Sampled: 0830
Sample Type: WATER

PARAMETER	MEASURED VALUE	METHOD DETECTION LIMIT	TIME OF ANALYSIS	DATE OF ANALYSIS	ANALYST
ANIONS					
Alkalinity Bicarbonate as HCO3	593 mg/l	1.02	0900	11/09/93	BH
Alkalinity Carbonate as CO3	0 mg/l	-	0900	11/09/93	BH
Alkalinity Total as CaCO3	486 mg/l	0.84	0900	11/09/93	BH
Chloride as Cl	65 mg/l	0.24	1300	11/09/93	BH
Sulfate as SO4	777 mg/l	2.29	1145	11/09/93	CC
CATIONS					
Calcium as Ca	90 mg/l	0.39	1130	11/15/93	NH
Hardness as CaCO3	660 mg/l	-	1130	11/15/93	NH
Magnesium as Mg	105 mg/l	0.31	1000	11/05/93	NH
Sodium as Na	340 mg/l	0.81	1130	11/15/93	NH
INORGANICS					
Electrical Conductivity	2410 umhos/cm	5.1	1500	11/12/93	BH
Oil & Grease	<1 mg/l	1	1130	11/05/93	CC
Settleable Solids	<0.2 ml/l	0.2	0945	11/02/93	CC
Sulfide as S	<1 mg/l	0.61	1500	11/02/93	DD
Total Dissolved Solids	1600 mg/l	11.7	1605	11/02/93	CC
Total Suspended Solids	<2 mg/l	3.5	1525	11/02/93	CC
METALS					
Aluminum as Al (Dissolved	0.1 mg/l	0.023	1100	11/17/93	NH
Arsenic as As (Dissolved)	<0.002 mg/l	0.0014	1300	11/08/93	AH
Boron as B (Dissolved)	0.3 mg/l	0.045	1100	11/17/93	NH
Cadmium as Cd (Dissolved)	<0.001 mg/l	0.0002	1130	11/30/93	AH
Copper as Cu (Dissolved)	<0.02 mg/l	0.005	1100	11/17/93	NH
Iron as Fe (Dissolved)	<0.05 mg/l	0.008	1100	11/17/93	NH
Iron as Fe (Total)	<0.05 mg/l	0.008	1330	12/01/93	BH
Lead as Pb (Dissolved)	<0.002 mg/l	0.0012	1400	11/22/93	NH
Manganese as Mn (Dissolved)	<0.02 mg/l	0.003	1100	11/17/93	NH
Manganese as Mn (Total)	<0.02 mg/l	0.003	1330	12/01/93	BH
Molybdenum as Mn (Total)	<0.05 mg/l	0.023	1100	11/17/93	NH
Selenium as Se (Dissolved	<0.002 mg/l	0.0011	1400	11/10/93	AH
Zinc as Zn (Dissolved)	<0.02 mg/l	0.008	1100	11/17/93	NH
NUTRIENTS					
Ammonia Nitrogen as N	<0.05 mg/l	0.034	1130	11/12/30	DD
Nitrite as N	<0.05 mg/l	0.005	1130	11/02/93	DD
Phosphorous Total	0.05 mg/l	<0.002	1330	11/18/93	CC
Nitrate as N	0.77 mg/l	0.005	1130	11/03/93	DD

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Laboratory No.: 146285
Sample Name: WELL/102783
Sample Date: 10/27/93
Collected by: G. HOWELL
Time Sampled: 0915
Sample Type: WATER

PARAMETER	MEASURED VALUE	METHOD DETECTION LIMIT	TIME OF ANALYSIS	DATE OF ANALYSIS	ANALYST
ANIONS					
Alkalinity Bicarbonate as HCO3	599 mg/l	1.02	0900	11/09/93	BH
Alkalinity Carbonate as CO3	0 mg/l	-	0900	11/09/93	BH
Alkalinity Total as CaCO3	491 mg/l	0.84	0900	11/09/93	BH
Chloride as Cl	47 mg/l	0.24	1300	11/09/93	BH
Sulfate as SO4	604 mg/l	2.29	1145	11/09/93	CC
CATIONS					
Calcium as Ca	99 mg/l	0.39	1130	11/15/93	NH
Hardness as CaCO3	590 mg/l	-	1130	11/15/93	NH
Magnesium as Mg	84 mg/l	0.31	1000	11/05/93	NH
Sodium as Na	276 mg/l	0.81	1000	11/05/93	NH
INORGANICS					
Electrical Conductivity	2100 umhos/cm	5.1	1500	11/12/93	BH
Oil & Grease	<1 mg/l	1	1130	11/05/93	CC
Settleable Solids	<0.2 ml/l	0.2	1130	11/02/93	CC
Sulfide as S	<1 mg/l	0.61	1500	11/02/93	DD
Total Dissolved Solids	1400 mg/l	11.7	1605	11/02/93	CC
Total Suspended Solids	<2 mg/l	3.5	1525	11/02/93	CC
METALS					
Aluminum as Al (Dissolved	<0.1 mg/l	0.023	1100	11/17/93	NH
Arsenic as As (Dissolved)	<0.002 mg/l	0.0014	1300	11/08/93	AH
Boron as B (Dissolved)	0.3 mg/l	0.045	1100	11/17/93	NH
Cadmium as Cd (Dissolved)	<0.001 mg/l	0.0002	1130	11/30/93	AH
Copper as Cu (Dissolved)	<0.02 mg/l	0.005	1100	11/17/93	NH
Iron as Fe (Dissolved)	<0.05 mg/l	0.008	1100	11/17/93	NH
Iron as Fe (Total)	0.14 mg/l	0.008	1330	12/01/93	BH
Lead as Pb (Dissolved)	<0.002 mg/l	0.0012	1400	11/22/93	NH
Manganese as Mn (Dissolved)	<0.02 mg/l	0.003	1100	11/17/93	NH
Manganese as Mn (Total)	<0.02 mg/l	0.003	1330	12/01/93	BH
Molybdenum as Mn (Total)	<0.05 mg/l	0.023	1100	11/17/93	NH
Selenium as Se (Dissolved	<0.002 mg/l	0.0011	1400	11/10/93	AH
Zinc as Zn (Dissolved)	<0.02 mg/l	0.008	1100	11/17/93	NH
NUTRIENTS					
Ammonia Nitrogen as N	<0.05 mg/l	0.034	1130	11/12/30	DD
Nitrite as N	<0.05 mg/l	0.005	1130	11/02/93	DD
Phosphorous Total	0.05 mg/l	<0.002	1330	11/18/93	CC
Nitrate as N	1.21 mg/l	0.005	1130	11/03/93	DD

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Laboratory No.: 146286
Sample Name: DUPLICATE 146281 CRS/102693
Sample Date: 10/26/93
Collected by: G. HOWELL
Time Sampled: 1320
Sample Type: WATER

PARAMETER	MEASURED VALUE	METHOD DETECTION LIMIT	TIME OF ANALYSIS	DATE OF ANALYSIS	ANALYST
ANIONS*					
Alkalinity Bicarbonate as HCO3	542 mg/l	1.02	0900	11/09/93	BH
Alkalinity Carbonate as CO3	0 mg/l	-	0900	11/09/93	BH
Alkalinity Total as CaCO3	444 mg/l	0.84	0900	11/09/93	BH
Chloride as Cl	97 mg/l	0.24	1300	11/09/93	BH
Sulfate as SO4	2860 mg/l	2.29	1345	11/10/93	CC
CATIONS*					
Calcium as Ca	549 mg/l	0.39	1130	11/15/93	NH
Hardness as CaCO3	2780 mg/l	-	1130	11/15/93	NH
Magnesium as Mg	342 mg/l	0.31	1130	11/15/93	NH
Sodium as Na	552 mg/l	0.81	1130	11/15/93	NH
INORGANICS					
Electrical Conductivity	5370 umhos/cm	5.1	1500	11/12/93	BH
Settleable Solids	<0.2 ml/l	0.2	1510	11/01/93	CC
Sulfide as S	<1 mg/l	0.61	1500	11/02/93	DD
Total Dissolved Solids	5100 mg/l	11.7	1605	11/02/93	CC
Total Suspended Solids	42 mg/l	3.5	1525	11/02/93	CC
METALS					
Aluminum as Al (Dissolved	0.4 mg/l	0.023	1100	11/17/93	NH
Arsenic as As (Dissolved)	<0.002 mg/l	0.0014	1300	11/08/93	AH
Boron as B (Dissolved)	1.0 mg/l	0.045	1100	11/17/93	NH
Cadmium as Cd (Dissolved)	<0.001 mg/l	0.0002	1130	11/30/93	AH
Copper as Cu (Dissolved)	<0.02 mg/l	0.005	1100	11/17/93	NH
Iron as Fe (Dissolved)	6.35 mg/l	0.008	1100	11/17/93	NH
Iron as Fe (Total)	50 mg/l	0.008	1330	12/01/93	BH
Lead as Pb (Dissolved)	<0.002 mg/l	0.0012	1400	11/22/93	NH
Manganese as Mn (Dissolved)	1.30 mg/l	0.003	1100	11/17/93	NH
Manganese as Mn (Total)	2.3 mg/l	0.003	1330	12/01/93	BH

* The cation-anion analysis does not meet our quality assurance requirements. However, the values reported herein were verified by duplicate analysis. This indicates there are other unmeasured cations or anions present in the sample.

