

0008

**CO-OP**



# COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 1919 SOUTH HIGHLAND AVE., SUITE 210-B, LOMBARD, ILLINOIS 60148 • TEL: 708-953-9300 FAX: 708-953-9306

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PLEASE ADDRESS ALL CORRESPONDENCE TO:  
P.O. BOX 1020, HUNTINGTON, UT 84528  
TEL: (801) 653-2311  
FAX: (801) 653-2436

June 3, 1996

CO-OP MINE  
P.O. Box 1245  
Huntington UT 84528

Sample identification by  
CO-OP MINE

NPDES-004

Temperature 10.0°C  
Rec'd 1440 hr.  
Sampled 1145 hr.

FIELD MEASUREMENTS  
pH 7.55  
Conductivity 775

NOTE: Dissolved metals filtered at Lab.

Kind of sample reported to us Water

Sample taken at Co-op

Sample taken by CT&E

Date sampled May 15, 1996

Date received May 15, 1996

Analysis report no. 59-15975

Parameter	Result	MRL	Units	Method	Analyzed		
					Date	Time	Analyst
Alkalinity, Bicarbonate	351	2	mg/l as HCO <sub>3</sub>	SM2320-B	05-20-1996	0730	SW
Alkalinity, Carbonate	<2	2	mg/l as CO <sub>3</sub>	SM2320-B	05-20-1996	0730	SW
Alkalinity, Total	287	2	mg/l as CaCO <sub>3</sub>	EPA 310.1	05-20-1996	0730	SW
Aluminum, Dissolved	<1	1	mg/l	EPA 202.1	05-22-1996	1045	MK
Anions	7.0	----	meq/l	-----	05-24-1996	1300	BR
Arsenic, Dissolved	<0.004	0.004	mg/l	EPA 206.2	05-17-1996	1230	MK
Boron, Dissolved	0.23	0.03	mg/l	EPA 212.3	05-18-1996	0630	MK
Cadmium, Dissolved	<0.004	0.004	mg/l	EPA 213.1	05-24-1996	0900	MK
Calcium, Total	78	0.2	mg/l	EPA 215.1	05-22-1996	0730	MK
Calcium, Dissolved	77	0.2	mg/l	EPA 215.1	05-22-1996	0730	MK
Cations	7.0	----	meq/l	-----	05-24-1996	1300	BR
Chloride	6.0	0.4	mg/l	SM4500-Cl-B	05-20-1996	1330	SW
Conductivity	626	1	umhos/cm	SM2510-B	05-17-1996	0930	SW
Copper, Dissolved	<0.03	0.03	mg/l	EPA 220.1	05-24-1996	0745	MK
Hardness, Total	342	----	mg/l as CaCO <sub>3</sub>	SM2340-B	05-24-1996	1300	BR
Iron, Total	0.03	0.03	mg/l	EPA 236.1	05-23-1996	1230	MK
Iron, Dissolved	<0.03	0.03	mg/l	EPA 236.1	05-23-1996	1230	MK
Lead, Dissolved	<0.08	0.08	mg/l	EPA 239.1	05-24-1996	0930	MK
Magnesium, Total	36	1.2	mg/l	EPA 242.1	05-22-1996	0830	MK
Magnesium, Dissolved	34	1.2	mg/l	EPA 242.1	05-22-1996	0830	MK
Manganese, Total	<0.04	0.04	mg/l	EPA 243.1	05-23-1996	1300	MK
Manganese, Dissolved	<0.04	0.04	mg/l	EPA 243.1	05-23-1996	1300	MK
Molybdenum, Dissolved	<0.07	0.07	mg/l	EPA 246.1	05-22-1996	1230	MK
Nitrogen, Ammonia	<0.2	0.2	mg/l as N	EPA 350.3	05-22-1996	0730	SW

Respectfully submitted,  
COMMERCIAL TESTING & ENGINEERING CO.

