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Analogs Notebook

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CENTER FOR
NUCLEAR WASTE
REGULATORY ANALYSES

SOUTHWEST RESEARCH INSTITUTE

308 --- Q199602290016
Scientific Notebook #024
Supporting the Geochemical
Analog of Contaminant

Analogs Book - #1
An-1

CNWRA
CONTROLLED
COPY 024

Pages 1 through 302 of this Scientific Notebook were reviewed for compliance with QAP-001 in response to Corrective Action Request 94-02. Corrections and clarifications were made as appropriate. In some cases, the date of a change will reflect the date of this review rather than the date of the original Scientific Notebook entry.

Randy Folch
SWRI-QA
11/02/94

"Geochemical Analog of Contaminant Transport in Unsaturated Rock Research Project"

Initial entries 4/29/91 By English Pearcy. EC

- Preliminary field sampling of the Peña Blanca Site was accomplished 2/26/91 to 2/28/91.

- Samples for standard thin sections were cut By J. Prikryl and sent to Mineral Optics Laboratory, Wilder, VT, (802) 295-9373, for preparation.

- These samples and the thin section subsamples are listed on p. 3 of this notebook.

- Details of field collection of these samples are recorded in field notebooks numbered CNWRA Controlled Copies 21 and 22

Thin section preparation

- Portions were cut from 12 samples using a Hillquist diamond trim saw with water as a coolant. Cutting was accomplished on 3/21 and 3/22/91 by J. Prikryl.
- Samples as cut were prepared (using standard techniques) into covered, 30μ-thick thin sections for petrographic study. This preparation was done by Mineral Optics Laboratory as noted above.
- Samples were recieved and qualified by ECP. Qualification consisted of verifying the thickness of the sections by observing the interference colors exhibited by quartz

AND feldspar crystals under crossed polarized, transmitted light on our Nikon petrographic microscope.

→ In all cases, for all thin sections in this batch, the maximum observed interference colors for quartz crystals were second order ~~other~~ yellows. Feldspars had maximum interference colors of first order grays and whites.

→ All sections are within optical tolerances and are, therefore, qualified.

ECP 5/8/91

Reference: Stoiber and Morse "Microscopic Identification of Crystals" 1972

Below is A printout of the Natural Analog Sample Custody Log, Current as of 4/29/91, ECP, for the Peña Blanca samples.

ECP 4/29/91

Natural Analog Samples

ID Code	Description	Reference	Collection Date	Initial Log Entry Date	Entry by	Storage Location	Collection Site	Collector
PUE1-ECP-1 PUE1-ECP-1-TS1 PUE1-ECP-1-TS2	reddish, welded tuff, Corrales Fm. standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory	ECP Field Notebook=CNWRA #21, p.6	2/26/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
PUE1-ECP-2	diabase dike in the Corrales Fm.	ECP Field Notebook=CNWRA #21, p.7	2/26/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
NOP1-ECP-1	high grade reduced U ore from adit, base of Nopal Fm.	ECP Field Notebook=CNWRA #21, p.7	2/26/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
MAR-ECP-1	uranophane crust in Peloncillos Fm.	ECP Field Notebook=CNWRA #21, p.8	2/26/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
MAR-ECP-2	calcite (?) with yellow U staining	ECP Field Notebook=CNWRA #21, p.8	2/26/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	WMM
NOP1-ECP-2	high grade oxidized ore from dump	ECP Field Notebook=CNWRA #21, p.9	2/26/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
PUE1-ECP-2	weeksite replacing feldspar in Nopal Fm.	ECP Field Notebook=CNWRA #21, p.9	2/27/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
MESA-ECP-1 MESA-ECP-1-TS1 MESA-ECP-1-TS2	brown vitrophyre, Mesa Fm. standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory	ECP Field Notebook=CNWRA #21, p.10	2/27/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
MESA-ECP-2 MESA-ECP-2-TS1 MESA-ECP-2-TS2	reddish devitrified vitrophyre, Mesa Fm. standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory	ECP Field Notebook=CNWRA #21, p.10	2/27/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
MESA-ECP-3 MESA-ECP-3-TS1 MESA-ECP-3-TS2	gray/brown welded tuff, Mesa Fm. standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory	ECP Field Notebook=CNWRA #21, p.10	2/27/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
PB-ECP-1 PB-ECP-1-TS1 PB-ECP-1-TS2	pink, friable tuff, Peña Blanca Fm. standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory	ECP Field Notebook=CNWRA #21, p.10	2/27/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
NOP-ECP-1 NOP-ECP-1-TS1 NOP-ECP-1-TS2	fresh, unaltered, gray tuff, Nopal Fm. standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory	ECP Field Notebook=CNWRA #21, p.11	2/27/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
COL-ECP-1 COL-ECP-1-TS1 COL-ECP-1-TS2	fresh and altered tuff, Colorados Fm. standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory	ECP Field Notebook=CNWRA #21, p.12	2/27/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
NOPI-ECP-2	brecciated tuff with Fe-oxides, Nopal Fm.	ECP Field Notebook=CNWRA #21, p.13	2/28/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
NOPI-ECP-3	oxidized U mineralization, uranophane and etc.	ECP Field Notebook=CNWRA #21, p.13	2/28/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
NOPI-ECP-4 NOPI-ECP-4-TS1 NOPI-ECP-4-TS2	strongly altered tuff standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory	ECP Field Notebook=CNWRA #21, p.14	2/28/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
NOPI-ECP-5	reddish tuff with bleached veinlets	ECP Field Notebook=CNWRA #21, p.14	2/28/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
NOPI-ECP-6	kaolinized tuff from level +10 Nopal	ECP Field Notebook=CNWRA #21, p.15	2/28/91	3/26/91	ECP	Building 57	Peña Blanca, Mex.	ECP
NOPI-ECP-7 NOPI-ECP-7-TS1 NOPI-ECP-7-TS2	lightly altered Nopal Fm. tuff standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory	ECP Field Notebook=CNWRA #21, p.16	2/28/91	3/26/91	ECP	Building 57	Peña Blanca, Mex.	ECP & WMM
NOPI-ECP-8 NOPI-ECP-8-TS1 NOPI-ECP-8-TS2	Nopal Fm. with bleached veinlets standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory	ECP Field Notebook=CNWRA #21, p.16	2/28/91	3/26/91	ECP	Building 57	Peña Blanca, Mex.	ECP & WMM
NOPI-ECP-9	intensely altered tuff, Nopal Fm.	ECP Field Notebook=CNWRA #21, p.17	2/28/91	3/26/91	ECP	Building 57	Peña Blanca, Mex.	ECP & WMM
NOPI-ECP-10	hematitic, silicified vein with slickensides	ECP Field Notebook=CNWRA #21, p.17	2/28/91	3/26/91	ECP	Building 57	Peña Blanca, Mex.	ECP & WMM
NOPI-ECP-11	Fe-oxide gossan, ore block from Nopal I	ECP Field Notebook=CNWRA #21, p.18	2/28/91	3/26/91	ECP	Building 57	Peña Blanca, Mex.	WMM
NOP-ECP-2 NOP-ECP-2-TS1	obsidian remnants from basal Nopal vitrophyre standard thin section by Mineral Optics Laboratory	ECP Field Notebook=CNWRA #21, p.18	2/28/91	3/26/91	ECP	Building 57	Peña Blanca, Mex.	WMM
ESC-ECP-1 ESC-ECP-1-TS1 ESC-ECP-1-TS2	fresh lithic tuff, Escuadra Fm. standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory	ECP Field Notebook=CNWRA #21, p.18	2/28/91	3/26/91	ECP	Building 57	Peña Blanca, Mex.	WMM

s/b NOPI-ECP 8-TS1, 8-TS2

pb 12/6/92

SAMPLES LISTED BELOW are FROM McDermitt, NV and from Virgin Valley, NV. This is A printout of the Sample custody Log current as of 4/30/91. ECP

Natural Analog Samples

The following samples were collected from the McDermitt Caldera, Nevada.

ID Code	Description	Reference	Collection Date	Initial Log Entry Date	Entry by	Storage Location	Collection Site	Collector
HC-WMM-1	welded tuff, some brecciation, slightly radioactive	WMM Field Notebook=CNWRA#22, p6	4/18/91	4/29/91	ECP	Building 57	McDermitt, NV	ECP&WMM
HC-WMM-2	partially oxidized "porcelain" rhyolite	WMM Field Notebook=CNWRA#22, p7	4/18/91	4/29/91	ECP	Building 57	McDermitt, NV	ECP&WMM
HC-WMM-3	silicified rhyolite porphyry	WMM Field Notebook=CNWRA#22, p8	4/18/91	4/29/91	ECP	Building 57	McDermitt, NV	ECP&WMM
MM-WMM-1	brecciated rhyolite with black quartz	WMM Field Notebook=CNWRA#22, p9	4/18/91	4/30/91	ECP	Building 57	McDermitt, NV	ECP&WMM
MM-WMM-2	brecciated rhyolite with black quartz and Fe oxides	WMM Field Notebook=CNWRA#22, p9	4/18/91	4/30/91	ECP	Building 57	McDermitt, NV	ECP&WMM
VV-WMM-1	ash-rich, unwelded tuff	WMM Field Notebook=CNWRA#22, p12	4/19/91	4/30/91	ECP	Building 57	Virgin Valley, NV	ECP&WMM
VV-WMM-2	lower brown opal bed, also fine-grained tuff layer	WMM Field Notebook=CNWRA#22, p12	4/19/91	4/30/91	ECP	Building 57	Virgin Valley, NV	ECP&WMM
VV-WMM-3	ash-rich, unwelded tuff	WMM Field Notebook=CNWRA#22, p12	4/19/91	4/30/91	ECP	Building 57	Virgin Valley, NV	ECP&WMM
VV-WMM-4A	upper brown opal bed with clay horizon	WMM Field Notebook=CNWRA#22, p12	4/19/91	4/30/91	ECP	Building 57	Virgin Valley, NV	ECP&WMM
VV-WMM-4B	upper brown opal bed with clay horizon	WMM Field Notebook=CNWRA#22, p13	4/19/91	4/30/91	ECP	Building 57	Virgin Valley, NV	ECP&WMM
VV-WMM-5	unwelded tuff, relatively white, fairly resistant	WMM Field Notebook=CNWRA#22, p13	4/19/91	4/30/91	ECP	Building 57	Virgin Valley, NV	ECP&WMM
VV-WMM-6	unwelded tuff, green/brown, clinoptilolite?	WMM Field Notebook=CNWRA#22, p13	4/19/91	4/30/91	ECP	Building 57	Virgin Valley, NV	ECP&WMM
VV-WMM-7	unwelded tuff, clinoptilolite?	WMM Field Notebook=CNWRA#22, p13	4/19/91	4/30/91	ECP	Building 57	Virgin Valley, NV	ECP&WMM
VV-WMM-8	green, fine-grained tuff, clinoptilolite?	WMM Field Notebook=CNWRA#22, p14	4/19/91	4/30/91	ECP	Building 57	Virgin Valley, NV	ECP&WMM
VV-WMM-9	green,fine-grained tuff, clinoptilolite and carnotite?	WMM Field Notebook=CNWRA#22, p15	4/19/91	4/30/91	ECP	Building 57	Virgin Valley, NV	ECP&WMM
VV-WMM-10	rhyolite flow rock with unknown yellow U? mineral	WMM Field Notebook=CNWRA#22, p15	4/19/91	4/30/91	ECP	Building 57	Virgin Valley, NV	ECP&WMM

ECP 4/30/91

5/9/91

Subsamples were taken from the Peña Blanca rocks for whole rock analysis for major and trace elements at TEXAS TECH University Department of Geosciences, Lubbock, TEXAS. (806) 742-3102. MELANIE BARNES is in charge of the lab at Texas Tech. ECP 5/9/91

SUBSAMPLES AND CODING ARE AS:

5911 = NOPI - ECP - 9 - WR1

5912 = NOP - ECP - 1 - WR1 (Fresh Tn ECP 4/30)

5913 = COL - ECP - 1 - WR1 (this sample is REDDISH)

5914 = NOPI - ECP - 8 - WR1 (this sample is BLEACHED

5915 = NOPI - ECP - 8 - WR2 (this sample is reddish

5916 = COL - ECP - 1 - WR~~1~~2 (this sample is bleach
ECP 6/5/91

5917 = NOPI - ECP - 7 - WR1

5910 = NOPI - ECP - 7 - WR2 (duplicate of 5917

5918 = NOPI - ECP - 4 - WR1

5909 = NOP - ECP - 1 - WR2 (duplicate of 5912

5920 = NOP - ECP - 2 - WR1

5919 = USGS STANDARD "GLASS MTN RHYOLITE" RGM-1 SPLIT 26, POS.

5908 = USGS STANDARD "ANALYZED GRANITE" G-2 SPLIT 11, POS. 2

7/25/94

At TEXAS TECH, the crushed and powdered samples will be prepared using lithium metaborate fusion and HCl dissolution. Analysis will be by Inductively-coupled ~~plasma~~ plasma (ICP) for major elements (Si, Ti, Al, Fe, Mn, Mg, Ca, Na, K, and P) and for trace elements (Sr, Zr, Y, Nb, Ba, Sc, Cr, Ni, Cu, and Zn). Rb analysis will be by flame atomic ~~emm~~ emission. FeO will be by titration.

ECP 7/25/94

ECP 5/8/91

ECP 7/25/94

5/13/91

J. Pritzl is conducting optical petrography on ~~these~~ the thin sections from the Peña Blanca rocks (see list on page 3). J.D.P. is using standard petrographic techniques and the Nikon Petrographic microscope in BLDG. 57. Data collected during this process, including notes, descriptions and photomicrographs are compiled in an optical microscopy notebook, a three-ring binder stored in BLDG. 57.

ECP 5/13/91

5/30/91

Petrographic descriptions and photomicrographs of thin sections from Peña Blanca rocks are compiled in a Notebook entitled "PEÑA Blanca Petrographic Analyses". This notebook is kept in the Geochemistry Lab, Bldg 57. Petrographic analyses were conducted using standard petrographic technique and pertinent reference materials.

The following reference materials were used to conduct petrographic analyses.

Phillips, W. R.
"Mineral Optics Principles and Techniques" 1971

Best, M.G.
"Igneous and Metamorphic Petrology"
W. H. Freeman and Company, 1982.

Deer, W.A., Howie, R.A., and Zussman, J.
"An Introduction to the Rock-Forming Minerals" Longman, 1980.

~~Hurlbut~~ JP 5/30/91
Hurlbut, C.S., Jr. and Klein, C.
"Manual of Mineralogy" John Wiley and Sons, 1977.

MacKenzie, W.S. and Guilford C.
"Atlas of rock-forming minerals in thin section" Longman, 1980.

5/31/91 JP

Subsamples of Pena Blanca rocks were taken for XRD analysis. XRD analyses were performed using the Siemens D-500 X-ray Diffractometer in Div. 06. Analyses were conducted in accordance with TOP-004-02.

Subsample names and analyses dates are:

· PUE1-ECP-1-XRD	5/6/91
NOP1-ECP-9-XRD	5/23/91
NOP1-ECP-7-XRD	5/23/91
· NOP-ECP-1-XRD	5/22/91
· PB-ECP-1-XRD	5/21/91
· MESA-ECP-3-XRD	5/30/91
· MESA-ECP-2-XRD	5/30/91
· ESC-ECP-1-XRD	5/21/91
NOP1-ECP-8-XRD	5/20/91
· NOP-ECP-2-XRD	5/20/91
· COL-ECP-1-XRD	5/22/91
· MESA-ECP-1-XRD	5/7/91

Each subsample consists of approximately 1.9 g + 0.1 g Al powder that was added as an internal reference. Original and working copies of XRD patterns are compiled in a folder entitled "PENA BLANCA - XRD PATTERNS". This folder is kept in the Geochemistry lab; Bldg 57.

5/31/91

Samples of uranium ores and uranium-bearing rocks from Peña Blanca were cut for preparation of reflected light thin sections. These samples were sent to Mineral Optics Laboratory, Wilder, VT, (802) 295-9373 for preparation.

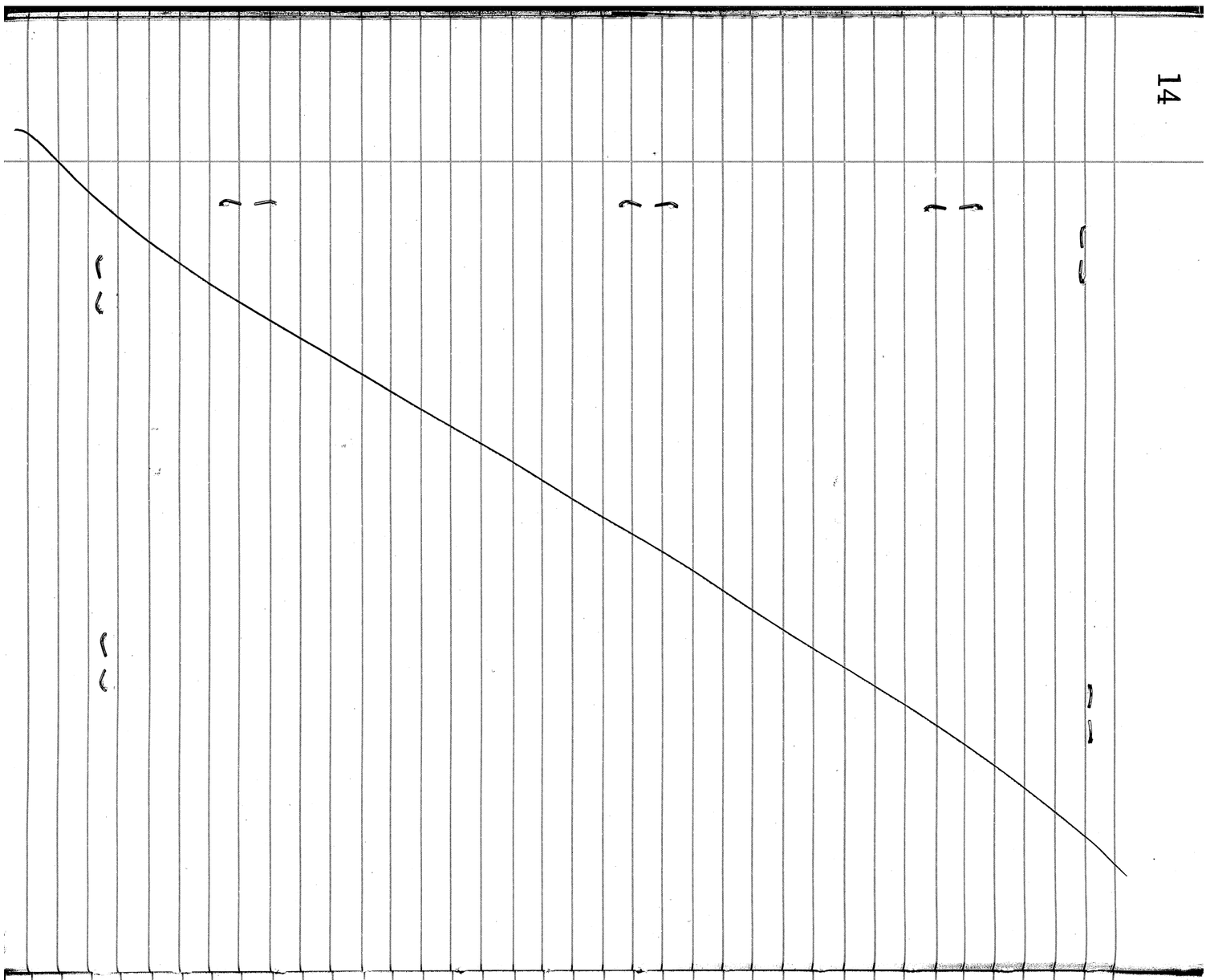
ECP 6/6/91

SEE NOTES on PAGE 12

NS = NOT sufficient sample for analysis

Whole Rock Analyses of Peña Blanca Rocks by Texas Tech May 1991																
Wt %	5908	5909	5910	5911	5912	5913	5914	5915	5916	5917	5918	5919	5920			
SiO2	69.65	75.73	72.80	75.73	74.75	67.49	73.18	70.52	70.46	73.34	55.78	72.60	63.89			
TiO2	0.50	0.25	0.25	0.26	0.26	0.24	0.27	0.29	0.29	0.25	0.55	0.28	0.38			
Al2O3	15.53	12.74	13.38	13.22	12.75	12.00	13.84	14.86	13.32	13.27	19.06	13.83	14.20			
FeO	*	0.23	0.06	0.13	0.32	0.04	0.18	0.12	0.24	0.06	0.12	*	0.46			
Fe2O3	*	1.23	1.81	0.35	1.29	1.94	0.39	1.27	0.30	1.49	2.71	*	1.63			
MnO	0.04	0.07	0.07	0.03	0.05	0.11	0.02	0.03	0.06	0.06	0.03	0.04	0.10			
MgO	0.75	0.14	0.16	0.09	0.16	0.16	0.08	0.09	0.23	0.15	2.22	0.31	0.64			
CaO	1.93	0.34	0.20	0.12	0.48	4.41	0.19	0.14	2.91	0.19	1.99	1.23	3.45			
Na2O	3.98	1.10	1.21	0.71	1.04	0.47	1.22	1.12	1.40	1.26	0.34	4.21	4.45			
K2O	4.30	6.53	6.82	6.89	6.43	4.13	8.61	9.65	5.89	7.04	0.60	4.36	2.54			
P2O5	0.13	0.07	0.02	0.03	0.07	0.04	0.04	0.03	0.05	0.03	0.05	0.05	0.08			
LOI	NS	2.45	2.46	2.47	2.74	8.17	2.10	1.95	4.89	2.31	17.11	NS	9.14			
Total	96.80	100.89	99.24	100.03	100.35	99.19	100.11	100.07	100.03	99.45	100.57	96.91	100.97			
Fe2O3T	2.72	1.48	1.88	0.50	1.64	1.99	0.59	1.39	0.56	1.56	2.84	1.92	2.16			

* These analyses have not yet been provided due to an equipment failure at Texas Tech. Melanie Barnes says they will be available "soon." ECP 6/6/91



ECP 6/6/91

Whole Rock Analyses of Peña Blanca Rocks by Texas Tech May 1991													
ppm	5908	5909	5910	5911	5912	5913	5914	5915	5916	5917	5918	5919	5920
Sc	3.5	3.1	5.5	3.3	3.2	5.5	3.4	3.5	4.1	4.0	10.0	4.5	6.2
V	34	16	19	61	16	20	14	13	10	17	113	12	9
Cr	8	4	1	1	3	4	1	2	4	0	5	1	3
Ni	2	3	2	3	2	2	3	3	4	3	6	3	2
Cu	8	0	0	2	0	0	3	0	0	0	0	9	2
Zn	77	32	32	31	30	50	20	25	43	26	399	29	58
Nb	10	30	33	33	27	29	32	35	37	32	28	10	26
Y	10.6	32.0	35.7	36.0	32.5	36.9	37.8	39.5	44.2	30.5	56.5	26.7	39.7
Zr	299	222	234	241	207	276	237	255	300	234	564	221	432
Ba	1774	183	82	79	180	62	78	78	85	79	89	917	150
Sr	485	63	38	57	72	113	48	43	118	35	138	106	305
Rb	172	303	369	371	291	174	450	485	256	378	23	153	276

SEE NOTES ON PAGE 17

ACCEPTANCE OF TEXAS TECH. WHOLE-ROCK ANALYSES
6/6/91 ECP

A January 23, 1991, memo from R.D. Brient to Center Qualified Suppliers List gives the acceptance criteria currently in effect for geochemical data at the Center.

Some of the analyses provided in this batch of samples do not meet the criteria in the Brient memo, nevertheless the analyses do have scientific usefulness and will not be summarily discarded.

MAJOR ELEMENTS (> 1 wt.%)
Analyses for CaO (on STANDARD RGM-1), Fe_2O_3 (on Duplicate set 5910/5917) and Na_2O (on Duplicate set 5908/5912) fail to meet the Brient Memo criteria because the abundances of each oxide are just over 1 wt % and are therefore subject to a ~~maximum~~ ECP 6/6/91 MAXIMUM 5% variance in any STANDARD or duplicate analysis. Though the percentage variances exceed the 5% criteria, the absolute variances are small (0.06 to 0.10 wt % average variance for the aggregate analyses). Consequently, the numbers are useful. We ~~will~~ ECP 6/6/91 will, however, retain awareness of the uncertainty associated with these numbers.

MINOR ELEMENTS (< 1 wt. %)
No distinction is made in the Brient Memo between "minor" elements and "trace" elements. Therefore,

many of these analyses fail to meet the % variance criteria because they have small absolute variances which add large % variances. For example, if a standard contained 4ppm of X and was reported by TEXAS TECH. to contain 3ppm of X it would have a 25% variance and, by the Brief Memo criteria, be unacceptable.

We will use such data because it is scientifically meaningful and will seek to have the ~~accepe~~ ECP 6/6/81 acceptance criteria for trace components modified appropriately.

Specifically, data in these analyses for MnO, P_2O_5, FeO, MgO, CaO, Cr, Ni, Cu, Sc, V, Zr, Nb, Y, Ba, and Sr falls into the above category.

ECP 6/6/81

ECP 6/6/91

TEXAS TECH WHOLE-ROCK ANALYSES
MAY 1991

SEE DISCUSSION PAGES 17-19

	Standard Analyses								Duplicate Analyses									
	G-2 Standard	TX Tech analysis	% Difference		RGM-1 Standard	TX Tech analysis	% Difference		5910	5917	% Difference		5909	5912	% Difference		Avg Diff	
Sc	3.70	3.5	5.41	Sc	5.5	4.5	18.18		5.5	4.0	27.27	Sc	3.1	3.2	-3.23	±	0.70	ppm
V	35.4	34	3.95	V	12.6	12	4.76		19	17	10.53	V	16	16	0.00	±	1.00	ppm
Cr	7	8	-14.29	Cr	2.7	1	62.96		1	0	100.00	Cr	4	3	25.00	±	1.18	ppm
Ni	5.1	2	60.78	Ni	5	3	40.00		2	3	-50.00	Ni	3	2	33.33	±	0.50	ppm
Cu	11.7	8	31.62	Cu	10.2	9	11.76		0	0	0.00	Cu	0	0	0.00	±	0.00	ppm
Zn	85	77	9.41	Zn	34.8	29	16.67		32	26	18.75	Zn	32	30	6.25	±	5.45	ppm
Nb	13.5	10	25.93	Nb	16.8	10	40.48		33	32	3.03	Nb	30	27	10.00	±	3.58	ppm
Y	12.0	10.6	11.67	Y	26.7	26.7	0.00		35.7	30.5	14.57	Y	32.0	32.5	-1.56	±	1.78	ppm
Zr	300	299	0.33	Zr	205	221	-7.80		234	234	0.00	Zr	222	207	6.76	±	8.00	ppm
Ba	1870	1774	5.13	Ba	705	917	-30.07		82	79	3.66	Ba	183	180	1.64	±	78.50	ppm
Sr	479	485	-1.25	Sr	111	106	4.50		38	35	7.89	Sr	63	72	-14.29	±	5.75	ppm
Rb	168	172	-2.38	Rb	154.2	153	0.78		369	378	-2.44	Rb	303	291	3.96	±	5.25	ppm

TEXAS TECH WHOLE-ROCK ANALYSES
MAY 1991

ECP 6/6/91

SEE DISCUSSION PAGES 17-19

	Standard Analyses								Duplicate Analyses									
	G-2 Standard	TX Tech analysis	% Difference		RGM-1 Standard	TX Tech analysis	% Difference		5910	5917	% Difference		5909	5912	% Difference		Avg Diff	
SiO2	69.11	69.65	-0.78	SiO2	73.43	72.60	1.13		72.80	73.34	-0.74	SiO2	75.73	74.75	1.29	±	0.72	wt%
TiO2	0.50	0.50	0.00	TiO2	0.26	0.28	-7.69		0.25	0.25	0.00	TiO2	0.25	0.26	-4.00	±	0.01	wt%
Al2O3	15.40	15.53	-0.84	Al2O3	13.76	13.83	-0.51		13.38	13.27	0.82	Al2O3	12.74	12.75	-0.08	±	0.08	wt%
FeO	1.45	*		FeO	1.24	*			0.06	0.06	0.00	FeO	0.23	0.32	-39.13	±	0.02	wt%
Fe2O3	1.08	*		Fe2O3	0.50	*			1.81	1.49	17.68	Fe2O3	1.23	1.29	-4.88	±	0.10	wt%
MnO	0.03	0.04	-17.65	MnO	0.04	0.04	0.00		0.07	0.06	14.29	MnO	0.07	0.05	28.57	±	0.01	wt%
MgO	0.76	0.75	1.32	MgO	0.29	0.31	-6.90		0.16	0.15	6.25	MgO	0.14	0.16	-14.29	±	0.02	wt%
CaO	1.94	1.93	0.52	CaO	1.16	1.23	-6.03		0.20	0.19	5.00	CaO	0.34	0.48	-41.18	±	0.06	wt%
Na2O	4.07	3.98	2.21	Na2O	4.19	4.21	-0.48		1.21	1.26	-4.13	Na2O	1.10	1.04	5.45	±	0.06	wt%
K2O	4.51	4.30	4.66	K2O	4.34	4.36	-0.46		6.82	7.04	-3.23	K2O	6.53	6.43	1.53	±	0.14	wt%
P2O5	0.14	0.13	7.14	P2O5	0.05	0.05	0.00		0.02	0.03	-50.00	P2O5	0.07	0.07	0.00	±	0.01	wt%
Fe2O3T	2.65	2.72	-2.64	Fe2O3T		1.92			1.88	1.56	17.02	Fe2O3T	1.48	1.64	-10.81			

* ANALYSES NOT YET AVAILABLE ECP 6/6/91

Polished Thin sections of Peña Blanca High-Grade Ore
6/25/91 (Reference page 12 of this Notebook)

The following samples were prepared as Polished Thin sections by Mineral Optics Lab:
(Samples received on 6/26/91)

* PUEI-ECP-2B-TS1	PAGE 9, Field Notes
* NOPI-ECP-2A-~~TS1~~ TS2 ECP 6/25/91	PAGE 9, Field NOTES
* NOPI-ECP-2B-TS1	PAGE 13, Field Notes
NOPI-ECP-3-TS1	PAGE 13, Field Notes
NOPI-ECP-1-TS4	PAGE 7, Field Notes
* NOPI-ECP-2A-TS1	PAGE 9, Field Notes
NOPI-ECP-1-TS3	PAGE 7, Field Notes
NOPI-ECP-1-TS1	PAGE 7, Field Notes
NOPI-ECP-1-TS2	PAGE 7, Field Notes
* NOPI-ECP-2B-TS2	PAGE 13, Field Notes

Duplication in sample numbers was found when reviewing these samples, changes were made to the custody log, sample labels, and in the Field Notebook (CNWRA No. 21) for the samples marked with an asterisk above.