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT

Project No.: 87-927
Laboratory No.: 146286
Sample Name: DUPLICATE 146281 CRS/102693
Sample Date: 10/26/93
Collected by: G. HOWELL
Time Sampled: 1320
Sample Type: WATER

PARAMETER	MEASURED VALUE		METHOD DETECTION LIMIT	TIME OF ANALYSIS	DATE OF ANALYSIS	ANALYST
Molybdenum as Mn (Total)	<0.05	mg/l	0.023	1100	11/17/93	NH
Selenium as Se (Dissolved	<0.002	mg/l	0.0011	1400	11/10/93	AH
Zinc as Zn (Dissolved)	0.34	mg/l	0.008	1100	11/17/93	NH
NUTRIENTS						
Ammonia Nitrogen as N	1.73	mg/l	0.034	1130	11/12/30	DD
Nitrite as N	<0.05	mg/l	0.005	1130	11/02/93	DD
Phosphorous Total	0.85	mg/l	<0.002	1330	11/18/93	CC
Nitrate as N	0.34	mg/l	0.005	1130	11/03/93	DD

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Laboratory No.: 146287
Sample Name: SPIKE 146284 ICE-1/102793
Sample Date: 10/26/93
Collected by: G. HOWELL
Time Sampled: 1320
Sample Type: WATER

PARAMETER	MEASURED VALUE		TIME OF ANALYSIS	DATE OF ANALYSIS	ANALYST
ANIONS					
Alkalinity Total as CaCO3	98	%	0900	11/09/93	BH
Chloride as Cl	95	%	1300	11/09/93	BH
Sulfate as SO4	97	%	1145	11/09/93	CC
CATIONS					
Calcium as Ca	100	%	1130	11/15/93	NH
Magnesium as Mg	102	%	1130	11/15/93	NH
Sodium as Na	100	%	1130	11/15/93	NH
INORGANICS					
Sulfide as S	110	%	1500	11/02/93	DD
METALS					
Aluminum as Al (Dissolved	94	%	1100	11/17/93	NH
Arsenic as As (Dissolved)	93	%	1300	11/08/93	AH
Boron as B (Dissolved)	104	%	1100	11/17/93	NH
Cadmium as Cd (Dissolved)	105	%	1130	11/30/93	AH
Copper as Cu (Dissolved)	100	%	1100	11/17/93	NH
Iron as Fe (Dissolved)	104	%	1100	11/17/93	NH
Iron as Fe (Total)	100	%	1330	12/01/93	BH
Lead as Pb (Dissolved)	90	%	1400	11/22/93	NH
Manganese as Mn (Dissolved)	100	%	1100	11/17/93	NH
Manganese as Mn (Total)	90	%	1330	12/01/93	BH
Molybdenum as Mn (Total)	100	%	1100	11/17/93	NH
Selenium as Se (Dissolved	100	%	1400	11/10/93	AH
Zinc as Zn (Dissolved)	100	%	1100	11/17/93	NH
NUTRIENTS					
Ammonia Nitrogen as N	106	%	1130	11/12/30	DD
Nitrite as N	103	%	1130	11/02/93	DD
Phosphorous Total	96	%	1330	11/18/93	CC
Nitrate as N	102	%	1130	11/03/93	DD

Project or Site Name: S-137.3-91 DOGM

Project Number

M. Howell

Sampler Name (Printed)

Huntingdon

Consulting Engineers & Environmental Scientists

- [x] Chen-Northern, Inc., Division
- [ ] Thomas-Hartig & Associates, Inc., Division
- [ ] Schaefer Dixon Associates, Inc., Division
- [ ] Herzog Associates, Inc., Division

Contact or Report To: 1127 W. 2320 S. # B. SLC, UT. 84119

Contact Address or Location

Sampler Signature

DATE COLLECTED	TIME COLLECTED	SAMPLE LOCATION OR DESCRIPTION	COMP OR GRAB	SAMPLE MATRIX	NO. OF CONTAINERS	ANALYSIS REQUIRED: 413.1	Sulfide	Total Metals	Dissolved Metals	TSS	Settleable Solids	Gross Alpha	NOTES	LAB NUMBER
10-26-93	1320	CRS/102693	grab	H_2O	7 (Rec'd 6 only)	x	x	x	x	x	x	x	NH3-1, Nitr, TKN/OS, Metals Sulfide DIT	146281
10-26-93	1400	CRB/102693	grab	H_2O	7 (Rec'd 6 only)	x	x	x	x	x	x	x		82
10-27-93	0730	F-2/102793	grab	H_2O	7	x	x	x	x	x	x	x		83
10-27-93	0830	ICE-1/102793	grab	H_2O	7	x	x	x	x	x	x	x		84
10-27-93	0915	WELL/102793	grab	H_2O	7	x	x	x	x	x	x	x		85
													Dup 146281 CRS/102693 10/26 1320	86
													Sp 146284 ICE-1/102793 10/27 0830	87
													Sulfide + Nitrate preserved in lab - (may not hold)	

Relinquished by:	Date	Time	Received by:
Carrie Bell	11/1/93	1100	C.M. Kaio Bliss / A. Edwards
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by:

Remarks: ATTN: David Council 11/1/93 3:15 pm

SEE attached list for Complete parameter listing

Cooler temp 15.7°C

ATTACHMENT B

SUNNYSIDE COGENERATION ASSOCIATES FACILITY

Carbon County, Utah

Groundwater Discharge Permit Number UGW070002

Surface Water and Discharge Basin Compliance Sampling

HUNTINGDON Chen – Northern

MONITORING LOCATION NUMBER: 004 UPDES

Runoff Basin / Spring / Other:

Sampling Parameters:

Date	Time	Personnel	Weather	Discharge Present (yes/no)	Observations (color, sheen, odor, etc.)	Flow (cfs)	Flow Meas. Method	Basin Water Level (feet)	Field Parameters: Temp (°C)	pH	SC (umhos)	DO ~~Meter No.~~	Collection Point	Sample Taken (yes/no)
9/4/92	1715	CW/GM	Cold/rainy	yes	no sheen, foam, or debris	10 gpm	VE	–	12	6.75	2173	11.1	discharge ditch	yes
10/3/92	825	GM	Clear, cool	yes		~10	VE	–	9	8.19	2897	11.1	"	yes
11/5/92	1335	GM	Sunny/Snow	yes		~20	VE	–	4	8.33	2400	8.6		yes
12/3/92	1457	GM CW	Cold Clear	yes		~25	VE	–	1.5	–	2386	9.8		yes
"	1515	"	"	yes		"	"	–	2.0	–	2352	10.0	Near Res.	yes
* 1/28/93	1057	GM CW	Cold Clear	yes		~25	"		6		.1504		At Outfall	yes
2/14/93	1617	GM	Cold Clear	yes		~25	VE	–	4	8.21	2150		"	yes
3/22/93	928	GM CW	Cold Hazy	yes		~25	VE	–	2	8.45	1636	9.6	"	yes
														yes
2/8/93	1345	GM RP	Cold Snowing	yes		~25	VE	–	4	8.58	2282	10.4	"	yes
2/25/93	1115	GM CW	Cold PC	yes		~20	VE	–	4	7.90	2150	10.2	"	yes
3/2/93	1309	GM	Cool Sunny	yes		~30	VE	–	6	8.65	2695	11.2	"	yes
3/23/93	1053	CW	Sunny Warm	yes	reduced Flow	~15	VE	–	11	7.43	1920	–	"	yes
4/8/93	1510	GM CW	Clear Cold	yes		20	VE	–	6	7.32	1900	10.6	"	yes
4/29	1156	GM	Clear Warm	yes		20	VE	–	13	8.59	2150	10.8	"	yes
5/7/93	1100	GM	Warm Sunny	yes		~25	VE	–	10.5	8.69	2200	9.8	"	yes
5/21/93	1328	GM	Warm	yes		25	VE	–	17.5	8.81	1950	–	"	yes
6/15/93	1430	RG	Warm Windy	yes	Flow Reduced by ½	8	Flume	–	7	8.3	1400	7.5	"	yes

* Basin water level measurements are taken from permanent reference point at basin location.

