Robert R. Marriam, Consultant
Remedium Group, Inc.
A Subsidiary of W. R. Grace & Co.

6401 Poplar Ave., Suite 301
Memphis, TN 38119

Tel: (901) 820-2023
Fax: (901) 820-2061

Remedium

SDMS Document ID
1061564
ADMINISTRATIVE RECORD

August 30, 2006

Ms. Bonnie Lavelle
US EPA Region 8
EPR - SR
999 18th Street, Suite 300
Denver, CO 80202

Dear Bonnie,

The Libby records have been searched for analyses of water sources connected to the former Libby Vermiculite Mine and drainage points. Attached you will find a series of water analyses conductd over a period of years from various points in the drainage area and/or potable water well for the mine use. A summary page of the analyses has been included as has a map showing the various sample points.

It is believed that certain conclusions can be drawn after reviewing these analyses.

1. The Ph of the water in almost every case is slightly alkaline (i.e., at or greater than 7.0). This is a definite indication that there is no acidic water leaving the mine property.

2. When a full scan of metals was run, there were no elevated levels of heavy metals.

3. On the basis of these analyses, the water from all of the sources, with the possible exception of moderate to high levels of hardness, was close to drinking water standards.

4. Certain of the samples analyzed, primarily from #2 – Toe Drain from Tailings Pond, showed slightly elevated fluoride levels.

Please advise if there are any questions.

Robert R. Marriam

Dwp
Enclosures

Libby Mine Water Samples

Date Taken	Location
6/1/1982	1, 2, 3, 4, 5, 6, 7
3/1/1985	Public Drinking Water: Potable Water
3/1/1985	Public Drinking Water: House Water
3/19/1985	1, 2, 4, 5, 6
7/23/1985	1, 2, 5, 6
2/3/1986	1, 2, 6
3/5/1986	Public Drinking Water: W R Grace - New Well
5/1/1986	1, 3, 5
5/16/1986	2, 4, 6
6/5/1986	Public Drinking Water: W R Grace - Various
6/13/1986	2, 3, 4, 5, 6
9/11/1986	1, 2, 3, 4, 5, 6
12/17/1986	1, 2, 3, 4, 5, 6
4/6/1987	1, 2, 3, 4, 5, 6
6/1/1987	1, 2, 3, 4, 5, 6
8/31/1987	1, 2, 3, 4, 5, 6
12/3/1987	1, 2, 3, 5, 6
3/8/1988	1, 2, 3, 4, 5, 6
3/29/1988	7, 8
6/14/1988	1, 2, 3, 4, 5, 6
8/30/1988	1, 2, 3, 4, 5, 6
12/14/1988	1, 2, 3, 4, 5, 6, 9
3/8/1989	1, 2, 3, 4, 5, 6
6/6/1989	1, 2, 3, 4, 5, 6, 9
9/6/1989	1, 2, 3, 4, 5, 6, 9
12/5/1989	1, 2, 3, 4, 5, 9
1/29/1990	Fleetwood/Artessian Well
1/29/1990	Carney Creek
1/29/1990	
1/30/1990	
3/13/1990	1, 2, 3, 4, 5, 6, 9
4/18/1990	Special Water Analysis: Flouride
6/5/1990	1, 2, 3, 4, 5, 6, 9
9/5/1990	1, 2, 3, 4, 5, 6, 9
12/17/1990	1, 2, 3, 4, 5, 9
3/26/1991	2, 4, 5, 6, 7
3/26/1991	W R Grace - Mine Site
3/26/1991	W R Grace - Screening Plant
6/18/1991	1, 2, 3, 4, 5, 6, 9
2/4/1992	7
2/10/1992	8
3/30/1992	7

Location Codes
1-Rainey Cr above Diversion
2-Toe Drain from Tailings Dam
3-Carney Cr
4-Lower Pond
5-Rainy Cr. at Kootenai
6-Kootenai River above Rainey Cr.
7-Mill Potable Water (Mine Site)
8-Screen Plant Potable Water
9-Loading Potable Water

SAMPLING LOCATIONS

#1 Rainy Cr. above diversion

#2 Toe drain from tailings dam

#3 Carney Cr.