6/25/91
ECP

Sample Custody Log

ID Code	Description	Reference	Collection Date	Initial Log Entry Date	Entry by	Storage Location	Collection Site	Collector
PUE1-ECP-1 PUE1-ECP-1-TS1 PUE1-ECP-1-TS2 PUE1-ECP-1-XRD	reddish, welded tuff, Corrales Fm. standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory x-ray diffraction powder	ECP Field Notebook=CNWRA #21, p.6	2/26/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
PUE1-ECP-2A	diabase dike in the Corrales Fm.	ECP Field Notebook=CNWRA #21, p.7	2/26/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
NOP1-ECP-1 NOP1-ECP-1-TS1 NOP1-ECP-1-TS2 NOP1-ECP-1-TS3 NOP1-ECP-1-TS4	high grade reduced U ore from adit, base of Nopal Fm. polished thin section by Mineral Optics Laboratory polished thin section by Mineral Optics Laboratory polished thin section by Mineral Optics Laboratory polished thin section by Mineral Optics Laboratory	ECP Field Notebook=CNWRA #21, p.7	2/26/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
MAR-ECP-1	uranophane crust in Peloncillos Fm.	ECP Field Notebook=CNWRA #21, p.8	2/26/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
MAR-ECP-2	calcite (?) with yellow U staining	ECP Field Notebook=CNWRA #21, p.8	2/26/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	WMM
PUE1-ECP-2B PUE1-ECP-2B-TS1	weeksite replacing feldspar in Nopal Fm. polished thin section by Mineral Optics Laboratory	ECP Field Notebook=CNWRA #21, p.9	2/27/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
MESA-ECP-1 MESA-ECP-1-TS1 MESA-ECP-1-TS2 MESA-ECP-1-XRD	brown vitrophyre, Mesa Fm. standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory x-ray diffraction powder	ECP Field Notebook=CNWRA #21, p.10	2/27/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
MESA-ECP-2 MESA-ECP-2-TS1 MESA-ECP-2-TS2 MESA-ECP-2-XRD	reddish devitrified vitrophyre, Mesa Fm. standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory x-ray diffraction powder	ECP Field Notebook=CNWRA #21, p.10	2/27/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
MESA-ECP-3 MESA-ECP-3-TS1 MESA-ECP-3-TS2 MESA-ECP-3-XRD	gray/brown welded tuff, Mesa Fm. standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory x-ray diffraction powder	ECP Field Notebook=CNWRA #21, p.10	2/27/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
PB-ECP-1 PB-ECP-1-TS1 PB-ECP-1-TS2 PB-ECP-1-XRD	pink, friable tuff, Peña Blanca Fm. standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory x-ray diffraction powder	ECP Field Notebook=CNWRA #21, p.10	2/27/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
NOP-ECP-1 NOP-ECP-1-TS1 NOP-ECP-1-TS2 NOP-ECP-1-WR1 NOP-ECP-1-WR2 NOP-ECP-1-XRD	fresh, unaltered, gray tuff, Nopal Fm. standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory whole rock sample, major and trace elements at TX Tech. whole rock sample, major and trace elements at TX Tech. x-ray diffraction powder	ECP Field Notebook=CNWRA #21, p.11	2/27/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
COL-ECP-1 COL-ECP-1-TS1 COL-ECP-1-TS2 COL-ECP-1-WR1 COL-ECP-1-WR2 COL-ECP-1-XRD	fresh and altered tuff, Coloradas Fm. standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory whole rock sample, major and trace elements at TX Tech. whole rock sample, major and trace elements at TX Tech. x-ray diffraction powder	ECP Field Notebook=CNWRA #21, p.12	2/27/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
NOPI-ECP-2A NOPI-ECP-2A-TS1 NOPI-ECP-2A-TS2	high grade oxidized ore from dump polished thin section by Mineral Optics Laboratory polished thin section by Mineral Optics Laboratory	ECP Field Notebook=CNWRA #21, p.9	2/26/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
NOPI-ECP-2B NOPI-ECP-2B-TS1 NOPI-ECP-2B-TS2	brecciated tuff with Fe-oxides, Nopal Fm. polished thin section by Mineral Optics Laboratory polished thin section by Mineral Optics Laboratory	ECP Field Notebook=CNWRA #21, p.13	2/28/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
NOPI-ECP-3 NOPI-ECP-3-TS1	oxidized U mineralization, uranophane and etc. polished thin section by Mineral Optics Laboratory	ECP Field Notebook=CNWRA #21, p.13	2/28/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
NOPI-ECP-4 NOPI-ECP-4-TS1 NOPI-ECP-4-TS2 NOPI-ECP-4-WR1	strongly altered tuff standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory whole rock sample, major and trace elements at TX Tech.	ECP Field Notebook=CNWRA #21, p.14	2/28/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
NOPI-ECP-5	reddish tuff with bleached veinlets	ECP Field Notebook=CNWRA #21, p.14	2/28/91	3/25/91	ECP	Building 57	Peña Blanca, Mex.	ECP
NOPI-ECP-6	kaolinized tuff from level +10 Nopal	ECP Field Notebook=CNWRA #21, p.15	2/28/91	3/26/91	ECP	Building 57	Peña Blanca, Mex.	ECP
NOPI-ECP-7 NOPI-ECP-7-TS1 NOPI-ECP-7-TS2 NOPI-ECP-7-WR1 NOPI-ECP-7-WR2 NOPI-ECP-7-XRD	lightly altered Nopal Fm. tuff standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory whole rock sample, major and trace elements at TX Tech. whole rock sample, major and trace elements at TX Tech. x-ray diffraction powder	ECP Field Notebook=CNWRA #21, p.16	2/28/91	3/26/91	ECP	Building 57	Peña Blanca, Mex.	ECP & WMM
NOPI-ECP-8 NOPI-ECP-8-TS1 NOPI-ECP-8-TS2 NOPI-ECP-8-WR1 NOPI-ECP-8-XRD	Nopal Fm. with bleached veinlets standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory whole rock sample, major and trace elements at TX Tech. x-ray diffraction powder	ECP Field Notebook=CNWRA #21, p.16	2/28/91	3/26/91	ECP	Building 57	Peña Blanca, Mex.	ECP & WMM
NOPI-ECP-9 NOPI-ECP-9-WR1 NOPI-ECP-9-WR2 NOPI-ECP-9-XRD	intensely altered tuff, Nopal Fm. whole rock sample, major and trace elements at TX Tech. whole rock sample, major and trace elements at TX Tech. x-ray diffraction powder	ECP Field Notebook=CNWRA #21, p.17	2/28/91	3/26/91	ECP	Building 57	Peña Blanca, Mex.	ECP & WMM
NOPI-ECP-10	hematitic, silicified vein with slickensides	ECP Field Notebook=CNWRA #21, p.17	2/28/91	3/26/91	ECP	Building 57	Peña Blanca, Mex.	ECP & WMM
NOPI-ECP-11	Fe-oxide gossan, ore block from Nopal I	ECP Field Notebook=CNWRA #21, p.18	2/28/91	3/26/91	ECP	Building 57	Peña Blanca, Mex.	WMM
NOP-ECP-2 NOP-ECP-2-TS1 NOP-ECP-2-WR1 NOP-ECP-2-WR1	obsidian remnants from basal Nopal vitrophyre standard thin section by Mineral Optics Laboratory whole rock sample, major and trace elements at TX Tech. x-ray diffraction powder	ECP Field Notebook=CNWRA #21, p.18	2/28/91	3/26/91	ECP	Building 57	Peña Blanca, Mex.	WMM
ESC-ECP-1 ESC-ECP-1-TS1 ESC-ECP-1-TS2 ESC-ECP-1-XRD	fresh lithic tuff, Escusdra Fm. standard thin section by Mineral Optics Laboratory standard thin section by Mineral Optics Laboratory x-ray diffraction powder	ECP Field Notebook=CNWRA #21, p.18	2/28/91	3/26/91	ECP	Building 57	Peña Blanca, Mex.	WMM

12/15/92
Pgh
THESE 2 S/B NOPI-ECP-9-TS1 + TS2

7/18/91 INITIAL AUTORADIOGRAPHY Experiments
ECP

→ For these 1ST experiments, we are using "dosimetry grade" sheets of CR-39 film from American Acrylics and Plastics, INC.
300 Benton St. P.O. Box 1045
Stratford, CT 06497

→ a series of experiments will be conducted varying the technique of Bosham (1981) to find appropriate exposure and etch times and conditions for the Peña Blanca samples.

→ in general, polished thin sections of Peña Blanca ore will be placed in direct contact with the CR-39 for some period of time after which the CR-39 will be etched in 6N NaOH solution at 80°C for several hours to reveal alpha particle impacts.

→ cutting the CR-39 into sample sheets a bit larger than standard thin sections has proved problematic as the material is quite brittle and thin (~1 mm). Cutting with a band saw does not work, cutting with a dry diamond blade on a radial arm saw is unacceptable ragged, scoring and breaking is unpredictable.

→ Pieces of CR-39 produced so far have ragged edges but are acceptable for these initial experiments.

→ I have chosen to use some of the most radioactive Peña Blanca samples first to calibrate the exposure and etching regime

→ Samples: PUE-ECP-2-TS1, NOPI-ECP-2B-TS2, and NOPI-ECP-1-TS3 will be exposed for 4 hours.

9:30 Am 7/18/91 ECP

- Samples placed in contact with CR-39
- one piece of CR-39 is also uncovered and placed near (~ 3 cm) the exposed samples as a control.

→ EXPOSURE ENDED AT 1:30 pm, for 4 Hrs Net

→ Etching will be in 6M NaOH solution in polypropylene beakers heated to 70° C in a lab oven

① PNE-ECP-2-TS1
② NOPI-ECP-2B-TS2
③ NOPI-ECP-1-TS3

} Beaker Numbers

→ Solution brought to temperature by pre-heating in the oven for 30 min.

→ Samples into etching solution @ 2:35 pm

→ Samples removed @ 4:35 pm, for 2 Hrs etch.

→ Upon removal samples rinsed in tap water then rinsed with DI water + ~~dried~~ ECP 7/18/91 dried with a Kimwipe

→ The hottest sample etched nicely w/ a good clear pattern whereas the sample w/ the least uranium had only a modest pattern and would clearly benefit from a longer exposure time.

Samples for quantitative XRD Analysis at CORE LABS, Dallas

7/19/91
ECP

5909 NOP-ECP-1-WR2
5910 NOPI-ECP-7-WR2
5917 NOPI-ECP-7-WR1
5911 NOPI-ECP-9-WR1
5912 NOP-ECP-1-WR1
5913 COL-ECP-1 WR1
5916 COL-ECP-1-WR2
NOP1B NOPI-ECP-1 (BLACK fraction)
NOP1Y NOPI-ECP-1 (Yellow fraction)

→ for those samples numbered 59XX above, I used the ~~SAM~~ ECP 7/19/91 same powders as for the TEXAS TECH whole rock Analyses

→ for the samples numbered NOP1B & Y, small chips of the High grade ore from Level 0 were hand-picked, crushed in a mortar and pestle and the chips separated into one sample that was almost entirely black and one sample almost entirely yellow.

7/19/91 ECP

1ST LONG-TERM AUTORADIOGRAPHY EXPOSURE

→ Sample NOP-ECP-1-TS1 will be exposed to CR-39 for at least one week

→ Exposure was begun at 5:00 pm on 7/18/91

→ This sample is fresh, unaltered Nopal formation collected several km from any known ore mineralization; the intent is to map out the location of the uranium (or any other alpha emitters) in the sample.

→ [see PAGE 57 for results. ECP 1/23/92]

8/1/91 ECP

Optical petrographic analyses of the polished thin sections prepared of the radioactive ore samples (see page 23 of this notebook) will be conducted according to standard petrographic procedures. The results will be recorded in a separate, ore petrography notebook so that large-scale photographs and sketches may be more easily kept with the notes.

8/15/91 ECP

ELECTRON Microprobe ANALYSES @ University of Utah with the help of Dr. William NASH AND Mr. RAY LAMBERT (801) 581-8587 = office (801) 581-7263 = LAB

Standards used, calibration data and experimental conditions as well as the raw data output are recorded in a separate notebook entitled "RAW Microprobe Data 1." (These are the actual printouts from the Cameca SX-50 Microprobe).

For these analyses we are using a Cameca SX-50 Microprobe with 4 WDS spectrometers, capable of quantitative analysis down to atomic Number 5 (boron). In particular, this system contains an X-ray reflector known as PC1 (manufactured by Ovonic). The PC1 is a 60 Å W/Si multilayer "synthetic crystal" which provides much higher peak intensities for light elements and completely supresses higher order interfering lines. This capability is important for quantitative analysis of O.

Sample: NOPI-ECP-1-TS3

Point A1 - UO_x grain within the black area

[Note - Locations of ANALYSES will be described here, and marked on photographs, and can be deduced more precisely from the coordinates on the RAW data form]

A2 - another point like A1 within the black area. There appear to be

slightly oxidized uraninite.

Point B1 - colloform UO_x

Point B2 - U-silicate (?), has U, O, K, and low Si, low totals may => a hydroxide, the mineral appears to have been damaged by the electron beam, also suggests that it is a hydroxide.

B3 - same as B2 in an adjacent location, also damaged by the beam

B4 - FeO_x (?) in center of location B area, this analysis appears to have sampled more than 1 phase, → poor analysis ←

B5 - this phase has a brighter BSE image, occurs surrounding the FeO_x in the veinlet center, appears to be the same mineral as B2 & B3

B6 - this phase has a darker BSE image and is located between the lighter phase (B2, B3, B5) and the colloform UO_x

C1 - UO_x (?) body within a silicified breccia fragment, margins of this body have the same serrate form as the veinlets but without an FeO_x-stained margin. This body could be

a 2-d cross-section of a veinlet like those nearby

C2 - same phase as C1 in a different location within the body

C3 - same phase as C1 and C2 in a different location within the body

C4 - Kaolinite (?) within the UO_x body at location C. analysis shows some U, but could be spurious x-rays from adjacent or included material.

D1 - large, yellow U-silicate crystal (XL) located in the most altered zone of TS3, very high O content => hydrated 10 μm beam size since is so large an XL

D2 - same XL as above, larger beam size, much lower Al this time, the D1 Al may have been spurious contamination

D3 - same XL as D1 and D2, 25 μm beam, same results as D2, only trace Al, not real, => soddyite (?), total is low => hydration?

Note: EDS of surrounding material shows strong Al + Si => Kaolinite, not chalcedony

D4 - Rosette near D1 - D2 - D3 appears to be the same material as D1 - D2 - D3, 10 μm beam

D5 - yellow U-silicate in side veinlet, has Ca => uranophane?

NOTE - material across the veinlet is the same as the rosette and the large XL

A3 - late veinlet which cross-cuts yellow vein filling and the black areas, has the same composition as the rosette

yellow area

A4 - possibly a bad analysis, may have included several phases (Ø's!)

A5 - came out the same as A4, I now believe it to be ~~the same~~ ECP 8/15/91 representative of this U-silicate

A6 - a larger grain (~ 20 μm max. dim.) of perhaps the same Ø as A4-A5, the beam degrades the XL as at location B. This grain may be a larger UOx grain which has been altered to U-silicate, appears to have the same composition as D1-D2-D3-D4, so = soddyite?, this late veinlet appears to have the same composition as the finer-grained material which it cross-cuts.

black area

A7 - located well within the black area, this is a larger (~15 μm max. dim.) grain (similar in size and form to A6) - composition also similar to A6, though they are in different alteration areas.

black

A8 - this analysis is a 100 μm x 80 μm raster analysis to get an idea of the bulk chemical composition of the BLACK area.

yellow

A9 - this analysis is a 100 μm x 80 μm raster analysis to get an idea of the bulk chemical composition of the yellow area.

A10 - this is a 100 μm raster across the boundary between the yellow and black areas, will conduct automated element mapping of this boundary.

8/16/91 ECP

NOTE - The Automated element mapping routine bombed during the night. so will do it now manually for: O, U, Si, BSE, Fe

- clearly there is greater O-content in the yellow area, Si less clear in these maps

- Now ~~with~~ ECP 8/16/91 we will try to further quantify the difference between the UOx (black) and the U-silicate (yellow)

A11 - the U-phase on the yellow side of the element-mapped area

A12 - same as A11, on a different XL, composition very close to A11

A13 - same as A11 and A12, on a different XL, again composition very similar

A14 - the U-phase in the black area

A15 - same as A14, on a different XL

A16 - same as A14 + A15, on a different XL

→ Go to area B_2 for element map.

→ Go to area B for element map.

- have strong Fe in center, but no Ti at all.

→ Back to B_2 for quantitative analysis

B7 - one of the 2 major veinlet fillings in the center of the colloform UO_x-lined area

B8 - same as B7, on a different spot

B9 - the other major veinlet-filling within the colloform UO_x area

B10 - same as B9, on a different spot

→ Filament burned out, no time to re-align and calibrate for quantitative work, so will just re-peak (i.e. locate the peak energies) for C and Au and scan the section (TS3) for those elements

48153 = C peak position
66724 = Au peak position

→ No Au seen anywhere on section TS3 after randomly searching much of the section

→ for C, the background is relatively high (the sample is C-coated) but there does not appear to be any C-bearing phase

ZCP 8/16/91

Initial entries of Bret Leslie BWL 9/19/91

Preparation of field collection of water samples for the Peña Blanca sampling trip (week of Sept 20-26) followed TOP-017. All samples were collected in polypropylene bottles, except for large volume (>5 liters) samples. These samples were collected in l sample containers.

Sample bottles were pre-weighed BWL 9/19/91 and will be acidified with concentrated nitric acid (HNO_3) of a measured quantity. When samples are returned to lab bottles will be reweighed. By subtracting the mass of acid added and sample bottle weight the quantity of fluid collected will be determined

Sample Bottle #	Weight of Bottle in (g)	Weight of Bottle +Sample+acid (g)	(ml) Acid Added 9/30/91 BWL	Sample weight (g)
19	19.3869	140.81 BWL 9/30/91	0.0	121.42 BWL 9/23/91
20	19.6582			
21	19.5457			
22	19.4060	153.21 BWL 9/30/91	0.0	133.80 BWL 9/23/91
23	19.3607			
24	19.3916			
25	55.27			
26	55.36	385.34 BWL 9/30/91	5.0	324.98 BWL 9/23/91
27	54.75	512.60 BWL 9/30/91	4.8	453.05 BWL 9/23/91
28	55.53			
29	55.45			
30	55.48			
31	101.82	1172.8 BWL 9/30/91	10.0	1060.98 BWL 9/23/91
32	101.26			
33	101.28			
34	102.23			
35	101.82			
36	101.05			
37 BWL 9/19/91	101.37	798.8 BWL 9/30/91	10.0	687.43 BWL 9/23/91

Other preparations for field sampling included preparation for the analysis of field Eh and semi-quantitative analysis of H_2S in the field.

Collection of samples for H_2S will rely on the rapid and quantitative of precipitation of CdS by the reaction of Cd^{+} in solution and H_2S in the sample.

Sample Bottle #37 weighed 101.86 grams dry, 291.92 g with nannopure H_2O. To this volume was added 3.95 g $CdCl_2$. The $CdCl_2$ + solution was agitated until it dissolved (BWL/9/30/91 Lot # I J14F)

In the field the Cd solution will be transferred to a graduated cylinder (1 l), fitted with a glass (gas dispersion) tube. (BWL 9/19/91) After sample solution is passed through the sample apparatus the solution and any precipitate will be transferred quantitatively (by swirling) back to the original sample bottle and returned to the lab

Similarly Bottle #38 weighed 101.93 g dry, 287.86 g with H_2O and contained 3.94 g $CdCl_2$.

Eh standards are based upon known ratios of Fe^{3+}/Fe^{2+} in solutions. Two reagent are used in each standard and two standards are utilized

		Lot # (BWL 9/30/91)	Standard A	Standard B
Fe^{3+} source	grams $K_3Fe(CN)_6$	905604	0.6585	~~0.6659~~ BWL 9/19/91 0.0659
Fe^{2+} source	grams $K_4Fe(CN)_6 \cdot 3H_2O$	901620	0.0885	0.8848

The reagents will be dissolved to 200 ml in the field using volumetric flask for each standard.

BWL 9/19/91

10/2/91 BWL

ICP analyses by BWL 10/2/91 of Division I of Peña Blanca samples
To test both the accuracy and precision of analyses by Div. I I will submit a duplicate of standard containing all the elements to be determined by their analysis. The standard will contain known quantities of:
Al, Ba, Ca, Cr, Cu, Pb, Mg, Mn, Ni, K, Na, Sr.
The standard to be submitted as a known & duplicate will be made by adding appropriate aliquots of QA approved Mixed Standard (A) Solutions, Standard (B) Solutions, and aliquots of standard (D) solutions (derived by using QA approved chemicals into volumetric flasks), outlined below. additional (C) standards of Div I will be used as no other option is presently available for these elements. These will not afford a test of accuracy, but will test the precision of the measurement for the effected elements.

(A) Spex Mixed Standard #4
1000 ppm Ca
400 ppm K
200 ppm Al
20 ppm Cr
20 ppm Ni
12/23/91 BWL 200 ppm Na

(B) Standard Solutions QA approved
1000 ppm Sr

10/2/91 BWL (C) ~~(D)~~ Division 1 "1000 ppm Standards" not QA approved
1000 ppm Pb
1000 ppm Cu

(D) 1000 ppm Standards of Ba, Fe, Mg & Mn will be made as follows:

1) Ba: $BaCl_2 \cdot 2H_2O$ will be measured and dissolved in nanopure water (>17 megaohm) to 1 l volume in volumetric flask. The solution volume will contain 10 ml concentrated HNO_3. The resulting solution will be ~10,000 ppm. Exact concentration of standard can be found on following pages.

(D) 2) Fe: $FeCl_3 \cdot 6H_2O$ will be measured & dissolved, acidified 10 ml HNO_3 into 1000 ml volumetric flask. Water used will be nanopure and exact concentration of "1000 ppm" standard is given in following pages

3) Mg: $MgCl_2 \cdot 2H_2O$ will be measured & dissolved in an acidified (10 ml HNO_3) solution to a total volume of 1000 ml. Water used will be nanopure. Exact concentration is shown in following pages.

4) Mn: $KMnO_4$ will be dissolved (a known mass of $KMnO_4$) in an acidified solution (10 ml HNO_3) of exactly 1000 ml. Water used will be nanopure and exact concentration of standard is given in following pages.

10/3/91 BWL

(D) 1) 0.0237 g $BaCl_2 \cdot 2H_2O$ dissolved in solution of 10 ml HNO_3 (conc) and nanopure H_2O BWL 10/3/91. This solution dilute to 1000 ml using a volumetric flask, resulting in a 13,167 ppm Ba solution

(D) 2) 0.0044 g $FeCl_3 \cdot 6H_2O$ was dissolved in nanopure H_2O and 10 ml conc HNO_3 and taken to 1000 ml in a volumetric flask. This standard contains 916.67 ppm Fe

(D) 3) 0.0037 g $MgCl_2 \cdot 2H_2O$ was dissolved in nanopure H_2O and ~~10~~ 5 (D) BWL 10/3/91 ml conc HNO_3 and taken to ~~1000~~ 500 ml BWL 10/3/91 in a volumetric flask. This standard contains 1370.4 ppm Mg

(D) 4) 0.0029 g $KMnO_4$ was dissolved in nanopure H_2O and 10 ml conc HNO_3 and taken to 1000 ml in a volumetric flask. This standard contains 1000 ppm Mn and 725.07 ppm K

10/4/91 BWL The resulting known duplicate sample was prepared from the standards on page 40 & 41 as follows

9.998 ml of Mixed Std #4 (pg 40 part A)
4.9935 ml of Sr Standard (pg 40 part B)
0.1 ml of Cu Standard (pg 40 part C)
BWL 10/4/91 ~~0.1~~ 1.02 ml of Pb standard (pg 40 part C)
0.1 ml of Ba Standard (pg 41 13,167 ppm)
0.1 ml of Fe Standard (pg 41 ~916 ppm)
4.995 ml of Mg standard (pg 41 1370 ppm)
0.1 ml of Mn (K) Standard (pg 41 1000 ppm Mn & 725 ppm K)
were added to 1000 ml volumetric flask to which 10 ml conc HNO_3 was added and it was taken to volume with nanopure H_2O.
Solution was mixed and split into 2 500 ml HDPE labeled CT-1 & CT-2. These will serve as test of precision & accuracy of DIV 1 ICP analyses.

Element	ppm conc in CT-1 & CT-2	measured by DIV 1 CT-1	CT-2
Ca	~~9.998~~ 10.00 BWL 10/3/91		
K	4.07		
Al	2.00		
Na	2.00		
Cr	0.20		
Ni	0.20		
† Cu	0.10		
Sr	4.99		
† Pb	1.02		
* Ba	1.32		
Mn	0.10		
~~K~~ BWL 10/3/91			
* Mg	6.85		
* Fe	0.09		

† These samples will not test accuracy only precision
* These samples were prepared from Chloride minerals with varied H_2O saturation and will primarily test their precision. Concentrations should be accurate to within 25% of stated value.

10/8/91 BWL Ion chromatography analyses by Div 1 of Peña Blanca samples
To test both the accuracy and precision of their analyses I will submit a duplicate of a standard containing the anions to be determined in their analyses. The standard will contain known quantities of Fl, Cl, nitrate, phosphate, and sulfate.
The standards to be submitted as a known and duplicate will be made adding appropriate aliquots of standard solutions (derived by dissolving QA approved chemicals into volumetric flasks).

Anions Standard Solutions

1) Fl: 0.0022 g of NaF was dissolved in 1000 ml of nanopure H_2O volumetrically. The resulting standard solution contains 1000.0 ppm F

2) Cl: 0.0081 g of NaCl was dissolved in ~~1000~~ 500 BWL 10/8/91 ml of nanopure H_2O volumetrically. The resulting standard solution contains 9,818.2 ppm Cl.