Flow measurement methods: W = Weir, VE = Visual Estimate, CC = Calibrated Container, DF = Debris Flow Rate Estimate

* Taken downstream near reservoir: sample named 004-RES

SUNNYSIDE COGENERATION ASSOCIATES FACILITY

Carbon County, Utah

Groundwater Discharge Permit Number UGW070002

Surface Water and Discharge Basin Compliance Sampling

HUNTINGDON Chen – Northern

MONITORING LOCATION NUMBER: 004 (cont.) UPDES

Runoff Basin / Spring / Other:

Sampling Parameters:

Date	Time	Personnel	Weather	Discharge Present (yes/no)	Observations (color, sheen, odor, etc.)	Flow (cfs)	Flow Meas. Method	Basin Water Level (feet)	Field Parameters: Temp (F) C	pH	SC (umhos)	DO Meter No.	Collection Point	Sample Taken (yes/no)
6/29/93	0853	GM/MH	Sunny, Hot	NO	No Discharge Slurry water is by passing decanting process & into 3rd box									in.
7/12/93	1337	CW GM	SH	NO	Some water in Basin, lower than 0/ng									NO
7/27/93	1024	GM	S, H	NO	1'-2' of water in basin									"
8/12/93	1350	MH	S, H	NO										"
8/20	1400	MH	SW	NO	Dry									"
9/3/93	1125	CW, GM	S, Warm	NO	NO Discharge									"
9/30	1800	RG	S, Windy	Yes		49	Flume		12	8.09	2900		below flow	yes
10/13	1135	MH	cool/Windy	Yes	Black high TSS	97.4	"		10.4	8.28	1300			
10/26	1140	MH	Cool/Windy	Yes					7.9	8.44	1250	6.5		
11/16	1200	MH	Cold	yes	Much Fines (TSS)	97.35	Flume		4.2	8.9	1250	6.1	"	yes
11/30	1312	GM CW	Cold	yes	Black V. high TSS	107.6	Flume		4.9	8.78	1050	-	"	yes
12/9	1036	GM	Cold Overcast	yes	Black V. high TSS high flow	148.1	Flume		3.4	8.24	2023	7.4	"	yes
12/23	1040	GM	Cold Overcast	yes	Clear V. Low Flow	4.3	Flume		3.0	8.57	2676	—	"	yes
1/13/94	1345	GM	Clear Cold	~~NO~~	NO DISCHARGE	—	-	—						NO
1/27/94	1348	MH	Clear Cold	NO	NO Discharge	0	—	—	—	—	·	—	—	NO

* Basin water level measurements are taken from permanent reference point at basin location.

Flow measurement methods: W = Weir, VE = Visual Estimate, CC = Calibrated Container, DF = Debris Flow Rate Estimate

SUNNYSIDE COGENERATION ASSOCIATES FACILITY

Carbon County, Utah

Groundwater Discharge Permit Number UGW070002

Surface Water and Discharge Basin Compliance Sampling

HUNTINGDON Chen – Northern

MONITORING LOCATION NUMBER: 007 UPDES

Runoff Basin / Spring / Other:

Sampling Parameters:

Date	Time	Personnel	Weather	Discharge Present (yes/no)	Observations (color, sheen, odor, etc.)	Flow (cfs)	Flow Meas. Method	Basin Water Level (feet)	Field Parameters: Temp (°C)	pH	SC (umhos)	DO Meter No.	SC corrected ~~Collection Point~~	Sample Taken (yes/no)
11/5/92	1150	GM	Clear, Cool	yes	Murky, stormwater	<1	VE	≤2'	2	8.78	700	8.6	1230	
4/2/93	1621	GM	Warm Partly Cl.	NO	Basin is Dry									
5/4/93	1157	GM	" "	NO	Basin is Dry									
6/2/93	1434	GM/MH	Sunny Hot	NO	Basin is Dry									
7/12/93	1353	CW GM	S, H	NO	Basin is Dry									
7/27/93	1527	GM	S, H	NO	Basin is Dry									
8/12/93	1406	MH	S, H	NO	Basin is Dry									
8/20/93	1430	MH	S, W	NO	Basin is Dry									
9/2/93	1504	CW, GM	SW	NO	Basin is Dry									
9/30	1703	CW, RG	S, W	NO	Basin is Dry									
10/13	1040	MH	Cloudy	NO	Basin contains ~1-2" Water									
10/26	1251	MH	Windy	NO	6" of Water									
11/16	1345	MH	Cold	NO	1.5" of Snow in Basin									
11/30	1440	GM CW	Cold	NO	Damp seeds in Basin									
12/9	1142	GM	Cold	NO	Snow in Basin									
12/23	1153	GM	Cold	NO	2" Snow in basin									
1/14/94	1001	GM	Cold Clear	NO	Snow in Basin									
1/31/94	1500	MH	Cold Clear	No	Basin is Dry									

* Basin water level measurements are taken from permanent reference point at basin location.

Flow measurement methods: W = Weir, VE = Visual Estimate, CC = Calibrated Container, DF = Debris Flow Rate Estimate

SUNNYSIDE COGENERATION ASSOCIATES FACILITY

Carbon County, Utah

Groundwater Discharge Permit Number UGW070002

Surface Water and Discharge Basin Compliance Sampling

HUNTINGDON Chen – Northern

MONITORING LOCATION NUMBER: 008 Old Coarse Refuse Pond UPDES

Runoff Basin / Spring / Other:

Sampling Parameters:

Date	Time	Personnel	Weather	Discharge Present (yes/no)	Observations (color, sheen, odor, etc.)	Flow (cfs)	Flow Meas. Method	Basin Water Level (feet)	Field Parameters: Temp (F)	pH	SC (umhos)	Meter No.	Collection Point	Sample Taken (yes/no)
4/29	1636	GM	PC	NO	Basin is Dry									
5/7	1215	GM	PC Warm	NO	Basin is Dry									
6/29	1404	GM/MH	Sunny Hot	NO	Basin is Dry									
7/2/93	1400	CW GM	S H	NO	Basin is Dry									
7/27	1034	GM	S H	NO	Basin is Dry.									
8/12/93	1413	MH	S H	NO	Basin is Dry									
8/20	1410	MH	Warm	NO	Basin is Dry									
9/2/93	1346	CW, GM	Warm	NO	Basin is Dry Installed Mile Post									
9/30	1402	CWRG	Windy Warm	NO	Basin is Dry									
10/13	1120	MH	Warm	NO	6" of Water									
10/26	1100	MH	Windy	NO	Basin is Dry									
11/16	1145	MH	Cold	NO	1' of snow in Basin									
11/30	1520	GMCW	Cold	NO	"									
12/9	1133	GM	Cold	NO	Snow in Basin									
12/23	1123	GM	Cold	NO	2" of snow in Basin									
1/14/94	0940	GM	Cold Clear	NO	Snow in Basin									
1/3/94	1400	MH	Cold Clear	NO	Trace of Snow in Basin									

* Basin water level measurements are taken from permanent reference point at basin location.

Flow measurement methods: W = Weir, VE = Visual Estimate, CC = Calibrated Container, DF = Debris Flow Rate Estimate

SUNNYSIDE COGENERATION ASSOCIATES FACILITY

Carbon County, Utah

Groundwater Discharge Permit Number UGW070002

Surface Water and Discharge Basin Compliance Sampling

HUNTINGDON Chen – Northern

MONITORING LOCATION NUMBER: 009 Pasture Pond

UPDES

Runoff Basin / Spring / Other:

Sampling Parameters:

Date	Time	Personnel	Weather	Discharge Present (yes/no)	Observations (color, sheen, odor, etc.)	Flow (cfs)	Flow Meas. Method	Basin Water Level (feet)	Field Parameters Temp (F)	pH	SC (umhos)	Meter No.	Collection Point	Sample Taken (yes/no)
4/29	1606	GM	Cloudy	NO	Basin is Dry									
5/7	1120	GM	PC.	NO	Basin is Dry									
6/29	1358	GM MH	Sunny/Hot	NO	Basin is Dry; has been expanded/deepened.									
7/12/93	1340	GM CW	Silt	NO	Basin is Dry									
7/27/93	1020	GM	Silt	NO	Basin is Dry									
8/12/93	1355	GM	Silt	NO	Basin is Dry									
8/20	1357	MH	SW	NO	Basin has 6" of black water									
9/7	1305	CW GM	SW	NO	Basin is Dry Installed Post									
9/30	1355	CW RG	Warm	NO	Basin is Dry									
10/13	1110	MH	Warm	NO	2" Water level Black Film.									
10/26	1215	MH	Warm	NO	2' Water level									
11/16	1230	MH	Cold	NO	2" W Level Black water									
11/30	1307	GM CW	Cold	NO	Snowmelt & Ice present									
12/9	1117	GM	Cold	NO	No water / Ice in basin									
12/23	1105	GM	Cold	NO	6" of ice in basin									
1/14/94	0933	GM	Cold Clear	NO	Dry									
1/31/94	1410	MH	Clear/Cold	NO	Dry									

* Basin water level measurements are taken from permanent reference point at basin location.

