



**AGENCY FOR NUCLEAR PROJECTS
NUCLEAR WASTE PROJECT OFFICE**

Capitol Complex
Carson City, Nevada 89710
Telephone: (702) 687-3744
Fax: (702) 687-5277

September 23, 1993

Charlotte Abrams, Senior Project Manager
Repository Licensing and Quality Assurance
Project Directorate
Division of High-Level Waste Management
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Charlotte:

Per your request, I have enclosed copies of our request to DOE for the seismic refraction survey performed across the southern end of Windy Wash and also our letter requesting data noted in the USGS monthly status reports and letters.

Please let me know if you need further information.

Sincerely,

A handwritten signature in black ink, appearing to read "Carl A. Johnson".

Carl A. Johnson
Administrator of Technical Programs

CAJ:mjj

Enclosures (2)

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WM-11
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September 9, 1993

Carl P. Gertz, Program Manager
Yucca Mountain Project Office
U.S. Department of Energy
P.O. Box 98608
Las Vegas, NV 89193-8608

Dear Mr. Gertz:

In the DOE Weekly Highlights dated July 1, 1993, there was a section regarding a seismic refraction survey performed across the southern end of Windy Wash. This Office requests the data generated from that seismic refraction survey. Since more than 45 days have elapsed since the performance of the job, the data should be available. Additionally, this Office requests any attendant analyses of this data that have been performed and are available.

Thank you for your prompt attention to this request. If you have any questions, please do not hesitate to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Robert R. Loux", written over a horizontal line.

Robert R. Loux
Executive Director

RRL:cs



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Carson City, Nevada 89710
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Fax: (702) 687-5277

August 31, 1993

Mr. Carl P. Gertz, Program Manager
Yucca Mountain Project Office
U.S. Department of Energy
P.O. Box 98608
Las Vegas, NV 89193-8608

Dear Mr. Gertz:

As you may be aware, the Regulatory Integration Branch, OCRWM, provides this Office with copies of the Yucca Mountain Project participant's Monthly Status Reports to the Project Office. Those reports provide this Office with valuable information on current activities and data development relative to characterization of the site. It is this information and data from those reports, in particular from the U.S. Geological Survey, that is the subject of this letter.

Various statements contained in the USGS status reports indicate that collection of data sets and attendant analyses have been conducted. This letter is to request copies of certain analyses and data sets discussed in the reports. We have organized the request by document and by isotope and other geochemical parameters to facilitate our tracking of the request and hopefully assist the DOE in expediting the response. Two types of USGS documents are identified: Monthly Status Reports, and dated letters from L. Hayes to C. Gertz. The request is as follows:

Uranium

USGS, YMP, Monthly Highlights and Status Report

January 1993

p.64 "Carbonate-rich samples were collected from several well-dated (11 to 81.6 ka by ¹⁴C, J. Quade, personal communication) sections to provide an empirical calibration for ²³⁴U-²³⁰Th dating

techniques." Requested Data - Location and Analyses of Carbonate-rich samples.

October/November FY 1993

p.64 "J. Paces obtained preliminary alpha-spectrometry results from three samples of Nevares Spring tufa mound. U isotopic compositions for leaches contain $^{234}\text{U}/^{238}\text{U}$ ratios of 1.7 to 1.8 which appears consistent with the relatively low compositions observed in modern discharge water...This may imply open-system behavior in one or more samples, or possibly a more complex mound stratigraphy than previously envisioned." Requested Data - Locations and alpha-spectrometry results from Nevares Spring tufa mound.

Strontium

USGS, YMP, Monthly Highlights and Status Report

August 1992

p.94 "Sr isotope data for VH-2 has unusually high $^{87}\text{Sr}/^{86}\text{Sr}$ ratios (0.7130) compared with data for other samples from elsewhere in the Tertiary aquifer." Requested Data - Sr isotope data for VH-2 and elsewhere in Tertiary aquifer.

p.94 "S. Mahan and B. Widmann prepared VH-1 water samples for XRF and mass spectrographic analysis. Preliminary results indicate that samples collected between 11:40 am and 12:10 pm have $^{87}\text{Sr}/^{86}\text{Sr}$ ratios lower (~0.711) than values obtained from VH-2 water and may suggest more complex flow patterns than originally expected." Requested Data - XRF mass spectrographic analyses, and Sr/Sr ratios of VH - 1.

