

CENTER FOR NUCLEAR WASTE
REGULATORY ANALYSES

308
Scientific Notebook #401

Q200104120003

CNWRA
CONTROLLED
COPY 401

Radionuclide Transport KTI
26.01402.871

DAVID R. TURNER
210.522.2139

6/19/00

SRI

Objectives (20.01402.871) - KTI on Radionuclide Transport (06/19/00)

This scientific notebook is to be used to document the results of experiments conducted to examine radionuclide transport. These experiments may be designed to examine different geochemical processes that lead to the retardation of radionuclide transport, including sorption, ion exchange, and coprecipitation. Different geochemical conditions will be investigated to determine the effects of geochemical variability on these retardation processes. The procedures used in these experiments will either be documented in this notebook, or incorporated by reference to other CNWRA notebooks. Computer codes that may be used include the most recent versions of the EPA geochemistry code MINTEQA2, the USGS hydrochemistry code PHREEQC, GIS software such as ArcView, and commercial software such as Microsoft Excel, TableCurve 2D&3D, SigmaPlot, and WordPerfect. To the extent possible, electronic copies of experimental results will be included in the back of this notebook.

INVESTIGATORS

Notebook issued to David R. Turner, CNWRA Principal Scientist

Entries are also submitted by Melissa Nugent, CNWRA Scientist MN

6/19/2000

MNugent

X-ray Diffraction Analysis of
Unreacted calcite and calcite

seeds with neptunium-doped overgrowths.

X-ray diffraction was performed in Division 18 by Jim Spencer. Two samples were analyzed. 'Calcite' is the unreacted seed material used in coprecipitation experiments. Sample '42600' is calcite that has Np-overgrowths. This sample was prepared on 4/26/2000 and details regarding its synthesis may be found on pages 116-121 of CNWRA Scientific Notebook Controlled Copy # 361.

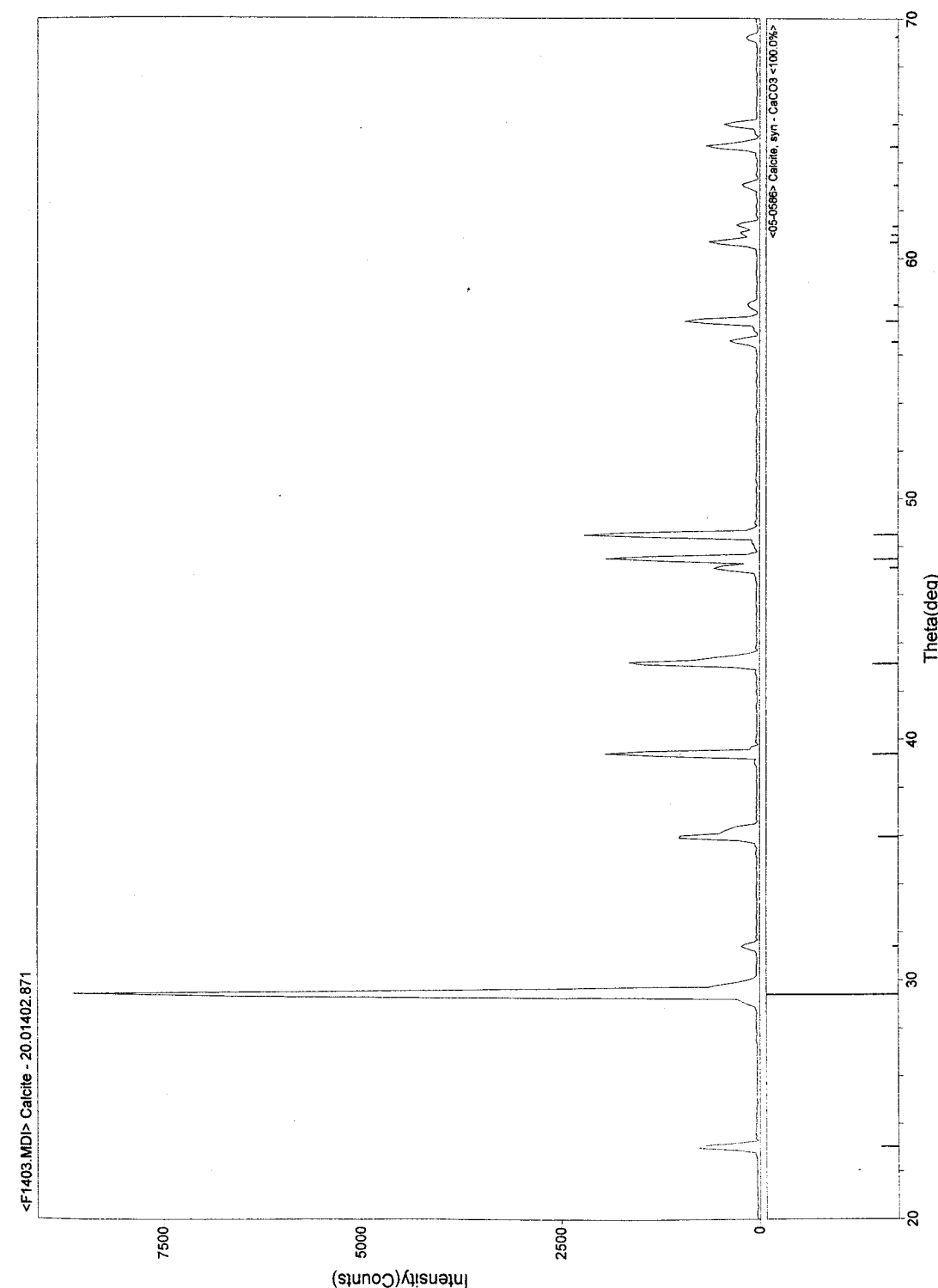
Both samples are pure calcite - no other phases present.