3) NO_3 (nitrate): 0.0071 g of $NaNO_3$ was dissolved in 500 ml of nanopure H_2O volumetrically. The resulting standard solution contains 10,365 ppm NO_3.

4) PO_4 (phosphate): 0.0089 g of Na_3PO_4 was dissolved in 500 ml of nanopure H_2O volumetrically. The resulting standard solution contains 12,027 ppm PO_4.

5) SO_4 (sulfate): 0.0073 g Na_2SO_4 was dissolved in 500 ml of nanopure H_2O volumetrically. The resulting standard solution contains 9865 ppm SO_4

10/8/91
BWL

The resulting known standard and duplicate to be submitted to DIV 1 for analysis was prepared from the standard solutions on pg 43 of this notebook as follows

0.50 ml of F standard solution 1000ppm
1.03 ml of Cl standard solution 9812.2ppm
0.10 ml of NO_3 standard solution 10,365ppm
0.10 ml of PO_4 standard solution 12,027ppm
0.50 ml of SO_4 standard solution 9865ppm

were added to a 1000ml volumetric flask and were diluted to volume with nanopure H_2O. The solution was mixed and split into 2 500ml HDPE bottles labelled AN-1 & AN-2 These samples ~~will test as~~ BWL 10/8/91 will serve as a test for precision & accuracy.

Anion	Concentration in AN-1 & AN-2 ppm	Results Div 1 AN-1	AN-2
F	0.50		
Cl	10.11		
NO_3	1.04		
PO_4	1.20		
SO_4	4.93		

Samples for cations and anions are ready to be submitted, awaiting a memo to Becky Riddle authorizing their analysis. I plan to walk the samples & memo over to Div 1.

10/8/91
BWL

To assess the importance of their digestion procedure for total metals it was necessary to take subsplits from CT-1 & CT-2 to make a sample CT-3 which will be submitted for analysis of total metals. Since CT-1 & CT-2 have identical contents of all constituents (pg 42) CT-3 will have same content of all constituents.

11/4/91
BWL

Received results from Becky Riddle for ion chromatography & IC P analyses of Knowns & Peña Blanca fluids
Results (xerox copies) are below for total Metals & pg 47 for anions

Total Metals Analysis-Table 1
20-3704-063
All Results in PPM

*	BLK	PSPK %R	CT-3	EM-1-2	EM12(DUP)
AL	<0.10	91	1.74	0.12	0.078
BA	<0.058	98	<0.058	<0.058	<0.058
CD	<0.006	97	<0.006	0.013	0.013
CR	<0.011	102	0.18	<0.011	<0.011
CU	<0.020	100	0.098	<0.020	<0.020
FE	<0.022	99	<0.022	0.075	0.069
MN	<0.007	102	<0.007	0.073	0.073
NI	<0.036	116	0.19	<0.036	<0.036
PB	<0.001	116	1.07	<0.001	<0.001
SR	<0.011	105	5.16	0.11	0.092
SI	<0.11	85	<0.11	23.1	23.2
CA	<1.1	91	9.6	25.0	25.6
K	<1.1	90	3.2	10.4	10.9
MG	<1.1	68	<1.1	<1.1	<1.1
NA	<1.1	71	<1.1	83.7	86.4

Total Metals Analysis-Table 2
20-3704-063
All Results in PPM

*	BLK	PSPK %R	BH-12-2	BH-MS%R	MS LEVEL
AL	<0.10	91	4.75	145	2.0
BA	<0.058	98	<0.058	99	1.0
CD	<0.006	97	<0.006	95	0.10
CR	<0.011	102	<0.011	99	0.10
CU	<0.020	100	0.022	96	0.20
FE	<0.022	99	0.78	125	0.10
MN	<0.007	102	0.60	73	0.10
NI	<0.036	116	<0.036	106	0.10
PB	<0.001	116	0.036	111	0.50
SR	<0.011	105	0.22	109	0.50
SI	<0.11	85	22.4	104	5.0
CA	<1.1	91	65.0	56+	10.0
K	<1.1	90	6.1	89	10.0
MG	<1.1	68	<1.1	97	10.0
NA	<1.1	71	13.8	82	10.0

+SAMPLE GREATER THAN 4X SPIKE VALUE

11/4/91
BWL

Anion Results

Anion Analysis Summary
20-3704-063
All Results in PPM

SAMPLE	FLUORIDE	CHLORIDE	PHOSPHATE	NITRATE	SULFATE
EM-1-3	3.31	26.5	<0.10	4.13	330
BH-12-3	1.57	3.00	<0.10	2.48	733
AN-1	<0.05	<0.05	<0.10	<0.50	<0.5
AN-2	<0.05	<0.05	<0.10	<0.50	<0.5
MS %R	81	102	116	97	89
MS LEVEL	0.20	0.20	1.0	0.33	2.0
BLANK	<0.05	<0.05	<0.10	<0.50	<0.50

Dissolved Metals Analysis
20-3704-063
All Results in PPM

*	BLK	CT-1	CT-2	EM-1-1	BH-12-1
AL	<0.094	1.86	1.85	<0.094	0.173
BA	<0.053	<0.053	<0.053	<0.053	<0.053
CD	<0.005	<0.005	<0.005	0.050	<0.005
CR	<0.010	0.232	0.228	<0.010	0.020
CU	<0.018	0.081	0.086	<0.018	0.032
FE	<0.020	<0.020	<0.020	<0.020	<0.020
MN	<0.006	<0.006	<0.006	0.054	0.187
NI	<0.032	0.193	0.194	<0.032	<0.032
PB	<0.10	0.89	0.88	0.12	<0.10
SR	<0.010	5.38	5.08	<0.010	0.207
SI	<0.10	<0.10	<0.10	10.2	6.53
CA	<1.0	9.5	9.8	25.5	57.7
K	<1.0	2.8	2.8	10.2	1.5
MG	<1.0	<1.0	<1.0	<1.0	<1.0
NA	<1.0	<1.0	<1.0	84.2	<14.6

ALL METALS RESULTS OBTAINED BY ICPAES EXCEPT LEAD FOR TOTAL ANALYSIS. TOTAL LEAD WAS ANALYZED BY GRAPHITE FURNACE ATOMIC ABSORPTION SPECTROPHOTOMETRY.

12/23/91

Division 1 (SwRI) Chemical Analyses

Knowns, accuracy and precision

Cations	Known concentration (ppm)	Dissolved CT-1	Dissolved CT-2	Total CT-3	Accuracy %	Precision %	IDL
BWL 12/23/91 ~~(micromole/l)~~							
Na	2	<1	<1	<1.1	>50		1.0
K	4.07	2.8	2.8	3.2	40.00	0	0.8
Ca	10	9.5	9.8	9.6	3.50	21.21	1.3
Mg	6.85	<1	<1	<1.1	>85		1.2
Sr	4.99	5.38	5.08	5.16	4.81	21.21	
Al	2	1.86	1.85	1.74	7.25	0.71	0.94
Si	0	<0.1	<0.1	<0.11			
Ba	1.32	<0.53	<0.53	<0.058	>60		0.053
Cd	0	<0.005	<0.005	<0.005			0.005
Cr	0.2	0.232	0.228	0.18	15.00	0.28	0.010
Cu	0.1	0.081	0.086	0.098	16.50	0.35	0.018
Fe	0.09	<0.02	<0.02	<0.022	>77		0.020
Mn	0.1	<0.006	<0.006	<0.007	>94		0.006
Ni	0.2	0.193	0.194	0.19	3.25	0.07	0.032
Pb	1.02	0.89	0.88	1.07	13.24	0.71	0.20
	Accuracy is average of CT-1 and CT-2 divided by known concentration subtracted from one and then multiplied by 100						
	Precision is the standard deviation of the CT-1 and CT-2 measurements						

IDL is instrument detection limit for ICP analysis by EPA methods 200.7 & 3015 in ppm.

BWL/12/23/91

The results of the chemical analyses of fluid samples collected in September 1991 from the Peña Blanca analyzed by Division 1 were presented on pgs 46 & 47. The above table on pg 49 addresses the accuracy and precision of the measurements for cations by Div 1. Unfortunately a similar analysis of the anion results is not possible since the known samples submitted to the division were below detection limit. A mistake in the dilution calculation was the cause of this error. To test the accuracy of their anion results sulfate will be measured. Similarly since the known cation samples CT-1 → CT- did not have a known Si BWL 12/23/91 concentration Si will be analyzed according to TOP-014. ~~The accuracy of the Na analysis is not constrained as no known concentration of Na was in cation standards (CT-1, CT-2, CT-3) in contradiction to the value of 2.00 ppm Na stated on pg 42.~~ BWL 12/23/91 Spex standard MIXSTD 4 contains 200 ppm Na (200 ug/ml) and was used in making CT-1, CT-2, & CT-3 (see pg 42) so accuracy calculation above ~~is~~ BWL 12/23/91 is okay for Na.

Since the Na concentration is important in the system Na measurements by the electrode measurement currently used in the sorption project will be used. The sample concentrations on pages 46-47 have not been corrected for dilution by acid. A summary of sample bottle numbers, sample identification, filtration used, and acidification scheme, & dilution factors are presented below. Note that CT-3 total standard have been digested by microwave (Method EPA 3015) prior to analysis by ICP (Method EPA 200.7).

Samples for Silica, Anions, alkalinity BWL 12/23/91 and dissolved metals were filtered in the field using a paper filter of qualitative grade. These samples except alkalinity BWL 12/23/91 were then refiltered at CNWRA through 0.45 uM filter on 9/30/91.

EM = El Mesquite BH = borehole - 12 is borehole #12

Sample Bottle Number	Sample Designation	Type of Sample	Dilution Factor @	Filtered 0.45um	Acidified
#10	EM-10	Alkalinity			
#13	EM-13	Silica		✓	
#22	EM-1-3	Anions		✓	
#27	EM-1-1	Dissolved Metal	1.0106	✓	✓
#31	EM-1-2	Total Metal	1.0095		✓
#19	BH-12-19	Alkalinity			
#18	BH-12-18	Silica		✓	
#7	BH-12-3	Anions		✓	
#26	BH-12-1	Dissolved Metal	1.0154	✓	✓
101.37	BH-12-2	Total Metal	1.0145		✓

@ Dilution Factor should be multiplied to measured results to get actual concentration. This factor corrects for the volume of acid added and is derive from table on pg 38

$$DF = \frac{1}{\frac{\text{Sample Wt}}{\text{Sample wt + acid wt}}} = \text{Dilution factor}$$

Si analysis of Peña Blanca Samples

I will take aliquots of EM-13, EM-1-1, BH-12-18, BH-12-1 and analyze them for silica. I expect Si concentrations to be 5-25 ppm. EM-1-1 & BH-12-1 represent acidified and filtered samples, while EM-13 & BH-12-18 have been filtered but not ~~acidified~~ (BWL 12/23/91) acidified.

These analyses will be performed using the heteropoly blue method outlined in TOP-014.

This requires that concentrations lie between 50 ppb - 2.5 ppm. I will need to dilute my samples be at least a factor of 10. Similarly standards need to be diluted to the appropriate concentration range.

Standards will be in ppb 0, ~175, ~350, ~877, 1750 which requires 0, 1, 2, 5, 10 ml of 10 ppm Si solution diluted to 57 ml total volume.

Standard solution is 10ppm	GC-03/234
HCl reagent	GC-03/234
Ammonium moly	GC-03/234
Oxalic acid	GC-03/234
Reducing agent	GC-03/234

Samples will all be 1 ml to 57 ml total volume diluted to 50 ml with nanopure H_2O.

STD	CONC ppb	ABS
0	0	-.004
1	175.44	.057
2	350.88	.118
3	877.19	.300
4	1754.39	.593

ID#		CONC	ABS
1	EM-13 DUP	1040	.352
2	EM-13	1033	.349
3	EM-1-1	1009	.341
4	BH-12-1	689	.232
5	BH-12-18	665	.224

BWL

12/27/91
BWL

```
815.0NM -164.*C
815.0NM -.008*A
STD #    ABS    CONC
```

BWL 12/23/91 Si Analysis Pena Blanca Samples

STD #	ABS	CONC
1	-.004	.0000
2	.057	175.4
3	.118	350.9
4	.300	877.2
5	.593	1754.

```
LINEAR FIT
NOT THRU ZERO
SLOPE          2937.
INTERCEPT      7.381

CORR COEF      1.0000
 ---------------- ID# 1      TST24
 815.0NM      1041. C

 ----------------      815.0NM   .352*A
ID# 2      TST24
 815.0NM      1033. C

 ----------------      815.0NM   .349*A
ID# 3      TST24
 815.0NM      1009. C

 ----------------      815.0NM   .341*A
ID# 4      TST24
 815.0NM       689. C

 ----------------      815.0NM   .232*A
ID# 5      TST24
 815.0NM       665. C

 ----------------      815.0NM   .224*A
```

Results of Si analyses
The raw data are presented at the left and the identity of samples is at bottom of pg 51.

Duplicate samples (#1 & #2) are within 1%.
There is no consistent difference between the acidified & filtered samples and the filtered samples.
Correction for dilutions appears below with a comparison of the results to that of Div #1 analyses.

Sample ID	Measured Concentration (ppm)	Analysis Dilution	Acid Dilution (pg 50)	Final Concentration (ppm)	Div 1 Final Conc. (ppm)
EM-1-1	1.009	57	1.0106	58.12	10.31 ~~73.40~~ BWL 12/27/91
EM-13	1.033	57		58.88	
EM-13 DUP	1.041	57		59.33	
BH-12-1	0.689	57	1.0154	39.88	6.63 ~~22.4~~ BWL 12/27/91 ~~22.77~~ BWL 12/27/91
BH-12-18	0.665	57		37.91	

The Si analyses of DIV are thus suspect and we will use the following values for EM and BH-12 for Si in ppm which represent the average of duplicate samples & the unacidified results
EM = El Mesquite = 59.11 ppm Si BH-12 = 37.91 ppm Si

12/27/91

SO_4 analysis
Using the turbidimetric method (426.C) from the standard methods of chemical analysis of waters and waste waters. It is based on light absorbance due to $BaSO_4$ suspension.
Standards and solutions should be between 0-40 mg/L

Reagents:
1) Buffer A Dissolve 30 g $MgCl_2 \cdot 6H_2O$ magnesium chloride
5 g $CH_3COONa \cdot 3H_2O$ sodium acetate
1.0 g KNO_3 potassium nitrate
20 ml CH_3COOH (99%) acetic acid
into 500 ml nanopure H_2O dilute to 1000 ml.

2) Standard SO_4 solution
1.00 ml = 100 ug SO_4^{2-} ⇒ 100 ppm SO_4^{2-}
0.1479 g Na_2SO_4
actual wt = 0.1477 g ⇒ 99.86 ppm SO_4^{2-}

Dilution of primary sulfate standard completed using volumetric flasks and pipets (glass).

ID #	Conc	Abs
1	24.97	.230
2	19.97	.208
3	14.98	.170
4	9.99	.114
5	0	.002
BH-12-3	2 ml ⇒ 100 ml	.002
BH-12-3 Dup	10 ml ⇒ 100 ml	.002

a bust so the samples are either way off or there is a matrix problem) so will have to rerun

BWL

12/28/91

SO_4 Analysis Redo

ID #	Conc	Abs
1	24.97	.253
2	19.97	.205
3	14.98	.153
4	9.99	.083
5	4.99	.036
6	0	-.001

Using 0.5, 1, 2 pipets diluted standard pg 53 to 10 ml with nanopure H_2O to get ~ 0, 5, 10, 15, 20, 25 ppm SO_4 Then added 2 ml Buffer & ~.2 g $BaCl_2 \cdot 2H_2O$

				Dilution Factor	Conc ppm
Dilution 3→10	EM-13	13.68	.134	3	41.04
"	EM-13 DUP	12.68		3	38.04
"	BH-12-3	12.07	.117	3	36.21
"	BH-12-3 DUP	11.64	.113	3	34.92
	EM-10 no Ba	1.55	.005	0	1.55
	BH-12-19 no Ba	1.74	.007	0	1.74
3→10 Dilution	EM-10 w/Ba	11.28	.109	3	33.84
2→10 Dilution	BH-12-19 w/Ba	7.55	.069	2	

BWL 12/28/91

BWL 12/28/91

see below

The observation of 12/27/91 suggested that 12/28/91 BWL such SO_4^{2-} concentrations were probably less than 50 ppm so that samples probably will only have to be diluted by a factor of 2-5.

Samples EM-10 & BH-12-19 were not filtered through 0.45 um filter so that they needed to be corrected for turbidity blank.

This corresponds to a decrease of the absorbance by 0.0015 for sample EM-10 w/Ba and 0.0014 for BH-12-19 w/Ba

This absorbance for			SO_4 ppm
EM-10	.1075	⇒	11.16
BH-12-19	.0676	⇒	7.41

conc = slope (abs) + intercept

conc = 94.13 (abs) + 1.045

Correction for dilution is as follows = $\dfrac{\text{measured conc}}{\left(\dfrac{\text{sample volume}}{\text{total volume}}\right)}$

12/28/91

Sulfate Analysis
12/28/91
BWL

```
Err5  -.7*C
ID# 7

 420.0NM        -.7*C
ID# 1
 420.0NM       .000*A
 ----------------
```

Blank Absorbance

1			.253	24.97
2	.205	19.97		
3	.153	14.98		
4	.083	9.990		
5	.036	4.990		
6	-.001	.0000		

```
LINEAR FIT
NOT THRU ZERO
SLOPE            94.13
INTERCEPT        1.045

CORR COEF        .9968
 ---------------- ID# 1
 420.0NM      13.68*C

 ---------------- ID# 2
 420.0NM       .134*A
 ----------------
ID# 3
 420.0NM      12.68*C
 ----------------  ----------------
ID# 5
 420.0NM      12.07*C
 ---------------- ID# 6

 420.0NM       .117*A
 ---------------- ID# 7
 420.0NM      11.64*C

 ---------------- ID# 8
 420.0NM       .113*A
 ----------------
ID# 9
 420.0NM       1.55*C
 ---------------- ID# 10

 420.0NM       .005*A
 ---------------- ID# 11
 420.0NM       .007*A

 ---------------- ID# 12
 420.0NM       1.74*C
 ----------------
ID# 13
 420.0NM      11.28*C
 ---------------- ID# 14

 420.0NM       .109*A
 ---------------- ID# 15
 420.0NM       .069*A

 ---------------- ID# 16
 420.0NM       7.55*C
 --------
```

Sample	Concentration Sulfate (ppm)
EM-13	45.57
EM-13-DUP	42.27
EM-10 w/Ba	37.20
BH-12-3	40.23
BH-12-3-Dup	38.80
BH-12-19 w/Ba	37.05

Sample	Average Conc* Sulfate (ppm)
El Mesquite	44
Borehole 12	39

* average from filtered samples

BWL

1/3/92 BWL Paula Mueller reported that the polarographic analyses for U in the fluid samples from Peña Blanca are EM1 = 0.225 ppm U & BH-12-1 = 2.21 ppm U and the raw data & calculations can be found in Polarographic Analyses of Uranium Binder Vol 6 12/14/91

1/23/92 Long-Term Autoradiography Experiment (ref. pages 25-27 and p. 30 of this notebook)

→ On 1/22/92 sample NOP-ECP-1-TS1 was removed from contact with the CR-39 alpha-sensitive film after 187 DAYS of exposure (begun on 7/19/91).

→ the same etching technique will be used as before (pages 25-27): etching in 6N NaOH solution at 80°C for 2 hours.

→ sample into NaOH @ 9:00 AM 1/23/92

→ Note: this sample is of fresh, unaltered Nopal formation, host rock of the upper part of the Nopal I deposit. This experiment is an attempt to determine the presence of alpha emitters among the various minerals and glass present in this sample. Such emitters are likely to be the U-bearing phases and may represent the source of U for the Nopal I and other U deposits in the Peña Blanca district.

→ sample removed at 11:00 AM 1/23/92 from 2 hours of etching, sample rinsed with DI water and dried with a chem wipe

→ some pits from alpha damage are immediately apparent.

1/23/92 JP

ELECTRON MICROPROBE ANALYSES

University of Utah assisted by
Dr William Nash and Ray Lambert
Office 801-581-8587
Lab 801-581-7263

Objective - collect data on chemistry of uranium ores from Pena Blanca, Mexico

Equipment - Cameca SX-50 Microprobe with 4 WDS spectrometers and PC1, LIF, TAP, and PET analyzing crystals.

Procedure - raw data output including calibration data, standards, and experimental conditions are recorded in a separate notebook entitled "Raw Microprobe Data #1".

Locations of spot analyses were either marked on described on photographs kept in a binder entitled "Petrographic, SEM, and EDS analyses of Uranium Ore Samples, Pena Blanca, Chihuahua, Mexico."

Results - a brief description of each spot analysis is given below:

Sample - NOP1-ECP-1-TS2
Spot locations are marked on an 8 1/2 x 11 color photo of thin section NOP1-ECP-1-TS2

Analysis No.		Description
TS2-1	Spot 7	uraninite, feldspar or ilmenite replacement product
TS2-2	Spot 7	uraninite, high Ti content = remnant ilmenite
TS2-3	Spot 7	uraninite
TS2-4	Spot 7	fibrous U oxyhydroxide adjacent to uraninite
TS2-5	Spot 7	fibrous U oxyhydroxide adjacent to uraninite
TS2-6	Spot 7	uraninite
TS2-7	Spot 2	uraninite, fills small fracture, massive
TS2-8	Spot 2	uraninite
TS2-9	Spot 3	U-oxyhydroxide fracture fill adjacent to spot 2.
TS2-10	Spot 6	uraninite, colloform relatively clean
TS2-11	Spot 6	U-oxyhydroxide in center of fracture adjacent to colloform uraninite
TS2-12	Spot 6	uraninite
TS2-13	Spot 6	uraninite

NOPI-ECP-1-TS2 cont.

Analysis No.		Description
TS2-14	Spot 1	uraninite, relatively clean colloform to botryodial
TS2-15	Spot 1	uraninite
TS2-16	Spot 8	Fibrous looking U-oxyhydroxide appears to be some clay contamination
TS2-17	Spot 8	Fibrous U oxyhydroxides with some clay contaminant.
TS2-18	Spot 4	Uraninite filling small fracture, relatively clean
TS2-19	Spot 4	Uraninite
TS2-20	Spot 5	Uranophane adjacent to uraninite in spot 4
TS2-21	Spot 5	Uranophane

Sample NOPI-ECP-1-TS3

Analysis No		Description
TS3-1	photo 10	uraninite replacing ilmenite, high Ti content.
TS3-2	photo 10	uraninite replacing ilmenite, high Ti content
TS3-3	photo 10	pyrite
TS3-4	photo 10	uraninite replacing ilmenite
TS3-5	photo 11	uraninite, much interference from intergrown clay

NOPI-ECP-1-TS3 cont.

Analysis No.		Description.
TS3-6	Photo 7	uraninite replacing ilmenite
TS3-7	Photo 7	uraninite replacing ilmenite
TS3-8	Photo 7	pyrite
TS3-9	photo 12	uraninite
TS3-10	photo 13	uraninite, much interference from intergrown clay
TS3-11	BSE photo P28	gray center infill high As, K, U oxyhydroxide ~~silicate~~ gp
TS3-12	BSE photo P28	dark gray center infill sodalite
TS3-13	BSE photo P28	gray center infill As, K, U oxyhydroxide
TS3-14	BSE photo P28	dark gray center infill sodalite
TS3-15	BSE photo P28	colloform uraninite
TS3-16	BSE photo P28	colloform uraninite
TS3-17	BSE photo P27	black center infill Fe, U, As, Ca, K
TS3-18	BSE photo p27	gray center infill As, K, U, Si.
TS3-19	BSE photo P27	dark gray center infill sodalite
TS3-20	BSE photo P27	light gray mineral U oxyhydroxide
TS3-21	BSE photo P27	colloform uraninite
TS3-22	BSE photo P27	light gray mineral U oxyhydroxide

NOP1-ECP-1-TS3 cont

Analysis No		Description
TS3-23	BSE photo p27	Dark gray center infill soddyite
TS3-24	BSE photo P32	Gray center infill As, K, U oxy hydroxide
TS3-25	BSE photo P32	Colloform uraninite
TS3-26	BSE photo P32	Dark gray center infill Soddyite
TS3-27	BSE photo P32	Colloform uraninite
TS3-28	BSE photo P32	Light gray mineral U oxy hydroxide
TS3-29	BSE photo P32	Black center infill Fe, U, As, K, Al
TS3-30	BSE photo P32	Gray center infill As, U, K oxy hydroxide
TS3-31	BSE photo P26	Colloform uraninite
TS3-32	BSE photo P26	Light gray mineral U oxy hydroxide
TS3-33	BSE photo P26	Colloform uraninite
TS3-34	BSE photo P26	Light gray mineral U oxy hydroxide
TS3-35	BSE photo P26	Gray center infill As, K, U oxy hydroxide
TS3-36	BSE photo P26	Dark gray center infill soddyite.
TS3-37	BSE photo P23	Smooth gray fracture fill As, K, U oxy hydroxide
TS3-38	BSE photo P23	Light gray mottled material U oxyhydroxide, some clay
TS3-39	BSE photo P23	Smooth gray fracture fill As, K, U oxy hydroxide

NOP1-ECP-1-TS3 cont

Analysis No.		Description
TS3-40	BSE photo p19	Smooth gray material soddyite
TS3-41	BSE photo p18	Smooth gray material soddyite
TS3-42	BSE photo P18	White mineral Ba, K, U oxyhydroxide
TS3-43	BSE photo P18	Gray mineral Uranophane
TS3-44	BSE photo P18	Light gray mineral U oxyhydroxide
TS3-45	BSE photo P18	White mineral Ba, K, U oxyhydroxide
TS3-46	BSE photo P17	Gray fracture Soddyite
TS3-47	BSE photo P18 Follow fracture	White mineral Ba oxy hydroxide
TS3-48	BSE photo P18 Follow fracture	Light gray mineral U oxy-hydroxide
TS3-49	BSE photo P10	White mineral soddyite
TS3-50	BSE photo P10	Gray mineral - cracks uranophane
TS3-51	BSE photo P10	White mineral soddyite
TS3-52	BSE photo P10	Gray mineral - cracks uranophane
TS3-53	BSE photo P10	Smooth gray mineral K, U silicate
TS3-54	BSE photo P10	Smooth gray mineral K, U silicate
TS3-55	BSE photo P10	Smooth gray mineral K, U silicate

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NOPI-ECP-1-TS3 cont

Analysis No		Description
TS3-56	BSE photo P16	White mineral soddyite
TS3-57	BSE photo P16	Gray mineral - cracks. uranophane
TS3-58	BSE photo P15	Gray mineral - cracks uranophane
TS3-59	BSE photo P15	White mineral soddyite
TS3-60	BSE photo P15	Gray mineral uranophane
TS3-61	BSE photo P13	White euhedral mineral soddyite
TS3-62	BSE photo P13	Dark gray mineral U, Ca clay
TS3-63	BSE photo P13	Black mineral Kaolinite
TS3-64	BSE photo P14	Gray mineral - cracks Uranophane
TS3-65	BSE photo P14	White mineral Soddyite
TS3-66	BSE photo P14	Gray mineral - cracks Uranophane
TS3-67	BSE photo P8	Gray mineral - cracks Uranophane
TS3-68	BSE photo P8	White mineral Soddyite
TS3-69	BSE photo P8	Not in pt mode - discard analysis
TS3-70	BSE photo P8	Gray mineral - cracks uranophane
TS3-71	BSE photo P8	White mineral Soddyite

NOPI-ECP-1-TS3 cont

Analysis No		Description
TS3-73	BSE photo P8	Gray mineral uranophane
TS3-72	BSE photo P1	White mineral Soddyite
TS3-74	BSE photo P1	Gray mineral - cracks uranophane
TS3-75	BSE photo P1	Dark red material Fe clay.