p.94 "Most samples have $^{87}\text{Sr}/^{86}\text{Sr}$ ratios approximately 0.713 and are similar in isotopic composition to the data from VH-2 in northern Crater Flat. These data may indicate, that water from the Tertiary aquifer to the west of Yucca Mountain, is enriched in radiogenic strontium on a regional scale and is isotopically distinct from Tertiary aquifer waters to the east." Requested Data - Sr/Sr ratios from Franklin Lake Playa.

p.95 "Samples of tufa from Nevares Spring, Death Valley, California have been prepared and analyzed for Sr concentrations and isotopic compositions by K. Futa, S. Mahan and B. Widmann. Peterman compiled initial analytical results which show a remarkable increase in Sr concentration with increasing stratigraphic height (and presumably age) in the spring mound. Sr contents increase in a fairly linear pattern from about 600 ppm at the base of the mound, to nearly 2000 ppm at the top (10 to 11 m above the base). The observed pattern of Sr variation must be recording a systematic change in the composition of the discharging water. Several samples from throughout the mound have been submitted to J. Paces

for U-series dating. Preliminary Sr isotopic data do not appear to record a similar history of monotonic variability. $^{87}\text{Sr}/^{86}\text{Sr}$ values for tufa samples range from 0.7196 to 0.7205 and are all higher than the present-day spring water which averages 0.71902." Requested Data - Sr Concentrations for Nevares Spring tufa.

September 1992

p.13 "Z. Peterman designed a series of leaching experiments on Topopah Springs high-silica rhyolite whole-rock samples from UE25A#1. Both leachates and residues will be analyzed for Sr contents and isotopic compositions in order to better define multi-component mixing between primary Sr incorporated in phenocrysts and tuff matrix versus secondary Sr presumably added along with minor carbonate." Requested Data - Sr content and isotopic compositions of high-silica rhyolite samples from UE25A#1.

p.81 "S. Mahan analyzed the Sr isotopic compositions of a second water sample collected recently from Nevares Spring in Death Valley. The resulting $^{87}\text{Sr}/^{86}\text{Sr}$ of 0.71901 is analytically identical to the first water sample ($^{87}\text{Sr}/^{86}\text{Sr} = 0.7102$) collected during the previous year implying that the Sr budget of this flow system may be well buffered at this time scale." Requested Data - Sr composition from Nevares Spring.

p.89 "S. Mahan prepared four water samples from Pyramid Lake, NV as part of a cooperative NRP/Regional WRD study with L. Benson. This project has yielded valuable analog Sr applications for the Yucca Mountain area. Previous data show that modern water samples containing low $^{87}\text{Sr}/^{86}\text{Sr}$ values are not in isotopic equilibrium with tufa samples containing much higher $^{87}\text{Sr}/^{86}\text{Sr}$ values. Therefore, tufas must have been precipitated from different waters that have not yet been sampled. (6 hrs)" Requested Data - Sr composition from Pyramid Lake.

January 1993

p.63 "S. Mahan analyzed a precipitation sample for Sr isotopes collected between October 27-30, 1992 from Yucca Crest. The $^{87}\text{Sr}/^{86}\text{Sr}$ composition for this sample is higher (0.71162 ± 0.00001) than the average precipitation composition (0.71108). In the future, UNLV will provide additional precipitation samples for Sr isotopic analysis from their network of collectors." Requested Data - Sr isotopes for precipitation sample from Yucca Crest.

October/November FY1993

p.16 "Present-day $^{87}\text{Sr}/^{86}\text{Sr}$ values of the high-silica rhyolite in G-4 show a progressive but erratic decrease with increasing depth, but the IR (Sr) ratios, calculated on the basis of a 12.8 Ma age, are remarkably uniform with a mean of 0.71284 ± 0.00019 . The depth-decreasing trend in $^{87}\text{Sr}/^{86}\text{Sr}$ is accommodated by a corresponding

decrease in Rb/Sr resulting in the uniform IR(Sr) values. The downward decrease in Rb/Sr results from a small but significant increase in Sr content. These data show that the "isotope stratigraphy" in the high-silica rhyolite previously observed in samples from UE25A#1 is an illusion imposed by alteration of the unit." Requested Data - Sr/Sr and Rb/Sr ratios of rhyolite in G-4.

p.90 "The precipitation sample collected during the August 11, 1992 thunderstorms (collected by D. Ambos) gave an $^{87}\text{Sr}/^{86}\text{Sr}$ value of 0.71111. This value is very close to the values obtained for March 1992 precipitates (average = 0.71108), but does not help resolve the low value (0.70840) obtained during Feb. 1992." Requested Data - Sr/Sr ratios of precipitation samples for August 11, 1992, March 1992, and February 1992.