*Larry Stow*  
Huntington Laboratory





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June 3, 1996

CO-OP MINE  
P.O. Box 1245  
Huntington UT 84528

Sample identification by  
CO-OP MINE

Kind of sample reported to us Water  
Sample taken at Co-op  
Sample taken by CT&E  
Date sampled May 15, 1996  
Date received May 15, 1996

NPDES-004  
Temperature 10.0°C  
Rec'd 1440 hr.  
Sampled 1145 hr.  
FIELD MEASUREMENTS  
pH 7.55  
Conductivity 775  
NOTE: Dissolved metals filtered at Lab.

Analysis report no. 59-15975

Parameter	Result	MRL	Units	Method	Analyzed		
					Date/Time	Analyst	
Nitrogen, Nitrate-Nitrite	0.07	0.06	mg/l as N	EPA 353.3	05-30-1996 0700	JC	
Nitrogen, Nitrite	0.003	0.002	mg/l as N	EPA 354.1	05-16-1996 1200	JC	
Oil & Grease	<2	2	mg/l	SM5520-B	05-20-1996 0700	JC	
Phosphorous, Ortho-PO <sub>4</sub>	0.005	0.003	mg/l as P	SM4500-P-E	05-16-1996 1000	JC	
Potassium, Total	1.9	0.6	mg/l	EPA 258.1	05-23-1996 1330	MK	
Potassium, Dissolved	1.9	0.6	mg/l	EPA 258.1	05-23-1996 1330	MK	
Selenium, Dissolved	<0.003	0.003	mg/l	EPA 270.2	05-18-1996 0700	MK	
Sodium, Total	5	0.6	mg/l	EPA 273.1	05-23-1996 1400	MK	
Sodium, Dissolved	5	0.6	mg/l	EPA 273.1	05-23-1996 1400	MK	
Solids, Total Dissolved	364	9	mg/l	EPA 160.1	05-16-1996 0700	JC	
Sulfate	51.4	8.0	mg/l	EPA 375.4	05-21-1996 0900	SW	
Zinc, Dissolved	0.01	0.01	mg/l	EPA 289.1	05-24-1996 0800	MK	
Cation/Anion Balance	0.4	----	%		05-24-1996 1300	BR	

Respectfully submitted,  
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory



OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS, TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES



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FAX: (801) 653-2436

June 4, 1996

CO-OP MINE  
P.O. Box 1245  
Huntington UT 84528

Sample identification by  
CO-OP MINE

Kind of sample reported to us Water  
Sample taken at Co-op  
Sample taken by CT&E  
Date sampled May 15, 1996  
Date received May 15, 1996

SBC-9 Source  
Temperature 10.0°C  
Rec'd 1440 hr.  
Sampled 1430 hr.  
FIELD MEASUREMENTS  
pH 7.05  
Conductivity 730  
NOTE: Dissolved metals filtered at Lab.

Analysis report no. 59-15974

Parameter	Result	MRL	Units	Method	Analyzed		
					Date/Time	Analyst	
Alkalinity, Bicarbonate	364	2	mg/l as HCO <sub>3</sub>	SM2320-B	05-20-1996 0730	SW	
Alkalinity, Carbonate	<2	2	mg/l as CO <sub>3</sub>	SM2320-B	05-20-1996 0730	SW	
Alkalinity, Total	298	2	mg/l as CaCO <sub>3</sub>	EPA 310.1	05-20-1996 0730	SW	
Aluminum, Dissolved	<1	1	mg/l	EPA 202.1	05-22-1996 1045	MK	
Anions	6.7	----	meq/l	-----	05-24-1996 1300	BR	
Arsenic, Dissolved	<0.004	0.004	mg/l	EPA 206.2	05-17-1996 1230	MK	
Boron, Dissolved	0.22	0.03	mg/l	EPA 212.3	05-18-1996 0630	MK	
Cadmium, Dissolved	<0.004	0.004	mg/l	EPA 213.1	05-24-1996 0900	MK	
Calcium, Total	82	0.2	mg/l	EPA 215.1	05-22-1996 0730	MK	
Calcium, Dissolved	75	0.2	mg/l	EPA 215.1	05-22-1996 0730	MK	
Cations	6.9	----	meq/l	-----	05-24-1996 1300	BR	
Chloride	6.0	0.4	mg/l	SM4500-Cl-B	05-20-1996 1330	SW	
Conductivity	607	1	umhos/cm	SM2510-B	05-17-1996 0930	SW	
Copper, Dissolved	<0.03	0.03	mg/l	EPA 220.1	05-24-1996 0745	MK	
Hardness, Total	339	----	mg/l as CaCO <sub>3</sub>	SM2340-B	05-24-1996 1300	BR	
Iron, Total	0.16	0.03	mg/l	EPA 236.1	05-23-1996 1230	MK	
Iron, Dissolved	<0.03	0.03	mg/l	EPA 236.1	05-23-1996 1230	MK	
Lead, Dissolved	<0.08	0.08	mg/l	EPA 239.1	05-24-1996 0930	MK	
Magnesium, Total	33	1.2	mg/l	EPA 242.1	05-22-1996 0830	MK	
Magnesium, Dissolved	30	1.2	mg/l	EPA 242.1	05-22-1996 0830	MK	
Manganese, Total	<0.04	0.04	mg/l	EPA 243.1	05-23-1996 1300	MK	
Manganese, Dissolved	<0.04	0.04	mg/l	EPA 243.1	05-23-1996 1300	MK	
Molybdenum, Dissolved	<0.07	0.07	mg/l	EPA 246.1	05-22-1996 1230	MK	
Nitrogen, Ammonia	<0.2	0.2	mg/l as N	EPA 350.3	05-22-1996 0730	SW	

