Alicia Mullins

From: David Pickett
Sent: Friday, April 19, 2002 5:00 PM
To: Bret Leslie
Subject: Nopal files

Bret,

Hopefully reasonably self-explanatory. The 234/238-230/238 plot on the poster is still OK for looking at all toal-rock data. I've given you some new plots of total rock/leachate relationships in the first Excel file.

The one sample that had large differences in U-Th isotopic characteristics between total-rock and leachate was NOPI-166, which was a very messy calcite-junk mixture. For other samples, my hypothesis is that leachable and residual fractions are similar in age, and both have a fair portion of the U. There are more details of my analysis that I still have to dredge back up from last fall. I'll have that stuff with me.

Looking forward to seeing you.

brief U-Th isotopic data Apr 2... Final summary of U_Th concs.xl...

David

Sample	NOPI-	cc=calcite cal=caliche cal, sil=hard caliche	Delta 234 U ‰ (today)	238 U ppm	232 Th ppb	232/238 atomic	230/238 atomic	230/234 atomic	232/238 activity	230/238 activity	230/234 activity	234/238 activity	230/232 activity	Age ** (Ky) (from U Texas)
n99-1	12-SEP1	cc	4.0	48.2	1860	0.0395	0.0000172	0.312	0.0126 ± 9.2E-5	1.016 ± .0039	1.016	1.012 ± .0040	1.004 80.63 ± .65	too old
n99-4	19-SEP2	cc, gray	227	17.2	193	0.0116	0.0000214	0.318	0.00369 ± 1.9E-5	1.263 ± .0062	1.263	1.030 ± .0052	1.226 342.3 ± 2.2	370 ± 13 ??
n99-5	24-SEP1	cc	-0.6	30.2	964	0.0327	0.0000173	0.315	0.0104 ± 6.4E-5	1.021 ± .0066	1.021	1.022 ± .0067	0.999 98.17 ± .76	too old
n99-11	166-SEP1-P	cc, gray	551	25.7	1173	0.0468	0.0000245	0.288	0.0149 ± 7.8E-5	1.449 ± .0076	1.449	0.934 ± .0050	1.551 97.25 ± .66	213 ± 3
n99-16	501-G-SEP3	cc, gray	222	19.4	497	0.0263	0.0000216	0.321	0.00839 ± 3.9E-5	1.273 ± .0060	1.273	1.041 ± .0051	1.223 151.7 ± .9	406 ± 18 ??
n99-18	436-L1-SEP4	cal	670	47.4	3430	0.0743	0.0000138	0.150	0.0237 ± 1.7 E-4	0.813 ± .0055	0.813	0.487 ± .0033	1.669 34.30 ± .30	68.1 ± 1.3
n99-26	499-L3-SEP4	cal,sil	1066	86.1	334	0.00398	0.0000097	0.0853	0.00127 ± 5.5E-6	0.571 ± .0021	0.571	0.276 ± .0010	2.069 449.6 ± 2.3	34.3 ± 0.2
n99-28	305-L1-SEP4	cal	233	186	289	0.00160	0.0000076	0.112	0.000509 ± 2.2E-6	0.446 ± .0020	0.446	0.362 ± .0017	1.232 876.2 ± 4.7	48.2 ± 0.3
n99-29	305-L2-SEP1	cal	207	278	256	0.000946	0.0000070	0.105	0.000302 ± 1.8E-6	0.412 ± .0024	0.412	0.341 ±.0020	1.208 1364.2 ± 9.2	45.0 ± 0.3
n99-30	305-L2-SEP4	cal	209	265	458	0.00178	0.0000072	0.108	0.000566 ± 3.3E-6	0.423 ± .0025	0.423	0.350 ± .0021	1.209 747.3 ± 4.9	46.3 ± 0.3
n99-32	306-SEP4	cal, sil	237	436	527	0.00124	0.0000154	0.227	0.000396 ± 2.5E-6	0.910 ± .0056	0.910	0.736 ± .0046	1.236 2298 ± 16	136.1 ± 1.6
n99-33	434-SEP2	cal, sil	109	144	4300	0.0305	0.0000030	0.0499	0.00973 ± 8.2E-5	0.179 ± .0014	0.179	0.162 ± .0013	1.105 18.39 ± .19	18.4 ± 0.8
n99-35	458-SEP1	cal, sil	-8.0	109	7865	0.0740	0.0000176	0.323	0.0236 ± 2.3E-4	1.037 ± .0060	1.037	1.045 ± .0062	0.992 43.9 ± .47	too old