Letters to Carl Gertz

From: Department of Interior

April 15, 1992

p.7 "Staff from the geological mapping of zonal features project continued high-precision Sr isotopic analyses of outcrop samples (from the volcanic section in the southern portion of Yucca Mountain) which are assumed to never have been positioned below the water table. These analyses are being compared to completed 87/86 Sr ratios from core samples collected below the Topopah Spring member to assess the amount of Sr modification caused by hydrothermal alteration." Requested Data - Sr isotopic analyses of outcrop samples from Southern Yucca Mountain.

October 16, 1992

"In support of stratigraphic studies, a series of leaching experiments were designed on Topopah Springs high-silica rhyolite whole-rock samples from UE-25a#1. Both leaches and residues will be analyzed for Sr contents and isotopic compositions in order to better define multi-component mixing between primary Sr incorporated in phenocrysts and tuff matrix versus secondary Sr presumably added along with minor carbonate. Quantitative leaching was initiated on six whole-rock samples analyzed previously without prior removal of acid-soluble Sr. Initial results indicate that whole-rock samples contain a small to substantial amount of Sr that is soluble in weak HCL. The relationships between primary and secondary Sr need to be characterized in order to understand the minor variations observed in Sr isotopic composition in the Topopah Springs unit, as well as to characterize the source of disseminated carbonate in the repository horizon." Requested Data - Sr content and isotopic composition from high-silica rhyolite from UE25a#1.

Fluid Inclusion

USGS, YMP, Monthly Highlights and Status Report

September 1992

p.87 "Fluid inclusion studies, in collaboration with E. Roedder (Harvard), have shown that drill holes USW G-1 and G-2 have inclusions suitable for study. Heating, freezing, and crushing studies are in progress. Preliminary results from ~5100' in USW G-2 support previous mineralogical studies that concluded temperatures were as much as 200 to 250° C during the moderate temperature diagenetic alteration event at ~ 10.5 ma." Requested Data - results from fluid inclusion studies for USW - G-1 and G-2.

January 1993

p.70 "J. Whelan spent a day with Roedder and D. Vaniman at LANL evaluating and preparing samples of drill hole calcite from the UZ for further fluid inclusion studies. The samples transferred to LANL were from USW G-2, GU-3, G-3, and G-4; and from UE25 UZ-16, A-4, A-5, and A-7. The initial results from these studies show that in USW G-1 temperatures of calcite deposition determined by crushing of vapor-rich UZ inclusions, range from 60 to 100°C; homogenization temperatures determined from SZ inclusions ranged from 74 to 114°C. Samples from USW G-2 yielded temperatures ranging from 51 to 104°C in the UZ and from 78 to 260°C in the SZ. The higher temperature calcite from deep in G-2 reflects (probably) the high-temperature diagenetic event at ~ 10.5 Ma." Requested Data - results of fluid inclusion studies of calcite from USW G-2, GU-3, G-4, UE25UZ-16, A-4, A-5, A-7.

Carbon and Oxygen

USGS, YMP, Monthly Highlights and Status Report

July 1992

p.105 "R. Moscati determined the $d^{13}C$ and $d^{18}O$ values of calcite from 14 samples from site 106. Eleven of these samples ranged from -3.8 to -5.1‰ and from 20.4 to 22.5‰, respectively; the other three produced CO_2 that ran very poorly on the mass spectrometer (with very noisy signals suggesting contamination by another gas) and had values ranging from -5.6 to -6.3‰ and from 30.7 to 43.1‰, respectively. The source of this unidentified contaminant gas appeared to be the samples themselves. The isotopic compositions of the samples that produced "clean" CO_2 are consistent with a pedogenic origin." Requested Data - C-13 and O-18 values of calcite from site 106.

p.106 "R. Moscati determined the $d^{13}C$ and the $d^{18}O$ values of 6 samples from the paludal deposits from site 199. These ranged from