#4 Lower Pond

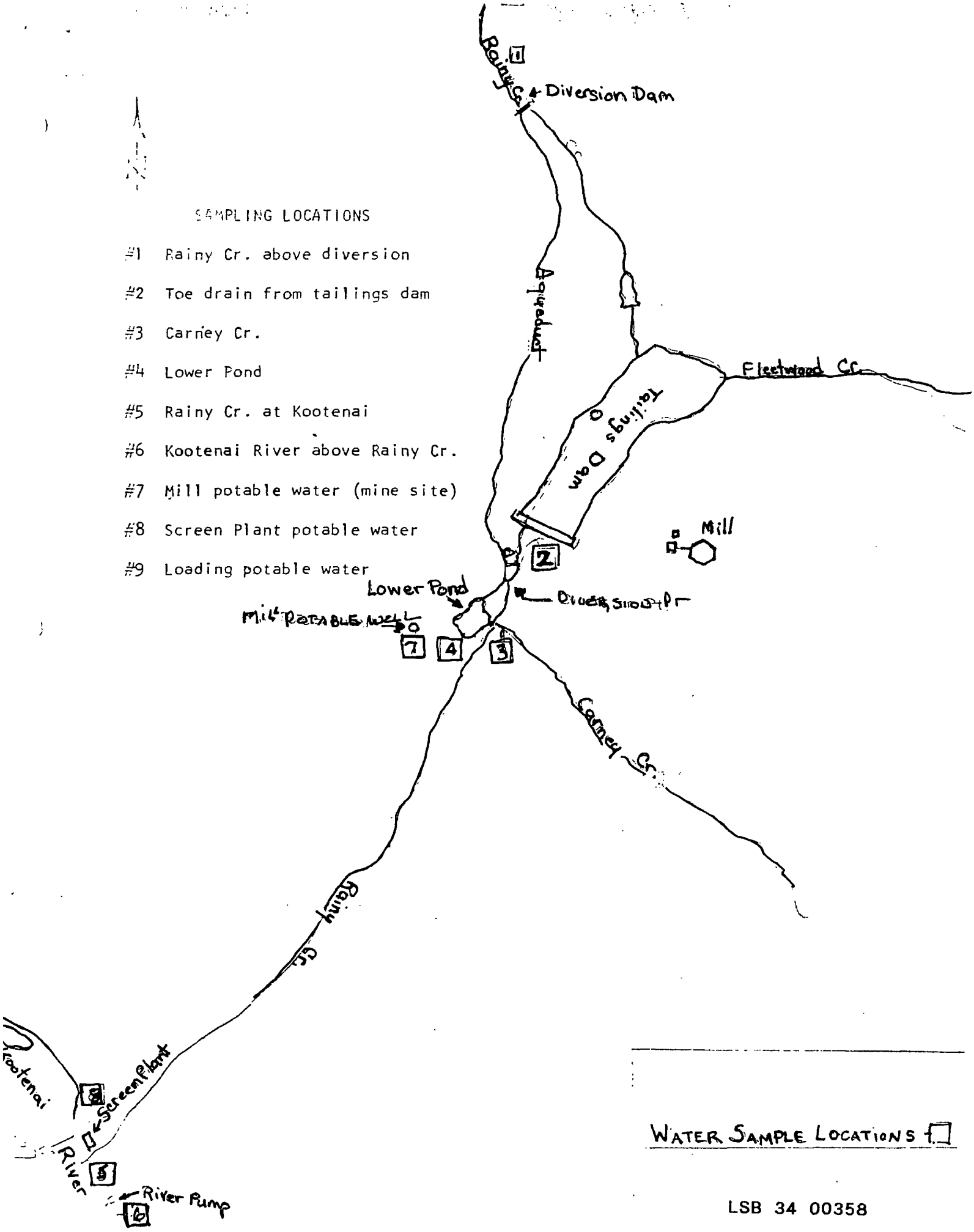
#5 Rainy Cr. at Kootenai

#6 Kootenai River above Rainy Cr.

#7 Mill potable water (mine site)

#8 Screen Plant potable water

#9 Loading potable water



WATER SAMPLE LOCATIONS

LSB 34 00358

	1-Rainy Cr. above Diversion #1	2-Toe Drain from Tailings Pond #2	3-Carney Cr. #3	5-Rainey Cr. at Kootenai #5	6-Kootenai River above Rainey Cr. #6****
Total Suspended Solids..... (mg/l)	4	4	6	3	6
Total Dissolved Solids..... (mg/l)	235	304	410	278	132
Turbidity..... (NTU)	.3	.32	.6	.37	.81
Sulfate..... (mg SO_4/l)	4.0	6.8	19.8	13.2	15.5
Specific Conductance..... (micromhos/cm)	390	490	610	440	200
pH.....	7.5	6.7	7.9	8.0	7.7
Fluoride..... (mg/l)	<0.1	5.4	0.12	0.76	0.12
Total Phosphorus..... (mgP/l)	0.035	0.21	0.3	0.095	0.03
Nitrates..... (NO_3-Nmg/l)	0.06	0.04	0.35	0.01	0.12
Kjeldahl Nitrogen..... (mg/l)	<0.1	<0.1	<0.1	<0.1	<0.1
Ammonia..... (NH_3-Nmg/l)	<0.1	<0.1	<0.1	<0.1	<0.1
Oil & Grease..... (mg/l)		<5		<5	

Table 3. Surface and groundwater chemical analysis.

Source: Geohydrology of the Rainy Creek Igneous Complex Near Libby, MT. Master of Science Thesis by Ronald Eric Zinner (June 1982), University of Nevada – Reno

	#4 4-Lower Pond	#7 7-Mill Potable Water (Mine Site) ****	
pH	7.4	7.0	Units
Total Alkalinity as $CaCO_3$	286	358	-----mg/l-----
Phenolphthalein Alkalinity	0	0	
Calcium	75	99	
Magnesium	19	24	
Total Hardness as $CaCO_3$	266	346	
as gpg	15.6	20.2	
Total Iron	0.04	0.07	
Sulfate	11	13	
Nitrates	0.05	0.07	
Potassium	11.7	11.7	
Sodium	6.9	6.9	
Chloride	3	6	
Arsenic	<0.005	<0.005	
Barium	0.2	0.3	
Cadmium	<0.001	<0.001	
Chromium	<0.02	<0.02	
Fluoride	3.8	1.1	
Lead	<0.01	<0.01	
Manganese	0.09	0.03	
Mercury	<0.0002	<0.0002	
Selenium	<0.005	<0.005	
Silver	<0.005	<0.005	
Zinc	<0.01	0.21	
Total Solids	324		
Turbidity TU	1.3		
Specific Conductance	515	605	
Oil & Grease	<5		

Table 3. (continued)

Source: Geohydrology of the Rainy Creek Igneous Complex Near Libby, MT. Master of Science Thesis by Ronald Eric Zinner (June 1982), University of Nevada – Reno

	#74	#96	#130	#131	4-Lower Pond #4	7-Mill Potable Water (Mine Site) #7	
Calcium	80.0	22.6	18.7	46.0	75.0	99.0	Units ---mg/l---
Magnesium	17.4	5.83	23.5	18.5	19.0	24.0	
Potassium	13.0	6.0	24.5	24.5	11.7	11.7	

Table 3. (continued)

Source: Geohydrology of the Rainy Creek Igneous Complex Near Libby, MT. Master of Science Thesis by Ronald Eric Zinner (June 1982), University of Nevada – Reno

M.E. LAB

Montana Environmental Laboratory

376 W. Washington — P.O. Box 1876 Kalispell, Montana 59901 Phone: 755-2131

NEOMA (RENE) SOL

Date Received: 3-4-85
Date Reported: 3-27-85
MEL # : 190

Reported To: W.R. Grace
Sample Source: House Water
Sample Date: 3-1-85

PUBLIC DRINKING WATER ANALYSIS:

Parameter	mg/l	Limits
pH	7.6	6.5 - 8.5
Total Alkalinity as $CaCO_3$	333	---
Phenolphthalein Alkalinity	0	---
Calcium	110.6	---
Magnesium	19.5	---
Total Hardness as $CaCO_3$	356	
as gpg	20.8	
SOFT : MOD. HARD : HARD.		
Total Iron	0.02	0.3
Sulfate	10	250
Nitrate as N	0.12	10
Total Dissolved Solids	398	500
Potassium	10.9	---
Sodium	6.9	20
Arsenic	<0.005	0.05
Barium	0.4	1.0
Cadmium	<0.001	0.010
Chromium	<0.02	0.05
Chloride	13	250
Fluoride	1.36	2.4
Lead	<0.01	0.05
Manganese	<0.02	0.05
Mercury	<0.001	0.002
Selenium	0.005	0.01
Silver	<0.005	0.05
Zinc	<0.01	5.

