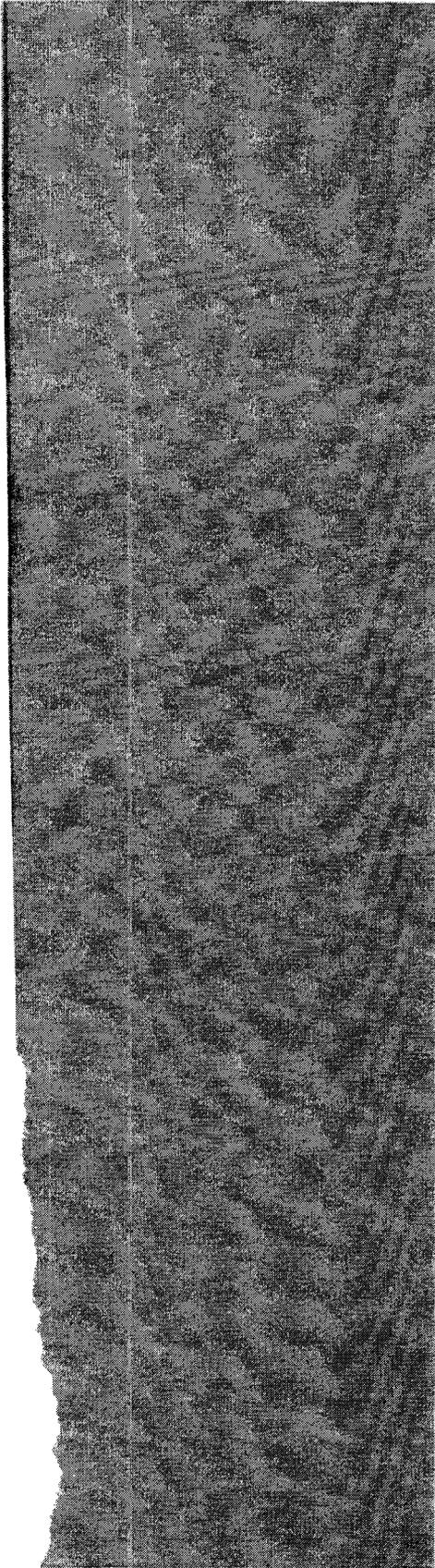


offsite

3/1/96



*Radionuclide and Heavy Metal Concentrations
in Soil, Vegetation, and Fish Collected
Around and Within Tsicoma Lake
in Santa Clara Canyon*

Los Alamos
NATIONAL LABORATORY

*Los Alamos National Laboratory is operated by the University of California
for the United States Department of Energy under contract W-7405-ENG-36.*



4080

Edited by Hector Hinojosa, Group CIC-1

An Affirmative Action/Equal Opportunity Employer

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither The Regents of the University of California, the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by The Regents of the University of California, the United States Government, or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of The Regents of the University of California, the United States Government, or any agency thereof. The Los Alamos National Laboratory strongly supports academic freedom and a researcher's right to publish; therefore, the Laboratory as an institution does not endorse the viewpoint of a publication or guarantee its technical correctness.

LA-13144-MS

UC-902
Issued: March 1996

*Radionuclide and Heavy Metal Concentrations
in Soil, Vegetation, and Fish Collected
Around and Within Tsicoma Lake
in Santa Clara Canyon*

*P. R. Fresquez
D. R. Armstrong
L. Naranjo, Jr.*

RADIONUCLIDE AND HEAVY METAL CONCENTRATIONS IN SOIL, VEGETATION, AND FISH COLLECTED AROUND AND WITHIN TSICOMA LAKE IN SANTA CLARA CANYON

by

P. R. Fresquez, D. R. Armstrong, and L. Naranjo, Jr.

ABSTRACT

Radionuclide (^3H , ^{90}Sr , ^{137}Cs , ^{238}Pu , ^{239}Pu , and total uranium) and heavy metal (Ag, As, Ba, Be, Cd, Cr, Hg, Ni, Pb, Sb, Se, and Tl) concentrations were determined in soil, vegetation (overstory and understory), and fish (rainbow trout) collected around and within Tsicoma Lake in Santa Clara Canyon in 1995. All heavy metal and most radionuclide concentrations around or within Tsicoma Lake, with the exception of uranium in soil, vegetation, and fish, were within or just above upper limit background concentrations. Detectable levels (where the analytical result was greater than two times the counting uncertainty) of uranium in soils, vegetation, and fish from Tsicoma Lake were found in slightly higher concentrations than in background samples. Overall, however, the maximum total committed effective dose equivalent (CEDE)(95% confidence level)—based on the consumption of 46 lb of fish—from Tsicoma Lake ($0.066 \text{ mrem y}^{-1}$) was within the maximum total CEDE from the ingestion of fish from the Mescalero National Fish Hatchery (background) ($0.113 \text{ mrem y}^{-1}$).

I. INTRODUCTION

As part of the Environmental Surveillance Program at Los Alamos National Laboratory (LANL), samples of air, water, soils, foodstuffs, and biota are routinely collected from LANL, perimeter, and regional (background) areas to assess the Laboratory's impact (radiological and nonradiological) on the

surrounding environment (EPG 1995).

There are several Native American communities located in the general vicinity of LANL, and a request was made by Santa Clara Pueblo officials (Dasheno 1995) to assess soil, vegetation, and fish from around and within Tsicoma Lake. Tsicoma Lake is the uppermost lake (there are three

others) located within Santa Clara Canyon approximately 13 miles northwest and slightly downwind of LANL (the prevailing wind direction at LANL during day and nighttime hours is northeasterly and northwesterly, respectively) (USDOE 1995) (Figure 1). This study reports (1) the concentrations of various heavy metals and radionuclides in soil, vegetation, and fish, and (2) the maximum total committed effective dose equivalent (CEDE) to people who may consume fish from Tsicoma Lake.

II. METHODS

In May of 1995, approximately five soil surface subsamples were collected with a 4-inch- (10-cm-) diameter stainless steel ring at the 0- to 2-inch (5-cm) depth around the perimeter of Tsicoma Lake and Fenton Lake (background). Fenton Lake is located well away and upwind of LANL (approximately 25 mi. away). All soil subsamples were mixed in a sealable plastic container to obtain one composite sample per site. The sample was submitted under full chain-of-custody to the Environmental Chemistry Group

(CST-9) at LANL for the analysis of various heavy metals (Ag, As, Ba, Be, Cd, Cr, Hg, Ni, Pb, Sb, Se, and Tl) and radionuclides (^3H , ^{90}Sr , ^{137}Cs , ^{238}Pu , ^{239}Pu , and total uranium). Metals were determined by inductively coupled plasma atomic emission spectrometry (ICPES) for Ag, Ba, Be, Cd, Cr, Ni, and Pb, by inductively coupled plasma mass spectrometry (ICPMS) for Sb and Tl; by electrothermal vaporation atomic absorption (ETVAA) for As and Se; and by cold vapor atomic absorption (CVAA) for Hg. Heavy metal results in soils were reported in $\mu\text{g dry g}^{-1}$ (ppm) (Appendix A). All methods of soil radionuclide analysis can be found in Purtymun et al. (1987) and Fresquez et al. (1995a). Radionuclide results in soils are expressed as pCi mL^{-1} of soil

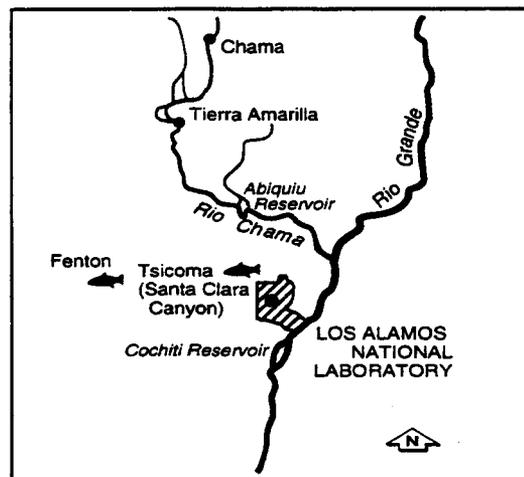


Fig. 1. Fish sampling locations.

moisture for tritium, and on an oven-dry weight basis (dry g^{-1}) for all of the other radioisotopes (Appendix B).

Vegetation samples were collected from overstory (blue spruce and ponderosa pine) and understory (grasses and forbs) materials around the perimeter of Tsicoma Lake and Fenton Lake. Overstory samples consisted of tree-shoot tips approximately 1 to 2 in. (2.5 to 5 cm) in length at the 4- to 5-ft height (1.3 to 1.6 m) and understory samples consisted of the top growth of grasses and forbs. All vegetation samples, consisting of 2 to 3 lb (0.9 to 1.4 kg) of composited material, were double bagged in labeled Ziploc plastic bags and transported to the Laboratory in locked ice chests. At the Laboratory, samples (unwashed) from each bag were divided into three subsets to provide analysis material for ^3H , heavy metals, and other radionuclides. Subsamples for ^3H analysis were placed in a glass beaker apparatus to collect distillate water (Salazar 1984). Vegetation subsamples for heavy metals were dried at 70°C for 48 h before being ground in a Wiley mill (40-mm screen) (Fresquez et al. 1990). The rest of the subsample set(s) were

placed in 1-L glass beakers and ashed at 500°C for 120 h; after ashing, the sample was pulverized and homogenized, transferred to labeled 500-mL poly bottles, and submitted with the distillate (water) samples under full chain-of-custody to CST-9 for the analysis of heavy metals and radionuclides. The analyses of heavy metals in vegetation, after first being digested with nitric or a combination of nitric and hydrochloric acid, were conducted using the same techniques as that used for soils. Heavy metal results in vegetation were reported in $\mu\text{g dry g}^{-1}$ (ppm) (Appendix A). All methods of radiochemical analyses in vegetation have been described previously (Salazar 1984). Radionuclide results were reported in pCi mL^{-1} (of tissue moisture) for tritium, and on an ash weight basis (ash g^{-1}) for all the other isotopes (Appendix B). Results in grams of ash are usually two to four orders of magnitude higher than live (wet) weight.

Samples of rainbow trout (*Salmo gairdneri*) from Tsicoma Lake, which was stocked approximately a year before with fish from Ruidoso, NM (Mescalero National Fish Hatchery) (Chavarria 1995), were collected with a rod and

reel. Background fish were collected by the Santa Clara Pueblo Environmental Department directly from the Mescalero National Fish Hatchery truck the day before fish were collected from Tsicoma Lake, as they were stocking the other three lakes in Santa Clara Canyon in 1995 (Chavarria 1995). All fish samples were placed in Ziploc bags and transferred to the Laboratory in locked ice chests. At the Laboratory, fish samples were gutted, had their heads and tails removed, and were rinsed with distilled water. Approximately 1000 g of wet fish muscle (and associated skeleton) (from 12 fish from Tsicoma and 7 fish from the Mescalero National Fish Hatchery) were placed into tared 1-L beakers and weighed. The beaker contents were oven-dried at 80°C for 120 h, weighed, and ashed at 500°C for 120 h. The sample ash was weighed, pulverized, and homogenized before it was submitted under full chain-of-custody to CST-9 for the analysis of heavy metals and radionuclides. Heavy metals in fish were analyzed, after first being digested with nitric acid, using the same methods as the soils and vegetation. Results for heavy metals in

fish were reported on a wet weight basis (wet g⁻¹) (Appendix A). All methods of radiochemical analysis in fish have been described previously (Salazar 1984) and were reported on an oven-dry weight basis (dry g⁻¹) (Appendix B).

The CEDE was calculated using the methodology outlined in the International Commission on Radiological Protection (ICRP) Publication 26 (ICRP 1977) and 30 (ICRP 1978), and the public dose conversion factors in Department of Energy report DOE/EH-0071 (DOE 1984). A dry/wet ratio of 0.25 and a consumption rate of 46 lb (21 kg) per year was used in the calculation.