Flow measurement methods: W = Weir, VE = Visual Estimate, CC = Calibrated Container, DF = Debris Flow Rate Estimate

SUNNYSIDE COGENERATION ASSOCIATES FACILITY

Carbon County, Utah

Groundwater Discharge Permit Number UGW070002

Surface Water and Discharge Basin Compliance Sampling

HUNTINGDON Chen – Northern

MONITORING LOCATION NUMBER: 012 Coarse Refuse Toe UPDES

Runoff Basin / Spring / Other:

Sampling Parameters:

Date	Time	Personnel	Weather	Discharge Present (yes/no)	Observations (color, sheen, odor, etc.)	Flow (cfs)	Flow Meas. Method	Basin Water Level (feet)	Field Parameters Temp (F)	pH	SC (umhos)	Meter No.	Collection Point	Sample Taken (yes/no)
4/29	1624	GM	PC	NO	Basin is Dry									
5/7	1159	GM	PC	NO	Basin is Dry									
6/29	1435	GM/MH	Sunny/Hot	NO	Basin is Dry									
7/12/93	1350	CW/GM	Sl H	NO	Basin is Dry									
7/27/93	1529	GM	Sl H	NO	Basin is Dry									
8/12/93	1404	MH	Sl H	NO	Basin is Dry									
8/20	1450	MH	Warm	NO	Basin is Dry									
9/2	1515	CW/GM	Warm	NO	Basin is Dry									
9/30	1709	CW RG	Warm	NO	Basin is Dry									
10/13	1035	MH	Warm	NO	2' water level									
10/26	1300	MH	Windy	NO	2' WL									
11/16	1350	MH	Cold	NO	2' WL No Ice Layer									
11/30	1443	GM CW	Cold	NO	Water/Ice 5 5" below discharge									
12/9	1140	GM	Cold	NO	ICE/water 2" in basin									
12/23	1156	GM	Cold	NO	2" of Snow in Basin									
1/14/94	1008	GM	Cold Clear	NO	6" of Ice									
1/31/94	1510	MH	Cold / Clear	NO	6" of Ice									

* Basin water level measurements are taken from permanent reference point at basin location.

Flow measurement methods: W = Weir, VE = Visual Estimate, CC = Calibrated Container, DF = Debris Flow Rate Estimate

SUNNYSIDE COGENERATION ASSOCIATES FACILITY

Carbon County, Utah

Groundwater Discharge Permit Number UGW070002

Surface Water and Discharge Basin Compliance Sampling

HUNTINGDON Chen – Northern

MONITORING LOCATION NUMBER: 013 Facility Sed Pond UPDES

Runoff Basin / Spring / Other:

Sampling Parameters:

Date	Time	Personnel	Weather	Discharge Present (yes/no)	Observations (color, sheen, odor, etc.)	Flow (cfs)	Flow Meas. Method	Basin Water Level (feet)	Field Parameters Temp (F)	pH	SC (umhos)	Meter No.	Collection Point	Sample Taken (yes/no)
4/29	1557	GM	PC	NO	Low Water level (~6' below overflow)									
5/7	1051	GM	PC	NO	" " " (6-8' " ")									
6/29	1351	GM/MH	Sunny Hot	NO	" " " "									
7/13/03	1320	GM/CW	Sit	NO	Lower WL than previously									
7/27	1016	GM	S,H	NO	Higher WL (3' below stand pipe)									
8/12/03	1334	MH	S,H	NO	Low WL									
8/20	1350	MH	SW	NO	2" clear Water									
9/2	1220	CW, GM	warm	NO	Some water (1') lasty Red Marker Post.									
9/30	1245	CW, RG	warm	NO	Water, Algae in pond.									
10/3	1100	MH	warm	NO	2.5-3' WL									
10/26	1230	MH	windy	NO	Water on Red stripe on stand pipe									
11/10	1245	MH	Cold	NO	WL on Red stripe Ice on surface									
11/20	1307	GM CW	Cold	NO	Snow melt + discharge.									
12/9	1110	GM	cold	NO	water/Ice 1' below ~~[illegible]~~ red stripe									
12/30	1059	GM	Cold	NO	Ice 1' below red stripe									
1/14/04	0424	GM	Cold Clear	NO	Ice 6" below Red stripe									
1/21/04	1435	MH	Cold + Clear	NO	1" WL 1" Ice Cap (3' below Red Stripe)									

* Basin water level measurements are taken from permanent reference point at basin location.

Flow measurement methods: W = Weir, VE = Visual Estimate, CC = Calibrated Container, DF = Debris Flow Rate Estimate

SUNNYSIDE COGENERATION ASSOCIATES FACILITY

Carbon County, Utah

Groundwater Discharge Permit Number UGW070002

Surface Water and Discharge Basin Compliance Sampling

HUNTINGDON Chen – Northern

MONITORING LOCATION NUMBER: 014 Coal Pile Sed. Pond UPDES

Runoff Basin / Spring / Other:

Sampling Parameters:

Date	Time	Personnel	Weather	Discharge Present (yes/no)	Observations (color, sheen, odor, etc.)	Flow (cfs)	Flow Meas. Method	Basin Water Level (feet)	Field Parameters Temp (F)	pH	SC (umhos)	Meter No.	Collection Point	Sample Taken (yes/no)
4/29	1602	GM	PC	NO	1' below top of overflow									
5/1	1053	GM	PC	NO	1' " " "									
6/29	1355	GM MH	Sunny Hot	NO	" " " "									
7/17/03	1330	GM CW	S, H	NO	Low water level.									
7/22/03	1018	GM	S, H	NO	Damp seds in Basin									
8/12/03	1342	GM	MH	NO	Dry Basin									
8/20	1355	MH	SH	NO	Basin is Dry									
9/2	1243	MH GM	W M	NO	Basin is Dry Installed Marker Post.									
9/30	1248	CW RG	Warm	NO	Basin is Dry Much Coal Fines in Basin									
10/13	1105	MH	W M	NO	1' from Discharge Black water Coal Fines.									
10/26	1225	MH	Windy	NO	" " "									
11/16	1240	MH	Cold	NO	1.5' from DP.									
11/30	1257	GM CW	Cold	NO	Ice/snowmelt at discharge point through stand pipe.									
12/9	1115	GM	Cold	NO	Ice 1' below overspill									
12/23	1102	GM	Cold	NO	Ice 1' below overspill									
1/14/04	0930	GM	Cold Clear	NO	Ice 1' below overspill									
1/3/04	1430	MH	Cold Clear	NO	No ice. film sheen present 2' below spill pipe									

* Basin water level measurements are taken from permanent reference point at basin location.

Flow measurement methods: W = Weir, VE = Visual Estimate, CC = Calibrated Container, DF = Debris Flow Rate Estimate

SUNNYSIDE COGENERATION ASSOCIATES FACILITY

Carbon County, Utah

Groundwater Discharge Permit Number UGW070002

Surface Water and Discharge Basin Compliance Sampling

HUNTINGDON Chen – Northern

MONITORING LOCATION NUMBER: 015 Landfill Sed. Pond UPDES

Runoff Basin / Spring / Other:

Sampling Parameters:

Date	Time	Personnel	Weather	Discharge Present (yes/no)	Observations (color, sheen, odor, etc.)	Flow (cfs)	Flow Meas. Method	Basin Water Level (feet)	Field Parameters: Temp (F)	pH	SC (umhos)	Meter No.	Collection Point	Sample Taken (yes/no)
4/29	1502	GM	Overcast	NO	Water in Basin ~10" below overflow Sample collected for GW permit at spillway									yes
5/7	1150	GM	PC	NO	1" " " 2" " Some Ash running into basin.									
6/29	1341	GM/MH	Sunny/Hot.	NO	Basin is Dry. Ash is Flowing into it.									
7/12/93	1417	CW GM	SH	NO	Basin is Dry									
7/27/93	1422	GM	SH	NO	Basin is Dry									
8/12/93	1422	MH	SH	NO	Basin is Dry									
8/20	1315	MH	SH	NO	Dry; Ash in Basin									
9/2	1740	CW, GM	SW	NO	Basin is Dry Installed Marker Post.									
9/30	1421	CW RG	W	NO	Basin is Dry Some ash in Basin									
10/13	2000	MH	W	NO	6" of water in East side									
10/26	1245	MH	Windy	NO	Basin is Dry									
11/16	1330	MH	Cold	NO	1" of snow									
11/30	1431	GM CW	Cold	NO	Ash seal present in basin									
12/9	1150	GM	Cold	NO	Water/Ice @ East End									
12/23	1150	GM	Cold	NO	Snow in basin, No discharge									
1/13/94	1430	GM	Cold Clear	NO	Basin is Dry Dump in place.									
1/31/94	1445	MH	Cold Clear	NO	Basin is Dry									

* Basin water level measurements are taken from permanent reference point at basin location.

Flow measurement methods: W = Weir, VE = Visual Estimate, CC = Calibrated Container, DF = Debris Flow Rate Estimate

SUNNYSIDE COGENERATION ASSOCIATES FACILITY

Carbon County, Utah

Groundwater Discharge Permit Number UGW070002

Surface Water and Discharge Basin Compliance Sampling

HUNTINGDON Chen – Northern

MONITORING LOCATION NUMBER: 016 Borrow Area Pond. UPDES

Runoff Basin / Spring / Other:

Sampling Parameters:

Date	Time	Personnel	Weather	Discharge Present (yes/no)	Observations (color, sheen, odor, etc.)	Flow (cfs)	Flow Meas. Method	Basin Water Level (feet)	Field Parameters Temp (F)	pH	SC (umhos)	Meter No.	Collection Point	Sample Taken (yes/no)
4/29	1608	GM	Overcast	NO	Basin is Dry									
5/7	1129	GM	PC	NO	Basin is Dry.									
6/29	1400	GM/MH	Sunny/Warm	NO	Basin is Dry.									
7/12/93	1356	GM CW	S H	NO	Basin is Dry									
7/27/93	1034	GM	S H	NO	Basin is Dry									
8/12/93	1410	MH	S H	NO	Basin is Dry									
8/20	1420	MH	S H	NO	Basin is Dry									
9/2	1317	CW GM	SW	NO	Basin is Dry									
9/30	1410	CW RG	W	NO	Basin is Dry									
10/13	1130	MH	W	NO	Basin is Dry									
10/26	1105	MH	windy	NO	Basin is Dry									
11/16	1145	MH	Cold	NO	1" of snow									
11/30	1528	GM CW	Cold	NO	"									
12/9	1130	GM	Cold	NO	Snow in basin									
12/13	1118	GM	Cold	NO	2" of snow in basin									
1/13/94	0936	GM	Cold Clear	NO	Snow in basin									
1/31/94	1355	MH	Cold Clear	NO	1" of Snow in Basin									

* Basin water level measurements are taken from permanent reference point at basin location.