LSB 34 00363

NOTE: Water is suitable for drinking (except for problems (*) noted below)
(---) no established limits

M.E. LAB

Montana Environmental Laboratory

376 W. Washington — P.O. Box 1876 Kalispell, Montana 59901 Phone: 755-2131

NEOMA (RENE) SOL

Date Received: 3-4-85
Date Reported: 3-27-85
MEL # : 191

Reported To: W.R. Grace
Sample Source: Potable Water
Sample Date: 3-1-85

PUBLIC DRINKING WATER ANALYSIS:

Parameter	mg/l	Limits
pH	7.2	6.5 - 8.5
Total Alkalinity as $CaCO_3$	335	---
Phenolphthalein Alkalinity	0	---
Calcium	107.4	---
Magnesium	20.0	---
Total Hardness as $CaCO_3$	350	
as gpg	20.5	
SOFT : MOD. HARD : HARD.		
Total Iron	<0.01	0.3
Sulfate	10	250
Nitrate as N	0.10	10
Total Dissolved Solids	395	500
Potassium	12.5	---
Sodium	8.1	20
Arsenic	<0.005	0.05
Barium	0.4	1.0
Cadmium	<0.001	0.010
Chromium	<0.02	0.05
Chloride	12	250
Fluoride	1.39	2.4
Lead	<0.01	0.05
Manganese	<0.02	0.05
Mercury	<0.001	0.002
Selenium	0.006	0.01
Silver	<0.005	0.05
Zinc	0.64	5.

LSB 34 00364

NOTE: Water is suitable for drinking (except for problems (*) noted below)
(---) no established limits

M.E. LAB

Montana Environmental Laboratory

376 W. Washington — P.O. Box 1876 Kalispell, Montana 59901 Phone: 755-2131

NEOMA (RENE) SOL

Date Received: 3-19-85
Date Reported: 4-2-85
MEL # : 247

W.R. Grace & Co. - ATTN: R. Geiger
P.O. Box 609
Libby, Mt. 59923

Sample Date: 3-19-85

SPECIAL WATER ANALYSIS:

	1-Rainy Cr. above Diversion #1	2-Toe Drain from Tailings Pond #2	3-Carney Cr. #3	4-Lower Pond #4	5-Rainey Cr. at Kootenai #5	6-Kootenai River above Rainey Cr. #6
Total Suspended Solids mg/l.....	<1	1	---	1	15	1
Total Dissolved Solids mg/l.....	217	394	---	416	376	172
Turbidity NTU.....	0.3	0.2	---	1.9	6.0	2.0
Sulfate $mgSO_4/l$.....	5.5	13	---	12	13	20
Specific Conductance micromhos/cm.....	350	610	---	630	550	300
pH.....	8.0	7.0	---	7.8	8.3	8.1
Total Phosphorus mgP/l.....	<0.01	0.425	---	0.405	0.32	0.045
Nitrate NO_3-Nmg/l.....	0.07	0.01	---	0.025	0.11	0.07
Kjeldahl Nitrogen mg/l.....	0.15	<0.03	---	1.47	0.44	<0.03
Ammonia NH_3-N mg/l.....	<0.03	<0.03	---	<0.03	<0.03	<0.03
Fluoride mg/l.....	0.10	5.25	---	4.80	2.70	0.47

M.E. LAB

Montana Environmental Laboratory

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NEOMA (RENE) SOL

Date Received: 7-23-85
Date Reported: 7-31-85
MEL # : 687

W.R. Grace & Co. - ATTN: R. Geiger
P.O. Box 609
Libby, Mt. 59923

Sample Date: 7-23-85

SPECIAL WATER ANALYSIS:

	1-Rainy Cr. above Diversion #1	2-Toe Drain from Tailings Pond #2	3-Carney Cr. #3	4-Lower Pond #4	5-Rainey Cr. at Kootenai #5	6-Kootenai River above Rainey Cr. #6
Total Suspended Solids mg/l.....	1	83			8	14
Total Dissolved Solids mg/l.....	208	382			362	153
Turbidity NTU.....	0.85	21.0			2.7	2.7
Sulfate $mgSO_4/l$.....	5	13.5			11.5	15.5
Specific Conductance micromhos/cm.....	340	600			580	260
pH.....	7.7	6.9			8.2	8.0
Total Phosphorus mgP/l.....	.01	.405			.275	.035
Nitrate NO_3-Nmg/l.....	0.02	0.06			0.03	0.02
Kjeldahl Nitrogen mg/l.....	0.6	1.1			0.6	0.6
Ammonia NH_3-N mg/l.....	<0.3	<0.3			<0.3	<0.3
Fluoride mg/l.....	0.11	7.7			1.9	0.53

RS

M.E. LAB

Montana Environmental Laboratory

376 W. Washington — P.O. Box 1876 Kalispell, Montana 59901 Phone: 755-2131

NEOMA (RENE) SOL

Date Received: 2-3-86
Date Reported: 2-12-86
MEL # : 84

W.R. Grace & Co. - ATTN: R. Geiger
P.O. Box 609
Libby, Mt. 59923

Sample Date: 2-3-86

SPECIAL WATER ANALYSIS:

	1-Rainy Cr. above Diversion	2-Toe Drain from Tailings Pond				6-Kootenai River above Rainey Cr.
	#1	#2	#3	#4	#5	#6
Total Suspended Solids mg/l.....	<1	1				38
Total Dissolved Solids mg/l.....	202	446				362
Turbidity NTU.....	1.5	0.75				25.0
Sulfate $mgSO_4/l$.....	4.5	9.5				12.5
Specific Conductance micromhos/cm.....	310	620				520
pH.....	8.0	7.0				8.4
Total Phosphorus mgP/l.....	<0.01	0.55				0.30
Nitrate NO_3-Nmg/l.....	0.05	0.03				0.08
Kjeldahl Nitrogen mg/l.....	<0.3	0.3				0.3
Ammonia NH_3-N mg/l.....	<0.3	<0.3				<0.3
Fluoride mg/l.....	0.17	5.0				3.2

LSB 34 00382

M.E. LAB

Montana Environmental Laboratory

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NEOMA (RENE) SOL

Date Received: 3-5-86
Date Reported: 3-25-86
MEL # : 173

Reported to: W.R. Grace
P.O. Box 609
Libby, Mt. 59923

Sample Source: W.R. Grace - new well
Sample Date: 3-5-86

ANALYSIS FOR NEW PUBLIC DRINKING WATER SUPPLIES:

Parameter	mg/l	Limits	Parameter	mg/l	Limits
pH.....	7.6	6.5 - 8.5	Specific Conductance...	360	---
Total Alkalinity..... (as $CaCO_3$)	154	---	Arsenic.....	<0.005	0.05
Phenolphthalein Alk.	0	---	Barium.....	0.9	1.0
Bicarbonate Alk.....	154	---	Cadmium.....	<0.001	0.010
Carbonate Alk.....	0	---	Chromium.....	<0.02	0.05
Total Hardness..... (as CaCO3)	184	---	Lead.....	<0.01	0.05
Calcium.....	41.7	---	Manganese.....	<0.02	0.05
Magnesium.....	19.5	---	Mercury.....	<0.001	0.002
Total Iron.....	<0.01	0.3	Selenium.....	<0.005	0.01
Sulfate.....	17	250	Silver.....	<0.005	0.05
Sodium.....	6.9	20			
Nitrate as N.....	2.4	10			
Fluoride.....	0.19	2.4			

LSB 34 00379

NOTE: Water is suitable for drinking (except for problems (*) noted below)
(---) no established limits.