III. RESULTS AND DISCUSSION

Soils. The results of heavy metal and radionuclide analysis in composite soil samples collected from around the perimeter of Tsicoma Lake in Santa Clara Canyon, as compared to background (Fenton Lake); can be found in Tables 1 and 2, respectively. All heavy metal elements in the composite soil sample collected from around Tsicoma Lake were within concentrations detected in a composite

Table 1. Total Recoverable Trace and Heavy Metals ($\mu\text{g dry g}^{-1}$) (ppm) in Soils Around Tsicoma Lake and Fenton Lake (Background) in 1995.

Location	Ag	As	Ba	Be	Cd	Cr	Hg	Ni	Pb	Sb	Se	Tl
Tsicoma Lake	<1.0	2.0	60.0	0.72	<0.4	3.5	0.03	5.4	<20.0	<0.25	0.5	0.25
Fenton Lake	<1.0	1.0	55.0	0.81	1.1	5.1	<0.01	<2.0	13.0	<0.25	0.4	0.25
RULB^a	<4.4	6.0	220.0	<0.90	<0.5	17.4	<0.05	<14.0	<21.8	<0.40	<1.2	<2.40

^aRegional upper limit background (mean + 2 std dev) from Fresquez et al. (1996a).

Table 2. Radionuclide Concentrations in Soils Around Tsicoma Lake and Fenton Lake (Background) in 1995.

Location	³ H (pCi mL ⁻¹)	¹³⁷ Cs (pCi dry g ⁻¹)	²³⁸ Pu (pCi dry g ⁻¹)	²³⁹ Pu (pCi dry g ⁻¹)	Uranium ($\mu\text{g dry g}^{-1}$)	⁹⁰ Sr (pCi dry g ⁻¹)
Tsicoma Lake	0.1 (0.6) ^b	0.32 (0.12)	0.032 ^{*a} (0.012)	0.018 (0.018)	4.15* (1.50)	0.4 (0.4)
Fenton Lake	0.1 (0.8)	0.42 (0.14)	0.010 (0.004)	0.025 (0.004)	4.02 (0.80)	0.3 (0.4)
RULB^c	6.3	1.13	0.008	0.028	4.05	0.8

^{*a}Detectable value (where the analytical result was greater than two times the counting uncertainty) and higher than the regional upper limit background (RULB).

^b(+/- 2 counting uncertainties); values are the uncertainty in the analytical results at the 95% confidence level.

^cRegional upper limit background (mean + 2 std dev) from Fresquez et al. (1995a).

soil sample collected from around Fenton Lake (background). Also, all heavy metal elements in soil samples collected around Tsicoma Lake were well within regional upper limit background (RULB) concentrations. RULB concentrations for heavy metals in soils were compiled from environmental surveillance data collected from surface soils from various regional locations around northern New Mexico from 1991 to 1995 (Fresquez et al. 1996a). The average concentration level plus twice the standard deviation of the mean (95% confidence level) was adopted as an indicator of an approximate RULB.

Two radionuclides, namely ^{238}Pu and total uranium, were found in detectable (where the analytical result was higher than two times the counting uncertainty) and in higher concentrations than in soils collected from around Fenton Lake or in soils collected from RULB locations (Fresquez et al. 1995a). The majority of ^{238}Pu detected in the environment is from fallout from aboveground nuclear tests (60%) (Klement 1965) and from the burnup of satellite power sources in the atmosphere (40%) (Perkins and Thomas 1980).

Uranium, on the other hand, occurs naturally in the soil and varies from region to region (Purtymun et al. 1987); the range in naturally occurring uranium concentrations in the Los Alamos vicinity, for example, is from 4 to 11 $\mu\text{g g}^{-1}$ (Crowe et al. 1978).

Vegetation. Most heavy metal elements in overstory vegetation collected from around the perimeter of Tsicoma Lake were well within concentrations detected in similar vegetation collected around Fenton Lake and from other RULB locations (Fresquez et al. 1996b) (Table 3). Although Ba, Cd, Cr, Ni, and Pb in understory vegetation collected around Tsicoma Lake were detected in slightly higher concentrations than in similar vegetation from around Fenton Lake, most of these metals, with the exception of Ni, were very close to concentrations found in understory vegetation from other regional background areas in northern New Mexico (Fresquez et al. 1996b). The level of Ni in understory plants from around the perimeter of Tsicoma Lake as compared to background may be a reflection of sample contamination during processing,

Table 3. Total Recoverable Trace and Heavy Metals ($\mu\text{g dry g}^{-1}$) (ppm) in Vegetation Around Tsicoma Lake and Fenton Lake (Background) in 1995.

	Ag	As	Ba	Be	Cd	Cr	Hg	Ni	Pb	Sb	Se	Tl
Tsicoma Lake												
Overstory	<1.0	<0.5	51.0	<0.08	<0.01	<0.50	0.05	<2.0	0.4	<0.2	<0.13	<0.2
Understory	<1.0	<0.5	34.0	<0.08	0.20	0.82	<0.03	5.6	2.0	<0.2	<0.13	<0.2
Fenton Lake												
Overstory	<1.0	<0.5	43.0	<0.08	0.04	0.53	0.03	<2.0	1.0	<0.2	<0.13	<0.2
Understory	<1.0	<0.5	19.0	<0.08	0.03	0.56	0.03	<2.0	0.4	<0.2	<0.13	<0.2
ROULB^a	<1.0	<0.2	13.0	<0.08	<0.40	<0.50	<0.10	<1.0	<4.0	<1.0	0.30	<1.0
RUULB^b	<1.0	<0.2	13.0	<0.08	<0.40	<0.50	<0.10	<1.0	<4.0	<1.0	2.80	<1.0

^aRegional overstory upper limit background (mean + 2 std dev) from Fresquez et al. (1996b).

^bRegional understory upper limit background (mean + std dev) from Fresquez et al. (1996b).

Table 4. Radionuclide Concentrations in Vegetation Around Tsicoma Lake and Fenton Lake (Background) in 1995.

Location	³ H (pCi mL ⁻¹)	¹³⁷ Cs (pCi dry g ⁻¹)	²³⁸ Pu (pCi dry g ⁻¹)	²³⁹ Pu (pCi dry g ⁻¹)	Uranium (mg dry g ⁻¹)	⁹⁰ Sr (pCi dry g ⁻¹)
Tsicoma Lake						
Overstory	-0.2 (0.6) ^a	0.01 (0.04)	0.003 (0.004)	0.002 (0.004)	0.28 (0.10)	6.2 (0.8)
Understory	0.0 (0.6)	0.36 (1.06)	0.001 (0.002)	0.005* ^b (0.004)	1.14* (0.22)	9.8* (1.4)
Fenton Lake						
Overstory	-0.1 (0.6)	0.22 (0.66)	0.000 (0.002)	0.001 (0.002)	0.67 (0.14)	3.4 (2.0)
Understory	-0.1 (0.6)	0.04 (0.12)	0.001 (0.000)	0.002 (0.002)	0.69 (0.14)	2.8 (0.6)
ROULB^c	2.3	2.13	0.001	0.004	0.42	13.3
RUULB^d	2.0	0.34	0.004	0.003	0.76	4.1

^a(+/- 2 counting uncertainties); values are the uncertainty in the analytical results at the 95% confidence level.

^b*Detectable value (where the analytical result was greater than two times the counting uncertainty) and higher than upper limit background (ULB).

^cRegional Overstory upper limit background (mean +2 std dev) from Fresquez et al. (1996b).

^dRegional Understory upper limit background (mean +2 std dev) from Fresquez et al. (1996b).

as the concentrations of Ni in soils around Tsicoma Lake were well within RULB concentrations (Table 1).

Most radionuclide levels in vegetation collected around Tsicoma Lake were well within radionuclide levels in vegetation collected around Fenton Lake and from regional background locations (Fresquez et al. 1996b) (Table 4). The levels of ^{239}Pu , ^{90}Sr , and uranium in understory vegetation collected around Tsicoma Lake, however, were just slightly above the RULB concentrations. Of these three radionuclides in vegetation, only uranium in soil collected from around Tsicoma Lake correlated well with the vegetation data (Table 1). The other two— ^{239}Pu and ^{90}Sr —were probably a reflection of soil surface plant (wind-borne and/or splash) deposition. Most (nearly 100%) of ^{239}Pu detected in plants, for example, is a result of soil deposition on the plant surface (Watters et al. 1983, White et al. 1981).

Fish. All heavy metals in fish collected from Tsicoma Lake were well within concentrations in prestocked fish collected from the Mescalero National Fish Hatchery and in fish collected from other regional background locations

(Fresquez et al. 1996c) (Table 5). Similarly, most radionuclides in fish, with the exception of uranium, collected from Tsicoma Lake were not found in detectable concentrations and/or in concentrations higher than in fish collected from the Mescalero National Fish Hatchery or in fish collected from regional background locations (Fresquez et al. 1994) (Table 6). Also, these data, particularly ^{90}Sr and ^{137}Cs , compare well with stocked trout in other Tribal lakes (Nambe and Jemez Pueblo Lakes) in the region (Fresquez et al. 1995b). Again, uranium was detected in higher concentrations in fish from Tsicoma Lake than in fish collected from either the Mescalero National Fish Hatchery or from other regional background locations. The difference in the uranium concentration between fish collected from Tsicoma Lake and from the Mescalero National Fish Hatchery, however, was small (e.g., 5 ng dry g^{-1}) (ppb). The isotopic ratio of ^{235}U to ^{238}U , which will indicate whether or not the uranium found in fish collected from Tsicoma Lake was from natural or man-made (e.g., depleted or enriched uranium) sources, will be determined in

Table 5. Total Recoverable Trace and Heavy Metals ($\mu\text{g wet g}^{-1}$) (ppm) in Rainbow Trout From Tsicoma Lake and Mescalero National Fish Hatchery (Background) in 1995.

Location	As	Ag	Ba	Be	Cd	Cr	Hg	Ni	Pb	Sb	Se	Tl
Tsicoma	<2.0	<1.0	0.3	<0.4	<0.4	<0.4	0.08	<1.0	<0.5	<0.5	<1.5	<0.5
Mescalero	<2.0	<1.0	0.2	<0.4	<0.4	<0.4	0.07	<1.0	<0.5	<0.5	<1.5	<0.5
RULB ^a	<0.7	<2.6	<2.9	<3.0	<0.63	<1.5	0.37	<2.8	<4.5	<0.7	<0.7	<0.7

^aRegional upper limit background (mean + 2 std dev) from Fresquez et al. (1996c).

Table 6. Radionuclide Concentrations in Rainbow Trout from Tsicoma Lake and Mescalero National Fish Hatchery (Background) in 1995.

Location	³ H pCi mL ⁻¹	¹³⁷ Cs 10 ⁻² pCi dry g ⁻¹	²³⁸ Pu 10 ⁻⁵ pCi dry g ⁻¹	²³⁹ Pu 10 ⁻⁵ pCi dry g ⁻¹	Uranium ng dry g ⁻¹	⁹⁰ Sr 10 ⁻² pCi dry g ⁻¹
Tsicoma	0.6 (0.6) ^b	3.0 (9.0)	-20.0 (20.0)	0.0 (20.0)	9.0* ^c (2.0)	0.0 (4.0)
Mescalero ^d	-0.1 (0.6)	4.0 (12.0)	-9.1 (18.0)	0.0 (18.0)	4.0 (1.8)	0.9 (9.1)
RULB ^e	0.2	27.7	23.6	28.3	6.5	17.0

^a(+/- 2 counting uncertainties); values are the uncertainty in the analytical results at the 95% confidence level.

^b*Detectable value (where the analytical result was greater than two times the counting uncertainty) and higher than regional upper limit background (RULB).

^cRegional upper limit background (mean + 2 std dev) from Fresquez et al. (1994).