** Assumed initial 230/232 Th = 4.4 ppm.

U Standard
(NBL 112a) -36.7 1 sd = 1.4 n = 6 (Standards run during the time interval of the analyses of these samples.)
(Nominal value) -36.9

Blanks: 3.9 pg 1.6 pg

Samples run the last half of 2001														
Leachant was 0.1 N HNO3														
n99-11 leach *		891.9 ± 1.6	13.55	710.9	0.0538	0.0000258	0.249	.0172 ± 9E-5	1.526 ± .006	1.526	0.806 ± .003	1.893	88.9 ± .6	147.2 ± 1.3
n99-18 leach *		671.3 ± 1.4	30.3	1450	0.0490	0.0000127	0.1383	.0156 ± 9E-5	0.749 ± .003	0.749	.448 ± .002	1.672	48.0 ± .3	61.3 ± .9
n99-26 leach *		953 ± 1.8	56.5	153	0.00277	0.0000092	0.0859	8.84E-4 ± 3.9E-6	0.544 ± .0026	0.544	0.278 ± .0014	1.957	615 ± 3.0	34.6 ± 0.2
n99-26 leach **		996 ± 2.0	52.7	123	0.00239	0.0000085	0.0780	7.64E-4 ± 3.4E-6	0.504 ± .0025	0.504	0.253 ± .0013	1.992	660 ± 3.3	31.0 ± 0.2
n99-28 leach *		228.9 ± 2.2	150.0	137.4	0.000939	0.0000070	0.1040	.000300 ± 1E-6	.414 ± .002	0.414	.337 ± .001	1.228	1382 ± 5	44.2 ± .2
n99-29 leach *		213.4 ± 1.0	162.1	122.2	0.000773	0.0000064	0.0954	.000247 ± 9E-7	.375 ± .001	0.375	.309 ± .001	1.214	1521 ± 6	39.9 ± .15
n99-30 leach *		209.9 ± 1.0	147.9	206.0	0.00143	0.0000073	0.1095	.000456 ± 2E-6	.429 ± .001	0.429	.355 ± .001	1.208	942 ± 4	47.2 ± .2
n99-32 leach *		242.4 ± 1.1	214.0	225.0	0.00108	0.0000163	0.240	.000344 ± 1.3E-6	.965 ± .003	0.965	.776 ± .003	1.244	2804 ± 12	150.9 ± 1.0
n99-33 leach *		113.7 ± 1.0	131.8	2660	0.0207	0.0000028	0.0451	.00660 ± .00005	.1626 ± .0009	0.1626	.1460 ± .0008	1.114	24.6 ± .2	16.7 ± .5
opal 1		3.0 ± 0.9	8830	7.0	0.000001	0.0000169	0.307	2.60E-7 ± 1.3E-7	0.999 ± .0025	0.999	0.996 ± .0026	1.003	3845000 ± 1860000	579 ± 80 ??
opal 2		1.7 ± 1.2	122800	280	0.000002	0.0000169	0.308	7.55E-7 ± 1.0 E-7	1.000 ± .0026	1.000	0.998 ± .0029	1.002	1325000 ± 174000	655 ± ??
opal 3		16.1 ± 1.0	7970	60	0.000008	0.0000173	0.310	2.47E-6 ± 1.1E-7	1.020 ± .0025	1.020	1.003 ± .0027	1.017	413000 ± 18000	626 ± ??
uranophane		9.2 ± 0.9	107200	97	0.000001	0.0000164	0.296	2.96E-7 ± 6.1E-7	0.968 ± .0023	0.968	0.960 ± .0024	1.008	3267000 ± 6705000	343 ± 6 ??