Sample NOPI-ECP-2A-TS1

Analysis No		Description
TS3-76	BSE photo P5	Fibrous gray mineral at center K, U silicate
TS1-77	BSE photo P5	White mineral U oxyhydroide, some Ca.
TS1-1	BSE photo P5	Gray smooth mineral K, U silicate
TS1-2	BSE photo P5	White mineral U oxyhydroide, some Ca.
TS1-3	BSE photo P5	White mineral U oxyhydroide
TS1-4	BSE photo P5	Fibrous gray mineral K, U silicate
TS1-5	BSE photo P5	White mineral U oxyhydroide + Ca
TS1-6	BSE photo P8	white mineral U oxyhydroide + Ca
TS1-7	BSE photo P8	White mineral U oxyhydroide + Ca
TS1-8	BSE photo P8	Gray mineral K, U silicate

NOPI-ECP-2A-TS1 cont

Analysis No		Description
TS1-9	BSE photo P8	white mineral U oxyhydroxide + Ca
TS1-10	BSE photo P8	white mineral U oxyhydroxide + Ca
TS1-11	BSE photo P8	gray mineral K, U silicate
TS1-12	BSE photo P10	white mineral soddyite
TS1-13	BSE photo P10	Gray mineral K, U silicate
TS1-14	BSE photo P13	White mineral soddyite
TS1-15	BSE photo P13	Smooth gray mineral K-U silicate
TS1-16	BSE photo P13	Smooth gray mineral K, U silicate
TS1-17	photo 17+18	Uranophane at rim, contaminated by intergrown clay
TS1-18	photo 17+18	Fibrous mineral at center, U-oxyhydroxide
TS1-19	photo 17+18	Soddyite
TS1-20	photo 17+18	Fibrous mineral at center, U oxyhydroxide
TS1-21	photo 17+18	Smooth gray in BSE K, U silicate
TS1-22	photo 17+18	Soddyite

1/24/92 JP

Element maps for image analysis were also collected for several spots on samples NOPI-ECP-1-TS3 and NOPI-ECP-2A-TS1. Maps for the following elements were collected: O, Al, K, Ca, Si, U, As

The approximate areas ~~where~~ element maps were collected are marked on photographs kept in the binder entitled "Petrographic, SEM, and EDS analyses of Uranium Ores Samples, Pena Blanca, Chihuahua, Mexico". 7 separate element maps were collected

Element map 1 - NOPI-ECP-2A-TS1, BSE photo p13
" 2 - NOPI-ECP-2A-TS1, photo 17
" 3 - NOPI-ECP-2A-TS1, BSE photo P7
" 4 - NOPI-ECP-2A-TS1, BSE photo P5
" 5 - NOPI-ECP-1-TS3, BSE photo P7
" 6 - NOPI-ECP-1-TS3, BSE photo P15
" 7 - NOPI-ECP-1-TS3, BSE photo P25

Element maps were stored in files on the Sun SparcStation which drives the Cameca SX-50 Microprobe at the University of Utah. These files will be copied to 3.5 inch disks and sent to J.P. A list of the files that contain the element maps or images is shown on the next page.

swri11bseZ.img	BSE	Element Map 1
swri11sp1.img	O	
swri11sp2.img	Al	
swri11sp3.img	K	
swri11sp4.img	Ca	
swri12bseZ.img	BSE	Element Map 2
swri12sp1.img	O	
swri12sp2.img	Al	
swri12sp3.img	K	
swri12sp4.img	Ca	
swri13bseZ.img	BSE	Element Map 3
swri13sp1.img	O	
swri13sp2.img	Al	
swri13sp3.img	K	
swri13sp4.img	Ca	
swri14bseZ.img	BSE	Element Map 4
swri14sp1.img	O	
swri14sp2.img	Al	
swri14sp3.img	K	
swri14sp4.img	Ca	
swri15bseZ.img	BSE	Element Map 5
swri15sp1.img	O	
swri15sp2.img	Al	
swri15sp3.img	K	
swri15sp4.img	Ca	
swri16bseZ.img	BSE	Element Map 6
swri16sp1.img	O	
swri16sp2.img	Al	
swri16sp3.img	K	
swri16sp4.img	Ca	
swri17bseZ.img	BSE	Element Map 7
swri17sp1.img	O	
swri17sp2.img	Al	
swri17sp3.img	K	
swri17sp4.img	Ca	
swri21sp2.img	Si	Element Map 1
swri21sp4.img	U	
swri22bseZ.img?		
swri22sp2.img	Si	Element Map 2
swri22sp4.img	U	
swri23sp2.img	Si	Element Map 3
swri23sp4.img	U	
swri24sp2.img	Si	Element Map 4
swri24sp4.img	U	
swri25sp2.img	Si	Element Map 5
swri25sp4.img	U	
swri26sp2.img	Si	Element Map 6
swri26sp4.img	U	
swri27sp2.img	Si	Element Map 7
swri27sp4.img	U	
swri31sp2.img	As	Element Map 1
swri35sp2.img	As	Element Map 5
swri36sp2.img	As	Element Map 6
swri37sp2.img	As	Element Map 7

1/29/92 BWL We received today some mineral separates from Phillipe Ildefonse, who collected them from the Peña Blanca site. Before these data (samples) can be accepted they will have to undergo qualification. Included with the samples were two maps which depict the locations from which the samples were obtained. Also included were the X-ray diffraction records of these samples. Qualification will include relocation of sample sites upon on next visit to the site. Additionally, X-ray diffraction of the sample powders will be performed to determine / confirm the mineralogy of these samples. The most important aspect of these French samples, is that they represent substantially complete mineral separates of the following minerals: α-uranophane, β-uranophane, Boltwoodite, weeksite, and soddyite. These samples have the following designations (by P.I), however, they will be accepted on the sample custody form according to our pre-existing sample designation. The sample below exhibits the sample designation scheme

eg. NOP1-ECP-35, where NOP1 represents a sample from the Nopal Formation (NOP) from the Nopal 1 deposit (1), and ECP are the initials of the sample collector.

For these samples from the Nopal 1 site, from the Nopal Formation, collected by Phillipe Ildefonse as ~~NOP1-I~~ BWL 1/29/92 NOP1-PI-XXX

Phillipe Ildefonse Original Sample designation	CNWRA Sample designation
NIØB6	NOP1-PI-ØB6
NIØB14	NOP1-PI-ØB14
NIØC28	NOP1-PI-ØC28
NIØC33	NOP1-PI-ØC33
NIØC23	NOP1-PI-ØC23
NI1C4	NOP1-PI-1C4
NIØG8	NOP1-PI-ØG8
NIØG14	NOP1-PI-ØG14
NIØG12	NOP1-PI-ØG12

~~where~~ BWL 1/29/92 B where - Ø or -1 represent samples from the level 0 or +10 level and B, C, G represent transects B, C, or gallery, respectively (Ildefonse et al, 1991).

Ildefonse, P., J.-P. Muller, B. Clozel and G. Calas, (1990) Engineering Geology 29, 413-439.

1/29/92 BWL A subsample of Peña Blanca rock was taken for XRD analysis. XRD analysis was performed using the Siemans D-500 X-ray diffractometer in Division 06. Analysis was conducted in accordance with TOP-004-002. The XRD pattern is located in the "Peña Blanca-XRD Patterns" folder

Sample NOPI-ECP-19-GAM-P/2 Analysis Date 1/29/92
This dark (black) carbonate veins sample consists solely of calcite ($CaCO_3$).

2/3/92 BWL The following samples from Peña Blanca were selected to be analyzed for radionuclides. These samples were mainly examples of whole-rock samples. Splits of previously powdered samples were used (eg. COL-ECP-1-WR2/1-GAM-P/1), as well as, subsamples chosen from the bulk sample (e.g. NOPI-ECP-19) were powdered for use. Only the NOPI-ECP-13, NOPI-ECP-19 and NOPI-ECP-34 samples were subsampled such that a fraction of the solid remains unpowdered. These ~~saw~~ BWL 2/3/92 subsamples have the following designations e.g. NOPI-ECP-13-GAM. Since gamma spectroscopy of powdered rocks was to be accomplished the sample designations follow this specification eg NOPI-ECP-15-GAM-P/1

where ~~XX~~-XX-XX-GAM indicates a subsample of the XX-XX-XX sample was taken for gamma analysis, and XX-XX-XX-GAM-P indicates that XX-XX-XX-GAM subsample was powdered. Finally the XX-XX-XX-GAM-P/1 indicates a subsample of the powdered sample was used for the gamma spectroscopy analysis. These subsamplings and powderings are recorded in the sample control logbook and are detailed in CNWRA Notebook 031, page 15 by myself BWL

Sub-samples used for Gamma analysis
COL-ECP-1-WR2/1-GAM-P/1
NOP-ECP-1-WR2/1-GAM-P/1
NOP-ECP-2-WR1/1-GAM-P/1
COL-ECP-1-WR1/1-GAM-P/1
NOPI-ECP-7-WR1/1-GAM-P/1
NOPI-ECP-8-WR1/1-GAM-P/1
NOPI-ECP-8-WR2/1-GAM-P/1
NOPI-ECP-4-WR1/1-GAM-P/1
NOPI-ECP-9-WR1/1-GAM-P/1
NOPI-ECP-16-GAM-P/1
NOPI-ECP-15-GAM-P/1
NOPI-ECP-34-GAM-P/1
NOPI-ECP-35-GAM-P/1
NOPI-ECP-36-GAM-P/1
NOPI-ECP-13-GAM-P/1
NOPI-ECP-19-GAM-P/1
NOPI-ECP-33-GAM-P/1
PUE1-ECP-1-GAM-P/1
PUE1-ECP-2A-GAM-P/1
MESA-ECP-1-GAM-P/1
MESA-ECP-2-GAM-P/1
MESA-ECP-3-GAM-P/1
PB-ECP-1-GAM-P/1
ESC-ECP-1-GAM-P/1

2/28/92 Sample preparation for Pesca Blanca Trip

Because we do not know a priori what the sample location will be I will just generically design numbers to the sample bottles & put their sample name (based on location) after sampling

Sample Bottle #	Sample Name	Weight Bottle EMPTY (g)	Weight Bottle + Sample + Acid	Acid Added (ml)	Sample Weight (g)
37		101.22			
38		101.30			
39		101.09	1137.0 No Acid		1035.91 3/17/92 BWL
40		102.15			
41		101.08	1120.3	10ml	1009.22 BWL 3/17/92
42		100.77	1074.8	10ml	964.03 BWL 3/17/92
43		55.08			
44		55.44			
45		54.82			
46		55.45			
47		55.30			

BWL

2/29/92 Eh buffers using Potassium Ferrocyanide Lot # 901620
BWL Potassium Ferricyanide Lot # 905604

		Std A	Std B
grams	$K_4Fe(CN)_6 \cdot 3H_2O$	0.0885g	0.8845 g
	$K_3Fe(CN)_6$	0.6588	0.06588g

3/10/92 ECP

Additional whole rock samples are being sent to Texas Tech for analysis to confirm earlier whole rock analyses of the unaltered Tn and Tco formations.

Samples are:

3101 = NOPI-ECP-36', WR1, unaltered Tn

3102 = NOPI-ECP-16', WR1, unaltered Tco

3103 = NOPI-ECP-39', WR1, unaltered Tn

3104 = USGS GLASS Mtn. Rhyolite RGM-1
split 26 position 24

3105 = previously analyzed No. 5912
= NOP-ECP-1-WR1

3106 = NOPI-ECP-36-WR2, duplicate of 3101

BWZ 3/10/92 3107 = NBS SRM 278 obsidian Rock

[See page 83 ECP 4/30/92]

3/17/92 BWL

Preparation for analysis of Peña Blanca March Fluids
Anions will be analyzed by Division #1 at SWRI.
The following samples will be submitted for analysis

Sample#	Description
3171	Split from 92-3/BH-12 anions bottle
3172	Nanopure H_2O from Bldg 57
3173	Split from 92-3/BH-12 anions bottle
3174	Split of Bottle #39 which is distilled H_2O from UACH ~91 ml = 90.8 grams
3175	Spex Minerals sample as prepared below

Using SPEX QC Mineral B (Batch 1321) and Mineral A (Batch 1320) to make the SPEX standard for Cl, Fl, SO_4 and alkalinity. Ca, Mg, K, & Na

Added 400 ml of pure H_2O to 500 ml volumetric flask. Added 5 mls of Minerals A & B to flask using volumetric pipet. Brought up to volume & mixed well. This is standard for Alkalinity (actually QC sample)
Remainder of Standards Mineral A & B put into dark 125 ml HDPE containers and labelled SPEX Mineral A & Mineral B

The standard (3175) to be submitted to Div 1 is also 5.0 ml of Mineral A + 5.0 ml of Mineral B + following P, N added and diluted to 500 ml. 5 ml NO_3 std + + 5 ml PO_4 std
Using $NaNO_3$ as source of nitrate & Na_2HPO_4 as source of phosphate
NO_3 Std: $NaNO_3$ FW = 84.99 0.6811 g $NaNO_3$ into 500 ml H_2O = 993.72 ppm NO_3 ~~Lot 912993~~ BWL 3/17/92 Lot # 7808 KDJE
PO_4 std: Na_2HPO_4 FW = 141.96 0.7426 g Na_2HPO_4 into 500 ml H_2O = = 1003.94 ppm PO_4 Lot 912993

Actual values	F	Cl	NO_3	PO_4	SO_4 in ppm
	1.0	51.4	9.94	10.04	20.0

3/20/92 OXALIC ACID CLEANING OF NOPAL I QUARTZ ECP

- Samples NOPI-ECP-39 AND NOPI-ECP-40 consist of quartz crystals heavily coated with Fe-oxide and Mn-oxide.
- These samples will first be washed in lab tap water, then soaked in ~0.6 molar Oxalic Acid (Lot # 905504) prepared by BWL on 3/20/92 by dissolving 37.5 g oxalic acid in 500 ml DIW.
- The purpose of this leaching is to remove as much of the Fe + Mn-oxides as possible while leaving the quartz undisturbed, so that the potential for preparation of double-polished fluid inclusion plates from these samples may be evaluated.
- Leaching began at ~3:00 pm on 3/20/92.

3/23/92 9:00 AM ECP
Samples examined. Most FeOx and MnOx removed, some remains. Samples drained, rinsed in tap water and immersed in fresh oxalic acid as above.

4/30/92 ECP
Samples drained, rinsed in tap water + dried at room temperature, essentially all FeOx + MnOx HAS been removed. Only a minor amount of some white clay-like material remains adhered to the quartz. Cleaning considered completed for practical purposes.

alkalinity Determination

3/25/92 BWL

The samples collected from borehole BH-12 at the Nopal I site at Peña Blanca Mexico will be analyzed for alkalinity using EPA Methods for Chemical Analysis of Water and Wastes Method 310.1 (Titrimetric, pH 4.5) alkalinity

Summary of Method: An unaltered sample is titrated to an electrometrically determined endpoint of pH 4.5.

Apparatus: Accumet 1002 pH/mV meter with pH/ATC electrode (13-620-111)

pH=7 Buffer (Lot. # 913238-24)

pH=4 Buffer (Lot # 910359-24)

SPEX QC Sample QCS-MIN Batch 1324 pH sample

SPEX QC Sample Mineral B (Batch 1321) and Mineral A (Batch 1320) prepared 02/7/76.

Gilmont 2ml Micrometer Buret S-1200-A

Volumetric pipets 5, 10, 25, 50, 100 ml Class A

0.02N Sulfuric acid Lot D43526

25ml of SPEX mineral sample will be used and the sample will also be 25ml at first try.

Spex Minerals sample (QC) will be made by 2ml of Mineral A & 2ml of Mineral B diluted to 200ml. 2ml volumetric pipets were used to transfer aliquots to the 200ml volumetric flask.

3/31/92 BWL

Anion Results Division 1 (Peña Blanca 3/92 sampled)

	Sample ID	F (ppm)	Cl (ppm)	NO_3 (ppm)	PO_4 (ppm)	SO_4 (ppm)
☆	3171	1.16	3.62	<0.002	1.63	4.48
☆	3173	1.05	3.43	<0.002	1.69	4.34
	BH-12-3	1.57	3.00	2.48	<0.10	7.33
	BH-12-3 (A)	—	—	—	—	39
☆	3172	<0.01	<0.02	<0.002	<0.003	<0.02
☆	3174	<0.01	<0.02	<0.002	<0.003	<0.02
☆	3175	1.14	3.72	<0.002	1.96	3.57
	Known value	1.0	51.4	9.94	10.04	20.0
	Difference	+14%	-93%		-80.5%	-82.15%

☆ The samples submitted from the most recent Peña Blanca trip 3/92. Their identities are given on pg 76 of this notebook. #s 3171 & 3173 are duplicates of fluid from Borehole 12 from the sampling in March. These values show >10% reproducibility. They are compared to the value of BH-12-3 & BH-12-3 (A) which is a reanalysis by turbidity for SO_4 (pg 55) of the sample collected in September from the same borehole. Both F & Cl are considered to be conservative and values should remain constant. The values for F & Cl between the two trips vary by -30% and +15%, respectively. The concentrations of PO_4, NO_3 & SO_4 were expected to be different since the water had gone anoxic. We would expected lower SO_4 concentrations if S_{total} is fixed and there was some H_2S (which there was). That PO_4 is higher is not surprising since CH_2O (organic matter) decomposition should release N, P, C due to oxidation. Nitrate has been presumably entirely utilized during organic matter oxidation (Froelich et al 1979). The sulfate value will be

Geochim. Cosmochim Acta, 43, 1075-1090.

checked via a turbidimetric ~~series~~ BWL 2/31/92 reanalysis (0341/55). It is extremely disconcerting nonetheless that Division 1 can not seem to reproduce an EPA Quality Control Sample. Samples 3172 & 3174 represents nanopure H_2O from Bldg 57 and quarty-distilled H_2O from UACA respectively, and thus it is reassuring that no anions were detected.

4/9/92 BWL

Alkalinity Determination Peña Blanca Fluids 3/92

Continued from page 70.

a rough titration using 25 ml of SPEX Alkalinity Minerals QC Sample was completed. 0.900 BWL 4/9/92

These results below showed that 4.22 ml of 0.02N H_2SO_4 would bring the sample to 4.22 pH. This rough titration should where the titration should end.

The following calculation is used (EPA Method 310.1)

$$\text{Alkalinity total (mg/l) } CaCO_3 = \frac{(2B-C) \times N \times 50{,}000}{\text{ml of sample}}$$

where B = ml of titrant to 1st recorded pH in range 4.3–4.6
C = total ml titrant to reach 0.3 pH units lower
N = normality of acid.

For Spex sample run today from data on following page we see that the total alkalinity is calculated to be

$$\text{Alk total} = \frac{(2(1.400) - 1.468)(.02)(50{,}000)}{50} = 26.64$$

The true value of the sample is 24.2 mg/l with 95% confidence interval being 21.5 – 27.4. Thus the QC sample is within the 95% CI.

For the 25 ml sample 92-3/BH-12 Total alk = 266.16 mg/l $CaCO_3$
BWL 4/9/92 ~~50~~ 25 ml sample 92-3/BH-12 " " 266.28 mg/l $CaCO_3$

Avger. Total alkalinity = 266.22 mg/l $CaCO_3$

$$\text{Alkalinity as meq equivalent/l} = \frac{(X \text{ mg/l } CaCO_3)}{100} \times (2)$$

5.32×10^{-3} eq/liter ⇒ 324.79 ppm HCO_3

4/13/92 BWL Alkalinity Data & Summary

Alkalinity 3/92

Sample Identity			Spex Alkalinity sample 50 ml		
Spex Alkalinity sample 25 ml			ml Acid	pH	
ml Acid	pH		0.000	7.90	
0.000	7.7		0.200	7.28	
0.200	6.86		0.300	7.26	
0.250	6.78		1.400	4.60	
0.300	6.66		1.468	4.30	
0.400	6.42				
0.500	6.27		Date	9-Apr-92	
0.600	5.97				
0.700	5.67				
0.800	5.11	92-3/BH-12 sample 50 ml		92-3/BH-12 sample ~~50~~ 25 ml BWL 4/13/92	
0.900	4.22	ml Acid	pH	ml Acid	pH
Date	25-Mar-92	0.000	7.09	6.300	5.27
		0.200	7.05	6.400	5.19
92-3/BH-12 sample 25 ml		0.400	6.95	6.500	5.08
ml Acid	pH	0.600	6.89	6.600	4.96
0.000	7.09	0.800	6.83	6.700	4.84
0.500	6.91	1.000	6.77	6.800	4.67
1.000	6.76	1.200	6.72	6.890	4.50
1.500	6.63	1.400	6.67	6.943	4.37
2.000	6.52	1.600	6.62		
2.500	6.40	1.800	6.58	Date	9-Apr-92
3.000	6.29	2.000	6.54		
3.500	6.18	2.200	6.49		
4.000	6.07	2.400	6.45		
4.500	5.95	2.600	6.40		
5.000	5.82	2.800	6.36		
5.500	5.64	3.000	6.32		
6.000	5.42	3.400	6.23		
6.200	5.32	3.600	6.18		
6.400	5.16	3.800	6.14		
6.500	5.07	4.000	6.10		
6.600	4.96	4.400	6.00		
6.700	4.84	4.800	5.89		
6.750	4.75	5.000	5.83		
6.800	4.66	5.200	5.77		
6.882	4.50	5.400	5.70		
6.946	4.36	5.500	5.67		
		5.700	5.59		
Date	9-Apr-92	6.000	5.45		
		6.100	5.39		
		6.200	5.33		

4/13/92

Total alkalinity as $CaCO_3$ mg/l = 266.22
alkalinity as HCO_3 ppm = 324.78

EAP

4/30/92 Additional Whole Rock Analyses (see page 75)

Results are acceptable subject to the discussion recorded earlier (see pages 17 - 19 here.

Comparison of current analyses of the Tn formation with earlier analyses shows substantial similarities. Samples were collected some kilometers apart indicating good lateral homogeneity of major oxide composition.

EAP 4/30/92

Whole Rock Analyses of Pena Blanca rocks by Texas Tech March 1992							
	TN	TCO	TA	STD	=5912	TA =3101	STD
Wt%	3101	3102	3103	3104	3105	3106	3107
SiO2	73.42	59.57	76.55	72.80	74.22	74.44	72.14
TiO2	0.24	0.15	0.22	0.26	0.24	0.24	0.23
Al2O3	13.08	10.85	11.76	13.75	12.54	12.68	14.07
FeO							
Fe2O3 T	1.47	1.96	1.44	1.92	1.52	1.44	2.10
MnO	0.05	0.09	0.03	0.04	0.05	0.04	0.06
MgO	0.13	0.53	0.05	0.29	0.14	0.12	0.25
CaO	0.46	10.31	0.09	1.22	0.49	0.35	0.98
Na2O	1.57	0.11	0.98	4.20	1.11	1.49	4.80
K2O	6.81	4.34	7.09	4.20	6.29	6.76	3.92
P2O5	2.00	0.04	0.03	0.05	0.07	0.04	0.05
LOI	2.44	11.82	1.65	1.07	2.82	2.25	0.67
Total	99.73	99.77	99.89	99.80	99.49	99.85	99.27

Whole Rock Analyses of Pena Blanca rocks by Texas Tech March 1992							
ppm	3101	3102	3103	3104	3105	3106	3107
Sc	2.4	3.4	2.3	4.80	3.1	2.6	4.9
V	13	19	22	12	17	14	8
Cr	0	0	0	0	0	0	0
Ni	0	0	0	0	0	0	0
Cu	2	2	3	9	3	5	5
Zn	29	43	19	35	29	30	49
Nb	34	33	37	11	32	36	20
Y	47.2	42.6	39.8	26.7	36.6	43.1	49.1
Zr	267	168	232	221	230	237	284
Ba	384	44	66	862	164	330	931
Rb	375	187	382	149	293	374	125
Sr	41	237	21	106	70	37	63

Intial Entries 5/26/92 By Jose M Garcia JMG

The sample rocks from Peña Blanca, Mexico gathered on 5/22/92 and 5/23/92. These samples were organized in the order of their location in Peña Blanca. One by one, each sample was tested with the contact scintillation meter. The sample rocks with 0.5 mRem/hr and more were set aside to let them in the outside room. The rest of the rocks with less then 0.5 mRem/hr were organized to be taken into the building. Sample custody entry forms were written for each rock sample.

5/27/90
JMG

Sample rocks of Peña Blanca, Mexico gathered on 5/22/92 and 5/23/92. Labels of some rock locations were placed on box covers for storage in the building. The sample rocks of North-South + East-West lines were placed in new plastic bags. The Random samples are still not in new bags.

5/28/92
JMG

Sample rocks of Peña Blanca, Mexico gathered on 5/22/92 and 5/23/92. Labels of the rest of the sample rock locations were placed on boxes. The random samples were placed in new plastic bags. The mass of all of each sample was taken and recorded in the sample custody forms. The sample rocks with low radiation, that is less then 0.5 mRem/hr were stored in the main building. The sample rocks with high radiation were stored in the outside portable building.

6/2/92
BWL

Sample preparation for whole rock & gamma spectrometry. Portions of rock samples will be powdered

First sample NOPI-ECP-22.5/19.55-WR which represents an aliquot representative of NOPI-ECP-22.5/19.55 that has been powdered. This sample is a kaolinitized tuff

wt sample+vial 39.6243 g
wt vial 11.0206 g

wt sample 28.6037 g

6/2/92
JMG

Second sample NOPI-ECP-22.65/18.85-WR which represents an aliquot representative of NOPI-ECP-22.65/18.85 that has been powdered.

wt sample + VIAL 29.4638 g
wt. VIAL 10.9889 g

wt. sample 18.4749 g

Third sample NOPI-ECP-22.85/20.1-WR which represents an aliquot representative of NOPI-ECP-22.85/20.1 that has been powdered.

wt sample + vial 31.9780 g
wt vial 10.8764 g

wt sample 21.1016 g

fourth sample NOPI-ECP-22.85/20.85-WR which represents an aliquot representative of NOPI-ECP-22.85/20.85 that has been powdered.

wt. sample + VIAL 35.7707 g
wt. vial 11.1411 g

wt. sample 24.6296 g

6/2/92
BWL

The following are the descriptions of the aliquots taken for whole rock and gamma spectrometry. Each sample was selected to be representative of the bulk sample rock, except as noted.

NOPI-ECP-22.65/18.85-WR is a hematite and limonite stained kaolinitized tuff.

NOPI-ECP-22.85/20.1-WR is a hematite-kaolinite vein in the kaolinitized tuff.

NOPI-ECP-22.85/20.85-WR is a kaolinitized tuff

NOPI-ECP-22.4/21.4-WR is a very limonitic kaolinitic tuff and incorporates a kaolinite and limonite fracture

NOPI-ECP-22.7/21.8-WR is a kaolinitized tuff

NOPI-ECP-22.3/18.3-WR is a kaolinitized tuff.

NOPI-ECP-22.85/17.85-WR is a slightly hematitic kaolinitized tuff.

NOPI-ECP-22.25/17.15-WR is a kaolinitized tuff.

NOPI-ECP-22.5/16.55-WR is a hematitic, kaolinitic tuff with U^{+6} minerals

NOPI-ECP-22.6/15.85-WR is a hematitic, kaolinitic tuff with U^{6} mineral

NOPI-ECP-22.35/15.3-WR is a kaolinitic, hematitic tuff.

6/3/92 JMG

5th sample NOPI-ECP - 22.4/21.4-WR which represents an aliquot representative of NOPI-ECP-22.4/21.4 that has been powdered.

wt. sample + vial 35.7353 g
wt vial 10.8264 g

wt sample 24.9089 g

6th sample NOPI-ECP - 22.7/21.8-WR which represents an aliquot representative of NOPI-ECP-22.7/21.8 that has been powdered.

wt. sample + vial 40.5961 g
wt vial 10.9037 g

wt sample 29.6924 g

7th sample NOPI-ECP - 22.3/18.3 - WR which represents an aliquot representative of NOPI-ECP-22.3/18.3 that has been powdered.

wt. sample + vial 43.3661 g
wt. vial 11.0014 g

wt sample 32.3647 g

8th sample NOPI-ECP - 22.85/17.85-WR which represents an aliquot representative of NOPI-ECP-22.85/17.85 that has been powdered.

wt sample + vial 36.9118 g
wt. vial 11.0301 g

wt sample 25.8817 g

9th sample NOPI-ECP - 22.25/17.15-WR which represents an aliquot representative of NOPI-ECP-22.25/17.15 that has been powdered

wt sample + vial 37.7231 g
wt. vial 10.9499 g

wt sample 26.8232 g

10th sample NOPI-ECP - 22.5/16.55-WR which represents an aliquot representative of NOPI-ECP-22.5/16.55 that has been powdered.

wt. sample + vial 35.2444 g
wt. vial 10.9668 g

wt. sample 24.2776 g

6/3/92
BWL

While making the powdered sample NOPI-ECP-22.5/16.55-WR it was noticed that a portion of the bulk rock NOPI-ECP-22.5/16.55 contained some highly mineralized zones.

a subsample of this highly mineralized area was taken as sample NOPI-ECP-22.5/16.55-A and observed under the binocular microscope. Several regions contained euhedral crystals of uranium bearing minerals (yellow acicular crystals, perhaps uranophane). More importantly these areas were highly open veinlets. There appears to be some highly vitreous brown/red leaf-like minerals coexisting with the U⁺⁶ minerals.