1996. Naturally occurring uranium, however, is highly suspected in these fish samples.

The maximum total CEDEs (mean + 2 sigma = 95% confidence level) from consuming 21 kg (46 lb) of fish from Tsicoma Lake in Santa Clara Canyon and from the Mescalero National Fish Hatchery were very low as suspected, 0.066 and 0.113 mrem y^{-1} , respectively (Table 7), and were very close to values measured from other stocked Tribal lakes in the region (e.g. Nambe was 0.072 and Jemez was 0.050 mrem y^{-1}) (the maximum total CEDEs from these lakes were calculated from Fresquez et al. 1995b). Of the 0.066 mrem y^{-1} maximum total CEDE measured from the ingestion of fish from Tsicoma Lake, 0.004 mrem y^{-1} (the net positive dose), could be (potentially) attributed to Laboratory operations (mostly from 3H and uranium; however, fallout and naturally occurring sources cannot be ruled out completely). In any case, the net positive dose from the ingestion of fish from Tsicoma Lake was far below the permissible dose limit of 100 mrem y^{-1} set by the ICRP above that recieved from other radiation sources

(natural and man-made) (USDOE 1990). A person living in the Santa Clara area, for example, can expect to receive about 300 to 350 mrem y^{-1} from other background radiation sources (e.g., cosmic, medical, radon, etc.) alone (EPG 1995).

ACKNOWLEDGMENT

Special thanks to Mr. Walter Dasheno and Mr. Regis Chavarria, Santa Clara Pueblo Environmental Department, for their assistance in this study. Paul Torrez, a Pojoaque Valley High School cooperative student, tabulated the data. Also, thanks to Belinda Gutierrez for the construction of Figure 1.

Table 7. The CEDE (mrem y⁻¹) from the Ingestion of Fish from Tsicoma Lake and Mescalero National Fish Hatchery (Background) by Nuclide.

Location	³ H	¹³⁷ Cs	²³⁸ Pu	²³⁹ Pu	²³⁴ U	²³⁵ U	²³⁸ U	⁹⁰ Sr	Total
Tsicoma	6.27 x 10 ^{-4a}	6.62 x 10 ⁻³	0.00 ^e	0.00	3.68 x 10 ⁻³	1.54 x 10 ⁻⁴	3.04 x 10 ⁻³	0.00	1.41 x 10 ⁻²
	6.27 x 10 ^{-4b}	1.98 x 10 ⁻²	3.35 x 10 ⁻³	3.79 x 10 ⁻³	8.17 x 10 ⁻⁴	3.43 x 10 ⁻⁵	6.77 x 10 ⁻⁴	2.29 x 10 ⁻²	5.21 x 10 ⁻²
	1.25 x 10 ^{-3c}	2.65 x 10 ⁻²	3.35 x 10 ⁻³	3.79 x 10 ⁻³	4.49 x 10 ⁻³	1.89 x 10 ⁻⁴	3.72 x 10 ⁻³	2.29 x 10 ⁻²	6.62 x 10^{-2f}
Mescalero	0.00	9.62 x 10 ⁻³	0.00	0.00	1.78 x 10 ⁻³	7.48 x 10 ⁻⁵	1.48 x 10 ⁻³	5.63 x 10 ⁻³	1.86 x 10 ^{-2c}
	6.12 x 10 ⁻⁴	2.89 x 10 ⁻²	3.29 x 10 ⁻³	3.72 x 10 ⁻³	8.02 x 10 ⁻⁴	3.37 x 10 ⁻⁵	6.64 x 10 ⁻⁴	5.69 x 10 ⁻²	9.49 x 10 ⁻²
	6.12 x 10 ⁻⁴	3.85 x 10 ⁻²	3.29 x 10 ⁻³	3.72 x 10 ⁻³	2.58 x 10 ⁻³	1.08 x 10 ⁻⁴	2.14 x 10 ⁻³	6.25 x 10 ⁻²	1.13 x 10^{-1f}
Net Positive ^d	6.42 x 10 ⁻⁴	0.00	6.22 x 10 ⁻⁵	7.04 x 10 ⁻⁵	1.91 x 10 ⁻³	8.02 x 10 ⁻⁵	1.58 x 10 ⁻³	0.00	4.35 x 10⁻³

^aCEDE based on the analytical result.

^bCEDE based on two counting uncertainties.

^cCEDE based on the analytical result plus two counting uncertainties.

^dTsicoma total (c) minus Mescalero total (c) CEDE; only positive doses counted.

^eAll negative analytical results were set to zero.

^fMaximum (based on the analytical result plus two counting uncertainties) total CEDE (results of all radionuclides added).

^gMaximum total net positive CEDE.

REFERENCES

- Chavarria, R., Santa Clara Pueblo Environmental Department, personal communication, (May, 1995).
- Crowe, B. M., G. W. Linn, G. Heiken, and M. L. Bevier, "Stratigraphy of the Bandelier Tuff in the Pajarito Plateau," Los Alamos Scientific Laboratory report LA-7225-MS (1978).
- Dasheno, W., Santa Clara Pueblo Environmental Department, personal communication, (May, 1995).
- EPG (Environmental Protection Group), "Environmental Surveillance at Los Alamos During 1993," Los Alamos National Laboratory report LA-12973-ENV (1995).
- Fresquez, P. R., R. E. Francis, and G. L. Dennis, "Sewage Sludge Effects on Soil and Plant Quality in a Degraded, Semiarid Grassland," *Journal of Environmental Quality* **19**:324-329 (1990).
- Fresquez, P. R., D. R. Armstrong, and J. G. Salazar, "Radionuclide Concentrations in Game and Nongame Fish Upstream and Downstream of Los Alamos National Laboratory: 1981 to 1993," Los Alamos National Laboratory report LA-12818-MS (1994).
- Fresquez, P. R., M. A. Mullen, and J. K. Ferenbaugh, "Radionuclides and Radioactivity in Soils Within and Around Los Alamos National Laboratory: 1974 to 1994," Los Alamos National Laboratory report LA-UR-95-3671 (1995a).
- Fresquez, P. R., D. R. Armstrong, and J. G. Salazar, "Radionuclide Concentrations in Fish Collected from Jemez, Nambe, and San Ildefonso Tribal Lakes," Los Alamos National Laboratory report LA-12899-MS (1995b).
- Fresquez, P. R., M. A. Mullen, and J. K. Ferenbaugh, "Trace and Heavy Metals in Soils Within and Around Los Alamos National Laboratory: 1974 to 1995," Los Alamos National Laboratory unpublished data (1996a).
- Fresquez, P. R., E. L. Vold, and L. Naranjo, Jr., "Radionuclide

Concentrations in Vegetation at Radioactive-Waste Disposal Area G during the 1995 Growing Season," Los Alamos National Laboratory report LA-13124-PR (1996b).

Fresquez, P. R., M. A. Mullen, and L. Naranjo, Jr., "Trace and Heavy Metals in Fish Collected Upstream and Downstream of Los Alamos National Laboratory: 1991 to 1995," Los Alamos National Laboratory unpublished data (1996c).

ICRP (International Commission on Radiological Protection), "Recommendations of the International Commission on Radiological Protection," International Commission on Radiological Protection Publication 26, Pergamon Press, New York, N.Y. (1977).

ICRP (International Commission on Radiological Protection), "Limits of Intakes of Radionuclides by Workers," International Commission on Radiological Protection Publication 30, Pergamon Press, New York, N.Y. (1978).

Klement, A. W., "Radioactive Fallout Phenomena and Mechanisms," Health Physics, 11:1265-1274 (1965).

Perkins, R. W., and C. W. Thomas, "Worldwide Fallout," in Transuranic Elements in the Environment, Technical Information Center, U.S. Department of Energy, Washington, D.C. (1980).

Purtymun, W. D., R. J. Peters, T. E. Buhl, M. N. Maes, and F. H. Brown, "Background Concentrations of Radionuclides in Soils and River Sediments in Northern New Mexico, 1974-1986," Los Alamos National Laboratory report LA-11134-MS (1987).

Salazar, J. G., "Produce and Fish Sampling Program of Los Alamos National Laboratory's Environmental Surveillance Group," Los Alamos National Laboratory report LA-10186-MS (September 1984).

USDOE (United States Department of Energy), "Internal Dose Conversion Factors for Calculation of Dose to the

Public," U.S. Department of Energy report DOE/EP-0071 (1984).

USDOE (United States Department of Energy), "Radiation Protection of the Public and the Environment," U.S. Department of Energy Order 5400.5 (1990).

USDOE (United States Department of Energy), "Final Environmental Impact Statement: Dual Axis Radiographic Hydrodynamic Test Facility," U.S. Department of Energy, DOE/EIS-0228 (1995).

Watters, R. L., T. E. Hakonson, and L. J. Lane, "The Behavior of Actinides in the Environment," *Radiochimica Acta.*, 32:89-103 (1983).

White, G. C., T. E. Hakonson, and A. J. Ahlquist, "Factors Affecting Radionuclide Availability to Vegetables Grown at Los Alamos," *Journal of Environmental Quality*, 10:294-299 (1981).

Appendix A. Analytical Data (Heavy Metal) for Vegetation, Soil, and Fish.

REPORT NUMBER: 37675

*Very Ag, Ba, Be, Cr, Ni
(Santa Clara and Fontana)*

***** CST ANALYTICAL REPORT *****

Prepared by: KITTY on 17-Aug-1995

REQUEST NUMBER: 22161 *→* MATRIX: BV ANALYST: OES PROGRAM CODE: WE6G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: EM90126 PAGE: 43

CUSTOMER SAMPLES:

ng/g = ppb / dry 2

Santa Clara

Fontana Lake

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SCOS	95.10849	AG	ICPES	< 1000.		NG/G	7/12/95	
SCOS	95.10849	BA	ICPES	51000.	5000.	NG/G	7/12/95	
SCOS	95.10849	BE	ICPES	< 80.		NG/G	7/12/95	
SCOS	95.10849	CR	ICPES	< 500.		NG/G	7/12/95	
SCOS	95.10849	NI	ICPES	< 2000.		NG/G	7/12/95	
SCUS	95.10850	AG	ICPES	< 1000.		NG/G	7/12/95	
SCUS	95.10850	BA	ICPES	34000.	3000.	NG/G	7/12/95	
SCUS	95.10850	BE	ICPES	< 80.		NG/G	7/12/95	
SCUS	95.10850	CR	ICPES	820.	770.	NG/G	7/12/95	
SCUS	95.10850	NI	ICPES	5600.	5300.	NG/G	7/12/95	
FLOS	95.10851	AG	ICPES	< 1000.		NG/G	7/12/95	
FLOS	95.10851	BA	ICPES	43000.	4000.	NG/G	7/12/95	
FLOS	95.10851	BE	ICPES	< 80.		NG/G	7/12/95	
FLOS	95.10851	CR	ICPES	530.	500.	NG/G	7/12/95	
FLOS	95.10851	NI	ICPES	< 2000.		NG/G	7/12/95	
FLUS	95.10853	AG	ICPES	< 1000.		NG/G	7/12/95	
FLUS	95.10853	BA	ICPES	19000.	2000.	NG/G	7/12/95	
FLUS	95.10853	BE	ICPES	< 80.		NG/G	7/12/95	
FLUS	95.10853	CR	ICPES	560.	500.	NG/G	7/12/95	
FLUS	95.10853	NI	ICPES	< 2000.		NG/G	7/12/95	

*dry 2
75°C for
48 hours*

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SCOS	95.10849	AG	ICPES	< 1000.		NG/G	7/12/95	
SCOS	95.10849	BA	ICPES	52000.	5000.	NG/G	7/12/95	
SCOS	95.10849	BE	ICPES	< 80.		UG/G	7/12/95	
SCOS	95.10849	CR	ICPES	< 600.		NG/G	7/12/95	
SCOS	95.10849	NI	ICPES	< 2000.		NG/G	7/12/95	

REPORT NUMBER: 37675 (continued)

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: KITTY on 17-Aug-1995

REQUEST NUMBER: 22161 MATRIX: BV ANALYST: OES PROGRAM CODE: WE6G
OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815
NOTEBOOK: EM90126 PAGE: 43

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.00533	BA	44.	4.	UG/G	57.	9.	7/12/95	UNDER CONTROL
00.00580	BA	16.	2.	UG/G	21.	3.	7/12/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 37675

Kitty Roberts
Analyst

Kitty Roberts
Reviewer

K. Doorn
Team Leader

mag
QA Officer

8/17/95
Date

8/17/95
Date

8/17/95
Date

8/17/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceding data was evaluated using ¹⁷ the standard statistical criteria set forth in