Radiological will follow...

M.E. LAB

Montana Environmental Laboratory

376 W. Washington — P.O. Box 1876 Kalispell, Montana 59901 Phone: 755-2131

NEOMA (RENE) SOL

Date Received: 3-5-86
Date Reported: 4-9-86
MEL # : 173

Reported To: W.R. Grace
P.O. Box 609
Libby, Mt. 59923

Sample Source: W.R. Grace - new well

Sample Date: 3-5-86

ANALYSIS FOR NEW PUBLIC DRINKING WATER SUPPLIES:

Parameter	Results
pCi/l recoverable	
Gross Alpha ± precision*.....	3.2(+ -2.7)

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96 x sigma

MONTANA ENVIRONMENTAL LABORATORY
376 W. WASHINGTON
P.O. BOX 1876
KALISPELL, MONTANA 59903
PHONE (406) 755-2131

SAMPLE RESULTS: 03/29/88

CONTROL NO: 240

STATE NO: 0001155

W.R. Grace
C/O Terry Jacobs
P.O. Box 609
Libby MT
59923

WATER SUPPLY NAME: W.R. Grace

REC'D AT LAB: 03/29/88
CITY: Libby COUNTY: Lincoln ANALYZED: 03/29/88 4:30 PM
COLLECTOR: Zwang Mary Jo PHONE: 293-3746 ANALYZED BY: Joanne

FLD NO: 1 SOURCE POINT: Mill Potable - mine site
LAB NO: 385 DATE SAMPLED: 03/28/88 TIME: 10:05

BACTERIOLOGICAL RESULTS:

SUITABLE FOR DRINKING
MEMBRANE FILTER METHOD: <1 COLIFORM BACTERIA ORGANISM/100 ML
(THERE HAS BEEN NO FECAL POLLUTION (ANIMAL OR HUMAN) OF WATER SUPPLY.)

FLD NO: 2 SOURCE POINT: Screen Plant - Potable Water
LAB NO: 386 DATE SAMPLED: 03/28/88 TIME: 10:25

BACTERIOLOGICAL RESULTS:

SUITABLE FOR DRINKING
MEMBRANE FILTER METHOD: <1 COLIFORM BACTERIA ORGANISM/100 ML.
(THERE HAS BEEN NO FECAL POLLUTION (ANIMAL OR HUMAN) OF WATER SUPPLY.)

BALANCE DUE: 20.00

GRACE

Zonolite
Construction Products Division

TO: File

DATE: May 12, 1986

FROM: T. Jacobs

SUBJECT: Potable Water Sampling

cc: Wm. McCaig

Potable water samples were taken by D. Black on May 1, 1986 at Screen Plant and Mill. Results obtained May 8, 1986 resulted in less than 1 coliform organisms per 100 ml for the Screen Plant and one (1) coliform per 100 ml for the Mill, indicating contamination of Mill water with coliform bacteria. To concur (see attached form) with State Law, I have taken a water sample from Mill today (May 12, 1986) and will take one Tuesday (May 13, 1986). At the same time I sampled locations listed below for chlorine residual and PH levels:

Location	Free Available Chlorine (FAC)	Date	PH	Time
Mill	0	5/12/86	7.5	0920 hrs
Construction Lunch Room	0	5/12/86	7.0	0945 hrs
Guard Shack	0	5/12/86	7.0	1025 hrs
Mine Office	0	5/12/86	7.2	1000 hrs
Engineering	0	5/12/86	7.5	1050 hrs
Garage	0	5/12/86	6.8	1037 hrs
Screen Plant	0	5/12/86	7.0	1250 hrs

Coliform is defined as "a group of bacteria that includes Aerobacter Aerogenes and Escherichia coli. Their presence in water, especially Escherichia coli, is presumptive evidence of fecal contamination."

At this time the chlorinator is not on line with the new well. Recommendation for installing chlorinator on new line to supply a trace of chlorine residual to system. This recommendation hinges on the 2 consecutive samples sent to Montana Environmental Laboratory.

Post Hoc: Previous sampling technique is questionable, T. Jacobs will do sampling of potable water systems.

T. Jacobs/sw

M.E. LAB

Montana Environmental Laboratory

376 W. Washington — P.O. Box 1876 Kalispell, Montana 59901 Phone: 755-2131

NEOMA (RENE) SOL

Date Received: 5-2-86
Date Reported: 5-9-86
MEL # : 362

W.R. Grace & Co. - ATTN: R. Geiger
P.O. Box 609
Libby, Mt. 59923

Sample Date: 5-1-86

SPECIAL WATER ANALYSIS:

	#1 1-Rainy Cr. above Diversion	#2	#3 3-Carney Cr.	#4	#5 5-Rainey Cr. at Kootenai	#6
Total Suspended Solids mg/l.....	2		3		4	
Total Dissolved Solids mg/l.....	211		255		306	
Turbidity NTU.....	0.4		2.9		2.9	
Sulfate $mgSO_4/l$.....	5		14		9	
Specific Conductance micromhos/cm.....	350		340		440	
pH.....	7.8		8.0		8.1	
Total Phosphorus mgP/l.....	<0.01		0.29		0.20	
Nitrate NO_3-Nmg/l.....	0.02		0.12		0.01	
Kjeldahl Nitrogen mg/l.....	<0.3		0.6		<0.3	
Ammonia NH_3-N mg/l.....	<0.3		<0.3		<0.3	
Fluoride mg/l.....	0.01		0.25		2.8	

