

04008684830E

40-8684



Malapai Resources Company

Wyoming Regional Office, P.O. Box 9950, Casper, Wyoming 82609
Phone: (307) 235-1221 TELECOPY (307) 234-3315

RETURN ORIGINAL TO PDR, HQ.

December 4, 1987

Mr. Scott R. Grace, Project Manager
Uranium Recovery Field Office
U.S. Nuclear Regulatory Commission, Region IV
P.O. Box 25325
Denver, Colorado 80225

WILLOW CREEK R & D
DOCKET NO. 40-8684



SUBJECT: SUBMITTAL OF SUPPLEMENTAL INFORMATION TO CASE NO. 0400-8684-830E;
MALAPAI RESOURCES COMPANY, WILLOW CREEK R & D AQUIFER RESTORATION

Dear Mr. Grace:

Please find attached to this letter additional information regarding Malapai Resources Company's Willow Creek R & D aquifer restoration results. Specifically, the information consists of the September and October, 1987 sample results from the restoration wells, and the updated Table 3 from the Willow Creek aquifer restoration report submitted to your office by letter dated October 26, 1987. At your suggestion, we request that this information be included in your Case No. 0400-8684-830E.

Please contact me if I may answer any questions or supply you with additional information.

Sincerely,

Donna L. Wichers
Manager - Licensing, Safety and Environmental Services

/dw

Enclosure

8801070428 871204
PDR ADOCK 04008684
C PDR

cc: G. Mooney - LQD/Sheridan
S. Hogg - LQD/Cheyenne
W. Garland - WQD/Cheyenne

DESIGNATED ORIGINAL

Certified By Mary C. Hood

FEE NOT REQUIRED
Supplemental info
to 10/26/87 app.