'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

REPORT NUMBER: 37695

*Very AS, Cd, Hg 1st
(Santo Clara & Benton)*

***** CST ANALYTICAL REPORT *****

Prepared by: PEC on 17-Aug-1995

REQUEST NUMBER: 22161 *←* MIX: BV ANALYST: AAS PROGRAM CODE: WE6G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: CST9002 PAGE: 65

CUSTOMER SAMPLES:

ng/g (ppb) / ~~ppm~~

*Santo Clara
Oxide
(dries)*

*Santo Clara
Underlying
flow*

*Benton
Lake*

*dry =
75°C for
48 hr*

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SCOS	95.10849	AS	ETVAA	< 500.		NG/G	7/10/95	
SCOS	95.10849	CD	ETVAA	< 10.		NG/G	7/10/95	
SCOS	95.10849	HG	CVAA	50.	30.	NG/G	6/28/95	
SCOS	95.10849	SE	ETVAA	< 130.		NG/G	7/12/95	
SCUS	95.10850	AS	ETVAA	< 500.		NG/G	7/10/95	
SCUS	95.10850	CD	ETVAA	200.	20.	NG/G	7/10/95	
SCUS	95.10850	HG	CVAA	< 30.		NG/G	6/28/95	
SCUS	95.10850	SE	ETVAA	< 130.		NG/G	7/12/95	
FLOS	95.10851	AS	ETVAA	< 500.		NG/G	7/10/95	
FLOS	95.10851	CD	ETVAA	40.	10.	NG/G	7/10/95	
FLOS	95.10851	HG	CVAA	30.	30.	NG/G	6/28/95	
FLOS	95.10851	SE	ETVAA	< 130.		NG/G	7/12/95	
FLUS	95.10853	AS	ETVAA	< 500.		NG/G	7/10/95	
FLUS	95.10853	CD	ETVAA	30.	10.	NG/G	7/10/95	
FLUS	95.10853	HG	CVAA	30.	30.	NG/G	6/28/95	
FLUS	95.10853	SE	ETVAA	< 130.		NG/G	7/12/95	

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SCOS	95.10849	AS	ETVAA	< 500.		NG/G	7/10/95	
SCOS	95.10849	CD	ETVAA	< 10.		NG/G	7/10/95	
SCOS	95.10849	HG	CVAA	50.	30.	NG/G	6/28/95	
SCOS	95.10849	HG	CVAA	50.	30.	NG/G	6/28/95	
SCOS	95.10849	SE	ETVAA	< 130.		NG/G	7/12/95	
SCUS	95.10850	HG	CVAA	40.	30.	NG/G	6/28/95	
SCUS	95.10850	HG	CVAA	30.	30.	NG/G	6/28/95	
FLOS	95.10851	HG	CVAA	30.	30.	NG/G	6/28/95	
FLOS	95.10851	HG	CVAA	30.	30.	NG/G	6/28/95	
FLUS	95.10853	HG	CVAA	30.	30.	NG/G	6/28/95	
FLUS	95.10853	HG	CVAA	30.	30.	NG/G	6/28/95	

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
SCOS	95.10849	AS	ETVAA	10.	8.	UG/L	7/10/95	
SCOS	95.10849	CD	ETVAA	8000.	7400.	UG/G	7/10/95	
SCOS	95.10849	SE	ETVAA	10.	2.7	UG/L	7/12/95	

REPORT NUMBER: 37674

*Very Pb, Sb, TL
(Santa Clara; Fortm)*

***** CST ANALYTICAL REPORT *****

Prepared by: KITTY on 17-Aug-1995

REQUEST NUMBER: 22161 RIX: BV ANALYST: IMS PROGRAM CODE: WE6G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

For mobile Santa Clara

ng/g (ppb) / dug

*75°C
in 40h*

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SCOS	95.10849	PB	ICPMS	400.	200.	NG/G	8/16/95	0626VEGET
SCOS	95.10849	SB	ICPMS	< 200.		NG/G	8/15/95	0626VEGET
SCOS	95.10849	TL	ICPMS	< 200.		NG/G	8/16/95	0626VEGET
SCUS	95.10850	PB	ICPMS	2000.	300.	NG/G	8/16/95	0626VEGET
SCUS	95.10850	SB	ICPMS	< 200.		NG/G	8/16/95	0626VEGET
SCUS	95.10850	TL	ICPMS	< 200.		NG/G	8/16/95	0626VEGET
FLOS	95.10851	PB	ICPMS	1000.	300.	NG/G	8/16/95	0626VEGET
FLOS	95.10851	SB	ICPMS	< 200.		NG/G	8/16/95	0626VEGET
FLOS	95.10851	TL	ICPMS	< 200.		NG/G	8/16/95	0626VEGET
FLUS	95.10853	PB	ICPMS	400.	200.	NG/G	8/16/95	0626VEGET
FLUS	95.10853	SB	ICPMS	< 200.		NG/G	8/16/95	0626VEGET
FLUS	95.10853	TL	ICPMS	< 200.		NG/G	8/16/95	0626VEGET

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SCOS	95.10849	PB	ICPMS	500.	200.	NG/G	8/16/95	0626VEGET
SCOS	95.10849	SB	ICPMS	< 200.		NG/G	8/15/95	0626VEGET
SCOS	95.10849	TL	ICPMS	< 200.		NG/G	8/16/95	0626VEGET

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
SCOS	95.10849	SB	ICPMS	50.	42.	UG/L	8/16/95	0626VEGET
SCOS	95.10849	TL	ICPMS	50.	57.	UG/L	8/16/95	0626VEGET

REPORT NUMBER: 37674 (continued)

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: KITTY on 17-Aug-1995

REQUEST NUMBER: 22161 MATRIX: BV ANALYST: IMS PROGRAM CODE: WE6G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: PAGE:

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.00533	PB	6.	0.3	UG/G	6.3	0.3	8/16/95	UNDER CONTROL
00.00533	SB	73.	22.	NG/G	36.	7.	8/16/95	UNDER CONTROL
00.00533	TL	42.	13.	NG/G	50.		8/16/95	UNDER CONTROL
00.00580	PB	14.	1.	UG/G	13.	2.	8/16/95	UNDER CONTROL
00.00580	SB	117.	35.	NG/G	40.		8/16/95	WARNING 2-3 SIG
00.00580	TL	13.	4.	NG/G	< 10.		8/16/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 37674

Kitty Roberts
Analyst

Kitty Roberts
Reviewer

JK Doorn
Team Leader

mag
QA Officer

8/17/95
Date

8/17/95
Date

8/17/95
Date

8/17/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

REPORT NUMBER: 35283

Soil (H.M.)-- Sb TL
(Santa Clara)

***** CST ANALYTICAL REPORT *****

Prepared by: MKOBY on 5-Jun-1995

REQUEST NUMBER: 22000 MATRIX: SS ANALYST: IMS PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

Santa Clara

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SC-4P-95HM	95.09423	SB	ICPMS	< 0.25		UG/G	6/05/95	B (1993) 0.25
SC-4P-95HM	95.09423	TL	ICPMS	0.25	0.25	UG/G	6/05/95	0.27

REPORT NUMBER: 35283 (continued)

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: MKOBY on 5-Jun-1995

REQUEST NUMBER: 22000 MATRIX: SS ANALYST: IMS PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: PAGE:

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.30469	SB	3.13	0.63	MG/KG	43.9	93.5	6/05/95	UNDER CONTROL
00.30469	TL	77.	5.	MG/KG	102.	50.5	6/05/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 35283

MKKoby
Analyst

MKKoby
Reviewer

BJDoom
Team Leader

mag
QA Officer

6/6/95
Date

6/6/95
Date

6/13/95
Date

6/13/95
Date

Sample Discrepancies Noted by Sample Management Section

REPORT NUMBER: 35212

Soil - H.M. Ag, Ba, Be, Cd, Cr, Ni, Pb
(Santa Clara)

***** CST ANALYTICAL REPORT *****

Prepared by: M. KOZUBAL on 2-Jun-1995

REQUEST NUMBER: 22000 MATRIX: SS ANALYST: OES PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: EMP0126 PAGE: 28

CUSTOMER SAMPLES:

Santa Clara

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SC-4P-95HM	95.09423	AG	ICPES	< 1.		UG/G	6/02/95	✓ <i>ok</i> 3.9
SC-4P-95HM	95.09423	BA	ICPES	60.	6.	UG/G	6/02/95	✓ <i>ok</i> 223.0
SC-4P-95HM	95.09423	BE	ICPES	0.72	0.08	UG/G	6/02/95	✓ <i>ok</i> 0.78
SC-4P-95HM	95.09423	CD	ICPES	< 0.4		UG/G	6/02/95	✓ <i>ok</i> 0.4
SC-4P-95HM	95.09423	CR	ICPES	3.5	0.7	UG/G	6/02/95	✓ <i>ok</i> 20.4
SC-4P-95HM	95.09423	NI	ICPES	5.4	3.6	UG/G	6/02/95	✓ <i>ok</i> 10.7
SC-4P-95HM	95.09423	PB	ICPES	< 20.		UG/G	6/02/95	✓ <i>ok</i> 22.0

REPORT NUMBER: 35212 (continued)

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: M. KOZUBAL on 2-Jun-1995

REQUEST NUMBER: 22000 MATRIX: SS ANALYST: OES PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: EMP0126 PAGE: 28

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.30469	AG	19.	2.	MG/KG	92.5	49.5	6/02/95	UNDER CONTROL
00.30469	BA	250.	25.	MG/KG	276.	82.5	6/02/95	UNDER CONTROL
00.30469	BE	85.	9.	MG/KG	95.1	43.	6/02/95	UNDER CONTROL
0.30469	CD	91.	9.	MG/KG	102.	56.5	6/02/95	UNDER CONTROL
00.30469	CR	150.	15.	MG/KG	154.	73.	6/02/95	UNDER CONTROL
00.30469	NI	140.	14.	MG/KG	163.	85.5	6/02/95	UNDER CONTROL
00.30469	PB	140.	14.	MG/KG	147.	73.5	6/02/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 35212

			
Analyst	Reviewer	Team Leader	QA Officer
<u>6-5-95</u>	<u>6-5-95</u>	<u>6/13/95</u>	<u>6/17/95</u>
Date	Date	Date	Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. 1, pp. 19-20.