#7 - Coliform Bacteria - 1 Coliform Organism per 100 ml of water - Contaminated

#8 - Coliform Bacteria -<1 Coliform Organism per 100 ml of water - Suitable

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NEOMA (RENE) SOL

Date Received: 5-16-86
Date Reported: 5-22-86
MEL # : 404

W.R. Grace & Co. - ATTN: R. Geiger
P.O. Box 609
Libby, Mt. 59923

Sample Date: 5-16-86

SPECIAL WATER ANALYSIS:

	#1	#2 2-Toe Drain from Tailings Pond	#3	#4 4-Lower Pond	#5	#6 6-Kootenai River above Rainey Cr.
Total Suspended Solids mg/l.....		1		1		1
Total Dissolved Solids mg/l.....		432		270		143
Turbidity NTU.....		1.7		0.7		4.5
Sulfate $mgSO_4/l$.....		6		6		17
Specific Conductance micromhos/cm.....		660		430		240
pH.....		6.8		7.6		7.5
Total Phosphorus mgP/l.....		0.55		0.19		0.02
Nitrate NO_3-Nmg/l.....		0.01		<0.01		0.04
Kjeldahl Nitrogen mg/l.....		0.3		0.3		<0.3
Ammonia NH_3-N mg/l.....		<0.3		<0.3		<0.3
Fluoride mg/l.....		4.8		3.0		0.50

M.E. LAB

Montana Environmental Laboratory

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NEOMA (RENE) SOL

Date Received: 6-13-86
Date Reported: 6-25-86
MEL # : 507

W.R. Grace & Co. - ATTN: R. Geiger
P.O. Box 609
Libby, Mt. 59923

Sample Date: 6-13-86

SPECIAL WATER ANALYSIS:

	#1	2-Toe Drain from Tailings Pond #2	3-Carney Cr. #3	4-Lower Pond #4	5-Rainey Cr. at Kootenai #5	6-Kootenai River above Rainey Cr. #6
Total Suspended Solids mg/l.....		3	1	<1	<1	1
Total Dissolved Solids mg/l.....		472	368	276	187	175
Turbidity NTU.....		0.7	1.3	1.5	1.7	2.1
Sulfate $mgSO_4/l$.....		8	18	9	17	18
Specific Conductance micromhos/cm.....		720	550	440	310	280
pH.....		6.6	7.9	7.8	7.8	7.8
Total Phosphorus mgP/l.....		0.56	0.34	0.13	0.03	0.03
Nitrate NO_3-Nmg/l.....		0.01	0.50	0.01	0.06	0.04
Kjeldahl Nitrogen mg/l.....		<0.3	<0.3	1.1	<0.3	<0.3
Ammonia NH_3-N mg/l.....		<0.3	<0.3	<0.3	<0.3	<0.3
Fluoride mg/l.....		5.25	1.18	0.94	0.16	0.64

M.E. LAB

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NEOMA (RENE) SOL

Date Received: 9-11-86
Date Reported: 9-18-86
MEL # : 783

W.R. Grace & Co.
P.O. Box 609
Libby, Mt. 59923

Sample Date: 9-11-86

SPECIAL WATER ANALYSIS:

	Rainy Crk. above diversion #1	Toe Dam from Tailings Dam #2	Carney Creek #3	Lower Pond #4	Rainy Creek @ Kootenai #5	Kootenai River above Rainy Crk. #6
Total Suspended Solids mg/l.....	<1	<1	2	<1	5	1
Total Dissolved Solids mg/l.....	249	433	398	361	345	120
Turbidity NTU.....	0.5	0.4	1.8	1.7	11.0	1.8
Sulfate $mgSO_4/l$.....	5.5	10	21	10	13	17
Specific Conductance micromhos/cm.....	360	770	610	570	510	220
pH.....	7.6	6.7	8.0	7.4	8.0	7.6
Total Phosphorus mgP/l.....	<0.01	0.64	0.47	0.30	0.09	<0.01
Nitrate NO_3-Nmg/l.....	0.03	0.02	0.50	0.02	0.07	0.11
Kjeldahl Nitrogen mg/l.....	0.3	0.3	0.6	0.6	1.1	0.3
Ammonia NH_3-N mg/l.....	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Fluoride mg/l.....	0.16	5.1	0.23	4.05	0.84	0.16

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NEOMA (RENE) SOL

Date Received: 12-18-86
Date Reported: 1-6-87
MEL # : 1042

W.R. Grace & Co.
P.O. Box 609
Libby, Mt. 59923

Sample Date: 12-17-86

SPECIAL WATER ANALYSIS:

	Rainy Cr. above diversion #1	Toe drain from tailings dam #2	Carney Cr. #3	Lower Pond #4	Rainey Cr. at Kootenai #5	Kootenai R. above Rainy Cr. #6
Total Suspended Solids mg/l.....	5	4	1	2	3	4
Total Dissolved Solids mg/l.....	224	506	404	411	188	160
Turbidity NTU.....	0.4	0.5	1.0	0.6	1.5	0.6
Sulfate $mgSO_4/l$.....	5	10.5	21	17	8.5	19
Specific Conductance micromhos/cm.....	360	730	560	560	510	230
pH.....	7.5	6.8	7.9	7.7	7.9	7.6
Total Phosphorus mgP/l.....	<0.01	0.68	0.42	0.38	0.14	<0.01
Nitrate NO_3-Nmg/l.....	0.06	0.10	0.60	0.37	0.19	0.10
Kjeldahl Nitrogen mg/l.....	<0.3	<0.3	<0.3	0.3	<0.3	<0.3
Ammonia NH_3-N mg/l.....	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Fluoride mg/l.....	0.18	4.65	0.37	3.00	1.04	0.19

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NEOMA (RENE) SOL

Date Received: 4-7-87
Date Reported: 4-14-87
MEL # : 204

W.R. Grace & Co.
P.O. Box 609
Libby, Mt. 59923

Sample Date: 4-6-87

SPECIAL WATER ANALYSIS:

	1-Rainy Cr. above Diversion #1	2-Toe Drain from Tailings Pond #2	3-Carney Cr. #3	4-Lower Pond #4	5-Rainey Cr. at Kootenai #5	6-Kootenai River above Rainey Cr. #6
Total Suspended Solids mg/l.....	<1	<1	4	6	1816	20
Total Dissolved Solids mg/l.....	185	432	293	358	1668	144
✓ Turbidity NTU.....	1.0	0.6	3.0	2.2	600	5.4
✓ Sulfate $mgSO_4/l$.....	2	11.5	17.0	17.0	24.0	19.7
Specific Conductance micromhos/cm.....	290	660	430	550	510	220
✓ pH.....	7.8	6.9	8.2	8.3	8.3	7.8
✓ Total Phosphorus mgP/l.....	.03	.55	.35	.38	.31	.02
✓ Nitrate NO_3-Nmg/l.....	0.13	0.03	0.16	0.02	0.29	0.10
Kjeldahl Nitrogen mg/l.....	0.3	.56	.56	0.3	.56	.56
Ammonia NH_3-N mg/l.....	<0.3	[illegible]	<0.3	<0.3	<0.3	<0.3
Fluoride mg/l.....	[illegible]	6.85	.82	5.35	3.5	.34