* Spike added prior to leaching
** Spike added following leach

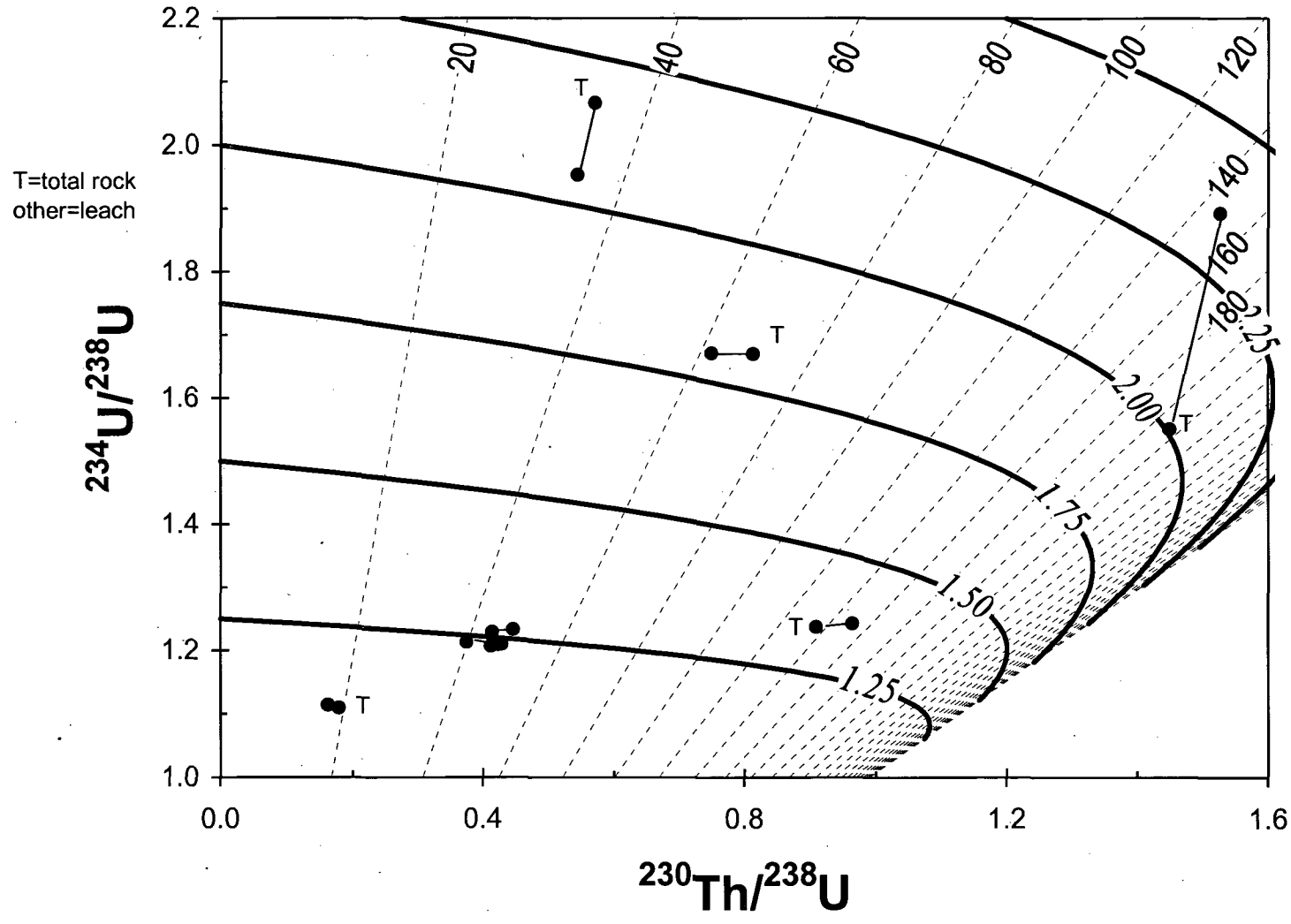
U Standard
(NBL 112a)
(Nominal value)