REPORT NUMBER: 35617

Soil - H.M. As, Hg, Se.
(Santa Clara)

***** CST ANALYTICAL REPORT *****

Prepared by: PEC on 13-Jun-1995

REQUEST NUMBER: 22000 MATRIX: SS ANALYST: AAS PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: CST9002 PAGE: 58

CUSTOMER SAMPLES:

Santa Clara

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SC-4P-95HM	95.09423	AS	ETVAA	2.	0.4	UG/G	6/01/95	<i>Bt(1953) = 5.8</i>
SC-4P-95HM	95.09423	HG	CVAA	0.03	0.01	UG/G	6/01/95	<i>0.01</i>
SC-4P-95HM	95.09423	SE	ETVAA	0.5	0.1	UG/G	6/01/95	<i>0.46</i>

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SC-4P-95HM	95.09423	HG	CVAA	0.02	0.01	UG/G	6/01/95	
SC-4P-95HM	95.09423	HG	CVAA	0.02	0.01	UG/G	6/01/95	

REPORT NUMBER: 35617 (continued)

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: PEC on 13-Jun-1995

REQUEST NUMBER: 22000 MATRIX: SS ANALYST: AAS PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: CST9002 PAGE: 58

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.30469	AS	112.	22.	MG/KG	128.	71.	6/13/95	UNDER CONTROL
00.30469	HG	4.	0.4	MG/KG	4.85	2.4	6/01/95	UNDER CONTROL
00.30469	SE	75.	15.	MG/KG	101.	55.	6/13/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 35617

PEC
Analyst

PEC
Reviewer

[Signature]
Team Leader

mag
QA Officer

6/13/95
Date

6/13/95
Date

6/13/95
Date

6/14/95
Date

Sample Discrepancies Noted by Sample Management Section

The control status of the preceding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

REPORT NUMBER: 35996

Soil (H.M) Ag Ba Be Cd Cr Ni Pb
(Fentm)

***** CST ANALYTICAL REPORT *****

Prepared by: MBG on 23-Jun-1995

REQUEST NUMBER: 22031 MATRIX: SS ANALYST: OES PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: EM90126 PAGE: 32

CUSTOMER SAMPLES:

Fentm Lake

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
FL-95-HM	95.09708	AG	ICPES	< 1.		UG/G	6/23/95	
FL-95-HM	95.09708	BA	ICPES	55.	5.5	UG/G	6/23/95	
FL-95-HM	95.09708	BE	ICPES	0.81	0.08	UG/G	6/23/95	
FL-95-HM	95.09708	CD	ICPES	1.1	0.4	UG/G	6/23/95	
FL-95-HM	95.09708	CR	ICPES	5.1	0.5	UG/G	6/23/95	
FL-95-HM	95.09708	NI	ICPES	< 2.		UG/G	6/23/95	
FL-95-HM	95.09708	PB	ICPES	13.	4.	UG/G	6/23/95	

REPORT NUMBER: 35996 (continued)

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: MBG on 23-Jun-1995

REQUEST NUMBER: 22031 MATRIX: SS ANALYST: OES PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: EM90126 PAGE: 32

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.30469	AG	53.	5.	MG/KG	92.5	49.5	6/23/95	UNDER CONTROL
00.30469	BA	290.	29.	MG/KG	276.	82.5	6/23/95	UNDER CONTROL
00.30469	BE	96.	9.6	MG/KG	95.1	43.	6/23/95	UNDER CONTROL
00.30469	CD	99.	9.9	MG/KG	102.	56.5	6/23/95	UNDER CONTROL
00.30469	CR	170.	17.	MG/KG	154.	73.	6/23/95	UNDER CONTROL
00.30469	NI	160.	16.	MG/KG	163.	85.5	6/23/95	UNDER CONTROL
00.30469	PB	150.	15.	MG/KG	147.	73.5	6/23/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 35996

Michelle B. Duss
Analyst

MBG
Reviewer

[Signature]
Team Leader

mag
QA Officer

6/23/95
Date

6/23/95
Date

7/3/95
Date

7/5/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceding data was evaluated using the standard statistical criteria set forth in
'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. 1, pp. 19-20.

(F. Lake)
Analysis Soil
SB, TL

REPORT NUMBER: 36323

***** CST ANALYTICAL REPORT *****

Prepared by: MKOBY on 30-Jun-1995

REQUEST NUMBER: 22031 MATRIX: SS ANALYST: IMS PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

Fraction 100%

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
FL-95-HM	95.09708 SB		ICPMS	< 0.25		MG/KG	6/29/95	
FL-95-HM	95.09708 TL		ICPMS	0.25	0.25	MG/KG	6/29/95	

CUSTOMER SAMPLE DUPLICATES:

ok

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
FL-95-HM	95.09708 SB		ICPMS	< 0.25		MG/KG	6/29/95	
FL-95-HM	95.09708 TL		ICPMS	0.25	0.25	MG/KG	6/29/95	

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
FL-95-HM	95.09708 SB		ICPMS	6.25		MG/KG	6/29/95	SB NOT IN SPIKE
FL-95-HM	95.09708 TL		ICPMS	6.25	6.5	MG/KG	6/29/95	

REPORT NUMBER: 36323 (continued)

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: MKOBY on 30-Jun-1995

REQUEST NUMBER: 22031 MATRIX: SS ANALYST: IMS PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: PAGE:

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

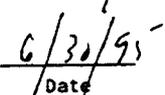
SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.30469	SB	2.98	0.37	MG/KG	43.9	93.5	6/29/95	UNDER CONTROL
00.30469	TL	100.	10.	MG/KG	102.	50.5	6/29/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 36323

 Analyst	 Reviewer	 Team Leader	 QA Officer
 Date	 Date	 Date	 Date

No Sample Discrepancies Noted by Sample Management Section

REPORT NUMBER: 35524

Soil (F 2nd flg) (Boulevard) for Santos Clara as, Hg, Sr,

***** CST ANALYTICAL REPORT *****

Prepared by: PEC on 9-Jun-1995

REQUEST NUMBER: 22031 MATRIX: SS ANALYST: AAS PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: CST9002 PAGE: 60

CUSTOMER SAMPLES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
FL-95-HM	95.09708	AS	ETVAA	1.	0.5	UG/G	6/09/95	
FL-95-HM	95.09708	HG	CVAA	< 0.01		UG/G	6/06/95	
FL-95-HM	95.09708	SE	ETVAA	0.4	0.1	UG/G	6/07/95	

Santos Clara

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
FL-95-HM	95.09708	HG	CVAA	0.05	0.01	UG/G	6/06/95	
FL-95-HM	95.09708	HG	CVAA	0.02	0.01	UG/G	6/06/95	
FL-95-HM	95.09708	SE	ETVAA	0.4	0.1	UG/G	6/07/95	

of

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
FL-95-HM	95.09708	HG	CVAA	2.	1.8	UG/L	6/06/95	
FL-95-HM	95.09708	SE	ETVAA	10.	5.	UG/G	6/07/95	

REPORT NUMBER: 35524 (continued)

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: PEC on 9-Jun-1995

REQUEST NUMBER: 22031 MATRIX: SS ANALYST: AAS PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: CST9002 PAGE: 60

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.30469	HG	4.	0.4	MG/KG	4.85	2.4	6/06/95	UNDER CONTROL
00.30469	SE	78.	16.	MG/KG	101.	55.	6/07/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 35524

<u>PEC</u> Analyst	<u>PEC</u> Reviewer	<u>[Signature]</u> Team Leader	<u>mag</u> QA Officer
<u>6/9/95</u> Date	<u>6/9/95</u> Date	<u>7/3/95</u> Date	<u>7/5/95</u> Date

No Sample Discrepancies Noted by Sample Management Section

REPORT NUMBER: 37611

*Zinks Pb, Sb, TL
(Santa Clara & Mexalero)*

***** CST ANALYTICAL REPORT *****

Prepared by: KITTY on 14-Aug-1995

REQUEST NUMBER: 22160 MATRIX: BA ANALYST: IMS PROGRAM CODE: WE6G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

Mexalero Santa Clara

ng/g (ppb) / list 2

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SC-4	95.10835	PB	ICPMS	< 500.		NG/G	8/14/95	
SC-4	95.10835	SB	ICPMS	< 500.		NG/G	8/14/95	
SC-4	95.10835	TL	ICPMS	< 500.		NG/G	8/14/95	
MA-5	95.10836	PB	ICPMS	< 500.		NG/G	8/14/95	
MA-5	95.10836	SB	ICPMS	< 500.		NG/G	8/14/95	
MA-5	95.10836	TL	ICPMS	< 500.		NG/G	8/14/95	

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
MA-5	95.10836	PB	ICPMS	< 500.		NG/G	8/14/95	
MA-5	95.10836	SB	ICPMS	< 500.		NG/G	8/14/95	
MA-5	95.10836	TL	ICPMS	< 500.		NG/G	8/14/95	

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
MA-5	95.10836	PB	ICPMS	23.	12.	UG/G	8/14/95	
MA-5	95.10836	SB	ICPMS	23.	1.	UG/G	8/14/95	
MA-5	95.10836	TL	ICPMS	23.	1.	UG/G	8/14/95	

REPORT NUMBER: 37611 (continued)

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: KITTY on 14-Aug-1995

REQUEST NUMBER: 22160 MATRIX: BA ANALYST: IMS PROGRAM CODE: WE6G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: PAGE:

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.00590	PB	200.	200.	NG/G	140.	20.	8/14/95	UNDER CONTROL
00.00590	SB	500.	500.	NG/G	3.		8/14/95	UNDER CONTROL
00.00590	TL	200.	200.	NG/G	3.		8/14/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 37611

Kitty Roberts
Analyst

Kitty Roberts
Reviewer

A. J. Dorn
Team Leader

mag
QA Officer

8/14/95
Date

8/14/95
Date

8/16/95
Date

8/16/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceding data was evaluated using the standard statistical criteria set forth in
'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

REPORT NUMBER: 36235

*John As, Hwy, Se.
(Santa Clara & Mesalero)*

***** CST ANALYTICAL REPORT *****

Prepared by: MAB on 29-Jun-1995

REQUEST NUMBER: 22160 MATRIX: BA ANALYST: AAS PROGRAM CODE: WE6G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

Mesalero Santa Clara

ng/g (ppb) wet g.

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SC-4	95.10835	AS	ETVAA	< 2000.		NG/G	6/28/95	
SC-4	95.10835	HG	CVAA	76.	10.	NG/G	6/27/95	
SC-4	95.10835	SE	ETVAA	< 1500.		NG/G	6/28/95	
MA-5	95.10836	AS	ETVAA	< 2000.		NG/G	6/28/95	
MA-5	95.10836	HG	CVAA	67.	10.	NG/G	6/27/95	
MA-5	95.10836	SE	ETVAA	< 1500.		NG/G	6/28/95	

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
MA-5	95.10836	AS	ETVAA	< 2000.		NG/G	6/28/95	
MA-5	95.10836	SE	ETVAA	< 1500.		NG/G	6/28/95	

MATRIX SPIKES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COMPLETION DATE	COMMENT
MA-5	95.10836	AS	ETVAA	10000.	5000.	NG/L	6/28/95	
MA-5	95.10836	SE	ETVAA	10000.	5000.	NG/L	6/28/95	

REPORT NUMBER: 36235 (continued)

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: MAB on 29-Jun-1995

REQUEST NUMBER: 22160 MATRIX: BA ANALYST: AAS PROGRAM CODE: WE6G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: PAGE:

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.00590	HG	1.2	1.2	NG/G	4.	2.	6/28/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 36235

M. Blahnik
Analyst

K. D.
Reviewer

K. Down
Team Leader

mag
QA Officer

6/29/95
Date

8/16/95
Date

8/16/95
Date

8/16/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

REPORT NUMBER: 37649

*Ferts Ag, Ba, Be, Cd,
(Spade - low Mexalero)
Cr, Ni*

***** CST ANALYTICAL REPORT *****

Prepared by: M. KOZUBAL on 16-Aug-1995

REQUEST NUMBER: 22160 MATRIX: BA ANALYST: OES PROGRAM CODE: WE6G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: EM90126 PAGE: 40

CUSTOMER SAMPLES:

ng/g (ppb) / wet g

*Santa Ana
4M. Col
Mogadero
H. H. H.
Ferts*

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SC-4	95.10835	AG	ICPES	< 1000.		NG/G	6/30/95	
SC-4	95.10835	BA	ICPES	250.	30.	NG/G	6/30/95	
SC-4	95.10835	BE	ICPES	< 40.		NG/G	6/30/95	
SC-4	95.10835	CD	ICPES	< 400.		NG/G	6/30/95	
SC-4	95.10835	CR	ICPES	< 400.		NG/G	6/30/95	
SC-4	95.10835	NI	ICPES	< 1000.		NG/G	6/30/95	
MA-5	95.10836	AG	ICPES	< 1000.		NG/G	6/30/95	
MA-5	95.10836	BA	ICPES	150.	30.	NG/G	6/30/95	
MA-5	95.10836	BE	ICPES	< 400.		NG/G	6/30/95	
MA-5	95.10836	CD	ICPES	< 400.		NG/G	6/30/95	
MA-5	95.10836	CR	ICPES	< 400.		NG/G	6/30/95	
MA-5	95.10836	NI	ICPES	< 1000.		NG/G	6/30/95	

CUSTOMER SAMPLE DUPLICATES:

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
MA-5	95.10836	AG	ICPES	< 1000.		NG/G	6/30/95	
MA-5	95.10836	BA	ICPES	150.	30.	NG/G	6/30/95	
MA-5	95.10836	BE	ICPES	< 40.		NG/G	6/30/95	
MA-5	95.10836	CD	ICPES	< 400.		NG/G	6/30/95	
MA-5	95.10836	CR	ICPES	< 400.		NG/G	6/30/95	
MA-5	95.10836	NI	ICPES	< 1000.		NG/G	6/30/95	

REPORT NUMBER: 37649 (continued)

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: M. KOZUBAL on 16-Aug-1995

REQUEST NUMBER: 22160 MATRIX: BA ANALYST: OES PROGRAM CODE: WE6G
OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815
NOTEBOOK: EM90126 PAGE: 40

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.00590	CR	1.3	0.7	UG/G	1.		6/30/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 37649

M. Kozubal
Analyst

M. Kozubal
Reviewer

S. D. Oom
Team Leader

mag
QA Officer

8-16-95
Date

8-16-95
Date

8/16/95
Date

8/16/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

Appendix B. Analytical Data (Radionuclide) for Vegetation, Soil, and Fish.