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NEOMA (RENE) SOL

Date Received: 6-2-87
Date Reported: 6-8-87
MEL # : 363

W.R. Grace & Co.
P.O. Box 609
Libby, Mt. 59923

Sample Date: 6-1-87

SPECIAL WATER ANALYSIS:

	1-Rainy Cr. above Diversion #1	2-Toe Drain from Tailings Pond #2	3-Carney Cr. #3	4-Lower Pond #4	5-Rainey Cr. at Kootenai #5	6-Kootenai River above Rainey Cr. #6
Total Suspended Solids mg/l.....	4	6	38	8	45	3
Total Dissolved Solids mg/l.....	230	417	377	331	368	149
Turbidity NTU.....	.35	.4	5.0	3.0	120	1.2
Sulfate $mgSO_4/l$.....	4	10	25	15	13	19
Specific Conductance micromhos/cm.....	380	735	580	560	580	270
pH.....	7.7	6.9	8.1	8.0	8.2	7.8
Total Phosphorus mgP/l.....	.03	.55	.47	.33	.31	.03
Nitrate NO_3-Nmg/l.....	0.03	<0.01	0.31	0.17	0.17	0.11
Kjeldahl Nitrogen mg/l.....	<0.3	0.3	.56	.56	<0.3	.56
Ammonia NH_3-N mg/l.....	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Fluoride mg/l.....	[illegible]	2.80	.28	3.50	3.60	.16

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NEOMA (RENE) SOL

Date Received: 9-1-87
Date Reported: 9-8-87
MEL # : 661

W.R. Grace & Co. - ATTN: R. Geiger
P.O. Box 609
Libby, Mt. 59923

Sample Date: 8-31-87

SPECIAL WATER ANALYSIS:

	1-Rainy Cr. above Diversion #1	2-Toe Drain from Tailings Pond #2	3-Carney Cr. #3	4-Lower Pond #4	5-Rainey Cr. at Kootenai #5	6-Kootenai River above Rainey Cr. #6
Total Suspended Solids mg/l.....	<1	<1	<1	<1	20	<1
Total Dissolved Solids mg/l.....	260	375	416	344	374	186
Turbidity NTU.....	0.4	0.4	0.6	1.0	5.5	0.4
Sulfate $mgSO_4/l$.....	4	9	24	11	13	19
Specific Conductance micromhos/cm.....	370	610	620	550	550	230
pH.....	7.8	7.3	8.1	7.95	8.1	7.85
Total Phosphorus mgP/l.....	<0.01	0.45	0.52	0.33	0.35	<0.01
Nitrate NO_3-Nmg/l.....	<0.01	0.03	0.40	0.06	0.06	0.08
Kjeldahl Nitrogen mg/l.....	0.56	0.28	0.56	0.28	0.56	0.56
Ammonia NH_3-N mg/l.....	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Fluoride mg/l.....	0.22	4.80	0.29	4.80	3.35	0.21

... GRACE
Terry J. Jacobs
SAFETY DIRECTOR
T. Jake
Date 9-10-87

M.E. LAB
Montana Environmental Laboratory
376 W. Washington — P.O. Box 1876 Kalispell, Montana 59901 Phone: 755-2131

NEOMA (RENE) SOL

Date Received: 12-4-87
Date Reported: 12-17-87
MEL # : 917

W.R. Grace & Co.
P.O. Box 609
Libby, Mt. 59923

Sample Date: 12-3-87

SPECIAL WATER ANALYSIS:

	1-Rainy Cr. above Diversion #1	2-Toe Drain from Tailings Pond #2	3-Carney Cr. #3	4-Lower Pond #4	5-Rainey Cr. at Kootenai #5	6-Kootenai River above Rainey Cr. #6
Total Suspended Solids mg/l	10	12	9	---	552	<1
Total Dissolved Solids mg/l	234	427	422	---	337	169
Turbidity NTU	0.5	0.5	1.2	---	770	1.0
Sulfate $mgSO_4/l$	4	9	20	---	12	22
Specific Conductance micromhos/cm	395	735	675	---	555	280
pH	8.1	7.4	8.4	---	8.4	8.0
Total Phosphorus mgP/l	<0.01	0.53	0.47	---	0.11	<0.01
Nitrate NO_3-N mg/l	0.06	0.02	0.41	---	0.13	0.08
Kjeldahl Nitrogen mg/l	<0.15	<0.15	<0.15	---	<0.15	<0.15
Ammonia NH_3-N mg/l	<0.15	<0.15	<0.15	---	<0.15	<0.15
Fluoride mg/l	0.22	4.25	0.31	---	0.8	0.16
Chloride mg/l	<1	11	2	---	10	3

W. R. GRACE
Terry J. Jacobs
SAFETY DIRECTOR
12-21-87
Date

LSB 34 00438

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NEOMA (RENE) SOL

Date Received: 3-10-88
Date Reported: 3-18-88
MEL # : 153

W.R. Grace & Co.
P.O. Box 609
Libby, Mt. 59923

Sample Date: 3/8/88

SPECIAL WATER ANALYSIS:

	Rainy Cr. above Diversion #1	Toe Drain from Tailings Dam #2	Carney Cr. #3	Lower Pond #4	Rainy Cr. @ Kootenai #5	Kootenai River above Rainy Cr. #6
Total Suspended Solids mg/l	<1	7	4	3	<1	1
Total Dissolved Solids mg/l	213	402	389	409	347	172
Turbidity NTU	0.15	0.40	0.85	0.80	0.50	1.4
Sulfate mg SO_4/l	4	13	19	16	13	21
Specific Conductance micromhos/cm	395	710	645	670	600	295
pH	8.1	7.3	8.4	8.4	8.5	8.2
Total Phosphorus mg P/l	<0.01	.42	.37	.34	.16	<0.01
Nitrate mg NO_3-N/l	0.11	0.04	0.36	0.16	0.04	0.04
Kjeldahl Nitrogen mg N/l	0.28	0.56	0.42	0.42	0.42	0.28
Ammonia mg NH_3-N/l	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Fluoride mg/l	0.25	4.73	0.39	2.30	1.32	0.33
Chloride mg/l	<1	9	2	7	8	4