With the metal pick several (3) fragments were pulled away from the open vuggy veinlets. This will form a subsample that will be used for XRD & further study. These 3 clusters of crystals will be sample NOPI-ECP-22.5/16.55-A-SEPI.
These samples clusters of acicular yellow minerals (uranophane?) and petals of brown-red mineral (jarosite?) appear as if they are flowers. A tentative identification of the brown-red mineral as jarosite is constructed with form, color and luster and hardness of mineral. It is translucent. It's surface appears to be coated in places by black droplets. These are probably hematite.

6/4/92
JMG

11th sample NOPI-ECP-22.6/15.85-WR which represents an aliquot representative of NOPI-ECP-22.6/15.85 that has been powdered.

wt.	sample + vial	35.9420g
wt	vial	10.9831g
	wt sample	24.9589g

12th sample NOPI-ECP-22.35/15.3-WR which represents an aliquot representative of NOPI-ECP-22.35/15.3 that has been powdered.

wt.	sample + vial	40.6622g
wt.	vial	10.9980g
	wt. sample	29.6642g

BWL
6/4/92

NOPI-ECP-7.45/7.9-WR is split of NOPI-ECP-7.45/7.9 which is a slightly altered tuff. It contains small patches of kaolinite.

NOPI-ECP-8.15/8.0-WR is a split of bulk rock sample ~~NOPI-ECP-7.45~~ BWL 6/4/92 NOPI-ECP-8.15/8.0. It is altered tuff with kaolinite and some limonite and hematite staining.

NOPI-ECP-9.0/7.5-WR is a split of bulk rock sample NOPI-ECP-9.0/7.5. It is an altered (kaolinitic) tuff. It is pervasively altered and has hematitic & limonitic (pink) staining throughout, without visible veining of iron minerals.

JMG
6/4/92

13th sample NOPI-ECP-7.45/7.9-WR which represents an aliquot representative of NOPI-ECP-7.45/7.9 that has been powdered.

wt	sample + vial	43.2967g
wt	vial	10.9970g
	wt sample	32.2997g

6/4/92 BWL

NOPI-ECP-9.7/7.35-WR is a split of bulk rock sample NOPI-ECP-9.7/7.35. It is a highly hematized kaolinitic altered tuff. Clear and distinct patches of hematite and kaolinite under binocular microscope.

NOPI-ECP-10.3/7.7-WR is a subsample of bulk rock sample ~~NOPI-ECP-9.7/7.~~ BWL 6/4/92 NOPI-ECP-10.3/7.7. It is a kaolinitized slightly limonitic tuff.

NOPI-ECP-10.8/7.8-WR is a subsample of bulk rock sample NOPI-ECP-10.8/7.8. It is an altered tuff containing kaolinite and limonite with minor hematite.

6/4/92 JMG

14th sample NOPI-ECP-8.15/8.0-WR which represents an aliquot representative of NOPI-ECP-8.15/8.0 that has been powdered.

wt. sample + vial 44.2821 g
wt. vial 11.1455 g
wt sample 33.1366 g

15th sample NOPI-ECP-9.0/7.5-WR which represents an aliquot representative of NOPI-ECP-9.0/7.5 that has been powdered.

wt. sample + vial 42.4970 g
wt. vial 10.9895 g
wt sample 31.5075 g

- sample NOPI-ECP-9.0/7.5-WR was too wet and it was very hard in the powdering apparatus so it is placed in the oven for drying and then for repowdering.

6/4/92 BWL

Preparation for drying samples. Porcelain crucibles were washed and rinsed with deionized H_2O and dried in drying oven. Crucible were placed in dessicator to cool. Dessicator contains Drierite (indicating)

A drying oven that has metal probe-type thermometer will be used.

A Sybron/Thermolyne Thermolyne Oven/Incubator SN # 2280 1386 Model OV 11225 will be used a Weston/Schlumberger metal probe thermometer 2788280 CH-8 will be used to monitor temperature

The temperature is cross-calibrated with calibrate thermometer #3313. A water bath was used to obtain constant temperature readings. The two thermometers measured the same temperature at 25, 55 & 92 °C. The metal probe is accurate ± 1°C, with divisions every 2°C. The thermolyne oven was run at following settings and allowed to maintain the temperature for 20 minutes. Temperature measured w/ metal probe.

Thermostat Setting	Temp °C
5	68
6	76
7	82
8	94
9	100
10	110
11	110
12	114
13	120

The crucibles will be weighed and the samples immediately added to the labeled crucibles. The weight of the crucible and sample powder will be recorded. The samples will be dried for 24 hours at 110 °C., placed in a dessicator to cool and reweighed.

6/4/92
BWL

Sample ID	Crucible #	wt Crucible grams	Before Drying crucible+sample grams	After Drying crucible+sample grams
NOPI-ECP-22.3/18.3-WR	1	30.0531	62.4155	62.2322
NOPI-ECP-22.85/20.1-WR	2	30.8300	51.9209	51.6143
NOPI-ECP-22.65/18.85-WR	3	31.8964	50.3615	50.1766
NOPI-ECP-22.5/19.55-WR	4	30.8730	59.4400	58.9600
NOPI-ECP-22.85/20.85-WR	5	45.8370	73.6220	73.3361
NOPI-ECP-22.4/21.4-WR	6	44.1701	69.0668	68.7491
NOPI-ECP-22.7/21.8-WR	7	46.2657	75.9466	75.6643

NOPI-ECP-11.55/7.8-WR is a subsample of the bulk rock sample NOPI-ECP-11.55/7.8. It is a kaolinitized slightly altered tuff. Minor limonite staining.

NOPI-ECP-11.9/7.9-WR is a subsample of the bulk rock sample NOPI-ECP-11.9/7.9. It is a kaolinitized limonitic tuff. It contains abundant cryptocrystalline yellow uranium minerals.

6/5/92
BWL

NOPI-ECP-12.5/7.75-WR is a subsample of the bulk rock sample NOPI-ECP-12.5/7.75. It is a limonitic kaolinitic altered tuff. It contains much cryptocrystalline uranium minerals (yellow) and dispersed limonite.

NOPI-ECP-12.95/7.9-WR is a subsample of the bulk rock sample NOPI-ECP-12.95/7.9 which will be powdered. It is a very hematitic kaolitinized tuff. Its color is strongly red emphasizing the large extent of iron oxidation and there are some more discrete areas of yellow (U) mineralization.

NOPI-ECP-13.5/7.75-WR is a subsample of the bulk rock sample NOPI-ECP-13.5/7.75 which will be powdered. It is an extremely hematitic, slightly limonitic and kaolinitized tuff.

NOPI-ECP-13.95/8.0-WR is a subsample of the bulk rock sample NOPI-ECP-13.95/8.0 which will be powdered. It is an extremely hematitic slightly kaolintized tuff. It contains abundant uranium mineralization (yellow) Much of the uranium mineralization consists of acicular cryptals.

NOPI-ECP-14.45/7.95-WR is a subsample of the bulk rock sample NOPI-ECP-14.45/7.95 which will be powdered. It is a hematitic limonitic (both strong) kaolintized tuff and contains some extremely minor U mineralization.

NOPI-ECP-15.0/7.6-WR is a subsample of the bulk rock sample NOPI-ECP-15.0/7.6 which will be powdered. It is a strongly hematitic, less limonitic, kaolinitized tuff. This split doesn't appear to contain U-bearing (yellow) minerals.

NOPI-ECP-15.6/7.7-WR is a subsample of the bulk rock sample NOPI-ECP-15.6/7.7 which BWL 6/5/92 will be powdered. It is an extremely hematitic, slightly kaolinitic tuff.

6/5/92 JP

Preparation of quartz for fluid inclusion analysis

Quartz crystals collected from the Nopal Formation (NOPI-ECP-39) were mounted in an epoxy resin. After hardening the epoxy mount was taken to Div 06 for sectioning by Jerry Siebert. An ISOMET precision saw was used to cut approximately 100 μm thick sections from the mount.

The ~100 μm thick quartz crystals were removed from the epoxy mounts and polished using diamond pastes and alumina micropolish.

6/5/92 BWL

The following samples had been dried for 24 hours @ 110°C and then quickly placed into a dessicator to cool. Gamma spectrometry vials were filled full. The following samples which are subsamples of the powdered bulk are given below. The sample weights used in the calculation of radioactivity per gram is given in the last column.

Mass of samples used for gamma spectrometry.

Sample #	Vial wt. (g)	Sample + Vial (g)	Sample Mass (g)
NOPI-ECP-22.3/18.3-WR-GAM	2.1014	5.9750	3.8736
NOPI-ECP-22.85/20.1-WR-GAM	2.0818	6.2898	4.2080
NOPI-ECP-22.65/18.85-WR-GAM	2.0812	5.6506	3.5694
NOPI-ECP-22.5/19.55-WR-GAM	2.1194	6.1442	4.0248
NOPI-ECP-22.85/20.85-WR-GAM	2.0832	6.1482	4.065
NOPI-ECP-22.4/21.4-WR-GAM	2.0965	6.1256	4.0291
NOPI-ECP-22.7/21.8-WR-GAM	2.0947	6.0290	3.9343

Vials sealed on June 5, 1992 by Bret Leslie

These samples will be counted via a gamma spectrometer and further details are given in the Radioactivity Lab notebook and in the data collection notebook (binder gamma spectrometer/samples (vol 1).

6/8/92
BWL

Sample ID	Crucible#	Crucible wt grams	Before Drying Powder + crucible grams	After Drying Powder + Crucible grams
NOPI-ECP-22.35/15.3-WR	1	30.0529	59.7094	59.4774
NOPI-ECP-22.6/15.85-WR	2	30.8298	55.7939	55.5391
NOPI-ECP-22.5/16.55-WR	3	31.8961	56.1845	55.9945
NOPI-ECP-22.25/17.15-WR	4	30.8716	57.6714	57.3323
BWL 6/8/92 ~~NOPI-ECP-8.15~~ NOPI-ECP-22.85/17.85-WR	5	45.8328	71.6985	71.4468
NOPI-ECP-8.15/8.0-WR	6	44.1698	77.2832	76.8078
NOPI-ECP-7.45/7.9-WR	7	46.2654	78.5415	78.1407

BWL
6/8/92
JMG

Samples into oven 110°C for 24 hour drying period

16th sample NOPI-ECP-9.7/7.35-WR which represents an aliquot representative of NOPI-ECP-9.7/7.35 that has been powdered.

wt. sample + vial 42.4340 g
wt. vial 11.0345 g
wt. sample 31.3995 g

17th sample NOPI-ECP-10.3/7.7-WR which represents an aliquot representative of NOPI-ECP-10.3/7.7 that has been powdered.

wt. sample + vial 51.2486 g
wt. vial 10.9547 g
wt. sample 40.2939 g

Sample NOPI-ECP-10.3/7.7-WR came out to be hard after powdering because of the water in it so it is placed into oven for repowdering later. Portion rock samples NOPI-ECP-10.8/7.8-WR, NOPI-ECP-11.55/7.8-WR, and NOPI-ECP-12.5/7.75-WR were place in oven, because droplets of water were inside the plastic bags.

6/8/92
BWL

Further sampling of bulk rock samples in anticipation of powdering them for gamma spectrometry.

NOPI-ECP-22.7/25.25-WR is a subsample of the bulk rock sample NOPI-ECP-22.7/25.25 which will be powdered. It is a strongly kaolinitized, lightly limonitic altered tuff.

NOPI-ECP-22.5/24.6-WR is a subsample of the bulk rock sample NOPI-ECP-22.5/24.6 which will be powdered. It is a moderately kaolinitized, moderately limonitized and slightly hematitic altered tuff.

NOPI-ECP-22.8/23.75-WR is a subsample of the bulk rock sample NOPI-ECP-22.8/23.75 which will be powdered. It is a strongly hematized, moderately limonitized, moderately kaolinitic altered tuff. Portions of the sample have very distinct regions of iron minerals with visible gradations between various iron phase and-base areas are also associated with nice pockets of kaolinite.

NOPI-ECP-22.7/23.0-WR is a subsample of the bulk rock sample NOPI-ECP-22.7/23.0 which will be powdered. It is a very strongly hematized, moderately limonitized, strongly kaolinitized altered tuff. The iron mineralization occurs dispersed as well as in veins and vuggy-like pockets were it is well-defined.

NOPI-ECP-22.6/22.4-WR is a subsample of the bulk rock sample NOPI-ECP-22.6/22.4 which will be powdered. It is a very strongly kaolinitized, lightly limonitic altered tuff.

NOPI-ECP-22.1/14.65-WR is a subsample of the bulk rock sample NOPI-ECP-22.1/14.65 which will be powdered. It is a strongly kaolinitic, strongly limonitic, moderately hematitic altered tuff. A separate sub-sample of two distinct U-bearing minerals from a vug. This sample is NOPI-ECP-22.1/14.65-SEP1. It will be later analyzed by XRD after further purification. It appears without calcite.

6/8/92 18th sample NOPI-ECP-10.8/7.8-WR which represents
JMG an aliquot representative of NOPI-ECP-10.8/7.8
that has been powdered.

wt. sample + vial 48.7447 g
wt. vial 10.9967 g
wt. sample 37.7480 g

6/8/92 NOPI-ECP-22.6/13.6-WR is a subsample of the bulk rock sample NOPI-ECP-22.6/13.6
BWL that will be powdered. It is a extremely brecciated, extremely hematized, extremely limonitized, extremely kaolinitized altered tuff. It contains minor to nonvisible. A subsample for XRD containing 0% mineral + iron oxide is placed into vial as NOPI-ECP-22.6/13.6-SEP1

6/8/92 19th sample NOPI-ECP-11.55/7.8-WR which represents
JMG an aliquot representative of NOPI-ECP-11.55/7.8
that has been powdered.

wt. sample + vial 49.1339 g
wt. vial 10.9979 g
wt. sample 38.1360 g

20th sample NOPI-ECP-11.9/7.9-WR which represents
an aliquot representative of NOPI-ECP-11.9/7.9 that
has been powdered.

wt. sample + vial 32.0361 g
wt. vial 11.1422 g
wt. sample 20.8939 g

6/9/92 The following samples had been dried for 24 hours at 110°C
BWL and then quickly placed into a dessicator to cool. Gamma spectrometry vials were filled full. The following samples which are subsamples of the powdered bulk rock are given below. The sample weights used in the calculation of radioactivity per gram is given in the last column.

Mass of samples used for gamma spectrometry.

Sample #	Vial wt. (g)	Sample + Vial (g)	Sample Mass (g)
NOPI-ECP-22.35/15.3-WR-GAM	2.0917	5.9644	3.8727
NOPI-ECP-22.6/15.85-WR-GAM	2.0823	6.7576	4.6753
NOPI-ECP-22.5/16.55-WR-GAM	2.1022	6.4463	4.3441
NOPI-ECP-22.25/17.15-WR-GAM	2.0857	6.4796	4.3939
NOPI-ECP-22.85/17.85-WR-GAM	2.0855	6.472	4.3865
NOPI-ECP-8.15/8.0-WR-GAM	2.0926	7.2848	5.1922
NOPI-ECP-7.45/7.9-WR-GAM	2.0971	7.0236	4.9265

Vials sealed on June 9, 1992 by Bret Leslie

These samples will be counted via a gamma spectometer and further details are given in the Radioactivity Scientific Notebook and in the data collection binder Gamma Spectrometer / Samples (Volume 1).

6/9/92 21th sample NOPI-ECP-12.5/7.75-WR which represents
JMG an aliquot representative of NOPI-ECP-~~12.5/7.5~~ 12.5/7.75 JMG 6/19/92
that has been powdered.

wt. sample + vial	44.8491 g
wt. vial	10.8260 g
wt. sample	34.0231 g

22nd sample NOPI-ECP-12.95/7.9-WR which represents
an aliquot representative of NOPI-ECP-12.95/7.9
that has been powdered.

wt. sample + vial	43.4743 g
wt. vial	10.9834 g
wt. sample	32.4909 g

23rd sample NOPI-ECP 13.5/7.75-WR which represents
an aliquot representative of NOPI-ECP-13.5/7.75 that
has been powdered.

wt. sample + vial	46.4971 g
wt. vial	10.9481 g
wt sample	35.5490 g

24th sample NOPI-ECP 13.95/8.0-WR which represents
an aliquot representative of NOPI-ECP 13.95/8.0
that has been powdered.

wt. sample + vial	45.5453 g
wt vial	11.1419 g
wt sample	34.4034 g

25th sample NOPI-ECP-14.45/7.95-WR which represents
an aliquot representative of NOPI-ECP 14.45/7.95 that
has been powdered.

wt. sample + vial	44.8657 g
wt. vial	10.9514 g
wt sample	33.9143 g

26th sample NOPI-ECP-15.0/7.6-WR which represents
an aliquot representative of NOPI-ECP-15.0/7.6
that has been powdered.

wt. sample + vial	45.6492 g
wt. vial	10.8983 g
wt. sample	34.7509 g

27th sample NOPI-ECP-15.6/7.7-WR which represents
an aliquot representative of NOPI-ECP-15.6/7.7
that has been powdered.

wt. sample + vial	46.5180 g
wt. vial	10.9849 g
wt. sample	35.5331 g

28th sample NOPI-ECP-22.6/22.4-WR which represents
an aliquot representative of NOPI-ECP 22.6/22.4
that has been powdered

wt. sample + vial	45.2551 g
wt. vial	11.1843 g
wt. sample	34.0708 g

29th sample NOPI-ECP-22.7/23.0-WR which represents
an aliquot representative of NOPI-ECP-22.7/23.0
that has been powdered

wt. sample + vial	49.6773 g
wt. vial	10.9529 g
wt. sample	38.7244 g

6/9/92
BWL

Sample ID	Crucible #	Crucible wt. grams	Before Drying Crucible + Powder grams	After Drying Crucible + Powder grams
NOPI-ECP-9.0/7.5-WR	1	30.0530	61.5610	61.4356
NOPI-ECP-9.7/7.35-WR	2	30.8299	62.2099	61.7922
NOPI-ECP-10.3/7.7-WR	3	31.8965	72.1942	72.1088
NOPI-ECP-10.9/7.8-WR	4	30.8725	68.6213	68.5376
NOPI-ECP-11.55/7.8-WR	5	45.8350	83.9756	83.8905
NOPI-ECP-11.9/7.9-WR	6	44.1705	65.0662	64.8375
NOPI-ECP-12.5/7.75-WR	7	46.2671	80.2763	80.1645

Samples into oven for a 24-hour drying period @ 17:30

6/10/92
BWL

Further sampling of bulk rock samples in anticipation of powdering them for gamma spectrometry

NOPI-ECP-6.2/8.1-WR is a subsample of the bulk rock sample NOPI-ECP-6.2/8.1 which will be powdered. It is lightly kaolinitic altered tuff.

6/10/92
JMd

30th sample NOPI-ECP-22.8/23.75-WR which represents an aliquot representative of NOPI-ECP-22.8/23.75 that has been powdered.

wt. sample + vial	46.5800 g
wt. vial	11.0247 g
wt. sample	35.5553 g

31st sample NOPI-ECP-22.5/24.6-WR which represents an aliquot representative of NOPI-ECP-22.5/24.6 that has been powdered.

wt. sample + vial	47.9326 g
wt. vial	11.1404 g
wt. sample	36.7922 g

32nd sample NOPI-ECP-22.7-/25.25-WR which represents an aliquot representative of NOPI-ECP-22.7/25.25 that has been powdered.

wt. sample + vial	45.1776 g
wt. vial	10.9156 g
wt. sample	34.2620 g

6/10/92
BWL

NOPI-ECP-5.2/7.5-WR is a subsample of the bulk rock sample NOPI-ECP-5.2/7.5 which will be powdered. It is a slightly limonitized slightly kaolinitic altered tuff. The patches of iron staining is localized and at times represent oxidation of magnetite (magnetic mineral). Contains some incorporated fragments, one of which contained a oxidizing iron fragment with possible U mineralization. A subsample of this was made and is NOPI-ECP-5.2/7.5-SEPI

6/11/92 BWL

The following samples had been dried for 24 hours @ 110°C and then quickly placed into a dessicator to cool. Gamma spectrometry vials were filled full. The following samples which are subsamples of the powdered rock are given below. The sample weights used in the calculation of radioactivity per gram is given in the last column.

Mass of samples used for gamma spectrometry.

Sample #	Vial wt. (g)	Sample + Vial (g)	Sample Mass (g)
NOPI-ECP-9.0/7.5-WR-GAM	2.0893	6.4407	4.3514
NOPI-ECP-9.7/7.35-WR-GAM	2.1137	7.0257	4.9120
NOPI-ECP-10.3/7.7-WR-GAM	2.1131	6.4940	4.3809
NOPI-ECP-10.8/7.8-WR-GAM	2.0952	6.5276	4.4324
NOPI-ECP-11.55/7.8-WR-GAM	2.0987	8.7524	6.6537
NOPI-ECP-11.9/7.9-WR-GAM	2.1078	6.4538	4.3460
NOPI-ECP-12.5/7.75-WR-GAM	2.0918	6.3182	4.2264

Vials sealed on June 11, 1992 by Bret Leslie

These samples will be counted using gamma spectrometer system and further details are given in the Radioactivity Scientific Notebook and in the data collection binder Gamma Spectrometer / Samples (Volume 1).

	Sample ID	Crucible #	Crucible Wt grams	Before Drying Crucible + Powder grams	After Drying Crucible + Powder grams
12:30	NOPI-ECP-22.6/22.4-WR	1	30.0538	64.1065	63.5729
	NOPI-ECP-22.7/23.0-WR	2	30.8299	69.5368	68.3437
	NOPI-ECP-22.8/23.75-WR	3	31.8974	67.4379	66.8195
	NOPI-ECP-22.5/24.6-WR	4	30.8719	67.6495	67.1558
	NOPI-ECP-22.7/25.25-WR	5	45.8383	80.0624	79.7432
	NOPI-ECP-12.95/7.9-WR	6	44.1716	76.6525	76.2915
	NOPI-ECP-13.5/7.75-WR	7	46.2663	81.7978	81.3993

6/12/92 JMG

33rd sample NOPI-ECP-22.1/14.65-WR which represents an aliquot representative of NOPI-ECP-22.1/14.65 that has been pondered.

wt. sample + vial	45.9922 g
wt. vial	10.9003 g
wt. sample	35.0919 g

34th sample NOPI-ECP-22.6/13.6-WR which represents an aliquot representative of NOPI-ECP-22.6/13.6 that has been powdered.

wt. sample + vial	57.7728 g
wt. vial	41.1342 g
wt. sample	416.6386 g

6/15/92 BWL

Further sampling of bulk rocks in anticipation of powdering them for gamma spectrometry.

NOPI-ECP-4.0/7.75-WR is a subsample of the bulk rock sample NOPI-ECP-4.0/7.75 which will be powdered. It is a lightly hematitized, slightly limonitized, moderately kaolinitized altered tuff. It also appears to have some Mn-oxide staining (dendritic pattern).

NOPI-ECP-2.55/7.65-WR is a subsample of the bulk rock sample NOPI-ECP-2.55/7.65 which will be powdered. It is a lightly hematized, slightly limonitized, slightly kaolinitized altered tuff.

NOPI-ECP-16.4/7.9-WR is a subsample of the bulk rock sample NOPI-ECP-16.4/7.9 which will be powdered. It is an extremely hematized, moderately kaolinitized tuff. Kaolinite occurs as pseudomorphs after feldspars and as minor fissure filling. There is some minor glassy-like inclusions.

NOPI-ECP-17.0/7.5-WR is a subsample of the bulk rock sample NOPI-ECP-17.0/7.5 which will be powdered. It is an extremely hematized, lightly limonitized, moderately kaolinitized altered tuff. Kaolinite is as pseudomorphs after feldspars and as minor fissure-filling agglomerates.

6/16/92 BWL

Further sampling of bulk rocks in anticipation of powdering them for gamma spectrometry

NOPI-ECP-17.4/7.85-WR is a subsample of the bulk rock sample NOPI-ECP-17.4/7.85 which will be powdered. It is a strongly hematitic, moderately limonitic, moderately kaolinitic altered tuff. The kaolinite occurs as pseudomorphs after feldspars and as prominent fissure fillings. A particular well developed vein complex of kaolinite and and hard 1 cm thick iron mineral vein is ~~subsampled~~ BWL 6/16/92 subsampled for future analysis as mineral separates. The subsample is ~~NOPI-ECP-17.4/7.85-WR-SEP1~~ BWL 6/16/92 NOPI-ECP-17.4/7.85-SEP1

NOPI-ECP-18.05/7.9-WR is a subsample of the bulk rock sample NOPI-ECP-18.05/7.9 which will be powdered. It is an extremely hematitized, strongly kaolinitized, lightly limonitized altered tuff. It is highly brecciated and fractures are filled with kaolinite and ferric iron minerals. It has abundant well-defined vuggy areas and iron-mineralized veins. It has botryoidal hematite. A piece of the hematite was mounted for SEM analysis. It is stem #3 and will be analyzed on 6/18/92 by J. Prikyl. sample is NOPI-ECP-18.05/7.9-SEM1 BWL 6/19/92

6/16/92 35th sample NOPI-ECP-6.2/8.1-WR which represents an aliquot representative of NOPI-ECP-6.2/8.1 that has been powdered

wt. sample + vial 37.0307g
wt. vial 11.0897g
wt. sample 25.941g

36th sample NOPI-ECP-5.2/7.5-WR which represents an aliquot representative of NOPI-ECP-5.2/7.5 that has been powdered

wt. sample + vial 41.3167g
wt. vial 11.1576g
wt. sample 30.1591g

6/16/92 BWL NOPI-ECP-18.35/7.9-WR is a subsample of the bulk rock sample NOPI-ECP-18.35/7.9 which will be powdered. It is a strongly hematitized, strongly kaolinitized altered tuff.

6/17/92

My Name is Omar C. Lagunas and my initials are O.C.L.. My purpose in this project is to prepare and analyze rock samples for gamma spectrometry.

6/17/92
OCL

The following samples have been dried for twenty-four hours and then placed in a dessicator to cool. Next, the Gamma spectrometry vials were filled full. The following samples are subsamples of the powdered rock given below, and the sample weights used in the calculation of radioactivity per gram are given in the last column.

Mass of samples used for gamma spectrometry.

Sample #	Vial wt. (g)	Sample + Vial (g)	Sample Mass (g)
NOPI-ECP-22.6/22.4-WR-GAM	2.0973	6.3927	4.2954
NOPI-ECP-22.7/23.0-WR-GAM	2.1032	7.2195	5.1163
NOPI-ECP-22.8/23.75-WR-GAM	2.0814	6.8251	4.7437
NOPI-ECP-22.5/24.6-WR-GAM	2.0934	6.6702	4.5768
NOPI-ECP-22.7/25.25-WR-GAM	2.0811	6.2661	4.1850
NOPI-ECP-12.95/7.9-WR-GAM	2.0809	6.3309	4.2500
NOPI-ECP-13.5/7.75-WR-GAM	2.0983	6.5512	4.4529

Vials sealed on June 16, 1992 by Omar Lagunas

The above samples will be counted using gamma spectrometry system and further details are given in the Radioactive Scientific Notebook and in the data collection binder

Gamma Spectrometer | Samples (VOLUME ONE)

SAMPLE I.D.	CRUCIBLE #	CRUCIBLE WEIGHT (g)	BEFORE DRYING CRUCIBLE + POWDER (g)	AFTER DRYING CRUCIBLE + POWDER (g)
NOPI-ECP-13.95/8.0 WR	1	30.0531 ~~30.8718~~ 6/17/92 OCL	64.3837	62.9898
NOPI-ECP-14.45/7.95 WR	2	30.8298	64.3782	64.0726
NOPI-ECP-15.0/7.6 WR	3	31.8963	66.6044	65.9368
NOPI-ECP-15.6/7.7 WR	4	30.8718	66.4040	65.9789
NOPI-ECP-22.1/14.65 WR	5	45.8343	80.9212	80.3479
NOPI-ECP-22.6/13.6 WR	6	44.1702	90.7986	90.4294
NOPI-ECP-5.2/7.5 WR	7	46.2053	76.4065	~~76.10~~ 6/17/92 OCL 76.1159

OCL Sample of NOPI-ECP-4.0/7.75-WR WHICH REPRESENTS AN ALIQUOT REPRESENTATIVE OF NOPI-ECP-4.0/7.75- THAT WAS POWDERED.