REPORT NUMBER: 39387

Vogel - 905r (Santa Clara and Fenton)

Page:

***** CST ANALYTICAL REPORT *****

Prepared by: AKS on 11-Jan-1996

ANALYSIS: SR-90 REQUEST NUMBER: 22156 MATRIX: BV ANALYST: RICHARD PETERS

PROGRAM CODE: WE3

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

ANALYTICAL TECHNIQUE: PC ANALYTICAL PROCEDURE: ER 190 NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

	CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
<i>Santa Clara</i>	SCOS3	95.10817	6.2	0.4	PCI/G	1/11/96	<i>Over story</i>
	SCUS4	95.10818	9.8	0.7	PCI/G	1/11/96	<i>Under story</i>
<i>Fenton Lake</i>	FLOS5	95.10819	3.4	1.	PCI/G	1/11/96	<i>Over story</i>
	FLUS6	95.10820	2.8	0.3	PCI/G	1/11/96	<i>Under story</i>

PCI/gam

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: AKS on 11-Jan-1996

REQUEST NUMBER: 22156 MATRIX: BV ANALYST: RICHARD PETERS PROGRAM CODE: WE3G
OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

There were no open (non-blind) Quality Control materials run with the samples reported above for one of the following reasons

- Only qualitative data requested
Only Blind QC samples run with this sample batch.
[X] No QC samples run with this sample batch.
No QC samples for this constituent and matrix type available within CST

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
Only Open (non-blind) QC samples run with this sample batch.
[X] No QC samples run with this sample batch.
No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 39387

Analyst signature and name

Reviewer signature and name

Team Leader signature and name

QA Officer signature and name

Date: 1/11/96

Date: 1-12-96

Date: 1/13/96

Date: 1/16/96

Vegetation
138 CS (Santa Clara and Fenton)

***** CST ANALYTICAL REPORT *****

Prepared by: YIG on 2-Aug-1995

ANALYSIS: CS-137 REQUEST NUMBER: 22156 MATRIX: BV ANALYST: SAMMY GARCIA PROGRAM CODE: WE3G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

ANALYTICAL TECHNIQUE: G ANALYTICAL PROCEDURE: NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
<i>Santa Clara</i> SC0S3	95.10817	0.01	0.02	PC1/G	7/27/95	
SCUS4	95.10818	0.36	0.53	PC1/G	7/27/95	
<i>Fenton</i> FLOS5	95.10819	0.22	0.33	PC1/G	7/27/95	
FLUS6	95.10820	0.04	0.06	PC1/G	7/27/95	

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: YIG on 2-Aug-1995

REQUEST NUMBER: 22156 MATRIX: BV ANALYST: SAMMY GARCIA PROGRAM CODE: WE3G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.33381	5.23	0.89	PCI/G	4.85	0.16	7/27/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 37417

Yig
Analyst

[Signature]
Reviewer

STG
Team Leader

mag
QA Officer

8/2/95
Date

8/2/95
Date

8/8/95
Date

8/9/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. 1, pp. 19-20.

REPORT NUMBER: 37182

3/17

*Vegetation
(Santalalou and
Fenton)*

Page: C

***** CST ANALYTICAL REPORT *****

Prepared by: ROBINSON on 25-Jul-1995

ANALYSIS: H-3 REQUEST NUMBER: 22033 MATRIX: W ANALYST: RICHARD ROBINSON

PROGRAM CODE: WE6G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

ANALYTICAL TECHNIQUE: LS ANALYTICAL PROCEDURE: ER210 NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

*Santa Clara Mex.
Santa Clara 4th pmw
Santa Clara Overly
Fenton Overly
Fenton Underly*

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
1-SC-M	95.09709	- 100.	300.	PCI/L	7/24/95	<i>Fork</i>
2-SC-4	95.09710	600	300.	PCI/L	7/24/95	
3-SC-PU	95.09711	- 200.	300.	PCI/L	7/24/95	} <i>Very DU.</i>
4-SC-PU	95.09712	0.0	300.	PCI/L	7/24/95	
5-FL-PO	95.09713	- 100.	300.	PCI/L	7/24/95	
6-FL-PU	95.09714	- 100.	300.	PCI/L	7/24/95	

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: ROBINSON on 25-Jul-1995

REQUEST NUMBER: 22033 MATRIX: W ANALYST: RICHARD ROBINSON PROGRAM CODE: WE6G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.33081	0.0	300.	PCI/L	0.0		7/24/95	UNDER CONTROL
00.33089	12300.	1100.	PCI/L	14825.	1482.5	7/24/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 37182

Richard Robinson
Analyst

STG
Reviewer

STG
Team Leader

C. J. J.
QA Officer

07/25/95
Date

7/27/95
Date

7/27/95
Date

7/27/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

REPORT NUMBER: 38058

*Vogel - main
(Sinter-Cocoa and Fenton)*

Page:

***** CST ANALYTICAL REPORT *****

Prepared by: AKS on 7-Sep-1995

ANALYSIS: U REQUEST NUMBER: 22156 MATRIX: BV ANALYST: RICHARD PETERS PROGRAM CODE: WE3
OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815
ANALYTICAL TECHNIQUE: KPA ANALYTICAL PROCEDURE: NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
<i>Sinter-Cocoa</i> SCOS3	95.10817	0.28	0.05	UG/G	9/07/95	
SCUS4	95.10818	1.14	0.11	UG/G	9/07/95	
FLOS5	95.10819	0.67	0.07	UG/G	9/07/95	
<i>Fenton</i> FLUS6	95.10820	0.69	0.07	UG/G	9/07/95	

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: AKS on 7-Sep-1995

REQUEST NUMBER: 22156 MATRIX: BV ANALYST: RICHARD PETERS PROGRAM CODE: WE3G
 OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.33291	4.5	0.45	UG/L	4.5	0.45	9/07/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 38058

AKS
Analyst

Emy
Reviewer

SVG
Team Leader

mag
QA Officer

9/7/95
Date

9.8.95
Date

9/11/95
Date

9/11/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

REPORT NUMBER: 37883

238 Pu-239Pu

Veg. (Sante Clara Fonten)

***** CST ANALYTICAL REPORT *****

Prepared by: CEA on 28-Aug-1995

REQUEST NUMBER: 22156 MATRIX: BV ANALYST: RICHARD PETERS PROGRAM CODE: WE3G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

*Sante Clara
Fonten*

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SCOS3	95.10817	<u>PU-238</u>	RAS	0.003	0.002	PCI/G	8/28/95	74%
SCOS3	95.10817	<u>PU-239</u>	RAS	0.002	0.002	PCI/G	8/28/95	74%
SCUS4	95.10818	<u>PU-238</u>	RAS	0.001	0.001	PCI/G	8/28/95	93%
SCUS4	95.10818	<u>PU-239</u>	RAS	0.005	0.002	PCI/G	8/28/95	93%
FLOS5	95.10819	<u>PU-238</u>	RAS	0.0	0.001	PCI/G	8/28/95	90%
FLOS5	95.10819	<u>PU-239</u>	RAS	0.001	0.001	PCI/G	8/28/95	90%
FLUS6	95.10820	<u>PU-238</u>	RAS	0.001		PCI/G	8/28/95	87%
FLUS6	95.10820	<u>PU-239</u>	RAS	0.002	0.001	PCI/G	8/28/95	87%

REPORT NUMBER: 37883 (continued)

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: CEA on 28-Aug-1995

REQUEST NUMBER: 22156 MATRIX: BV ANALYST: RICHARD PETERS PROGRAM CODE: WE3G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: PAGE:

SUMMARY OF TRACER RECOVERY IN CUSTOMER AND QA SAMPLES

CUSTOMER NUMBER	CST SAMPLE NUMBER	ANALYSIS	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COLLECTION DATE	COMMENT
SCOS3	95.10817	PU-242T	2.06	1.524	PCI/SAMPLE	6/16/95	74%
SCUS4	95.10818	PU-242T	2.06	1.916	PCI/SAMPLE	6/16/95	93%
FLOS5	95.10819	PU-242T	2.06	1.854	PCI/SAMPLE	6/16/95	90%
FLUS6	95.10820	PU-242T	2.06	1.792	PCI/SAMPLE	6/16/95	87%

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.33824	PU-238	3.1911	0.1268	PCI/SAMPLE	3.2	0.1	8/28/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 37883

EGH
Analyst

Reviewer

SG
Team Leader

mag
QA Officer

8/28/95
Date

Date

9/1/95
Date

9/6/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

Soil - 24' Am
(Santo Clara)

***** CST ANALYTICAL REPORT *****

Prepared by: CAH on 18-Jul-1995

ANALYSIS: AM-241 REQUEST NUMBER: 21999 MATRIX: SS ANALYST: RICHARD PETERS PROGRAM CODE: WE1C
OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815
ANALYTICAL TECHNIQUE: RAS ANALYTICAL PROCEDURE: NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SC-4P-95RAD	95.09424	0.013	0.002	PCI/G	7/17/95 68%	

x²

Santo Clara

B6 = 0.023 pCi/g

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: CAH on 18-Jul-1995

REQUEST NUMBER: 21999 MATRIX: SS ANALYST: RICHARD PETERS PROGRAM CODE: WE1C
 OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

SUMMARY OF TRACER RECOVERY IN CUSTOMER AND QA SAMPLES

CUSTOMER NUMBER	CST SAMPLE NUMBER	ANALYSIS	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COLLECTION DATE	COMMENT
SC-4P-95RAD	95.09424	AM-243T	5.91	4.019	PCI/SAMPLE	5/24/95	68%

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

There were no open (non-blind) Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Blind QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
95.10354	3.47	0.213	PCI/L	3.31	0.06	7/17/95	UNDER CONTROL

REPORT NUMBER: 36924

CAH
Analyst

STG
Reviewer

STG
Team Leader

mag
QA Officer

7-18-95

7/19/95

7/19/95

7/19/95

Soil - 238 Pu 239 Pu
(Santa Clara)

REPORT NUMBER: 36359

***** CST ANALYTICAL REPORT *****

Prepared by: GMM on 30-Jun-1995

REQUEST NUMBER: 21999 MATRIX: SS ANALYST: RICHARD PETERS PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: N887 PHONE: 7-0815

NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

Santa Clara

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	78%	COMMENT
SC-4P-95RAD	95.09424	PU-238	RAS	0.032	0.006	PC1/G	6/30/95	78%	Bt = 0.005
SC-4P-95RAD	95.09424	PU-239	RAS	0.018	0.004	PC1/G	6/30/95	78%	0.025 PC1/G

Date

Date

Date

Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in
'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

REPORT NUMBER: 36359

SP
Analyst

STG
Reviewer

STG
Team Leader

NK for M/G
QA Officer

30 July 95
Date

7/3/95
Date

7/3/95
Date

7/3/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

REPORT NUMBER: 36359 (continued)

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: GMM on 30-Jun-1995

REQUEST NUMBER: 21999 MATRIX: SS ANALYST: RICHARD PETERS PROGRAM CODE: WE1C
OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815
NOTEBOOK: PAGE:

SUMMARY OF TRACER RECOVERY IN CUSTOMER AND QA SAMPLES

CUSTOMER NUMBER	CST SAMPLE NUMBER	ANALYSIS	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COLLECTION DATE	COMMENT
SC-4P-95RAD	95.09424	PU-242T	7.21	5.624	PCI/SAMPLE	5/24/95	78%