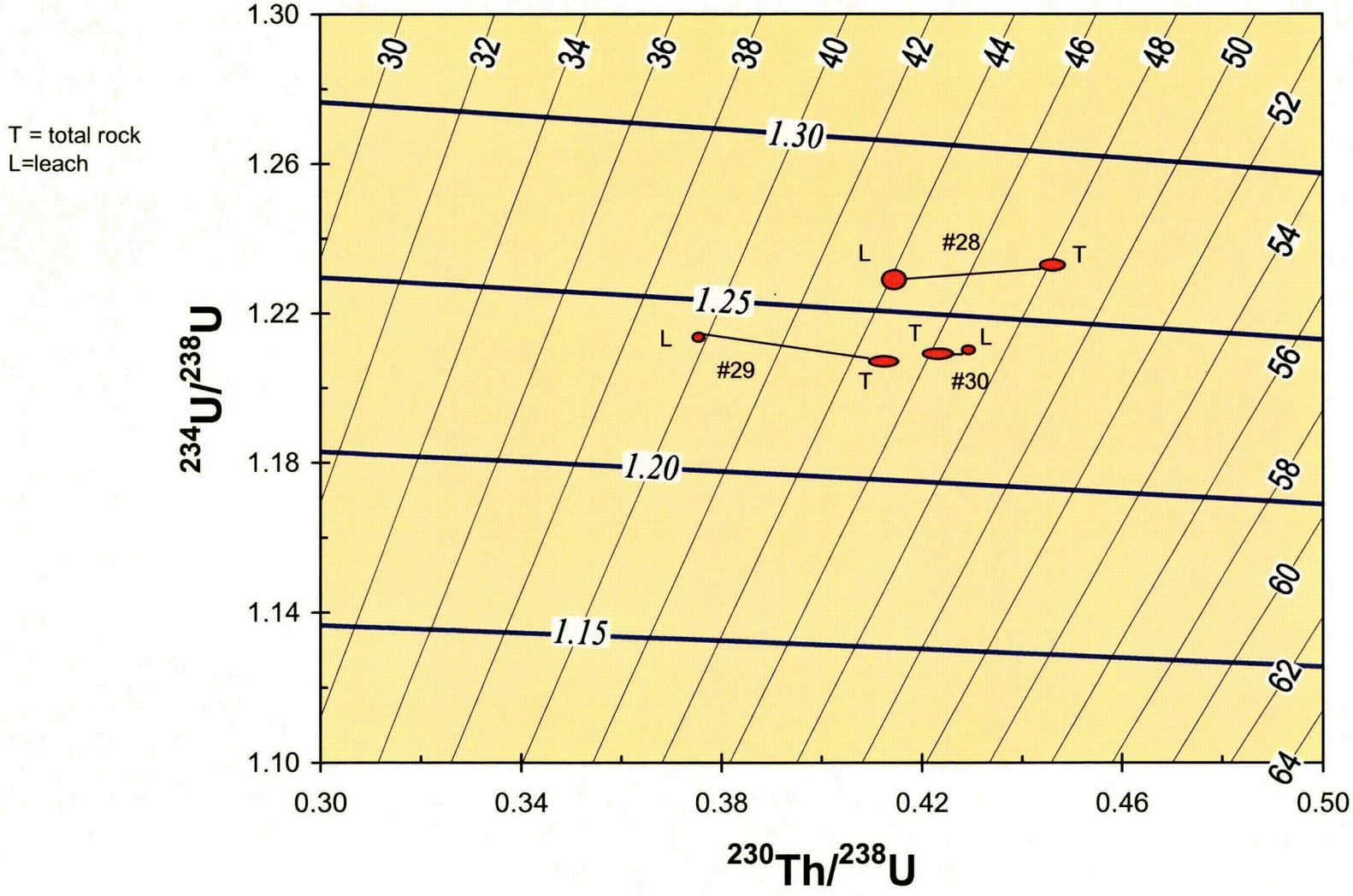
Blanks:	w/ opals	8 pg	1.1 pg
	w/ acid sol.	2.2 pg	0.9 pg

Acid-insoluble in 0.1 N HNO3. Recovery of insoluble material not 100%.