Flow measurement methods: W = Weir, VE = Visual Estimate, CC = Calibrated Container, DF = Debris Flow Rate Estimate

Huntingdon
Chen-Northern, Inc.
600 SOUTH 25TH STREET
P.O. BOX 30615
BILLINGS, MT 59107
(406) 248-9161
FAX (406) 248-9282

TECHNICAL REPORT

REPORT TO: ATTN: MR. CHUCK WEMPLE
CHEN-NORTHERN, INC.
1127 WEST 2320 SOUTH, SUITE B
SALT LAKE CITY, UT 84119

DATE: July 1, 1993
JOB NUMBER: 87-927
SHEET: 1 of 2
INVOICE NO.: 23618

REPORT OF: Water Analysis - Sunnyside Cogen. Facility - 5-137.1-91

SAMPLE IDENTIFICATION:

On June 17, 1993, this water sample (laboratory number 141864) was delivered to our laboratory for analysis. Tests were conducted in accordance with the U.S. Environmental Protection Agency Manual EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".

The test results are shown on the following page.

Reviewed by David Cornill

rmr

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF OUR CLIENTS AND AUTHORIZATION FOR PUBLICATION OF STATEMENTS, CONCLUSIONS OR EXTRACTS FROM OR REGARDING OUR REPORTS IS RESERVED PENDING OUR WRITTEN APPROVAL. SAMPLES WILL BE DISPOSED OF AFTER TESTING IS COMPLETED UNLESS OTHER ARRANGEMENTS ARE AGREED TO IN WRITING.

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Project Name: Sunnyside Cogen. Facility (5-137.1-91)

July 1, 1993

Laboratory No.: 141864
Sample Name: 004/061593
Sample Date: 06/15/93
Collected by: RICHARD E. GIRAUD
Time Sampled: 1430
Sample Type: WATER

PARAMETER	MEASURED VALUE	METHOD DETECTION LIMIT	DATE OF ANALYSIS	TIME OF ANALYSIS	ANALYST
INORGANICS:					
pH (150.1)	8.5 S.U.	-	06/17/93	16:55	C. Corder
Total Dissolved Solids (160.1)	1180 mg/l	20 mg/l	06/22/93	17:30	B. Hebert
Total Suspended Solids (160.2)	61 mg/l	5 mg/l	06/17/93	15:45	C. Corder
METALS:					
Iron as Fe (Total)(200.7)	0.73 mg/l	0.05 mg/l	06/23/93	10:15	N. Halloway
PETROLEUM HYDROCARBONS:					
Recoverable Petroleum Hydrocarbons (418.1)	5.0 mg/l	0.2 mg/l	06/23/93	9:35	A. Holm

CHAIN OF CUSTODY RECORD

Huntingdon
Consulting Engineers Environmental Scientists

- ☐ Chen-Northern, Inc. Division
- ☐ Thomas-Hartig & Associates, Inc. Division
- ☐ Schaefer-Dixon Associates, Inc. Division
- ☐ Herzog Associates, Inc. Division

Sunnyside Cogeneration
Project or Site Name

5-1372-91
Project Number

Richard E. Giraud
Sampler Name (Printed)

Chuck Wemple
Contact or Report to

1127W 2325S Suite B SLC UT 84119
Contact Address or Location

Richard E. Giraud
Sampler Signature

DATE COLLECTED	TIME COLLECTED	SAMPLE LOCATION OR DESCRIPTION	COMP OR GRAB	SAMPLE MATRIX	NO. OF CONTAINERS	ANALYSIS REQUIRED: Anions	TDS	Metals	Other Stuff				NOTES	LAB NUMBER
6-15-93	14:30	CRB/032393	G	W	3	✓	✓	✓	✓				Coal runoff basin	

Concurrence See attached

Relinquished by:	Date	Time	Received by:
Richard E. Giraud	6-16-93	14:00	Carrie Airbone
Relinquished by:	Date	Time	Received by: GAI Lab Blgr
	6/17/93		L. Cleveland
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by:

Remarks: Analysis Date, Time, Name Method and minimum detection level must appear on the lab report.

Huntingdon
Chen-Northern, Inc.
600 SOUTH 25TH STREET
P.O. BOX 30615
BILLINGS, MT 59107
(406) 248-9161
FAX (406) 248-9282

TECHNICAL REPORT

REPORT TO: ATTN: CHUCK WEMPLE
CHEN-NORTHERN, INC.
1127 WEST 2320 SOUTH, SUITE B
SALT LAKE CITY UT 84119

DATE: November 4, 1993
JOB NUMBER: 87-927
SHEET: 1 of 3
INVOICE NO.: 003676

REPORT OF: Water Analysis - Sunnyside Cogeneration Facility 5-137.1-41

SAMPLE IDENTIFICATION:

On October 16, 1993, these water samples (our laboratory numbers 145792 through 145795) were received in our laboratory for analysis. Tests were conducted in accordance with the U.S. Environmental Protection Agency Manual EPA 600/4-79-020, *"Methods for Chemical Analysis of Water and Wastes."*

The results of the analysis are shown on the following pages.

A < sign indicates the value reported was the practical quantitation limit for this sample using the method described. Concentrations of analyte, if present, below this were not quantifiable.

Reviewed by David Cowell

rmr

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Laboratory No.: 145792
Sample Name: OUTFALL 004-101393
Sample Date: 10/13/93
Collected by: HOWELL
Time Sampled: 1215
Sample Type: WATER

PARAMETER	MEASURED VALUE	METHOD DETECTION LIMIT	TIME OF ANALYSIS	DATE OF ANALYSIS	ANALYST
INORGANICS					
Oil & Grease	<1 mg/l	1	1530	10/28/93	CC

Laboratory No.: 145793
Sample Name: OUTFALL 004-101393
Sample Date: 10/13/93
Collected by: HOWELL
Time Sampled: 1215
Sample Type: WATER

PARAMETER	MEASURED VALUE	METHOD DETECTION LIMIT	TIME OF ANALYSIS	DATE OF ANALYSIS	ANALYST
METALS					
Iron as Fe (Total)	0.55 mg/l	0.008	1330	10/28/93	NH

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Laboratory No.: 145794
Sample Name: OUTFALL 004-101393
Sample Date: 10/13/93
Collected by: HOWELL
Time Sampled: 1215
Sample Type: WATER

PARAMETER	MEASURED VALUE	METHOD DETECTION LIMIT	TIME OF ANALYSIS	DATE OF ANALYSIS	ANALYST
INORGANICS					
Total Suspended Solids	115 mg/l	5	1130	10/20/93	BH

Laboratory No.: 145795
Sample Name: OUTFALL 004-101393
Sample Date: 10/13/93
Collected by: HOWELL
Time Sampled: 1215
Sample Type: WATER

PARAMETER	MEASURED VALUE	METHOD DETECTION LIMIT	TIME OF ANALYSIS	DATE OF ANALYSIS	ANALYST
INORGANICS					
pH	8.2 S.U.	-	1655	10/19/93	BH
Total Dissolved Solids	1240 mg/l	20	1600	10/20/93	BH

UPDES

CHAIN OF CUSTODY RECORD

Huntingdon
Consulting Engineers Environmental Scientists

- [x] Chen-Northern, Inc., Division
- [ ] Thomas-Hartig & Associates, Inc., Division
- [ ] Schaefer Dixon Associates, Inc., Division
- [ ] Herzog Associates, Inc., Division

10-30

Sunnyside Cogeneration Facility
Project or Site Name

5-137.1-91
Project Number

H. Howell
Sampler Name (Printed)

Chuck Wemple
Contact or Report to

1127 W. 2320 S. SLC, Ut. 84119
Contact Address or Location

Sampler Signature

DATE COLLECTED	TIME COLLECTED	SAMPLE LOCATION OR DESCRIPTION	COMP OR GRAB	SAMPLE MATRIX	NO. OF CONTAINERS	TDS	TSS	Oil & Grease	Total Fe	PH			NOTES	LAB NUMBER
10/13	1215	outfall 004/101393		H_2O	1-1,000 ml Water			✓					TDS: EPA 160.1	145792
10/13	1215	Outfall 004/101393			1-1,000 ml Poly				✓				PH: EPA 150.1	793
10/13	1215	Outfall 004/101393			1-500 ml		✓						Oil+Grease: EPA 413.1	794
10/13	1215	Outfall 004/101393			1-500 ml	✓				✓			TSS: 160.2	795
													Total Iron by no digestion filtration - analysis by AAS.	