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

There were no open (non-blind) Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Blind QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
95.09511	PU-238	1.015	0.16	PCI/L	0.91	0.05	6/30/95	UNDER CONTROL
95.09511	PU-239	1.593	0.23	PCI/L	1.45	0.02	6/30/95	UNDER CONTROL
95.09512	PU-238	10.01	0.498	PCI/L	10.3	0.52	6/30/95	UNDER CONTROL
95.09512	PU-239	2.426	0.153	PCI/L	2.36	0.04	6/30/95	UNDER CONTROL

REPORT NUMBER: 36234

*Soil - U
(Santa Clara)*

Page:

***** CST ANALYTICAL REPORT *****

Prepared by: AKS on 29-Jun-1995

ANALYSIS: U REQUEST NUMBER: 21999 MATRIX: SS ANALYST: RICHARD PETERS PROGRAM CODE: WE1

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

ANALYTICAL TECHNIQUE: KPA ANALYTICAL PROCEDURE: NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SC-4P-95RAD	95.09424	4.15	0.75	UG/G	6/29/95	<i>Bf = 3,40</i>

Santa Clara

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: AKS on 29-Jun-1995

REQUEST NUMBER: 21999 MATRIX: SS ANALYST: RICHARD PETERS PROGRAM CODE: WE1C
 OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.33291	4.34	0.43	UG/L	4.5	0.45	6/29/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 36234

AS
Analyst

STG
Reviewer

STG
Team Leader

mag
QA Officer

6/29/95
Date

6/29/95
Date

6/29/95
Date

6/29/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

Soil - 90sr
(Santa Clara)

***** CST ANALYTICAL REPORT *****

Prepared by: AKS on 7-Jul-1995

ANALYSIS: SR-90 REQUEST NUMBER: 21999 MATRIX: SS ANALYST: STEVEN GOLDSTEIN PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

ANALYTICAL TECHNIQUE: PC ANALYTICAL PROCEDURE: ER 190 NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

Santa Clara

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SC-4P-95RAD	95.09424	0.4	0.2	PCI/G	7/07/95	B.G = 0.88 pci/g.

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: AKS on 7-Jul-1995

REQUEST NUMBER: 21999 MATRIX: SS ANALYST: STEVEN GOLDSTEIN PROGRAM CODE: WE1C
OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

There were no open (non-blind) Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
Only Blind QC samples run with this sample batch.
No QC samples run with this sample batch.
No QC samples for this constituent and matrix type available within CST

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
Only Open (non-blind) QC samples run with this sample batch.
No QC samples run with this sample batch.
No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 36512

AS Analyst

STB Reviewer

STB Team Leader

mag QA Officer

7/7/95 Date

7/13/95 Date

7/13/95 Date

7/14/95 Date

Soil- 3H
(Santa Clara)

***** CST ANALYTICAL REPORT *****

Prepared by: ROBINSON on 30-May-1995

ANALYSIS: H-3 REQUEST NUMBER: 21999 MATRIX: SS ANALYST: RICHARD ROBINSON PROGRAM CODE: WE6G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

ANALYTICAL TECHNIQUE: LS ANALYTICAL PROCEDURE: ER210 NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

Santa Clara

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SC-4P-95RAD	95.09424	100.	300.	PCI/L	5/30/95	BG = 7200 pCi/L

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: ROBINSON on 30-May-1995

REQUEST NUMBER: 21999 MATRIX: SS ANALYST: RICHARD ROBINSON PROGRAM CODE: WE6G
 OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

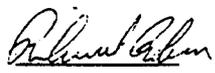
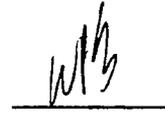
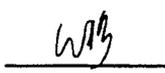
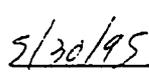
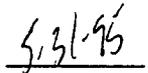
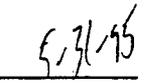
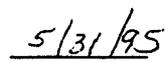
SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.33081	200.	300.	PCI/L	0.0		5/30/95	UNDER CONTROL
00.33082	16600.	600.	PCI/L	15241.	1524.1	5/30/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
95.09275	10.6	1.	NCI/L	12.2	0.5	5/30/95	UNDER CONTROL
95.09296	1900.	400.	PCI/L	2728.	71.	5/30/95	WARNING 2-3 SIG

REPORT NUMBER: 35105

			
Analyst	Reviewer	Team Leader	QA Officer
			
Date	Date	Date	Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. 1, pp. 19-20.

Soil - 137CS
(Santa Clara)

***** CST ANALYTICAL REPORT *****

Prepared by: YIG on 9-Jun-1995

ANALYSIS: CS-137 REQUEST NUMBER: 21999 MATRIX: SS ANALYST: SAMMY GARCIA PROGRAM CODE: 1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

ANALYTICAL TECHNIQUE: G ANALYTICAL PROCEDURE: NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

Santa Clara

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SC-4P-95RAD	95.09424	0.32	0.06	PC1/G	6/09/95	BG = 1.10 pCi/g

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: YIG on 9-Jun-1995

REQUEST NUMBER: 21999 MATRIX: SS ANALYST: SAMMY GARCIA PROGRAM CODE: WE1C
OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.33404	4.48	0.48	PCI/G	4.98	0.16	6/09/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 35520

YIG
Analyst

[Signature]
Reviewer

[Signature]
Team Leader

mag
QA Officer

6/9/95
Date

6/9/95
Date

6/14/95
Date

6/15/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. 1, pp. 19-20.

REPORT NUMBER: 37430

*Soil 238pu - 239 pu
(main file)*

***** CST ANALYTICAL REPORT *****

Prepared by: GMM on 2-Aug-1995

REQUEST NUMBER: 22032 MATRIX: SS ANALYST: RICHARD PETERS PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

Faint

CUSTOMER NUM	SAMPLE NUM	ANALYSIS TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
FL-95-RAD	95.09707 PU-238	RAS	0.01	0.002	PCI/G	7/26/95	83%
FL-95-RAD	95.09707 PU-239	RAS	0.025	0.002	PCI/G	7/26/95	83%

REPORT NUMBER: 37430 (continued)

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: GMM on 2-Aug-1995

REQUEST NUMBER: 22032 MATRIX: SS ANALYST: RICHARD PETERS PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: PAGE:

SUMMARY OF TRACER RECOVERY IN CUSTOMER AND QA SAMPLES

CUSTOMER NUMBER	CST SAMPLE NUMBER	ANALYSIS	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COLLECTION DATE	COMMENT
FL-95-RAD	95.09707	PU-242T	7.21	5.984	PCI/SAMPLE	5/31/95	83%

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

There were no open (non-blind) Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Blind QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
95.09858	PU-238	0.517	0.016	PCI/G	0.51	0.017	7/26/95	UNDER CONTROL
95.09858	PU-239	0.613	0.018	PCI/G	0.6	0.019	7/26/95	UNDER CONTROL
95.09858	PU-239	0.613	0.018	PCI/G	0.6	0.019	7/26/95	UNDER CONTROL

REPORT NUMBER: 37430

RJP

SJG75

SJB

mag

U/P

Analyst

Reviewer

Team Leader

QA Officer

7 Aug 95
Date

8/7/95
Date

8/7/95
Date

8/9/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

REPORT NUMBER: 37241

905r Soil (Action file)

Page:

~~Command = timeout*****~~ CST ANALYTICAL REPORT *****
~~Error = nametype : timeout~~

Stack =

Prepared by: AKS on 26-Jul-1995

ANALYSIS: SR-90 REQUEST NUMBER: 22032 MATRIX: SS ANALYST: STEVEN GOLDSTEIN PROGRAM CODE: WE

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

ANALYTICAL TECHNIQUE: PC ANALYTICAL PROCEDURE: NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
<i>Fisher Lake</i> FL-95-RAD	95.09707	0.3	0.2	PCI/G	7/26/95	

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: AKS on 26-Jul-1995

REQUEST NUMBER: 22032 MATRIX: SS ANALYST: STEVEN GOLDSTEIN PROGRAM CODE: WE1C
OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

There were no open (non-blind) Quality Control materials run with the samples reported above for one of the following reasons

- Only qualitative data requested
Only Blind QC samples run with this sample batch.
[X] No QC samples run with this sample batch.
No QC samples for this constituent and matrix type available within CST

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- [X] Only qualitative data requested
Only Open (non-blind) QC samples run with this sample batch.
No QC samples run with this sample batch.
No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 37241

AS Analyst

Evg Reviewer

STG Team Leader

mag QA Officer

7/26/95 Date

7-27-95 Date

7/28/95 Date

7/28/95 Date

No Sample Discrepancies Noted by Sample Management Section

REPORT NUMBER: 36467

Soil-137Cs
(Fenton)

Page: 01

***** CST ANALYTICAL REPORT *****

Prepared by: YIG on 6-Jul-1995

ANALYSIS: CS-137 REQUEST NUMBER: 22032 MATRIX: SS ANALYST: SAMMY GARCIA PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

ANALYTICAL TECHNIQUE: G ANALYTICAL PROCEDURE: NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

Fenton

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
FL-95-RAD	95.09707	0.42	0.07	PCI/G	7/06/95	

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: YIG on 6-Jul-1995

REQUEST NUMBER: 22032 MATRIX: SS ANALYST: SAMMY GARCIA PROGRAM CODE: WE1C
 OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.33404	4.59	0.49	PCI/G	4.98	0.16	7/06/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 36467

<u>Yig</u> Analyst	<u>[Signature]</u> Reviewer	<u>Evey</u> Team Leader	<u>mag</u> QA Officer
<u>7/6/95</u> Date	<u>7-7-95</u> Date	<u>7-7-95</u> Date	<u>7/7/95</u> Date

No Sample Discrepancies Noted by Sample Management Section

control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. 1, pp. 19-20.

REPORT NUMBER: 37111

Soil - U

Page: (

***** CST ANALYTICAL REPORT *****

Prepared by: AKS on 21-Jul-1995

ANALYSIS: U REQUEST NUMBER: 22032 MATRIX: SS ANALYST: RICHARD PETERS PROGRAM CODE: WE1C
OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815
ANALYTICAL TECHNIQUE: KPA ANALYTICAL PROCEDURE: NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

Fenton file

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
FL-95-RAD	95.09707	4.02	0.4	UG/G	7/21/95	

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: AKS on 21-Jul-1995

REQUEST NUMBER: 22032 MATRIX: SS ANALYST: RICHARD PETERS PROGRAM CODE: WE1C
 OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.33291	4.5	0.45	UG/L	4.5	0.45	7/21/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 37111

AKS
Analyst

Enzy
Reviewer

SJG
Team Leader

mag
QA Officer

7/21/95
Date

7/21/95
Date

7/21/95
Date

7/21/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

REPORT NUMBER: 37652

Soil - 241 Am

***** CST ANALYTICAL REPORT *****

Prepared by: CAH on 16-Aug-1995

ANALYSIS: AM-241 REQUEST NUMBER: 22032 MATRIX: SS ANALYST: RICHARD PETERS PROGRAM CODE: WE1C
 OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815
 ANALYTICAL TECHNIQUE: RAS ANALYTICAL PROCEDURE: ER120 NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

Justin Jike

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
FL-95-RAD	95.09707	0.013	0.003	PCI/G	8/10/95 24%	

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: CAH on 16-Aug-1995

REQUEST NUMBER: 22032 MATRIX: SS ANALYST: RICHARD PETERS PROGRAM CODE: WE1C
 OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

SUMMARY OF TRACER RECOVERY IN CUSTOMER AND QA SAMPLES

CUSTOMER NUMBER	CST SAMPLE NUMBER	ANALYSIS	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COLLECTION DATE	COMMENT
FL-95-RAD	95.09707	AM-243T	5.91	1.418	PCI/SAMPLE	5/31/95	24%

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

There were no open (non-blind) Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Blind QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
95.09858	0.851	0.039	PCI/G	0.82	0.037	8/10/95	UNDER CONTROL

REPORT NUMBER: 37652

RJP
Analyst

STG
Reviewer

STG
Team Leader

mag
QA Officer

84

15 Aug 95

8/18/95

8/18/95

8/18/95

Date

Date

Date

Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceding data was evaluated using the standard statistical criteria set forth in
'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