original sample wt. for leachates	wt. of insol. residue ###	acid-insol. wt. %	Age guess ky	DAP calc 230/238 no Th correction	percent difference fror measured	calc init 234/238
			1000	1.006	-1.0	
			371	1.263	0.0	1.646
			1000	0.998	-2.2	
			213	1.448	0.0	2.007
			406	1.273	0.0	1.702
			69.2	0.813	0.0	1.814
			34.3	0.571	0.1	2.178
			48.3	0.446	0.0	1.266
			45	0.412	0.1	1.236
			46.4	0.423	0.0	1.238
			136.1	0.910	0.0	1.347
			19.2	0.179	-0.2	1.111
			1000	0.989	-4.6	
			These are iterative age calculations.			
0.0643	0.0115	18	147.6	1.526	0.0	2.355
0.0386	0.0097	25	62	0.749	0.0	1.801
0.0189	0.0117	62	34.6	0.544	0.0	2.055
0.0181	0.0111	61	31.1	0.504	0.1	2.083
0.0399	0.016	40	44.3	0.414	0.0	1.258
0.0473	0.0268	57	39.9	0.375	0.0	1.240
0.0429	0.0184	43	47.2	0.429	-0.1	1.238
0.0464	0.0249	54	150.6	0.965	0.0	1.373
0.0273	0.0071	26	17.2	0.163	0.1	1.120
			579	0.999	0.0	1.015
			655	1.000	0.0	1.013
			600	1.020	0.0	1.092
			345	0.968	0.0	1.022

Sample	Delta 234 U ‰ (today)	±	238 U ppm	232 Th ppb	232/238 atomic	230/238 atomic	230/234 atomic	232/238 activity	±	230/238 activity	±	230/234 activity	±	234/238 activity (from delta)	±	230/232 activity	±	Age ** (Ky)	Age guess ky	DAP calc 230/238 no Th correcti	percent difference fn measured	calc init 234/238
n99-11	551		25.7	1173	0.0468	0.0000245	0.288	0.0149	7.80E-05	1.449	0.0076	0.934	0.005	1.551	0.0016	97.2	0.7	213 ± 3	213.2	1.448	0.0	2.007
n99-11 leach *	891.9	1.6	13.55	710.9	0.0538	0.0000258	0.249	0.01718	9.00E-05	1.526	0.006	0.806	0.003	1.892	0.0016	88.9	0.6	147.2 ± 1.3	147.8	1.526	0.0	2.354
n99-18	670		47.4	3430	0.0743	0.0000138	0.150	0.0237	1.70E-04	0.813	0.0055	0.487	0.0033	1.670	0.0017	34.3	0.3	68.1 ± 1.3	69.2	0.813	0.0	1.815
n99-18 leach *	671.3	1.4	30.3	1450	0.0490	0.0000127	0.1383	0.01564	9.00E-05	0.749	0.003	0.448	0.002	1.671	0.0014	48	0.3	61.3 ± .9	62.1	0.749	0.1	1.800
n99-26	1066		86.1	334	0.00398	0.0000097	0.0853	0.00127	5.50E-06	0.571	0.0021	0.276	0.001	2.066	0.0021	449.6	2.3	34.3 ± 0.2	34.3	0.571	-0.1	2.175
n99-26 leach *	953	1.8	56.5	153	0.00277	0.0000092	0.0859	8.84E-04	3.90E-06	0.544	0.0026	0.278	0.0014	1.953	0.0018	615.0	3.0	34.6 ± 0.2	34.7	0.544	0.0	2.051
n99-28	233		186	289	0.00160	0.0000076	0.112	0.000509	2.20E-06	0.446	0.002	0.362	0.0017	1.233	0.0012	876.2	4.7	48.2 ± 0.3	48.3	0.446	0.1	1.267
n99-28 leach *	228.9	2.2	150.0	137.4	0.000939	0.0000070	0.1040	0.0003	1.00E-06	0.414	0.002	0.337	0.001	1.229	0.0022	1382.0	5.0	44.2 ± .2	44.3	0.414	0.1	1.259
n99-29	207		278	256	0.000946	0.0000070	0.105	0.000302	1.80E-06	0.412	0.0024	0.341	0.002	1.207	0.0012	1364.2	9.2	45.0 ± 0.3	45	0.412	0.0	1.235
n99-29 leach *	213.4	1	162.1	122.2	0.000773	0.0000064	0.0954	0.000247	9.00E-07	0.375	0.001	0.309	0.001	1.213	0.0010	1521.0	6.0	39.9 ± .15	39.9	0.375	0.0	1.239
n99-30	209		265	458	0.00178	0.0000072	0.108	0.000566	3.30E-06	0.423	0.0025	0.350	0.002	1.209	0.0012	747.3	4.9	46.3 ± 0.3	46.4	0.423	0.0	1.238
n99-30 leach *	209.9	1	147.9	206.0	0.00143	0.0000073	0.1095	0.000456	2.00E-06	0.429	0.001	0.355	0.001	1.210	0.0010	942.0	4.0	47.2 ± .2	47.1	0.429	-0.1	1.240
n99-32	237		436	527	0.00124	0.0000154	0.227	0.000396	2.50E-06	0.910	0.006	0.736	0.0046	1.237	0.0012	2298.0	16.0	136.1 ± 1.6	136.1	0.910	0.0	1.348
n99-32 leach *	242.4	1.1	214.0	225.0	0.00108	0.0000163	0.240	0.000344	1.30E-06	0.965	0.003	0.776	0.003	1.242	0.0011	2804.0	12.0	150.9 ± 1.0	150.9	0.965	0.0	1.371
n99-33	109		144	4300	0.0305	0.0000030	0.0499	0.00973	8.20E-05	0.179	0.0014	0.162	0.0013	1.109	0.0011	18.4	0.2	18.4 ± 0.8	19.2	0.179	0.2	1.115
n99-33 leach *	113.7	1	131.8	2660	0.0207	0.0000028	0.0451	0.0066	0.00005	0.1626	0.0009	0.146	0.0008	1.114	0.0010	24.6	0.2	16.7 ± .5	17.2	0.163	0.1	1.119