Relinquished by:	Date	Time	Received by:
H. Howell	10/14/93	9:00	BUS
BUS	10/16	12:00	Herit Bottelson CNE BISS Lab

Remarks:
Attn: David Council

Huntingdon
Chen-Northern, Inc.
600 SOUTH 25TH STREET
P.O. BOX 30615
BILLINGS, MT 59107
(406) 248-9161
FAX (406) 248-9282

TECHNICAL REPORT

REPORT TO: ATTN: CHUCK WEMPLE
CHEN-NORTHERN, INC.
1127 WEST 2320 SOUTH, SUITE B
SALT LAKE CITY UT 84119

DATE: November 11, 1993
JOB NUMBER: 87-927
SHEET: 1 of 2
INVOICE NO.: 003873

REPORT OF: Water Analysis - SCA - UPDES (5-137.1-91)

SAMPLE IDENTIFICATION:

On November 1, 1993, this water sample (our laboratory number 146288) was received in our laboratory for analysis. Tests were conducted in accordance with the U.S. Environmental Protection Agency Manual EPA 600/4-79-020, *"Methods for Chemical Analysis of Water and Wastes."*

The results of the analysis are shown on the following page.

A < sign indicates the value reported was the practical quantitation limit for this sample using the method described. Concentrations of analyte, if present, below this were not quantifiable.

Reviewed by David Connell

rmr

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF OUR CLIENTS AND AUTHORIZATION FOR

Client Name: CHEN-NORTHERN, INC. SALT LAKE CITY, UT
Project No.: 87-927
Laboratory No.: 146288
Sample Name: OUTFALL 004/102
Sample Date: 10/26/93
Collected by: M. HOWELL
Time Sampled: 1140
Sample Type: WATER

	MEASURED VALUE	METHOD DETECTION LIMIT	TIME OF ANALYSIS	DATE OF ANALYSIS	ANALYST
INORGANICS					
Oil & Grease	<1 mg/l	1	1130	11/05/93	CC
pH	8.8 S.U.	-	1600	11/01/93	BH
Total Dissolved Solids	1200 mg/l	12	1605	11/02/93	CC
Total Suspended Solids	66 mg/l	4	1525	11/02/93	CC
METALS					
Iron as Fe (Soluble)	0.33 mg/l	0.008	1100	11/05/93	NH

Project or Site Name

5 - 137.1 - 91 UPDES

Project Number

M. Howell

Sampler Name (Printed)

Huntingdon

Consulting Engineers Environmental Scientists

- [x] Chen-Northern, Inc., Division
- [ ] Thomas-Hartig & Associates, Inc., Division
- [ ] Schaefer Dixon Associates, Inc., Division
- [ ] Herzog Associates, Inc., Division

Contact or Report to

1127 W. 2320 S. #B

Contact Address or Location

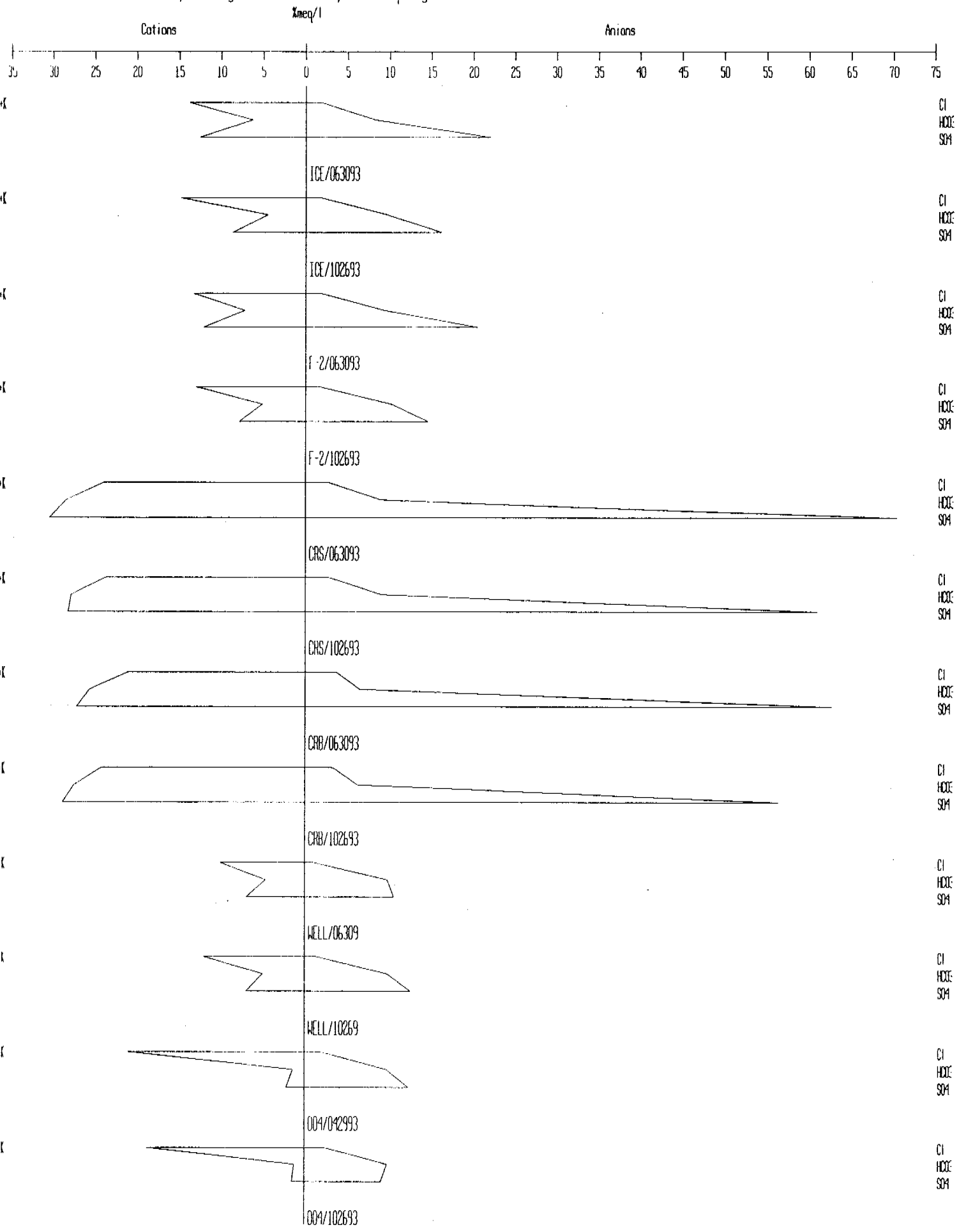
Sampler Signature

DATE COLLECTED	TIME COLLECTED	SAMPLE LOCATION OR DESCRIPTION	COMP OR GRAB	SAMPLE MATRIX	NO. OF CONTAINERS	ANALYSIS REQUIRED: Total Fe	Oil + Grease	TSS	TDS	pH			NOTES	LAB NUMBER
10-26-93	1140	outfall 004/102	grab	H_2O	4	✓	✓	✓	✓	✓			Oil + Grease - 413.1 EPA	146285
													Total Suspended Solids - 160.2 EPA	
													Total Dissolved Solids - EPA 160.3	
													Iron as Fe No digestion filtration analysis by AAS.	
													pH - EPA 150.1	

Relinquished by:	Date	Time	Received by:	Remarks:
Carrier / Bus	11/1/93	1100	CWI Lab Bldg. H. Blackburn	
Relinquished by:	Date	Time	Received by:	
Relinquished by:	Date	Time	Received by:	
Relinquished by:	Date	Time	Received by:	Cooler temp 17.9°C