REPORT NUMBER: 36053

Soil - 3¹
(Fenton)

Page: C

***** CST ANALYTICAL REPORT *****

Prepared by: ROBINSON on 27-Jun-1995

ANALYSIS: H-3 REQUEST NUMBER: 22032 MATRIX: SS ANALYST: RICHARD ROBINSON PROGRAM CODE: WE1C

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

ANALYTICAL TECHNIQUE: LS ANALYTICAL PROCEDURE: NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

Fenton

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
FL-95-RAD	95.09707	100.	400.	PCI/L	6/26/95	

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: ROBINSON on 27-Jun-1995

REQUEST NUMBER: 22032 MATRIX: SS ANALYST: RICHARD ROBINSON PROGRAM CODE: WE1C
 OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.33081	0.0	300.	PCI/L	0.0		6/26/95	UNDER CONTROL
00.33081	100.	300.	PCI/L	0.0		6/26/95	UNDER CONTROL
00.33081	0.0	300.	PCI/L	0.0		6/26/95	UNDER CONTROL
00.33082	13200.	1100.	PCI/L	15241.	1524.1	6/26/95	UNDER CONTROL
00.33082	13600.	1100.	PCI/L	15241.	1524.1	6/26/95	UNDER CONTROL
00.33082	14200.	1100.	PCI/L	15241.	1524.1	6/26/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
95.09862	6700.	800.	PCI/L	8380.	218.	6/26/95	WARNING 2-3 SIG
95.10503	7200.	800.	PCI/L	8380.	218.	6/26/95	UNDER CONTROL
95.10656	9500.	900.	PCI/L	11180.	291.	6/26/95	UNDER CONTROL
95.10657	6900.	800.	PCI/L	8380.	218.	6/26/95	UNDER CONTROL
95.10657	6800.	500.	PCI/L	8380.	218.	6/26/95	WARNING 2-3 SIG

REPORT NUMBER: 36053

Richard Robinson
Analyst

WMB
Reviewer

WMB
Team Leader

mag
QA Officer

6/27/95
Date

6-28-95
Date

6/28/95
Date

6/28/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceding data was evaluated using the standard statistical criteria set forth in

*File - 137 CS
(Santa Clara & Alcala)*

***** CST ANALYTICAL REPORT *****

Prepared by: YIG on 2-Aug-1995

ANALYSIS: CS-137 REQUEST NUMBER: 22337 MATRIX: BA ANALYST: SAMMY GARCIA PROGRAM CODE: WE3G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

ANALYTICAL TECHNIQUE: G ANALYTICAL PROCEDURE: NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE
SC4L2	95.10815	0.3	0.45	PCI/G	7/27/95
MBG1	95.10816	0.44	0.66	PCI/G	7/27/95

PCI/g ash
PCI/g dry
COMMENT ±2SD
0.03(0.09)
0.04(0.120)

*ald
0.10
0.091*

Marcalo

300
 $3.0 \times 10^{-2} (\pm 9.0)$
 $4.0 \times 10^{-2} (\pm 12.0)$

avg term av = 27.7 PCI/g dry $\times 10^{-2}$

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: YIG on 2-Aug-1995

REQUEST NUMBER: 22337 MATRIX: BA ANALYST: SAMMY GARCIA PROGRAM CODE: WE3G
 OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.33381	5.23	0.89	PCI/G	4.85	0.16	7/27/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 37418

YIG
Analyst

[Signature]
Reviewer

SVL
Team Leader

mag
QA Officer

8/2/95
Date

8/2/95
Date

8/8/95
Date

8/9/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. 1, pp. 19-20.

REPORT NUMBER: 37881

Jim 238 Pa 239 Pa
(Santa Clara & Merced)

***** CST ANALYTICAL REPORT *****

Prepared by: CEA on 28-Aug-1995

REQUEST NUMBER: 22337 MATRIX: BA ANALYST: RICHARD PETERS PROGRAM CODE: WE3G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

SC4L2
0.10
0.091
Merced

CUSTOMER NUM	SAMPLE NUM	ANALYSIS	ANALYTICAL TECHNIQUE	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
SC4L2	95.10815	PU-238	RAS	0.002	0.001	PCI/G	8/28/95	90% → 0.0002
SC4L2	95.10815	PU-239	RAS	0.0	0.001	PCI/G	8/28/95	90% 0.0000
MBG1	95.10816	PU-238	RAS	0.001		PCI/G	8/28/95	90% - 0.000091
MBG1	95.10816	PU-239	RAS	0.0		PCI/G	8/28/95	90% 0.000

pci/g air
pci/dry

(± 25%)
0.00020
0.00020
0.00018
0.00018

- 20 x 10⁻⁵ pci/dry (± 20)
0.0 (± 20)
- 9.1 x 10⁻⁵ (± 18)
0.0 (± 18)

Long term air 238 Pa = 23.6 x 10⁻⁵
239 Pa = 26.3 x 10⁻⁵

REPORT NUMBER: 37881 (continued)

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: CEA on 28-Aug-1995

REQUEST NUMBER: 22337 MATRIX: BA ANALYST: RICHARD PETERS PROGRAM CODE: WE3G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

NOTEBOOK: PAGE:

SUMMARY OF TRACER RECOVERY IN CUSTOMER AND QA SAMPLES

CUSTOMER NUMBER	CST SAMPLE NUMBER	ANALYSIS	AMOUNT SPIKED	AMOUNT RECOVERED	UNITS	COLLECTION DATE	COMMENT
SC4L2	95.10815	PU-242T	2.06	1.854	PCI/SAMPLE	7/20/95	90%
MBG1	95.10816	PU-242T	2.06	1.854	PCI/SAMPLE	7/20/95	90%

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYSIS	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.33824	PU-238	3.1911	0.1268	PCI/SAMPLE	3.2	0.1	8/28/95	UNDER CONTROL

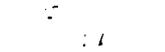
SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 37881


Analyst


Reviewer


Team Leader


QA Officer

8/28/95
Date

Date

9/1/95
Date

9/6/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

Fish - 90Sr
(Santa Clara & Mesalero)

***** CST ANALYTICAL REPORT *****

Prepared by: AKS on 12-Oct-1995

ANALYSIS: SR-90 REQUEST NUMBER: 22337 MATRIX: BA ANALYST: RICHARD PETERS PROGRAM CODE: WE3

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

ANALYTICAL TECHNIQUE: PC ANALYTICAL PROCEDURE: ER 190 NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

Santa Clara

a/d ratio

0.10
0.091

CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE
SC4L2	95.10815	0.0	0.2	PC1/G	10/12/95
MBG1	95.10816	0.1	0.5	PC1/G	10/12/95

pli/g ant.

pli / dry gram
1SD
0.0 (± 0.020)
0.0091 (± 0.0455)

Mesalero

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: AKS on 12-Oct-1995

REQUEST NUMBER: 22337 MATRIX: BA ANALYST: RICHARD PETERS PROGRAM CODE: WE3G
OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

There were no open (non-blind) Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Blind QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 38634

[Signature]
Analyst

[Signature]
Reviewer

[Signature] SJC
Team Leader

[Signature]
QA Officer

10/12/95
Date

10-17-95
Date

10/20/95
Date

10/20/95
Date

95

No Sample Discrepancies Noted by Sample Management Section

John W. Wynn (U)
(Santa Clara & Merced)

***** CST ANALYTICAL REPORT *****

Prepared by: AKS on 7-Sep-1995

ANALYSIS: U REQUEST NUMBER: 22337 MATRIX: BA ANALYST: RICHARD PETERS PROGRAM CODE: WE30

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

ANALYTICAL TECHNIQUE: KPA ANALYTICAL PROCEDURE: NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

<i>addition</i>	<i>Santa Clara</i>	CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	<i>only</i> UNITS	COMPLETION DATE	COMMENT
0.10	}	SC4L2	95.10815	0.09	0.01	UG/G	9/07/95	0.009 (± 0.001)
0.091		MBG1	95.10816	0.04	0.01	UG/G	9/07/95	0.004 (± 0.0009)
	<i>Merced</i>							

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: AKS on 7-Sep-1995

REQUEST NUMBER: 22337 MATRIX: BA ANALYST: RICHARD PETERS PROGRAM CODE: WE3G
 OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.33291	4.5	0.45	UG/L	4.5	0.45	9/07/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 38057

AKS
Analyst
9/7/95
Date

Eray
Reviewer
9-8-95
Date

STG
Team Leader
9/11/95
Date

mag
QA Officer
9/11/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. I, pp. 19-20.

my fish (Santo Clara)

***** CST ANALYTICAL REPORT *****

Prepared by: ROBINSON on 25-Jul-1995

ANALYSIS: H-3 REQUEST NUMBER: 22033 MATRIX: W ANALYST: RICHARD ROBINSON PROGRAM CODE: WE6G

OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M337 PHONE: 7-0815

ANALYTICAL TECHNIQUE: LS ANALYTICAL PROCEDURE: ER210 NOTEBOOK: PAGE:

CUSTOMER SAMPLES:

	CUSTOMER NUMBER	SAMPLE NUMBER	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	COMPLETION DATE	COMMENT
<i>Santa Clara Mex.</i>	1-SC-M	95.09709	100.	300.	PCI/L	7/24/95	<i>fish</i>
<i>Santa Clara 4th pmw</i>	2-SC-6	95.09710	600.	300.	PCI/L	7/24/95	
<i>Santa Clara Overly</i>	3-SC-PO	95.09711	200.	300.	PCI/L	7/24/95	
<i>Santa Clara water</i>	4-SC-PU	95.09712	0.0	300.	PCI/L	7/24/95	<i>Very</i>
<i>Santa Clara Overly</i>	5-FL-PO	95.09713	100.	300.	PCI/L	7/24/95	<i>BU.</i>
<i>Santa Clara Underway</i>	6-FL-PU	95.09714	100.	300.	PCI/L	7/24/95	

***** CST QUALITY ASSURANCE REPORT *****

Prepared by: ROBINSON on 25-Jul-1995

REQUEST NUMBER: 22033 MATRIX: W ANALYST: RICHARD ROBINSON PROGRAM CODE: WE6G
 OWNER: Philip R. Fresquez GROUP: ESH-20 MAIL-STOP: M887 PHONE: 7-0815

SUMMARY OF CONTROL STATUS OF OPEN (NON-BLIND) QC SAMPLES RUN WITH THIS BATCH

SAMPLE NUM	ANALYTICAL RESULT	ANALYTICAL UNCERTAINTY	UNITS	QC VALUE	QC UNCERTAINTY	COMPLETION DATE	COMMENT
00.33081	0.0	300.	PCI/L	0.0		7/24/95	UNDER CONTROL
00.33089	12300.	1100.	PCI/L	14825.	1482.5	7/24/95	UNDER CONTROL

SUMMARY OF CONTROL STATUS OF BLIND QC SAMPLES RUN WITH THIS BATCH

There were no blind Quality Control materials run with the samples reported above for one of the following reasons:

- Only qualitative data requested
- Only Open (non-blind) QC samples run with this sample batch.
- No QC samples run with this sample batch.
- No QC samples for this constituent and matrix type available within CST

REPORT NUMBER: 37182

Richard Robinson
Analyst

STG
Reviewer

STG
Team Leader

r. ag
QA Officer

07/25/95
Date

7/27/95
Date

7/27/95
Date

7/27/95
Date

No Sample Discrepancies Noted by Sample Management Section

The control status of the preceeding data was evaluated using the standard statistical criteria set forth in 'Quality Assurance for Health and Environmental Chemistry: 1992,' LA-12790-MS, Vol. 1, pp. 19-20.

This report has been reproduced directly from the best available copy.

It is available to DOE and DOE contractors from the Office of Scientific and Technical Information, P.O. Box 62, Oak Ridge, TN 37831. Prices are available from (615) 576-8401.

It is available to the public from the National Technical Information Service, US Department of Commerce, 5285 Port Royal Rd. Springfield, VA 22616.

Los Alamos
NATIONAL LABORATORY

Los Alamos, New Mexico 87545