BIANNUAL SPRING MONITORING REPORT

3rd Quarter 1992

		SP-2			SP-4		
		Jul.	Aug.	Sep.	Jul.	Aug.	Sep.
Sample Date		7/14/92			7/14/92		
Sample Time		1330			1020		
Sampled By		Eccli			Eccli		
Flow Rate	gpm	2.4			4.1		
Air Temperature	deg. F	69			56		
Water Temperature	deg. F	45			44		
PH	units	7.60			8.11		
Conductivity	umhos/cm	362			418		
Dissolved Oxygen	ppm						
Total Dissolved Solids	mg/l	294			314		
Total Settleable Solids	mg/l						
Total Suspended Solids	mg/l	3			5		
Total Hardness (CaCo3)	mg/l						
Acidity	mg/l						
Aluminum (Al)	mg/l						
Arsenic (As)	mg/l						
Barium (Ba)	mg/l						
Bicarbonate (HCO3)	mg/l						
Boron (B)	mg/l						
Carbonate (CO3)	mg/l						
Cation-Anion Balance	%						
Cadmium (Cd)	mg/l						
Calcium (Ca)	mg/l						
Chloride (Cl-1)	mg/l	2.06			2.57		
Chromium (Cr)	mg/l						
Copper (Cu)	mg/l						
Fluoride (Fl)	mg/l						
Iron (Fe) Dissolved	mg/l	<0.05			<0.05		
Iron (Fe) Total	mg/l	0.06			0.07		
Lead (Pb)	mg/l						
Sulfate (SO4-2)	mg/l	9.06			9.06		
Sulfide (SO2-1)	mg/l						
Magnesium (Mg)	mg/l						
Manganese (Mn)	mg/l						
Mercury (Hg)	mg/l						
Molybdenum (Mo)	mg/l						
Nickel (Ni)	mg/l						
Nitrogen: Ammonia (NH3)	mg/l						
Total Nitrate & Nitrite	mg/l	0.15			<0.02		
Nitrate (NO3-1)	mg/l						
Nitrite (NO2)	mg/l						
Oil and Grease	mg/l						
Potassium (K)	mg/l						
Phosphate Total (PO4-3)	mg/l						
Selenium (Se)	mg/l						
Sodium (Na)	mg/l						
Zinc (Zn)	mg/l						

I/A = Inaccessible

BIANNUAL SPRING MONITORING REPORT

3rd Quarter 1992

		SP-5			SP-11		
		Jul.	Aug.	Sep.	Jul.	Aug.	Sep.
Sample Date		7/14/92			7/13/92		
Sample Time		0855			1030		
Sampled By		Eccli			Eccli		
Flow Rate	gpm	1			6.8		
Air Temperature	deg. F	59			70		
Water Temperature	deg. F	46			55		
PH	units	7.42			7.60		
Conductivity	umhos/cm	465			399		
Dissolved Oxygen	ppm						
Total Dissolved Solids	mg/l	344			298		
Total Settleable Solids	mg/l						
Total Suspended Solids	mg/l	1			2		
Total Hardness (CaCo3)	mg/l						
Acidity	mg/l						
Aluminum (Al)	mg/l						
Arsenic (As)	mg/l						
Barium (Ba)	mg/l						
Bicarbonate (HCO3)	mg/l						
Boron (B)	mg/l						
Carbonate (CO3)	mg/l						
Cation-Anion Balance	%						
Cadmium (Cd)	mg/l						
Calcium (Ca)	mg/l						
Chloride (Cl-1)	mg/l	2.06			4.11		
Chromium (Cr)	mg/l						
Copper (Cu)	mg/l						
Fluoride (Fl)	mg/l						
Iron (Fe) Dissolved	mg/l	<0.05			<0.05		
Iron (Fe) Total	mg/l	<0.05			0.09		
Lead (Pb)	mg/l						
Sulfate (SO4-2)	mg/l	33.3			33.8		
Sulfide (SO2-1)	mg/l						
Magnesium (Mg)	mg/l						
Manganese (Mn)	mg/l						
Mercury (Hg)	mg/l						
Molybdenum (Mo)	mg/l						
Nickel (Ni)	mg/l						
Nitrogen: Ammonia (NH3)	mg/l						
Total Nitrate & Nitrite	mg/l	<0.02			<0.02		
Nitrate (NO3-1)	mg/l						
Nitrite (NO2)	mg/l						
Oil and Grease	mg/l						
Potassium (K)	mg/l						
Phosphate Total (PO4-3)	mg/l						
Selenium (Se)	mg/l						
Sodium (Na)	mg/l						
Zinc (Zn)	mg/l						

I/A = Inaccessible

BIANNUAL SPRING MONITORING REPORT

3rd Quarter 1992

		SP-12			SP-13		
		Jul.	Aug.	Sep.	Jul.	Aug.	Sep.
Sample Date		7/14/92			7/13/92		
Sample Time		1145			0135		
Sampled By		Eccli			Eccli		
Flow Rate	gpm	4.1			Damp - No measurable flow.		
Air Temperature	deg. F	68					
Water Temperature	deg. F	51					
PH	units	8.30					
Conductivity	umhos/cm	394					
Dissolved Oxygen	ppm						
Total Dissolved Solids	mg/l	284					
Total Settleable Solids	mg/l						
Total Suspended Solids	mg/l	4					
Total Hardness (CaCo3)	mg/l						
Acidity	mg/l						
Aluminum (Al)	mg/l						
Arsenic (As)	mg/l						
Barium (Ba)	mg/l						
Bicarbonate (HCO3)	mg/l						
Boron (B)	mg/l						
Carbonate (CO3)	mg/l						
Cation-Anion Balance	%						
Cadmium (Cd)	mg/l						
Calcium (Ca)	mg/l						
Chloride (Cl-1)	mg/l	3.5					
Chromium (Cr)	mg/l						
Copper (Cu)	mg/l						
Fluoride (Fl)	mg/l						
Iron (Fe) Dissolved	mg/l	<0.05					
Iron (Fe) Total	mg/l	<0.05					
Lead (Pb)	mg/l						
Sulfate (SO4-2)	mg/l	21.0					
Sulfide (SO2-1)	mg/l						
Magnesium (Mg)	mg/l						
Manganese (Mn)	mg/l						
Mercury (Hg)	mg/l						
Molybdenum (Mo)	mg/l						
Nickel (Ni)	mg/l						
Nitrogen: Ammonia (NH3)	mg/l						
Total Nitrate & Nitrite	mg/l	<0.02					
Nitrate (NO3-1)	mg/l						
Nitrite (NO2)	mg/l						
Oil and Grease	mg/l						
Potassium (K)	mg/l						
Phosphate Total (PO4-3)	mg/l						
Selenium (Se)	mg/l						
Sodium (Na)	mg/l						
Zinc (Zn)	mg/l						

I/A = Inaccessible

MINE WATER DISCHARGE REPORT
1992
DISCHARGE STATUS

Discharge Point	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
D001	D	D	D	D / D	D / D	D / D	D / D	D / D	D / D			
D002	D	D	D	D / D	D / D	D / D	D / D	D / D	D / D			
D003	ND	ND	ND	ND	ND	ND	ND	ND	ND			
D004	ND	ND	ND	ND	ND	ND	ND	ND	ND			
D005	ND	ND	ND	ND	ND	ND	ND	ND	ND			
D006	ND	ND	ND	ND	ND	ND	ND	ND	ND			
D007	ND	ND	ND	ND	ND	ND	ND	ND	ND			
D008	ND	ND	ND	ND	ND	ND	ND	ND	ND			
D009	ND	ND	ND	ND	ND	ND	ND	ND	ND			
D010	ND	ND	ND	IA	D	D	ND	ND	ND			
D011	ND	ND	ND	ND	ND	ND	ND	ND	ND			
D012	ND	ND	ND	ND	ND	ND	ND	ND	ND			
D013	ND	ND	ND	ND	ND	ND	ND	ND	ND			

D = Discharge occurred ND = No discharge IA = Inaccessable

MINE WATER DISCHARGE REPORT

STATION D001

1992

Parameters	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Date	01-24	02-21	03-26	04-09 04-30	05-14 05-28	06-11 06-26	07-09 07-23	08-07 08-20	09-03 09-17			
Time	1015	IA	1400	0920 0945	1115 1100	1230 1120	1330 1025	1120 1330	1159 1030			
Flow Rate (gpm)	265		215	242 809	193 346	373 373	404 346	404 346	319 30			
PH	6.69		7.13	7.05 6.92	6.98 6.97	6.94 6.97	6.97 6.94	6.96 6.98	6.89 6.96			
Conductivity (umhos/cm)	900		845	1180 1044	930 967	968 885	883 962	863 769	889 930			
Oil&Grease (mg/l)	2.1		<1	<1 1.4	1.2 0.3	0.2 0.2	<1 0.8	<1 2.3	0.4 1.1			
T.D.S. (mg/l)	684		720	698 713	667 730	662 671	659 701	690 696	670 666			
T.S.S. (mg/l)	2.0		5.0	<0.5 8.0	5.0 1.0	4.0 3.0	5.0 3.0	1.0 9.0	2.0 2.0			
Total Iron (mg/l)	0.04		0.02	0.05 <0.02	<0.02 0.06	0.02 0.19	<0.02 0.07	0.07 0.05	<0.02 0.06			

IA = Inaccessable

MINE WATER DISCHARGE REPORT

STATION D002

1992

Parameters	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Date	01-24	02-21	03-26	04-09 04-30	05-14 05-28	06-11 06-26	07-09 07-23	08-07 08-20	09-03 09-17			
Time	930	900	1320	0840 0830	1000 1020	1155 1015	1255 920	1030 1245	1115 940			
Flow Rate (gpm)	89	215	292	215 30	171 215	104 171	74 104	89 74	171 292			
PH	7.71	6.83	8.06	8.15 8.20	8.23 8.20	8.12 8.14	8.15 8.30	8.33 8.13	8.09 8.21			
Conductivity (umhos/cm)	830	900	892	958 895	930 958	1012 920	936 971	936 715	903 974			
Oil&Grease (mg/l)	1.5	3.3	<1	<1 1.0	0.1 0.5	0.4 0.9	0.3 0.5	2.1 1.7	1.6 0.9			
T.D.S. (mg/l)	684	663	704	636 659	706 630	620 660	655 637	624 597	631 665			
T.S.S. (mg/l)	1.0	2.0	4.0	<0.5 6.0	9.0 <0.05	13.0 6.0	5.0 6.0	3.0 <0.05	1.0 5.0			
Total Iron (mg/l)	0.03	<0.02	<0.02	<0.02 <0.02	<0.02 <0.02	0.15 0.04	<0.02 0.03	0.05 <0.02	0.03 0.02			

MINE WATER DISCHARGE REPORT

STATION D010

1992

Parameters	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Date	IA	IA	IA	IA	05-14	06-11	07-09	08-07	09-17			
Time					0900	0945	840	1020	1115			
Flow Rate (gpm)					1.24	0.75	Dry	Dry	Dry			
PH					7.95	7.83						
Conductivity (umhos/cm)					720	517						
Oil&Grease (mg/l)					0.4	0.4						
T.D.S. (mg/l)					359	369						
T.S.S. (mg/l)					2.0	1.0						
Total Iron (mg/l)					<0.02	<0.02						

IA = Inaccessable

WATER MONITORING REPORT

4th Quarter 1992

UNITED STATES FUEL COMPANY
Hiawatha, Utah 84527

QUARTERLY STREAM MONITORING REPORT

4th Quarter 1992

		ST-1			ST-2		
		Oct.	Nov.	Dec.	Oct.	Nov.	Dec.
Sample Date		10/13/92			10/13/92		
Sample Time		1400			1345		
Sampled By		Eccli			Eccli		
Flow Rate	gpm	41.2			104		
Air Temperature	deg. F	64			62		
Water Temperature	deg. F	46			42		
PH	units	8.10			8.12		
Conductivity	umhos/cm	1360			664		
Dissolved Oxygen	ppm	5.9			5.0		
Total Dissolved Solids	mg/l						
Total Settleable Solids	mg/l						
Total Suspended Solids	mg/l						
Total Hardness (CaCo3)	mg/l						
Acidity	mg/l						
Aluminum (Al)	mg/l						
Arsenic (As)	mg/l						
Barium (Ba)	mg/l						
Bicarbonate (HCO3)	mg/l						
Boron (B)	mg/l						
Carbonate (CO3)	mg/l						
Cation-Anion Balance	%						
Cadmium (Cd)	mg/l						
Calcium (Ca)	mg/l						
Chloride (Cl-1)	mg/l						
Chromium (Cr)	mg/l						
Copper (Cu)	mg/l						
Fluoride (Fl)	mg/l						
Iron (Fe) Dissolved	mg/l						
Iron (Fe) Total	mg/l						
Lead (Pb)	mg/l						
Sulfate (SO4-2)	mg/l						
Sulfide (SO2-1)	mg/l						
Magnesium (Mg)	mg/l						
Manganese (Mn)	mg/l						
Mercury (Hg)	mg/l						
Molybdenum (Mo)	mg/l						
Nickel (Ni)	mg/l						
Nitrogen: Ammonia (NH3)	mg/l						
Nitrate (NO3-1)	mg/l						
Nitrite (NO2)	mg/l						
Oil and Grease	mg/l						
Potassium (K)	mg/l						
Phosphate Total (PO4-3)	mg/l						
Selenium (Se)	mg/l						
Sodium (Na)	mg/l						
Zinc (Zn)	mg/l						

I/A = Inaccessable

QUARTERLY STREAM MONITORING REPORT

4th Quarter 1992

		ST-2B			ST-3		
		Oct.	Nov.	Dec.	Oct.	Nov.	Dec.
Sample Date		10/13/92			10/13/92		
Sample Time		1310			1430		
Sampled By		Eccli			Eccli		
Flow Rate	gpm	41			5		
Air Temperature	deg. F	62			72		
Water Temperature	deg. F	43			46		
PH	units	8.13			8.04		
Conductivity	umhos/cm	505			2430		
Dissolved Oxygen	ppm	4.7			4.9		
Total Dissolved Solids	mg/l						
Total Settleable Solids	mg/l						
Total Suspended Solids	mg/l						
Total Hardness (CaCo3)	mg/l						
Acidity	mg/l						
Aluminum (Al)	mg/l						
Arsenic (As)	mg/l						
Barium (Ba)	mg/l						
Bicarbonate (HCO3)	mg/l						
Boron (B)	mg/l						
Carbonate (CO3)	mg/l						
Cation-Anion Balance	%						
Cadmium (Cd)	mg/l						
Calcium (Ca)	mg/l						
Chloride (Cl-1)	mg/l						
Chromium (Cr)	mg/l						
Copper (Cu)	mg/l						
Fluoride (Fl)	mg/l						
Iron (Fe) Dissolved	mg/l						
Iron (Fe) Total	mg/l						
Lead (Pb)	mg/l						
Sulfate (SO4-2)	mg/l						
Sulfide (SO2-1)	mg/l						
Magnesium (Mg)	mg/l						
Manganese (Mn)	mg/l						
Mercury (Hg)	mg/l						
Molybdenum (Mo)	mg/l						
Nickel (Ni)	mg/l						
Nitrogen: Ammonia (NH3)	mg/l						
Nitrate (NO3-1)	mg/l						
Nitrite (NO2)	mg/l						
Oil and Grease	mg/l						
Potassium (K)	mg/l						
Phosphate Total (PO4-3)	mg/l						
Selenium (Se)	mg/l						
Sodium (Na)	mg/l						
Zinc (Zn)	mg/l						

I/A = Inaccessible

QUARTERLY STREAM MONITORING REPORT

4th Quarter 1992

		ST-3A			ST-3B		
		Oct.	Nov.	Dec.	Oct.	Nov.	Dec.
Sample Date		10/13/92			10/13/92		
Sample Time		1200			0940		
Sampled By		Eccli			Eccli		
Flow Rate	gpm	Dry			0.9		
Air Temperature	deg. F				55		
Water Temperature	deg. F				49		
PH	units				7.88		
Conductivity	umhos/cm				4960		
Dissolved Oxygen	ppm				4.3		
Total Dissolved Solids	mg/l						
Total Settleable Solids	mg/l						
Total Suspended Solids	mg/l						
Total Hardness (CaCo3)	mg/l						
Acidity	mg/l						
Aluminum (Al)	mg/l						
Arsenic (As)	mg/l						
Barium (Ba)	mg/l						
Bicarbonate (HCO3)	mg/l						
Boron (B)	mg/l						
Carbonate (CO3)	mg/l						
Cation-Anion Balance	%						
Cadmium (Cd)	mg/l						
Calcium (Ca)	mg/l						
Chloride (Cl-1)	mg/l						
Chromium (Cr)	mg/l						
Copper (Cu)	mg/l						
Fluoride (Fl)	mg/l						
Iron (Fe) Dissolved	mg/l						
Iron (Fe) Total	mg/l						
Lead (Pb)	mg/l						
Sulfate (SO4-2)	mg/l						
Sulfide (SO2-1)	mg/l						
Magnesium (Mg)	mg/l						
Manganese (Mn)	mg/l						
Mercury (Hg)	mg/l						
Molybdenum (Mo)	mg/l						
Nickel (Ni)	mg/l						
Nitrogen: Ammonia (NH3)	mg/l						
Nitrate (NO3-1)	mg/l						
Nitrite (NO2)	mg/l						
Oil and Grease	mg/l						
Potassium (K)	mg/l						
Phosphate Total (PO4-3)	mg/l						
Selenium (Se)	mg/l						
Sodium (Na)	mg/l						
Zinc (Zn)	mg/l						

I/A = Inaccessible

QUARTERLY STREAM MONITORING REPORT

4th Quarter 1992

		ST-4			ST-4A		
		Oct.	Nov.	Dec.	Oct.	Nov.	Dec.
Sample Date		10/13/92			10/13/92		
Sample Time		1445			1505		
Sampled By		Eccli			Eccli		
Flow Rate	gpm	Dry			Dry		
Air Temperature	deg. F						
Water Temperature	deg. F						
PH	units						
Conductivity	umhos/cm						
Dissolved Oxygen	ppm						
Total Dissolved Solids	mg/l						
Total Settleable Solids	mg/l						
Total Suspended Solids	mg/l						
Total Hardness (CaCo3)	mg/l						
Acidity	mg/l						
Aluminum (Al)	mg/l						
Arsenic (As)	mg/l						
Barium (Ba)	mg/l						
Bicarbonate (HCO3)	mg/l						
Boron (B)	mg/l						
Carbonate (CO3)	mg/l						
Cation-Anion Balance	%						
Cadmium (Cd)	mg/l						
Calcium (Ca)	mg/l						
Chloride (Cl-1)	mg/l						
Chromium (Cr)	mg/l						
Copper (Cu)	mg/l						
Fluoride (Fl)	mg/l						
Iron (Fe) Dissolved	mg/l						
Iron (Fe) Total	mg/l						
Lead (Pb)	mg/l						
Sulfate (SO4-2)	mg/l						
Sulfide (SO2-1)	mg/l						
Magnesium (Mg)	mg/l						
Manganese (Mn)	mg/l						
Mercury (Hg)	mg/l						
Molybdenum (Mo)	mg/l						
Nickel (Ni)	mg/l						
Nitrogen: Ammonia (NH3)	mg/l						
Nitrate (NO3-1)	mg/l						
Nitrite (NO2)	mg/l						
Oil and Grease	mg/l						
Potassium (K)	mg/l						
Phosphate Total (PO4-3)	mg/l						
Selenium (Se)	mg/l						
Sodium (Na)	mg/l						
Zinc (Zn)	mg/l						

I/A = Inaccessible

QUARTERLY STREAM MONITORING REPORT

4th Quarter 1992

		ST-4B			ST-5		
		Oct.	Nov.	Dec.	Oct.	Nov.	Dec.
Sample Date		10/13/92			10/13/92		
Sample Time		1520			1535		
Sampled By		Eccli			Eccli		
Flow Rate	gpm	Dry			89		
Air Temperature	deg. F				72		
Water Temperature	deg. F				54		
PH	units				8.17		
Conductivity	umhos/cm				1340		
Dissolved Oxygen	ppm				5.5		
Total Dissolved Solids	mg/l						
Total Settleable Solids	mg/l						
Total Suspended Solids	mg/l						
Total Hardness (CaCo3)	mg/l						
Acidity	mg/l						
Aluminum (Al)	mg/l						
Arsenic (As)	mg/l						
Barium (Ba)	mg/l						
Bicarbonate (HCO3)	mg/l						
Boron (B)	mg/l						
Carbonate (CO3)	mg/l						
Cation-Anion Balance	%						
Cadmium (Cd)	mg/l						
Calcium (Ca)	mg/l						
Chloride (Cl-1)	mg/l						
Chromium (Cr)	mg/l						
Copper (Cu)	mg/l						
Fluoride (Fl)	mg/l						
Iron (Fe) Dissolved	mg/l						
Iron (Fe) Total	mg/l						
Lead (Pb)	mg/l						
Sulfate (SO4-2)	mg/l						
Sulfide (SO2-1)	mg/l						
Magnesium (Mg)	mg/l						
Manganese (Mn)	mg/l						
Mercury (Hg)	mg/l						
Molybdenum (Mo)	mg/l						
Nickel (Ni)	mg/l						
Nitrogen: Ammonia (NH3)	mg/l						
Nitrate (NO3-1)	mg/l						
Nitrite (NO2)	mg/l						
Oil and Grease	mg/l						
Potassium (K)	mg/l						
Phosphate Total (PO4-3)	mg/l						
Selenium (Se)	mg/l						
Sodium (Na)	mg/l						
Zinc (Zn)	mg/l						

I/A = Inaccessible

BIANNUAL SPRING MONITORING REPORT

4th Quarter 1992

		SP-2			SP-4		
		Oct.	Nov.	Dec.	Oct.	Nov.	Dec.
Sample Date		10/30/92			10/30/92		
Sample Time		I/A			I/A		
Sampled By							
Flow Rate	gpm						
Air Temperature	deg. F						
Water Temperature	deg. F						
PH	units						
Conductivity	umhos/cm						
Dissolved Oxygen	ppm						
Total Dissolved Solids	mg/l						
Total Settleable Solids	mg/l						
Total Suspended Solids	mg/l						
Total Hardness (CaCo3)	mg/l						
Acidity	mg/l						
Aluminum (Al)	mg/l						
Arsenic (As)	mg/l						
Barium (Ba)	mg/l						
Bicarbonate (HCO3)	mg/l						
Boron (B)	mg/l						
Carbonate (CO3)	mg/l						
Cation-Anion Balance	%						
Cadmium (Cd)	mg/l						
Calcium (Ca)	mg/l						
Chloride (Cl-1)	mg/l						
Chromium (Cr)	mg/l						
Copper (Cu)	mg/l						
Fluoride (Fl)	mg/l						
Iron (Fe) Dissolved	mg/l						
Iron (Fe) Total	mg/l						
Lead (Pb)	mg/l						
Sulfate (SO4-2)	mg/l						
Sulfide (SO2-1)	mg/l						
Magnesium (Mg)	mg/l						
Manganese (Mn)	mg/l						
Mercury (Hg)	mg/l						
Molybdenum (Mo)	mg/l						
Nickel (Ni)	mg/l						
Nitrogen: Ammonia (NH3)	mg/l						
Total Nitrate & Nitrite	mg/l						
Nitrate (NO3-1)	mg/l						
Nitrite (NO2)	mg/l						
Oil and Grease	mg/l						
Potassium (K)	mg/l						
Phosphate Total (PO4-3)	mg/l						
Selenium (Se)	mg/l						
Sodium (Na)	mg/l						
Zinc (Zn)	mg/l						

I/A = Inaccessible

BIANNUAL SPRING MONITORING REPORT

4th Quarter 1992

		SP-5			SP-11		
		Oct.	Nov.	Dec.	Oct.	Nov.	Dec.
Sample Date		10/30/92			10/30/92		
Sample Time		I/A			I/A		
Sampled By							
Flow Rate	gpm						
Air Temperature	deg. F						
Water Temperature	deg. F						
PH	units						
Conductivity	umhos/cm						
Dissolved Oxygen	ppm						
Total Dissolved Solids	mg/l						
Total Settleable Solids	mg/l						
Total Suspended Solids	mg/l						
Total Hardness (CaCo3)	mg/l						
Acidity	mg/l						
Aluminum (Al)	mg/l						
Arsenic (As)	mg/l						
Barium (Ba)	mg/l						
Bicarbonate (HCO3)	mg/l						
Boron (B)	mg/l						
Carbonate (CO3)	mg/l						
Cation-Anion Balance	%						
Cadmium (Cd)	mg/l						
Calcium (Ca)	mg/l						
Chloride (Cl-1)	mg/l						
Chromium (Cr)	mg/l						
Copper (Cu)	mg/l						
Fluoride (Fl)	mg/l						
Iron (Fe) Dissolved	mg/l						
Iron (Fe) Total	mg/l						
Lead (Pb)	mg/l						
Sulfate (SO4-2)	mg/l						
Sulfide (SO2-1)	mg/l						
Magnesium (Mg)	mg/l						
Manganese (Mn)	mg/l						
Mercury (Hg)	mg/l						
Molybdenum (Mo)	mg/l						
Nickel (Ni)	mg/l						
Nitrogen: Ammonia (NH3)	mg/l						
Total Nitrate & Nitrite	mg/l						
Nitrate (NO3-1)	mg/l						
Nitrite (NO2)	mg/l						
Oil and Grease	mg/l						
Potassium (K)	mg/l						
Phosphate Total (PO4-3)	mg/l						
Selenium (Se)	mg/l						
Sodium (Na)	mg/l						
Zinc (Zn)	mg/l						

I/A = Inaccessible

BIANNUAL SPRING MONITORING REPORT

4th Quarter 1992

		SP-12			SP-13		
		Oct.	Nov.	Dec.	Oct.	Nov.	Dec.
Sample Date		10/30/92			10/21/92		
Sample Time		I/A			1230		
Sampled By					Eccli		
Flow Rate	gpm				Dry		
Air Temperature	deg. F						
Water Temperature	deg. F						
PH	units						
Conductivity	umhos/cm						
Dissolved Oxygen	ppm						
Total Dissolved Solids	mg/l						
Total Settleable Solids	mg/l						
Total Suspended Solids	mg/l						
Total Hardness (CaCo3)	mg/l						
Acidity	mg/l						
Aluminum (Al)	mg/l						
Arsenic (As)	mg/l						
Barium (Ba)	mg/l						
Bicarbonate (HCO3)	mg/l						
Boron (B)	mg/l						
Carbonate (CO3)	mg/l						
Cation-Anion Balance	%						
Cadmium (Cd)	mg/l						
Calcium (Ca)	mg/l						
Chloride (Cl-1)	mg/l						
Chromium (Cr)	mg/l						
Copper (Cu)	mg/l						
Fluoride (Fl)	mg/l						
Iron (Fe) Dissolved	mg/l						
Iron (Fe) Total	mg/l						
Lead (Pb)	mg/l						
Sulfate (SO4-2)	mg/l						
Sulfide (SO2-1)	mg/l						
Magnesium (Mg)	mg/l						
Manganese (Mn)	mg/l						
Mercury (Hg)	mg/l						
Molybdenum (Mo)	mg/l						
Nickel (Ni)	mg/l						
Nitrogen: Ammonia (NH3)	mg/l						
Total Nitrate & Nitrite	mg/l						
Nitrate (NO3-1)	mg/l						
Nitrite (NO2)	mg/l						
Oil and Grease	mg/l						
Potassium (K)	mg/l						
Phosphate Total (PO4-3)	mg/l						
Selenium (Se)	mg/l						
Sodium (Na)	mg/l						
Zinc (Zn)	mg/l						

I/A = Inaccessible

MINE WATER DISCHARGE REPORT
1992
DISCHARGE STATUS

Discharge Point	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
D001	D	D	D	D D	D D	D D	D D	D D	D D	D	D	D
D002	D	D	D	D D	D D	D D	D D	D D	D D	D	ND	ND
D003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
D004	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
D005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
D006	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
D007	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
D008	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
D009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
D010	ND	ND	ND	IA	D	D	ND	ND	ND	ND	IA	IA
D011	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
D012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
D013	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

D = Discharge occurred ND = No discharge IA = Inaccessible

MINE WATER DISCHARGE REPORT

STATION D001

1992

Parameters	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Date	01-24	02-21	03-26	04-09 04-30	05-14 05-28	06-11 06-26	07-09 07-23	08-07 08-20	09-03 09-17	10-28	11-19	12-21
Time	1015	IA	1400	0920 0945	1115 1100	1230 1120	1330 1025	1120 1330	1159 1030	1400	1400	1115
Flow Rate (gpm)	265		215	242 809	193 346	373 373	404 346	404 346	319 30	346	628	498
PH	6.69		7.13	7.05 6.92	6.98 6.97	6.94 6.97	6.97 6.94	6.96 6.98	6.89 6.96	7.06	7.10	7.14
Conductivity (umhos/cm)	900		845	1180 1044	930 967	968 885	883 962	863 769	889 930	1270	1050	1020
Oil&Grease (mg/l)	2.1		<1	<1 1.4	1.2 0.3	0.2 0.2	<1 0.8	<1 2.3	0.4 1.1	1.3	<1	0.9
T.D.S. (mg/l)	684		720	698 713	667 730	662 671	659 701	690 696	670 666	634	699	741
T.S.S. (mg/l)	2.0		5.0	<0.5 8.0	5.0 1.0	4.0 3.0	5.0 3.0	1.0 9.0	2.0 2.0	4.0	5.0	4.0
Total Iron (mg/l)	0.04		0.02	0.05 <0.02	<0.02 0.06	0.02 0.19	<0.02 0.07	0.07 0.05	<0.02 0.06	<0.02	0.09	<0.02

IA = Inaccessable

MINE WATER DISCHARGE REPORT

STATION D002

1992

Parameters	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Date	01-24	02-21	03-26	04-09 04-30	05-14 05-28	06-11 06-26	07-09 07-23	08-07 08-20	09-03 09-17	10-28	11-19	
Time	930	900	1320	0840 0830	1000 1020	1155 1015	1255 920	1030 1245	1115 940	1300	1315	
Flow Rate (gpm)	89	215	292	215 30	171 215	104 171	74 104	89 74	171 292	74	0	0
PH	7.71	6.83	8.06	8.15 8.20	8.23 8.20	8.12 8.14	8.15 8.30	8.33 8.13	8.09 8.21	8.45		
Conductivity (umhos/cm)	830	900	892	958 895	930 958	1012 920	936 971	936 715	903 974	1130		
Oil&Grease (mg/l)	1.5	3.3	<1	<1 1.0	0.1 0.5	0.4 0.9	0.3 0.5	2.1 1.7	1.6 0.9	0.8		
T.D.S. (mg/l)	684	663	704	636 659	706 630	620 660	655 637	624 597	631 665	628		
T.S.S. (mg/l)	1.0	2.0	4.0	<0.5 6.0	9.0 <0.05	13.0 6.0	5.0 6.0	3.0 <0.05	1.0 5.0	5.0		
Total Iron (mg/l)	0.03	<0.02	<0.02	<0.02 <0.02	<0.02 <0.02	0.15 0.04	<0.02 0.03	0.05 <0.02	0.03 0.02	<0.02		

MINE WATER DISCHARGE REPORT

STATION D010

1992

Parameters	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Date	IA	IA	IA	IA	05-14	06-11	07-09	08-07	09-17	10-28	11-19	
Time					0900	0945	840	1020	1115	1130	I/A	I/A
Flow Rate (gpm)					1.24	0.75	Dry	Dry	Dry	Dry		
PH					7.95	7.83						
Conductivity (umhos/cm)					720	517						
Oil&Grease (mg/l)					0.4	0.4						
T.D.S. (mg/l)					359	369						
T.S.S. (mg/l)					2.0	1.0						
Total Iron (mg/l)					<0.02	<0.02						

IA = Inaccessible

Olympus Aerial Surveys, Inc.
Subsidence Study Report
using elevation readings from photography dated
September 30, 1992 versus those of September 28, 1988
FOR
U. S. FUEL Co.