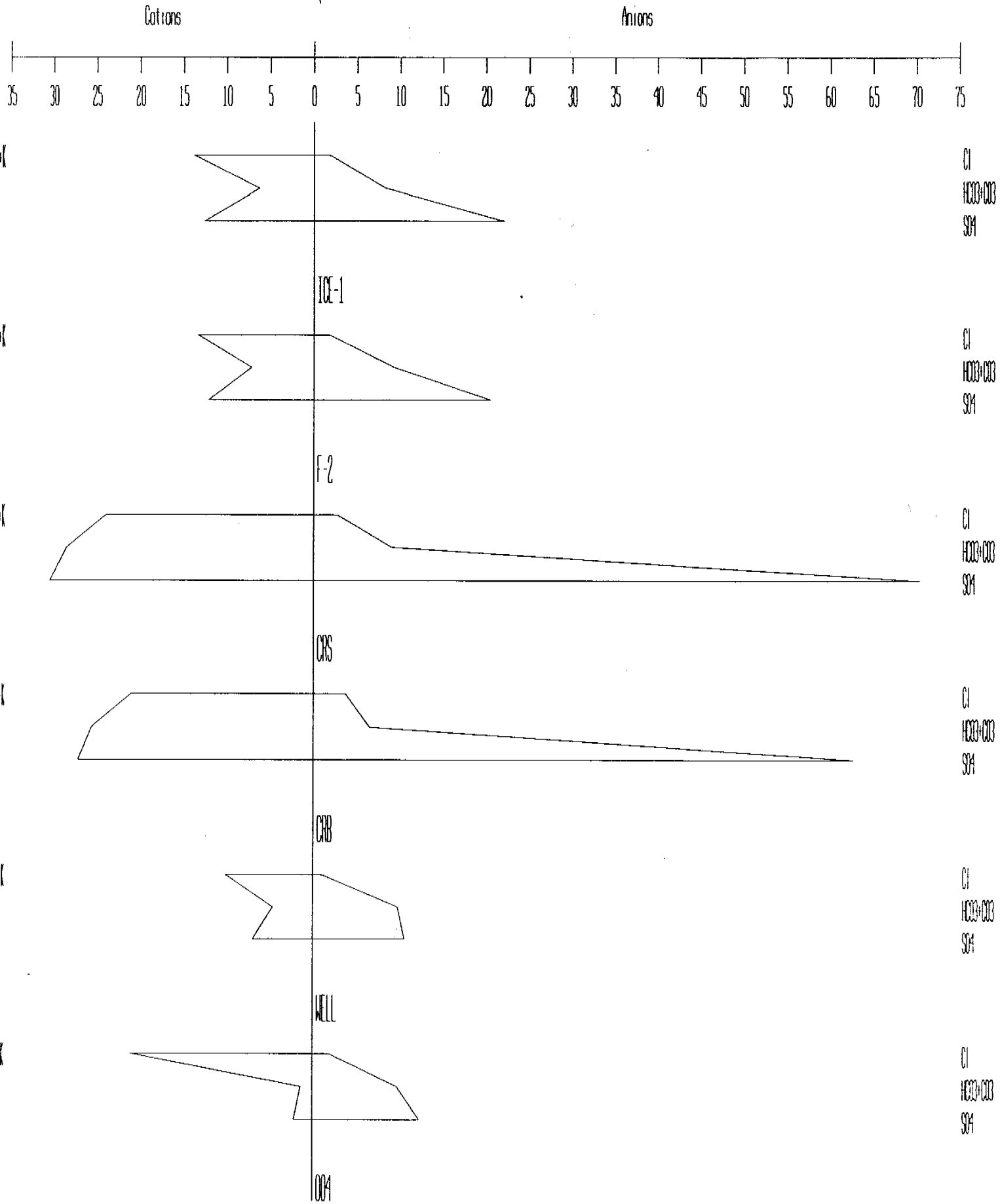
ATTACHMENT C

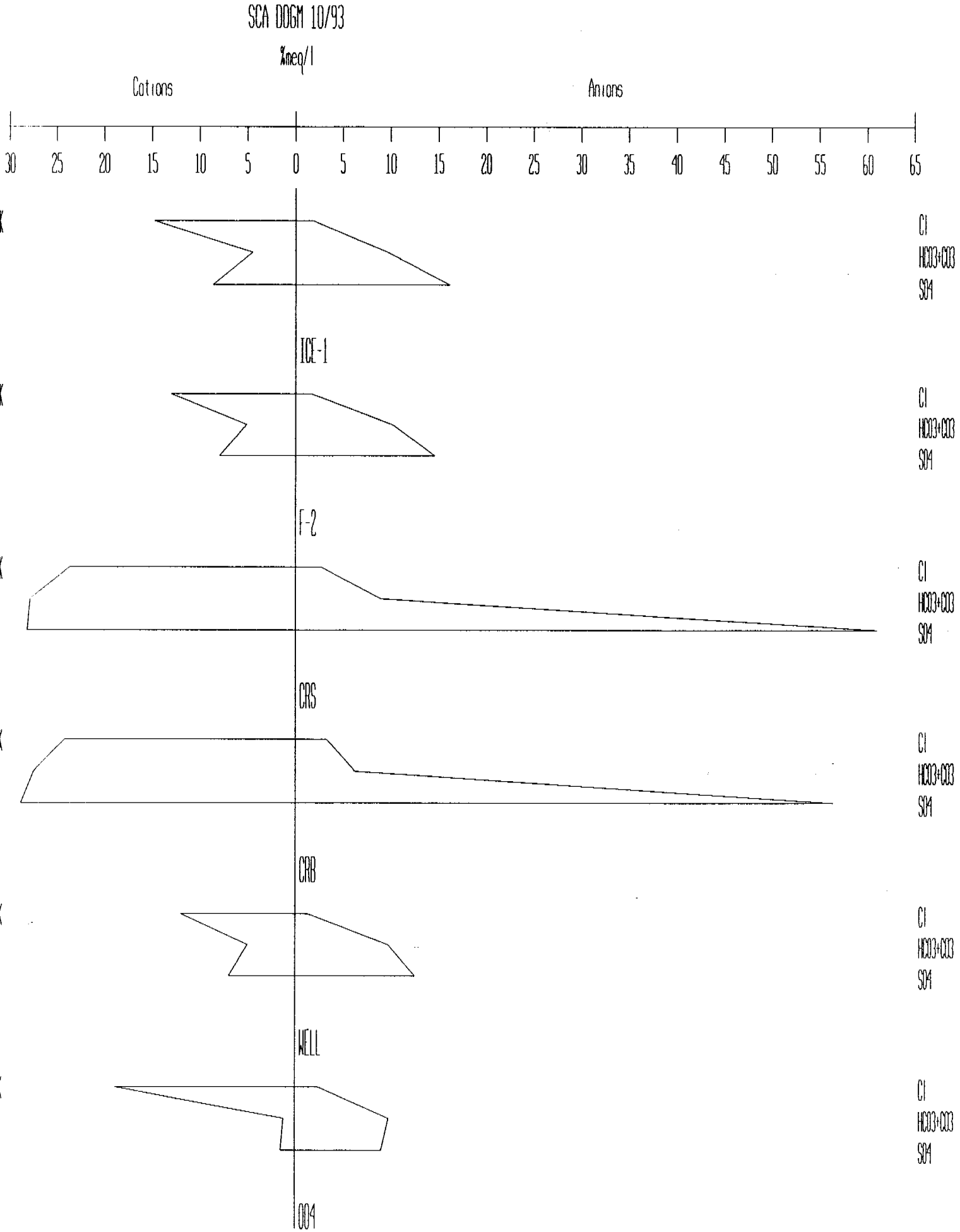
Sunnyside Cogeneration Facility DOGM Sampling Data