Respectfully submitted,  
COMMERCIAL TESTING & ENGINEERING CO.

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OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS, TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES

TERMS AND CONDITIONS ON REVERSE

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FAX: (801) 653-2436

June 4, 1996

CO-OP MINE  
P.O. Box 1245  
Huntington UT 84528

Sample identification by  
CO-OP MINE

SBC-9 Source

Temperature 10.0°C  
Rec'd 1440 hr.  
Sampled 1430 hr.

FIELD MEASUREMENTS  
pH 7.05  
Conductivity 730

NOTE: Dissolved metals filtered at Lab.

Kind of sample reported to us Water  
Sample taken at Co-op  
Sample taken by CT&E  
Date sampled May 15, 1996  
Date received May 15, 1996

Analysis report no. 59-15974

Parameter	Result	MRL	Units	Method	Analyzed		
					Date/Time/Analyst		
Nitrogen, Nitrate-Nitrite	<0.06	0.06	mg/l as N	EPA 353.3	05-30-1996	0700 JC	
Nitrogen, Nitrite	<0.002	0.002	mg/l as N	EPA 354.1	05-16-1996	1200 JC	
Oil & Grease	<2	2	mg/l	SM5520-B	05-20-1996	0700 JC	
Phosphorous, Ortho-PO <sub>4</sub>	0.006	0.003	mg/l as P	SM4500-P-E	05-16-1996	1000 JC	
Potassium, Total	1.0	0.6	mg/l	EPA 258.1	05-23-1996	1330 MK	
Potassium, Dissolved	0.8	0.6	mg/l	EPA 258.1	05-23-1996	1330 MK	
Selenium, Dissolved	<0.003	0.003	mg/l	EPA 270.2	05-18-1996	0700 MK	
Sodium, Total	4	0.6	mg/l	EPA 273.1	05-23-1996	1400 MK	
Sodium, Dissolved	3	0.6	mg/l	EPA 273.1	05-23-1996	1400 MK	
Solids, Total Dissolved	341	9	mg/l	EPA 160.1	05-16-1996	0700 JC	
Sulfate	29.3	2	mg/l	EPA 375.4	05-21-1996	0900 SW	
Zinc, Dissolved	<0.01	0.01	mg/l	EPA 289.1	05-24-1996	0800 MK	
Cation/Anion Balance	1.3	----	%		05-24-1996	1300 BR	

Respectfully submitted,  
COMMERCIAL TESTING & ENGINEERING CO.

*Ray Lewis R*

Huntington Laboratory



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June 3, 1996

CO-OP MINE  
P.O. Box 1245  
Huntington UT 84528

Sample identification by  
CO-OP MINE

3rd West South

Temperature 10.0°C  
Rec'd 1440 hr.  
Sampled 1200 hr.