-1.0 to -2.8‰ and from 18.8 to 21.5‰, respectively; the $d^{13}C$ values of this calcite are similar to those of pond/marshland/playa deposits studied by R. Hay and others (1986), and the $d^{18}O$ values suggest some evaporation of the depositing waters prior to calcite precipitation. This is consistent with the wetland depositional environment postulated by E. Taylor. The $d^{13}C$ values, however, are more consistent with deposition from the waters hosted by the Paleozoic rocks deep in the section than with waters of the Tertiary rocks that underlie the deposit. Speculation regarding the relatively ^{13}C -enriched compositions of this calcite: (1) waters of the Paleozoic aquifer rose through the section (and through the Tertiary aquifer as well) and flowed on the surface; this is unlikely and apparently inconsistent with Sr isotopic compositions of the site 199 calcite (Z. Peterman and B. Marshall); (2) the wetland plant community imparted carbon to the system that was ^{13}C -enriched with respect to the surrounding dryland plants (this is pure speculation that J. Whelan needs to research more thoroughly); (3) the waters of Crater Flat have interacted extensively with the Paleozoic marine carbonate colluvium that is a major component of the valley fill." Requested Data - C-13 and O-18 values from Site 199.

p.106 "R. Moscati determined the $d^{13}C$ and $d^{18}O$ values of 22 samples of vein and pedogenic calcrete from trenches CFS-E, CF-1, CF-2, and 8. These ranged from -3.7 to 6.3‰ and from 19.3 to 23.0‰, respectively, consistent with precipitation in the near surface via soil dominated processes and similar to the values already reported from Trench 14." Requested Data - C-13 and O-18 values from trenches CFS-E, CF-1, CF-2 and 8.

p.106 "R. Moscati determined the $d^{13}C$ and $d^{18}O$ values of 3 samples in Cenozoic limestone from the Tonopah RR locale in Ash Meadows (-0.7 to -1.1‰ and 15.7 to 17.5‰, respectively). The $d^{13}C$ values, as at site 199, suggest input of Paleozoic carbonate carbon with similar caveats. The $d^{18}O$ values are similar to present day spring carbonates but the possibility of considerably different water $d^{18}O$ values in these lakes/springs/marshes cannot be discounted." Requested Data - C-13 and O-18 values from Tonopah RR in Ash Meadows.

p.106 "R. Moscati determined the $d^{13}C$ and $d^{18}O$ values of 3 trench 14 vein calcites (-4.5 to 6.3‰ and 19.5 to 20.3‰, respectively) and 5 samples of the slope parallel calcrete exposed at the base of the south wall of trench 14 (-5.3 to -5.9‰ and 19.6 to 20.9‰, respectively). All values fall within already existing ranges of data from the trench." Requested Data - C-13 and O-18 values from Trench 14 calcites and calcrete.

p.107 "R. Moscati determined the $d^{13}C$ (-2.5‰) and $d^{18}O$ (15.4‰) of a sample from Nevares spring deposits in Death Valley; these values are entirely consistent with published values from other spring

locales." Requested Data - C-13 and O-18 values from Nevares Spring.

August 1992

p.100 "J. Whelan received $d^{18}O$ data from four trench 14 samples from Arizona State University; these numbers ranged from 24.0 to 31.3‰, but the lowest value was reported to be questionable due to abnormal behavior during extraction. At present the stable isotopes of the coexisting calcite from these samples has not been run; however, assuming a value of 20‰ for the coexisting calcite (trench 14 calcite oxygen isotopic compositions are 20 ± 1 ‰) shows that the opal-calcite fractionation indicate depositional temperatures at or below present day surface conditions. Indeed, some of the samples would indicate temperatures lower than $0^{\circ}C$! (Kita et al., 1985). This suggests, that the opal deposited from meteoric waters having $d^{18}O$ values higher than those that precipitated the calcite, probably as a result of evaporation. Assuming an initial $d^{18}O$ of the meteoric water of -13 ‰, these opals precipitated at temperatures of $-4^{\circ}C$ to $+7^{\circ}C$. At mean annual temperatures of $10^{\circ}C$ and $20^{\circ}C$, these opals precipitated from fluids with $d^{18}O$ values between -12 and -8.3 ‰, and between -9.1 and -5.4 ‰, respectively. Based on the results of Benson and McKinley (1985), meteoric waters of -10 ‰ are conceivable, as are $d^{18}O$ -enrichments of several ‰ due to evaporation in the desert soil environment." Requested Data - O-18 results from Trench-14.

p.100 "J. Whelan received $d^{18}O$ data from Arizona State University for eleven samples of opal/chalcedony from Yucca Mountain drill core. All of these samples were from the unsaturated zones of the sampled drill holes; the values ranged from 14.7 to 26.6‰. Assuming a value of -13 ‰ for the depositing waters, implies that these opal deposited at temperatures ranging from 10° to $58^{\circ}C$ (Kita et al., 1985); considering the assumptions involved, this agreement with present day rock temperatures and ground-water compositions, is very good and argues against high temperature hydrothermal fluids depositing the opal." Requested Data - O-18 values of opal/chalcedony from drill core.