WT. OF SAMPLE + VIAL 34.4475 g
WT. OF VIAL 10.8826 g
WT OF SAMPLE 23.5649 g

Sample of NOPI-ECP-16.4/7.9-WR WHICH REPRESENTS AN ALIQUOT REPRESENTATIVE OF NOPI-ECP- ~~4.0/7.75~~ 16.4/7.9 6/17/92 OCL THAT WAS POWDERED.

WT. OF SAMPLE + VIAL 42.1017 g
WT. OF VIAL 11.0112 g
WT. OF SAMPLE 31.0905 g

Sample of NOPI-ECP-17.0/7.5-WR WHICH REPRESENTS AN ALIQUOT REPRESENTATIVE OF NOPI-ECP-17.0/7.5 THAT WAS POWDERED

WT. OF SAMPLE + VIAL 40.4374
WT. OF VIAL 11.0005
WT. OF SAMPLE 29.4369

6/17/92 BWL NOPI-ECP-18.6/7.7-WR is a subsample of the bulk rock sample NOPI-ECP-18.6/7.7 which will be powdered. It is a moderately hematitized, moderately to slightly limonetized, strongly kaolinitized altered tuff.

BWL NOPI-ECP-19.0/7.8-WR is a subsample of the bulk rock sample NOPI-ECP-19.0/7.8 which will be powdered. It is a very strongly hematitized, strongly kaolinitized altered tuff. It contains abundant veins filled with kaolinite and iron-bearing minerals. A particularly vuggy area of iron-rich minerals was separated into a glass vial and will form the sample NOPI-ECP-19.0/7.8-SEP1. It contains possible jarosite

BWL NOPI-ECP-19.65/7.55-WR is a subsample of the bulk rock sample NOPI-ECP-19.65/7.55 which will be powdered. It is an extremely hematitic, moderately kaolinitic, slightly limonitic altered tuff. It has some highly mineralized (iron-bearing minerals & kaolinite) veins.

OCL Sample of NOPI-ECP-17.4/7.85 WR WHICH REPRESENTS AN ALIQUOT OF NOPI-ECP-17.4/7.85 THAT WAS POWDERED.

WT. SAMPLE + VIAL		44.5208 g
WT. VIAL	-	11.0087 g
WT. SAMPLE		33.5121 g

BWL NOPI-ECP-20.1/7.7-WR is a subsample of the bulk rock sample NOPI-ECP-20.1/7.7 which will be powdered. It is a strongly altered tuff. It contains V mineralization, abundant limonite, moderate hematite (in veins) and very abundant kaolinite in mm-cm wide fractures. Two mineral separates were made from a kaolinite fracture NOPI-ECP-20.1/7.7-SEP1 and from an iron mineral bearing vug NOPI-ECP-20.1/7.7-SEP2

OCL SAMPLE OF NOPI-ECP-18.05/7.9-WR WHICH REPRESENTS AN ALIQUOT OF NOPI-ECP-18.05/7.9 THAT WAS POWDERED.

WT. OF SAMPLE + VIAL		43.9427 g
WT. OF VIAL	-	10.8928 g
WT. OF SAMPLE		33.0499 g

BWL NOPI-ECP-20.65/7.55-WR is a subsample of the bulk rock sample NOPI-ECP-20.65/7.55 which will be powdered. It is a moderately limonitic, strongly kaolinitic, altered tuff.

OCL SAMPLE OF NOPI-ECP-18.35/7.9-WR WHICH REPRESENTS AN ALIQUOT OF NOPI-ECP-18.35/7.9 THAT WAS POWDERED.

WT. SAMPLE + VIAL		44.3413
WT. OF VIAL	-	11.0269 g
WT. OF SAMPLE		33.3144 g

6/18/92 OCL

SAMPLE OF NOPI-ECP - 2.55/7.65 WR WHICH REPRESENTS AN ALIQUOT OF NOPI-ECP - 2.55/7.65 THAT WAS PONDERED

WT. SAMPLE + VIAL _ 42.4489 g
WT. VIAL 10.9744 g
WT. SAMPLE 31.6745 g

OCL

SAMPLE OF NOPI-ECP - 18.6/7.7 - WR WHICH REPRESENTS AN ALIQUOT OF NOPI-ECP - 18.6/7.7 THAT WAS PONDERED.

WT. SAMPLE + VIAL _ 43.9909 g
WT. VIAL 10.8994 g
WT. SAMPLE 33.0915 g

OCL

SAMPLE OF NOPI-ECP - 19.0/7.8 - WR WHICH REPRESENTS AN ALIQUOT OF NOPI-ECP - 19.0/7.8 THAT WAS PONDERED.

WT. SAMPLE + VIAL _ 32.6268 g
WT. VIAL 10.9845 g
WT. SAMPLE 21.6423 g

OCL

SAMPLE OF NOPI-ECP - 19.65/7.55 - WR WHICH REPRESENTS AN ALIQUOT OF NOPI-ECP - 19.65/7.55 THAT WAS POWDERED.

WT. SAMPLE + VIAL _ 39.9783 g
WT. VIAL 10.9406 g
WT. SAMPLE 29.0377 g

OCL

SAMPLE OF NOPI-ECP - 20.1/7.7 - WR WHICH REPRESENTS AN ALIQUOT OF NOPI-ECP - 20.1/7.7 THAT WAS POWDERED.

WT. SAMPLE + VIAL _ 40.3195 g
WT. VIAL 11.0956 g
WT. SAMPLE 29.2239 g

6/18/92 BWL

NOPI-ECP-22.5/10.4-WR is a subsample of the bulk rock sample NOPI-ECP-22.5/10.4 which will be powdered. It is a slightly hematitized moderately limonitized, moderately to strongly kaolinitized, U^{+6}-mineral bearing altered tuff. The U^{+6} minerals are moderately abundant and occurs as both euhedral-laths of U minerals on surfaces and as intimately intergrown with limonitic staining.

NOPI-ECP-22.8/10.8-WR is a subsample of the bulk rock sample NOPI-ECP-22.8/10.8 which will be powdered. It is a strongly kaolinitized, moderately limonitized, moderately hematitized altered tuff. It contains veins of Fe-rich minerals with minor U^{+6} mineralization associated intimately with Fe or Mn oxides.

OCL

SAMPLE OF NOPI-EPC - 20.65/7.55 - WR WHICH REPRESENTS AN ALIQUOT OF NOPI-EPC - 20.65/7.55 THAT WAS POWDERED.

WT. SAMPLE + VIAL _ 44.0343 g
WT. VIAL 11.0100 g
WT. SAMPLE 33.0243 g

OCL

SAMPLE OF NOPI-EPC - ~~20.65~~ 6/18/92 OCL 22.5/10.4 - WR WHICH REPRESENTS AN ALIQUOT OF NOPI-EPC - 22.5/10.4 THAT WAS POWDERED.

WT. SAMPLE + VIAL _ 32.4358 g
WT. VIAL 11.0009 g
WT. SAMPLE 21.4349 g

OCL SAMPLE OF ~~NOPI-EP~~ 6/18/92 ocl NOPI-ECP-22.8/10.8-WR
WHICH REPRESENTS AN ALIQUOT OF NOPI-ECP-22.8/10.8
THAT WAS POWDERED.

WT.	SAMPLE + VIAL	34.6596 g
WT.	VIAL	10.9031 g
WT.	SAMPLE	23.7565 g

6/19/92 BWL Sample # NOPI-ECP-18.05/7.9-SEM1 which was analyzed on 6/18/92 by SEM was entered into the binder SEM & EDS of U ore samples Pena Blanca, Mexico. It was a botryoidal/reniform sample of Fe_2O_3. It contained no U, but some Pb. It was destroyed during and as part of the analysis. More of this type of texture is still available in the bulk sample NOPI-ECP-18.05/7.9.

NOPI-ECP-22.25/11.45-WR is a subsample of the bulk rock sample NOPI-ECP-22.25/11.45 which will be powdered. It is a very strongly kaolinitized with fissures and feldspar replacement kaolinite. It has moderately strong U^{+6} mineralization. It contains two different U phases. Predominately a pale yellow mineral as a surface coating with a few well-formed crystals. Occasionally it is recovered by an orange-yellow U mineral that is somewhat rare. It may worthwhile to make a separate if possible

NOPI-ECP-22.6/11.9-WR is a subsample of the bulk rock sample NOPI-ECP-~~22.25~~ WRCE BWL 22.6/11.9 which will be powdered. It is a moderately hematitic, lightly limonitic moderately kaolinitic altered tuff. It contains Fe-rich veins and vugs and some kaolinite fissures. It also contains minor ^{+6}U mineralization. A separate of a Fe-rich mineral vein which has jarosite and U^{+6} minerals intergrown was taken as NOPI-ECP-22.6/11.9-SEP1. This sample under optical and binocular microscope clearly shows that the uranium mineral (uranophane) which forms rectangular block crystals postdates and lies on top of Fe-bearing minerals which line the vug. The Fe-bearing is translucent and brown it is probably jarosite.

NOPI-ECP-22.8/12.95-WR is a subsample of the bulk rock sample NOPI-ECP-22.8/12.95 which will be powdered. It is a strongly limonitic, strongly hematitic, moderately U^{+6}, strongly kaolinitic altered tuff. Abundant kaolinite + U^{+6} fissures

6/19/92 BWL

NOPI-ECP-22.5/12.4-WR is a subsample of the bulk rock sample NOPI-ECP-22.5/12.4 which will be powdered. It is a uraninite bearing, very strongly U^{+6} bearing, moderately kaolinitic, slightly hematitic, slightly limonitic altered tuff. It is highly brecciated with fine mineral filled sample.

NOPI-ECP-16.0/14.4-WR is a subsample of the bulk rock sample NOPI-ECP-16.0/14.4 which will be powdered. It is moderately limonitic, moderately kaolinitic altered tuff. It has a moderate amount of U^{+6} mineral coating surfaces of fractures.

NOPI-ECP-17.1/15.2-WR is a subsample of the bulk rock sample NOPI-ECP-17.1/15.2 which will be powdered. It is an extremely hematitic, moderately kaolinitic, with strong U^{+6} mineralization, altered tuff.

6/19/92 JMC

Sample NOPI-ECP-22.25/11.45-WR which represents an aliquot representative of NOPI-ECP-22.25/11.45 that has been powdered.

wt. sample + vial 40.7944g
wt. vial 10.9764g
wt. sample 29.8180g

Sample NOPI-ECP-22.6/11.9-WR which represents an aliquot representative of NOPI-ECP-22.6/11.9 that has been powdered.

wt. sample + vial 41.3705g
wt. vial 11.1680g
wt. sample 30.2025g

Sample NOPI-ECP-22.8/12.95-WR which represents an aliquot representative of NOPI-ECP-22.8/12.95 that has been powdered.

wt. sample + vial 23.2997g
wt. vial 10.8936g
wt. sample 12.4061g

6/19/92 JMC

Sample NOPI-ECP-22.5/12.4-WR which represents an aliquot ~~of~~ JMC 6/19/92 representative of NOPI-ECP-22.5/12.4 that has been powdered.

wt. sample + vial 24.7208g
wt. vial 11.1678g
wt. sample 13.5530g

Sample NOPI-ECP-16.0/14.4-WR which represents an aliquot representative of NOPI-ECP-16.0/14.4 that has been powdered.

wt sample + vial 30.5073g
wt. vial 10.9085g
wt. sample 19.5988g

6/19/92 OCL

The following samples have been dried for 24 hours and then placed in a dessicator to cool. Next, the Gamma Spectrometry vials were filled full. The following samples are subsamples of the powdered rocks given below, and the sample weights used in the calculation of radioactivity per gram are given in the last column.

Mass of samples used for gamma spectrometry.

Sample #	Vial wt. (g)	Sample + Vial (g)	Sample Mass (g)
NOPI-ECP-15.6/7.7 WR-GAM	2.1190	6.6148	4.4958
NOPI-ECP-22.1/14.65WR-GAM	2.0973	6.4835	4.3862
NOPI-ECP-15.0/7.6-WR-GAM	2.0996	6.7881	4.6885
NOPI-ECP-14.45/7.95-WR-GAM	2.0940	6.4866	4.3926
NOPI-ECP-22.6/13.6-WR-GAM	2.1019	7.4171	5.3152
NOPI-ECP-5.2/7.5-WR-GAM	2.1001	6.8357	4.7356
NOPI-ECP-13.95/8.0-WR-GAM	2.0864	6.9843	4.8979

Vials sealed on June 19, 1992 by Omar Lagunas

The samples on the bottom of page 123 will be ~~used~~ 6/19/92 OCL counted using gamma spectrometry and further details are given in the radioactive Scientific Notebook and in the Data Collection Binder Gamma Spectrometer/Samples (volume one).

6/19/92
OCL

	SAMPLE I.D. #	CRUCIBLE #	CRUCIBLE WEIGHT (g)	BEFORE DRYING CRUCIBLE + POWDER (g)	AFTER DRYING CRUCIBLE + POWDER (g)
3:10 pm	NOPI-EPC-4.0/7.75-WR	1	30.0528	53.5951	53.3621
	NOPI-EPC-2.55/7.65-WR	2	30.82298	61.0810	60.7113
	NOPI-EPC-6.2/8.1-WR	3	31.8961	57.8179	57.5740
	NOPI-EPC-16.4/7.9-WR	4	30.8716	61.9323	61.3254
	NOPI-EPC-17.0/7.5-WR	5	45.8336	75.2332	74.2702
	NOPI-EPC-17.4/7.85-WR	6	44.1708	77.6641	77.0138
	NOPI-EPC-18.05/7.9-WR	7	46.2660	79.2914	78.5802

6/19/92
JMC

Sample NOPI-ECP-17.1/15.2-WR which represents an aliquot representative of NOPI-ECP-17.1/15.2 that has been powdered

wt sample + vial 27.9811 g
wt vial 10.9938 g
wt sample 16.9873 g

6/20/92
BWL

The following samples have been dried for 24 hours and then placed into a dessicator to cool. The gamma spectrometry vials were then filled full. The following samples are subsamples of the powdered rock given below. The sample weights used in the calculation of radioactivity per gram are given in the last column.

Mass of samples used for gamma spectrometry.

Sample #	Vial wt. (g)	Sample + Vial (g)	Sample Mass (g)
NOPI-ECP-4.0/7.75 WR-GAM	2.0852	6.2885	4.2033
NOPI-ECP-2.55/7.65-WR-GAM	2.092	6.9307	4.8387
NOPI-ECP-6.2/8.1-WR-GAM	2.0954	6.3972	4.3018
NOPI-ECP-16.4/7.9-WR-GAM	2.0747	6.6505	4.5758
NOPI-ECP-17.0/7.5-WR-GAM	2.0901	6.878	4.7879
NOPI-ECP-17.4/7.85-WR-GAM	2.0826	7.0259	4.9433
NOPI-ECP-18.05/7.9-WR-GAM	2.0899	7.1261	5.0362

Vials sealed on June 20, 1992 by Bret Leslie

These samples will be counted using a gamma spectrometer and further details are given in the Radioactivity Scientific Notebook and in the data collection binder Gamma Spectrometer/Samples (Volume 1).

6/21/92
BWL

Sample ID#	Crucible#	Crucible wt g	Before Drying Crucible + Sed Wt g	After Drying Crucible + Sed wt g
NOPI-ECP-25.5/10.4-WR	1	30.0530	51.4798	51.2544
NOPI-ECP-18.35/7.9-WR	2	30.8502	64.1470	63.8350
1:00 PM NOPI-ECP-18.6/7.7-WR	3	31.8964	64.9610	64.1792
NOPI-ECP-19.0/7.8-WR	4	30.8719	52.4926	52.0891
NOPI-ECP-19.65/7.55-WR	5	45.8336	74.8667	74.6177
NOPI-ECP-20.1/7.7-WR	6	44.1703	73.3827	72.8634
NOPI-ECP-20.65/7.55-WR	7	46.2660	79.2679	78.4833

Further sampling of bulk rocks in anticipation of powdering them for gamma spectrometry.

NOPI-ECP-18.55/16.2-WR is a subsample of the bulk rock sample NOPI-ECP-18.55/16.2 which will be powdered. It is a U ore sample with primarily kaolinitic (strong) and various $^{+6}$U minerals coating fracture surfaces. It is a limonitic strong altered tuff.

NOPI-ECP-19.6/14.5-WR is a subsample of the bulk rock sample ~~NOPI-ECP-18.55/16.5~~ BWL 6/21/92 NOPI-ECP-19.6/14.5 which will be powdered. It is a strongly hematitic, strongly limonitic, strongly kaolinitic altered ~~tuff~~ tuff with very abundant U^{+6} mineralization.

NOPI-ECP-25.2/9.5-WR is a subsample of the bulk rock sample NOPI-ECP-25.2/9.5 which will be powdered. It is a extremely strongly hematitic, extremely strong limonitic, strongly kaolinitic altered tuff with extremely abundant U^{+6} mineral coating fracture surfaces.

NOPI-ECP-24.0/10.5-WR is a subsample of the bulk rock sample NOPI-ECP-24.0/10.5 which will be powdered. It is an extremely kaolinitic, strongly hematitic, very strongly limonitic altered tuff with extremely abundant U^{+6} mineralization.

6/21/92
BWL

NOPI-ECP-23.3/9.8-WR is a subsample of the bulk rock sample NOPI-ECP-23.3/9.8 which will be powdered. It is a strongly limonitic, strongly kaolinitic altered tuff with abundant U^{+6} minerals coating fractures. Veins of Fe-rich minerals and frames of kaolinite.

NOPI-ECP-26.75/11.25-WR is a subsample of the bulk rock sample NOPI-ECP-26.75/11.25 which will be powdered. It is an extremely brecciated, extremely kaolinitic, strongly hematitic, and strongly limonitic altered tuff. It contains abundant U^{+6} minerals which occupy open spaces and precipitated on and subsequent to the iron oxides which line numerous veins. Fe_2O_3 botryodyal, and leafy jarosite directly underlie the U^{+6} minerals.

NOPI-ECP-26.85/11.65-WR is a subsample of the bulk rock sample NOPI-ECP-26.85/11.65 which will be powdered. It is a extremely kaolinitic, strongly limonitic, highly hematitic brecciated altered tuff with ubiquitous U^{+6} minerals and possible U^{+4} minerals on open surfaces.

6/22/92

OCL SAMPLE OF NOPI-ECP - 26.85/11.65 - WR WHICH REPRESENTS AN ALIQUOT REPRESENTATIVE OF NOPI-ECP - 26.85/11.65 THAT HAS BEEN POWDERED.

WT. SAMPLE + VIAL 41.7635 g
WT. VIAL 10.9438 g
WT. SAMPLE 30.8197 g

OCL SAMPLE OF NOPI-ECP - 23.3/9.8 - WR WHICH REPRESENTS AN ALIQUOT REPRESENTATIVE OF NOPI-ECP - 23.3/9.8 THAT HAS BEEN POWDERED.

WT SAMPLE + VIAL 30.4154 g
WT VIAL 10.9801 g
WT SAMPLE 19.4353 g

OCL SAMPLE OF NOPI-EPC - 24.0/10.5 - WR WHICH REPRESENTS AN ALIQUOT REPRESENTATIVE OF NOPI-EPC - 24.0/10.5 THAT HAS BEEN POWDERED.

WT. SAMPLE + VIAL 35.9701
WT. VIAL 10.8801 g
WT. SAMPLE 25.0900 g

OCL SAMPLE OF NOPI-EPC - ~~24.0~~ 26.75/11.25 - WR WHICH REPRESENTS AN ALIQUOT REPRESENTATIVE OF NOPI-ECP - 26.75/11.25 THAT WAS POWDERED. ocl 6/22/92

WT. SAMPLE + VIAL 25.6210 g
WT. VIAL 10.9528 g
WT. SAMPLE 14.6682 g

OCL SAMPLE OF NOPI-EPC - 19.6/14.5 - WR WHICH REPRESENTS AN ALIQUOT REPRESENTATIVE OF NOPI-ECP - 19.6/14.5 THAT HAS BEEN POWDERED.

WT SAMPLE + VIAL 37.3733 g
WT VIAL 10.9922 g
WT SAMPLE 26.3811 g

OCL SAMPLE OF NOPI-EPC - 18.55/16.2 - WR WHICH REPRESENTS AN ALIQUOT REPRESENTATIVE OF NOPI-EPC - 18.55/16.2 THAT HAS BEEN POWDERED.

WT. SAMPLE + VIAL 40.0445 g
WT. ocl 6/22/92 & VIAL 11.0103 g
WT. SAMPLE 29.0342 g

OCL SAMPLE OF NOPI-EPC - 25.2/9.5 - WR WHICH REPRESENTS AN ALIQUOT REPRESENTATIVE OF NOPI-EPC - 25.2/9.5 THAT HAS BEEN POWDERED.

WT. SAMPLE + VIAL 34.4153 g
WT. VIAL 10.9231 g
WT. SAMPLE 23.4922 g

6/23/92 OCL

THE FOLLOWING SAMPLES HAVE BEEN DRIED FOR 24 HOURS AND THEN PLACED INTO A DESSICATOR TO COOL. THE GAMMA SPECTROMETRY VIALS WERE FILLED FULL. THE FOLLOWING SAMPLES ARE SUBSAMPLES OF THE POWDERED ROCKS GIVEN BELOW, AND THE SAMPLE WEIGHTS USED IN THE CALCULATION OF RADIOACTIVITY PER GRAM ARE GIVEN IN THE LAST COLUMN.

Mass of samples used for gamma spectrometry.

Sample #	Vial wt. (g)	Sample + Vial (g)	Sample Mass (g)
NOPI-ECP-22.5/10.4-WR-GAM	2.1267	5.9303	3.8036
NOPI-ECP-18.35/7.9-WR-GAM	2.1074	6.4416	4.3342
NOPI-ECP-18.6/7.7-WR-GAM	2.1102	6.6844	4.5742
NOPI-ECP-19.0/7.8-WR-GAM	2.0918	6.4272	4.3354
NOPI-ECP-19.65/7.5-WR-GAM (7.55 page 116 143)	2.1408	6.3091	4.1683
NOPI-ECP-20.1/7.7-WR-GAM	2.1641	6.3330	4.1689
NOPI-ECP-20.65/7.55-WR-GAM	~~2.1102~~ 2.1185 (6/23/92 OCL)	6.4554	4.3369

Vials sealed on June 23, 1992 by Omar Lagunas

THESE SAMPLES WILL BE COUNTED USING A GAMMA SPECTROMETER AND FURTHER DETAILS ARE GIVEN IN THE RADIOACTIVE SCIENTIFIC NOTEBOOK AND IN THE DATA COLLECTION BINDER GAMMA SPECTROMETER | SAMPLES (VOLUME ONE)

OCL

Sample ID #	Crucible #	Crucible wt (g)	Before drying crucible + powder wt. (g)	After drying crucible + powder wt. (g)
N:Dam. NOPI-ECP-22.8/10.8-WR	1	30.0530	53.7877	53.6638
NOPI-ECP-22.8/12.95-WR	2	30.8297	43.2277	43.0476
NOPI-ECP-22.25/11.45-WR	3	31.8963	61.7096	61.5429
NOPI-ECP-22.6/11.9-WR	4	30.8718	61.0757	60.9279
NOPI-ECP-22.5/12.4-WR	5	45.8333	59.3940	59.2408
NOPI-ECP-16.0/14.4-WR	6	44.1702	63.7202	63.4175
NOPI-ECP-17.1/15.2-WR	7	46.2657	63.2655	63.0754

6/23/92 JMG

The East-West traverse samples were cutted into test slide blocks for later to obtain thin slide block samples of the bulk samples. A new name was given for every new sample and the letters TSB were written after its original name. The range of the East West traverse extend from NOPI-ECP-2.55/7.65-TSB to NOPI-ECP-20.65/7.55-TSB.

6/24/92 OCL

THE FOLLOWING SAMPLES HAVE BEEN DRIED FOR 24 HOURS AND THEN PLACED IN A DESSICATOR TO COOL. THE GAMMA SPECTROMETRY VIAL WERE FILLED FULL. THE FOLLOWING SAMPLES ARE SUBSAMPLES OF THE POWDERED ROCKS GIVEN BELOW, AND THE SAMPLE WEIGHTS USED IN THE CALCULATION OF RADIOACTIVITY PER GRAM ARE GIVEN IN THE LAST COLUMN

Mass of samples used for gamma spectrometry.

Sample #	Vial wt. (g)	Sample + Vial (g)	Sample Mass (g)
NOPI-ECP-22.8/10.8-WR-GAM	2.1133	6.3351	4.2218
NOPI-ECP-22.8/12.95-WR-GAM	2.1342	6.3840	4.2498
NOPI-ECP-22.25/11.45-WR-GAM	2.0938	6.3819	4.2881
NOPI-ECP-22.6/11.9-WR-GAM	2.1293	6.4341	4.3048
NOPI-ECP-22.5/12.4-WR-GAM	2.1024	6.2948	4.1924
NOPI-ECP-16.0/14.4-WR-GAM	2.1777	6.3041	4.1264
NOPI-ECP-17.1/15.2-WR-GAM	2.1233	6.4422	4.3189

Vials sealed on June 24, 1992 by Omar Lagunas

THESE SAMPLES WILL BE COUNTED USING A GAMMA SPECTROMETER AND FURTHER DETAILS ARE GIVEN IN THE RADIOACTIVE SCIENTIFIC NOTEBOOK AND IN THE DATA COLLECTION BINDER GAMMA SPECTROMETRY / Samples (volume one)

5:00 pm

	Sample I.D. #	crucible #	crucible wt (g)	before drying crucible + powder wt (g)	after drying crucible + powder wt (g)
NOPI-ECP-	26.95/11.65-WR	1	30.0531	60.8448	59.8394
NOPI-ECP-	23.3/9.8-WR	2	30.8301	50.2434	49.9189
NOPI-ECP-	24.0/10.5-WR	3	31.8965	56.9917	56.6854
NOPI-ECP-	26.75/11.25-WR	4	30.8719	45.5244	45.3471
NOPI-ECP-	19.6/14.5-WR	5	45.8333	72.1979	71.1311
NOPI-ECP-	18.55/16.2-WR	6	46.2657	73.2010	72.9954
NOPI-ECP-	25.2/9.5-WR	7	44.1702	69.7567	69.4976

6/25/92 JMG

All of the rest of rocks samples with low gama reading were cutted into small thin blocks. All of the North-South traveuse was cutted ~~ex~~ JMG 6/25/92 for the exception of the following three: NOPI-ECP-22.5/12.4, NOPI-ECP-22.35/15.3, NOPI-ECP 22.6/15.83, which had high gamma readings. Two of the random samples were cutted and they are:

NOPI-ECP-23.3/9.8-TSB and NOPI-ECP 16.0/14.4-TSB

6/26/92
OCL

THE FOLLOWING SAMPLES HAVE BEEN DRIED FOR 24 HOURS AND PLACED INTO A DESSICATOR TO COOL. THE GAMMA SPECTROMETRY VIALS WERE THEN FILLED FULL. THE FOLLOWING SAMPLES ARE SUBSAMPLES OF THE POWDERED ROCKS GIVEN BELOW, AND THE SAMPLE WEIGHTS USED IN CALCULATING RADIOACTIVITY PER GRAM ARE GIVEN IN THE LAST COLUMN.

Mass of samples used for gamma spectrometry.

Sample #	Vial wt. (g)	Sample + Vial (g)	Sample Mass (g)
NOPI-ECP-26.85/11.65-WR-GAM	2.1323	7.6038	5.4715
NOPI-ECP-23.3/9.8-WR-GAM	2.1558	6.3256	4.1698
NOPI-ECP-24.0/10.5-WR-GAM	2.1389	6.7454	4.6065
NOPI-ECP-26.75/11.25-WR-GAM	2.1007	6.1741	4.0734
NOPI-ECP-19.6/14.5-WR-GAM	2.1077	7.1073	4.9996
NOPI-ECP-18.55/16.2-WR-GAM	2.1363	6.3908	4.2545
NOPI-ECP-25.2/9.5-WR-GAM	2.1408	6.4057	4.2649

Vials sealed on June 26, 1992 by Omar Lagunas

THESE SAMPLES WILL BE COUNTED USING A GAMMA SPECTROMETER AND FURTHER DETAILS ARE GIVEN IN THE RADIOACTIVE SCIENTIFIC NOTEBOOK AND IN THE DATA COLLECTION BINDER GAMMA SPECTROMETRY | SAMPLES (VOL. 1).