X-ray analysis of calcite
Unreacted calcite

6/19/2000

M. Nugent

mmmm

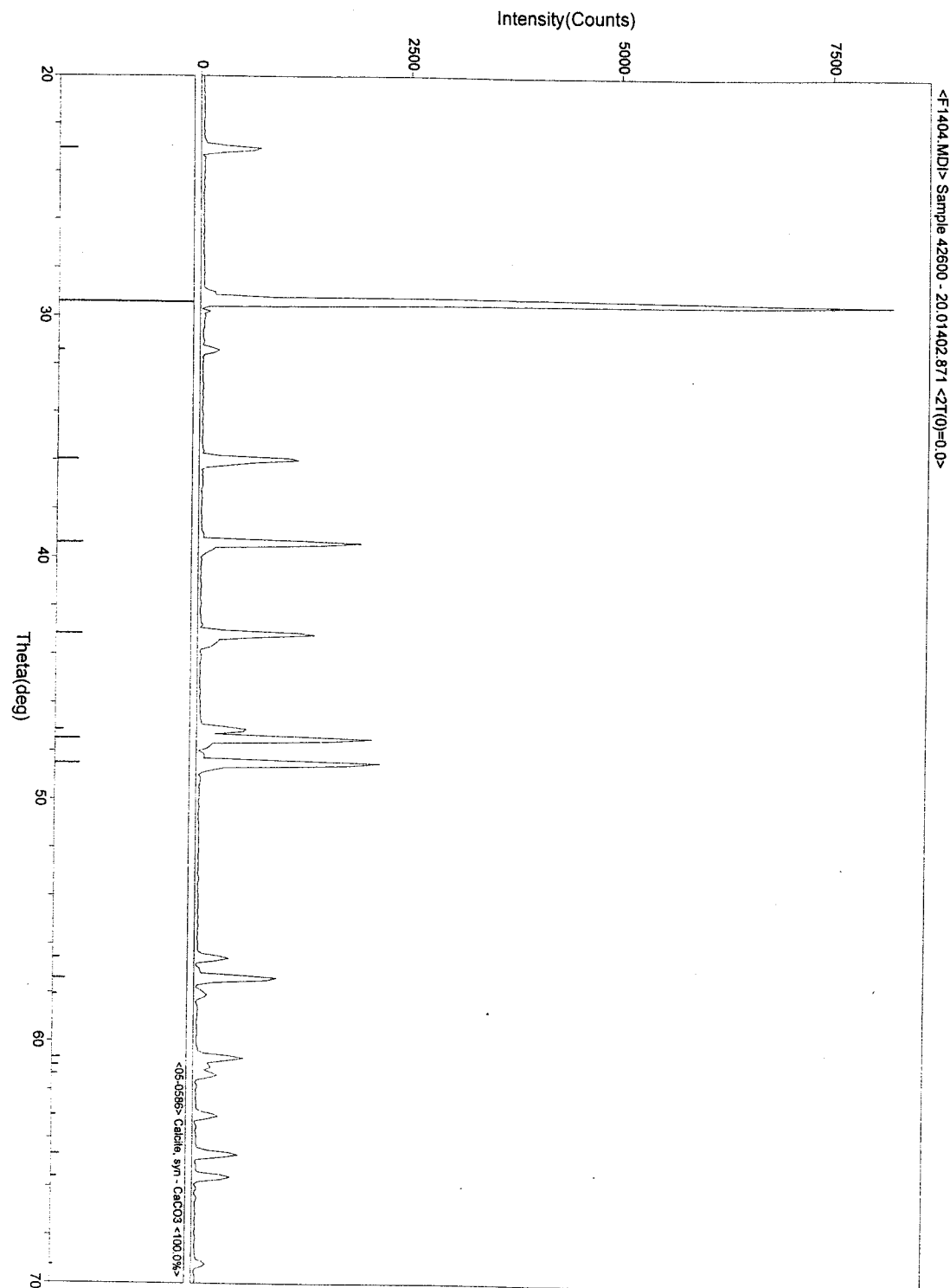


<winjdedata> Monday, May 01, 2000 @ 10:19a

Southwest Research Institute

M. Nugent
6/19/2000

X ray analysis of calcite: Sample 42600 (Np-overgrowth calcite)



c:\winlab\data> Monday, May 01, 2000 @01:54p

6/19/2000

M. Nugent

Preparation of standards for Ca
analysis by Atomic Adsorption

Standards will be prepared at approximately 0.5 ppm Ca, 1 ppm Ca, 2 ppm Ca, 4 ppm Ca and 5 ppm Ca for analysis of calcium samples which have been ~~data~~ MN 6/19/2000 diluted to ~2.5 ppm. These samples are from neptunium calcite coprecipitation experiments. The standards will be prepared from a 1000 ppm calcium standard (see below) and 0.006 M Na stock solution.

Calcium Standard: Lot # 986835-24, Fisher AA standard

0.006 M NaCl stock solution: using the solution prepared on 12/13/99 and recorded on page 158 of CNWRA Scientific Notebook Controlled Copy # 361.

Standard Desired Ca Conc., ppm	Mass, Ca Standard (g)	Mass, Ca Standard + Na Stock Solution (g)	Calculated Ca Concentration, ppm
0.5	0.0505	101.415	0.4980
1	0.1017	100.001	1.0170
2	0.2022	99.8569	2.0249
4	1.0106	252.0808	4.0090
5	0.5016	104.0839	4.8192

M Nugent

6/23/2000
Dilution of Samples from Np-calcite
coprecipitation experiments for Ca analysis
by Atomic Adsorption

Sample Dilution for Ca analysis by AA.
Dilutions performed 6/23/200 by M. Nigam

[illegible]

34

M. Nugent

HNegent

Sample dilution for Ca analysis by AA
Dilutions performed 6/23/2000 by M. J. Gent

[illegible]

My Nugent

Sample dilution for Ca analysis by AA.
Dilutions performed 6/23/2000 by M. Nugent

[illegible]

Preparation of sample for Lst analysis of Np.

Dissolve some of calcite seed product from experiment performed on 5/11/2000 and recorded on pages 141-144 of CNWRA Scientific Notebook controlled copy # 361.