January 1993

p.71 "Scoping studies of the ^{14}C ages of UZ drill hole calcites are a bit discouraging with respect to paleoclimate studies. With the exception of one sample from USW G-1 with an age of $20.9 \pm .09$ ka, the other 13 samples had very old ages ranging from 33.3 to > 54 ka. The calcite analyzed came from the surfaces of free-growing crystals and should have represented the latest precipitation in these samples. The very old ages probably represent incorporation of "dead" carbon, perhaps provided by local dissolution of older calcite or from equilibration of infiltrating waters with soil zone calcrete, into the precipitating fluids." Requested Data - C-14

ages of calcites from USW G-1 and other drill holes. October/
November FY 1993

p.92 "Moscati performed 12 analyses of carbonate from samples from site 106 and from the carbonate material at Wahmonie. This data ranged from -5.3 to -4.6 ($\delta^{13}\text{C}$) and from 19.9 to 24.5 ($\delta^{18}\text{O}$), all values which are consistent with formation in the soil zone from waters recharged by meteoric processes in the near surface environment." Requested Data - C-13 and O-18 values from site 106 and Wahmonie.

p.92 "Moscati performed 22 analyses of carbonate from samples from Travertine Point ($\delta^{13}\text{C}$ = 0.2 to 1.3; $\delta^{18}\text{O}$ = 15.0 to 16.6), Nevares Spring ($\delta^{13}\text{C}$ = -2.5 to -13.0; $\delta^{18}\text{O}$ = 15.3 to 18.9), and Grapevine Spring ($\delta^{13}\text{C}$ = 0.0 to 0.5; $\delta^{18}\text{O}$ = 13.7 to 15.5); and one analysis of Pz limestone near Nevares ($\delta^{13}\text{C}$ = -1.0; $\delta^{18}\text{O}$ = 25.1). Although inter site differences in the isotopic composition of the carbonate are apparent, probably reflecting differences in the hydrology of the aquifers discharging the waters or in the temperature of calcite precipitation, these values are all consistent with spring discharge depositional settings. Many more analyses are planned to determine if systematic time/space variations exist within these deposits. Nevares, in particular has displayed systematic Sr isotope variations and the minimal amount of stable isotope data in hand suggests time-dependent increases in both $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ during a significant portion of Nevares deposition." Requested Data - C-13 and O-18 values from Travertine Spring, Nevares Spring, and Grapevine Spring.

p.92 "R. Moscati determined the stable isotopic compositions of 33 samples of pedogenic calcrete and rhizolithic calcite from Busted Butte, Eleanna Trench, Trenches 1 and 16, and Yucca Crest. The $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values of these samples ranged from -2.2 to -6.5 and from 17.0 to 21.6, respectively. Busted Butte samples tended to have $\delta^{13}\text{C}$ in the higher part of this range, as noted in previous work; and, interestingly, the samples from soils formed at higher elevations on Yucca Crest tended to have lower $\delta^{13}\text{C}$ values and higher $\delta^{18}\text{O}$ values." Requested Data - C-13 and O-18 values from Busted Butte, Eleanna Trench, Trenches 1 and 16, Yucca Crest.