1992 HIAWATHA SUBSIDENCE STUDY

USING SEPT 1992 RE-SURVEYED CONTROL:

POINT	EASTING	NORTHING	1988 ELEVATION	1992 DIFFERENCE	POINT
300	-16154.84	9455.11	9145.11	OBSCURED	300
301	-19121.40	10685.80	9834.34	-0.78	301
302	-19173.66	10300.36	9820.79	-0.58	302
303	-18869.55	10206.93	9700.41	-0.02	303
304	-18581.16	10303.30	9654.68	-0.64	304
305	-18086.90	10234.14	9506.03	+0.86	305
306	-17709.62	10335.41	9565.75	-0.28	306
307	-17396.10	10215.50	9578.39	-0.01	307
308	-17026.66	10492.97	9421.05	-0.33	308
309	-16470.35	10432.95	9107.78	-0.01	309
310	-16010.35	10379.94	8892.65	-0.30	310
311	-15534.21	10214.41	8658.30	-0.01	311
312	-15030.33	10279.77	8555.36	-0.02	312
313	-19120.12	10030.57	9726.74	-0.01	313
314	-19064.92	9847.59	9637.45	-0.15	314
315	-18832.57	9843.37	9572.86	-0.38	315
316	-18533.11	9941.48	9495.16	-0.38	316
317	-18093.74	9870.18	9353.92	-0.02	317
318	-17723.09	9760.03	9359.17	+0.54	318
319	-17264.45	9925.78	9502.48	0.0	319
320	-17237.77	9502.10	9325.44	+0.37	320
321	-17042.88	9835.38	9468.03	+0.67	321
322	-16862.99	9375.28	9410.64	-0.10	322
323	-16407.90	9639.15	9323.66	-0.12	323
324	-16022.32	9703.75	8994.83	-0.05	324
325	-15799.88	9592.11	8894.32	-0.54	325
326	-15439.19	9670.87	8702.31	-0.49	326
327	-14529.15	9520.17	8629.18	+0.46	327
328	-14098.14	9468.10	8680.60	-0.18	328
329	-13724.83	9466.06	8644.11	-0.33	329
331	-19057.04	9390.63	9480.81	-0.04	331
332	-18770.99	9358.94	9450.32	-0.30	332
333	-18429.55	9256.83	9293.85	-0.04	333
334	-17992.74	9296.12	9004.63	+0.02	334
335	-17505.63	9482.54	9272.66	+1.36	335
336	-17290.22	8829.29	8940.62	+0.07	336

337	-17042.45	9167.67	9216.47	+0.32	337
338	-16634.56	8974.17	9327.09	-0.24	338
339	-16314.62	9041.05	9307.09	+0.01	339
340	-16079.12	9068.77	9303.68	+0.11	340
341	-15915.27	9013.40	9190.97	+0.99	341
342	-15592.65	8946.68	9109.82	+1.22	342
343	-15148.10	8843.97	9083.49	+0.17	343
344	-14876.36	8741.88	9076.67	-0.01	344
345	-14506.67	8799.79	9019.29	-0.19	345
346	-14038.53	8845.22	8830.35	-0.05	346
347	-13740.43	8785.27	8694.09	+0.25	347
348	-13309.51	8655.70	8500.94	+0.37	348
349	-19032.93	8822.29	9267.53	-0.12	349
350	-18890.63	8447.55	9009.19	+0.05	350
351	-19344.28	8372.53	9011.03	+0.36	351
352	-19439.16	7927.91	9252.92	-0.07	352
353	-18801.99	7864.43	8831.27	-0.05	353
354	-18818.43	7465.64	8863.47	-0.22	354
355	-19385.66	7463.43	9253.96	-0.10	355
356	-19380.47	7271.07	9182.23	-0.47	356
357	-19063.20	6496.12	9430.72	+1.05	357
358	-19224.35	6288.24	9473.18	+0.11	358
359	-19198.78	5878.10	9389.51	+0.17	359
360	-18883.64	5414.38	9434.91	+0.59	360
361	-19002.72	5175.54	9524.31	-0.05	361
362	-18941.90	4764.81	9554.81	+0.48	362
363	-18853.51	3778.42	9634.85	+0.11	363
364	-19168.25	3300.66	9776.17	+0.03	364
365	-19130.53	3130.86	9769.47	-0.04	365
366	-19053.54	2638.47	9737.63	-0.08	366
367	-18969.16	2264.18	9728.72	+0.14	367
368	-18935.45	1853.96	9723.52	-0.31	368
369	-20166.08	9321.90	9569.49	-1.51	369
370	-19829.94	9318.36	9648.96	-1.22	370
371	-21680.93	9106.98	9826.11	-0.21	371
372	-21298.94	9057.08	9817.86	-0.06	372
373	-20819.75	8986.88	9754.46	-0.47	373
374	-20367.54	9121.52	9580.80	-0.53	374
375	-20036.82	8969.18	9460.34	-0.74	375
376	-19815.99	8907.58	9470.75	-1.55	376
377	-19490.49	9064.17	9436.42	+0.16	377
378	-21666.05	8764.28	9801.38	+0.41	378
379	-21356.45	8757.05	9813.17	+0.36	379
380	-20916.70	8591.22	9783.94	-0.53	380
381	-20318.90	8603.66	9606.75	-2.30	381
382	-20069.16	8380.79	9533.03	-1.86	382
383	-19859.97	8756.37	9385.83	-2.07	383
384	-19459.87	8502.21	9136.19	-2.32	384

385	-21704.69	8452.24	9791.02	-0.02	385
386	-21286.26	8301.75	9845.25	-0.24	386
387	-20935.16	8329.74	9807.50	0.0	387
388	-20678.23	8266.42	9743.70	-0.24	388
389	-20436.99	8163.26	9686.88	-0.92	389
390	-20045.45	8071.42	9565.09	-1.75	390
391	-19591.36	7908.10	9329.55	-2.09	391
392	-20940.17	8042.87	9830.70	-0.25	392
393	-20514.77	7860.31	9765.89	-0.64	393
394	-20298.03	7698.64	9712.01	-0.09	394
395	-19343.99	7458.34	9226.76	-0.92	395
396	-20545.28	7554.42	9819.35	-0.23	396
397	-20715.05	7300.77	9871.54	-0.12	397
398	-20203.05	7270.05	9630.36	-0.06	398
399	-18623.10	8438.53	9862.74	-0.42	399
400	-18300.56	8438.86	8935.10	-0.06	400
401	-18085.67	8396.12	8872.62	-0.02	401
402	-17712.05	8476.90	8659.57	-0.45	402
403	-17465.94	8461.25	8713.42	-0.08	403
404	-17162.72	8423.47	8801.87	-0.19	404
405	-16856.16	8485.74	8941.97	-0.50	405
406	-16533.80	8458.64	8995.07	-0.76	406
407	-16223.30	8454.41	9084.35	-0.90	407
408	-15915.85	8443.88	8937.60	-0.88	408
409	-15606.06	8430.98	8867.10	-1.18	409
410	-15291.41	8442.89	8872.42	-0.25	410
411	-15000.03	8436.97	8899.24	-0.12	411
412	-14697.00	8451.37	8974.20	+0.05	412

NOTE:
As in the prior reports, 1988 elevations for points 349 to 368 are using the revised values to reflect better information. This revision is in accordance with our prior discussions on the subject.

Prepared by

MT. NEBO SCIENTIFIC RESEARCH & CONSULTING
Post Office Box 337
Springville, Utah 84663
(801) 489-6937

for

EARTHFAX ENGINEERING
7324 South 1300 East
Midvale, Utah 84047

and

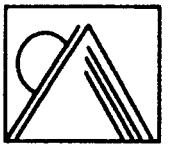
U.S. FUELS COMPANY
Hiawatha, Utah

Report: Patrick Collins, Ph.D.

September 28, 1992

VEGETATION SAMPLING RESULTS
AND DATA SUMMARIES
FOR U.S. FUELS COMPANY PROPERTY

1992



VEGETATION SAMPLING RESULTS AND DATA SUMMARIES FOR U.S. FUELS COMPANY PROPERTY

1992

INTRODUCTION

Vegetation studies are commonly done within permit areas to assess the affect of mining related activities on the plant communities and to provide reference areas. The reference areas are often used as standards for revegetation success at the time of final reclamation.

An earlier vegetation study was conducted for *U.S. Fuels Company* and submitted to the State of Utah, Division of Oil, Gas & Mining (DOGM). The study was entitled: Vegetation of the U.S. Fuels Company Property, Hiawatha, Utah: A Consolidation of Data Collected During the 1980 and 1981 Field Season (*Bio/West Inc.*, July 12, 1983). DOGM reviewed the report and in a Technical Deficiency Review (March 4, 1992), requested that additional vegetation information be submitted to comply with current regulations for the biological resources. Subsequently, a meeting with DOGM, *U.S. Fuels Company, Earthfax Engineering* & *Mt.*

Nebo Scientific was conducted on-site (June 18, 1992) to review the deficiencies and formulate specific goals for future studies. This report attempts to adequately address most of the vegetation information requested by DOGM at that time.

Cover and woody species densities were requested by DOGM of the following plant communities on *U.S. Fuels Company's* property:

Mixed Conifer Reference Area,
Mountain Brush Reference Area,
Pinyon-Juniper Reference Area,
Riparian Reference Area.

METHODS

Cover

U.S. Fuels Company provided raw field data from earlier vegetation studies on their property conducted by *Bio/West, Inc.* The cover data were recorded in 1980-81 using "step-point" methods. In this study, 20-point transects were randomly placed to determine cover and species composition of the plant communities. Raw field data sheets were summarized for this document and reported in the tables supplied. *Bio/West's* raw

data sheets and *Mt. Nebo Scientific's* computer summary sheets are also provided in an appendix of this report.

Density

For the Mixed Conifer Reference Area (MCR2) and the Mountain Brush Reference Area (MBR1), on-site data were recorded in August and September of 1992 by *Mt. Nebo Scientific*. Density of woody plant species were recorded using the point quarter distance method (Cottom and Curtis 1956). In this method, random points were placed on the sample sites and measured into four quarters. The distances to the nearest woody plant species were then recorded in each quarter. The average point-to-individual distance was equal to the square root of the mean area per individual.

For the Pinyon-Juniper Reference Area raw data sheets for the earlier *Bio/West* studies were summarized for this report. The point quarter method was also employed in the field in their study.

For the density of the Riparian Reference area, however, it was decided in the meeting with DOGM that the previously recorded and summarized data in RA13 would be adequate for the Riparian Reference Area.

Nomenclature

In an attempt to standardize all data and previous reports of the area, plant species nomenclature follows the previously recorded field data, even if specific names have recently been changed. Similar summary table formats were also employed for the same reasons.

RESULTS

Results from new and previous sampling for the following communities are provide in tables 1-8 of this report:

Mixed Conifer Reference Area,
Mountain Brush Reference Area,
Pinyon-Juniper Reference Area,
Riparian Reference Area.

Appropriate group comparisons and diversity indices will be employed to statistically compare cover, woody species density and species diversity of each area with the respective reference areas at the time of final reclamation.

Table 1. Summary of cover data for the mixed-conifer reference area MCR2 (data summary created from existing U.S. Fuels' 1980 raw data).

Lifeform	Species	Common Name	% Relative Cover	% Rel. Cover by Lifeform
Grasses	Elymus salinus	Salina wildrye	0.70	2.40
	Oryzopsis hymenoides	Indian ricegrass	1.60	
Forbs	Astragalus spp.	Milkvetch	0.85	3.09
	Arnica cordifolia	Heartleaf arnica	0.36	
	Osmorhiza obtusa	Sweetroot	0.65	
	Solidago sp.	Goldenrod	0.57	
	Swertia radiata	Swertia	0.28	
Shrubs	Amalanchier alnifolia	Serviceberry	0.95	9.67
	Berberis repens	Oregon grape	4.10	
	Juniperus communis	Common Juniper	0.29	
	Holodiscus dumosus	Ocean-spray	0.59	
	Physocarpos malvaceus	Ninebark	0.79	
	Pachistima myrsinites	Mountain Lover	0.38	
	Symphoricarpos oreophilus	Snowberry	3.89	
Trees	Acer glabrum	Rocky Mtn. maple	12.28	84.85
	Abies concolor	White fir	27.64	
	Populus tremuloides	Aspen	25.67	
	Picea pungens	Blue spruce	4.14	
	Prunus virginiana	Chokecherry	0.70	
	Pseudotsuga menziesii	Douglas fir	11.73	
	Plant		78.75	
	Litter		13.75	
	Rock		2.00	
	Bare ground		5.50	

Table 2. Average woody plant density (number of individuals per acre) for the mixed-conifer reference area MCR2 (data summary created from Mt. Nebo Scientific's field sampling in 1992).

Lifeform	Species	Common name	Density
Shrubs	Cercocarpos montanus	Mtn. mahogany	298.63
	Populus tremuloides	Aspen	16.59
	Ribes cereum	Currant	116.13
	Rosa woodsii	Wood's rose	16.59
	Symphoricarpos oreophilus	Snowberry	497.71
Trees	Abies concolor	White fir	763.16
	Juniperus communis	Common juniper	149.31
	Pseudotsuga menziesii	Douglas fir	796.34
TOTAL			2654.46

Table 3. Summary of cover data for the mountain brush reference area MBR1 (data summary created from existing U.S. Fuels' 1980 raw data).

Lifeform	Species	Common Name	% Relative Cover	% Rel. Cover by Lifeform
Grasses	Agropyron smithii	Western wheatgrass	5.93	24.44
	Agropyron trachycaulum	Slender wheatgrass	1.62	
	Elymus salina	Salina wildrye	12.80	
	Poa pratensis	Bluegrass	0.36	
	Oryzopsis hymenoides	Indian ricegrass	3.79	
Forbs	Circium	Thistle	0.38	8.82
	Senecio multilobatus	Lobeleaf groundsel	0.36	
	Solidago sp.	Goldenrod	0.38	
	Viguiera multiflora	Showy goldeneye	0.29	
	Hymenoxys sp.	Hymenoxys	1.06	
	Erigeron speciosus	Oregon fleabane	2.77	
	Machaeranthera sp.	Machaeranthera	2.54	
Shrubs	Amalanchier alnifolia	Serviceberry	9.03	43.70
	Artemisia tridentata	Big sagebrush	5.80	
	Berberis repens	Oregon grape	1.60	
	Cercocarpos montanus	Mountain mohogany	18.93	
	Ephedra viridis	Mormon tea	2.51	
	Eriogonum corymbosum	Buckwheat	1.86	
	Holodiscus dumosus	Ocean-spray	0.65	
	Juniperus scopulorum	Rocky Mtn. Juniper	2.19	
	Symphoricarpos oreophilus	Snowberry	2.93	
	Xanthocephalum sarothrae	Broom snakeweed	0.67	
Trees	Juniperus osteosperma	Utah juniper	0.29	22.46
	Pseudotsuga menziesii	Douglas fir	1.82	
	Pinus edulis	Pinyon pine	4.59	
	Quercus gambelii	Shrub oak	15.54	
	Plant		72.25	
	Litter		3.50	
	Rock		13.25	
	Bare ground		6.50	

Table 4. Average woody plant density (number of individuals per acre) for the mountain brush reference area MBR1 (data summary created from Mt. Nebo Scientific's field sampling in 1992).

Lifeform	Species	Common name	Density
Shrubs	Artemisia nova	Black sagebrush	113.94
	Artemisia tridentata	Big sagebrush	170.90
	Cercocarpos montanus	Mtn. mahogany	1139.36
	Ephedra viridis	Mormon tea	113.94
	Eriogonum corymbosum	Buckwheat	113.94
	Symphoricarpos oreophilus	Snowberry	14.24
	Xanthocephalum sarothrae	Broom snakeweed	170.91
Trees			
	Amalanchier alnifolia	Serviceberry	14.24
	Pinus edulis	Pinyon pine	142.42
	Pseudotsuga menziesii	Douglas fir	56.97
TOTAL			2050.86

Table 5. Summary of cover data for the Pinyon-Juniper reference area PJR5 (data summary created from existing U.S. Fuels' 1980 raw data).

Lifeform	Species	Common Name	% Relative Cover	% Rel. Cover by Lifeform
GRASSES	Agropyron spicatum	Bluebunch wheatgrass	0.71	3.96
	Bouteloua gracilis	Blue grama	1.71	
	Oryzopsis hymenoides	Indian Ricegrass	1.08	
	Stipa comata	Needle-and-threadgrass	0.45	
FORBS	Talinum parviflorum	Fameflower	1.43	1.43
SHRUBS	Artemisia tridentata	Big sagebrush	0.91	3.42
	Artemisia nova	Black sagebrush	1.43	
	Cercocarpos montanus	Mtn. Mohogany	0.45	
	Xanthocephalum sarothrae	Broom snakeweed	0.63	
TREES	Juniperus osteosperma	Utah juniper	37.19	91.19
	Pinus edulis	Pinyon pine	54.00	
	Plant		43.00	
	Litter		14.75	
	Rock		2.25	
	Bare ground		40.00	

Table 6. Average woody plant density (number of individuals per acre) for the Pinyon-Juniper reference area PJR5 (data summary created from existing U.S. Fuels' 1981 raw data).

Lifeform	Species	Common name	Density
Trees			
	Juniperus osteosperma	Utah juniper	354.60
	Pinus edulis	Pinyon pine	141.84
			496.44
TOTAL			

Table 7. Summary of cover data for the riparian reference area RA13 (data summary created from existing U.S. Fuels' 1981 summary tables).

Lifeform	Species	Common Name	% Relative Cover	% Rel. Cover by Lifeform
Grasses & Grasslikes	Carex sp.	Sedge	41.3	72.8
	Poa sp.	Bluegrass	26.4	
	Scirpus americanus	American bullrush	3.1	
	Hordeum jubatum	Foxtail barley	2.0	
Forbs	Equisetum arvense	Field horsetail	5.6	16.9
	Equisetum laevigatum	Smooth horsetail	5.5	
	Cirsium vulgare	Common thistle	2.6	
	Agoseris glauca	False dandelion	1.8	
	Cynoglossum officinale	Houndstongue	0.8	
	Aster foliaceus	Leafy aster	0.5	
	Rumex crispus	Curlydock	0.1	
Shrubs	Rosa woodsii	Wild rose	2.7	6.7
	Symphoricarpos oreophilus	Snowberry	2.2	
	Chrysothamnus nauseosus	Rubber rabbitbrush	1.2	
	Artemisia tridentata	Big sagebrush	0.6	
Trees	Salix exigua	Sandbar willow	3.6	3.6
	Plant		32.6	
	Litter		45.6	
	Rock		1.2	
	Bare ground		21.8	

Table 8. Average woody plant density (number of individuals per acre) for the riparian reference area RA13 (data summary created from existing U.S. Fuels' 1981 summary tables).

Lifeform	Species	Common name	Density
Shrubs			
	Rosa woodsii	Wood's rose	546.35
	Artemisia tridentata	Big sagebrush	283.29
	Symphoricarpos oreophilus	Snowberry	242.82
	Chrysothamnus nauseosus	Rubber rabbitbrush	141.65
Trees			
	Salix exigua	Sandbar willow	1112.93
	Pseudotsuga menziesii	Douglas fir	80.94
	Populus tremuloides	Aspen	40.47
TOTAL			2448.44

TEST PLOT NO. 1

TEST PLOT NO. 1

TEST PLOT NO. 2 SEED MIX 2

TEST PLOT NO. 2 SEED MIX NO. 1

UNITED STATES FUEL CO. 1992

MIDDLE FORK TEST PLOT

SOUTH FORK TEST PLOT

UNITED STATES FUEL CO.
1992

UNITED STATES FUEL COMPANY

Annual Impoundment Report

1992

UNITED STATES FUEL COMPANY

Slurry Impoundment Report - 1992

Slurry Impoundment No. 1 (1211-UT-09-00098-01)

Slurry Pond No. 1 remained inactive in 1992. No slurry was added and no coal fines were removed.

The embankment top remains at elevation 7175. The surface of the dry coal fines is at elevation 7164. The total storage capacity of the pond is 247 acre-feet. Coal fines occupy approximately 235 acre-feet.

No changes have occurred to diminish embankment stability. No water is impounded and no fires have occurred in construction materials. This impoundment will no longer be utilized as an active facility and plans for abandonment are anticipated.

Slurry Impoundment No. 4 (1211-UT-09-00098-02)

A plan for abandonment of this facility was submitted to the District Manager in November, 1992. Work has begun on regrading the embankment into the interior of the impoundment. No water is impounded, there are no signs of embankment instability and no fires have occurred.

Slurry Impoundment No. 5 (1211-UT-09-00098-03)

Main Cell

Approximately 8,000 tons of coal fines were recovered from the main cell of Pond No. 5 during 1992. No slurry was added.

No changes have been made to the embankment of this cell during 1992. The embankment top remains at elevation 7085.5 while the dry slurry surface is at an average elevation of 7049 feet. There are no signs of structural instability and no fires have occurred.

The total storage capacity of the main cell is approximately 500 acre-feet. It presently stores about 120 acre-feet of coal fines.

North Cell

No slurry was added to or removed from the North Cell during 1992 and no structural changes have been made to the embankment. It's top remains at elevation 7068. The coal fines are at approximately 7055 feet. There are no signs of structural instability and no fires have occurred.

UNITED STATES FUEL COMPANY

Refuse Pile Report - 1992

Refuse Pile No. 1 (1211-UT-09-00098-04)

Refuse Pile No. 1 remains inactive. No changes in its configuration have occurred during 1992. This pile does not impound water and has not had any fires occur in the refuse material. No hazardous or unstable conditions have been observed.

Refuse Pile No. 2 (1211-UT-09-00098-05)

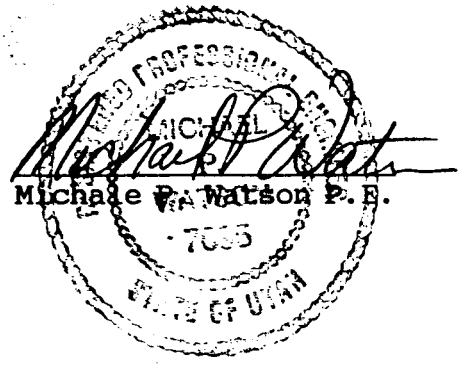
Refuse Pile No. 2 was inactive in 1992. No refuse has been deposited since June of 1991. There are no signs of structural instability and no fires have occurred.

UNITED STATES FUEL COMPANY

Annual Impoundment Report - 1992

-CERTIFICATION-

I certify on January 14, 1993 that the work performed on these impoundments, embankments and refuse piles has been conducted in accordance with the appropriate plans and regulations.



Michael P. Watson P.E.

INSPECTION FORM

COAL REFUSE PILES AND COAL WASTE IMPOUNDMENTS

Name ROBERT ECCLI Title ENGR.

Date NOVEMBER 20, 1992 Date last inspected AUGUST 17, 1992

Site Name REFUSE PILES NO.1 & NO.2 Mine Name KING MINES

Refuse Facility ID # 1211-UT-09-00098-04 & 05

Refuse piles---Part A only
Impoundments---Part A and Part B

Part A

1.	Foundation preparation (vegetation, topsoil removal?)- N/A	___Yes	___No
2.	Lift Thickness (inches)---------- N/A	----------	
3.	Compaction (4 to 6 complete passes)---------- N/A	___Yes	___No
4.	Burning* (specify extent and location)----------	___Yes	_✓_No
5.	Angle of Slope (degrees)----------	24 TO 30 DEG.	
6.	Seepage* (specify location, color, & appr. volume--------	___Yes	_✓_No
7.	Cracks or scarps* (location, size)----------	___Yes	_✓_No
8.	Major erosion problems* (location and extent)----------	___Yes	_✓_No
9.	Water impounding against toe* ----------	___Yes	_✓_No

Part B N/A

10.	Embankment freeboard (feet)----------	----------	
11.	____Increase____Decrease in water level (feet)----------	___Yes	___No
12.	Sumps or sinkholes in slurry surface----------	___Yes	___No
13.	Clogging* (pipes, ditches, spillway)----------	___Yes	___No
14.	Trash racks clear and in place----------	___Yes	___No

* Adverse conditions noted in these items should be described (extent, location, volume, etc.) in the space provided. Major adverse changes could cause instability.

Inspection Category	Comments
	REFUSE PILE NO.1 INACTIVE
	REFUSE PILE NO.2 BEING REGRADED INTO SLURRY POND NO.4.

Mark Platt

INSPECTION FORM

COAL REFUSE PILES AND COAL WASTE IMPOUNDMENTS

Name ROBERT ECCLI Title ENGR.

Date AUGUST 17, 1992 Date last inspected MAY 8, 1992

Site Name REFUSE PILES No1 & No 2 Mine Name KING MINES

Refuse Facility ID # 1211-UT-09-00098-04 & 05

Refuse piles---Part A only
Impoundments---Part A and Part B

Part A

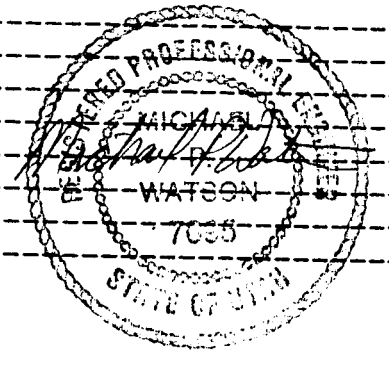
1.	Foundation preparation (vegetation, topsoil removal?)- N/A	___Yes	___No
2.	Lift Thickness (inches)---------- N/A		
3.	Compaction (4 to 6 complete passes)---------- N/A	___Yes	___No
4.	Burning* (specify extent and location)----------	___Yes	✓No
5.	Angle of Slope (degrees)----------	24 To 30 DEG.	
6.	Seepage* (specify location, color, & appr. volume--------	___Yes	✓No
7.	Cracks or scarps* (location, size)----------	___Yes	✓No
8.	Major erosion problems* (location and extent)----------	___Yes	✓No
9.	Water impounding against toe* ----------	___Yes	✓No

Part B N/A

10.	Embankment freeboard (feet)----------		
11.	____Increase____Decrease in water level (feet)----------	___Yes	___No
12.	Sumps or sinkholes in slurry surface----------	___Yes	___No
13.	Clogging* (pipes, ditches, spillway)----------	___Yes	___No
14.	Trash racks clear and in place----------	___Yes	___No

* Adverse conditions noted in these items should be described (extent, location, volume, etc.) in the space provided. Major adverse changes could cause instability.

Inspection Category	Comments
	REFUSE PILES No1 & No 2 CURRENTLY INACTIVE



FORM 1

INSPECTION FORM

COAL REFUSE PILES AND COAL WASTE IMPOUNDMENTS

Name ROBERT ECCLI Title ENGR.

Date MAY 8, 1992 Date last inspected MARCH 6, 1992

Site Name REFUSE PILES NO. 1 & NO. 2 Mine Name KING MINES

Refuse Facility ID # 1211-UT-09-00098-04 & 05

Refuse piles---Part A only
Impoundments---Part A and Part B

REGISTERED PROFESSIONAL ENGINEER MICHAEL P. WATSON 7095 STATE OF UTAH

Part A

1.	Foundation preparation (vegetation, topsoil removed)	N/A	___Yes ___No
2.	Lift Thickness (inches)		___N/A
3.	Compaction (4 to 6 complete passes)	N/A	___Yes ___No
4.	Burning* (specify extent and location)		___Yes ✓No
5.	Angle of Slope (degrees)	24 to 30°	
6.	Seepage* (specify location, color, & appr. volume		___Yes ✓No
7.	Cracks or scarps* (location, size)		___Yes ✓No
8.	Major erosion problems* (location and extent)		___Yes ✓No
9.	Water impounding against toe*		___Yes ✓No

Part B N/A

10.	Embankment freeboard (feet)		
11.	___Increase___Decrease in water level (feet)		___Yes ___No
12.	Sumps or sinkholes in slurry surface		___Yes ___No
13.	Clogging* (pipes, ditches, spillway)		___Yes ___No
14.	Trash racks clear and in place		___Yes ___No

* Adverse conditions noted in these items should be described (extent, location, volume, etc.) in the space provided. Major adverse changes could cause instability.