SCA DOGM 06/93

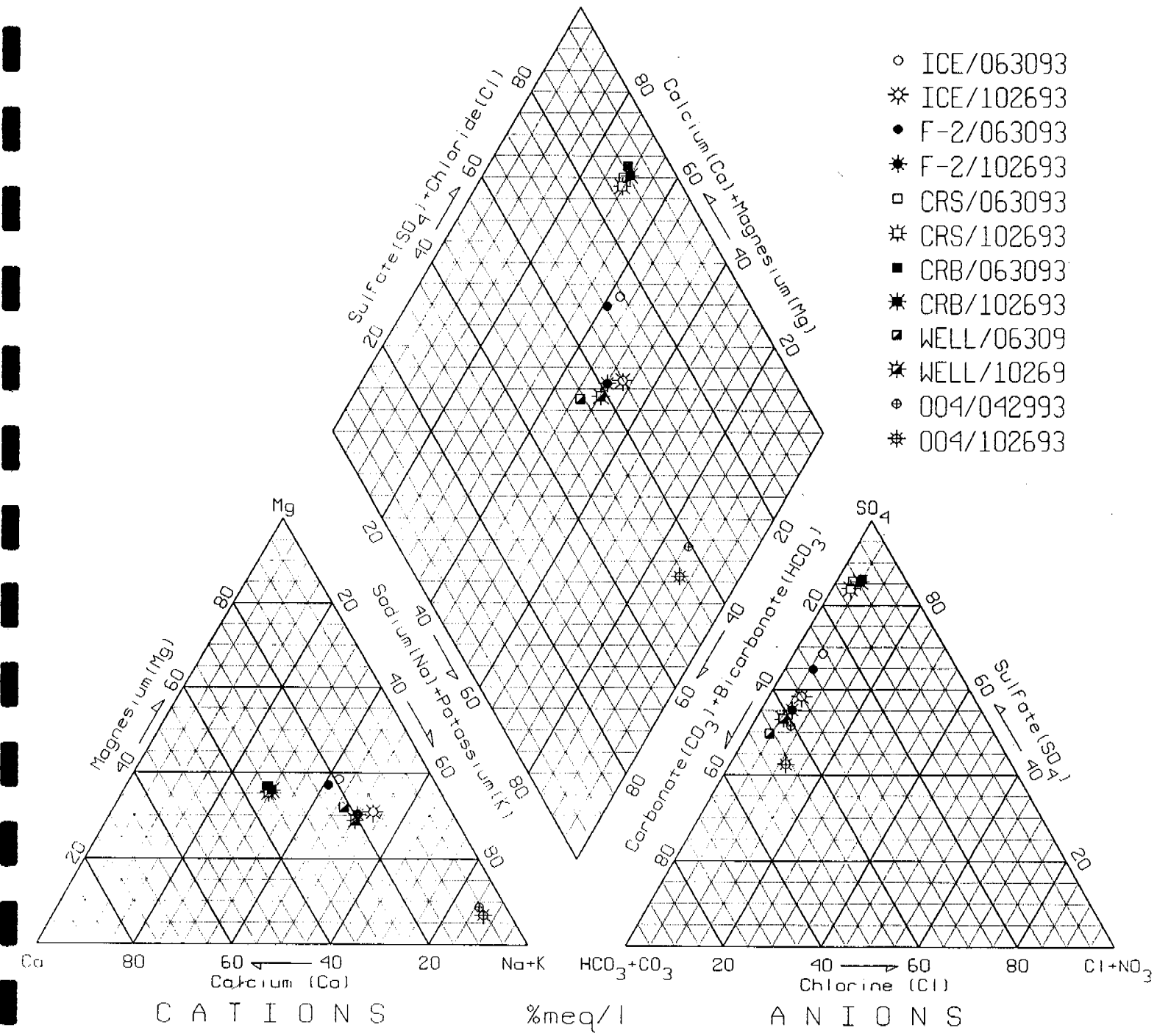
%meq/l



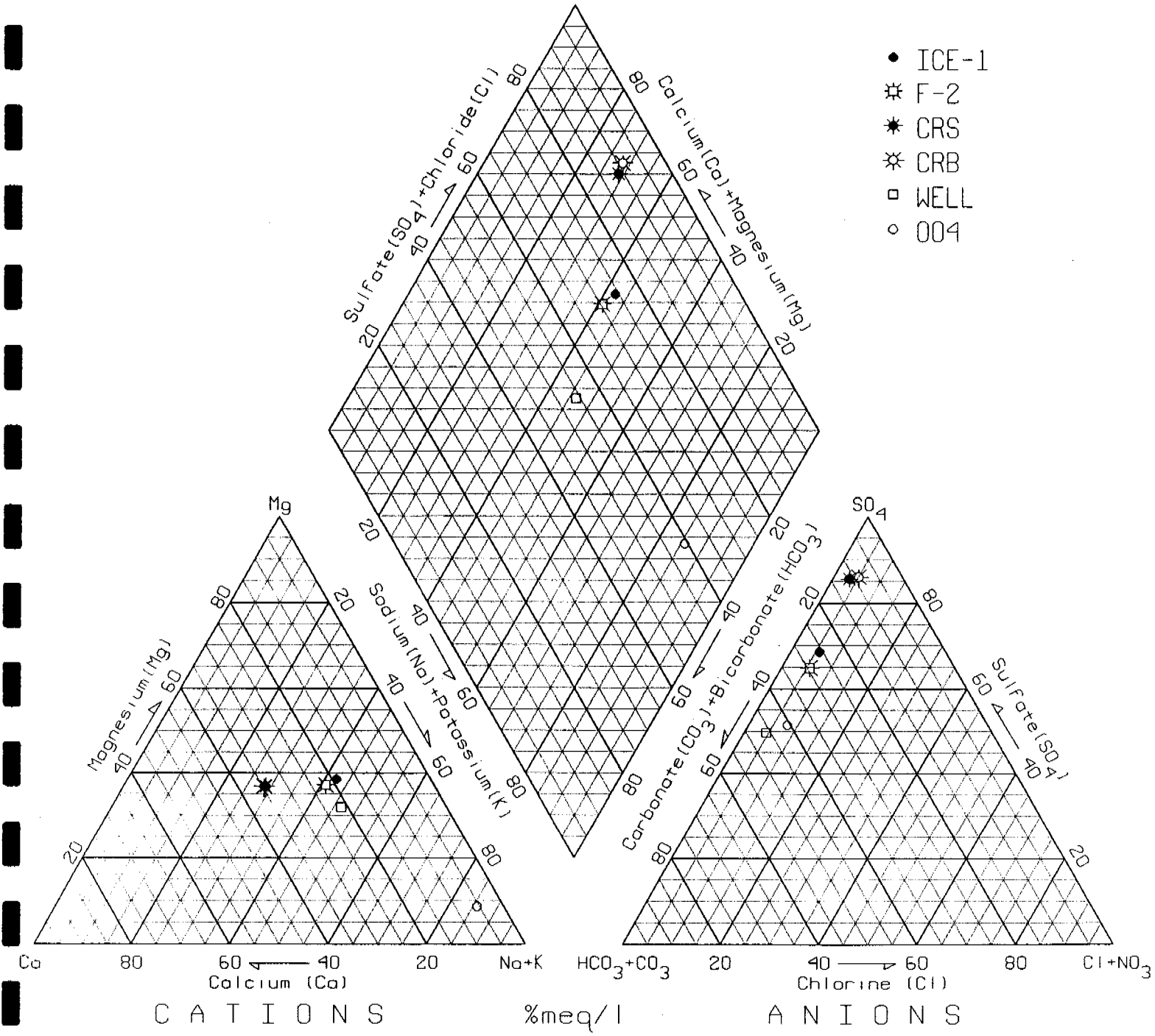
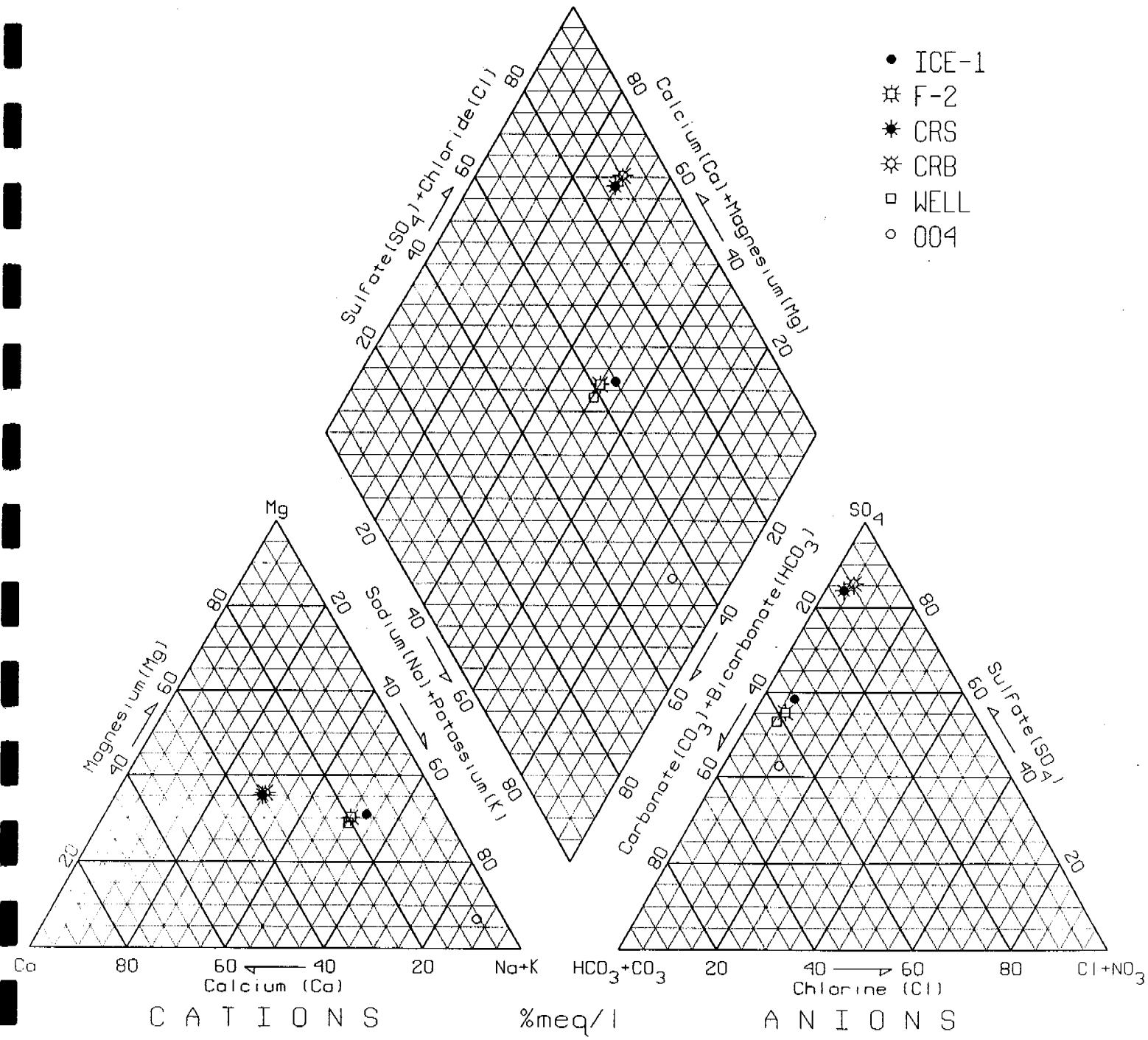

SCA DOGM 10/93
%meq/l
Cations
Anions
30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65
Na+K
Ca
Mg
Cl
HCO3+CO3
SO4
ICE-1
F-2
CRS
CRB
WELL
004

ATTACHMENT D

Sunnyside Cogeneration Facility DOGM Sampling Data



SCA DOGM 06/93



SCA DOGM 10/93