FIELD MEASUREMENTS

pH 7.85  
Conductivity 1200

NOTE: Dissolved metals filtered at Lab.

Kind of sample Water  
reported to us

Sample taken at Co-op

Sample taken by CT&E

Date sampled May 15, 1996

Date received May 15, 1996

Analysis report no. 59-15972

Parameter	Result	MRL	Units	Method	Analyzed		
					Date/Time/Analyst		
Alkalinity, Bicarbonate	438	2	mg/l as HCO <sub>3</sub>	SM2320-B	05-20-1996	0730	SW
Alkalinity, Carbonate	<2	2	mg/l as CO <sub>3</sub>	SM2320-B	05-20-1996	0730	SW
Alkalinity, Total	359	2	mg/l as CaCO <sub>3</sub>	EPA 310.1	05-20-1996	0730	SW
Aluminum, Dissolved	<1	1	mg/l	EPA 202.1	05-22-1996	1045	MK
Anions	13.0	----	meq/l	-----	05-24-1996	1300	BR
Arsenic, Dissolved	<0.004	0.004	mg/l	EPA 206.2	05-17-1996	1230	MK
Boron, Dissolved	0.28	0.03	mg/l	EPA 212.3	05-18-1996	0630	MK
Cadmium, Dissolved	<0.004	0.004	mg/l	EPA 213.1	05-24-1996	0900	MK
Calcium, Total	116	0.2	mg/l	EPA 215.1	05-22-1996	0730	MK
Calcium, Dissolved	113	0.2	mg/l	EPA 215.1	05-22-1996	0730	MK
Cations	12.8	----	meq/l	-----	05-24-1996	1300	BR
Chloride	380.0	0.4	mg/l	SM4500-Cl-B	05-20-1996	1330	SW
Conductivity	1125	1	umhos/cm	SM2510-B	05-17-1996	0930	SW
Copper, Dissolved	<0.03	0.03	mg/l	EPA 220.1	05-24-1996	0745	MK
Hardness, Total	606	----	mg/l as CaCO <sub>3</sub>	SM2340-B	05-24-1996	1300	BR
Iron, Total	<0.03	0.03	mg/l	EPA 236.1	05-23-1996	1230	MK
Iron, Dissolved	<0.03	0.03	mg/l	EPA 236.1	05-23-1996	1230	MK
Lead, Dissolved	<0.08	0.08	mg/l	EPA 239.1	05-24-1996	0930	MK
Magnesium, Total	77	1.2	mg/l	EPA 242.1	05-22-1996	0830	MK
Magnesium, Dissolved	69	1.2	mg/l	EPA 242.1	05-22-1996	0830	MK
Manganese, Total	<0.04	0.04	mg/l	EPA 243.1	05-23-1996	1300	MK
Manganese, Dissolved	<0.04	0.04	mg/l	EPA 243.1	05-23-1996	1300	MK
Molybdenum, Dissolved	<0.07	0.07	mg/l	EPA 246.1	05-22-1996	1230	MK
Nitrogen, Ammonia	<0.2	0.2	mg/l as N	EPA 350.3	05-22-1996	0730	SW

Respectfully submitted,  
COMMERCIAL TESTING & ENGINEERING CO.

*Larry Stewart*

Huntington Laboratory





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June 3, 1996

CO-OP MINE  
P.O. Box 1245  
Huntington UT 84528

Sample identification by  
CO-OP MINE

3rd West South

Temperature 10.0°C  
Rec'd 1440 hr.  
Sampled 1200 hr.

FIELD MEASUREMENTS  
pH 7.85  
Conductivity 1200

NOTE: Dissolved metals filtered at Lab.