88-0193

TABLE 3

WILLOW CREEK R&D
WELLFIELD GROUNDWATER QUALITY CONCENTRATIONS

MAJOR IONS (mg/l)	BASELINE		POST-MINING		RESTORATION							POST RESTORATION STABILITY					CLASS I STANDARDS
	N=52 to 55 04/86		N=7 12/10/86 02/05/87	N=3 02/25/87	N=9 03/24/87	N=5 04/16/87	N=5 05/13/87	N=4 06/22/87	N=7 07/14/87	N=5 07/23/87	N=5 08/24/87 ENERGY LAB	N=5 08/31/87 WAMCO	N=5 09/24/87 ENERGY LAB	N=5 10/26/87 ENERGY LAB	N=5 10/26/87 WAMCO		
Ca	8.6		90.2	52.5	42.2	20.9	3.2	18.1	7.59	7.8	13.8	9.6	12.0	12.9			
Mg	1.2		14.0	8.1	7.1	3.3	0.51	2.3	1.19	1.20	1.98	4.2	1.8	1.6			
Na	136		780.4	382.3	383.3	252.2	84.96	228.3	140.2	123.6	148.4	134.2	142.2	144.6			
K	2.6		5.4	4.1	3.6	2.5	0.83	2.0	1.41	1.76	1.8	1.6	1.7	1.5			
CO3	7.32		0	0	0	0	4.62	0	0	0.42	0	0	0	0			
HCO3	118		1701.3	775.7	675.7	383.2	161.2	348.2	232.7	188.12	180.2	201.2	195.2	209.4			
SO4	194.8		387.3	270.3	265.2	221.4	41.6	225.3	118.8	109.2	198.0	151.4	159.4	163.8			
Cl	7.2		152.3	66.0	66.1	27.1	5.7	19.5	12.3	11.2	10.6	13.2	11.3	10.9			
NH4	<0.05		0.11	0.06	0.09	0.17	0.11	0.28	<0.07	<0.01	<0.01	0.16	0.086	<0.05			
NO2(N)	<0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.01	<0.01			
NO3(N)	<0.06		0.22	0.02	0.02	0.03	0.02	0.02	0.03	0.02	0.06	<0.03	0.02	0.02			
F	0.171		<0.11	0.18	0.24	0.23	<0.1	<0.1	<0.1	<0.1	<0.10	0.13	<0.11	<0.12			
SiO2	9.11		22.0	13.5	10.5	9.7	6.5	6.6	12.7	9.3	11.8	452.4	12.9	12.6			
TDS	425		2406.3	1328.7	1237.3	776.4	239.6	673.0	418.9	356.8	457.6	448	448	435.6			
Cond	653		3457.1	1823.0	1709	1165.8	402.6	1113.0	657.6	581.4	753.6	705	698.8	714.2			
Alk	109.4		1447.5	636.0	553.3	313.8	140.8	285.5	190.7	154.9	147.6	165	159.9	168.4			
pH	8.87		7.4	8.0	7.84	8.06	8.52	7.53	7.98	7.86	7.32	7.77	7.986	7.51			
6.5-9.0																	
TRACE METALS (mg/l)																	
Al	<0.10		0.66	0.81	0.47	0.26	<0.12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10			
As	<0.0025		0.148	0.068	0.223	0.198	0.088	0.074	0.097	0.045	0.031	0.009	0.027	0.0298			
Ba	<0.10		0.12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10		0.019	
B	<0.11		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.014	<0.10	<0.10			
Cd	<0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002	<0.01	<0.01			
Co	<0.01		<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002	<0.01	<0.01			
Cr	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.01	<0.05	<0.05		0.05	
Cu	<0.01		0.05	0.09	0.04	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		1.0	
Fe	<0.06		0.12	0.16	0.07	<0.076	<0.052	<0.058	<0.057	<0.05	0.36	0.22	0.22	0.22		0.3	
Pb	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		0.05	
Mn	<0.02		0.09	0.05	0.04	<0.02	<0.01	0.028	<0.017	0.012	0.04	0.04	0.04	0.03		0.05	
Hg	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001		0.002	
Mo	<0.1		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10			
Ni	<0.05		<0.05	<0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05			
Se	<0.001		3.094	1.846	2.544	1.475	0.405	0.044	0.073	0.061	<0.011	<0.022	<0.014	<0.0088		0.01	
V	<0.1		2.61	2.66	9.03	6.48	2.86	0.93	0.91	0.36	<0.021	<0.10	<0.11	<0.18		<0.0014 <0.16	
Zn	<0.01		0.11	0.02	<0.02	0.04	0.01	<0.02	<0.011	<0.01	<0.01	<0.007	<0.012	<0.01		5.0	
RADIOCHEM (pCi/l)																	
U (mg/l)	0.0354		36.4	53.9	22.9	9.80	2.36	4.46	2.42	1.802	1.17	1.321	1.35	1.52		5.0	
Ra-226	73.2		1225.7	515.3	473.9	207.3	59.2	133.6	94.9	93.4	147.52	41.2	120.18	132.1		5.0	

*N= Number of samples (data points) used for arithmetic average. Samples taken from wells RW-01, RW-02, WCPW-21, IW-01, IW-02, IW-03, IW-04, IW-06 and IW-07.

WATER ANALYSIS REPORT-MALAPAI RESOURCES, INC

Project:

Christensen Ranch Willow Creek R&D

Sample I.D.:	IW-01	IW-03	IW-04	IW-06	RW-02	WCDW-25	WCDW-26	
Sample Date:	10-26-87	10-26-87	10-26-87	10-26-87	10-26-87	10-26-87	10-26-87	Det. Limit
Report Date:	12-02-87	12-02-87	12-02-87	12-02-87	12-02-87	12-02-87	12-02-87	& Range
Sample Number:	87-13500	87-13501	87-13502	87-13503	87-13504	87-13505	87-13506	

MAJOR IONS mg/l:

Ca	16.7	7.6	10.1	11.5	18.8	13.0	17.5	0.05
Mg	2.3	0.9	1.3	1.6	1.8	1.6	2.6	0.01
Na	178	110	137	153	145	145	176	0.05
K	2.0	1.0	1.4	2.0	1.2	1.7	2.1	0.10
CO3	0	0	0	0	0	0	0	0.10
CO3-total	272.4	165.6	207.6	194.4	170.4	188.4	254.4	0.10
HCO3	297	168	211	198	173	192	259	0.10
SO4	181	109	139	187	203	183	199	0.50
Cl	11.9	9.2	11.4	11.2	10.6	11.0	16.2	0.10
NH4 (N)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	0.05
NO2 (N)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
NO3 (N)	0.02	0.02	0.02	0.02	0.01	0.01	0.03	0.01
F	0.11	0.16	0.11	<0.1	<0.1	<0.1	<0.1	0.10
SiO2	13.7	11.6	11.3	11.3	15.0	12.6	9.8	1.00
TDS @ 180 C	516	328	390	462	482	454	532	1.0
Cond (umho/cm)	861	533	664	750	763	684	874	1.0
Alk-CaCO3	227	138	173	162	142	157	212	0.1
pH (units)	7.95	7.40	7.67	7.61	6.94	7.67	7.45	1-14

TRACE METALS mg/l:

Al	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10
As	0.034	0.025	0.024	0.052	0.014	0.052	0.018	0.001
Ba	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10
B	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10
Cd	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Cr	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Fe	0.14	0.57	0.21	0.13	0.23	0.05	0.17	0.05
Pb	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
Mn	0.02	0.04	0.05	0.02	0.04	0.01	0.04	0.01
Hg	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
Mo	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10
Ni	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
Se	<0.001	<0.001	0.006	0.035	<0.001	<0.001	<0.001	0.001
V	0.50	<0.10	<0.10	<0.10	<0.10	0.20	<0.10	0.10
Zn	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01

RADIOMETRIC pCi/l:

U (mg/l)	3.411	0.375	0.659	1.615	1.558	3.980	8.073	0.0003
Ra226	293.8	43.9	84.8	116.1	119.9	86.6	47.5	0.20
Ra Prec. +/-	4.6	2.0	2.4	2.8	2.9	2.6	1.8	

Q.A. DATA:

Anion meq:	8.98	5.29	6.68	7.46	7.36	7.27	8.85	
Cation meq:	8.96	5.30	6.64	7.46	7.48	7.25	9.02	
A/C Balance:	1.002	0.998	1.007	1.000	0.985	1.002	0.981	0.95-1.05
WYDED A/C Bal.%	-0.12	0.09	-0.36	0.01	0.77	-0.11	0.95	-5 - +5
Calc TDS mg/l:	558	385	418	478	484	468	561	
TDS A/C Bal:	0.924	0.981	0.933	0.966	0.996	0.970	0.948	0.90-1.10

Q.A. MANAGER:

ENERGY LABORATORIES, INC.

WATER ANALYSIS REPORT-MALAPAI RESOURCES, INC

Project:

Christensen Ranch Willow Creek R&D

Sample I.D.:	RW-02	IW-01	IW-03	IW-04	IW-06	WCDW-25	WCDW-26	Det. Limit
Sample Date:	09-24-87	09-24-87	09-24-87	09-24-87	09-24-87	09-24-87	09-24-87	& Range
Report Date:	12-02-87	12-02-87	12-02-87	12-02-87	12-02-87	12-02-87	12-02-87	
Sample Number:	87-11927	87-11928	87-11929	87-11930	87-11931	87-11932	87-11933	

MAJOR IONS mg/l:

Ca	19.2	13.4	8.9	9.3	9.8	11.4	16.5	0.05
Mg	2.2	2.4	1.2	1.5	1.6	1.3	2.9	0.01
Na	145	166	118	137	145	130	171	0.05
K	1.8	2.0	1.4	1.6	1.8	1.8	2.2	0.10
CO3	0	0	0	0	0	0	0	0.10
CO3-total	148.8	252.0	168.0	196.8	194.4	175.2	230.4	0.10
HCO3	151	256	171	200	198	178	235	0.10
SO4	215	170	112	136	164	146	206	0.50
Cl	11.1	12.1	10.4	11.7	11.3	10.3	15.4	0.10
NH4 (N)	0.08	0.08	0.10	0.08	0.09	0.05	0.05	0.05
NO2 (N)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
NO3 (N)	0.02	0.02	0.01	0.02	0.03	0.02	0.01	0.01
F	<0.1	0.13	<0.1	0.11	<0.1	<0.1	<0.1	0.10
SiO2	16.3	13.7	11.6	11.6	11.3	12.2	10.5	1.00
TDS @ 180 C	522	510	348	418	442	396	536	1.0
Cond (umho/cm)	774	798	568	653	701	641	834	1.0
Alk-CaCO3	124	210	140	164	162	146	192	0.1
pH (units)	7.87	8.12	8.08	7.99	7.87	8.05	7.95	1-14

TRACE METALS mg/l:

Al	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10
As	0.014	0.030	0.022	0.022	0.046	0.067	0.016	0.001
Ba	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10
B	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10
Cd	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Cr	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Fe	0.23	0.15	0.34	0.21	0.15	0.03	0.10	0.05
Pb	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
Mn	0.04	0.03	0.07	0.04	0.02	0.01	0.04	0.01
Hg	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
Mo	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10
Ni	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
Se	<0.001	0.001	0.002	0.012	0.054	0.001	<0.001	0.001
V	<0.10	0.40	<0.10	<0.10	<0.10	0.20	<0.10	0.10
Zn	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	0.01

RADIOMETRIC pCi/l:

U (mg/l)	1.256	2.763	0.482	0.618	1.658	3.015	5.427	0.0003
Ra226	89.9	261.0	34.2	93.2	122.6	112.6	98.3	0.20
Ra Prec. +/-	2.6	4.4	1.6	2.6	3.0	2.9	2.7	
Th230	30.0	72.6	26.7	18.2	42.5	75.1	174	0.20
Th Prec. +/-	3.9	5.5	3.8	3.3	4.4	5.6	8.1	
Pb210	381.9	168.2	321.8	240.5	188.4	1776	140.6	1.0
Pb Prec. +/-	14.3	17.3	14.1	11.3	10.2	30.8	9.2	
Po210	169.3	353.6	348.2	121.4	566.9	29.7	<1	1.0
Po Prec. +/-	6.4	9.2	9.1	5.5	11.6	2.9		

Q.A. DATA:

Anion meq:	7.27	8.09	5.43	6.45	6.98	6.25	8.58	
Cation meq:	7.55	8.26	5.75	6.62	7.03	6.47	8.70	
A/C Balance:	0.963	0.979	0.944	0.974	0.993	0.966	0.986	0.95-1.05
WYDER A/C Bal.%	1.87	1.07	2.88	1.32	0.34	1.75	0.71	-5 - +5
Calc TDS mg/l:	488	511	350	410	446	405	548	
TDS A/C Bal:	1.070	0.998	0.994	1.020	0.991	0.977	0.979	0.90-1.10

Q.A. MANAGER:

ENERGY LABORATORIES, INC.

WAMCO LAB

P. O. Box 2953 - Casper, WY 82602

ANALYSIS REPORT

COMPANY: Malapai Resources

DATE Nov. 25, 1987

Sample type Water

Date Rec'd 11/20/87

W. O. No. 7097

Analysis in Milligrams per Liter except where Noted
Limits of Detection are Noted Following Less Than Mark (<)

Sample No.	1	2	3	4	5
Sample Descr.	IW-06	WCOW-25	WCOE-26	IW-01	IW-03
Sample Date	(10-26-87 split- all wells)				
Arsenic (As)	0.031	0.038	0.011	0.022	0.016
Selenium (Se)	<.001	<.001	<.001	<.001	<.001
Vanadium (Va)	<0.10	0.17	<.10	0.40	<.10

Sample No.	6	7
Sample Descr.	RW-02	IW-04
Sample Date	(10-26-87 split- all wells)	
Arsenic (As)	0.010	0.016
Selenium (Se)	<.001	0.003
Vanadium (Va)	<.10	<.10