- Mass, Bottle + cap: 16.9095 grams
- tare scale
- Mass, calcite seeds 0.1030 grams
- added ~3ml of 1M HCl and allowed seed to fully dissolve.
- Mass, calcite seed + HCl: 3.1014 grams.

LST analyses are presented on the following 2 pages (pages 10 and 11 of this scientific notebook, CNWRA Controlled Copy # 401).

M Nugent
6/28/2000
ISA analysis

M Nugent

Assay Definition-

Assay Description:

Assay Type: Alpha/Beta
Report Name: Manual Np_Pa 3% 2sigma
Output Data Path: C:\Packard\Tricarb\Results\Nugent\Manual Np_Pa 3%2S
Raw Results Path: C:\Packard\Tricarb\Results\Nugent\Manual Np_Pa 3%2S
Comma-Delimited File Name: C:\Packard\Tricarb\Results\Nugent\Manual Np_Pa 3%2S\Manual Np_Pa 3%2S.txt

Count Conditions-

Nuclide: Manual Np/Pa
Quench Indicator: SIS
External Std Terminator (sec): n/a
Pre-Count Delay (min): 0.00
Quench Set:
Count Time (min): 999.00
Count Mode: Normal
Assay Count Cycles: 1 Repeat Sample Count: 1
#Vials/Sample: 1 Calculate % Reference: Off

Background Subtract: On - 1st Vial
Low CPM Threshold: Off
2 Sigma % Terminator: On - Any Region

In Use Discriminator: 137

Regions	LL	UL	Bkg Subtract	2Sigma % Terminator
Beta A	0.0	400.0	1st Vial	0.00
Beta B	0.0	2000.0	1st Vial	0.00
Alpha	100.0	400.0	1st Vial	3.00

Count Corrections-

Static Controller: On Luminescence Correction: Off
Colored Samples: n/a Heterogeneity Monitor: n/a
Coincidence Time (nsec): 18 Delay Before Burst (nsec): 75

Half Life-

Regions	Half Life	Units	Reference Date	Reference Time
Beta A				
Beta B				
Alpha				

Cycle 1 Results

S#	Count Time	CPMA	A:2S%	CPMB	B:2S%	CPMA	alpha2S%	SIS	MESSAGES
1	999.00	35.40	1.06	43.11	0.96	2.45	4.05	898.30	B
2	2.63	3425.81	2.12	3423.43	2.12	1690.71	3.00	254.17	

M Nugent
6/28/2000
ISA analysis

M Nugent

Calibration Information

Software Version IC: 2.09
Software Version EC: 1.10
Instrument Model: Tri-Carb 3100TR
Instrument Serial Number: 405314
3H Chi Square: 22.05 Date Processed: 6/27/00 11:37:50 AM
14C Chi Square: 16.60 Date Processed: 6/27/00 11:37:50 AM
3H E^2/B (0-18.6 keV and 1-18.6 keV): 269.94 Date Processed: 6/27/00 11:37:50 AM
14C E^2/B (0-156 keV and 1-156 keV): 488.71 Date Processed: 6/27/00 11:37:50 AM
3H Efficiency (0-18.6 keV): 65.48 Date Processed: 6/27/00 11:37:50 AM
14C Efficiency (0-156 keV): 96.78 Date Processed: 6/27/00 11:37:50 AM
IPA Background Date Processed: 6/27/00 11:37:50 AM
3H Background CPM (0-18.6 keV): 15.82 Date Processed: 6/27/00 11:37:50 AM
14C Background CPM (0-156 keV): 23.83 Date Processed: 6/27/00 11:37:50 AM
3H Calibration DPM: 285000
3H Reference Date: 10/29/99
14C Calibration DPM: 134100
===== Errors and Warnings =====
===== End of Errors and Warnings =====

I have reviewed this scientific notebook and find it in agreement with QAP-001. There is sufficient information regarding methods used for conducting tests, acquiring and analyzing data so that another qualified individual could repeat the activity.

E. C. Dean
4/3/2001