Kind of sample reported to us Water  
Sample taken at Co-op  
Sample taken by CT&E  
Date sampled May 15, 1996  
Date received May 15, 1996

Analysis report no. 59-15972

Parameter	Result	MRL	Units	Method	Analyzed		
					Date/Time/Analyst		
Nitrogen, Nitrate-Nitrite	0.07	0.06	mg/l as N	EPA 353.3	05-30-1996	0700	JC
Nitrogen, Nitrite	<0.002	0.002	mg/l as N	EPA 354.1	05-16-1996	1200	JC
Oil & Grease	<2	2	mg/l	SM5520-B	05-20-1996	0700	JC
Phosphorous, Ortho-PO <sub>4</sub>	0.003	0.003	mg/l as P	SM4500-P-E	05-16-1996	1000	JC
Potassium, Total	3.0	0.6	mg/l	EPA 258.1	05-23-1996	1330	MK
Potassium, Dissolved	2.9	0.6	mg/l	EPA 258.1	05-23-1996	1330	MK
Selenium, Dissolved	0.006	0.003	mg/l	EPA 270.2	05-18-1996	0700	MK
Sodium, Total	17	0.6	mg/l	EPA 273.1	05-23-1996	1400	MK
Sodium, Dissolved	12	0.6	mg/l	EPA 273.1	05-23-1996	1400	MK
Solids, Total Dissolved	748	9	mg/l	EPA 160.1	05-16-1996	0700	JC
Sulfate	227.0	16.0	mg/l	EPA 375.4	05-21-1996	0900	SW
Zinc, Dissolved	<0.01	0.01	mg/l	EPA 289.1	05-24-1996	0800	MK
Cation/Anion Balance	-0.6	----	%		05-24-1996	1300	BR

Respectfully submitted,  
COMMERCIAL TESTING & ENGINEERING CO.

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Final Watermarked For Your Protection

TERMS AND CONDITIONS ON REVERSE

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June 3, 1996

CO-OP MINE  
P.O. Box 1245  
Huntington UT 84528

Sample identification by  
CO-OP MINE

3rd West Bleeder

Temperature 11.0°C  
Rec'd 1440 hr.  
Sampled 1340 hr.

Kind of sample reported to us Water

Sample taken at Co-op

Sample taken by CT&E

Date sampled May 15, 1996

Date received May 15, 1996

FIELD MEASUREMENTS

pH 7.75

Conductivity 730

NOTE: Dissolved metals filtered at Lab.

Analysis report no. 59-15973

Parameter	Result	MRL	Units	Method	Analyzed		
					Date/Time	Analyst	
Alkalinity, Bicarbonate	347	2	mg/l as HCO <sub>3</sub>	SM2320-B	05-20-1996 0730	SW	
Alkalinity, Carbonate	<2	2	mg/l as CO <sub>3</sub>	SM2320-B	05-20-1996 0730	SW	
Alkalinity, Total	285	2	mg/l as CaCO <sub>3</sub>	EPA 310.1	05-20-1996 0730	SW	
Aluminum, Dissolved	<1	1	mg/l	EPA 202.1	05-22-1996 1045	MK	
Anions	6.4	----	meq/l	-----	05-24-1996 1300	BR	
Arsenic, Dissolved	<0.004	0.004	mg/l	EPA 206.2	05-17-1996 1230	MK	
Boron, Dissolved	0.20	0.03	mg/l	EPA 212.3	05-18-1996 0630	MK	
Cadmium, Dissolved	<0.004	0.004	mg/l	EPA 213.1	05-24-1996 0900	MK	
Calcium, Total	77	0.2	mg/l	EPA 215.1	05-22-1996 0730	MK	
Calcium, Dissolved	71	0.2	mg/l	EPA 215.1	05-22-1996 0730	MK	
Cations	6.6	----	meq/l	-----	05-24-1996 1300	BR	
Chloride	6.0	0.4	mg/l	SM4500-Cl-B	05-20-1996 1330	SW	
Conductivity	580	1	umhos/cm	SM2510-B	05-17-1996 0930	SW	
Copper, Dissolved	<0.03	0.03	mg/l	EPA 220.1	05-24-1996 0745	MK	
Hardness, Total	323	----	mg/l as CaCO <sub>3</sub>	SM2340-B	05-24-1996 1300	BR	
Iron, Total	0.12	0.03	mg/l	EPA 236.1	05-23-1996 1230	MK	
Iron, Dissolved	<0.03	0.03	mg/l	EPA 236.1	05-23-1996 1230	MK	
Lead, Dissolved	<0.08	0.08	mg/l	EPA 239.1	05-24-1996 0930	MK	
Magnesium, Total	32	1.2	mg/l	EPA 242.1	05-22-1996 0830	MK	
Magnesium, Dissolved	30	1.2	mg/l	EPA 242.1	05-22-1996 0830	MK	
Manganese, Total	<0.04	0.04	mg/l	EPA 243.1	05-23-1996 1300	MK	
Manganese, Dissolved	<0.04	0.04	mg/l	EPA 243.1	05-23-1996 1300	MK	
Molybdenum, Dissolved	<0.07	0.07	mg/l	EPA 246.1	05-22-1996 1230	MK	
Nitrogen, Ammonia	<0.2	0.2	mg/l as N	EPA 350.3	05-22-1996 0730	SW	