T=total rock
other=leach
$^{234}U/^{238}U$
$^{230}Th/^{238}U$
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.0
0.4
0.8
1.2
1.6
20
40
60
80
100
120
140
160
180
2.25
2.00
1.75
1.50
1.25
T


T = total rock
L=leach
1.30
1.26
1.22
1.18
1.14
1.10
0.30
0.34
0.38
0.42
0.46
0.50
$^{234}U/^{238}U$
$^{230}Th/^{238}U$
30
32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
62
64
1.30
1.25
1.20
1.15
L
#28
T
L
#29
T
T
L
#30

sample	reported U conc	units	wt leachate (g)	total ug U	reported Th conc		total ug Th	wt leached solid, g	"U conc" in leached solid, ppm	ug U in total powder - UT work	% U that was leached	UT 232/238 activity
BLANK LEACHATE	0.331	ug/L	10.7820	0.004								
NOPI-164-SEP1-L	228	ug/L	10.4569	2.384	55.4	ug/L	0.579	0.0844	28.25	5.50	43.4	
NOPI-164-SEP4-L	110	ug/L	10.6821	1.175	41.8	ug/L	0.447	0.1128	10.42	5.90	19.9	
NOPI-179-SEP1-P-L	23.7	ug/L	13.6465	0.323	11.3	ug/L	0.154	0.094	3.44	1.00	32.4	
NOPI-179-SEP1-P-L Dupl	22.9	ug/L			12.1	ug/L	0.000					
NOPI-305-L1-SEP4-L	864	ug/L	10.5369	9.104	0.992	ug/L	0.010	0.0869	104.76	16.59	54.9	0.000509
NOPI-305-L2-SEP1-L	1178	ug/L	10.8376	12.767	1.67	ug/L	0.018	0.1534	83.22	40.69	31.4	0.000302
NOPI-305-L2-SEP4-L	576	ug/L	11.0349	6.356	1.25	ug/L	0.014	0.0876	72.56	16.76	37.9	0.000566
NOPI-306-SEP4-L	1037	ug/L	11.3289	11.748	2.14	ug/L	0.024	0.1142	102.87	60.67	19.4	0.000396
NOPI-434-SEP2-L	1443	ug/L	12.3424	17.810	3.19	ug/L	0.039	0.1932	92.18	17.46	102.0	0.009730
NOPI-434-SEP4-L	1295	ug/L	11.8976	15.407	4.59	ug/L	0.055	0.1737	88.70	16.24	94.9	
NOPI-436-L1-SEP1-L	93.8	ug/L	11.7079	1.098	5.96	ug/L	0.070	0.1684	6.52	6.52	16.8	
NOPI-436-L1-SEP4-L	94.0	ug/L	10.5820	0.995	3.81	ug/L	0.040	0.1058	9.40	3.31	30.1	0.023700
NOPI-436-L2-SEP2-L	42.5	ug/L	11.0130	0.468	7.04	ug/L	0.078	0.1051	4.45	3.29	14.2	
NOPI-436-L2-SEP4-L	48.0	ug/L	10.8256	0.520	7.08	ug/L	0.077	0.0926	5.61	4.38	11.9	