6/29/92
JMG

The rock sample NOPI-ECP-14 was broken to obtain the quartz or calcite ($CaCO_3$). Two more subsamples were obtained, NOPI-ECP-14-SEP1 which has the quartz

wt. vial + sample	8.9281 g
wt. vial	6.8614 g
wt. sample	2.0267 g

NOPI-ECP-14-SEP2 which has the rest of the rock sample including left over quartz.

wt. vial + sampl	14.1434 g
wt. vial	4.9878 g
wt. sample	9.0556 g

6/30/92 JMG

Sample rock NOPI-ECP-17 which is made of caliche was smashed into tiny sandlike grains. Then the smashed sample was placed in a sieve series to obtain five different sizes of caliche grains. The new samples with the grain size are as follows:

New name	size (mm)
NOPI-ECP-17-SEP1	>1.00 mm
wt. vial + sample	19.8578 g
wt. vial	5.1140 g
wt. sample	14.7438 g

NOPI-ECP-17-SEP2	>0.250 mm	
wt. vial + sample	~~13.8242 g~~ JMG 6/30/92	32.3252 g
wt. vial	~~5.5975 g~~	11.0026 g
wt. sample		21.3226 g

NOPI-ECP-17-SEP3	~~>0.063 mm~~ JMG 6/30/92	>0.125 mm
wt. vial + sample	~~12.7939 g~~	13.8242 g
wt. vial	~~5.1781 g~~	5.5975 g
wt. sample		8.2267 g

NOPI-ECP-17-SEP4	>0.063 mm
wt. vial + sample	12.7939 g
wt. vial	5.1781 g
wt. sample	7.6158 g

NOPI-ECP-17-SEP5	=< 0.063 mm
wt. vial + sample	8.6116 g
wt. vial	6.8264 g
wt. sample	1.7852 g

Sample NOPI-ECP-11 which contains Fe_2O_3 and $Fe(OH)_3$ was scratched to obtain ~~separate~~ JMG 6/30/92 ~~compos~~ both compounds separately. The new names and weights are in the following page.

6/30/92 JMG

NOPI-ECP-11-SEP1 – which is $Fe(OH)_3$ and is orange brownish, soft

wt. vial + sample	6.9322 g
wt. vial	6.8182 g
wt. sample	0.114 g

NOPI-ECP-11-SEP2 - which is Fe_2O_3 - small pebbles, dark

wt. vial + sample	8.2280 g
wt. vial	6.6633 g
wt. sample	1.5647 g

A portion of the rock sample NOPI-ECP-11 was cutted for further study on a slass like portion of the sample.

7/7/92 JMG

Sample NOPI-ECP-33 which contains Fe oxide/ Mn oxide (Fe_2O_3, MnO_2) were seperated two samples were made.

NOPI-ECP-33-SEP1 - contains both Fe_2O_3 and MnO_2

wt sample + vial	9.6089 g
wt. vial	6.7911 g
wt. sample	2.8178 g

NOPI-ECP-33-SEP2 - contains all of the sample

wt. sample + vial	17.8522 g
wt. vial	5.0688 g
wt. sample	12.7834 g

Sample NOPI-ECP-17.4/7.85-WR-SEP1 and NOPI-ECP-17.4/7.85 which also contain Fe_2O_3 and MnO_2 were seperated and four samples were obtained

NOPI-ECP-17.4/7.85-WR-SEP2 - contains Fe_2O_3

wt sample + vial	8.0495 g
wt vial	6.8016 g
wt sample	1.2479 g

NOPI-ECP-17.4/7.85-WR-SEP3 - contains left overs of Fe_2O_3 and the sample

wt sample + vial	8.6822 g
wt vial	6.8081 g
wt sample	1.8741 g

NOPI-ECP-17.4/7.85-WR-SEP4 - contains MnO_2

wt sample + vial	7.3553 g
wt vial	6.7846 g
	0.5707 g

NOPI-ECP-17.4/7.85-WR-SEP5 - contains sample + left over MnO_2

wt sample + vial	19.5794 g
wt vial	5.0515 g
	14.5279 g

7/10/92 OCL

Sample of SAN-WMM-003 ROCK SAMPLE TAKEN AT SANTORINI, GREECE HAS BEEN DRIED AND HEATED TO DETERMINE THE MOISTURE CONTENT OF THE SAMPLE. FOLLOWING THE PROCEDURE DESCRIBED IN THE WORK METHODS OF SOIL ANALYSIS - part one - PHYSICAL AND MINERALOGICAL PROPERTIES, INCLUDING STATISTICS OF MEASUREMENT AND SAMPLING by the American Society of ~~Agronomy~~ Agronomy, 7/10/92 ocl the sample of SAN-WMM-003 WAS PLACED INTO A GLASS VIAL THAT WAS PLACED INTO A DESSICATOR. THE sample and the vial and lid were weighed on on analytical balance. The sample and vial were then put into a Thermolyne oven without the lid on the vial at a temperature ranging from 30°C to 50°C. This ensured that no organic matter would be lost due to oxidation caused by excessive heat. The sample, vial, and lid dried in the oven for about 24 hours, and were then placed in a dessicator to cool. Accidentally the glass vial lid broke and another lid had to be used. The following measurements and calculation reveal the true mass of the sample after drying and cooling.

day 1
7/7/92

initial mass of dry vial + lid + sample	137.4137 g
mass of dry vial + lid	76.5486 g
mass of sample before drying	60.8651 g

after 24 hours of drying in oven

day 2
7/8/92

① mass of dry broken lid 23.5230 g

② mass of sample + vial + NEW lid 133.8289 g

③ mass of sample + vial (NO lid) ~~118.0537~~ 111.8537 g

④ mass of new lid [②-③] 21.9752 g

⑤ mass of vial 53.0256 g

⑥ difference in masses of broken and new lids (①-④) 1.5478 g

⑦ change in mass of original vial + sample + lid and dry vial + sample + new lid 3.5848 g

⑧ loss of H_2O in sample (⑦-⑥) 2.037 g

⑨ mass of sample after drying 58.8281 g

The vial + sample and lid again were placed into the thermolyne oven for 24 hours and put into a dessicator to cool. They were measured on the analytical balance.

day 3
7/9/92

mass of dry vial + lid + mass 133.4851 g

original mass of dry vial + sample + new lid 133.8289

change in mass of sample .3438 g

mass of dry sample 58.4843 g

7/13/92 OCL

Sample + vial + lid were left in thermolyne oven over the weekend to continue to dry, and then were placed into a dessicator to cool. The mass of the sample + vial + lid were then measured on the analytical balance, and the mass of the dried sample was determined

mass of dry sample + vial + lid 133.4808

mass of sample after 2nd drying 133.4851

change in mass of sample ~~.3438~~ 7/13/92 OCL .0043 g

mass of dry sample 58.4800 g

7/13/92 JMG

Sample NOPI-ECP-22.7/23.0 which contains Fe oxide/Mn oxide were seperated two samples were made:
NOPI-ECP-22.7/23.0-SEP1 - contains MnO_2
wt. vial 6.8182 g
wt. vial + sample 7.1001 g
wt. sample 0.2819 g

NOPI-ECP-22.7/23.0-SEP2, contains Fe_2O_3

wt. vial + sample 8.3844 g

wt. vial 6.8390 g

wt. sample 1.5454 g

NOPI-ECP-22.7/23.0-SEP3, contain sample left over

wt. vial + sample 28.5189 g Fe_2O_3 + MnO_2

wt. vial 18.9984 g

wt. sample 9.5205 g

7/14/92 OCL

THE FINAL DRYING TIME OF 24 HOURS HAS PAST AND THE DRIED SAMPLE + VIAL + LID WERE TAKEN OUT OF THE THERMOLYNE OVEN (< 50°C) AND PLACED INTO THE DESSICATOR TO COOL. THE COOLED SAMPLE + VIAL + LID WERE FINALLY WEIGHED ON THE ANALYTICAL BALANCE, AND THE FOLLOWING CALCULATIONS SHOW THE MOISTURE CONTENT IN SAMPLE SAN-WMM-003.

final drying

mass of dried sample + lid + vial 133.4793 g

mass of sample before final drying stage 133.4808 g

change in mass (loss of ~~water~~ moisture) 7/14/92 OCL .0015 g

new sample mass after final drying 58.4785 g

initial sample mass 60.8651 g

% of moisture in original sample

$$\frac{60.8651\,g - 58.4785\,g}{60.8651\,g} \times 100\% = \boxed{3.92\,\%}$$

by wt.

7/16/92
JMG

Sample NOP1-ECP-18.05/7.9 which has a black mineral and white clay was seperated into three samples.

NOP1-ECP-18.05/7.9-SEP2 - contains black mineral
wt. vial + sample 7.0650 g
wt. vial 6.8356 g

wt. sample 0.2294 g

NOP1-ECP-18.05/7.9-SEP3 - contains white clay (MnO_2)
wt. vial + sample 8.0726 g
wt. vial 6.7450 g

wt sample 1.3276 g

NOP1-ECP-18.05/7.9-SEP4 - contains leftovers of all the rock sample
wt. vial + sample 17.1084 g
wt. vial 5.0717 g

wt sample 12.0367 g

Sample NOP1-ECP-22.85/20.1 which has a brownish soft mineral was seperated into one more sample

NOP1-ECP-22.85/20.1-SEP1 - contains the brown soft mineral
~~wt. vial + sample 15.0197 g~~ JMG 7/16/92
wt. vial + sample 15.0100 g
wt. vial 5.0197 g
wt. sample 9.9903 g

7/20/92
JMG

Sample NOP1-ECP-18.35/7.9 which has white clay and brown orange mineral was seperated

NOP1-ECP-18.35/7.9-SEP1 - white clay
wt. vial + sample 6.8105 g
wt. vial 6.5531 g

wt. sample 0.2574 g

NOP1-ECP-18.35/7.9-SEP2 - brown orange mineral
wt. vial + sample ~~6.7581 g~~ JMG 7/20/92 7.0268 g
wt. vial ~~7.0268 g~~ 6.7581 g

wt. sample 0.2687 g

7/21/92
JMG

Sample NOP1-ECP-18.6/7.7 was seperated into small portions of quartz and kaolinite

NOP1-ECP-18.6/7.7-SEP1 - contains the quartz

wt. vial + sample 6.7798g
wt. vial 6.6722g

wt. sample 0.1076g

NOP1-ECP-18.6/7.7-SEP2 - contains white clay (kaolinite)

wt. vial + sample 7.6937g
wt. vial 6.6721g

wt. sample 1.0216g

Sample NOP1-ECP-19.0/7.8 was seperated into small portions of a black redish mineral and white clay.

NOP1-ECP-19.0/7.8-SEP2 - contains the black redish mineral

wt. vial + sample 8.9409g
wt. vial 6.8201g

wt. sample 2.1208g

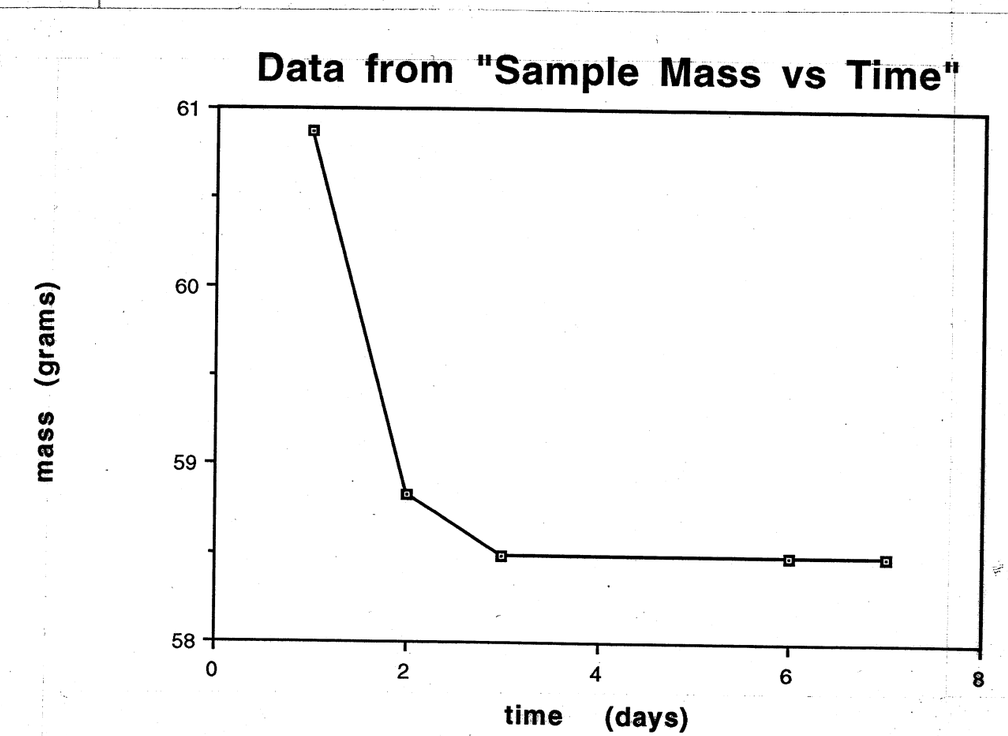
NOP1-ECP-19.0/7.8-SEP3 - contains white clay (kaolinite)

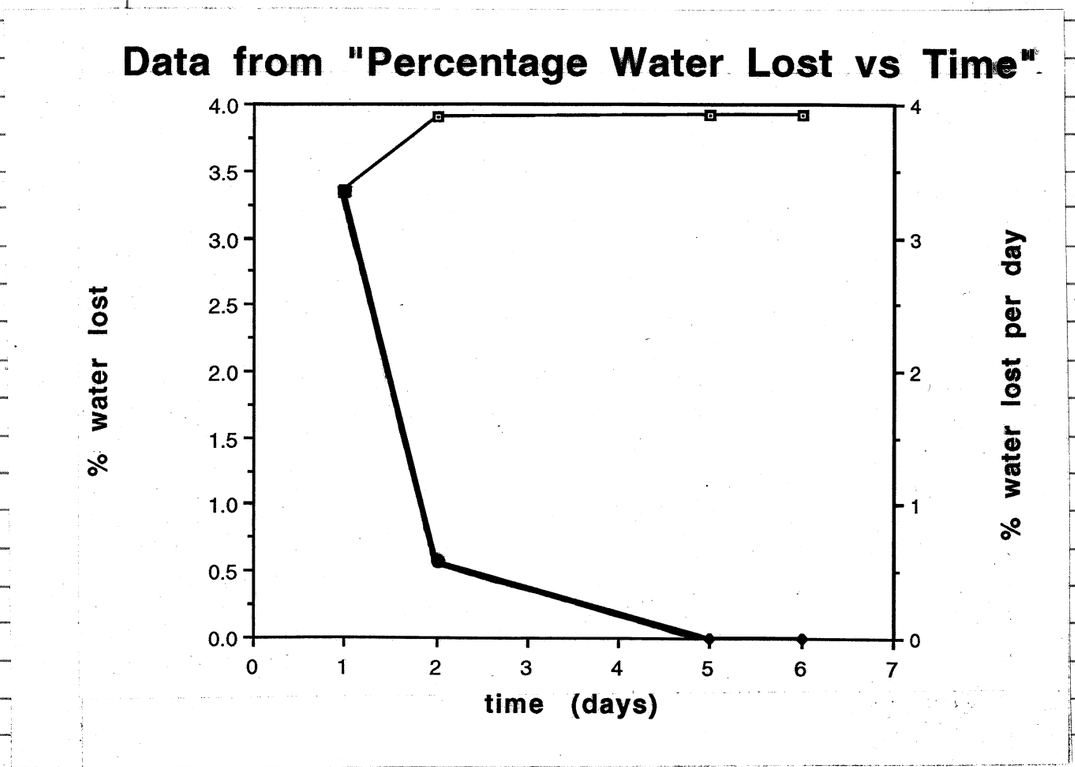
wt. vial + sample 7.0587g
wt. vial 6.6630g

wt. sample 0.3957g

7/22/92
O.C.L.

IN REFERENCE TO THE DRYING OF THE ROCK SAMPLE SAN-WMM-003 TAKEN FROM SANTORINI, GREECE, THE FOLLOWING GRAPHS REVEAL THE CHANGE IN MASS OF THE SAMPLE IN REFERENCE TO TIME AND, ON THE NEXT PAGE, THE PERCENTAGE OF WATER LOST FROM A DAY TO DAY BASIS AND IN REFERENCE TO THE ORIGINAL SAMPLE MASS VERSUS TIME.





7/24/92 JMG

Sample NOP1-ECP-19.65/7.55-5 ~~5~~ 0md was seperated into small portions of Kaolinite and a black redish mineral.

NOP1-ECP-19.65/7.55-5CP1 - black redish mineral

wt. vial + sample	8.5455g
wt. vial	6.8186g
wt. sample	1.7269g

NOP1-ECP-19.65/7.55-5EP2 - kaolinite

wt. vial + sample	~~7.6~~ 0md 7.2697g
wt. vial	6.8509g
wt. sample	0.4188g

Sample NOP1-ECP-20.1/7.7 was seperated into small portions of kaolinite and a black redish mineral.

psh 12/17/92 - Duplicate #

NOP1-ECP-20.1/7.7-5CP1A - kaolinite

wt. vial + sample	8.3849g
wt. vial	6.9230g
wt. sample	1.4619g

psh 12/17/92. Duplicate #

NOP1-ECP-20.1/7.7-5EP2A - black redish mineral

wt. vial + sample	7.1850g
wt. vial	6.8174g
wt. sample	0.3676g

Sample NOP1-ECP-20.65/7.55 was seperated into a small portion of Kaolinite

NOP1-ECP-20.65/7.55-5EP1 - Kaolinite

wt. vial + sample	7.8523g
wt. vial	6.8458g
wt. sample	1.0065g

7/27/92
O.C.L

SAMPLE OF CGF-1 HAS BEEN POWDERED AND PLACED INTO A PLASTIC COUNTING VIAL FOR GAMMA SPECTROMETRY. THE WT. OF THE VIAL AND THE VIAL + SAMPLE WERE MEASURED, AND THE SAMPLE MASS WAS THEN CALCULATED.

WT. SAMPLE + VIAL	6.9321
− WT. VIAL	2.1131
WT. SAMPLE	4.8190 g

THE SAMPLE IS LABELED CGF-1-GAM

7/28/92
JMG

Sample NOP1-ECP-37 was divided into four different rocks from the sample. They were placed into four different bags.

NOP1-ECP-37 bag D contains a black unknown mineral, a glasslike mineral and yellow uranium, and kaolinite.

NOP1-ECP-37-SCP1 - contains black unknown mineral

wt. sample + vial	6.9587 g
wt. vial	− 6.8261 g
wt. sample	0.1326 g

NOP1-ECP-37-SCP2 - contains kaolinite

wt. sample + vial	6.8521 g
wt. vial	− 6.8329 g
wt. sample	0.0192 g

Work was with sample NOP1-ECP-37-SCP3 and NOP1-ECP-37-SEP4, but still the total amount of the sample is not reached.

7/25/92
JP

ELECTRON MICROPROBE ANALYSES
at TEXAS A+M University
assisted by Ray Guillemette
(Dept. of Geology; Associate
Research Scientist)

Objective: collect data on chemistry
of uranium minerals from
Nopal I, Peña Blanca,
Mexico.

Equipment: Cameca SX50 with 4
Wavelength dispersive
spectrometers and PC1, PET, LIF,
and TAP analyzing crystals

Procedure: raw data including calibration
data, standards, experimental
conditions, and analyses are
kept in a separate wateebook
entitled "Peña Blanca Electron
Microprobe Data @ Texas
A+M"

Location of spot chemical
analyses on thin sections
were marked on images
collected and printed prior
to the analyses. These
images are kept in a

binder entitled "Electron Microprobe
Analyses of Uranium Ore Samples,
Peña Blanca, Chihuahua, Mexico".

In addition to hardcopy output of
raw data and images were written to
3.5" disks which are kept in the
fireproof filing cabinet in Bldg 57.

Results: data collected is summarized below

Wt % (Normalized)

Analysis	O	Na	Al	Si	P	As	U	Th	Pb	Ca	K	S	Fe	Mn	Ti	Ba
4UO2-std-ck#1	65.553	0.000	0.000	0.020	0.000	0.000	34.360	0.001	0.007	0.000	0.000	0.035	0.024	0.000	0.000	0.000
4UO2-std-ck#2	65.121	0.013	0.003	0.038	0.011	0.012	34.317	0.000	0.000	0.000	0.460	0.000	0.000	0.006	0.019	0.000
Test analyses																
Sample NOPI-ECP-32-TS2																
Image 32_TS4_7BSE.Zimg																
32-ts4-p1	54.044	0.396	0.234	29.323	0.024	0.028	15.259	0.013	0.085	0.410	0.081	0.002	0.061	0.008	0.032	0.000
32-ts4-p2	68.121	0.786	0.185	0.452	0.020	0.116	27.576	0.000	0.187	2.037	0.455	0.015	0.025	0.005	0.020	0.000
32-ts4-p3	67.520	0.643	0.095	0.541	0.000	0.071	30.191	0.004	0.151	0.138	0.396	0.173	0.005	0.034	0.038	0.000
32-ts2-p1	66.417	0.113	0.010	0.331	0.003	0.025	32.337	0.012	0.049	0.000	0.444	0.198	0.000	0.007	0.055	0.000
32-ts2-p2	70.173	0.117	0.119	0.283	0.009	0.017	27.670	0.007	0.017	0.316	1.081	0.060	0.061	0.000	0.069	0.000
32-ts2-p3	67.304	0.567	0.167	2.057	0.000	0.038	28.572	0.004	0.024	0.561	0.419	0.114	0.029	0.023	0.121	0.000
32-ts2-p4	66.983	0.429	0.086	0.654	0.000	0.022	30.880	0.000	0.042	0.065	0.477	0.243	0.008	0.015	0.096	0.000
32-ts2-p5	64.646	0.155	0.306	0.344	0.031	0.014	33.784	0.000	0.016	0.039	0.460	0.157	0.018	0.000	0.030	0.000
32-ts2-p6	65.519	0.354	0.081	0.437	0.000	0.008	32.789	0.019	0.066	0.000	0.458	0.252	0.003	0.000	0.013	0.000
32-ts2-p7	68.992	0.061	0.392	0.141	0.017	0.008	29.046	0.000	0.000	0.283	0.943	0.006	0.000	0.034	0.079	0.000
32-ts2-p8	72.903	0.097	0.435	0.161	0.015	0.005	25.217	0.016	0.000	0.166	0.897	0.019	0.017	0.000	0.052	0.000
32-ts2-p9	66.267	0.838	0.080	0.713	0.022	0.040	29.339	0.000	0.070	2.001	0.456	0.111	0.014	0.000	0.050	0.000
32-ts2-p10	67.407	0.585	0.103	1.717	0.058	0.072	28.660	0.011	0.076	0.494	0.430	0.164	0.025	0.035	0.163	0.000
Sample NOPI-ECP-32-TS4																
Image 32-TS4-5BSE.Zimg																
32-ts4-p1	66.710	1.429	0.082	0.477	0.018	0.135	27.423	0.000	1.041	2.136	0.398	0.000	0.131	0.000	0.020	0.000
32-ts4-p2	66.861	0.847	0.156	0.324	0.019	0.153	29.749	0.012	0.575	0.650	0.457	0.157	0.041	0.000	0.000	0.000
32-ts4-p3	72.246	0.041	0.281	0.141	0.000	0.012	26.177	0.000	0.029	0.136	0.885	0.013	0.000	0.000	0.038	0.000
32-ts4-p4	67.024	1.340	0.039	0.395	0.012	0.132	27.431	0.014	0.896	2.140	0.398	0.023	0.119	0.002	0.033	0.000
32-ts4-p5	73.971	0.148	0.751	0.611	0.006	0.000	23.316	0.008	0.004	0.092	1.049	0.009	0.034	0.000	0.000	0.000
32-ts4-p6	66.957	0.662	0.099	0.466	0.037	0.094	30.516	0.000	0.264	0.291	0.401	0.160	0.012	0.000	0.041	0.000
32-ts4-p7	72.029	0.138	0.196	0.089	0.000	0.000	26.479	0.000	0.004	0.178	0.851	0.000	0.026	0.001	0.010	0.000
32-ts4-p8	66.871	1.480	0.108	0.387	0.080	0.173	27.429	0.000	0.747	2.066	0.449	0.003	0.199	0.007	0.000	0.000
32-ts4-p9	72.894	0.087	0.073	0.064	0.000	0.033	25.838	0.000	0.029	0.089	0.843	0.000	0.000	0.000	0.050	0.000
32-ts4-p10	65.077	0.000	0.016	12.826	0.046	0.430	14.509	0.006	0.000	6.846	0.196	0.000	0.000	0.011	0.035	0.000
32-ts4-p11	67.134	0.003	0.027	12.777	0.024	1.157	12.859	0.000	0.005	5.779	0.210	0.016	0.000	0.000	0.009	0.000
32-ts4-p12	69.615	0.013	0.009	12.017	0.020	0.390	12.609	0.004	0.000	5.096	0.167	0.008	0.002	0.024	0.027	0.000
Image 32-TS4-4BSE.Zimg																
32-ts4-p13	68.512	0.308	0.746	0.438	0.002	0.045	28.985	0.021	0.159	0.106	0.510	0.123	0.000	0.000	0.045	0.000
32-ts4-p14	68.661	0.057	0.000	0.030	0.078	0.000	30.332	0.026	0.136	0.039	0.583	0.005	0.000	0.000	0.052	0.000
32-ts4-p15	65.444	0.343	1.322	1.097	0.002	0.130	30.414	0.014	0.124	0.286	0.501	0.260	0.036	0.003	0.023	0.000
32-ts4-p16	70.831	0.041	0.019	0.052	0.019	0.000	28.023	0.021	0.118	0.017	0.773	0.000	0.068	0.000	0.018	0.000
32-ts4-p17	67.532	0.107	0.212	8.226	0.054	0.725	18.603	0.019	0.278	3.719	0.398	0.041	0.035	0.000	0.050	0.000
32-ts4-p18	67.276	0.670	0.122	0.415	0.055	0.088	27.145	0.000	2.660	1.035	0.420	0.000	0.055	0.051	0.009	0.000
32-ts4-p19	68.382	0.320	0.072	0.461	0.000	0.063	29.609	0.019	0.283	0.066	0.482	0.214	0.000	0.030	0.000	0.000
Image 32-TS4-3BSE.Zimg																
32-ts4-p20	68.088	0.678	0.182	0.469	0.000	0.073	27.097	0.010	1.379	1.496	0.453	0.004	0.030	0.009	0.032	0.000
32-ts4-p21	67.926	0.321	0.053	0.419	0.028	0.000	30.006	0.013	0.296	0.140	0.458	0.255	0.014	0.008	0.063	0.000
32-ts4-p22	70.578	0.534	0.046	0.509	0.000	0.028	27.037	0.000	0.458	0.163	0.418	0.197	0.000	0.010	0.022	0.000
32-ts4-p23	67.540	0.752	0.159	0.447	0.005	0.057	27.661	0.000	1.338	1.459	0.484	0.017	0.067	0.000	0.014	0.000
Image 32-TS4-2BSE.Zimg																
32-ts4-p24	67.682	0.776	0.220	0.440	0.000	0.173	28.478	0.000	0.305	1.363	0.484	0.012	0.000	0.068	0.000	0.000
32-ts4-p25	67.407	0.924	0.138	0.365	0.027	0.197	28.438	0.000	0.393	1.523	0.447	0.024	0.064	0.007	0.047	0.000
32-ts4-26	66.489	0.567	1.692	0.852	0.020	0.106	28.839	0.000	0.244	0.448	0.515	0.132	0.042	0.000	0.054	0.000
32-ts4-p27	67.780	0.765	0.149	0.402	0.008	0.159	28.194	0.000	0.419	1.615	0.431	0.018	0.026	0.000	0.034	0.000

Sample
NOP1-ECP-1-TS3
Image
1-TS3_1BSE_Z.img
Image
1-TS3-2BSE_Z.img
1-TS3-3BSE_Z.img
Sample
NOP1-ECP-30-TS2
Image
30-TS2-1BSE_Z.img
30-TS2-2BSE.Z.img
Sample
NOP1-ECP-30-TS5
Image
30-TS5-1BSE.Z.img
30-TS5_2BSE.Z.img
30-TS5-3BSE_Z.img