Respectfully submitted,  
COMMERCIAL TESTING & ENGINEERING CO.

*Ray Stow Jr*

Huntington Laboratory



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Watermarked For Your Protection

TERMS AND CONDITIONS ON REVERSE



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June 3, 1996

CO-OP MINE  
P.O. Box 1245  
Huntington UT 84528

Sample identification by  
CO-OP MINE

3rd West Bleeder

Temperature 11.0°C  
Rec'd 1440 hr.  
Sampled 1340 hr.

FIELD MEASUREMENTS  
pH 7.75  
Conductivity 730

NOTE: Dissolved metals filtered at Lab.

Kind of sample reported to us Water

Sample taken at Co-op

Sample taken by CT&E

Date sampled May 15, 1996

Date received May 15, 1996

Analysis report no. 59-15973

Parameter	Result	MRL	Units	Method	Analyzed		
					Date/Time/Analyst		
Nitrogen, Nitrate-Nitrite	<0.06	0.06	mg/l as N	EPA 353.3	05-30-1996	0700	JC
Nitrogen, Nitrite	<0.002	0.002	mg/l as N	EPA 354.1	05-16-1996	1200	JC
Oil & Grease	<2	2	mg/l	SM5520-B	05-20-1996	0700	JC
Phosphorous, Ortho-PO <sub>4</sub>	<0.003	0.003	mg/l as P	SM4500-P-E	05-16-1996	1000	JC
Potassium, Total	0.9	0.6	mg/l	EPA 258.1	05-23-1996	1330	MK
Potassium, Dissolved	0.8	0.6	mg/l	EPA 258.1	05-23-1996	1330	MK
Selenium, Dissolved	<0.003	0.003	mg/l	EPA 270.2	05-18-1996	0700	MK
Sodium, Total	4	0.6	mg/l	EPA 273.1	05-23-1996	1400	MK
Sodium, Dissolved	4	0.6	mg/l	EPA 273.1	05-23-1996	1400	MK
Solids, Total Dissolved	315	9	mg/l	EPA 160.1	05-16-1996	0700	JC
Sulfate	26.9	0.8	mg/l	EPA 375.4	05-21-1996	0900	SW
Zinc, Dissolved	0.04	0.01	mg/l	EPA 289.1	05-24-1996	0800	MK
Cation/Anion Balance	1.5	----	%		05-24-1996	1300	BR

Respectfully submitted,  
COMMERCIAL TESTING & ENGINEERING CO.

Huntington Laboratory



OVER 40 BRANCH LABORATORIES STRATEGICALLY LOCATED IN PRINCIPAL COAL MINING AREAS, TIDEWATER AND GREAT LAKES PORTS, AND RIVER LOADING FACILITIES



June 12, 1996

TRITIUM LABORATORY

Data Release #96-54  
Job # 847

CO-OP MINING COMPANY  
TRITIUM SAMPLES

A handwritten signature in cursive script, appearing to read "Gote Ostlund".