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NEOMA (RENE) SOL

Date Received: 6/15/88
Date Reported: 6/21/88
MEL # : 431

W.R. Grace & Co.
P.O. Box 609
Libby, Mt. 59923

Sample Date: 6/14/88

SPECIAL WATER ANALYSIS:

	1-Rainy Cr. above Diversion #1	2-Toe Drain from Tailings Pond #2	3-Carney Cr. #3	4-Lower Pond #4	5-Rainey Cr. at Kootenai #5	6-Kootenai River above Rainey Cr. #6
Total Suspended Solids mg/l	<1	1	3	1	2	1
Total Dissolved Solids mg/l	227	402	399	297	355	156
Turbidity NTU	0.20	0.34	1.5	1.1	0.38	1.1
Sulfate mg SO_4/l	4	10	20	16	13	23
Specific Conductance micromhos/cm	410	700	655	525	610	270
pH	8.2	7.4	8.5	8.2	8.5	8.4
Total Phosphorus mg P/l	0.01	0.47	0.41	0.20	0.14	<0.01
Nitrate mg NO_3-N/l	0.03	0.04	0.37	0.06	0.04	0.06
Kjeldahl Nitrogen mg N/l	0.42	0.56	0.56	0.56	0.56	0.56
Ammonia mg NH_3-N/l	<0.15	<0.15	<0.15	<0.15	<0.15	0.53
Fluoride mg/l	0.12	4.30	0.36	2.95	1.02	0.20
Chloride mg/l	1	10	3	8	8	3

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NEOMA (RENE) SOL

Date Received: 8/31/88
Date Reported: 9/07/88
MEL # : 667

W.R. Grace & Co.
P.O. Box 609
Libby, Mt. 59923

Sample Date: 8/30/88

SPECIAL WATER ANALYSIS:

	Rainy Creek above Diversion #1	Toe Drain from Tailings Dam #2	Carney Creek #3	Lower Pond #4	Rainey Creek @ Kootenai #5	Kootenai River above Rainy Creek #6
Total Suspended Solids mg/l	2	<1	1	1	4	2
Total Dissolved Solids mg/l	262	438	441	405	346	149
Turbidity NTU	0.30	0.45	0.30	0.70	0.50	0.60
Sulfate mg SO_4/l	4.2	7.8	17.4	9.3	12.8	18.0
Specific Conductance micromhos/cm	450	765	730	690	575	245
pH	7.8	7.2	8.4	8.1	8.4	8.1
Total Phosphorus mg P/l	0.06	0.64	0.42	0.39	0.16	0.02
Nitrate mg NO_3-N/l	0.01	0.02	0.59	<0.01	0.06	0.12
Kjeldahl Nitrogen mg N/l	0.14	0.56	0.28	0.56	0.56	0.56
Ammonia mg NH_3-N/l	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Fluoride mg/l	0.22	4.70	0.35	4.20	0.76	0.22
Chloride mg/l	1	12	2	14	6	3

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Montana Environmental Laboratory

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NEOMA (RENE) SOL

Date Received: 12/14/88
Date Reported: 12/22/88
MEL # : 887

W.R. Grace & Co.
P.O. Box 609
Libby, MT 59923

PURCH. DEPT. 1988 DEC 28 8:28 RECEIVED

Sample Date: 12/14/88

SPECIAL WATER ANALYSIS:

	1-Rainy Cr. above Diversion #1	2-Toe Drain from Tailings Pond #2	3-Carney Cr. #3	4-Lower Pond #4	5-Rainey Cr. at Kootenai #5	6-Kootenai River above Rainey Cr. #6	9-Loading Potable Water #9
Total Suspended Solids mg/l	11	3	154	15	44	<1	46
Total Dissolved Solids mg/l	211	479	440	412	373	134	406
Turbidity NTU	0.45	0.56	55	3.6	34	1.1	35
Sulfate mg SO_4/l	3	11	29	15	14	22	14
Specific Conductance micromhos/cm	380	820	670	720	610	275	665
pH	8.2	7.2	8.4	8.1	8.4	8.1	8.3
Total Phosphorus mg/l	<0.01	0.55	0.45	0.42	0.17	<0.01	0.36
Nitrate mg NO_3-N/l	0.11	0.04	0.38	0.19	0.14	0.07	0.24
Kjeldahl Nitrogen mg N/l	1.12	0.56	0.56	0.56	0.28	0.56	0.84
Ammonia mg NH_3-N/l	0.18	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Fluoride mg/l	0.16	5.35	0.15	3.10	1.10	0.17	1.98
Chloride mg/l	2	13	1	10	12	4	14

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NEOMA (RENE) SOL

Date Received: 3/09/89
Date Reported: 3/16/89
MEL # : 137

W.R. Grace & Co.
P.O. Box 609
Libby, MT 59923

Sample Date: 3/08/89

SPECIAL WATER ANALYSIS:

	1-Rainy Cr. above Diversion #1	2-Toe Drain from Tailings Pond #2	3-Carney Cr. #3	4-Lower Pond #4	5-Rainey Cr. at Kootenai #5	6-Kootenai River above Rainey Cr. #6
Total Suspended Solids mg/l	---	1	16	3	6	<1
Total Dissolved Solids mg/l	---	461	378	391	348	148
Turbidity NTU	---	1.2	4.0	2.0	6.0	1.7
Sulfate mg SO_4/l	---	10	25	14	16	23
Specific Conductance micromhos/cm	---	680	540	575	490	245
pH	---	7.2	7.4	7.9	8.4	8.0
Total Phosphorus mg/l	---	0.82	0.39	0.44	0.21	<0.01
Nitrate mg NO_3-N/l	---	0.05	0.57	0.04	0.16	0.06
Kjeldahl Nitrogen mg N/l	---	0.42	0.42	0.42	0.28	0.28
Ammonia mg NH_3-N/l	---	<0.15	<0.15	<0.15	<0.15	<0.15
Fluoride mg/l	---	5.10	0.28	4.70	1.18	0.18
Chloride mg/l	---	10	2	12	8	4

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NEOMA (RENE) SOL

Date Received: 6/07/89
Date Reported: 6/14/89
MEL # : 390

W.R. Grace & Co.
P.O. Box 609
Libby, MT 59923

Sample Date: 6/06/89

SPECIAL WATER ANALYSIS:

	1-Rainy Cr. above Diversion #1	2-Toe Drain from Tailings Pond #2	3-Carney Cr. #3	4-Lower Pond #4	5-Rainey Cr. at Kootenai #5	6-Kootenai River above Rainey Cr. #6	9-Loading Potable Water #9
Total Suspended Solids mg/l	7	2	8	8	10	9	6
Total Dissolved Solids mg/l	213	323	339	319	318	127	314
Turbidity NTU	0.30	0.30	0.50	1.3	1.2	2.7	1.0
Sulfate mg SO_4/l	3	9	17	9	11	17	10
Specific Conductance micromhos/cm	360	520	520	505	510	210	510
pH	8.1	7.4	8.5	8.2	8.6	8.2	8.4
Total Phosphorus mg/l	0.02	0.40	0.42	0.29	0.26	0.01	0.27
Nitrate mg NO_3-N/l	0.02	0.17	0.26	0.06	0.06	0.07	0.09
Kjeldahl Nitrogen mg N/l	1.12	0.84	1.12	1.12	0.56	0.14	0.56
Ammonia mg NH_3-N/l	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Fluoride mg/l	0.18	5.00	0.28	4.90	3.00	0.12	3.90
Chloride mg/l	1.0	11.0	3.5	11.5	10.0	3.0	11.0

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NEOMA (RENE) SOL

Date Received: 9/07/89
Date Reported: 9/15/89
MEL # : 639

W.R. Grace & Co.
P.O. Box 609
Libby, MT 59923

Sample Date: 9/06/89

SPECIAL WATER ANALYSIS:

	1-Rainy Cr. above Diversion #1	2-Toe Drain from Tailings Pond #2	3-Carney Cr. #3	4-Lower Pond #4	5-Rainey Cr. at Kootenai #5	6-Kootenai River above Rainey Cr. #6	9-Loading Potable Water #9
Total Suspended Solids mg/l	67	<1	7	1	10	<1	5
Total Dissolved Solids mg/l	257	387	419	361	361	137	388
Turbidity NTU	6.0	0.35	1.1	0.80	2.3	0.60	1.4
Sulfate mg SO_4/l	2	8	21	10	10	15	10
Specific Conductance micromhos/cm	450	675	685	625	630	235	650
pH	8.1	8.35	8.5	8.3	8.6	8.3	8.5
Total Phosphorus mg/l	<0.01	0.45	0.43	0.31	0.30	<0.01	0.35
Nitrate mg NO_3-N/l	0.01	0.12	0.41	0.04	0.05	0.06	0.06
Kjeldahl Nitrogen mg N/l	1.12	0.84	0.84	1.12	1.12	1.12	1.12
Ammonia mg NH_3-N/l	0.35	<0.15	<0.15	<0.15	<0.15	0.18	<0.15
Fluoride mg/l	0.10	4.50	0.39	3.85	3.30	0.19	3.85
Chloride mg/l	2.0	16.0	3.0	14.5	15.5	2.0	17.0

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Montana Environmental Laboratory

376 W. Washington — P.O. Box 1876 Kalispell, Montana 59901 Phone: 755-2131

NEOMA (RENE) SOL

Date Received: 12/06/89
Date Reported: 12/13/89
MEL # : 835

W.R. Grace & Co.
P.O. Box 609
Libby, MT 59923

Sample Date: 12/05/89

SPECIAL WATER ANALYSIS:

	1-Rainy Cr. above Diversion #1	2-Toe Drain from Tailings Pond #2	3-Carney Cr. #3	4-Lower Pond #4	5-Rainey Cr. at Kootenai #5	9-Loading Potable Water #9
Total Suspended Solids mg/l.....	5	<1	9	9	34	27
Total Dissolved Solids) mg/l.....	197	721	378	380	356	384
Turbidity NTU.....	0.40	1.8	2.4	2.0	24	26
Sulfate mg SO_4/l.....	3	9	1	14	18	19
Specific Conductance micromhos/cm.....	380	720	645	660	600	630
pH.....	8.2	7.3	8.4	8.2	8.5	8.4
Total Phosphorus mg/l.....	<0.01	0.43	0.48	0.43	0.26	0.33
Nitrate mg NO_3-N/l.....	0.12	0.10	0.22	0.12	0.17	0.23
Kjeldahl Nitrogen mg N/l.....	0.84	0.56	1.12	0.56	0.28	0.28
Ammonia mg NH_3-N/l.....	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Fluoride mg/l.....	0.10	4.60	0.19	2.70	1.24	2.00
Chloride mg/l.....	1	20	3	14	14	18

Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-80-005)

EMS No.	T-2009	Client	WRGRACE
Sample No.	2-Fleetwood/Artessian Well	Reference	PO# 26094
Date	1/29/90		

Total Asbestos Fibers	*BDL	MFL
Chrysotile Fibers	*BDL	MFL
Amphibole Fibers	*BDL	MFL
> 5 Micron length (chrysotile)	*BDL	MFL
> 5 Micron length (amphibole)	*BDL	MFL
Mass (Chrysotile)	*BDL	µg/L
Mass (amphibole)	*BDL	µg/L
More/Less than 5 Chrysotile Fibers in Sample	LESS	
More/Less than 5 Amphibole Fibers in Sample	LESS	
Poisson 95% Confidence Interval	0 to 0.8	MFL
Detection Limit	0.2	MFL

* BDL : Below Detection Limit; MFL: Million Fibers per Liter

Size Distribution (Chrysotile and Amphibole)

Particle Length - Microns

O -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 & UP
0	0	0	0	0	0

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 & UP
0	0	0	0	0	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 & UP
0	0	0	0	0	0

LSB 34 00532

Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-80-005)

EMS No.	T-2009	Client	WR GRACE
Sample No.	1-CARNEY CREEK	Reference	P0# 26094
Date	1/29/90		

Total Asbestos Fibers	280	MFL
Chrysotile Fibers	*BDL	MFL
Amphibole Fibers	280	MFL
> 5 Micron length (chrysotile)	*BDL	MFL
> 5 Micron length (amphibole)	34	MFL
Mass (Chrysotile)	*BDL	µg/L
Mass (amphibole)	1600	µg/L
More/Less than 5 Chrysotile Fibers in Sample	LESS	
More/Less than 5 Amphibole Fibers in Sample	MORE	
Poisson 95% Confidence Interval	11 to 79	MFL
Detection Limit	6.8	MFL

* BDL : Below Detection Limit; MFL: Million Fibers per Liter

Size Distribution (Chrysotile and Amphibole)

Particle Length - Microns

O -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 & UP
0	7	8	2	8	17

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 & UP
0	1	5	11	3	22

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 & UP
21	15	5	1	0	0

LSB 34 00535