December FY 1993

p.68 "R. Moscati performed 3 analyses of carbonate from samples from site 106 and from the carbonate material at Wahmonie. This data fell within the previously reported (November 1993) ranges of -5.3 to -4.6 ($\delta^{13}\text{C}$) and 19.9 to 24.5 ($\delta^{18}\text{O}$). Requested Data - C-13 and O-18 values from site 106 and Wahmonie.

p.68 "R. Moscati performed 40 analyses of carbonate from samples from Nevares Spring ($\delta^{13}\text{C}$ = -2.5 to -13.0; $\delta^{18}\text{O}$ = 15.3 to 18.9), and Grapevine Spring ($\delta^{13}\text{C}$ = -4.5 to -0.8; $\delta^{18}\text{O}$ = 13.6 to 18.9). The Grapevine Spring results suggest that pedogenic processes may have

affected some of the carbonate to produce the lighter $\delta^{13}\text{C}$ /heavier ^{18}O compositions." Requested Data - C-13 and O-18 values from Nevares Spring and Grapevine Spring.

p.68 "R. Moscati determined the isotopic composition of 17 samples of carbonate fracture coating and calcrete from the surface to a depth of 73.0' in drill hole UE25 RF-9 (collared about 0.25 km NE of Exile Hill). The $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values of these samples ranged from -6.2 to -4.3 and 18.6 to 21.5, respectively, in concert with precipitation within the near surface pedogenic environment from descending fluids recharged within surface environment." Requested Data - C-13 and O-18 values from UE25-RF-9.

p.68 "R. Moscati determined the stable isotopic compositions of 2 samples of pedogenic calcrete from Yucca Crest. The $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values for these samples were -7.5 and 2.7 and 16.4 and 19.5, respectively." Requested Data - C-13 and O-18 values from Yucca Crest.

Letters to Carl Gertz

From: Department of Interior

August 11, 1992

"Staff from the calcite silica project determined $d^{13}\text{C}$ and $d^{18}\text{O}$ values from the following locations: 14 samples from site 106; 6 samples from the paludal deposits from site 199; 22 samples of vein and pedogenic calcrete from trenches CFS-E, CF-1, CF-2, and 8; 3 samples of Cenozoic limestone from the Tonopah RR locale in Ash Meadows; 3 trench 14 vein calcites plus 5 samples of the slope parallel calcrete exposed at the base of the south wall of trench 14; and 1 sample from Nevares spring deposits in Death Valley." Requested Data - C-13 and O-18 values from Site 106, Site 109, Trenches CFS-E, CF-1, CF-2 and 8, Tonopah RR, Trench 14 and Nevares Spring.

March 10, 1993

"Sixty three determinations were performed of the $d^{13}\text{C}$ and $d^{18}\text{O}$ compositions of samples from drillhole USW G-1. In general, the new data fit the patterns observed in the reconnaissance data set, but are significant in two respects: (1) both the upper and lower lithophysal zones of the Topopah Springs contain calcite mineralizations in which the earlier portion has heavy $d^{13}\text{C}$ values (to 3.7‰) whereas the later calcite fits the pattern of light $d^{13}\text{C}$ values typical of the unsaturated zone; this is similar to the errant values reported from G-4. (2) some calcite from deep in G-1 has very light values (down to 1.3‰) that strongly suggest either very warm or isotopically light waters, or a combination of the two. Sixty nine determinations were performed of the $d^{13}\text{C}$ and $d^{18}\text{O}$ compositions of samples from drill hole USW G-2, again confirming

previously recognized patterns, and again with unusually heavy $d^{13}C$ values occurring within the lower lithophysal zone of the Topopah Springs. In this drill hole, however, these heavy values are only about 50m above the SWL, so it is possible that they represent deposition from some past higher water table. Forty nine determinations of the $d^{13}C$ and $d^{18}O$ compositions of samples are from drill holes UE-25 A-5, RF-3, and USW GU-3. The latter three of these holes were cored from near the surface and, therefore, provide an opportunity to sample calcite from the surficial zone dominated by soil processes into the deeper fractures coated with calcite druses. In general, the data collected shows a smooth isotopic transition from soil calcrete values (like trench 14) into the compositions typical of the unsaturated zone. Ten samples of air and/or soil gas were analyzed." Requested Data - C-13 and O-18 values from USW G-1, G-2, UE-25 A-5, RF-3, and USW GU-3.

Other Data

USGS, YMP, Monthly Highlights and Status Report

January 1992

p.83 "K. Futa continued the Nd isotope analyses of calcite fracture fillings in core samples from USW G-2, -3, and -4. Preliminary results suggest an analytically measurable isotopic difference in $^{143}Nd/^{144}Nd$ between surficial calcites and deep fracture fillings. Requested Data - Nd/Nd values of calcite fracture fillings from USW G-2, -3, and -4.