---

Dr. H. Gote Ostlund  
Head, Tritium Laboratory

Distribution:  
Co-Op Mining Company  
Box 1245  
Huntington, Utah 84528

Rosenstiel School of Marine and Atmospheric Science  
Tritium Laboratory  
4600 Rickenbacker Causeway  
Miami, Florida 33149-1098  
(305) 361-4100  
Fax (305) 361-4112

GENERAL COMMENTS ON TRITIUM RESULTSTritium Scale (New)

Tritium concentrations are expressed in TU, where 1 TU indicates a T/H ratio of  $10^{-18}$ . The values refer to the new tritium scale of U.S. National Institute of Science and Technology (formerly NBS), and based on their tritium water standard #4926 as measured on 1961/09/03 and again 1978/09/03, and age-corrected with the new half-life of 12.43 years, i.e.,  $\lambda = 5.576\% \text{ year}^{-1}$ . In this scale, 1 TU is 7.088 dpm/kg  $\text{H}_2\text{O}$ , or 3.193 pCi/kg  $\text{H}_2\text{O}$ , or 0.1181 Bq/kg  $\text{H}_2\text{O}$  (Bq = disint/sec). TU values are calculated for date of sample collection, REFDATE in the table, as provided by the submitter. If no such date is available, date of sample arrival at our laboratory is used. The stated errors, eTU, are one standard deviation (1 sigma) including all conceivable contributions. In the table, QUANT is quantity of sample received, and ELYS is the amount of water taken for electrolytic enrichment. DIR means direct run (no enrichment).

Through 31 December 1993, we reported tritium values in the "old" scale using the half-life 12.26 years, i.e.,  $\lambda = 5.65\% \text{ year}^{-1}$ . In that old scale, 1 TU(old) is 7.186 dpm/kg  $\text{H}_2\text{O}$ , 3.237 pCi/kg  $\text{H}_2\text{O}$ . To convert from the new scale back to the old at any given point in time, multiply the listed TU(new)-values by F, where

$$F = 0.9645 - (\text{year}-1990) \times 0.0008$$

i.e. for 1994 the factor is 0.9613. The formula is correct within 0.02% between 1962 and 1999. To convert data from the old scale to the new, divide by F.

Very low tritium values

In some cases, negative TU values are listed. Such numbers can occur because the net tritium count rate is, in principle the difference between the count rate of the sample and that of a tritium-free sample (background count or blank sample). Given a set of "unknown" samples with no tritium, the distribution of net results should become symmetrical around 0 TU. The negative values are reported as such for the benefit of allowing the user unbiased statistical treatment of sets of the data. For other applications, 0 TU should be used.

Reliability of results

Refer to Services Rendered (Tritium), Section II.8, in the "Tritium Laboratory Price Schedule; Procedures and Standards; Advice on Sampling". Tritium efficiencies and background values are different in the nine counters and values are corrected for cosmic intensity, gas pressure and other parameters. For tritium, the efficiency is typically 1.00 cpm per 100 TU (direct counting). At 50x enrichment, the efficiency is equivalent to 1.00 cpm per 2 TU. The background is about 0.3 cpm, known to about  $\pm 0.02$  cpm. Our reported results include not only the Poisson statistics, but also other experimental uncertainties such as enrichment error, etc.

References

Mann, W.B., M.P. Unterweger, and B.M. Coursey, Comments on the NBS tritiated-water standards and their use, *Int. J. Appl. Radiat. Isot.*, 33, 383-386, 1982.

Taylor, C.B., and W. Roether, A uniform scale for reporting low-level tritium measurements in water, *Int. J. Appl. Radiat. Isot.*, 33, 377-382, 1982.

Client: CO-OP MINING COMPANY  
Recvd : 96/05/24  
Job# : 847  
Final : 96/06/11

Purchase Order: 12264  
Contact: Co-Op Mining Co. 801/687-2450  
P.O. Box 1245 Fax -5238  
Huntington, UT 84528

Cust	LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
CO-OP	BIRCH SPRING	847.01	960520	1000	275 r	0.35	0.10
CO-OP	BIG BEAR SPRING	847.02	960520	950	229	14.2	0.5
CO-OP	SBC-9 SOURCE	847.03	950515	1000	247 r	0.36	0.09