Inspection Category	Comments
	NO REFUSE DEPOSITED AT EITHER SITE THIS QUARTER
	REFUSE PILES NO. 1 & 2 ARE CURRENTLY INACTIVE

INSPECTION FORM

COAL REFUSE PILES AND COAL WASTE IMPOUNDMENTS

Name ROBERT ECCLI Title ENGR.

Date MARCH 6, 1992 Date last inspected 12-2-91

Site Name REFUSE PILES NO. 1 & NO. 2 Mine Name KING

Refuse Facility ID # 1211-UT-09-00098-04 &
1211-UT-09-00098-05

Refuse piles---Part A only
Impoundments---Part A and Part B

Part A

1.	Foundation preparation (vegetation, topsoil removal?)	N/A	Yes ___ No
2.	Lift Thickness (inches)		N/A
3.	Compaction (4 to 6 complete passes)	N/A	___ Yes ___ No
4.	Burning* (specify extent and location)		___ Yes ___ No
5.	Angle of Slope (degrees)		___ Yes ✓ No
6.	Seepage* (specify location, color, & appr. volume		24 TO 30°
7.	Cracks or scarps* (location, size)		___ Yes ✓ No
8.	Major erosion problems* (location and extent)		___ Yes ✓ No
9.	Water impounding against toe*		___ Yes ✓ No

Part B N/A

10.	Embankment freeboard (feet)		
11.	___Increase___Decrease in water level (feet)		___ Yes ___ No
12.	Sumps or sinkholes in slurry surface		___ Yes ___ No
13.	Clogging* (pipes, ditches, spillway)		___ Yes ___ No
14.	Trash racks clear and in place		___ Yes ___ No

* Adverse conditions noted in these items should be described (extent, location, volume, etc.) in the space provided. Major adverse changes could cause instability.

Inspection Category	Comments
	NO REFUSE DEPOSITED AT EITHER SITE
	DURING PAST 9 MONTHS.
	REFUSE PILES NO. 1 & NO. 2 ARE CURRENTLY INACTIVE

REGISTERED PROFESSIONAL ENGINEER
MICHAEL P. WATSON
7095
STATE OF UTAH

UNITED STATES FUEL COMPANY

Hiawatha Mines ACT #007/001

Quarterly Sediment Pond Inspection Sheet

Inspector's Name ROBERT ECCLI Date 11-20-92

Sediment Pond Name and Location SEE BELOW Date Last Inspected 8-17-92

Observations Made

1) Seepage (specify location, color and approximate volume):
   - at isolated spots on embankment slopes . NONE
   - at natural hillside NONE
   - over sidespread areas NONE
   NONE

2) Cracks or scarps on crest NO

3) Cracks or scarps on slope NO

4) Sloughing or bulging on slope NO

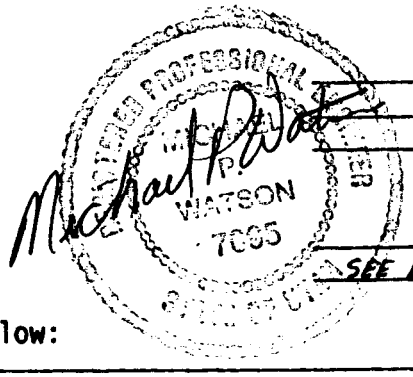
5) Major erosional problems:
   - spillway NO
   - embankments NO
   - diversion ditches NO

6) Existing embankment freeboard:
   Water____ Increase____ Decrease____ No Water SEE BELOW

7) Visible sumps or sinkholes NO

8) Clogging:
   - spillway channels and pipes NO
   - decant system NO
   - diversion ditches NO

9) Cracking or crushing of pipes:
   - spillway pipes NO
   - decant system SEE BELOW



Note additional comments below:

POND NO.	LOCATION	COMMENTS
D003	UPPER RAIL YARD DRY	HOLE IN ELBOW OF DECANT PIPE.
D004	NORTH OF SLURRY POND NO. 1	DRY
D005	EAST OF SLURRY POND NO. 4	DRY
D006	NORTHEAST OF SLURRY POND NO. 5	DRY
D007	SOUTHEAST OF SLURRY POND NO. 5	DRY
D008	MIDDLE FORK MINE YARD	6" WATER
D009	SOUTH FORK MINE YARD	DRY
D011	SOUTH FORK TRUCK LOADOUT	12" WATER

UNITED STATES FUEL COMPANY

Hiawatha Mines ACT #007/001

Quarterly Sediment Pond Inspection Sheet

Inspector's Name ROBERT ECCLI Date 8-17-92

Sediment Pond Name and Location SEE BELOW Date Last Inspected 5-8-92

Observations Made

1) Seepage (specify location, color and approximate volume):
   - at isolated spots on embankment slopes — NONE
   - at natural hillside — NONE
   - over sidespread areas — NONE

2) Cracks or scarps on crest — NO

3) Cracks or scarps on slope — NO

4) Sloughing or bulging on slope — NO

5) Major erosional problems:
   - spillway — NO
   - embankments — NO
   - diversion ditches — NO

6) Existing embankment freeboard:
   Water____ Increase____ Decrease____ No Water — SEE BELOW

7) Visible sumps or sinkholes — NO

8) Clogging:
   - spillway channels and pipes — NO
   - decant system — NO
   - diversion ditches — NO

9) Cracking or crushing of pipes:
   - spillway pipes — NO
   - decant system — NO

Note additional comments below:

POND NO.	LOCATION	COMMENTS
D003	UPPER RAIL YARD	DRY
D004	NORTH OF SLURRY POND NO.1	DRY
D005	EAST OF SLURRY POND No.4	DRY
D006	NORTHEAST OF SLURRY POND NO.5	DRY
D007	SOUTHEAST OF SLURRY POND No.5	DRY
D008	MIDDLE FORK MINE YARD	2" WATER
D009	SOUTH FORK MINE YARD	1" WATER
D011	SOUTH FORK TRUCK LOADOUT	8" WATER

UNITED STATES FUEL COMPANY

Hiawatha Mines ACT #007/001

Quarterly Sediment Pond Inspection Sheet

Inspector's Name ROBERT ECCLI Date 5-8-92

Sediment Pond Name and Location SEE BELOW Date Last Inspected 3-6-92

Observations Made

1) Seepage (specify location, color and approximate volume):
   - at isolated spots on embankment slopes — NONE
   - at natural hillside — NONE
   - over sidespread areas — NONE
   - NONE

2) Cracks or scarps on crest — NO

3) Cracks or scarps on slope — NO

4) Sloughing or bulging on slope — NO

5) Major erosional problems:
   - spillway — NO
   - embankments — NO
   - diversion ditches — NO

6) Existing embankment freeboard:
   Water____ Increase____ Decrease____ No Water — SEE BELOW

7) Visible sumps or sinkholes — NO

8) Clogging:
   - spillway channels and pipes — NO
   - decant system — NO
   - diversion ditches — NO

9) Cracking or crushing of pipes:
   - spillway pipes — NO
   - decant system — NO

REGISTERED PROFESSIONAL ENGINEER MICHAEL P. WATSON 7095 STATE OF UTAH

Note additional comments below:

POND NO.	LOCATION	COMMENTS
D003	UPPER RAIL YARD	2" WATER
D004	NORTH OF SLURRY POND NO. 1	DRY
D005	EAST OF SLURRY POND NO. 4	DRY
D006	NORTHEAST OF SLURRY POND NO. 5	DRY
D007	SOUTHEAST OF SLURRY POND NO. 5	DRY
D008	MIDDLE FORK MINE YARD	3" WATER
D009	SOUTH FORK MINE YARD	3" WATER
D011	SOUTH FORK TRUCK LOADOUT	4" WATER

UNITED STATES FUEL COMPANY

Hiawatha Mines ACT #007/001

Quarterly Sediment Pond Inspection Sheet

Inspector's Name ROBERT ECCLI Date 3-6-92

Sediment Pond Name and Location SEE BELOW Date Last Inspected 12-3-91

Observations Made

1) Seepage (specify location, color and approximate volume):
   - at isolated spots on embankment slopes — NONE
   - at natural hillside — NONE
   - over sidespread areas — NONE
   - NONE

2) Cracks or scarps on crest — NO

3) Cracks or scarps on slope — NO

4) Sloughing or bulging on slope — NO

5) Major erosional problems:
   - spillway — NO
   - embankments — NO
   - diversion ditches — NO

6) Existing embankment freeboard:
   Water ✓ Increase ____ Decrease ____ No Water — MINOR WATER SEE BELOW

7) Visible sumps or sinkholes — NO

8) Clogging:
   - spillway channels and pipes — NO
   - decant system — NO
   - diversion ditches — NO

9) Cracking or crushing of pipes:
   - spillway pipes — NO
   - decant system — NO

REGISTERED PROFESSIONAL ENGINEER MICHAEL P. WATSON 7095 STATE OF UTAH

Note additional comments below:

POND NO.	LOCATION	COMMENTS
D003	UPPER RAIL YARD	4" WATER NORTH END
D004	NORTH OF SLURRY POND No1	2" WATER
D005	EAST OF SLURRY POND No4	3" WATER
D006	NORTHEAST OF SLURRY POND No.5	2" WATER SOUTHEND
D007	SOUTHEAST OF SLURRY POND No.5	2" WATER EAST END
D008	MIDDLE FORK MINE YARD	SNOW IN BOTTOM
D009	SOUTH FORK MINE YARD	" " "
D011	SOUTH FORK TRUCK LOADOUT	" " "

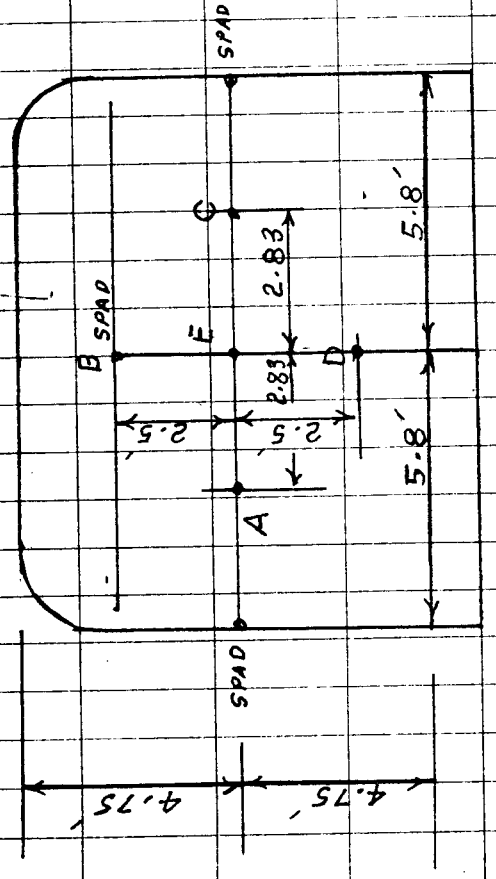

92 6 11

RETURN AIR PORTAL

(10)

CONDITION STATUS

1. DAMP - Damp walls occasional drippers
2. FLOW NOTED - Tricikles & disernable small flows
3. SIGNIFICANT FLOW - Unusual though minor increase



4. CRITICAL - Potentially Serious

(11)

RETURN AIR PORTAL

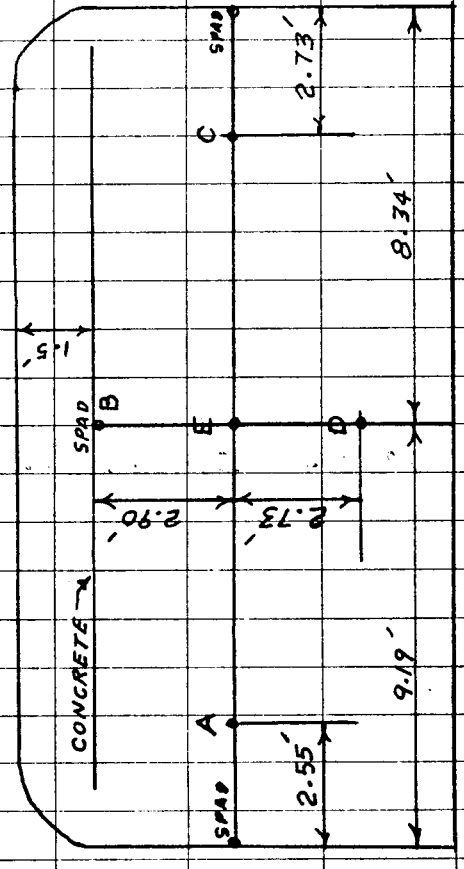
DATE	DISTANCE (FT.) A	B	C	D	E	CONDITION
6-16-89	4.76	5.18	4.62	5.14	5.20	BULKHEAD DAMP FLOOR MUDDY
6-13-90	4.76	5.18	4.62	5.14	5.20	BULKHEAD DAMP STANDING WATER ON FLOOR
11-28-90	4.76	5.16	4.62	5.14	5.20	BULKHEAD DAMP FLOOR FROZEN MUD
4-17-91						BULKHEAD DAMP FLOOR FROZEN
05-06-91				FLOOR FROZEN		BULKHEAD DAMP SMALL TRICKLE RIGHT SIDE
06-10-91	4.76	5.16	4.62	5.15	5.20	BULKHEAD SLIGHTLY DAMP SMALL TRICKLES FLOWS NOTED
07-26-91						CONDITION 2
08/20/91						CONDITION 2
09/16/91						CONDITION 2
10/18/91	4.76	5.16	4.62	5.15	5.20	CONDITION 2
04/24/92						CONDITION 2
05/29/92						CONDITION 2
06/11/92	4.76	5.16	4.62	5.15	5.20	CONDITION 2
07/17/92						CONDITION 2
08/22/92						CONDITION 2
09/21/92		FLOOR MUDDY	NO STANDING WATER			CONDITION 2
10/20/92	4.76	5.16	4.61	5.14	5-19	CONDITION 2


92 6 1

MAIN ENTRY PORTAL

CONDITION STATUS

1. DAMP - DAMP WALLS OCCASSIONAL DRIPPERS.
2. FLOW NOTED - TRICKLES & DISERNABLE SMALL FLOWS.
3. SIGNIFICANT FLOW - UNUSUAL THOUGH MINOR INCREASE.
4. CRITICAL - POTENTIALLY SERIOUS.



MAIN ENTRY PORTAL

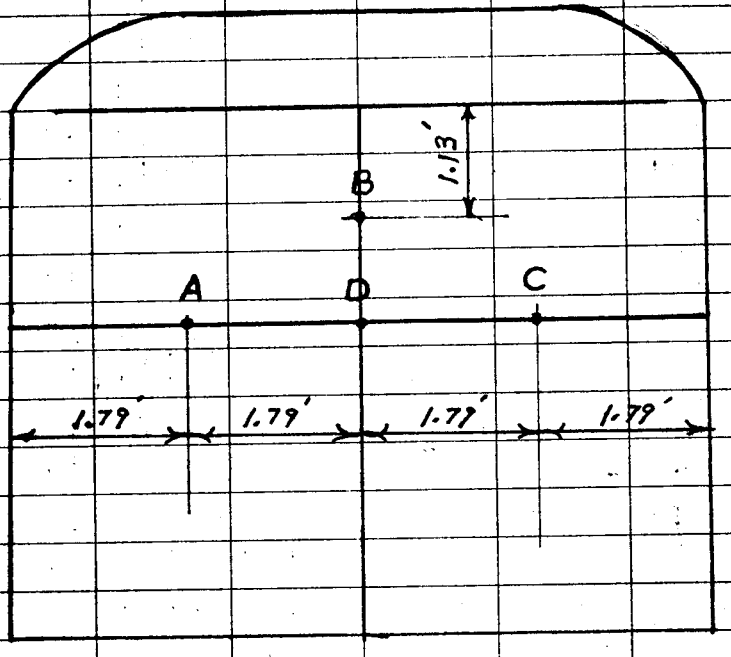
MEASURE BACK OF SPAD TO PLUG

DATE	DISTANCE (FT.) A	B	C	D	E	CONDITION
9-30-87		6.93	5.37			BULKHEAD DAMP SMALL TRICKLES AT FLOOR
9-16-89	5.05	6.93	5.35	6.94	6.93	BULKHEAD DAMP VERY SMALL TRICKLES
6-18-90	5.05	6.92	5.35	6.94	6.93	BULKHEAD DAMP SMALL TRICKLES NOTED
11-29-90	5.05	6.92	5.35	6.94	6.98	BULKHEAD DAMP SMALL TRICKLES
4-17-91						BULKHEAD DAMP SMALL TRICKLES
05/06/91	5.05	6.93	5.35	6.94	6.98	BULKHEAD DAMP SMALL TRICKLES AT LEFT 1/3
06/10/91	5.05	6.93	5.35	6.94	6.98	BULKHEAD DAMP SMALL TRICKLES NOTED FLOWS NOTED
07/26/91						CONDITION 2
08/20/91						CONDITION 2
09/16/91						CONDITION 2
10/18/91	5.05	6.93	5.35	6.94	6.98	CONDITION 2
04/29/92						CONDITION 2
05/29/92						CONDITION 2
06/11/92	5.05	6.94	5.36	6.95	6.98	CONDITION 2
07/17/92						CONDITION 2
08/22/92						CONDITION 2
09/21/92						CONDITION 2
10/20/92	5.05	6.93	5.34	6.95	6.99	CONDITION 2


92 6 11

MANWAY PORTAL

MANWAY PORTAL



MANWAY PORTAL

DATE	DISTANCE (FT.) A	B	C	D	CONDITION
9-30-87	2.59	2.97	2.75	2.62	BULKHEAD DAMP FLOOR WET
9-16-89	2.59	2.97	2.75	2.62	BULKHEAD DAMP FLOOR WET
6-13-90	2.59	2.97	2.75	2.62	BULKHEAD DAMP FLOOR WET
11-28-90	2.59	2.97	2.75	2.62	BULKHEAD DAMP FLOOR WET
4-17-91					NORMAL
05-06-91					
06-10-91	2.59	2.97	2.75	2.62	BULKHEAD DAMP FLOOR WET 4.8 PSI NORMAL
07/26-91		GAUGE = 7.5 PSI			DAMP CONDITION 1
08/20/91		GAUGE = 7.0 PSI			DAMP CONDITION 1
09/16/91					GAUGE 6.5 PSI CONDITION 1
10/18/91	2.59	2.97	2.75	2.62	GAUGE 6.5 PSI CONDITION 1
04/24/92					5.0 PSI CONDITION 1
05/29/92					5.4 PSI CONDITION 1
06/11/92	2.59	2.97	2.75	2.62	5.2 PSI CONDITION 1
07/17/92					CONDITION 1
08/22/92					CONDITION 1
09/21/92					GAUGE 4.5 CONDITION 1
10/20/92	2.58	2.97	2.75	2.62	CONDITION 1

Client : EarthFax Engineering, Inc.
Address : 7324 S. 1300 E., Su. 100
Midvale, UT 84047
Attn. : David Wheeler
Project :
Sample Matrix: Soil
Sample ID: Composite 1 Lab No. : 92-SI/01058
Sample Date Time: 06/30/92 Date Received: 08/06/92

Parameters

Saturation %	40.	%	
pH, saturated paste	5.7	units	1
Conductivity, sat. paste	3.24	mmhos/cm	1
Calcium, soluble	19.5	meq/l	1
Magnesium, soluble	41.0	meq/l	1
Sodium, soluble	.61	meq/l	1
Sodium Absorption Ratio	.1		
Cation Exchange Capacity	10.	meq/100g	
Exchangeable Sodium %	.8	%	
Nitrate as N, soluble	2.4	mg/kg	6
Nitrogen, total kjeldahl	.30	%	
Boron, soluble	1.2	mg/kg	2
Selenium, soluble	.06	mg/kg	2
Sulfur, organic	.41	%	
Sulfur, pyritic	.05	%	
Sulfur, total	.90	%	
Sulfur, sulfate	.44	%	
Neutralization Potential	.7	% as CaCO3	
Acid-Base Potent.(CaCO3)	5.	Tons/1000T	
Coarse Fragments > 2mm	55.9	%	
Sand 2.00 - .062 mm	66.	%	
Silt .062 - .002 mm	19.	%	
Clay -.002 mm	15.	%	
Texture	SL		

1 Saturated Paste Extraction
2 Hot Water Extraction
6 Water Extraction
Remarks: # ABP Calculated From Pyritic Sulfur.
Note: Negative sign "-" denotes that the value is less than "<"

Scott Habermehl, Quality Assurance Officer/S.H.

Frank E. Polniak, Inorganic Laboratory Supervisor/FP

UTAH STATE UNIVERSITY • LOGAN, UTAH 84322-4830

USU Analytical Laboratories
Soil Testing Lab Plant Analysis Lab
Feed Analysis Lab Irrigation Water Analysis Lab

Telephone (801) 750-2217
Fax (801)750-3376

4 September 1992

Results for:

David Wheeler
Earthfax Engineering
7324 S. Union Park Ave.
Suite 100
Midvale, UT 84047

Soil sample received 8/19/92.

		Ash	Walkley-Black		----%ATM-----	
USU#	ID	%OM	%OC	%OM	1/3	15
6160	Comp. 1 & 2	37.2	5.2	8.96	14.7	8.8

If you have any questions, please contact the lab.

007/011

ANNUAL REPORT FOR 1988

US FUEL

KING MINES

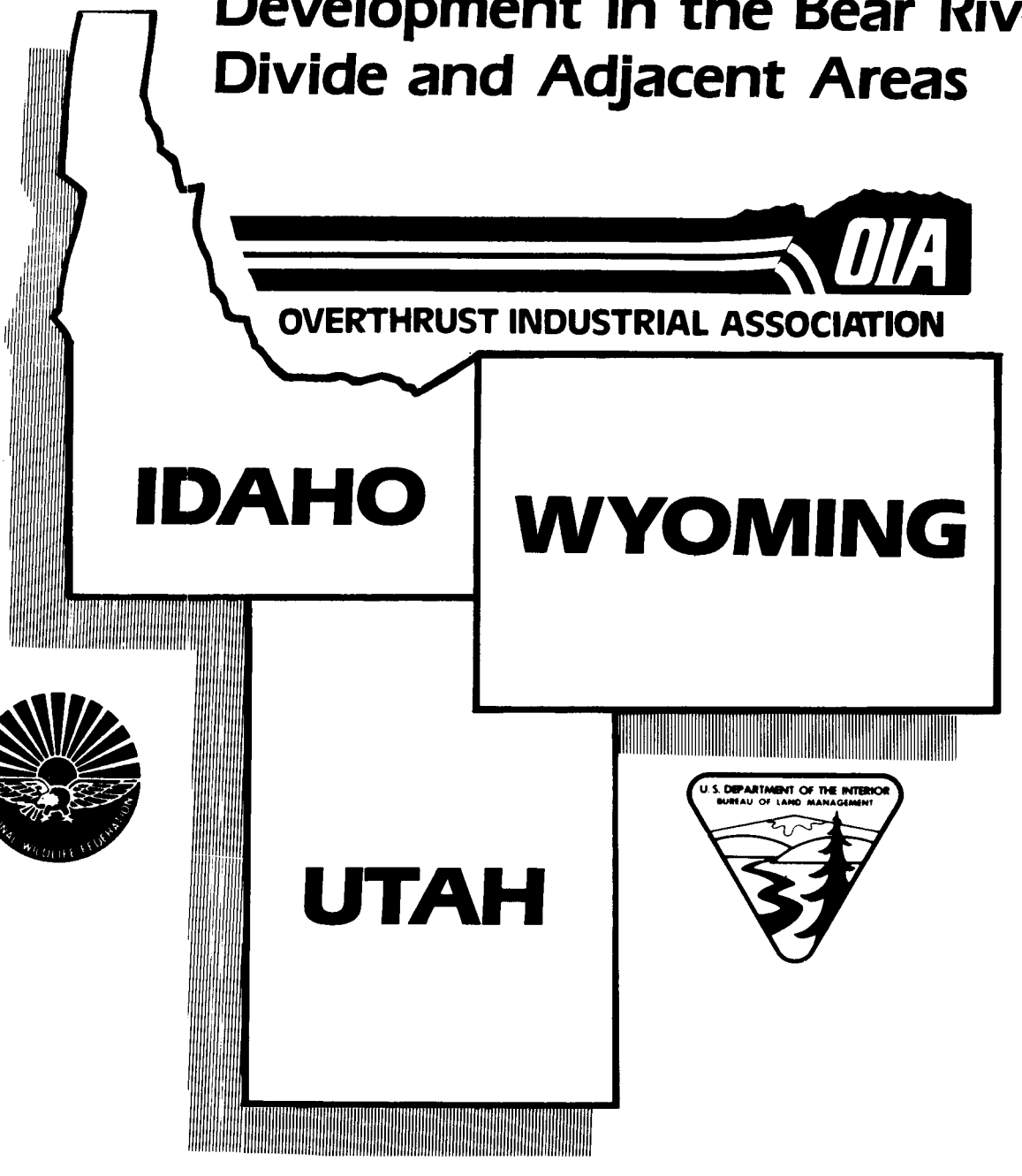
ACT 007/011

Mutz

Cooperative Wildlife Program

A Reclamation Manual:

Suggested Practices for Land Disturbed by Oil and Gas Development in the Bear River Divide and Adjacent Areas



RES 12-0/84
BLM 8/21/84

United States Department of the Interior

FISH AND WILDLIFE SERVICE
ENDANGERED SPECIES OFFICE
1406 FEDERAL BUILDING
125 SOUTH STATE STREET
SALT LAKE CITY, UTAH 84138-1197

IN REPLY REFER TO:

August 13, 1984

SE/SLC:6-5-84-0026

MEMORANDUM

TO: Robert Schueneman, Chief Technical Support Branch
Office of Surface Mining Denver, Colorado

FROM: Field Supervisor, Endangered Species Office
U.S. Fish and Wildlife Service, Salt Lake City, Utah

SUBJECT: Section 7 Consultation, Hiawatha Mines Complex

This responds to your memorandum received June 1, 1984 and amended on July 18, 1984 in which the Office of Surface Management (OSM) made a determination that the depletion of ground water as a result of the operation of the Hiawatha Mine Complex (HMC) may effect the Colorado squawfish (Ptychocheilus lucius) and the humpback chub (Gila cypha). In that memorandum you also requested that the Fish & Wildlife Service (FWS) prepare a biological opinion for this project. You also concluded that the proposed action would not affect the bald eagle (Haliaeetus leucocephalus), black-footed ferret (Mustela nigripes), or the peregrine falcon (Falco peregrinus). Our comments have been prepared as prescribed in the Section 7 Interagency Cooperation Regulations, 50 CFR 402, and the Endangered Species Act (ESA), 16 U.S.C., 1531 et seq.

BIOLOGICAL OPINION

The issuance of a permit to allow continued operation of the HMC is not likely to jeopardize the continued existence of the Colorado squawfish provided the conservation measures outlined below are adopted and followed. The above action also is not likely to jeopardize the continued existence of the humpback chub. The FWS concurs with the determination of no effect for the bald eagle, black-footed ferret, and the peregrine falcon. No further comments on these 3 species will be made in this opinion.

PROJECT DESCRIPTION

The proposed action is approval of a permanent program permit for U.S. Fuels Company to continue its underground coal operation in Carbon and Emery Counties, Utah. The operation will last approx-

imately 30 years during which coal will be removed from under some 19,211 acres. The surface facilities are already constructed and located approximately 15 miles southwest of Price, Utah. The only additional surface disturbance proposed is the borrow of topsoil from 26 acres. The continued operation will result in an annual depletion of 26 acre-feet per year (af/yr) from the Price River drainage. The depletion is from mine equipment and ventilation fans operating in the mines.

BASIS FOR OPINION

COLORADO SQUAWFISH

Early records indicate that the Colorado squawfish was once abundant throughout the Colorado River system. It was abundant over all of its range prior to the 1850's (Seethaler, 1978). The present range of the squawfish is restricted to the upper Colorado River basin. It is found inhabiting about 345 miles of the main stem Colorado River from the mouth of the Yampa downstream to the confluence of the Green and Colorado Rivers (Fish and Wildlife Service, 1982).

Decline of the populations of the squawfish correlates very closely with the construction of dams and reservoirs and the removal of water from the Colorado River system. Colorado squawfish evolved in and apparently require habitat conditions typified by great seasonal fluctuations in flow and turbidity, coupled with warm summer temperatures. Additionally, it appears that squawfish require relatively unrestricted movement to satisfy all of their life history requirements. Movement of adult squawfish appears to be related to flow, temperature, feeding and spawning behavior.

The life stages that appear to be most critical are from egg fertilization through its first year of life. It has been demonstrated that these phases of squawfish development are also closely tied to some specific habitat requirements. It is imperative that proper flows and temperatures are provided during these essential life stages. The Conservation Measures outlined below will help meet the habitat requirement needs of the Colorado squawfish.

HUMPBACK CHUB

Humpback chub generally do not make migrational movements in the Upper Colorado River and tend to reside throughout the year within a limited stretch of river. Humpback chub are found inhabiting narrow, deep canyon areas which are quite restricted in distribution. They seldom leave their canyon habitat (FWS, 1982). While the humpback chub are still occasionally found dispersed in the Green and Yampa Rivers, the only major population of humpback chub conclusively known to exist in the Upper Colorado River Basin are located in Black Rocks and Westwater Canyons on the Colorado River. Since the HMC will not have any

effect on the Colorado River at the sites where known humpback chub populations occur, in our opinion, the proposed project is not likely to jeopardize the continued existence of the humpback chub.

CONSERVATION MEASURES

FWS believes that any further water depletions from the upper basin may have detrimental effects on listed fishes; however it is believed that certain management techniques can be implemented to offset harmful effects from additional development. Two major categories for potential impacts are considered: (1) direct, project specific impacts and; (2) indirect subtle impacts.