Analysis	O	Na	Al	Si	P	As	U	Th	Pb	Ca	K	S	Fe	Mn	Ti	Ba
4UO2-std-ck#1	66.129	0.000	0.015	0.000	0.047	0.000	33.249	0.003	0.000	0.000	0.483	0.000	0.011	0.000	0.063	0.000
4UO2-std-ck#2	66.167	0.000	0.229	0.041	0.018	0.000	33.001	0.016	0.000	0.000	0.479	0.000	0.015	0.010	0.024	0.000
1-ts3-p1	68.091	0.170	0.115	0.450	0.000	0.044	30.282	0.005	0.052	0.000	0.463	0.266	0.012	0.021	0.029	0.000
1-ts3-p2	68.220	0.252	0.039	0.517	0.000	0.000	30.087	0.005	0.020	0.000	0.508	0.287	0.000	0.020	0.045	0.000
1-ts3-p3	74.346	0.026	0.004	0.586	0.746	4.391	18.032	0.000	0.012	0.000	1.724	0.071	0.000	0.021	0.041	0.000
1-ts3-p4	75.128	0.000	0.003	7.183	0.009	0.130	17.008	0.000	0.003	0.000	0.473	0.016	0.000	0.016	0.031	0.000
1-ts3-p5	74.434	0.028	0.000	0.445	0.730	4.352	18.369	0.000	0.001	0.000	1.449	0.160	0.000	0.000	0.032	0.000
1-ts3-p6	67.439	0.200	0.166	0.581	0.000	0.001	30.763	0.000	0.030	0.007	0.519	0.205	0.020	0.000	0.070	0.000
1-ts3-p7	73.145	0.274	0.034	3.422	0.013	0.055	22.009	0.000	0.249	0.127	0.528	0.040	0.013	0.015	0.074	0.000
1-ts3-p8	75.431	0.000	0.000	7.117	0.018	0.051	17.017	0.009	0.006	0.000	0.311	0.012	0.002	0.000	0.026	0.000
1-ts3-p10	66.913	1.059	0.196	0.417	0.055	0.001	27.058	0.014	2.054	1.648	0.469	0.000	0.000	0.072	0.043	0.000
1-ts3-11	67.396	0.623	0.041	0.368	0.000	0.072	29.696	0.000	0.313	0.842	0.512	0.137	0.000	0.000	0.000	0.000
1-ts3-12	68.315	0.850	0.037	0.256	0.016	0.072	27.840	0.001	0.570	1.476	0.455	0.102	0.009	0.000	0.000	0.000
1-ts3-p13	68.874	0.754	0.154	4.905	0.002	0.042	22.431	0.000	0.886	1.474	0.408	0.000	0.032	0.000	0.038	0.000
1-ts3-14	67.936	0.897	0.338	0.483	0.000	0.053	27.494	0.000	0.799	1.428	0.478	0.024	0.002	0.009	0.060	0.000
1-ts3-p15	66.282	0.855	0.316	0.684	0.009	0.059	29.026	0.001	0.780	1.256	0.553	0.033	0.033	0.039	0.077	0.000
1-ts3-p16	1.019	0.004	0.003	0.020	0.000	0.000	92.210	0.034	0.933	3.690	1.353	0.024	0.353	0.092	0.266	0.000
1-ts3-17	62.844	0.494	0.062	0.329	0.000	0.000	35.216	0.037	0.083	0.086	0.488	0.196	0.055	0.000	0.110	0.000
1-ts3-18	65.130	0.452	0.015	0.337	0.014	0.011	32.933	0.014	0.075	0.102	0.569	0.253	0.057	0.000	0.038	0.000
1-ts3-p19	66.704	0.287	0.019	0.318	0.007	0.001	31.818	0.000	0.054	0.018	0.501	0.114	0.081	0.000	0.079	0.000
30-ts2-p1	66.796	0.743	0.081	0.563	0.026	0.106	28.936	0.005	0.746	1.370	0.378	0.052	0.121	0.000	0.078	0.000
30-ts2-p2	67.460	0.598	0.000	0.497	0.035	0.130	29.051	0.014	0.614	1.033	0.415	0.035	0.093	0.000	0.025	0.000
30-ts2-p3	72.723	0.158	0.011	0.054	0.000	0.031	26.192	0.000	0.027	0.041	0.647	0.025	0.000	0.033	0.057	0.000
30-ts2-p4	73.084	0.024	0.008	0.036	0.008	0.043	26.120	0.005	0.000	0.018	0.586	0.032	0.000	0.000	0.038	0.000
30-ts2-p5	67.198	0.767	0.079	0.629	0.007	0.098	27.963	0.000	0.564	2.077	0.409	0.049	0.144	0.017	0.000	0.000
30-ts2-p6	69.221	0.575	0.064	0.422	0.003	0.072	27.652	0.000	0.565	0.815	0.387	0.093	0.082	0.028	0.019	0.000
30-ts2-p7	67.305	0.889	0.055	0.574	0.000	0.100	28.118	0.013	0.526	1.835	0.430	0.020	0.048	0.000	0.086	0.000
30-ts2-p8	71.586	0.041	0.017	0.024	0.000	0.011	27.619	0.000	0.000	0.050	0.515	0.030	0.064	0.031	0.011	0.000
30-ts2-p9	68.148	0.000	0.012	12.235	0.011	0.727	12.902	0.000	0.009	5.717	0.204	0.002	0.013	0.008	0.013	0.000
30-ts2-p10	69.178	0.012	0.006	12.091	0.030	0.683	12.345	0.011	0.000	5.410	0.203	0.001	0.005	0.017	0.010	0.000
30-ts2-p11	99.106	0.371	0.062	0.396	0.000	0.053	0.000	0.000	0.000	0.001	0.001	0.003	0.002	0.000	0.000	0.005
30-ts5-p1	66.555	1.132	0.098	0.235	0.089	0.108	27.432	0.003	0.582	3.159	0.425	0.025	0.141	0.016	0.000	0.000
30-ts5-p2	66.542	1.100	0.093	0.307	0.011	0.090	27.590	0.000	0.678	2.824	0.487	0.015	0.218	0.005	0.039	0.000
30-ts5-p3	70.382	0.069	0.005	0.030	0.008	0.024	28.765	0.000	0.002	0.021	0.653	0.000	0.000	0.000	0.040	0.000
30-ts5-p4	71.847	0.210	0.215	1.165	0.049	0.132	25.176	0.009	0.058	0.316	0.785	0.000	0.001	0.019	0.019	0.000
30-ts5-p5	68.690	0.907	0.215	0.312	0.057	0.104	27.647	0.012	0.514	0.852	0.474	0.074	0.061	0.000	0.082	0.000
30-ts5-p6	68.825	0.989	0.025	0.221	0.003	0.086	27.814	0.000	0.521	0.915	0.474	0.037	0.069	0.019	0.004	0.000
30-ts5-p7	76.761	0.096	0.040	0.022	0.000	0.000	22.477	0.000	0.007	0.160	0.325	0.006	0.031	0.000	0.075	0.000
30-ts5-p8	73.131	0.000	0.004	8.110	0.076	0.176	18.039	0.000	0.000	0.019	0.307	0.002	0.128	0.000	0.008	0.000
30-ts5-p9	71.092	0.000	0.007	11.976	0.000	0.109	11.868	0.000	0.000	4.461	0.241	0.011	0.186	0.005	0.045	0.000
30-ts5-p10	61.921	0.012	2.847	0.360	0.105	0.909	0.890	0.005	0.062	0.057	0.021	0.000	32.800	0.000	0.013	0.000
30-ts5-p11	74.614	0.000	0.000	7.667	0.043	0.097	16.936	0.000	0.000	0.007	0.326	0.023	0.282	0.000	0.005	0.000
30-ts5-p12	77.043	0.012	0.002	0.066	0.023	0.000	22.238	0.000	0.035	0.225	0.326	0.011	0.018	0.000	0.000	0.000
30-ts5-p14	70.650	0.839	0.217	0.301	0.080	0.356	25.107	0.000	1.131	0.576	0.655	0.038	0.007	0.011	0.031	0.000
30-ts5-p15	77.106	0.015	0.000	0.043	0.005	0.000	22.065	0.000	0.031	0.210	0.428	0.000	0.000	0.035	0.063	0.000
30-ts5-p16	77.022	0.054	0.006	0.042	0.000	0.006	22.156	0.006	0.027	0.143	0.389	0.000	0.118	0.000	0.030	0.000
30-ts5-p17	71.336	0.018	0.000	8.627	0.202	2.455	12.913	0.000	0.000	4.114	0.324	0.000	0.005	0.006	0.000	0.000
30-ts5-p18	73.606	0.052	0.000	0.026	0.000	0.040	23.422	0.005	0.234	0.075	2.530	0.000	0.000	0.000	0.010	0.000
30-ts5-p19	73.929	0.008	0.000	0.012	0.000	0.000	23.034	0.000	0.054	0.015	2.921	0.016	0.003	0.002	0.006	0.000
30-ts5-p20	70.649	0.975	0.163	0.271	0.000	0.140	25.467	0.000	0.129	1.380	0.743	0.035	0.000	0.000	0.050	0.000
30-ts5-p21	70.856	0.020	0.017	8.725	0.084	2.034	13.080	0.012	0.016	4.712	0.403	0.000	0.042	0.000	0.000	0.000
4UO2-std-ck-3	64.882	0.029	0.031	0.072	0.013	0.000	34.457	0.018	0.000	0.000	0.477	0.006	0.004	0.007	0.004	0.000
5Fe2O3-ck#1	54.571	0.017	0.013	0.002	0.000	0.000	0.000	0.000	0.000	0.008	0.010	0.012	45.350	0.000	0.017	0.000
5SiO2-ck#1	63.428	0.000	0.000	36.559	0.000	0.003	0.000	0.000	0.004	0.000	0.000	0.003	0.001	0.002	0.000	0.000
3dolomite-ck-20	85.696	0.002	0.000	0.009	0.009	0.000	0.000	0.000	0.000	14.254	0.000	0.000	0.008	0.014	0.008	0.000
4UO2-std-ck-4	65.586	0.004	0.023	0.007	0.022	0.000	33.769	0.000	0.000	0.000	0.506	0.000	0.053	0.002	0.029	0.000

Wt %

Analysis	O	Na	Al	Si	P	As	U	Th	Pb	Ca	K	S	Fe	Mn	Ti	Ba
4UO2-std-ck#1	11.304	0.000	0.000	0.006	0.000	0.000	88.155	0.003	0.016	0.000	0.000	0.012	0.014	0.000	0.000	0.000
4UO2-std-ck#2	11.265	0.003	0.001	0.012	0.004	0.010	88.323	0.000	0.000	0.000	0.195	0.000	0.000	0.003	0.010	0.000
32-ts4-p1	19.635	0.207	0.143	18.702	0.017	0.048	82.481	0.071	0.398	0.374	0.072	0.002	0.077	0.010	0.035	0.000
32-ts4-p2	13.497	0.224	0.062	0.157	0.008	0.107	81.287	0.000	0.480	1.011	0.220	0.006	0.017	0.003	0.012	0.000
32-ts4-p3	12.562	0.172	0.030	0.177	0.000	0.062	83.570	0.010	0.364	0.064	0.180	0.065	0.003	0.022	0.021	0.000
32-ts2-p1	11.811	0.029	0.003	0.103	0.001	0.021	85.558	0.030	0.112	0.000	0.193	0.071	0.000	0.004	0.029	0.000
32-ts2-p2	13.454	0.032	0.039	0.095	0.003	0.016	78.930	0.020	0.042	0.152	0.507	0.023	0.041	0.000	0.040	0.000
32-ts2-p3	12.996	0.157	0.054	0.697	0.000	0.035	82.083	0.012	0.060	0.271	0.198	0.044	0.019	0.015	0.070	0.000
32-ts2-p4	12.275	0.113	0.027	0.210	0.000	0.019	84.193	0.000	0.101	0.030	0.214	0.089	0.005	0.009	0.053	0.000
32-ts2-p5	11.007	0.038	0.088	0.103	0.010	0.011	85.582	0.000	0.035	0.017	0.191	0.053	0.011	0.000	0.015	0.000
32-ts2-p6	11.556	0.090	0.024	0.135	0.000	0.006	86.042	0.048	0.150	0.000	0.198	0.089	0.002	0.000	0.007	0.000
32-ts2-p7	13.020	0.016	0.125	0.047	0.006	0.007	81.553	0.000	0.000	0.134	0.435	0.002	0.000	0.022	0.045	0.000
32-ts2-p8	15.450	0.030	0.155	0.060	0.006	0.005	79.506	0.050	0.000	0.088	0.465	0.008	0.013	0.000	0.033	0.000
32-ts2-p9	12.572	0.228	0.026	0.238	0.008	0.035	82.812	0.000	0.171	0.951	0.211	0.042	0.009	0.000	0.029	0.000
32-ts2-p10	13.084	0.163	0.034	0.585	0.022	0.065	82.764	0.032	0.191	0.240	0.204	0.064	0.017	0.023	0.095	0.000
32-ts4-p1	12.760	0.393	0.027	0.160	0.007	0.121	78.040	0.000	2.578	1.024	0.186	0.000	0.088	0.000	0.011	0.000
32-ts4-p2	12.087	0.220	0.047	0.103	0.007	0.129	80.012	0.032	1.347	0.295	0.202	0.057	0.026	0.000	0.000	0.000
32-ts4-p3	14.160	0.012	0.093	0.049	0.000	0.011	76.336	0.000	0.074	0.067	0.424	0.005	0.000	0.000	0.023	0.000
32-ts4-p4	12.963	0.372	0.013	0.134	0.005	0.120	78.934	0.040	2.245	1.037	0.188	0.009	0.080	0.001	0.019	0.000
32-ts4-p5	16.041	0.046	0.275	0.233	0.003	0.000	75.226	0.026	0.012	0.050	0.556	0.004	0.026	0.000	0.000	0.000
32-ts4-p6	12.142	0.173	0.030	0.148	0.013	0.080	82.332	0.000	0.620	0.132	0.178	0.058	0.008	0.000	0.022	0.000
32-ts4-p7	14.143	0.039	0.065	0.031	0.000	0.000	77.354	0.000	0.010	0.088	0.408	0.000	0.018	0.001	0.006	0.000
32-ts4-p8	12.905	0.410	0.035	0.131	0.030	0.156	78.752	0.000	1.866	0.999	0.212	0.001	0.134	0.005	0.000	0.000
32-ts4-p9	14.540	0.025	0.025	0.022	0.000	0.031	76.680	0.000	0.074	0.044	0.411	0.000	0.000	0.000	0.030	0.000
32-ts4-p10	17.858	0.000	0.008	6.179	0.024	0.553	59.236	0.026	0.000	4.706	0.132	0.000	0.000	0.011	0.029	0.000
32-ts4-p11	20.709	0.001	0.014	6.919	0.015	1.671	59.016	0.000	0.019	4.466	0.158	0.010	0.000	0.000	0.009	0.000
32-ts4-p12	21.700	0.006	0.005	6.576	0.012	0.569	58.478	0.018	0.000	3.979	0.127	0.005	0.002	0.026	0.025	0.000
32-ts4-p13	12.947	0.084	0.238	0.145	0.001	0.040	81.495	0.057	0.390	0.050	0.236	0.047	0.000	0.000	0.025	0.000
32-ts4-p14	12.477	0.015	0.000	0.010	0.028	0.000	82.002	0.068	0.319	0.018	0.259	0.002	0.000	0.000	0.028	0.000
32-ts4-p15	11.809	0.089	0.402	0.347	0.001	0.110	81.648	0.038	0.290	0.129	0.221	0.094	0.023	0.002	0.012	0.000
32-ts4-p16	13.534	0.011	0.006	0.018	0.007	0.000	79.662	0.058	0.293	0.008	0.361	0.000	0.045	0.000	0.010	0.000
32-ts4-p17	16.459	0.037	0.087	3.520	0.025	0.828	67.454	0.067	0.878	2.271	0.237	0.020	0.030	0.000	0.037	0.000
32-ts4-p18	12.642	0.181	0.039	0.137	0.020	0.077	75.889	0.000	6.473	0.487	0.193	0.000	0.036	0.033	0.005	0.000
32-ts4-p19	12.832	0.086	0.023	0.152	0.000	0.056	82.661	0.051	0.687	0.031	0.221	0.080	0.000	0.019	0.000	0.000
32-ts4-p20	13.177	0.189	0.059	0.159	0.000	0.066	78.020	0.027	3.457	0.725	0.214	0.001	0.020	0.006	0.018	0.000
32-ts4-p21	12.540	0.085	0.016	0.136	0.010	0.000	82.413	0.034	0.708	0.065	0.207	0.094	0.009	0.005	0.035	0.000
32-ts4-p22	14.045	0.153	0.015	0.178	0.000	0.026	80.049	0.000	1.180	0.081	0.203	0.079	0.000	0.007	0.013	0.000
32-ts4-p23	12.841	0.205	0.051	0.149	0.002	0.051	78.240	0.000	3.294	0.695	0.225	0.006	0.045	0.000	0.008	0.000
32-ts4-p24	12.872	0.212	0.071	0.147	0.000	0.154	80.582	0.000	0.750	0.649	0.225	0.004	0.000	0.045	0.000	0.000
32-ts4-p25	12.820	0.253	0.044	0.122	0.010	0.176	80.470	0.000	0.967	0.726	0.208	0.009	0.042	0.005	0.027	0.000
32-ts4-26	12.535	0.154	0.538	0.282	0.007	0.093	80.889	0.000	0.596	0.212	0.237	0.050	0.028	0.000	0.031	0.000
32-ts4-p27	13.063	0.212	0.049	0.136	0.003	0.144	80.843	0.000	1.045	0.780	0.203	0.007	0.018	0.000	0.019	0.000

Analysis	O	Na	Al	Si	P	As	U	Th	Pb	Ca	K	S	Fe	Mn	Ti	Ba
4UO2-std-ck#1	11.852	0.000	0.004	0.000	0.016	0.000	88.659	0.009	0.000	0.000	0.212	0.000	0.007	0.000	0.034	0.000
4UO2-std-ck#2	11.815	0.000	0.069	0.013	0.006	0.000	87.674	0.042	0.000	0.000	0.209	0.000	0.009	0.006	0.013	0.000
1-ts3-p1	12.681	0.045	0.036	0.147	0.000	0.038	83.902	0.013	0.125	0.000	0.211	0.099	0.008	0.013	0.016	0.000
1-ts3-p2	12.853	0.068	0.012	0.171	0.000	0.000	84.338	0.014	0.050	0.000	0.234	0.108	0.000	0.013	0.025	0.000
1-ts3-p3	19.061	0.010	0.002	0.264	0.370	5.272	68.782	0.000	0.039	0.000	1.080	0.036	0.000	0.019	0.031	0.000
1-ts3-p4	20.870	0.000	0.001	3.503	0.005	0.169	70.294	0.000	0.013	0.000	0.321	0.009	0.000	0.015	0.025	0.000
1-ts3-p5	18.867	0.010	0.000	0.198	0.358	5.166	69.271	0.000	0.004	0.000	0.897	0.082	0.000	0.000	0.024	0.000
1-ts3-p6	12.458	0.053	0.052	0.188	0.000	0.001	84.544	0.000	0.072	0.003	0.234	0.076	0.013	0.000	0.039	0.000
1-ts3-p7	16.780	0.090	0.013	1.378	0.006	0.059	75.118	0.000	0.739	0.073	0.296	0.019	0.011	0.012	0.051	0.000
1-ts3-p8	20.760	0.000	0.000	3.438	0.010	0.066	69.676	0.036	0.023	0.000	0.209	0.007	0.002	0.000	0.021	0.000
1-ts3-p10	12.779	0.291	0.063	0.140	0.021	0.001	76.883	0.038	5.081	0.789	0.219	0.000	0.000	0.047	0.024	0.000
1-ts3-11	12.636	0.168	0.013	0.121	0.000	0.063	82.836	0.000	0.760	0.396	0.234	0.052	0.000	0.000	0.000	0.000
1-ts3-12	13.328	0.238	0.012	0.088	0.006	0.065	80.807	0.002	1.439	0.722	0.217	0.040	0.006	0.000	0.000	0.000
1-ts3-p13	15.636	0.246	0.059	1.955	0.001	0.045	75.765	0.000	2.604	0.838	0.226	0.000	0.025	0.000	0.026	0.000
1-ts3-14	13.206	0.251	0.111	0.165	0.000	0.048	79.512	0.000	2.011	0.695	0.227	0.009	0.002	0.006	0.035	0.000
1-ts3-p15	12.381	0.229	0.100	0.224	0.003	0.051	80.664	0.002	1.887	0.588	0.252	0.012	0.021	0.025	0.043	0.000
1-ts3-p16	0.060	0.000	0.000	0.002	0.000	0.000	80.980	0.029	0.713	0.546	0.195	0.003	0.073	0.019	0.047	0.000
1-ts3-17	4.048	0.046	0.007	0.037	0.000	0.000	33.750	0.035	0.069	0.014	0.077	0.025	0.012	0.000	0.021	0.000
1-ts3-18	11.105	0.111	0.004	0.101	0.004	0.009	83.538	0.035	0.166	0.044	0.237	0.087	0.034	0.000	0.019	0.000
1-ts3-p19	11.776	0.073	0.006	0.099	0.002	0.001	83.569	0.000	0.123	0.008	0.216	0.040	0.050	0.000	0.042	0.000
30-ts2-p1	12.596	0.201	0.026	0.186	0.009	0.093	81.185	0.013	1.822	0.647	0.174	0.020	0.080	0.000	0.044	0.000
30-ts2-p2	12.729	0.162	0.000	0.165	0.013	0.115	81.556	0.038	1.499	0.488	0.191	0.013	0.061	0.000	0.014	0.000
30-ts2-p3	14.788	0.046	0.004	0.019	0.000	0.029	79.239	0.000	0.070	0.021	0.321	0.010	0.000	0.023	0.035	0.000
30-ts2-p4	14.711	0.007	0.003	0.013	0.003	0.040	78.220	0.016	0.000	0.009	0.288	0.013	0.000	0.000	0.023	0.000
30-ts2-p5	13.060	0.214	0.026	0.214	0.003	0.089	80.856	0.000	1.419	1.011	0.194	0.019	0.098	0.011	0.000	0.000
30-ts2-p6	13.686	0.163	0.021	0.146	0.001	0.067	81.341	0.000	1.447	0.404	0.187	0.037	0.057	0.019	0.011	0.000
30-ts2-p7	13.110	0.249	0.018	0.196	0.000	0.092	81.482	0.036	1.326	0.896	0.205	0.008	0.032	0.000	0.050	0.000
30-ts2-p8	13.926	0.012	0.006	0.008	0.000	0.010	79.937	0.000	0.000	0.024	0.245	0.012	0.044	0.021	0.006	0.000
30-ts2-p9	21.208	0.000	0.006	6.684	0.006	1.060	59.736	0.000	0.037	4.457	0.155	0.001	0.014	0.008	0.012	0.000
30-ts2-p10	22.279	0.005	0.003	6.835	0.019	1.031	59.148	0.050	0.000	4.365	0.160	0.001	0.005	0.019	0.010	0.000
30-ts2-p11	10.292	0.055	0.011	0.072	0.000	0.026	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.000	0.000	0.004
30-ts5-p1	12.975	0.317	0.032	0.080	0.033	0.098	79.565	0.008	1.470	1.543	0.203	0.010	0.096	0.011	0.000	0.000
30-ts5-p2	12.816	0.304	0.030	0.104	0.004	0.081	79.055	0.000	1.692	1.362	0.229	0.006	0.146	0.004	0.023	0.000
30-ts5-p3	13.361	0.019	0.002	0.010	0.003	0.021	81.244	0.000	0.006	0.010	0.303	0.000	0.000	0.000	0.023	0.000
30-ts5-p4	14.632	0.061	0.074	0.416	0.019	0.126	76.279	0.026	0.153	0.161	0.391	0.000	0.001	0.013	0.011	0.000
30-ts5-p5	13.221	0.251	0.070	0.106	0.021	0.094	79.169	0.032	1.282	0.411	0.223	0.029	0.041	0.000	0.047	0.000
30-ts5-p6	13.259	0.274	0.008	0.075	0.001	0.078	79.721	0.000	1.299	0.442	0.223	0.014	0.047	0.012	0.002	0.000
30-ts5-p7	16.773	0.030	0.015	0.009	0.000	0.000	73.073	0.000	0.020	0.088	0.173	0.002	0.024	0.000	0.049	0.000
30-ts5-p8	19.151	0.000	0.002	3.728	0.038	0.215	70.284	0.000	0.000	0.013	0.196	0.001	0.117	0.000	0.006	0.000
30-ts5-p9	23.295	0.000	0.004	6.889	0.000	0.167	57.860	0.000	0.000	3.662	0.193	0.007	0.213	0.006	0.044	0.000
30-ts5-p10	24.766	0.007	1.920	0.252	0.081	1.703	5.295	0.027	0.320	0.057	0.020	0.000	45.793	0.000	0.016	0.000
30-ts5-p11	19.996	0.000	0.000	3.607	0.022	0.122	67.526	0.000	0.000	0.005	0.213	0.012	0.263	0.000	0.004	0.000
30-ts5-p12	16.995	0.004	0.001	0.025	0.010	0.000	72.984	0.000	0.101	0.124	0.176	0.005	0.014	0.000	0.000	0.000
30-ts5-p14	14.252	0.243	0.074	0.107	0.031	0.337	75.355	0.000	2.955	0.291	0.323	0.015	0.005	0.008	0.019	0.000

Analysis	O	Na	Al	Si	P	As	U	Th	Pb	Ca	K	S	Fe	Mn	Ti	Ba
30-ts5-p15	16.951	0.005	0.000	0.016	0.002	0.000	72.169	0.000	0.087	0.116	0.230	0.000	0.000	0.026	0.042	0.000
30-ts5-p16	16.713	0.017	0.002	0.016	0.000	0.006	71.528	0.019	0.075	0.078	0.206	0.000	0.090	0.000	0.020	0.000
30-ts5-p17	21.079	0.008	0.000	4.475	0.116	3.397	56.769	0.000	0.000	3.046	0.234	0.000	0.005	0.006	0.000	0.000
30-ts5-p18	15.851	0.016	0.000	0.010	0.000	0.041	75.042	0.017	0.652	0.040	1.331	0.000	0.000	0.000	0.006	0.000
30-ts5-p19	16.334	0.003	0.000	0.005	0.000	0.000	75.715	0.000	0.156	0.008	1.577	0.007	0.002	0.001	0.004	0.000
30-ts5-p20	14.596	0.289	0.057	0.098	0.000	0.135	78.281	0.000	0.344	0.714	0.375	0.014	0.000	0.000	0.031	0.000
30-ts5-p21	20.884	0.008	0.009	4.514	0.048	2.807	57.360	0.049	0.060	3.479	0.290	0.000	0.043	0.000	0.000	0.000
4UO2-std-ck-3	11.186	0.007	0.009	0.022	0.004	0.000	88.380	0.045	0.000	0.000	0.201	0.002	0.003	0.004	0.002	0.000
5Fe2O3-ck#1	23.070	0.010	0.009	0.001	0.000	0.001	0.000	0.000	0.000	0.008	0.011	0.010	66.921	0.000	0.021	0.000
5SiO2-ck#1	46.278	0.000	0.000	46.826	0.000	0.009	0.000	0.000	0.034	0.000	0.000	0.005	0.002	0.004	0.000	0.000
3dolomite-ck-20	51.661	0.002	0.000	0.009	0.010	0.000	0.000	0.000	0.000	21.527	0.000	0.001	0.016	0.029	0.015	0.000
4UO2-std-ck-4	11.325	0.001	0.007	0.002	0.007	0.000	86.754	0.000	0.000	0.000	0.214	0.000	0.032	0.001	0.015	0.000

7/30/92 JMC

Sample NOPI-ECP-22 which contains veins or layers of a black mineral (calcium carbonate) was seperated to obtain a smaller portion of the black mineral

NOPI-ECP-22-SEP1 - black mineral

wt. sample + vial 7.2392 g
wt. vial 5.4937 g

wt. sample 1.7455 g

NOPI-ECP-SEP2- contains leftovers of black mineral and rock

wt. sample + vial 11.1090 g
wt. vial 5.0873 g

wt. sample 6.0217 g

continuation on Sample NOPI-ECP-37

NOPI-ECP-37-SEP3- contains yellow uranium and glasslike mineral

wt. sample + vial 6.9107 g
wt. vial 6.8836 g

wt sample 0.0271 g

NOPI-ECP-37-SCP4- contains leftsoves of uranium + glasslike mineral and the rest of the rock

wt. sample + vial 7.5260 g
wt. vial 6.8632 g

wt sample 0.6628 g