October/November FY 1993

p.15 "Rock chemistry (energy-dispersive XRF technique) is being used to check field correlations. Initial results indicate that some rock units frequently difficult to distinguish in hand specimen are notably different in trace-element abundances including elements that are virtually immobile during weak hydrothermal alteration." Requested Data - results of XRF trace-element analyses.

p.15 "K. Futa continued isotopic work on samples from the Raven Canyon reference section and of samples from well JF-3." Requested Data - Location and results of isotope analysis on samples from Raven Canyon and results from JF-3.

p.89 "Leach and residue fractions were also completed on three samples from the tufa mound at Nevares Spring, Death Valley. Ages of these samples from the lowest and intermediate stratigraphic levels will place initial constraints on the history of paleodischarge and on isotopic and compositional fluctuations observed at this site." Requested Data - Results from tufa mound samples at Nevares Spring.

p.94 "K. Futa completed chemistry of a suite of 20 calcite fracture fillings from the Topopah Spring Member in drill hole VH-2 in Crater Flat. These samples were spiked so that accurate Sr concentrations can be determined." Requested Data - Chemistry results from VH-2.

p.93 "E. Roedder (Harvard) reports that crushing stage experiments on individual vapor-phase inclusions from the unsaturated zone of USW G-1 indicate that the inclusions are filled with air and/or CO2 and water vapor. The inclusions are at less than atmospheric pressures due to the post-entrapment condensation of water on the inclusion walls. Estimates of the inclusion pressure allow calculation of the original water vapor content, which in turn permit estimates of the temperature that do not appear to continue into the overlying tuffs of the Bullfrog Member. Pertinent field observations are as follows:" Requested Data - Vapor-Phase inclusion results from USW G-1.

Letters to Carl Gertz

From: Department of Interior

March 11, 1992

p.6 "In support of past discharge studies, preliminary analyses of faunal samples from modern springs indicate that the material contains ostracodes at many sites which were also sampled for water quality. Coupling the water quality analyses with the occurrence of ostracodes will give the water quality parameters including water temperature for the ecological range of individual ostracode species. This data is then stored in the ostracode database and will be used for site characterization interpretations. Ostracodes were found in samples from wet and dry playas collected in FY 1991 from Jornada Lakes, Isaak Lake and Playas Lake, New Mexico. In California, ostracodes were found in samples from Dry Lake at 29 Palms Marine Corps Base, Hayfield Lake, Silver Dry Lake and East Cronese Lake, California. Ostracodes were found in FY 1992 sites at Coral Valley, Mud Lake, and Big Smoky Valley Playa in Nevada. Playas containing ostracodes immediately below the playa surface indicate that for at least part of the year these sites are fed by discharging ground water either from the discharge area of a deep aquifer or from a shallow flow system where the discharge area is the playa bottom. In the arid west, playas without ground-water discharges areas are generally dry." Requested Data - Analyses of faunal samples from Modern Springs.

January 13, 1993

"Staff supporting calcite-silica studies (1) performed 3 analyses of carbonate from samples from site 106 and from the carbonate material at Wahmonie; (2) performed 40 analyses of carbonate from Nevares Spring and Grapevine Spring, (3) determine the isotopic

composition of 17 samples of carbonate fracture coating and calcrete from the surface to a depth of 73' in drill hole UE25 RF-9; (4) determined isotopic composition of 10 samples of shallow calcite/calcrete fracture coatings from UE A-6. This data was similar to that from US25 RF-9. These two holes provide valuable comparisons for existing data from trenches on and near Exile Hill; (5) determined stable isotopic compositions of 2 samples of pedogenic calcrete from Yucca Crest; and (6) determined isotopic compositions of several samples from USW G-4, in general, duplicate analyses of existing data. This represents the initiation of extensive analytical work on samples already in hand from drill core penetrating Yucca Mountain. Sm and Nd isotopes were measured on four spiked samples of volcanic rock associated with vein calcites from drill-core samples. Results will be used to evaluate whether host rock and vein carbonate are in isotopic equilibrium, and to assess issues of secondary mobility of the rare earth elements." Requested Data - Isotopic composition of carbonate from Site 106, Wahmonie, Nevares Spring, Grapevine Spring, UE25 RF-9, UEA-6, Yucca Crest and USW G-4.

Your prompt attention to this request is appreciated. Should you have questions, do not hesitate to contact Carl Johnson of my staff.

Sincerely,

Robert R. Loux
Executive Director

RRL:CAJ:jem

cc: L. Hayes USGS
C. Schluter TRAC