1. Direct Impacts

In the case of the HMC the direct impacts to the Colorado squawfish are simply the violation of required fish flows in essential reaches for this species. The HMC by depleting ground water a significant distance from occupied habitat, will have an imperceptable effect on minimum flows. The amount and timing of the reduction of minimum flows as a result of depleting 26 af/yr from the ground water will not be measurable and cannot be analyzed by the FWS hydrologic model. Because of the above and because this is a continuing small water depletion project, it is determined that the HMC will not effect FWS minimum flows.

2. Indirect Effects

Other impacts resulting from water developments may be more subtle, but just as harmful in a cumulative sense. The fact that water is depleted from the rivers reduces the flexibility of the system to withstand additional water losses without detrimental impacts to essential areas. Creation of habitat favorable to introduced species is an example of how seemingly minor changes in flow regimes may shift the balance between survival and extinction for one or all of these listed fishes.

Depletions that bring present day flows down to the prescribed minimums can only occur if enhancement measures contained in active research and management plans are funded by the project sponsor or proponent. FWS has identified certain conservation measures that are currently considered necessary to maintain the survival of the fish and contribute toward future recovery. These measures include monitoring known populations and attempting to locate new areas containing the fish; further analyzing the potential effects of water depletions and associated flow regime modifications; locating existing and potential spawning and YOY rearing areas; researching and constructing various fish passage and habitat restoration features; and producing the fish in a hatchery facility for research and restocking of individuals in existing and historical habitat.

Since such measures will develop critically important data on the

survival needs of the fish, attempt to restore essential habitat, and allow a recovery program to be implemented, funding of these activities by project sponsors is considered a reasonable and prudent alternative designed to compensate or prevent the adverse effects of water depletion. Under a procedure developed by the FWS, Upper Basin project sponsors are assessed a proportion of the total cost needed to support these conservation measures, currently estimated at approximately 25 million dollars.

The cost assessed any particular project is based upon the amount of water that the project would annually deplete from the upper Colorado River system in proportion to the amount available for development. It has been estimated by the Bureau of Reclamation that a total of 1.906 million af (maf) remains available for development in the Upper Basin under the Colorado River Compact.

Of this amount, 231,000 af are allocated to Arizona and New Mexico and will eventually be diverted from the San Juan River and would not affect areas currently occupied by the endangered fishes in the Upper Basin. This leaves 1.675 maf in the Upper Colorado River as the value against which project depletions are assessed in calculating a project's proportion of the conservation measures. Based upon the use projection of 26 af/yr for the HMC the amount of contribution to the Conservation measures would not exceed $388. A contribution of this amount to the conservation fund will offset the impacts of the depletion of water on the Colorado squawfish and will not jeopardize the continued existence of this species. The FWS should be notified in writing within three months of the date of this biological opinion whether the OSM and the operators of the HMC agree with this conservation measure. Negotiations for contributing to the fund should be initiated as soon as possible.

The FWS is currently attempting, with the assistance and input of other concerned and interested Federal and State agencies, to develop conservation measures which will provide for the conservation and recovery of the endangered Colorado River fishes. If the results of this coordinated effort is a continuation of minimum flows and contributions of funds towards the conservation effort, then the approach outlined above as an alternative precluding jeopardy to the Colorado squawfish will remain valid. If a different approach is developed it would then be used in future consultations.

Should there be any changes in the amount of water depletion or any other project change from that which was proposed which may

affect any endangered or threatened species, or if there is failure to agree to the Conservation Measures the FWS should be contacted to determine if further consultation is required.

Fred L. Bolwahnn
Field Supervisor

REFERENCES

Seethaler, K. 1978. Life History and Ecology of the Colorado Squawfish (Ptychocheilus lucius) in the upper Colorado River basin. Thesis, Utah State University. Logan, Utah.

U.S. Fish and Wildlife Service. 1982. Colorado River Fishery Project Final Report. Part I (42 pp), Part II (356pp), and Part III (324 pp). Prepared for the U.S. Bureau of Reclamation, Salt Lake City, Utah. April 1982.

United States Department of the Interior
FISH AND WILDLIFE SERVICE

MAILING ADDRESS:
Post Office Box 25486
Denver Federal Center
Denver, Colorado 80225

STREET LOCATION:
134 Union Blvd.
Lakewood, Colorado 80228

IN REPLY REFER TO:

FA/SE/OSM-Hiawatha
Mining Complex,
U.S. Fuel Co.

MAY 13 1985

Jean Semborski, Engineer
United States Fuel Company
P.O. Box A
Hiawatha, Utah 84521

Dear Ms. Semborski:

In response to your letter of April 25, 1985, we accept the contribution of $388.00 from United States Fuel Company for the conservation of endangered fishes in the Upper Colorado River Basin. This acknowledges your compliance with our biological opinion.

Sincerely yours,

JOHN L. SPINKS, JR.
Acting Regional Director

cc: Administrator,
Western Technical Center
Office of Surface Mining,
Denver, Colorado

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF SURFACE MINING

CONFIRMATION/REPORT OF TELEPHONE CONVERSATION

TO	**Name** Robert Radtke	**FROM**	**Name** Dan Heinze
	Office Endangered Species - USFWS		**Office** BSB - EAD - OFO
	Location Salt Lake City, Utah		**Location** Denver, Colorado
	Telephone Number FTS 588-4430		**Telephone Number** FTS 564-2[illegible]

Purpose of Call:

I called to verify the accuracy and validity of our original biological assessment and the USFWS biological opinion for the Hiawatha mine. These documents, completed in 1984, concluded that terrestrial species would not be affected but that the water depletion associated with the mine would require a consultation for Windy Gap compliance.

Explanatory Remarks:

Bob confirmed that these 1984 conclusions are still valid and that no new species have been added to the list of threatened and endangered species for the project area. Therefore, our previous Section 7 compliance is still accurate and the operator must contribute to the endangered fishes recovery fund.

[illegible] - 1987
(Date)

R.D. Heinze
(Signature)

CONFIRMATION COPY

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Moab District
P. O. Box 970
Moab, Utah 84532

IN REPLY
REFER TO:
3450
(U-066)

JUN 27 1984

Memorandum

To: Center Administrator, OSM, Denver

Attention: Sarah Bransom

From: ACTING District Manager, Moab

Subject: Modification of Permanent Program Permit to Mine Application; U. S. Fuel's Hiawatha Complex

This office has received and reviewed the following items relating to subject modification:

1. Submittal of 05/14/84, Exhibits III-2C, 2D and 3E.

2. Submittal of 15/17/84, Submittal in Response to OSM Determination of Adequacy Letter (05/01/84).

3. Submittal of 06/01/84, Additional Information on Proposed Unit Train Loadout.

We do not have any comments on these modifications or the plan in general because 1) Surface facilities are located entirely on private estate with any impact on BLM managed lands adequately mitigated, 2) The Federal surface over the Federal coal leases is managed by the Forest Service, and 3) Review of the Resource Recovery and Protection Plan is by our State Office.

Your request for our review of the above specifically asked for our analysis of 1) Post-mining land use, 2) Coal recovery procedures, and 3) A final concurrence letter. For the reasons enumerated above, we do not have any comment on these items. For documentation purposes you may consider this as our "final concurrence letter".

Kenneth V Rhea

Klein
thru
Branson

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
UTAH STATE OFFICE
136 E. South Temple
SALT LAKE CITY, UTAH 84111

IN REPLY REFER TO
3482
SL-025431
(U-921

July 20, 1984

Memorandum

To: Utah Senior Project Manager, OSM, Denver

Attn: Ms. Sarah Bransom

From: Chief, Branch of Mining Law and Solid Minerals
BLM-SO, Salt Lake City, Utah

Subject: United States Fuel Company, Hiawatha Complex, Carbon and Emery Counties, Utah, Permit Application Package (PAP)

The Resource Recovery and Protection Plan (R_2P_2) or underground mining part of the subject PAP was considered adequate for BLM administration of the associated Federal coal leases. Our memorandum dated May 8, 1984, stated that the R_2P_2 on file in this office is compatible with 43 CFR 3482.1(c) rules and regulations, and that the proposed coal recovery procedures will safely obtain maximum economic recovery of the coal resource within the plan area by following the planned technology and by using the types of equipment listed in the plan. Since that time we have received the following information and data:

1. Three maps forwarded with your letter dated June 11, 1984, and identified as "05/14/84 submittal of revisions for mining and reclamation plan, Exhibits XIII-2c, 2d, and 3e."

2. Maps and pages forwarded with your letter dated June 11, 1984, and identified as "05/17/84 submittal of revisions for MRP in response to OSM determination of adequacy letter of 05/01/84."

3. Maps and pages forwarded with your letter dated June 11, 1984, and identified as "06/01/84 submittal of additional information on proposed unit train loadout in response to OSM letter of 05/01/84."

4. Pages forwarded with your letter dated June 25, 1984, and identified as "Plan of action for evaluation of underground reservoir, June 15, 1984."

5. A page forwarded with your letter dated July 2, 1984, and identified as "06/07/84 submittal of revisions for mining and reclamation plan regarding road maintenance."

We have reviewed the supplemental information and data listed above and have determined there are no conflicts with the planned coal recovery procedures or with future recovery of coal resources.

Within the limits of our authority we concur with the Hiawatha mine complex R_2P_2 plan on file in this office as amended and recommend that it be included as an integral part of the subject PAP.

J. Gordon Whitney
acting

cc: US Fuel Co.
UDOGM
DM-MDO

UT0006

United States Department of Agriculture
Forest Service
Manti-LaSal National Forest
599 West Price River Drive
Price, Utah 84501

Reply to: 2820

Date: December 4, 1984

Allen D. Klein, Administrator
OSM - Reclamation and Enforcement
Brooks Towers - 1020 15th Street
Denver, Colorado 80202

Dear Mr. Klein:

The Forest Service received a copy of U.S. Fuel's Mining and Reclamation Plan (MRP) for the King Mines complex March 31, 1981. We have not yet received the draft Technical Analysis (TA). Consequently, our review encompassed only the 1981 MRP and subsequent revisions through the September 4, 1984, submittals by OSM.

Our only comment which requires no response is as follows:

Exhibit X-1 and Exhibit X-2 - The indicated crucial, critical deer winter range area (c-d-wt) is too large on Gentry Mountain, and does not correlate with the crucial, critical elk winter range (c-e-wt) in the same area. The deer area is too large and the elk area is too small.

To continue our cooperative efforts to meet your difficult time schedule, I will consent for the Forest Service to U.S. Fuel's MRP. Consent is subject to our receipt and review of the TA, and satisfactory response to our comments on both documents.

Sincerely,

Reed C Christensen

REED C. CHRISTENSEN
Forest Supervisor

United States
Department of
Agriculture

Forest
Service

Manti-LaSal
National Forest

599 West Price River Dr.
Price, Utah 84501

OSM/RE-WT-19

1987 MAR -6 AM 8:49

WESTERN FIELD OPERATIONS

Reply to: 2820

Date: February 26, 1987

Richard M. Holbrook
Office of Surface Mining
Reclamation and Enforcement
Brooks Towers
1020 15th Street
Denver, Colorado 80202

Dear Rick:

Your office sent us a letter, dated January 6, 1987, transmitting a copy of the Technical Analysis (TA) and Environmental Assessment (EA) for U.S. Fuel Company's Hiawatha Mine Complex and requesting Forest Service consent for approval of the Mine and Reclamation Plan (MRP). This letter was in response to our last correspondence to OSM regarding approval of the MRP, dated December 4, 1984, when we consented to the MRP subject to our receipt and approval of the Technical Analysis.

We have reviewed the TA and EA and have the following comments:

1. Copies of the approved signature title pages for the TA and EA were not attached. Please send copies of these as soon as possible.

2. We have not received any hydrologic monitoring data from OSM, UDOGM, or directly from U.S. Fuel Company. The monitoring data and annual reports must be forwarded to the Forest or sent directly to the Forest by U.S. Fuel Company. For the past submitted data, annual reports summarizing the monitoring data will be sufficient for our records.

Some of the information in the TA and EA is outdated, however, this does not detract from the adequacy of the coverage of the permit area which lies on National Forest System lands.

The Manti-LaSal National Forest consents to approval of the Mine and Reclamation Plan contingent upon a response that the materials, as requested in items 1 and 2, will be forwarded to the Forest.

Sincerely,

W. K. Bailey

for
REED C. CHRISTENSEN
Forest Supervisor

SCOTT M. MATHESON
GOVERNOR

STATE OF UTAH
DEPARTMENT OF COMMUNITY AND
ECONOMIC DEVELOPMENT

Division of
State History
(UTAH STATE HISTORICAL SOCIETY)

MELVIN T. SMITH, DIRECTOR
300 RIO GRANDE
SALT LAKE CITY, UTAH 84101-1182
TELEPHONE 801/533-5755

July 9, 1984

Rex L. Wilson
Chief Archeologist
Office of Surface Mining
Reclamation and Enforcement
Brooks Towers
1020 - 15th Street
Denver, Colorado 80202

RE: U. S. Fuel Company's Hiawatha Mines Complex

In Reply Refer To Case No. E409

Dear Mr. Wilson:

The Utah Preservation Office has received for consideration your letter of June 29, 1984, requesting consultation on the Hiawatha Mines Complex owned by U.S. Fuel Company.

After review of the material provided, our office would concur with the eligibility of the three sites mentioned, the Mohrland town site, (42Em1642), the prehistoric rock shelter (42Em1641), and the townsite of Hiawatha. Also, after consideration of the proposed mitigation plans of the U.S. Fuel Company, our office would concur with the Office of Surface Mining's determination of no adverse effect as outlined by 36 CFR 800.

The above is provided on request as information or assistance. We make no regulatory requirement, since that responsibility rests with the federal agency official, as outlined by 36 CFR 800. However, if you have questions or need additional assistance, please let us know. Contact Jim Dykman at 533-7039.

Sincerely,

Wilson G. Martin
Deputy State Historic Preservation Officer

JLD:jrc:E409/0602V

1984 JUL 16 AM 9:23

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Moab District
P. O. Box 970
Moab, Utah 84532

3480
U-51923
(U-066)

Memorandum

To: Richard Holbrook, Senior Project Manager
Office of Surface Mining Reclamation and Enforcement,
Denver

MAR 5 1987

From: District Manager, Moab

Subject: Addendum to United States Fuel Company Permit Application - R2P2 Approval, Federal Lease U-51923

The one volume addendum to United States Fuel Company Permit Application - Federal Lease U-51923, forwarded to this office by the Utah Division of Oil, Gas and Mining and received by the Price River Resource Area on February 20, 1987, has been reviewed for completeness and adequacy.

When United States Fuel Company submitted their Permit Application Package, Federal Lease U-51923 had not yet been issued, even though the 160-acre lease was within the permit boundary. Therefore, the Resource Recovery and Protection Plan (R2P2) for U-51923 must be submitted and reviewed before mining may commence on this lease. The R2P2 has been reviewed and determined to be adequate in that the mineable reserves shall be recovered to the extent possible.

cc: Price (U-066)

3/11/87- The R2P2 was submitted and reviewed, and BLM is recommending approval per the final sentence of this letter (tel. conv. with Brent Northrup, BLM, Moab District, 3/11/87).

United States Department of Agriculture | Forest Service | Manti-LaSal National Forest | 599 West Price River Dr. Price, Utah 84501

Reply to: 2820

Date: March 16, 1987

Richard M. Holbrook
OSM - Reclamation & Enforcement
Brooks Towers
1020 15th Street
Denver, Colorado 80202

Dear Rick:

We have reviewed MRP Amendment, Request to Mine Federal Coal Lease U-51923, U.S. Fuel Company, Hiawatha Complex, ACT/007/011 - 86A, Folder No. 2, Carbon County, Utah.

The lease lies on private surface within the Forest boundary. Since the lease area and environmental considerations for mining this lease have already been covered in the Mine and Reclamation Plan and no additional concerns have been identified by the Forest, we have no objections or comments for approval of the amendment.

Please reference our letter to your office, dated February 26, 1987, regarding consent for approval of the Mine and Reclamation Plan.

Sincerely,

W. H. Bailey

for
REED C. CHRISTENSEN
Forest Supervisor

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT

This permit, UT-0006, which is issued concurrently with Utah Permit ACT/007/011, is issued for the United States of America by the Office of Surface Mining Reclamation and Enforcement (OSMRE) to

U.S. Fuel Company
Hiawatha, Utah 84527

for the Hiawatha Mines Complex (King 4, 5, and 6). U.S. Fuel Company is the lessee of Federal coal leases SL-025431, SL-069985, U-058261, U-51923, and U-026583.

Sec. 1 STATUTES AND REGULATIONS - This permit is issued pursuant to the Surface Mining Control and Reclamation Act of 1977, 30 U.S.C. 1201 et seq., hereafter referred to as SMCRA, and the Federal coal leases issued pursuant to the Mineral Leasing Act of 1920, as amended, 30 U.S.C. 181 et seq., the Federal Coal Leasing Amendments Act of 1976, as amended 30 U.S.C. 201 et seq. and in the case of acquired lands, the Mineral Leasing Act for Acquired Lands of 1947, as amended, 30 U.S.C. 351 et seq. This permit is also subject to all regulations of the Secretary of the Interior including, but not limited to, 30 CFR Chapter VII and 43 CFR Group 3400, and to all regulations of the Secretary of Energy promulgated pursuant to Section 302 of the Department of Energy Organization Act of 1977, 42 U.S.C. 7152, which are now in force or, except as expressly limited herein, hereafter in force, and all such regulations are made a part hereof.

Sec. 2 The permittee is authorized to conduct surface coal mining and reclamation operations on Federal lands in the permit area within the State of Utah, Emery and Carbon Counties, and located within:

T. 15 S., R. 7 E., SLM, sec. 13, 24, 25, 36;
T. 15 S., R. 8 E., SLM, sec. 17-21, 26-35;
T. 16 S., R. 8 E., SLM, sec. 3-6, 8, 9;

excluding 55 acres for the town of Hiawatha in:

T. 15 S., R. 8 E., SLM, sec. 27, 34; as shown on attached maps P-1 and P-2; subject to the conditions of Federal coal leases, the approved mining plan, and all other applicable conditions, laws and regulations.

Sec. 3 This permit ~~is issued~~ will expire on March 13, 1992 for a ~~term of 5 years commencing on the date the permit is signed by~~ the permittee, except that this permit will ~~terminate~~ if the permittee has not begun the underground coal mining and reclamation operations covered herein ~~within 3 years from the date of permit issuance~~.

Sec. 4 The permit rights may not be transferred, assigned, or sold without the approval of the Director, OSMRE. Transfer, assignment, or sale of permit rights must be done in accordance with 30 CFR 740.13(e) and UMC 788.18.

Sec. 5 The permittee shall allow the authorized representatives of the Secretary, and the Utah Division of Oil, Gas, and Mining including but not limited to, inspectors and fee compliance officers, without advance notice or a search warrant, upon presentation of appropriate credentials, and without delay to:

a. Have the rights-of-entry provided for in 30 CFR 842.13 and UMC 840.12 and 842.13; and,

b. Be accompanied by private persons for the purpose of conducting an inspection in accordance with 30 CFR 842.12 and UMC 842.12, when the inspection is in response to an alleged violation reported by the private person.

Sec. 6 The permittee shall conduct surface and underground coal mining activities and reclamation operations only on those lands specifically designated as being within the permit area on the maps submitted in the permit application and approved for the term of the permit and which are subject to the performance bond.

Sec. 7 The permittee shall take all possible steps to minimize any adverse impact to the environment or public health and safety resulting from noncompliance with any term or condition of this permit, including, but not limited to:

a. Any accelerated or additional monitoring necessary to determine the nature and extent of noncompliance and the results of the noncompliance;

b. Immediate implementation of measures necessary to comply; and,

c. Warning, as soon as possible after learning of such noncompliance, any person whose health and safety is in imminent danger due to the noncompliance.

Sec. 8 The permittee shall dispose of solids, sludge, filter backwash, or pollutants removed in the course of treatment or control of waters or emissions to the air in the manner required by the approved Utah State Program and the Federal Lands Program which prevents violation of any applicable State or Federal law.

Sec. 9 The permittee shall conduct its operations:

a. In accordance with the terms of the permit to prevent significant, imminent environmental harm to the health and safety of the public; and

b. Utilizing methods specified as conditions of the permits by OSMRE and the Utah Division of Oil, Gas and Mining, the approved Utah State Program, and the Federal Lands Program.

Sec. 10 The permittee shall provide the names, addresses, and telephone numbers of persons responsible for operations under the permit to whom notices and orders are to be delivered.

Sec. 11 Upon expiration, this permit may be renewed for areas within the boundaries of the existing permit in accordance with SMCRA, the approved Utah State Program and the Federal Lands Program.

Sec. 12 If during the course of mining operations previously unidentified prehistoric or historic resources are discovered, the permittee shall ensure that the resources are not disturbed and shall notify the Utah Division of Oil, Gas and Mining and OSMRE. The permittee shall take such necessary actions as are required by the Utah Division of Oil, Gas and Mining, in coordination with OSMRE.

Sec. 13 The operator shall pay all reclamation fees required by 30 CFR Chapter VII, Subchapter R for coal produced under this permit.

Sec. 14 APPEALS - The permittee shall have the right to appeal: (a) under 30 CFR 775 from actions or decisions of any official of OSMRE; (b) under 43 CFR 3000.4 from an action or decision of any official of the Bureau of Land Management; (c) under 30 CFR 290 from an action, order, or decision of any official of the Minerals Management Service; or (d) under applicable regulations from any action or decision of any other official of the Department of the Interior arising in connection with this permit.

Sec. 15 SPECIAL CONDITIONS - The permittee shall comply with the terms and conditions set out in the leases and this permit. In addition, the permittee shall comply with the conditions appended hereto as Attachment A. These conditions are also imposed upon the permittee's agents and employees. The failure or refusal of any of these persons to comply with these conditions shall be deemed a failure of the permittee to comply with the terms of this permit and the lease. In accordance with 30 CFR Part 774, these conditions may be revised or amended, in writing, by the mutual consent of OSMRE and the permittee at any time to adjust to changed conditions or to correct an oversight. OSMRE may, by order, require reasonable revisions of this permit to ensure compliance with SMCRA and the regulatory program.

OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT

for Charles M Albrecht, Acting
Chief, Federal Programs Division
Western Field Operations

MARCH 20, 1987
Date

Attachment A

Condition No. 1

Prior to the initiation of any ground disturbance activities, the permittee shall contact OSMRE, Utah DOGM and SHPO concerning the need for a cultural resources inventory of the impact area. If an inventory is required, the operator shall ensure that all cultural resources are properly evaluated in terms of National Register of Historic Places eligibility criteria. Where a significant site will be affected by mining, the permittee will consult with OSMRE, Utah DOGM, and the SHPO to develop and implement appropriate impact mitigation measures according to a mutually agreed upon schedule.

Condition No. 2

Within sixty (60) days of the effective date of this permit, the permittee must submit a revised surface-water monitoring program to include alkalinity, dissolved iron, and oil and grease. Streams will be monitored monthly during the period of April through October in accordance with Utah DOGM's abbreviated sampling analytical schedule. Measurements of turbidity may be substituted for the measurement of total suspended solids following the development of an adequate site-specific relationship between the two parameters. Twice per year, the full suite of water-quality parameters will be analyzed using the comprehensive analytical schedule developed by Utah DOGM.

Condition No. 3

Within sixty (60) days of the effective date of this permit, the permittee must submit to the RA a revised plan demonstrating adequate runoff storage for Slurry Pond 5A. Slurry Pond 5A is not to be used to contain runoff from the undisturbed areas flowing through culverts Nos. 2 and 12 until a revised plan is submitted and approved by the regulatory authority.

Condition No. 4

Within sixty (60) days of the effective date of this permit, the permittee must submit to the RA a plan for a physical inspection of each seal impounding the underground reservoir and a contingency plan if inspections identify a possibility of failure. Starting in September 1987, each curved bulkhead must be inspected at least annually using the following as a minimum:

1) Photo monitor each curved bulkhead abutment using permanent picture points and camera mounts.

2) Establish a survey net to monitor horizontal and vertical movement at several selected points in and around each bulkhead. This net should be to second order survey accuracy.

3) Establish a bulkhead leakage monitoring system that measures the water flow through each bulkhead and adjacent materials to measure leakage. This escaping water must be less than 0.25 gallons of water per bulkhead per 24 hour period. This item must be monitored monthly.

Condition No. 5

Within sixty (60) days of the effective date of this permit, the permittee must revise and submit to the RA for approval a revised spring monitoring schedule and must include in its monitoring program the USFS spring (Water Right 91-1633).

Condition No. 6

Within sixty (60) days of the effective date of this permit, the permittee must revise the in-mine ground water monitoring program in consultation with Utah DOGM. This monitoring program shall be submitted to the regulatory authority for final approval.

Condition No. 7

Within sixty (60) days of the effective date of this permit, the permittee must provide results of sampling to a minimum of seven feet and laboratory analyses of soil from the equipment storage yard confirming that the projected quantity and quality of soil are accurate.

Condition No. 8

Within ninety (90) days of the effective date of this permit, the permittee must provide the results of sampling and laboratory analysis of the soils in the nonrefuse portion of the preparation plant area to insure that a minimum of 18 inches of suitable subsoil material is available for redistribution after backfilling and grading.

Condition No. 9

Within sixty (60) days of the effective date of this permit, the permittee must provide the location (exhibit) and proposed protective measures to be used for any and all substitute topsoil stockpiles in the nonrefuse portion of the preparation plant area.

Condition No. 10

The permittee must, by July 1, 1986, submit the necessary data collected during 1985, that reevaluates the cover value for all vegetation reference areas. Discussions evaluating the new data and how it relates to the vegetation type must also be provided.

Condition No. 11

As a condition of the U. S. Fish and Wildlife Service's Windy Gap analysis for impacts to threatened and endangered species, the permittee must implement within thirty (30) days of the effective date of this permit the mitigation measures identified in the USFWS letter dated August 13, 1984, and submit proof of such compliance to the regulatory authority.

Condition No. 12

Prior to initiating soil salvage activities in Area D borrow area or developing the existing access road through the adjacent riparian zone, the permittee shall consult with the regulatory authority to determine whether any design changes are required due to changes in the condition of the stream crossing. At such time, at a minimum, the disturbance to established riparian vegetation, topsoil salvage, the need for temporary culverts, and spillage into the perennial stream shall be considered.

Condition No. 13

The permittee shall comply with all terms of the Reclamation Fee Installment Agreement entered into on November 11, 1985, by and between U.S. Fuel Company and OSMRE, U.S. Department of the Interior. OSMRE may immediately suspend or revoke the permittee's permit or right to mine if the U.S. Fuel Company fails to comply with any of the terms of the agreement.

Condition No. 14

The applicant shall commit, within 30 days of permit approval, to restoring areas impacted by subsidence-caused surface cracks or other subsidence features such as escarpments (not to include naturally occurring escarpments which are not a result of mining) which are of a size or nature that could, in the Division's determination, either injure or kill grazing livestock or wildlife. Restoration shall include recontouring of the affected land surface including measures to prevent rilling, and revegetation in accordance with the approved permanent revegetation plan in the MPR. Restoration shall be undertaken after annual subsidence survey data indicate that the surfaced has stabilized, but in all cases restoration and revegetation shall be completed prior to bond release.

Condition No. 15

The applicant shall commit, within 30 days of permit approval, to compensate surface owners (except for land owned by the applicant) for lands which cannot be safely grazed due to hazards caused by surface effects of subsidence, with land (in close proximity) of comparable size and grazing capacity to be used for grazing until restoration of the damaged land is achieved.

Condition No. 16

The applicant shall commit, within 30 days of permit approval, to compensate, at a fair market value, owners of livestock which are injured or killed as a direct result of surface hazards caused by subsidence.

Condition No. 17

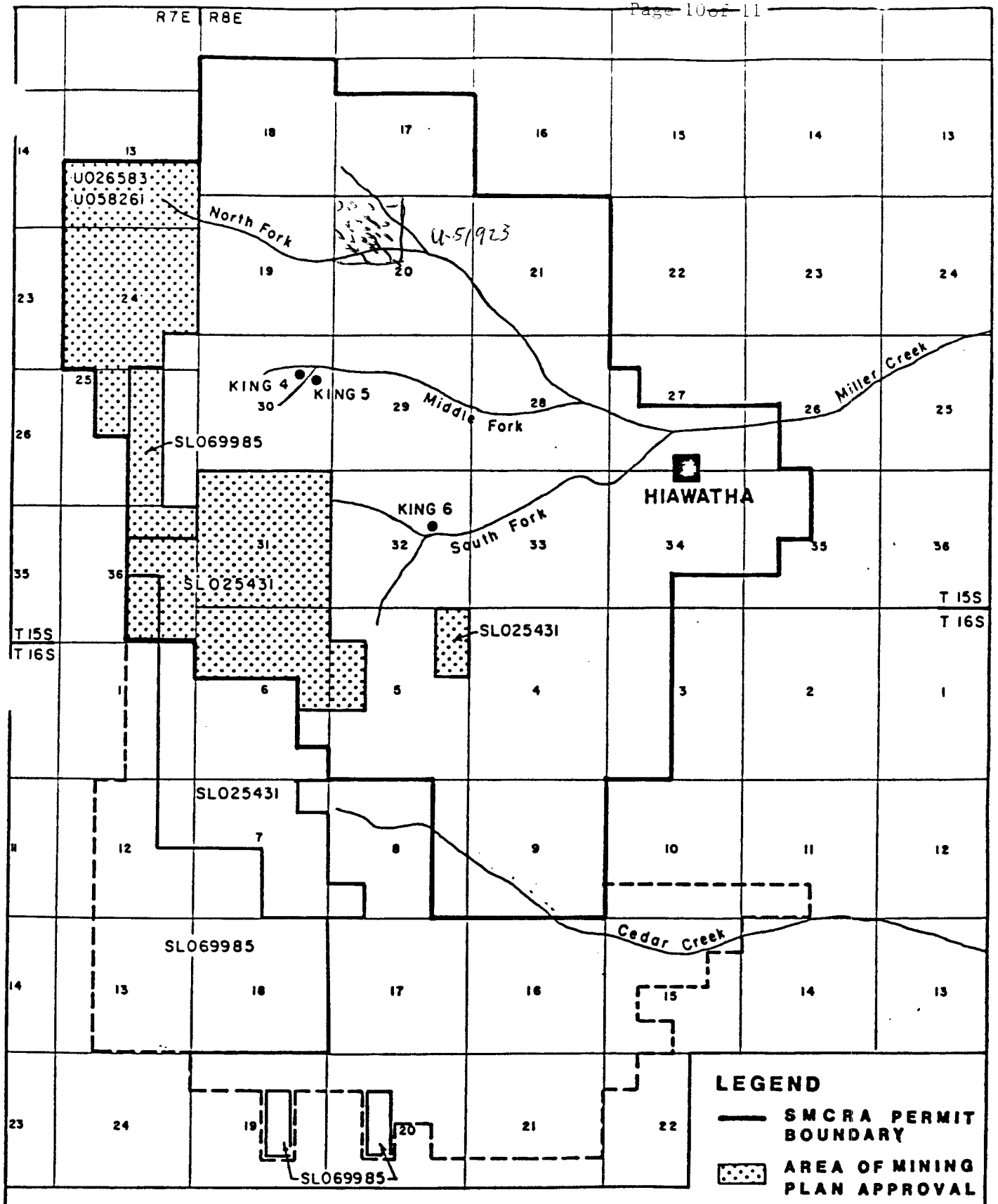
The permittee shall replace any water demonstrated to have been lost or adversely affected by mining operations with water from an alternate source in sufficient quantity and quality to maintain the current and postmining land use. The permittee will advise the regulatory authority of the loss or adverse occurrence within two working days of becoming aware that it has occurred, and within 14 days of notification shall submit to the regulatory authority for approval a plan to replace the affected water. Upon acceptance of the plan by the regulatory authority, the plan shall be implemented in the time-frame dictated by the regulatory authority's approval notification.