NOPI-458-SEP1-L	1174	ug/L	9.7447	11.440	4.22	ug/L	0.041	0.0007	16343.25	15.68	73.0	0.023600
NOPI-458-SEP4-L	1145	ug/L	9.1348	10.459	9.28	ug/L	0.085	0.002	5229.67	16.38	63.8	
NOPI-499-L2-SEP1-L	50.1	ug/L	9.7409	0.488	8.61	ug/L	0.084	0.0708	6.89	3.97	12.3	
NOPI-499-L2-SEP3-L	43.4	ug/L	10.3282	0.448	9.22	ug/L	0.095	0.0686	6.53	2.64	17.0	
NOPI-499-L3-SEP4-L	266	ug/L	9.7232	2.586	0.767	ug/L	0.007	0.0957	27.03	9.39	27.5	0.001270
NOPI-501-G-SEP3-L	74.0	ug/L	18.3870	1.361	2.55	ug/L	0.047	0.2011	6.77	2.74	49.6	0.008390
NOPI-501-D-SEP1-L	78.1	ug/L			2.68	ug/L	0.000					
SPC00543702-U	74.4	ug/L	18.2305	1.356	114	ug/L	2.078	0.3605	3.76			
SPC00603876-U	74.9	ug/L			18.4	ug/L	0.000					
SPC00603876-U Duplicat	75.7	ug/L			20.1	ug/L	0.000					
	checked 2/5/01		checked 2/5/01	checked 2/5/01				checked 2/5/01	checked 2/5/01			
				but no soln density correction								

sample	234/238 activity	Age (Ky)	Div 1 234/238 leachate	ug Th in total powder - UT work	% Th that was leached
BLANK LEACHATE					
NOPI-164-SEP1-L				3.29	17.6
NOPI-164-SEP4-L				3.02	14.8
NOPI-179-SEP1-P-L				0.495	31.1
NOPI-179-SEP1-P-L Dupl					
NOPI-305-L1-SEP4-L	1.23	48.2 ± 0.3	1.46	0.025	42.0
NOPI-305-L2-SEP1-L	1.21	45.0 ± 0.3	1.75	0.039	46.4
NOPI-305-L2-SEP4-L	1.21	46.3 ± 0.3	1.64	0.027	50.2
NOPI-306-SEP4-L	1.24	136.1 ± 1.6	1.47	0.073	33.1
NOPI-434-SEP2-L	1.10	18.4 ± 0.8	1.81	0.507	7.8
NOPI-434-SEP4-L				0.624	8.7
NOPI-436-L1-SEP1-L				0.468	14.9
NOPI-436-L1-SEP4-L	1.67	68.1 ± 1.3	<7.9	0.258	15.6
NOPI-436-L2-SEP2-L				0.877	8.8
NOPI-436-L2-SEP4-L				1.350	5.7
NOPI-458-SEP1-L	0.99	too old	1.01	1.017	4.0
NOPI-458-SEP4-L				1.789	4.7
NOPI-499-L2-SEP1-L				0.862	9.7
NOPI-499-L2-SEP3-L				0.792	12.0
NOPI-499-L3-SEP4-L	2.07	34.3 ± 0.2	2.93	0.038	19.8
NOPI-501-G-SEP3-L	1.22	406 ± 18 ??	<10	0.070	66.9
NOPI-501-D-SEP1-L					
SPC00543702-U					
SPC00603876-U					
SPC00603876-U Duplicat					