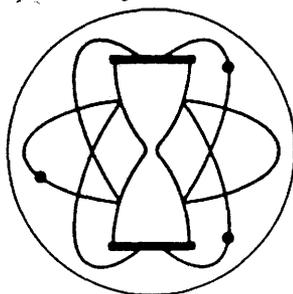
r: RERUN in progress

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r: RERUN in progress



**GEOCHRON LABORATORIES** a division of  
**KRUEGER ENTERPRISES, INC.**

711 CONCORD AVENUE ♦ CAMBRIDGE, MASSACHUSETTS 02138 ♦ U. S. A  
TELEPHONE: (617) 876-3691 TELEFAX: (617) 661-0148

**STABLE ISOTOPE RATIO ANALYSES**

**REPORT OF ANALYTICAL WORK**

Submitted by: Charles Reynolds  
Co-op Mining Company  
P.O. Box 1245  
Huntington, UT 84528

Date Received: 05/23/96  
Date Reported: 06/19/96  
Your Reference: P.O. #12265

Our Lab. Number	Your Sample Number	Description	$\delta^{34}\text{S}$
SR-90039	Birch Spring	BaSO <sub>4</sub>	+ 3.8
SR-90040	Big Bear Spring	BaSO <sub>4</sub>	+ 5.4
SR-90041	SBC-9 Source	BaSO <sub>4</sub>	+11.3

\*Unless otherwise noted, analyses are reported in ‰ notation and are computed as follows:

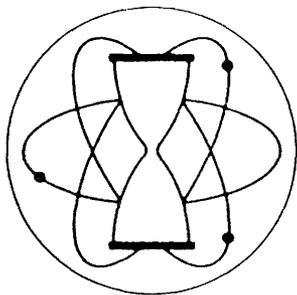
$$\delta^{34}\text{S}_{\text{sample}} \text{‰} = \left[ \frac{{}^{34}\text{S}/{}^{32}\text{S}_{\text{sample}}}{{}^{34}\text{S}/{}^{32}\text{S}_{\text{standard}}} - 1 \right] \times 1000$$

Where:

<sup>34</sup>S/<sup>32</sup>S standard is Cañon Diablo troilite

And:

<sup>34</sup>S/<sup>32</sup>S = 0.0450045



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Your Reference: P.O. #12265

Our Lab. Number	Your Sample Number	Description	$\delta^{13}\text{C}$		
CR-90039	Birch Spring	BaCO <sub>3</sub>	-9.7	-10.8	-10.3 **
CR-90040	Big Bear Spring	BaCO <sub>3</sub>		-9.7	
CR-90041	SBC-9 Source	BaCO <sub>3</sub>		-10.0	

\*\* Replicate preparations and analysis.

\*Unless otherwise noted, analyses are reported in ‰ notation and are computed as follows:

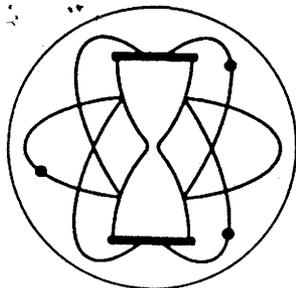
$$\delta^{13}\text{C}_{\text{sample}} \text{‰} = \left[ \frac{^{13}\text{C}/^{12}\text{C}_{\text{sample}}}{^{13}\text{C}/^{12}\text{C}_{\text{standard}}} - 1 \right] \times 1000$$

Where:

<sup>13</sup>C/<sup>12</sup>C standard is PDB

And:

<sup>13</sup>C/<sup>12</sup>C standard = 0.011237



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Date Reported: 06/19/96  
Your Reference: P.O. #12265

Our Lab. Number	Your Sample Number	Description	$\delta D^*$	$\delta^{18}O^*$
HOR-90039	Birch Spring	Water	-129	-17.0
HOR-90040	Big Bear Spring	Water	-127	-16.7
HOR-90041	SBC-9 Source	Water	-130	-17.2 -17.1 **

\*\* Duplicate preparations and analyses.

\*Unless otherwise noted, analyses are reported in ‰ notation and are computed as follows:

$$\delta R_{\text{sample}} \text{‰} = \left[ \frac{R_{\text{sample}}}{R_{\text{standard}}} - 1 \right] \times 1000$$

Where:

D/H standard is SMOW  
 $^{18}O/^{16}O$  standard is SMOW

And:

$D/H_{\text{standard}} = 0.000316^{**}$   
 $^{18}O/^{16}O_{\text{standard}} = 0.0039948^{**}$

\*\*Double atom ratio