Condition No. 18

Existing raptor nests adversely affected by mine related subsidence shall be replaced or otherwise mitigated by the permittee in consultation with the U.S. Fish and Wildlife Service and the Utah Division of Wildlife Resources according to the requirements of UMC 784.21 and UMC 817.97. Notification of the loss to the above-named agencies and the regulatory authority shall take place within two working days of the permittee becoming aware that the loss has occurred.

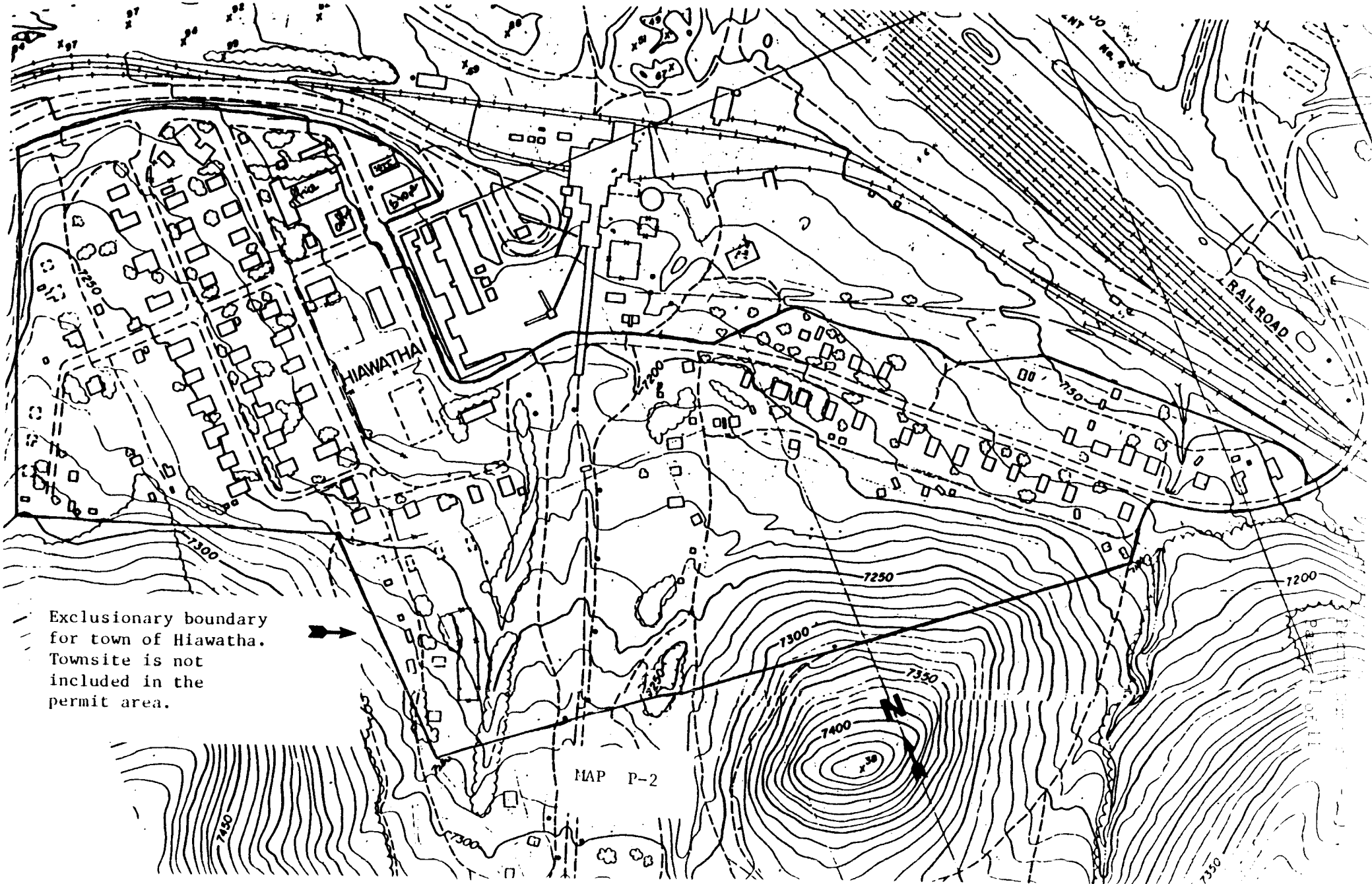
Condition No. 19

At least 60 days prior to beginning second seam mining inside a perennial stream buffer zone as defined by a 20 degree angle of draw from vertical, measured from the limit of mining in the lowest seam to the center of the stream channel, the permittee shall present a detailed evaluation of the anticipated effects of multiple seam mining on perennial streams to the regulatory authority for review and approval as required by UMC 817.126(a). This evaluation must be based upon subsidence monitoring information collected on multiple seam mining in areas with similar overburden depth and surface topography.



MAP P-1

HIAWATHA MINES COMPLEX



Exclusionary boundary for town of Hiawatha. Townsite is not included in the permit area.

MAP P-2

Lynn,

Finally found these. We'll probably be getting other copies. Go ahead an send out revs. reports if they look ok.

Sue

UNITED STATES FUEL COMPANY

P.O. Box A
Hiawatha, Utah 84527

(801) 637-2252
TELEX: 453-123

March 30, 1989

Mr. Lowell Braxton, Administrator
Division of Oil, Gas and Mining
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Dear Lowell:

Please find enclosed U.S. Fuel's annual report and attachments. All required reports are being submitted with the exception of the subsidence report. U.S. Fuel has contacted the contractor but they are unable to meet the deadline. This information will be submitted as soon as received.

Sincerely,

Jean Semborski

Jean Semborski
Environmental Coordinator

JS:lj

Enclosure:

COAL MINING AND RECLAMATION OPERATIONS FOR 1988
(Authority UMC 784)

(Must be submitted to the Division by March 31, 1989)

State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
3 Triad Centter, Suite 350
355 West North Temple
Salt Lake City, Utah 84180-1203

(801) 538-5340

Operator: United States Fuel Company

Mine Name: King Mines

Mailing Address: P.O. Box A Hiawatha, Utah 84527

Company Representative: Jean Semborski

Permit Number: ACT 007/011

Date of Most Recent Permanent Program Permit: March 13, 1987

Quantity of Coal Mined (tonnage) 1988: 617,596

Attach Updated Mine Sequence Map.

All monitoring activities during the report period must be submitted with this report (including, but not limited to):

A. Summarized Water Monitoring Data - Quarterly Reports Enclosed

B. Precipitation or Other Climatological Data - None

C. Subsidence Monitoring Report - Not recieved yet

D. Vegetation Data (test plots) or Revegetation Success Monitoring (includes interim and final) - Final reports enclosed (8 copies)

E. Permit Stipulation Status - Received Division approval on all responses to the Permit conditions on 1/21/88

djh F. Annual Slurry Impoundment & Refuse Pile Report
AT57

WATER MONITORING REPORT

SECOND QUARTER - 1988

UNITED STATES FUEL COMPANY
HIAWATHA , UTAH 84527

STREAM MONITORING REPORT

EFFLUENT CHARACTERISTICS	ST- 1			ST- 2		
	APRIL	MAY	JUNE	APRIL	MAY	JUNE
Flow Rate G.P.M.	I.A.	377	103	I.A.		
Air Temperature °F		56	63			
Water Temperature °F		46	52			
Acidity mg/l $CaCO_3$						
Alkalinity, Total mg/l $CaCO_3$		208	267		219	192
Alkalinity, Bicarbonate "		208	267		219	192
Alkalinity, Carbonate "		0	0		0	0
Chloride mg/l $CaCO_3$		5	12		3	5
Conductivity uhmos/cm		600	1069		449	408
Fluoride mg/l						
Kjeldahl N mg/l						
Nitrogen, Nitrate mg/l						
Nitrogen, Nitrite mg/l						
Oil & Grease mg/l		<1	1		<1	1
pH units		8.0	8.2		8.5	8.5
Phosphorus, Total mg/l						
Radioactivity: Gross Alpha						
Gross Beta						
Solids, Total Dissolved mg/l		450	876		280	244
Solids, Total Suspended mg/l		24	6		66	<2
Sulfate mg/l		167	379		39	21
Arsenic mg/l						
Cadmium mg/l						
Calcium mg/l		79	113		65	56
Iron mg/l						
Magnesium mg/l		52	96		28	23
Manganese mg/l						
Potassium mg/l		3	6		1	1
Selenium mg/l						
Silica mg/l						
Sodium mg/l		5	9		4	3
Zinc mg/l						
Iron (Diss.) mg/l		.04	.04		.04	<.02
Total Organic Carbon mg/l						

STREAM MONITORING REPORT

* SEE ATTACHED ANALYSES SHEET

EFFLUENT CHARACTERISTICS	ST- 2A			ST- 2B		
	APRIL	MAY	JUNE	APRIL	MAY	JUNE*
Flow Rate G.P.M.	I.A.	319	292	I.A.	514	389
Air Temperature °F		57	70		56	63
Water Temperature °F		43	50		52	51
Acidity mg/l $CaCO_3$						
Alkalinity, Total mg/l $CaCO_3$		206	206		235	196
Alkalinity, Bicarbonate "		206	206		235	196
Alkalinity, Carbonate "		0	0		0	0
Chloride mg/l $CaCO_3$		3	5		4	4
Conductivity uhmos/cm		464	471		484	529
Fluoride mg/l						
Kjeldahl N mg/l						
Nitrogen, Nitrate mg/l						
Nitrogen, Nitrite mg/l						
Oil & Grease mg/l		<1	1		<1	<1
pH units		8.5	8.4		8.4	8.4
Phosphorus, Total mg/l						
Radioactivity: Gross Alpha						
Gross Beta						
Solids, Total Dissolved mg/l		288	278		332	318
Solids, Total Suspended mg/l		50	2		90	16
Sulfate mg/l		35	23		56	51
Arsenic mg/l						
Cadmium mg/l						
Calcium mg/l		63	61		72	47
Iron mg/l						
Magnesium mg/l		28	25		36	35
Manganese mg/l						
Potassium mg/l		1	1		2	2
Selenium mg/l						
Silica mg/l						
Sodium mg/l		3	3		4	4
Zinc mg/l						
Iron (Diss.) mg/l		.04	<.02		.04	.02
Total Organic Carbon mg/l						

STREAM MONITORING REPORT

EFFLUENT CHARACTERISTICS	ST- 3			ST- 3A		
	APRIL	MAY	JUNE	APRIL	MAY	JUNE
Flow Rate G.P.M.	72.1	52	21	DRY	DRY	DRY
Air Temperature °F	62	56	76			
Water Temperature °F	43	56	56			
Acidity mg/l $CaCO_3$						
Alkalinity, Total mg/l $CaCO_3$	317	288	310			
Alkalinity, Bicarbonate "	317	288	310			
Alkalinity, Carbonate "	0	0	0			
Chloride mg/l $CaCO_3$	338	450	446			
Conductivity uhmos/cm	1860	2460	2570			
Fluoride mg/l						
Kjeldahl N mg/l						
Nitrogen, Nitrate mg/l						
Nitrogen, Nitrite mg/l						
Oil & Grease mg/l	<1	<1	1			
pH units	8.24	8.1	8.2			
Phosphorus, Total mg/l						
Radioactivity: Gross Alpha						
Gross Beta						
Solids, Total Dissolved mg/l	1412	1960	2012			
Solids, Total Suspended mg/l	238	64	40			
Sulfate mg/l	420	576	568			
Arsenic mg/l						
Cadmium mg/l						
Calcium mg/l	143	170	177			
Iron mg/l						
Magnesium mg/l	129	176	182			
Manganese mg/l						
Potassium mg/l	8	9	9			
Selenium mg/l						
Silica mg/l						
Sodium mg/l	143	179	182			
Zinc mg/l						
Iron (Diss.) mg/l	<.02	<.02	.07			
Total Organic Carbon mg/l						

STREAM MONITORING REPORT

EFFLUENT CHARACTERISTICS	ST- 3B			ST- 4		
	APRIL	MAY	JUNE	APRIL	MAY	JUNE
Flow Rate G.P.M.				DRY	DRY	DRY
Air Temperature °F						
Water Temperature °F						
Acidity mg/l $CaCO_3$						
Alkalinity, Total mg/l $CaCO_3$	277	292	278			
Alkalinity, Bicarbonate "	277	292	312			
Alkalinity, Carbonate "	0	0	0			
Chloride mg/l $CaCO_3$	660	850	1210			
Conductivity uhmos/cm	2500	2990	3530			
Fluoride mg/l						
Kjeldahl N mg/l						
Nitrogen, Nitrate mg/l						
Nitrogen, Nitrite mg/l						
Oil & Grease mg/l	<1	<1	1			
pH units	8.05	8.0	8.1			
Phosphorus, Total mg/l						
Radioactivity: Gross Alpha						
Gross Beta						
Solids, Total Dissolved mg/l	1734	2222	2586			
Solids, Total Suspended mg/l	18	6	8			
Sulfate mg/l	235	319	307			
Arsenic mg/l						
Cadmium mg/l						
Calcium mg/l	139	250	224			
Iron mg/l						
Magnesium mg/l	97	138	125			
Manganese mg/l						
Potassium mg/l	7	8	8			
Selenium mg/l						
Silica mg/l						
Sodium mg/l	300	355	384			
Zinc mg/l						
Iron (Diss.) mg/l	<.02	.18	.10			
Total Organic Carbon mg/l						

STREAM MONITORING REPORT

EFFLUENT CHARACTERISTICS	ST- 4A			ST- 4B		
	APRIL	MAY	JUNE	APRIL	MAY	JUNE
Flow Rate G.P.M.	DRY			DRY	DRY	
Air Temperature °F						
Water Temperature °F						
Acidity mg/l $CaCO_3$						
Alkalinity, Total mg/l $CaCO_3$		252	239			347
Alkalinity, Bicarbonate "		252	239			347
Alkalinity, Carbonate "		0	0			0
Chloride mg/l $CaCO_3$		4	5			60
Conductivity uhmos/cm		595	637			1100
Fluoride mg/l						
Kjeldahl N mg/l						
Nitrogen, Nitrate mg/l						
Nitrogen, Nitrite mg/l						
Oil & Grease mg/l		<1	1			1
pH units		8.5	8.6			7.7
Phosphorus, Total mg/l						
Radioactivity: Gross Alpha						
Gross Beta						
Solids, Total Dissolved mg/l		436	370			810
Solids, Total Suspended mg/l		16	6			14
Sulfate mg/l		101	88			177
Arsenic mg/l						
Cadmium mg/l						
Calcium mg/l		72	64			104
Iron mg/l						
Magnesium mg/l		53	48			76
Manganese mg/l						
Potassium mg/l		2	2			4
Selenium mg/l						
Silica mg/l						
Sodium mg/l		6	6			23
Zinc mg/l						
Iron (Diss.) mg/l		<.02	<.02			<.02
Total Organic Carbon mg/l						

STREAM MONITORING REPORT

* SEE ATTACHED ANALYSES SHEETS

EFFLUENT CHARACTERISTICS	ST- 5			ST- 6		
	APRIL	MAY	JUNE *	APRIL	MAY	JUNE *
Flow Rate G.P.M.	700	1030	404 ✓	467	969	736 ✓
Air Temperature °F	66	80	66 ✓	47	60	80 ✓
Water Temperature °F	53	56	58 ✓	46	58	60 ✓
Acidity mg/l $CaCO_3$						
Alkalinity, Total mg/l $CaCO_3$	261	240	239	220	204	178
Alkalinity, Bicarbonate "	261	240	239	220	204	178
Alkalinity, Carbonate "	0	0	0	0	0	0
Chloride mg/l $CaCO_3$	51	25	44	7	5	6
Conductivity uhmos/cm	1060	764	1091	814	593	807
Fluoride mg/l						
Kjeldahl N mg/l						
Nitrogen, Nitrate mg/l						
Nitrogen, Nitrite mg/l						
Oil & Grease mg/l	1	<1	<1	1	<1	<1
pH units	8.28	8.4	8.3	8.37	8.4	8.4
Phosphorus, Total mg/l						
Radioactivity: Gross Alpha						
Gross Beta						
Solids, Total Dissolved mg/l	826	544	836	556	456	544
Solids, Total Suspended mg/l	46	108	60	132	88	140
Sulfate mg/l	370	198	292	239	111	214
Arsenic mg/l						
Cadmium mg/l						
Calcium mg/l	95	91	78	76	74	61
Iron mg/l						
Magnesium mg/l	109	61	95	68	48	59
Manganese mg/l						
Potassium mg/l	5	3	5	4	3	3
Selenium mg/l						
Silica mg/l						
Sodium mg/l	26	16	26	10	7	8
Zinc mg/l						
Iron (Diss.) mg/l	<.02	.07	.05	<.02	.08	.24
Total Organic Carbon mg/l						

STREAM MONITORING REPORT

EFFLUENT CHARACTERISTICS	ST- 6A			ST- 7		
	APRIL	MAY	JUNE	APRIL	MAY	JUNE
Flow Rate G.P.M.				—	2648	—
Air Temperature °F					58	
Water Temperature °F					40	
Acidity mg/l $CaCO_3$						
Alkalinity, Total mg/l $CaCO_3$	224	233	224		202	
Alkalinity, Bicarbonate "	224	233	224		202	
Alkalinity, Carbonate "	0	0	0		0	
Chloride mg/l $CaCO_3$	4	3	5		2	
Conductivity uhmos/cm	623	486	573		402	
Fluoride mg/l						
Kjeldahl N mg/l						
Nitrogen, Nitrate mg/l						
Nitrogen, Nitrite mg/l						
Oil & Grease mg/l	<1	<1	1		<1	
pH units	8.44	8.5	8.6		8.5	
Phosphorus, Total mg/l						
Radioactivity: Gross Alpha						
Gross Beta						
Solids, Total Dissolved mg/l	372	338	362		254	
Solids, Total Suspended mg/l	114	22	4		32	
Sulfate mg/l	107	62	78		10	
Arsenic mg/l						
Cadmium mg/l						
Calcium mg/l	59	66	61		68	
Iron mg/l						
Magnesium mg/l	49	39	43		21	
Manganese mg/l						
Potassium mg/l	2	1	2		1	
Selenium mg/l						
Silica mg/l						
Sodium mg/l	6	5	6		3	
Zinc mg/l						
Iron (Diss.) mg/l	<.02	.03	.02		.06	
Total Organic Carbon mg/l						

Client : United States Fuel Company
Address : P.O. Box A
Hiawatha, Utah 84527
Attn. : Ms. Jean Semborski
P.O. No.: H-17880
Sample ID: ST2B-71 Lab No. : 88-WI/03899
Sample Date Time: 06/23/88 11:00 Date Received: 07/01/88

Parameters

Alkalinity as CaCO3	196.	mg/l
Bicarbonate as CaCO3	196	mg/l
Boron, dissolved	.02	mg/l
Calcium, dissolved	47.	mg/l
Carbonate as CaCO3	0	mg/l
Chloride	4.	mg/l
Conductivity @ 25C	453.	umhos/cm
Fluoride	.1	mg/l
Hardness as CaCO3	261.	mg/l
Hydroxide as CaCO3	0	mg/l
Magnesium, dissolved	35.	mg/l
Nitrogen, ammonia	.04	mg/l
Nitrate as N, dissolved	-.02	mg/l
Nitrate/Nitrite as N	-.02	mg/l
Nitrite as N, dissolved	-.01	mg/l
Oil and Grease	-1.	mg/l
Phosphorus, ortho total	.02	mg/l
Potassium, dissolved	2.	mg/l
SAR in water	.11	
Sodium, dissolved	4.	mg/l
Sulfate	51.	mg/l
Sulfide as S	#	mg/l
Cations (sum)	5.45	meq/l
Anions (sum)	5.10	meq/l
Cation-Anion Balance	3.32	%
Solids, total dissolved	318.	mg/l
Solids, total suspended	16.	mg/l
Solids, total volatile	4.	mg/l
Aluminum, dissolved	-.05	mg/l
Arsenic, dissolved	-.001	mg/l
Barium, dissolved	.07	mg/l
Cadmium, dissolved	-.005	mg/l
Chromium, dissolved	-.01	mg/l
Copper, dissolved	.01	mg/l
Iron, dissolved	.02	mg/l
Iron, total	.12	mg/l
Lead, dissolved	-.02	mg/l
Manganese, dissolved	-.01	mg/l
Mercury, dissolved	-.0001	mg/l
Molybdenum, dissolved	-.05	mg/l
Nickel, dissolved	.02	mg/l
Selenium, dissolved	-.001	mg/l
Zinc, dissolved	.01	mg/l

Remarks:
Note: Negative sign "-" denotes that the value is less than "<"

Ralph V. Poulsen, Laboratory Director
Ralph V. Poulsen, M.S.

Client : United States Fuel Company
Address : P.O. Box A
Hiawatha, Utah 84527
Attn. : Ms. Jean Semborski
P.O. No.: H-17880
Sample ID: ST5-88
Sample Date Time: 06/23/88 10:30

Lab No. : 88-WI/03900
Date Received: 07/01/88

Parameters

Alkalinity as CaCO3	239.	mg/l
Bicarbonate as CaCO3	239	mg/l
Boron, dissolved	.08	mg/l
Calcium, dissolved	78.	mg/l
Carbonate as CaCO3	0	mg/l
Chloride	44.	mg/l
Conductivity @ 25C	999.	umhos/cm
Fluoride	.2	mg/l
Hardness as CaCO3	585.	mg/l
Hydroxide as CaCO3	0	mg/l
Magnesium, dissolved	95.	mg/l
Nitrogen, ammonia	.03	mg/l
Nitrate as N, dissolved	.11	mg/l
Nitrate/Nitrite as N	.11	mg/l
Nitrite as N, dissolved	-.01	mg/l
Oil and Grease	-1.	mg/l
Phosphorus, ortho total	.02	mg/l
Potassium, dissolved	5.	mg/l
SAR in water	.47	
Sodium, dissolved	26.	mg/l
Sulfate	292.	mg/l
Sulfide as S	#	mg/l
Cations (sum)	12.96	meq/l
Anions (sum)	12.14	meq/l
Cation-Anion Balance	3.27	%
Solids, total dissolved	836.	mg/l
Solids, total suspended	60.	mg/l
Solids, total volatile	16.	mg/l
Aluminum, dissolved	-.05	mg/l
Arsenic, dissolved	-.001	mg/l
Barium, dissolved	.06	mg/l
Cadmium, dissolved	-.005	mg/l
Chromium, dissolved	-.01	mg/l
Copper, dissolved	.02	mg/l
Iron, dissolved	.05	mg/l
Iron, total	.93	mg/l
Lead, dissolved	-.02	mg/l
Manganese, dissolved	-.01	mg/l
Mercury, dissolved	-.0001	mg/l
Molybdenum, dissolved	-.05	mg/l
Nickel, dissolved	-.02	mg/l
Selenium, dissolved	-.001	mg/l
Zinc, dissolved	-.01	mg/l

Remarks:
Note: Negative sign "-" denotes that the value is less than "<"

Ralph V. Poulsen, Laboratory Director
Ralph V. Poulsen/S.H.

Client : United States Fuel Company
Address : P.O. Box A
Hiawatha, Utah 84527
Attn. : Ms. Jean Semborski
P.O. No.: H-17880
Sample ID: ST6-91
Sample Date Time: 06/23/88 09:45

Lab No. : 88-WI/03898
Date Received: 07/01/88

Parameters

Alkalinity as CaCO3	178.	mg/l
Bicarbonate as CaCO3	178	mg/l
Boron, dissolved	.07	mg/l
Calcium, dissolved	61.	mg/l
Carbonate as CaCO3	0	mg/l
Chloride	6.	mg/l
Conductivity @ 25C	686.	umhos/cm
Fluoride	.1	mg/l
Hardness as CaCO3	394.	mg/l
Hydroxide as CaCO3	0	mg/l
Magnesium, dissolved	59.	mg/l
Nitrogen, ammonia	.07	mg/l
Nitrate as N, dissolved	-.02	mg/l
Nitrate/Nitrite as N	-.02	mg/l
Nitrite as N, dissolved	-.01	mg/l
Oil and Grease	-1.	mg/l
Phosphorus, ortho total	.02	mg/l
Potassium, dissolved	3.	mg/l
SAR in water	.18	
Sodium, dissolved	8.	mg/l
Sulfate	214.	mg/l
Sulfide as S	#	mg/l
Cations (sum)	8.32	meq/l
Anions (sum)	8.22	meq/l
Cation-Anion Balance	.60	%
Solids, total dissolved	544.	mg/l
Solids, total suspended	140.	mg/l
Solids, total volatile	24.	mg/l
Aluminum, dissolved	.12	mg/l
Arsenic, dissolved	-.001	mg/l
Barium, dissolved	.06	mg/l
Cadmium, dissolved	-.005	mg/l
Chromium, dissolved	-.01	mg/l
Copper, dissolved	-.01	mg/l
Iron, dissolved	.24	mg/l
Iron, total	1.01	mg/l
Lead, dissolved	-.02	mg/l
Manganese, dissolved	.02	mg/l
Mercury, dissolved	-.0001	mg/l
Molybdenum, dissolved	-.05	mg/l
Nickel, dissolved	-.02	mg/l
Selenium, dissolved	-.001	mg/l
Zinc, dissolved	.02	mg/l

Remarks: No H2S Data-No Tan Bottle Received/Filtered GREEN 3898-900
Note: Negative sign "-" denotes that the value is less than "<"

Ralph V. Poulsen, Laboratory Director
Ralph V. Poulsen M.S.

STREAM MONITORING REPORT

* SEE ATTACHED LAB SHEET

EFFLUENT CHARACTERISTICS		ST-1			ST-2		
		JULY	AUG	SEPT*	JULY	AUG	SEPT*
Flow Rate	G.P.M.	72	72	72 ✓			90 ✓
Air Temperature	°F	58	68	55			61
Water Temperature	°F	59	58	54 J			47 ✓
Alkalinity, total	mg/l $CaCO_3$	296	300	302	196	202	218
Alkalinity, bicarbonate	"	296	300	302	196	202	218
Alkalinity, carbonate	"	0	0	0	0	0	0
Boron, dissolved	mg/l						<.01
Calcium, dissolved	mg/l	133	123	120	44	56	58
Chloride	mg/l	13	13	13	2	2	2
Conductivity	mg/l	1195	1255	1299	407	445	473
Fluoride	mg/l						.2
Magnesium, dissolved	mg/l	119	105	127	27	29	32
Nitrogen, ammonia	mg/l						<.02
Nitrogen, nitrate	mg/l						<.02
Nitrogen, nitrite	mg/l						<.01
Nitrogen, nitrate nitrite	mg/l						<.02
Oil and Grease	mg/l	<1	<1	<1	<1	<1	<1
pH	units	8.0	8.3	8.2	8.2	8.7	8.4
Phosphorus, total	mg/l						<.01
Potassium, dissolved	mg/l	5	6	7	1	1	1
Sodium, dissolved	mg/l	10	10	12	3	4	3
Sulfate	mg/l	504	502	490	31	33	47
Solids, total dissolved	mg/l	1042	1008	996	246	256	284
Solids, total suspended	mg/l	24	18	26	6	<2	2
Solids, total volatile	mg/l						
Aluminum, dissolved	mg/l						<.05
Arsenic, dissolved	mg/l						.001
Barium, dissolved	mg/l						.04
Cadmium, dissolved	mg/l						<.005
Chromium, dissolved	mg/l						<.01
Copper, dissolved	mg/l						<.01
Iron, dissolved	mg/l	.08	.06	.14	<.02	<.02	.03
Lead, TOTAL	mg/l						<.02
Manganese, TOTAL	mg/l						<.01
Mercury, dissolved	mg/l						<.0001
Selenium, dissolved	mg/l						<.001

Client : United States Fuel Company
Address : P.O. Box A
Hiawatha, Utah 84527
Attn. : Ms. Jean Semborski
P.O. No.: H-17880

Sample ID: ST1-75
Sample Date Time: 09/20/88 15:35

Lab No. : 88-WI/05409
Date Received: 09/26/88

Parameters

Acidity as CaCO3	0	mg/l
Alkalinity as CaCO3	302.	mg/l
Bicarbonate as CaCO3	302	mg/l
Boron, dissolved	.11	mg/l
Calcium, dissolved	120.	mg/l
Carbonate as CaCO3	0	mg/l
Chloride	13.	mg/l
Fluoride	.3	mg/l
Hardness as CaCO3	821.	mg/l
Magnesium, dissolved	127.	mg/l
Nitrogen, ammonia	.02	mg/l
Nitrate as N, dissolved	.23	mg/l
Nitrate/Nitrite as N	.23	mg/l
Nitrite as N, dissolved	-.02	mg/l
Oil and Grease	-1.	mg/l
Hydroxide as CaCO3	0	mg/l
Phosphorus, total	-.01	mg/l
Potassium, dissolved	7.	mg/l
SAR in water	.18	
Sodium, dissolved	12.	mg/l
Sulfate	490.	mg/l
Sulfide as S	.10	mg/l
Cations (sum)	17.12	meq/l
Anions (sum)	16.72	meq/l
Cation-Anion Balance	1.18	%
Solids, total dissolved	996.	mg/l
Solids, total suspended	26.	mg/l
Solids, settleable	-.1	ml/l/hr
Aluminum, total	.36	mg/l
Arsenic, total	-.001	mg/l
Barium, total	-.01	mg/l
Cadmium, total	-.005	mg/l
Chromium, total	-.01	mg/l
Copper, total	-.01	mg/l
Iron, dissolved	.14	mg/l
Iron, total	.63	mg/l
Lead, total	-.02	mg/l
Manganese, total	.04	mg/l
Mercury, total	.0006	mg/l
Molybdenum, total	-.05	mg/l
Nickel, total	-.02	mg/l
Selenium, total	.002	mg/l
Zinc, total	-.01	mg/l

Remarks: Lab Filtering Required on "GREEN" Bottles #5409-13

Note: Negative sign "-" denotes that the value is less than "<"

Ralph V. Poulsen, Laboratory Director

Client : United States Fuel Company
Address : P.O. Box A
Hiawatha, Utah 84527
Attn. : Ms. Jean Semborski
P.O. No.: H-17880

Sample ID: ST2-49
Sample Date Time: 09/20/88 13:15

Lab No. : 88-W1/05279
Date Received: 09/21/88

Parameters

Acidity as CaCO3	0	mg/l
Alkalinity as CaCO3	218.	mg/l
Bicarbonate as CaCO3	218	mg/l
Boron, dissolved	-.01	mg/l
Calcium, dissolved	58.	mg/l
Carbonate as CaCO3	0	mg/l
Chloride	2.	mg/l
Fluoride	.2	mg/l
Hardness as CaCO3	276.	mg/l
Magnesium, dissolved	32.	mg/l
Nitrogen, ammonia	-.02	mg/l
Nitrate as N, dissolved	-.02	mg/l
Nitrate/Nitrite as N	-.02	mg/l
Nitrite as N, dissolved	-.01	mg/l
Oil and Grease	-1.	mg/l
Hydroxide as CaCO3	0	mg/l
Phosphorus, total	-.01	mg/l
Potassium, dissolved	1.	mg/l
SAR in water	.08	
Sodium, dissolved	3.	mg/l
Sulfate	47.	mg/l
Sulfide as S	.01	mg/l
Cations (sum)	5.68	meq/l
Anions (sum)	5.40	meq/l
Cation-Anion Balance	2.53	%
Solids, total dissolved	284.	mg/l
Solids, total suspended	2.	mg/l
Solids, settleable	-.1	ml/l/hr
Aluminum, total	-.05	mg/l
Arsenic, total	.001	mg/l
Barium, total	.04	mg/l
Cadmium, total	-.005	mg/l
Chromium, total	-.01	mg/l
Copper, total	-.01	mg/l
Iron, dissolved	.03	mg/l
Iron, total	.03	mg/l
Lead, total	-.02	mg/l
Manganese, total	-.01	mg/l
Mercury, total	-.0001	mg/l
Molybdenum, total	-.05	mg/l
Nickel, total	-.02	mg/l
Selenium, total	-.001	mg/l
Zinc, total	-.01	mg/l

Remarks:

Note: Negative sign "-" denotes that the value is less than "<"

Ralph V. Poulsen, L.S.H.
Ralph V. Poulsen, Laboratory Director

STREAM MONITORING REPORT

* SEE ATTACHED LAB SHEET

EFFLUENT CHARACTERISTICS	ST- 2A			ST- 2B		
	JULY	AUG	SEPT*	JULY	AUG	SEPT*
Flow Rate G.P.M.	104	74	89	148	133	89
Air Temperature °F	60	64	60	58	66	59
Water Temperature °F	55	51	47	55	51	49
Alkalinity, total mg/l $CaCO_3$	214	224	226	245	245	272
Alkalinity, bicarbonate "	214	224	226	245	245	272
Alkalinity, carbonate "	0	0	0	0	0	0
Boron, dissolved mg/l						
Calcium, dissolved mg/l	49	62	60	56	61	75
Chloride mg/l	2	3	3	6	6	8
Conductivity mg/l	420	506	515	564	708	777
Fluoride mg/l						
Magnesium, dissolved mg/l	30	31	34	45	44	61
Nitrogen, ammonia mg/l						
Nitrogen, nitrate mg/l						
Nitrogen, nitrite mg/l						
Nitrogen, nitrate nitrite mg/l						
Oil and Grease mg/l	<1	<1	<1	<1	<1	<1
pH units	7.9	8.5	8.2	8.1	8.5	8.3
Phosphorus, total mg/l						
Potassium, dissolved mg/l	1	1	1	2	2	3
Sodium, dissolved mg/l	4	5	3	5	6	8
Sulfate mg/l	35	33	45	88	86	165
Solids, total dissolved mg/l	274	278	294	372	384	526
Solids, total suspended mg/l	12	<2	2	16	2	4
Solids, total volatile mg/l						
Aluminum, dissolved mg/l						
Arsenic, dissolved mg/l						
Barium, dissolved mg/l						
Cadmium, dissolved mg/l						
Chromium, dissolved mg/l						
Copper, dissolved mg/l						
Iron, dissolved mg/l	.02	<.02	<.02	.03	.02	.02
Lead, dissolved mg/l						
Manganese, dissolved mg/l						
Mercury, dissolved mg/l						
Selenium, dissolved mg/l						

Client : United States Fuel Company
Address : P.O. Box A
Hiawatha, Utah 84527
Attn. : Ms. Jean Semborski
P.O. No.: H-17880

Sample ID: ST2A-48
Sample Date Time: 09/20/88 15:00

Lab No. : 88-WI-05274
Date Received: 09/21/88

Parameters

Acidity as CaCO3	0	mg/l
Alkalinity as CaCO3	226.	mg/l
Bicarbonate as CaCO3	226	mg/l
Boron, dissolved	-.01	mg/l
Calcium, dissolved	60.	mg/l
Carbonate as CaCO3	0	mg/l
Chloride	3.	mg/l
Fluoride	.2	mg/l
Hardness as CaCO3	289.	mg/l
Magnesium, dissolved	34.	mg/l
Nitrogen, ammonia	-.02	mg/l
Nitrate as N, dissolved	-.02	mg/l
Nitrate/Nitrite as N	-.02	mg/l
Nitrite as N, dissolved	-.01	mg/l
Oil and Grease	-1.	mg/l
Hydroxide as CaCO3	0	mg/l
Phosphorus, total	-.01	mg/l
Potassium, dissolved	1.	mg/l
SAR in water	.08	
Sodium, dissolved	3.	mg/l
Sulfate	45.	mg/l
Sulfide as S	.01	mg/l
Cations (sum)	5.95	meq/l
Anions (sum)	5.55	meq/l
Cation-Anion Balance	3.48	%
Solids, total dissolved	294.	mg/l
Solids, total suspended	2.	mg/l
Solids, settleable	-.1	ml/l/hr
Aluminum, total	-.05	mg/l
Arsenic, total	.004	mg/l
Barium, total	.05	mg/l
Cadmium, total	-.005	mg/l
Chromium, total	-.01	mg/l
Copper, total	.01	mg/l
Iron, dissolved	-.02	mg/l
Iron, total	.04	mg/l
Lead, total	-.02	mg/l
Manganese, total	-.01	mg/l
Mercury, total	-.0001	mg/l
Molybdenum, total	-.05	mg/l
Nickel, total	-.02	mg/l
Selenium, total	-.001	mg/l
Zinc, total	-.01	mg/l

Remarks:

Note: Negative sign "-" denotes that the value is less than "<"

Ralph V. Poulsen, Laboratory Director

Client : United States Fuel Company
Address : P.O. Box A
Hiawatha, Utah 84527
Attn. : Ms. Jean Semborski
P.O. No.: H-17880

Sample ID: ST2B-74
Sample Date Time: 09/20/88 15:30

Lab No. : 88-WI-05273
Date Received: 09/21/88

Parameters

Acidity as CaCO3	0	mg/l
Alkalinity as CaCO3	272.	mg/l
Bicarbonate as CaCO3	272	mg/l
Boron, dissolved	.01	mg/l
Calcium, dissolved	75.	mg/l
Carbonate as CaCO3	0	mg/l
Chloride	8.	mg/l
Fluoride	.2	mg/l
Hardness as CaCO3	438.	mg/l
Magnesium, dissolved	61.	mg/l
Nitrogen, ammonia	.02	mg/l
Nitrate as N, dissolved	-.02	mg/l
Nitrate/Nitrite as N	-.02	mg/l
Nitrite as N, dissolved	-.01	mg/l
Oil and Grease	-1.	mg/l
Hydroxide as CaCO3	0	mg/l
Phosphorus, total	-.01	mg/l
Potassium, dissolved	3.	mg/l
SAR in water	.17	
Sodium, dissolved	8.	mg/l
Sulfate	165.	mg/l
Sulfide as S	.01	mg/l
Cations (sum)	9.18	meq/l
Anions (sum)	9.13	meq/l
Cation-Anion Balance	.27	%
Solids, total dissolved	526.	mg/l
Solids, total suspended	4.	mg/l
Solids, settleable	-.1	ml/l/hr
Aluminum, total	.09	mg/l
Arsenic, total	.002	mg/l
Barium, total	.04	mg/l
Cadmium, total	-.005	mg/l
Chromium, total	-.01	mg/l
Copper, total	.01	mg/l
Iron, dissolved	.02	mg/l
Iron, total	.08	mg/l
Lead, total	-.02	mg/l
Manganese, total	.01	mg/l
Mercury, total	-.0001	mg/l
Molybdenum, total	-.05	mg/l
Nickel, total	-.02	mg/l
Selenium, total	-.001	mg/l
Zinc, total	-.01	mg/l

Remarks: Lab Filtering Required on "GREEN" Bottles 5273-77

Note: Negative sign "-" denotes that the value is less than "<"

Ralph V. Poulsen, Laboratory Director

STREAM MONITORING REPORT

* SEE ATTACHED LAB SHEET

EFFLUENT CHARACTERISTICS		ST- 3			ST- 3A		
		JULY	AUG	SEPT*	JULY	AUG	SEPT
Flow Rate	G.P.M.	DRY	21	21	DRY	DRY	DRY
Air Temperature	°F		63	63			
Water Temperature	°F		51	48			
Alkalinity, total mg/l	$CaCO_3$		310	314			
Alkalinity, bicarbonate	"		310	314			
Alkalinity, carbonate	"		0	0			
Boron, dissolved	mg/l						
Calcium, dissolved	mg/l		158	146			
Chloride	mg/l		393	372			
Conductivity	mg/l		2390	2360			
Fluoride	mg/l						
Magnesium, dissolved	mg/l		170	174			
Nitrogen, ammonia	mg/l						
Nitrogen, nitrate	mg/l						
Nitrogen, nitrite	mg/l						
Nitrogen, nitrate nitrite	mg/l						
Oil and Grease	mg/l		<1	<1			
pH	units		8.3	8.2			
Phosphorus, total	mg/l						
Potassium, dissolved	mg/l		8	9			
Sodium, dissolved	mg/l		153	167			
Sulfate	mg/l		525	508			
Solids, total dissolved	mg/l		1748	1718			
Solids, total suspended	mg/l		8	6			
Solids, total volatile	mg/l						
Aluminum, dissolved	mg/l						
Arsenic, dissolved	mg/l						
Barium, dissolved	mg/l						
Cadmium, dissolved	mg/l						
Chromium, dissolved	mg/l						
Copper, dissolved	mg/l						
Iron, dissolved	mg/l		.03	.14			
Lead, dissolved	mg/l						
Manganese, dissolved	mg/l						
Mercury, dissolved	mg/l						
Selenium, dissolved	mg/l						

Client : United States Fuel Company
Address : P.O. Box A
Hiawatha, Utah 84527
Attn. : Ms. Jean Semborski
P.O. No.: H-17880

Sample ID: ST3-75
Sample Date Time: 09/20/88 16:00

Lab No. : 88-WI/05410
Date Received: 09/26/88

Parameters

Acidity as CaCO3	0	mg/l
Alkalinity as CaCO3	314.	mg/l
Bicarbonate as CaCO3	314	mg/l
Boron, dissolved	.18	mg/l
Calcium, dissolved	146.	mg/l
Carbonate as CaCO3	0	mg/l
Chloride	372.	mg/l
Fluoride	.3	mg/l
Hardness as CaCO3	1078.	mg/l
Magnesium, dissolved	174.	mg/l
Nitrogen, ammonia	-.02	mg/l
Nitrate as N, dissolved	.19	mg/l
Nitrate/Nitrite as N	.19	mg/l
Nitrite as N, dissolved	-.02	mg/l
Oil and Grease	-1.	mg/l
Hydroxide as CaCO3	0	mg/l
Phosphorus, total	-.01	mg/l
Potassium, dissolved	9.	mg/l
SAR in water	2.24	
Sodium, dissolved	167.	mg/l
Sulfate	508.	mg/l
Sulfide as S	.04	mg/l
Cations (sum)	29.15	meq/l
Anions (sum)	27.39	meq/l
Cation-Anion Balance	3.11	%
Solids, total dissolved	1718.	mg/l
Solids, total suspended	6.	mg/l
Solids, settleable	-.1	ml/l/hr
Aluminum, total	.11	mg/l
Arsenic, total	-.001	mg/l
Barium, total	-.01	mg/l
Cadmium, total	-.005	mg/l
Chromium, total	-.01	mg/l
Copper, total	-.01	mg/l
Iron, dissolved	.14	mg/l
Iron, total	.31	mg/l
Lead, total	-.02	mg/l
Manganese, total	.03	mg/l
Mercury, total	-.0001	mg/l
Molybdenum, total	-.05	mg/l
Nickel, total	.02	mg/l
Selenium, total	-.001	mg/l
Zinc, total	-.01	mg/l

Remarks:

Note: Negative sign "-" denotes that the value is less than "<"

Ralph V. Poulsen, L.S.H.
Ralph V. Poulsen, Laboratory Director

STREAM MONITORING REPORT

* SEE ATTACHED LAB SHEET

EFFLUENT CHARACTERISTICS		ST-3B			ST-4		
		JULY	AUG	SEPT*	JULY	AUG	SEPT
Flow Rate	G.P.M.	DRY	DRY	3	DRY	DRY	DRY
Air Temperature	°F			55			
Water Temperature	°F			49			
Alkalinity, total	mg/l $CaCO_3$			304			
Alkalinity, bicarbonate	"			304			
Alkalinity, carbonate	"			0			
Boron, dissolved	mg/l						
Calcium, dissolved	mg/l			187			
Chloride	mg/l			868			
Conductivity	mg/l			360			
Fluoride	mg/l						
Magnesium, dissolved	mg/l			139			
Nitrogen, ammonia	mg/l						
Nitrogen, nitrate	mg/l						
Nitrogen, nitrite	mg/l						
Nitrogen, nitrate nitrite	mg/l						
Oil and Grease	mg/l			<1			
pH	units			8.2			
Phosphorus, total	mg/l						
Potassium, dissolved	mg/l			10			
Sodium, dissolved	mg/l			481			
Sulfate	mg/l			300			
Solids, total dissolved	mg/l			2600			
Solids, total suspended	mg/l			18			
Solids, total volatile	mg/l						
Aluminum, dissolved	mg/l						
Arsenic, dissolved	mg/l						
Barium, dissolved	mg/l						
Cadmium, dissolved	mg/l						
Chromium, dissolved	mg/l						
Copper, dissolved	mg/l						
Iron, dissolved	mg/l			.75			
Lead, dissolved	mg/l						
Manganese, dissolved	mg/l						
Mercury, dissolved	mg/l						
Selenium, dissolved	mg/l						

Client : United States Fuel Company
Address : P.O. Box A
Hiawatha, Utah 84527
Attn. : Ms. Jean Semborski
P.O. No.: H-17880

Sample ID: ST3B-53
Sample Date Time: 09/21/88 11:30

Lab No. : 88-WI/05492
Date Received: 09/27/88

Parameters

Acidity as CaCO3	0	mg/l
Alkalinity as CaCO3	304.	mg/l
Bicarbonate as CaCO3	304	mg/l
Boron, dissolved	.22	mg/l
Calcium, dissolved	187.	mg/l
Carbonate as CaCO3	0	mg/l
Chloride	868.	mg/l
Fluoride	.5	mg/l
Hardness as CaCO3	1037.	mg/l
Magnesium, dissolved	139.	mg/l
Nitrogen, ammonia	.20	mg/l
Nitrate as N, dissolved	.13	mg/l
Nitrate/Nitrite as N	.13	mg/l
Nitrite as N, dissolved	-.02	mg/l
Oil and Grease	-1.	mg/l
Hydroxide as CaCO3	0	mg/l
Phosphorus, total	.16	mg/l
Potassium, dissolved	10.	mg/l
SAR in water	6.57	
Sodium, dissolved	481.	mg/l
Sulfate	300.	mg/l
Sulfide as S	.01	mg/l
Cations (sum)	42.17	meq/l
Anions (sum)	36.68	meq/l
Cation-Anion Balance	6.96	%
Solids, total dissolved	2600.	mg/l
Solids, total suspended	18.	mg/l
Solids, settleable	-.1	ml/l/hr
Aluminum, total	.30	mg/l
Arsenic, total	-.001	mg/l
Barium, total	.09	mg/l
Cadmium, total	-.005	mg/l
Chromium, total	-.01	mg/l
Copper, total	.01	mg/l
Iron, dissolved	.13	mg/l
Iron, total	.75	mg/l
Lead, total	-.02	mg/l
Mercury, total	-.0001	mg/l
Molybdenum, total	-.05	mg/l
Nickel, total	-.02	mg/l
Selenium, total	-.001	mg/l
Zinc, total	.01	mg/l

Remarks: Cations & Anions Retested To Verify CAB

Note: Negative sign "-" denotes that the value is less than "<"

Ralph V. Poulsen, Laboratory Director
Ralph V. Poulsen, I.S.H.

STREAM MONITORING REPORT

EFFLUENT CHARACTERISTICS		ST- 4A			ST- 4B		
		JULY	AUG	SEPT	JULY	AUG	SEPT
Flow Rate	G.P.M.	DRY	DRY	DRY	DRY	DRY	DRY
Air Temperature	°F						
Water Temperature	°F						
Alkalinity, total mg/l	$CaCO_3$						
Alkalinity, bicarbonate	"						
Alkalinity, carbonate	"						
Boron, dissolved	mg/l						
Calcium, dissolved	mg/l						
Chloride	mg/l						
Conductivity	mg/l						
Fluoride	mg/l						
Magnesium, dissolved	mg/l						
Nitrogen, ammonia	mg/l						
Nitrogen, nitrate	mg/l						
Nitrogen, nitrite	mg/l						
Nitrogen, nitrate nitrite	mg/l						
Oil and Grease	mg/l						
pH	units						
Phosphorus, total	mg/l						
Potassium, dissolved	mg/l						
Sodium, dissolved	mg/l						
Sulfate	mg/l						
Solids, total dissolved	mg/l						
Solids, total suspended	mg/l						
Solids, total volatile	mg/l						
Aluminum, dissolved	mg/l						
Arsenic, dissolved	mg/l						
Barium, dissolved	mg/l						
Cadmium, dissolved	mg/l						
Chromium, dissolved	mg/l						
Copper, dissolved	mg/l						
Iron, dissolved	mg/l						
Lead, dissolved	mg/l						
Manganese, dissolved	mg/l						
Mercury, dissolved	mg/l						
Selenium, dissolved	mg/l						

STREAM MONITORING REPORT

* SEE ATTACHED LAB SHEET

EFFLUENT CHARACTERISTICS		ST-5			ST-6		
		JULY	AUG	SEPT*	JULY	AUG	SEPT*
Flow Rate	G.P.M.	292	292	215	118	133	148
Air Temperature	°F	85	70	60	—	74	57
Water Temperature	°F	60	58	51	—	55	51
Alkalinity, total mg/l	$CaCO_3$	239	234	250	212	218	216
Alkalinity, bicarbonate	"	239	234	250	212	218	216
Alkalinity, carbonate	"	0	0	0	0	0	0
Boron, dissolved	mg/l						
Calcium, dissolved	mg/l	82	90	114	60	66	84
Chloride	mg/l	26	29	43	8	7	8
Conductivity	mg/l	904	829	1250	740	796	903
Fluoride	mg/l						
Magnesium, dissolved	mg/l	81	93	111	70	69	81
Nitrogen, ammonia	mg/l						
Nitrogen, nitrate	mg/l						
Nitrogen, nitrite	mg/l						
Nitrogen, nitrate nitrite	mg/l						
Oil and Grease	mg/l	<1	<1	<1	<1	<1	1
pH	units	8.1	8.5	8.3	8.4	8.7	8.5
Phosphorus, total	mg/l						
Potassium, dissolved	mg/l	4	5	5	3	3	4
Sodium, dissolved	mg/l	15	20	26	11	12	12
Sulfate	mg/l	319	340	401	239	230	278
Solids, total dissolved	mg/l	754	732	904	556	526	620
Solids, total suspended	mg/l	2	6	6	6	12	74
Solids, total volatile	mg/l						
Aluminum, dissolved	mg/l						
Arsenic, dissolved	mg/l						
Barium, dissolved	mg/l						
Cadmium, dissolved	mg/l						
Chromium, dissolved	mg/l						
Copper, dissolved	mg/l						
Iron, dissolved	mg/l	.04	.05	.05	<.02	.06	.03
Lead, dissolved	mg/l						
Manganese, dissolved	mg/l						
Mercury, dissolved	mg/l						
Selenium, dissolved	mg/l						

Client : United States Fuel Company
Address : P.O. Box A
Hiawatha, Utah 84527
Attn. : Ms. Jean Semborski
P.O. No.: H-17880

Sample ID: ST5-91
Sample Date Time: 09/21/88 11:00

Lab No. : 88-WI/05490
Date Received: 09/27/88

Parameters

Acidity as CaCO3	0	mg/l
Alkalinity as CaCO3	250.	mg/l
Bicarbonate as CaCO3	250	mg/l
Boron, dissolved	.12	mg/l
Calcium, dissolved	114.	mg/l
Carbonate as CaCO3	0	mg/l
Chloride	43.	mg/l
Fluoride	.2	mg/l
Hardness as CaCO3	740.	mg/l
Magnesium, dissolved	111.	mg/l
Nitrogen, ammonia	-.02	mg/l
Nitrate as N, dissolved	.93	mg/l
Nitrate/Nitrite as N	.93	mg/l
Nitrite as N, dissolved	-.02	mg/l
Oil and Grease	-1.	mg/l
Hydroxide as CaCO3	0	mg/l
Phosphorus, total	-.01	mg/l
Potassium, dissolved	5.	mg/l
SAR in water	.42	
Sodium, dissolved	26.	mg/l
Sulfate	401.	mg/l
Sulfide as S	.02	mg/l
Cations (sum)	16.08	meq/l
Anions (sum)	14.63	meq/l
Cation-Anion Balance	4.72	%
Solids, total dissolved	904.	mg/l
Solids, total suspended	6.	mg/l
Solids, settleable	-.1	ml/l/hr
Aluminum, total	.14	mg/l
Arsenic, total	-.001	mg/l
Barium, total	.02	mg/l
Cadmium, total	-.005	mg/l
Chromium, total	-.01	mg/l
Copper, total	.03	mg/l
Iron, dissolved	.05	mg/l
Iron, total	.16	mg/l
Lead, total	-.02	mg/l
Mercury, total	-.0001	mg/l
Molybdenum, total	-.05	mg/l
Nickel, total	-.02	mg/l
Selenium, total	-.001	mg/l
Zinc, total	.02	mg/l

Remarks:

Note: Negative sign "-" denotes that the value is less than "<"

Ralph V. Poulsen, Laboratory Director
Ralph V. Poulsen, L.S.H.

Client : United States Fuel Company
Address : P.O. Box A
Hiawatha, Utah 84527
Attn. : Ms. Jean Semborski
P.O. No.: H-17880

Sample ID: ST6-94
Sample Date Time: 09/21/88 10:30

Lab No. : 88-WI/05491
Date Received: 09/27/88

Parameters

Acidity as CaCO3	0	mg/l
Alkalinity as CaCO3	216.	mg/l
Bicarbonate as CaCO3	216	mg/l
Boron, dissolved	.06	mg/l
Calcium, dissolved	84.	mg/l
Carbonate as CaCO3	0	mg/l
Chloride	8.	mg/l
Fluoride	.2	mg/l
Hardness as CaCO3	542.	mg/l
Magnesium, dissolved	81.	mg/l
Nitrogen, ammonia	-.02	mg/l
Nitrate as N, dissolved	-.02	mg/l
Nitrate/Nitrite as N	-.02	mg/l
Nitrite as N, dissolved	-.02	mg/l
Oil and Grease	1.	mg/l
Hydroxide as CaCO3	0	mg/l
Phosphorus, total	.05	mg/l
Potassium, dissolved	4.	mg/l
SAR in water	.23	
Sodium, dissolved	12.	mg/l
Sulfate	278.	mg/l
Sulfide as S	.58	mg/l
Cations (sum)	11.47	meq/l
Anions (sum)	10.38	meq/l
Cation-Anion Balance	4.99	%
Solids, total dissolved	620.	mg/l
Solids, total suspended	74.	mg/l
Solids, settleable	-.1	ml/l/hr
Aluminum, total	1.22	mg/l
Arsenic, total	-.001	mg/l
Barium, total	.03	mg/l
Cadmium, total	-.005	mg/l
Chromium, total	.01	mg/l
Copper, total	-.01	mg/l
Iron, dissolved	.03	mg/l
Iron, total	1.26	mg/l
Lead, total	-.02	mg/l
Mercury, total	-.0001	mg/l
Molybdenum, total	-.05	mg/l
Nickel, total	-.02	mg/l
Selenium, total	-.001	mg/l
Zinc, total	.01	mg/l

Remarks:

Note: Negative sign "-" denotes that the value is less than "<"

Ralph V. Poulsen, Laboratory Director
Ralph V. Poulsen/S.H

STREAM MONITORING REPORT

* SEE ATTACHED LAB SHEET

EFFLUENT CHARACTERISTICS		ST-6A			ST-7		
		JULY	AUG	SEPT*			
Flow Rate	G.P.M.			140	DISCONTINUED		
Air Temperature	°F			57			
Water Temperature	°F			45			
Alkalinity, total	mg/l $CaCO_3$	233	226	258			
Alkalinity, bicarbonate	"	233	226	258			
Alkalinity, carbonate	"	0	0	0			
Boron, dissolved	mg/l						
Calcium, dissolved	mg/l	54	54	67			
Chloride	mg/l	4	4	4			
Conductivity	mg/l	548	625	822			
Fluoride	mg/l						
Magnesium, dissolved	mg/l	44	51	67			
Nitrogen, ammonia	mg/l						
Nitrogen, nitrate	mg/l						
Nitrogen, nitrite	mg/l						
Nitrogen, nitrate nitrite	mg/l						
Oil and Grease	mg/l	<1	<1	<1			
pH	units	8.2	8.7	8.4			
Phosphorus, total	mg/l						
Potassium, dissolved	mg/l	1	2	3			
Sodium, dissolved	mg/l	7	7	7			
Sulfate	mg/l	103	111	148			
Solids, total dissolved	mg/l	370	370	466			
Solids, total suspended	mg/l	<2	<2	24			
Solids, total volatile	mg/l						
Aluminum, dissolved	mg/l						
Arsenic, dissolved	mg/l						
Barium, dissolved	mg/l						
Cadmium, dissolved	mg/l						
Chromium, dissolved	mg/l						
Copper, dissolved	mg/l						
Iron, dissolved	mg/l	.02	.04	.08			
Lead, dissolved	mg/l						
Manganese, dissolved	mg/l						
Mercury, dissolved	mg/l						
Selenium, dissolved	mg/l						

Client : United States Fuel Company
Address : P.O. Box A
Hiawatha, Utah 84527
Attn. : Ms. Jean Semborski
P.O. No.: H-17880

Sample ID: ST6A-75
Sample Date Time: 09/21/88 10:15

Lab No. : 88-WI/05411
Date Received: 09/26/88

Parameters

Acidity as CaCO3	0	mg/l
Alkalinity as CaCO3	258.	mg/l
Bicarbonate as CaCO3	258	mg/l
Boron, dissolved	-.02	mg/l
Calcium, dissolved	67.	mg/l
Carbonate as CaCO3	0	mg/l
Chloride	4.	mg/l
Fluoride	.2	mg/l
Hardness as CaCO3	442.	mg/l
Magnesium, dissolved	67.	mg/l
Nitrogen, ammonia	-.02	mg/l
Nitrate as N, dissolved	.05	mg/l
Nitrate/Nitrite as N	.03	mg/l
Nitrite as N, dissolved	-.02	mg/l
Oil and Grease	-1.	mg/l
Hydroxide as CaCO3	0	mg/l
Phosphorus, total	-.01	mg/l
Potassium, dissolved	3.	mg/l
SAR in water	.15	
Sodium, dissolved	7.	mg/l
Sulfate	148.	mg/l
Sulfide as S	.23	mg/l
Cations (sum)	9.23	meq/l
Anions (sum)	8.38	meq/l
Cation-Anion Balance	4.83	%
Solids, total dissolved	466.	mg/l
Solids, total suspended	24.	mg/l
Solids, settleable	-.1	ml/l/hr
Aluminum, total	.45	mg/l
Arsenic, total	.001	mg/l
Barium, total	-.01	mg/l
Cadmium, total	-.005	mg/l
Chromium, total	-.01	mg/l
Copper, total	-.01	mg/l
Iron, dissolved	.08	mg/l
Iron, total	.38	mg/l
Lead, total	-.02	mg/l
Manganese, total	.01	mg/l
Mercury, total	-.0001	mg/l
Molybdenum, total	-.05	mg/l
Nickel, total	-.02	mg/l
Selenium, total	-.001	mg/l
Zinc, total	-.01	mg/l

Remarks:

Note: Negative sign "-" denotes that the value is less than "<"

Ralph V. Poulsen/S.H.
Ralph V. Poulsen, Laboratory Director

MINE WATER DISCHARGE REPORT

1988

Station D 001

Parameters	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Flow Rate G.P.M.	I.A.	I.A	561	350	NO DISCH.	597						
Acidity Mg/L			0	0		0						
Alkalinity Mg/L			355	363		353						
Conductivity UMHOS/CM			966	938		995						
Oil & Grease Mg/L			<1	1		1						
pH			7.2	7.1		7.1						
Total Dissolved Solids Mg/L			700	728		794						
Total Suspended Solids Mg/L			<2	<2		<2						
Iron, Dissolved Mg/L			<.02	<.02		<.02						
Iron Total Mg/L			.07	.10		.05						
Manganese, Total Mg/L			.01	.01		.01						

MINE WATER DISCHARGE REPORT

1988

Station D 002

Parameters	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Flow Rate G.P.M.	265	37	292	133	279	404						
Acidity Mg/L	0	0	0	0	0	0						
Alkalinity Mg/L	264	290	300	284	228	235						
Conductivity UMHOS/CM	930	919	883	—	925	888						
Oil & Grease Mg/L	<1	1	1	1	<1	<1						
pH	8.2	8.2	8.4	8.3	8.2	7.8						
Total Dissolved Solids Mg/L	644	634	604	622	660	638						
Total Suspended Solids Mg/L	<2	<2	6	<2	2	2						
Iron, Dissolved Mg/L	.03	<.02	<.02	<.02	<.02	<.02						
Iron Total Mg/L	.03	<.02	<.02	<.02	<.02	.04						
Manganese, Total Mg/L	<.01	<.01	<.01	<.01	<.01	<.01						

MINE WATER DISCHARGE REPORT

1988

Station D 010

Parameters	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Flow Rate G.P.M.	I.A.	IA	IA	IA	6.3	7.2						
Acidity Mg/L					0	0						
Alkalinity Mg/L					160	247						
Conductivity UMHOS/CM					455	575						
Oil & Grease Mg/L					<1	<1						
pH					7.96	8.2						
Total Dissolved Solids Mg/L					306	330						
Total Suspended Solids Mg/L					<2	10						
Iron, Dissolved Mg/L					.02	<.02						
Iron Total Mg/L					.07	.07						
Manganese, Total Mg/L					.01	<.01						

WATER MONITORING REPORT

3RD QUARTER - 1988

UNITED STATES FUEL COMPANY
HIAWATHA , UTAH 84527

SPRING MONITORING REPORT

2ND Quarter

EFFLUENT CHARACTERISTIC							
		SP1	SP2	SP4	SP5	SP6	SP8
Flow Rate	g.p.m.	2.6	4.0	19.5	8	14	1.2
Air Temperature	°F	62	70	64	68	72	72
Water Temperature	°F	50	50	48	42	54	50
Alkalinity, Total	mg/l	159	169	234	240	171	294
Alkalinity, Bicarb.	mg/l	159	231	208	296	218	294
Alkalinity, Carbonate	mg/l	0	0	0	0	0	0
Chloride	mg/l	3	2	1	3	1	3
Coliform, Fecal	MPN/100 ml						
Coliform, Total	MPN/100 ml						
Conductivity	umhos/cm	298	412	470	520	415	605
Fluoride	mg/l						
Hardness, Total	mg/l $CaCO_3$						
Nitrogen, Ammonia	mg/l						
Nitrogen, Nitrate	mg/l						
Oil and Grease	mg/l						
pH	units	6.9	7.6	8.0	7.6	8.2	7.3
Phosphorus, Ortho	mg/l						
Phosphorus, Total	mg/l						
Solids, Total Diss.	mg/l	208	260	284	346	250	384
Solids, Total Susp.	mg/l	<2	90	20	<2	<2	2
Sulfate	mg/l	14	6	8	31	8	49
Sulfide	mg/l						
Turbidity	mg/l						
Total Cations	mg/l						
Total Anions	meq/l						
Calcium	mg/l	49	54	61	70	49	58
Iron, Dissolved	mg/l	<.02	.03	<.02	<.02	<.02	<.02
Magnesium	mg/l	10	14	20	26	16	39
Manganese	mg/l						
Potassium	mg/l	1	1	<1	<1	1	1
Sodium	mg/l	4	3	3	6	2	6

SPRING MONITORING REPORT

2 ND Quarter

EFFLUENT CHARACTERISTIC		SP9	SP 11	SP 12	SP 13	SP 14	
Flow Rate	g.p.m.	3	4.7	.8	1.0	7.2	
Air Temperature	°F	78	67	70	68	54	
Water Temperature	°F	47	62	42	44	50	
Alkalinity, Total	mg/l	173	218	236	351	196	
Alkalinity, Bicarb.	mg/l	212	218	280	351	196	
Alkalinity, Carbonate	mg/l	0	0	0	0	0	
Chloride	mg/l	2	3	2	15	2	
Coliform, Fecal	MPN/100 ml						
Coliform, Total	MPN/100 ml						
Conductivity	umhos/cm	365	427	448	1030	304	
Fluoride	mg/l						
Hardness, Total	mg/l $CaCO_3$						
Nitrogen, Ammonia	mg/l						
Nitrogen, Nitrate	mg/l						
Oil and Grease	mg/l						
pH	units	8.2	8.4	7.6	7.8	7.8	
Phosphorus, Ortho	mg/l						
Phosphorus, Total	mg/l						
Solids, Total Diss.	mg/l	224	298	306	830	232	
Solids, Total Susp.	mg/l	60	2	8	<2	16	
Sulfate	mg/l	8	41	33	294	2	
Sulfide	mg/l						
Turbidity	mg/l						
Total Cations	mg/l						
Total Anions	meq/l						
Calcium	mg/l	42	44	57	124	54	
Iron, Dissolved	mg/l	.05	<.02	.02	<.02	.02	
Magnesium	mg/l	21	34	29	86	17	
Manganese	mg/l						
Potassium	mg/l	<1	1	1	3	<1	
Sodium	mg/l	3	3	6	11	3	

SPRING MONITORING REPORT

3RD Quarter

EFFLUENT CHARACTERISTIC		SP1	SP2	SP4	SP5	SP6	SP8
Flow Rate	g.p.m.		1.1	1.6	3	7.9	1
Air Temperature	°F		55	47	52	53	57
Water Temperature	°F		51	41	45	44	46
Alkalinity, Total	mg/l		172	246	276	198	312
Alkalinity, Bicarb.	mg/l		172	246	276	198	312
Alkalinity, Carbonate	mg/l		0	0	0	0	0
Chloride	mg/l	DISCONTINUED	<1	1	3	<1	3
Coliform, Fecal	MPN/100 ml						
Coliform, Total	MPN/100 ml						
Conductivity	umhos/cm		434	511	606	468	680
Fluoride	mg/l						
Hardness, Total	mg/l $CaCO_3$						
Nitrogen, Ammonia	mg/l						
Nitrogen, Nitrate	mg/l						
Oil and Grease	mg/l						
pH	units		8.2	8.0	7.3	8.3	7.6
Phosphorus, Ortho	mg/l						
Phosphorus, Total	mg/l						
Solids, Total Diss.	mg/l		240	282	336	228	392
Solids, Total Susp.	mg/l		148	<2	<2	10	6
Sulfate	mg/l		8	10	33	8	62
Sulfide	mg/l						
Turbidity	mg/l						
Total Cations	mg/l						
Total Anions	meq/l						
Calcium	mg/l		56	69	86	70	79
Iron, Dissolved	mg/l		.02	<.02	<.02	<.02	<.02
Magnesium	mg/l		14	24	27	18	50
Manganese	mg/l						
Potassium	mg/l		<1	<1	1	<1	1
Sodium	mg/l		2	3	6	2	5

SPRING MONITORING REPORT

3RD Quarter

EFFLUENT CHARACTERISTIC		SP 9	SP 11	SP 12	SP 13	SP 14	
Flow Rate	g.p.m.		6.5	NO	.13		
Air Temperature	°F		59	FLOW	53		
Water Temperature	°F		57		55		
Alkalinity, Total	mg/l		214		360		
Alkalinity, Bicarb.	mg/l		214		360		
Alkalinity, Carbonate	mg/l		0		0		
Chloride	mg/l		2		18		
Coliform, Fecal	MPN/100 ml						
Coliform, Total	MPN/100 ml						
Conductivity	umhos/cm		386		1224		
Fluoride	mg/l						
Hardness, Total	mg/l $CaCO_3$						
Nitrogen, Ammonia	mg/l						
Nitrogen, Nitrate	mg/l						
l and Grease	mg/l						
pH	units		8.2		7.5		
Phosphorus, Ortho	mg/l						
Phosphorus, Total	mg/l						
Solids, Total Diss.	mg/l		272		904		
Solids, Total Susp.	mg/l		<2		26		
Sulfate	mg/l		39		333		
Sulfide	mg/l						
Turbidity	mg/l						
Total Cations	mg/l						
Total Anions	meq/l						
Calcium	mg/l		50		126		
Iron, Dissolved	mg/l		<.02		.04		
Magnesium	mg/l		35		107		
Manganese	mg/l						
Potassium	mg/l		1		4		
Sodium	mg/l		3		14		

DISCONTINUED

DISCONTINUED

WATER MONITORING REPORT

FOURTH QUARTER - 1988

UNITED STATES FUEL COMPANY

HIAWATHA , UTAH 84527

STREAM MONITORING REPORT

EFFLUENT CHARACTERISTICS	ST-1			ST-2		
	OCT.	NOV.	DEC.	OCT.	NOV.	DEC.
Flow Rate G.P.M.	82			59		
Air Temperature °F	56			49		
Water Temperature °F	47			44		
Alkalinity, total mg/l $CaCO_3$						
Alkalinity, bicarbonate "						
Alkalinity, carbonate "						
Boron, dissolved mg/l						
Calcium, dissolved mg/l						
Chloride mg/l						
Conductivity mg/l	1361			514		
Fluoride mg/l						
Magnesium, dissolved mg/l						
Nitrogen, ammonia mg/l						
Nitrogen, nitrate mg/l						
Nitrogen, nitrite mg/l						
Nitrogen, nitrate nitrite mg/l						
Oil and Grease mg/l						
pH units	8.3			8.2		
Phosphorus, total mg/l						
Potassium, dissolved mg/l						
Sodium, dissolved mg/l						
Sulfate mg/l						
Solids, total dissolved mg/l						
Solids, total suspended mg/l						
Solids, total volatile mg/l						
Aluminum, dissolved mg/l						
Arsenic, dissolved mg/l						
Barium, dissolved mg/l						
Cadmium, dissolved mg/l						
Chromium, dissolved mg/l						
Copper, dissolved mg/l						
Iron, dissolved mg/l						
Lead, dissolved mg/l						
Manganese, dissolved mg/l						
Mercury, dissolved mg/l						
Selenium, dissolved mg/l						

NO MONITORING REQUIRED NOV - MARCH

STREAM MONITORING REPORT

EFFLUENT CHARACTERISTICS	ST- 2A			ST-2B		
	OCT.	NOV.	DEC.	OCT.	NOV.	DEC.
Flow Rate G.P.M.	.59			118		
Air Temperature °F	49			56		
Water Temperature °F	44			47		
Alkalinity, total mg/l $CaCO_3$						
Alkalinity, bicarbonate "						
Alkalinity, carbonate "						
Boron, dissolved mg/l						
Calcium, dissolved mg/l						
Chloride mg/l						
Conductivity mg/l	515			791		
Fluoride mg/l						
Magnesium, dissolved mg/l						
Nitrogen, ammonia mg/l						
Nitrogen, nitrate mg/l						
Nitrogen, nitrite mg/l						
Nitrogen, nitrate nitrite mg/l						
Oil and Grease mg/l						
pH units	8.4			8.4		
Phosphorus, total mg/l						
Potassium, dissolved mg/l						
Sodium, dissolved mg/l						
Sulfate mg/l						
Solids, total dissolved mg/l						
Solids, total suspended mg/l						
Solids, total volatile mg/l						
Aluminum, dissolved mg/l						
Arsenic, dissolved mg/l						
Barium, dissolved mg/l						
Cadmium, dissolved mg/l						
Chromium, dissolved mg/l						
Copper, dissolved mg/l						
Iron, dissolved mg/l						
Lead, dissolved mg/l						
Manganese, dissolved mg/l						
Mercury, dissolved mg/l						
Selenium, dissolved mg/l						

NO MONITORING REQUIRED NOV. - MARCH

STREAM MONITORING REPORT

EFFLUENT CHARACTERISTICS	ST- 3			ST- 3A		
	OCT.	NOV.	DEC.	OCT.	NOV.	DEC.
Flow Rate G.P.M.	44			DRY		
Air Temperature °F	57					
Water Temperature °F	50					
Alkalinity, total mg/l $CaCO_3$						
Alkalinity, bicarbonate "						
Alkalinity, carbonate "						
Boron, dissolved mg/l						
Calcium, dissolved mg/l						
Chloride mg/l						
Conductivity mg/l	2420					
Fluoride mg/l						
Magnesium, dissolved mg/l						
Nitrogen, ammonia mg/l						
Nitrogen, nitrate mg/l						
Nitrogen, nitrite mg/l						
Nitrogen, nitrate nitrite mg/l						
Oil and Grease mg/l						
pH units	8.3					
Phosphorus, total mg/l						
Potassium, dissolved mg/l						
Sodium, dissolved mg/l						
Sulfate mg/l						
Solids, total dissolved mg/l						
Solids, total suspended mg/l						
Solids, total volatile mg/l						
Aluminum, dissolved mg/l						
Arsenic, dissolved mg/l						
Barium, dissolved mg/l						
Cadmium, dissolved mg/l						
Chromium, dissolved mg/l						
Copper, dissolved mg/l						
Iron, dissolved mg/l						
Lead, dissolved mg/l						
Manganese, dissolved mg/l						
Mercury, dissolved mg/l						
Selenium, dissolved mg/l						

STREAM MONITORING REPORT

EFFLUENT CHARACTERISTICS	ST- 3B			ST-4		
	OCT.	NOV.	DEC.	OCT.	NOV.	DEC.
Flow Rate G.P.M.	5			DRY		
Air Temperature °F	58					
Water Temperature °F	50					
Alkalinity, total mg/l $CaCO_3$						
Alkalinity, bicarbonate "						
Alkalinity, carbonate "						
Boron, dissolved mg/l						
Calcium, dissolved mg/l						
Chloride mg/l						
Conductivity mg/l	3860					
Fluoride mg/l						
Magnesium, dissolved mg/l						
Nitrogen, ammonia mg/l						
Nitrogen, nitrate mg/l						
Nitrogen, nitrite mg/l						
Nitrogen, nitrate nitrite mg/l						
Oil and Grease mg/l						
pH units	8.2					
Phosphorus, total mg/l						
Potassium, dissolved mg/l						
Sodium, dissolved mg/l						
Sulfate mg/l						
Solids, total dissolved mg/l						
Solids, total suspended mg/l						
Solids, total volatile mg/l						
Aluminum, dissolved mg/l						
Arsenic, dissolved mg/l						
Barium, dissolved mg/l						
Cadmium, dissolved mg/l						
Chromium, dissolved mg/l						
Copper, dissolved mg/l						
Iron, dissolved mg/l						
Lead, dissolved mg/l						
Manganese, dissolved mg/l						
Mercury, dissolved mg/l						

STREAM MONITORING REPORT

EFFLUENT CHARACTERISTICS	ST-4A			ST-4B		
	OCT.	NOV.	DEC.	OCT.	NOV.	DEC.
Flow Rate G.P.M.	DRY			DRY		
Air Temperature °F						
Water Temperature °F						
Alkalinity, total mg/l $CaCO_3$						
Alkalinity, bicarbonate "						
Alkalinity, carbonate "						
Boron, dissolved mg/l						
Calcium, dissolved mg/l						
Chloride mg/l						
Conductivity mg/l						
Fluoride mg/l						
Magnesium, dissolved mg/l						
Nitrogen, ammonia mg/l						
Nitrogen, nitrate mg/l						
Nitrogen, nitrite mg/l						
Nitrogen, nitrate nitrite mg/l						
Oil and Grease mg/l						
pH units						
Phosphorus, total mg/l						
Potassium, dissolved mg/l						
Sodium, dissolved mg/l						
Sulfate mg/l						
Solids, total dissolved mg/l						
Solids, total suspended mg/l						
Solids, total volatile mg/l						
Aluminum, dissolved mg/l						
Arsenic, dissolved mg/l						
Barium, dissolved mg/l						
Cadmium, dissolved mg/l						
Chromium, dissolved mg/l						
Copper, dissolved mg/l						
Iron, dissolved mg/l						
Lead, dissolved mg/l						
Manganese, dissolved mg/l						
Mercury, dissolved mg/l						

STREAM MONITORING REPORT

EFFLUENT CHARACTERISTICS	ST-5			ST-6		
	OCT.	NOV.	DEC.	OCT.	NOV.	DEC.
Flow Rate G.P.M.	160			215		
Air Temperature °F	51			56		
Water Temperature °F	54			55		
Alkalinity, total mg/l $CaCO_3$						
Alkalinity, bicarbonate "						
Alkalinity, carbonate "						
Boron, dissolved mg/l						
Calcium, dissolved mg/l						
Chloride mg/l						
Conductivity mg/l	1448			912		
Fluoride mg/l						
Magnesium, dissolved mg/l						
Nitrogen, ammonia mg/l						
Nitrogen, nitrate mg/l						
Nitrogen, nitrite mg/l						
Nitrogen, nitrate nitrite mg/l						
Oil and Grease mg/l						
pH units	8.3			8.6		
Phosphorus, total mg/l						
Potassium, dissolved mg/l						
Sodium, dissolved mg/l						
Sulfate mg/l						
Solids, total dissolved mg/l						
Solids, total suspended mg/l						
Solids, total volatile mg/l						
Aluminum, dissolved mg/l						
Arsenic, dissolved mg/l						
Barium, dissolved mg/l						
Cadmium, dissolved mg/l						
Chromium, dissolved mg/l						
Copper, dissolved mg/l						
Iron, dissolved mg/l						
Lead, dissolved mg/l						
Manganese, dissolved mg/l						
Mercury, dissolved mg/l						

STREAM MONITORING REPORT

EFFLUENT CHARACTERISTICS	ST- 6A			ST- 7		
	OCT.	NOV.	DEC.			
Flow Rate G.P.M.	160			DISCONTINUED		10/11/88
Air Temperature °F	54					
Water Temperature °F	47					
Alkalinity, total mg/l $CaCO_3$						
Alkalinity, bicarbonate "						
Alkalinity, carbonate "						
Boron, dissolved mg/l						
Calcium, dissolved mg/l						
Chloride mg/l						
Conductivity mg/l	763					
Fluoride mg/l						
Magnesium, dissolved mg/l						
Nitrogen, ammonia mg/l						
Nitrogen, nitrate mg/l						
Nitrogen, nitrite mg/l						
Nitrogen, nitrate nitrite mg/l						
Oil and Grease mg/l						
pH units	8.6					
Phosphorus, total mg/l						
Potassium, dissolved mg/l						
Sodium, dissolved mg/l						
Sulfate mg/l						
Solids, total dissolved mg/l						
Solids, total suspended mg/l						
Solids, total volatile mg/l						
Aluminum, dissolved mg/l						
Arsenic, dissolved mg/l						
Barium, dissolved mg/l						
Cadmium, dissolved mg/l						
Chromium, dissolved mg/l						
Copper, dissolved mg/l						
Iron, dissolved mg/l						
Lead, dissolved mg/l						
Manganese, dissolved mg/l						
Mercury, dissolved mg/l						
Selenium, dissolved mg/l						

MINE WATER DISCHARGE REPORT

1988

Station D 001

Parameters	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Flow Rate G.P.M.	I.A.	I.A.	561	350	NO DISCH.	597	628	NO DISCH.	14	420	514	171
Acidity Mg/L			0	0		0	0		0	0	0	0
Alkalinity Mg/L			355	363		353	349		346	320	340	344
Conductivity UMHOS/CM			966	938		995	965		935	1005	923	480
Oil & Grease Mg/L			<1	1		1	1		<1	<1	15	<1
pH			7.2	7.1		7.1	6.7		7.2	7.0	7.2	7.2
Total Dissolved Solids Mg/L			700	728		794	756		694	704	696	726
Total Suspended Solids Mg/L			<2	<2		<2	2		6	<2	<2	<2
Iron, Dissolved Mg/L			<.02	<.02		<.02	<.02		<.02	.08	.09	<.02
Iron Total Mg/L			.07	.10		.05	.18		.13	.07	.11	.1
Manganese, Total Mg/L			.01	.01		.01	.01		.03	.01	.01	.01

MINE WATER DISCHARGE REPORT

1988

Station D 002

arameters	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
low Rate .P.M.	265	37	292	133	279	404	561	265	597	435	182	597
cidity g/L	0	0	0	0	0	0	0	0	0	0	0	0
lkalinity g/L	264	290	300	284	228	235	286	270	260	268	294	270
onductivity MHOS/CM	930	919	883	—	925	888	854	892	920	942	936	906
il & Grease g/L	<1	1	1	1	<1	<1	<1	1	<1	<1	<1	<1
H	8.2	8.2	8.4	8.3	8.2	7.8	7.9	8.3	8.2	8.3	8.3	8.2
otal Dissolved olids Mg/L	644	634	604	622	660	638	688	618	654	620	644	656
otal Suspended olids Mg/L	<2	<2	6	<2	2	2	<2	<2	6	4	4	<2
ron, Dissolved g/L	.03	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02
ron Total g/L	.03	<.02	<.02	<.02	<.02	.04	.02	<.02	.08	<.02	<.02	.03
anganese, Total g/L	<.01	<.01	<.01	<.01	<.01	<.01	.01	<.01	.01	<.01	<.01	<.01

MINE WATER DISCHARGE REPORT

1988

Station D 010

arameters	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
low Rate .P.M.	I.A.	I.A.	I.A.	I.A.	6.3	7.2	6.6	5.3	4.6	1.3	NO DISCH.	I.A.
cidity g/L		-			0	0	0	0	0	0		
lkalinity g/L					160	247	239	216	212	230		
onductivity MHOS/CM					455	575	553	522	523	522		
il & Grease g/L					<1	<1	<1	<1	<1	1		
H					7.96	8.2	8.1	8.5	8.2	8.4		
otal Dissolved olids Mg/L					306	330	338	298	302	286		
otal Suspended olids Mg/L					<2	10	2	<2	<2	6		
ron, Dissolved g/L					.02	<.02	<.02	<.02	<.02	<.02		
ron Total g/L					.07	.07	<.02	<.02	<.02	.02		
anganese, Total g/L					.01	<.01	<.01	<.01	<.01	<.01		

UNITED STATES FUEL COMPANY

P.O Box A
Hiawatha Utah 84527

(801) 637-2252
TELEX: 453-123

February 20, 1989

John DeMichiei, District Manager
Mine Safety and Health Administration
Coal Mine Safety and Health, District 9
P.O. Box 25367
Denver, Colorado 80225

Re: Annual Impoundment Report - King No. 4 Mine, ID No. 4200098
Slurry Impoundment No. 1, ID No. 1211-UT-09-00098-01
Slurry Impoundment No. 4, ID No. 1211-UT-09-00098-02
Slurry Impoundment No. 5, ID No. 1211-UT-0S-00098-03
Refuse Pile No. 2, ID No. 1211-UT-09-00098-5

Dear Mr. DeMichiei:

The enclosed certified annual impoundment report is submitted by United States Fuel Company for slurry impounding structures and a refuse pile located near Hiawatha, Utah. As required by 30 CFR 77.261-4 and 77.214.3. The enclosed report contains the annual up date on the ponds and refuse pile for 1988.

Sincerely,

Richard Bury
Safety Director

Enclosure:

RE:JS:lj

cc: E. Gardiner
M. Watson

KING COAL

U.S. FUEL COMPANY

Slurry Impoundment Report - 1988

SLURRY IMPOUNDMENT NO. 1 (1211-UT-09-00098-01)

Slurry pond No. 1 has remained inactive since 1983. It was not used at all during 1988 for slurry disposal. No changes have been made to it's configuration. The embankment top is at an elevation of 7,175 feet while the dry slurry surface stands at an elevation of 7,164.5 feet.

The pond will remain inactive so that dried slurry fines can be retrieved at some future date. The pond presently stores approximately 235 acre-feet of coal fines.

Nothing has occurred to diminish embankment stability. No fires have occurred in the construction materials.

U.S. FUEL COMPANY

Slurry Impoundment Report - 1988

SLURRY IMPOUNDMENT NO. 4 (1211-UT-09-00098-02)

Coal fines were recovered from slurry pond No. 4 during 1988. Approximately 14,800 tons were recovered from this pond. No additional coal slurry material was added during 1988. Recovery of coal fines is expected to continue into 1989.

No structural changes have been made to this pond other than the addition of refuse material to the refuse area north and east of slurry pond No. 4. No fires have occurred in construction materials.

It is uncertain when this pond will be reactivated to impound slurry.

U.S. FUEL COMPANY

Slurry Impoundment Report - 1988

SLURRY IMPOUNDMENT NO. 5 (1211-UT-09-00098-03)

Slurry pond No. 5 has been the only pond actively receiving and storing slurry from the preparation plant during 1988. The slurry level at the beginning of 1988 was 7,065.4. At the end of December, 1988, the level was measured at 7,068.5, with the total elevation increase for 1988 being 3.1 feet. At the present, approximately 300 acre-feet of slurry are impounded by this pond. An additional storage capacity of 200 acre-feet is available for slurry disposal.

The top of slurry pond No. 5 stands at an elevation of 7085.5 feet. No changes have been made to the embankment of this pond during 1988. Nothing has occurred that would decrease the pond's stability or effectiveness. This pond will probably remain active for slurry disposal through most of 1989.

The north cell of slurry pond no. 5 is currently being mined out for recovery of coal fines material. Extraction of the dry slurry is expected to continue into 1989. The embankment of this cell remains at an elevation of 7,068.0 feet. Approximately 42,400 tons of slurry have been removed through December 31, 1988.

U.S. FUEL COMPANY

Refuse Pile Report - 1988

REFUSE PILE NO. 1 (1211-UT-09-00098-07)

Refuse pile No. 1 is no longer active for refuse disposal. This refuse pile does not impound water and has not had any fires occur in the refuse material. The top of this pile is 7,187 feet. No stability problems are known to be associated with this pile.

U.S. FUEL COMPANY

Refuse Pile Report - 1988

REFUSE PILE NO. 2 (1211-UT-09-00098-05)

Refuse pile No. 2, as approved in February, 1987, is being utilized for refuse disposal. The refuse pile is being constructed in accordance with MSHA approved plans. Refuse is currently being placed in the east portion of the refuse pile site. The maximum elevation found in the overall area is 7,125 feet elevation above sea level. No fires have occurred in refuse material. Nothing has occurred to diminish the structural stability of the refuse pile. Refuse will continue to be placed at this site for several more years.

I certify that work performed on these impoundments and embankments has been conducted in accordance with the appropriate plans and regulations.

Michael P. Watson, P.E.

UNITED STATES FUEL COMPANY

VEGETATION TEST PLOTS

YEAR 5 FINAL REPORT

Hiawatha, Utah

UNITED STATES FUEL COMPANY

VEGETATION TEST PLOTS

YEAR 5 FINAL REPORT

Hiawatha, Utah

Prepared for

United States Fuel Company
P.O. Box A
Hiawatha, Utan 84527

by

Joseph M. Jarvis

Biologist

January, 1989

TABLE OF CONTENTS

List of Tables

1.0 INTRODUCTION

A vegetation test plot program was submitted with the mine permit applications by U.S. Fuels to satisfy OSM regulations for a tested revegetation program. This final report covers the 5th year of the program, or the 4th growing season, and summarizes the results from the previous years. The results of the 1st and 2nd growing seasons are contained in the 1985 and 1986 progress reports respectivly (Appendix 1&2). Under the plan originally submitted to the DOGM, the growth of the 3rd growing season (1987) was not to be measured.

The test plot program was installed in 1984 with the preparation of the plot sites and the seeding of various seed mixes that fall. The 1985 growing season was generally "dry" and "mild". The soil was dry when the plots were measured in August for the first monitoring report. The precipitation in the 1986 growing season was "normal" but the summer was dry. The soil was dry when the first plots were read on August 20th but rain fell that afternoon and continued the next day, saturating the soil. The 1988 year was considered a "drought" year, with little winter or spring moisture. There was scattered late summer storms, that provided some moisture late in the growing season.

2.0 METHODS

Photos were taken at each photo station established in 1985, the first year of monitoring. Thus, each pnoto station was pnotographed in the 1st(1985), 2nd(1986), and 4th(1988) growing seasons. The various treatments were sampled by the methods explained in the 1985 progress report. In 1988, the live, above-ground growth was clipped, air-dried, and weighed to obtain data on productivity.

Plots and subplots sampled:

Study Site #1
"old coal refuse substrate"
subplots 1,2,3,4,5 and 6

"new coal refuse substrate"
subplots A,B,C,D,E and F

Study Site #2
Plot #1
Plot #2

Canyon Plots
Middle Fork Plot

South Fork Plot

Riparian Plot

3.0 RESULTS

3.1 Study Site #1

The "drought" years of 1987 and 1988 have hindered plant growth and slowed the rate of succession. This site is slowly progressing from a plant cover of adventative species in the 1st growing season, through a cover of annual species, to a sparse cover of perennial species mixed with a few annual species. The establishment of mature perennial plants has greatly increased the plant cover. The presence of more perennial grass has also greatly increased the densities of basal stems, when compared to the 2nd seasons growth. See Table 3.1.1.

Table 3.1.1 Transect Data, 1988

Subplot	Percent of Bare	Rock	Litter	Cover	Productivity Dry Weight lbs/acre	Basal Stems Per Quad
A. New Coal Refuse Substrate						
A	17*	0	36	47	438	50.3
B	7	0	49	44	750	46.0
C	13	0	42	45	938	58.8
D	11	0	46	43	438	61.3
E	2	0	50	48	875	57.2
F	1	0	58	41	500	43.9
Means	8.5	0.0	46.8	44.7	656	53.0
B. Old Coal Refuse Substrate						
1	8*	0	48	44	688	55.7
2	7	0	50	43	1063	56.1
3	9	1	44	46	750	55.3
4	4	0	47	49	1125	67.0
5	0	1	22	77	625	40.8
6	3	1	41	55	1000	57.0
Means	5.2	0.5	42.0	52.3	875	55.4

* Coal fines, from adjacent refuse piles, have blown onto these two subplots producing bare areas with no vegetative growth.

The litter accumulation is slightly greater in the new substrate when compared with the old substrate. The percentage of plant cover and the productivity of the old substrate is greater than the new substrate, and is significant at the 5% level respectivly. The densities of plant growth in each substratum is nearly equal, as judged by basal stems per unit area.

The differences in substrate where compared by separating the

applications of the two seed mixes and the topsoil depths. Generally the new substrate is superior where seed mix #1 was applied. However, with seed mix #2, the old substrate proves superior as a growing medium over the new substrate.

When the combined means of the seed mix applications are compared, the #2 seed mix is superior to the #1 seed mix in litter accumulation, productivity and plant stem density (litter and productivity at 5% level). Seed mix #1 is slightly superior in plant cover.

Table 3.1.2 Seed Mix and Substrate Comparisons

Subplot	Percent of Bare	Rock	Litter	Cover	Productivity Dry Weight lbs/acre	Basal Stems Per Quad
Seed Mix #1-New Substrate						
A	17*	0	36	47	438	50.3
C	13	0	42	45	938	58.8
E	2	0	50	48	875	57.2
Means	10.7	0	42.7	46.7	750	55.4
Old Substrate						
1	8*	0	48	44	688	55.7
3	9	1	44	46	750	55.3
5	0	1	22	77	625	40.8
Means	5.7	0.7	38	55.7	688	50.6
Combined Means	8.2	0.3	40.3	51.2	719	53.0
Seed Mix #2-New Substrate						
B	7	0	49	44	750	46.0
D	11	0	46	43	438	61.3
F	1	0	58	41	500	43.9
Means	6.3	0	51	42.7	563	50.4
Old Substrate						
2	7	0	50	43	1063	56.1
4	4	0	47	49	1125	67.0
6	3	1	41	55	1000	57.0
Means	4.7	0.3	46	49	1063	60.0
Combined Means	5.5	0.1	48.5	45.6	813	55.2

Table 3.1.3 compares the topsoil applications with the old and new substrates. There were three topsoil depths used in the

plot design, 6",12", and 18". Generally the old substrate is superior to the new substrate in plant growth despite the topsoil depths. The litter acumulation is greater on the new substrate. The increase in topsoil depth does not seem to change the differences between the old and new substrate.

When topsoil depth is considered, regardless of old or new substrates, the increase from 6" to 12" depths has the greatest affect on plant growth (productivity and basal stems). The 12" topsoil depth is sufficient to establish the best plant cover attainable on these types of substrates. The few repetitions in each plot do not allow for statistical testing.

Table 3.1.3 Topsoil Depths and Substrates

Subplot	Bare	Percent of Rock	Litter	Cover	Productivity Dry Weight lbs/acre	Basal Stems Per Quad
6"-New Substrate						
A	17*	0	36	47	438	50.3
B	7	0	49	44	750	46.0
Means	12	0	42.5	45.5	594	48.2
6"-Old Substrate						
1	8*	0	48	44	688	55.7
2	7	0	50	43	1063	56.1
Means	7.5	0	49	43.5	876	55.9
Combined Means	9.75	0	45.8	44.5	735	52.0
12"-New Substrate						
C	13	0	42	45	938	58.8
D	11	0	46	43	438	61.3
Means	12	0	44	44	688	60.0
12"-Old Substrate						
3	9	1	44	46	750	55.3
4	4	0	47	49	1125	67.0
Means	6.5	0.5	45.5	47.5	937	61.2
Combined Means	9.2	0.2	44.7	45.7	813	60.6
18"-New Substrate						
E	2	0	50	48	875	57.2
F	1	0	58	41	500	43.9
Means	1.5	0	54	44.5	688	50.6
18"-Old Substrate						
5	0	1	22	77	625	40.8
6	3	1	41	55	1000	57.0
Means	1.5	1	31.5	66	813	48.9
Combined Means	1.5	0.5	42.7	55.2	750	49.8

Table 3.1.4 Species Composition Test Site #1, 1988

Species	Total # Plots	Ave. # Stems/Quad	Percent of Total Cover
A. New Coal Refuse Substrate			
Agropyron smithii	3	3.59	3.00
Agropyron sp.	5	8.56	10.48
Agropyron cristatum	1	2.85	3.49
Bromus tectorum	6	26.25	57.08
Oryzopsis hymenoides	4	5.46	6.52
Stipa comata	1	0.40	0.70
Sitanion hystrix	1	1.25	0.47
Salsola kali	5	1.10	3.96
Astragalus ciceri	1	0.25	0.47
Linium lewisii	3	1.92	5.13
Grindelia squarrosa	4	0.47	4.67
Ceratoides lanata	4	0.48	2.80
Atriplex canescens	2	0.17	0.70
unknowns	1	0.25	0.47
Total Species	13		
B. Old Coal Refuse Substrate	30 quads		
Agropyron smithii	1	2.26	1.54
Agropyson spicatum	1	1.02	0.58
Agropyron sp.	5	16.26	21.23
Agropyron cristatum	2	3.92	3.47
Bromus tectorum	6	20.67	40.92
Oryzopsis hymenoides	3	4.39	2.51
Sitanion hystrix	1	1.11	0.19
Stipa comata	1	0.21	0.19
Astragalus ciceri	2	0.32	0.58
Grindelia squarrosa	4	1.20	11.19
Linium lewisii	2	1.47	3.86
Salsola kali	4	0.48	2.12
Artemisia tridentata	1	0.17	1.93
Ceratoides lanata	5	1.81	8.68
Chrysothamnus viscidiflorus	1	0.11	0.39
Total Species	15		

3.2 Study Site #2

This site, where 12" of topsoil was removed, has shown an increase in seeded species. The annual grasses have been replaced by perennial grasses and shrubs, the forbs are still a major part of the seeded communities. The developing seeded plant cover has diversity as grasses, forbs and shrubs are all present on the sites. Seed Mix #1 appears at this time to be superior to Seed Mix #2 (Table 3.2.1, cover and density at 5% level).

Table 3.2.1 Transect Data, 10 quadrants per seed mix

Percent of Bare	Rock	Litter	Cover	Basal Stems/Quadrant
A. Seed Mix #1				
31.4	0.0	44.4	24.2	37.1
B. Seed Mix #2				
29.7	0.0	55.1	15.2	26.7

Table 3.2.2 Species Composition on Subplots, 1988

Species	Total # Plots	Total # Stems	Mean # /Quad	Percent of Total Cover
A. Seed Mix #1				
Agropyron trachycaulum*	7	134	19.1	25.61
Oryzopsis hymenoides *	4	39	9.8	7.43
Sitanion hystrix	1	17	17.0	4.00
grass seedlings	2	8	4.0	2.00
Grass Subtotal				39.04
Astragalus cicer	1	4	4.0	4.13
Lathyrus sp.	3	9	3.0	7.02
Linium lewissi	10	92	9.2	45.88
Sphaeralcea coccinea	3	3	1.0	1.65
Forb Subtotal				58.78
Ceratoides lanata *	1	2	2.0	1.23
Chrysothamnus nauseosus	*4	22	5.5	5.37
Snrub Subtotal				6.60
* seeded species				39.64
Total # of Species	11			
B. Seed Mix #2				
Agropyron sp. *	4	73	18.5	17.76
Oryzopsis hymenoides *	3	8	2.4	3.29
Bromus tectorum	1	18	18.0	3.29
Grass Subtotal				24.34
Linium lewisii *	3	21	7.0	4.60
Melilotus officinalis *	1	1	1.0	0.66
Penstemon Palmeri	3	37	12.3	15.79
Forb Subtotal				21.05
Ceratoides lanata *	2	3	1.5	5.26
Chrysothamnus nauseosus	*4	28	7.0	18.42
Chrysothamnus viscidiflorus	4	35	8.8	23.03
Snrub Subtotal				46.71
* seeded species				49.99
Total # of Species	9			

The percentage of seeded species is higher in the plant community established in the plot seeded with seed mix #2. However, the number of seeded species present in both plant

communities is similar(6 in #1, 7 in #2). The #1 seed mix community also has a greater total number of species than the #2 seed mix community. The percentage of grass is higher in the seed mix #1 plant community than the #2 mix, but the opposite is true for the shrub component of the respective seeded communities. Generally the distribution of the major plant groups is more even in the #2 seed mix community. There appears to have been some crossover of seeded species in each plot apparently due to proximity of plots and/or sloppiness of seeding efforts. This confuses the analysis and renders statistical analysis valueless.

3.3 Canyon Plots

The three plots have produced good stands of seeded grasses and forbs. Most of the species had flowered or were flowering during the field work in August. Generally grasses have increased on the plots and matured. Also species diversity has increased but total vegetative cover has decreased. This is probably due to the decrease in the total number of plants in the plots as evidenced by the reduction in basal stems per quadrant from 1985 and 1986 (Table 3.3.1).

Table 3.3.1 Transect Data, 1988 5 quadrants

Percent of				Productivity	Basal Stems
Bare	Rock	Litter	Cover	lbs./acre	/Quadrant
A. Middle Fork					
10	0	57	33	788	58.10
B. South Fork					
9	7	42	42	1088	56.80
C. Riparian					
14	1	52	33	375	21.00

The Middle Fork and South Fork plots have an excellent stand of seeded and seral plants. The amount of litter and production of forage is equal to that normally produced on adjacent indigeneous plant communities. The amount of litter on the Riparian Plot has increased and bare ground has decreased. The low forage production is a result of the shading by the tree stand.

Table 3.3.2 Species Composition

Species	Total # Plots	Total # Plants	Mean # /Quad	Percent of Total Cover
A. Middle Fork				
Agropyron spicatum *	3	22	7.4	5.40
Bromus marginatus *	5	21	4.2	6.60
Dactylis glomerata *	5	53	10.6	52.40
Elymus sp. *	5	26	5.2	13.00
Phleum alpinum *	5	63	12.6	17.40
Grass Subtotal				94.80
Hedysarum boreale *	1	1	1.0	1.20
unknown forbs	1	2	2.0	1.20
Forb Subtotal				2.40
Symphoricarpos * oreophilus	1	1	1.0	1.80
B. South Fork				
Agropyron subsecundum	4	23	5.8	5.20
Bromus marginatus *	2	16	8.0	4.06
Dactylis glomerata *	5	112	22.4	45.50
Phleum alpinum *	4	29	7.3	19.80
Oryzopsis hymenoides *	4	54	13.5	9.00
Grass Subtotal				83.56
Cynoglossum officinale	1	1	1.0	2.36
Hedysarum boreale *	2	3	1.5	8.50
Viguiera multiflora	2	8	4.0	3.30
Unknown Forb	1	1	1.0	0.47
Forb Subtotal				14.63
Cercocarpus ledifolius *	1	1	1.0	0.47
Symphoricarpos oreophilus *	1	4	4.0	1.42
Shrub Subtotal				1.89
C. Riparian				
Agropyron smithii *	1	4	4.0	1.23
Bromus marginatus *	4	41	10.2	25.15
Dactylis glomerata *	3	43	14.3	22.70
Elymus sp. *	2	7	3.5	4.29
Phleum alpinum *	1	36	36.0	9.20
Grass Subtotal				62.57
Cynoglossum officinale	1	1	1.0	3.06
Hedysarum boreale	1	1	1.0	1.84
Mahonia repens	4	19	4.8	29.45
Forb Subtotal				34.35

Table 3.3.2 Con't.

Abies sp.	1	1	1.0	1.84
Populus tremuloides	1	1	1.0	1.23
Shrub Subtotal				3.07

The plant communities established in the South and Middle Forks are a grass/forb type with a very minor shrub component. The seeded grass species account for most of the grasses in the communities. The grasses in the Riparian seeded community are similar to those of the South and Middle Forks communities, even thougn a different seed mix was used in the Riparian plot.

4.0 Summary of Results

This section provides a summary of the change in the plots through the years and a comparison of seed mixtures and sites.

4.1 Study Site #1

Table 4.1.1 Species Composition Changes, 1985-1988

Species	Total # Plots 1985	1986	1988	Percent of Total Cover 1985	1986	1988
A. New Coal Refuse Substrate, 30 quads						
Agropyron smitnii	-	-	3	-	-	3.00
Agropyron sp.	-	7	5	-	56.00	10.48
Agropyron cristatum	-	-	1	-	-	3.49
Bromus tectorum	-	-	6	-	-	57.08
Oryzopsis hymenoides	-	-	4	-	-	6.52
Stipa comata	-	-	1	-	-	0.70
Sitanion hystrix	2	-	1	0.01	-	0.47
grass seedlings	7	6	-	0.01	9.00	-
Astragalus ciceri	1	-	-	-	-	0.47
Chenopodium sp.	25	-	-	5.80	-	-
Grindelia squarrosa	1	-	5	tr	-	4.67
Kochia scoparia	28	4	-	19.50	13.00	-
Linium lewisii	-	-	3	-	-	5.13
Salsola kali	30	4	5	72.30	4.00	3.96
Ceratoides lanata	5	7	4	0.01	12.00	2.80
Atriplex canescens	-	1	2	-	2.00	0.70
unknowns	1	-	1	tr	-	0.47
B. Old Coal Refuse Substrate 30 quads						
Agropyron smithii	-	-	1	-	-	1.54
Agropyson spicatum	-	-	1	-	-	0.58
Agropyron sp.	-	3	5	-	3.00	21.23
Agropyron cristatum	-	5	2	-	28.00	3.47
Bromus tectorum	-	-	6	-	-	40.92
Oryzopsis hymenoides	-	3	3	-	10.00	2.51
Sitanion hystrix	-	2	1	-	3.00	0.19
Stipa comata	-	-	1	-	-	0.19
grass seedlings	1	7	-	tr	6.00	-
Astragalus ciceri	-	-	2	-	-	0.58
Chenopodium sp.	23	1	-	3.60	1.00	-
Descuriana sp.	-	1	-	-	3.00	-
Grindelia squarrosa	-	5	4	-	28.00	11.19
Linium lewisii	-	-	2	-	-	3.86
Kochia scoparia	30	6	-	25.10	13.00	-
Salsola kali	30	2	4	70.00	1.00	2.12
Artemisia tridentata	-	-	1	-	-	1.93
Ceratoides lanata	9	-	5	0.60	-	8.68
Chrysothamnus viscidiflorus	-	-	1	-	-	0.39
unknowns	3	-	-	0.60	-	-

The Chenopodium sp. and the Kochia scoparia were the early pioneers of these seeded disturbed sites. These plants quickly faded as the perennial seeded species, especially the grasses, began to become established and eventually dominate the new plant community. It was amazing that Bromus tectorum, an invader annual grass, did not become established until the 3rd or 4th growing season.

The Ceratoides lanata became the dominant species of seeded shrubs. The only seeded forbs to become established were the Linium lewisii and Astragalus ciceri. The seeded grass species that formed a dominant part of the plant community were the Agropyron spp. and the Oryzopsis hymenoides.

4.2 Study Site #2

Table 4.2.1 Species Composition Changes, 1985-1988

Species	Total # of Plots 1985	1986	1988	Percent of Total Cover 1985	1986	1988
A. Seed Mix #1						
Agropyron trachycaulum*	-	4	7	-	15.00	25.61
Oryzopsis hymenoides *	-	1	4	-	1.00	7.43
Sitanion hystrix	-	1	-	-	4.00	-
grass seedlings	6	2	2	10.50	2.00	2.00
Elymus sp.	-	1	-	-	14.00	-
Grass Subtotal				10.50	36.00	35.04
Aster chilensis *	-	1	-	-	1.04	-
Astragalus cicer	1	2	1	0.70	3.64	4.13
Chenopodium sp.	1	-	-	0.70	-	-
Convolvulus sp.	1	1	-	4.50	1.04	-
Grindelia squarrosa	2	5	-	4.20	29.70	-
Kochia scoparia	4	-	-	7.00	-	-
Lathyrus sp.	-	-	3	-	-	7.02
Linium lewisii	4	5	10	7.30	13.02	45.88
Melilotus officinalis *	2	1	-	6.30	5.21	-
Salsola kali	10	-	-	53.70	-	-
Sphaeralcea coccinea	-	4	3	-	7.81	1.65
Forb Subtotals				84.40	61.46	58.68
Ceratoides lanata *	3	2	1	1.00	1.04	1.23
Chrysothamnus nauseosus *	2	4	4	1.70	5.21	5.37
Purshia tridentata	-	1	-	-	0.52	-
Shrub Subtotals				2.70	6.77	6.60
* seeded species				9.00	42.50	39.64
B. Seed Mix #2						
Agropyron sp. *	-	6	4	-	20.32	17.76
Oryzopsis hymenoides *	-	2	3	-	1.62	3.29
Bromus tectorum	-	-	1	-	-	3.29
grass seedlings	7	-	-	11.80	-	-
Grass Subtotal				11.80	21.94	24.34
Astragalus cicer *	-	1	-	-	0.81	-
Cardaria sp.	-	2	-	-	2.44	-
Chenopodium sp.	4	-	-	3.10	-	-
Erigeron sp.	1	1	-	1.50	1.62	-
Grindelia squarrosa	3	4	-	6.10	19.70	-
Helianthus sp.	1	-	-	1.50	-	-
Kochia scoparia	3	-	-	9.70	-	-
Linium lewisii *	4	5	3	4.60	23.60	4.60
Melilotus officinalis *	2	1	1	1.50	5.69	0.66

Table 4.2.1 Con't.

Penstemon Palmeri	-	-	3	-	-	15.79
Salsola kali	9	-	-	46.10	-	-
Spharaelcea coccinea	2	1	-	2.10	tr.	-
Forb Subtotal				76.20	51.68	21.05
Ceratoides lanata *	3	1	2	2.60	5.24	5.26
Chrysothamnus nauseosus	*4	7	4	2.10	21.14	18.42
Chrysotnamnus viscidiflorus	-	-	4	-	-	23.03
Purshia tridentata *	1	-	-	0.50	-	-
Shrub Subtotal				5.20	26.38	46.71
* seeded species				11.30	78.42	49.99

The amount of differences, in bare ground, between the two seed mixes is neglible. Most of the basic difference is in a greater litter occurrence in Seed Mix #2, and a greater plant cover in Seed Mix #1.

The first years' growth in both plots was dominated by adventative species, similar to those found a Study Site #1. However, by the second year of growth the seeded species and other perennials had largely replaced the adventative species. By the fourth year of growth, the seeded species accounted for 40-50% of the plant cover.

The plant cover in the Seed Mix #1 plot is composed mostly of grasses and forbs, while that in Seed Mix #2 has a greater amount of shrubs. The comparisons of the two seed mixes is not clear due to an apparent mixing of seeded species from one plot to another. The proximity has allowed the seed mixes to cross from one plot to another, either at seeding or during subsequent seed production by the seeded species. Both plots have very similar appearances.

4.3 Canyon Plots

Table 4.3.1 Species Composition Changes, 1985-1988

Species	Total # of Plots 1985	1986	1988	Percent of Total Cover 1985	1986	1988
A. Middle Fork						
Avena fatua	1	-	-	0.90	-	-
Agropyron spicatum *	-	2	3	-	6.60	5.40
Bromus marginatus *	3	5	5	0.90	12.00	6.60
Dactylis glomerata *	-	4	5	-	15.60	52.40
Elymus sp. *	-	3	5	-	14.40	13.00
Phleum alpinum *	1	4	5	0.90	31.80	17.40
grass seedling *	5	1	-	91.30	0.60	-
Grass Subtotal				94.00	81.00	94.80
Chenopodium sp.	1	-	-	0.50	-	-
Hedysarum boreale *	-	-	1	-	-	1.20
Kochia scoparia	-	3	-	-	7.80	-
Monolepsis nuttallianus	1	1	-	0.90	2.40	-
unknown forbs	1	2	1	0.50	1.80	1.20
Forb Subtotal				1.90	12.00	2.40
Symphoricarpos * oreophilus	-	-	1	-	-	1.80
Populus tremuloides	-	2	-	-	4.80	-
Shrub Subtotal				-	4.80	1.80
* seeded species				93.10	81.00	97.80
B. South Fork						
Avena fatua	-	1	-	-	0.54	-
Agropyron subsecundum	2	1	4	2.20	0.54	5.20
Bromus marginatus *	4	5	2	7.40	43.74	4.06
Dactylis glomerata *	-	4	5	-	29.16	45.50
Phleum alpinum *	4	1	5	2.20	0.54	19.80
Oryzopsis hymenoides *	-	-	4	-	-	9.00
grass seedlings *	5	1	-	64.80	0.54	-
Grass Subtotal				76.60	82.62	83.56
Cleome serrulata	2	-	-	6.60	-	-
Chenopodium album	2	-	-	1.40	-	-
Chenopodium sp.	1	-	-	tr.	-	-
Cynoglossum officinale	2	-	1	2.70	-	2.36
Hedysarum boreale *	-	-	2	-	-	8.50
Melilotus officinale	2	4	-	1.40	5.94	-
Salsola kali	1	-	-	1.40	-	-
Viguiera multiflora	1	2	2	0.50	3.78	3.30
Unknown Forb	5	-	1	9.40	-	0.47
Forb Subtotal				23.40	9.72	14.63
Cercocarpus ledifolius* Symphoricarpos	-	-	1	-	-	0.47

Table 4.3.1 Con't.

oreophilus *	-	1	1	-	0.54	1.42
Shrub Subtotal				-	0.54	1.89
* seeded species				74.40	74.52	88.75
C. Riparian						
Agropyron smithii *	-	2	1	-	38.18	1.23
Bromus ciliatus *	-	3	4	-	28.41	25.15
Dactylis glomerata	-	1	3	-	1.33	22.70
Elymus sp.	-	-	2	-	-	4.29
Phleum alpinum *	-	-	1	-	-	9.20
Poa pratensis *	1	1	-	2.50	2.22	-
grass seedlings *	5	-	-	93.10	-	-
Grass Subtotal				95.60	70.14	62.57
Balsamorhiza sagitta *	1	-	-	0.60	-	-
Cynoglossum officinale	-	-	1	-	-	3.06
Hedysarum boreale	-	-	1	-	-	1.84
Vicia americana *	1	-	-	1.90	-	-
Mahonia repens	1	2	4	0.60	5.77	29.45
Melilotus officinale	-	1	-	-	1.33	-
Mertensia sp.	1	1	-	1.20	8.88	-
Forb Subtotal				4.30	15.98	34.35
Abies sp.	-	-	1	-	-	1.84
Populus tremuloides	-	-	1	-	-	1.23
Shrub Subtotal				-	-	3.07
* seeded species				98.10	68.81	35.88

The seeded grasses and forbs did very well in the Middle and South Fork plots, establishing a good ground cover. The seeded shrub species were not evident in these plots. In the Riparian Plot, the seeded species initially provided much of the ground cover. However, with time other native species, common to riparian communities, colonized the plot and became co-dominant with the seeded species.

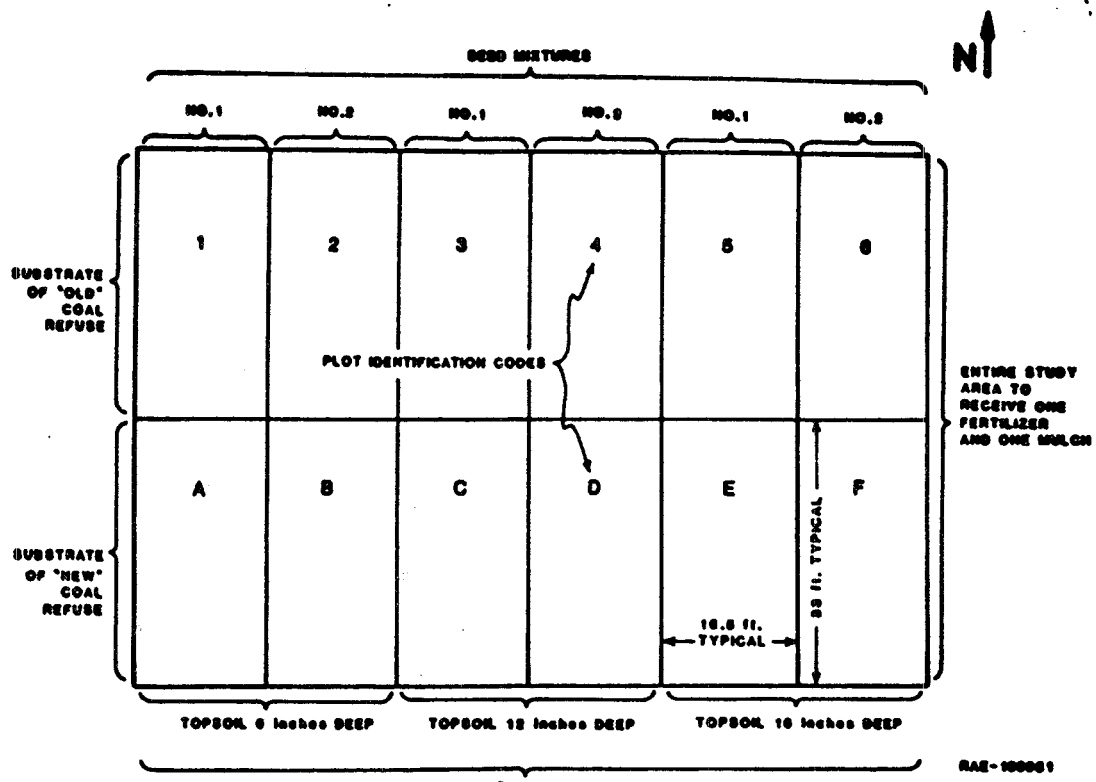


FIGURE IX-1. LAYOUT OF "STUDY SITE NUMBER 1" TO BE LOCATED IN COAL REFUSE IMPOUNDMENT AREA.

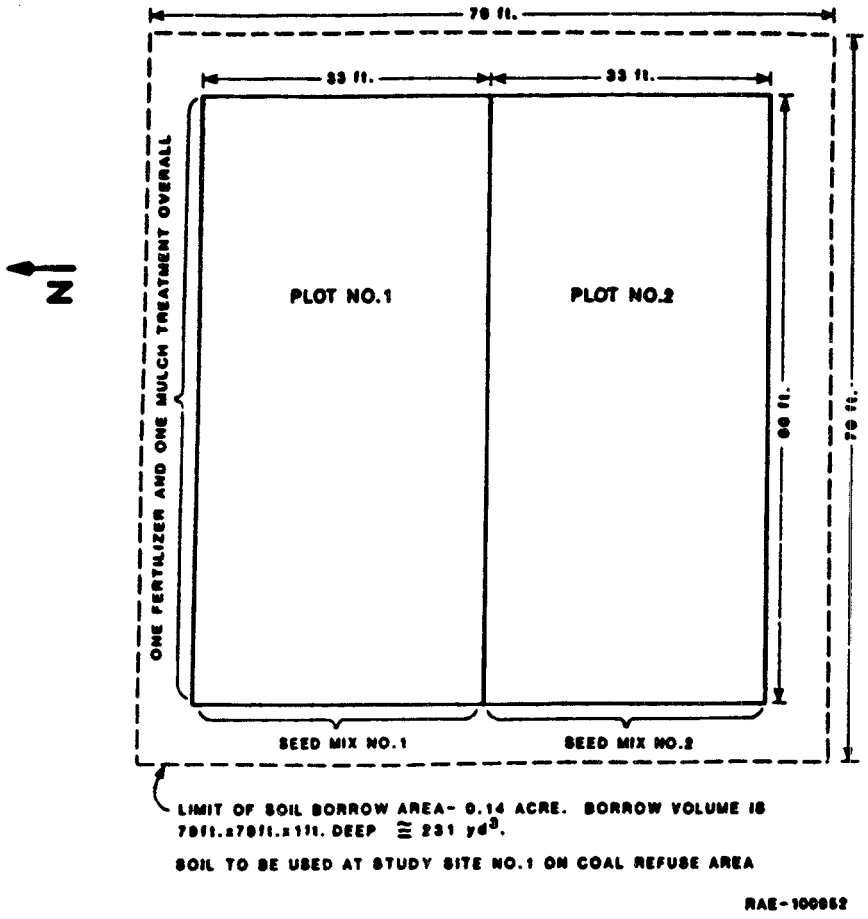


FIGURE IX-2. LAYOUT OF "STUDY SITE NUMBER 2" TO BE LOCATED AT BORROW SITE IN SAGEBRUSH VEGETATION ZONE EAST OF COAL SLURRY IMPOUNDMENTS.