Los Alamos
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

DATE: November 17, 1995
IN REPLY REFER TO: ESH-18/WQ&H-95-0550
MAIL STOP: K497
TELEPHONE: (505) 667-0313

Mr. Joseph C. Vozella
Assistant Area Manager
Office of Environment and Projects
U.S. Department of Energy
Los Alamos Area Office
Los Alamos, NM 87544

SUBJECT: **RESPONSE TO 10/11/95 NMED DOE OB MEMO REGARDING RADIONUCLIDE RESULTS FOR TEST WELLS TW-4 AND DT-9**

Dear Mr. Vozella:

The New Mexico Environment Department (NMED) Department of Energy Oversight Bureau (DOE OB) has called to our attention their 1994 finding of a Strontium-90 value in Test Well 4 of 6.6±1.0 pCi/L. This is close to our value of 6.2±3.4 pCi/L for a split sample.

In July of 1995 during constant pumping of Test Well 4, we collected a time series of eight samples and two duplicates. Preliminary trace-level tritium analyses by the University of Miami show that all samples have a tritium level below 1 tritium unit (about 3.24 pCi/L). Waters with such low tritium levels have probably been isolated from surface recharge for at least 50 years.

Strontium-90 results for these eight time series Test Well 4 samples (see Table 1) were all below about 1.0±0.8 pCi/L, with one possible exception. One sample had a higher value of 2.9±0.8 pCi/L initially, but showed 0.5±1.2 pCi/L on reanalysis. These tritium and Strontium-90 data contradict the 1994 findings, and suggest that there is no surface contamination in this well.

There are two possible explanations for the 1994 ^{90}Sr finding: (1) both the Laboratory and NMED samples were contaminated by the sampling process, which occurred near the site of the former TA-45 radioactive liquid waste treatment plant; or, (2) contamination in this test well, if present, is not pervasive in light of the negative 1995 and prior years' results.

The NMED DOE OB also cited what they believe to be elevated levels of ^{238}Pu, $^{239,240}Pu$, ^{241}Am, Gross Alpha, and Gross Beta for Test Well DT-9 (see Table 2). The Laboratory's 1994 Environmental

Surveillance Report values for the split sample are also presented in Table 2, and these values are generally lower than the NMED DOE OB results. The numbers presented in parentheses are the standard deviation of the analytical uncertainty for the analytical result given.

The counting statistics for radiometric analyses are described by a Poisson distribution. If the measured value exceeds 1.65 times the standard deviation, a detection may have occurred. This procedure only accounts for uncertainty in counting statistics, however, and may be less than the overall method error for an analysis. The 1.65 σ values are shown in Table 2.

The values for ^{238}Pu, $^{239,240}Pu$, ^{241}Am, which the NMED DOE OB cited as elevated, are either near or less than 1.65 times the standard deviations of the analytical result. It is questionable whether these analytical results are significantly different from zero. Therefore these values are not elevated, but are near the analytical detection limit.

Table 1. Strontium-90 Results from Test Well 4 for 1995

Well Bore No.	^{90}Sr (pCi/L)	$\pm^{90}Sr$ (pCi/L)
0	0.10	0.70
1	1.10	0.80
2	0.30	0.90
2 Duplicate	0.20	1.20
3	2.90	0.80
3 Reanalysis	0.50	1.20
4	0.50	0.90
4 Reanalysis	0.10	1.20
5	0.10	0.80
7	0.30	0.90
10	0.50	1.20
10 Duplicate	1.00	1.20

In the case of the gross alpha and beta results, the Laboratory's 1994 Environmental Surveillance Report values for the split sample are again lower than those of the NMED DOE OB. According to the Laboratory radiochemists, the methods used to determine gross alpha and beta are only approximate. The NMED DOE OB value for gross alpha is below the EPA primary drinking water maximum contaminant level of 15 pCi/L, and the gross beta value is below the EPA screening level of 50 pCi/L.

Table 2. Radiochemical Analysis of Test Well DT-9 for 1994

	^{3}H (nCi/l)	^{90}Sr (pCi/l)	^{137}Cs (pCi/l)	Total Uranium (mg/l)	^{238}Pu (pCi/l)	$^{239,240}Pu$ (pCi/l)	^{241}Am (pCi/l)	Gross Alpha (pCi/l)	Gross Beta (pCi/l)	Gross Gamma (pCi/l)
NMED/AIP	<0.2	<1.4	<2.9	<0.3 (0.04)	0.135 (0.065)	0.045 (0.036)	0.117 (0.073)	9 (2)	14 (2)	
1.65 × σ					0.11	0.06	0.12			
LANL	0.1 (0.3)	0.7 (0.7)	<1.2	0.2 (0.0)	-0.004 (0.030)	0.026 (0.020)	0.062 (0.030)	1 (1)	4 (1)	90 (50)
1.65 × σ					0.05	0.03	.05			

Regardless of the interpretation of these data, we agree with the NMED DOE OB that quarterly sampling of the Test Wells is desirable. We have laid out our proposal to institute such sampling in two previous letters to you (WQ&H:95-0469 dated October 6, 1995 from Steve Rae; and WQ&H:95-0499 dated October 25, 1995 from Bruce Gallaher).

Please call me at 667-0313 if I can be of further help in this matter.

Sincerely,

David B. Rogers, Hydrologist,
Water Quality & Hydrology Group

DBR/em

Attach.: 10/11/95 Memo "Radionuclide results for Test Well 4 (TW-4) and Test Well DT-9, Los Alamos National Laboratory (LANL)"

Cy: Dennis Erickson, ESH-DO, w/att., MS K491
John Gustafson, PA-1, w/att., MS C177
Steve Rae, ESH-18, w/att., MS K497
Bruce Gallaher, ESH-18, w/att., MS K497
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State of New Mexico
ENVIRONMENT DEPARTMENT
DOE OVERSIGHT BUREAU
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Los Alamos, New Mexico 87545

GARY E. JOHNSON
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11 October 1995

Mr. Ivan Trujillo, LAAO AIP
Point of Contact
Department of Energy
Los Alamos Area Office
528 35th Street, Mail Stop A316
Los Alamos, NM 87544

RE: Radionuclide results for Test Well 4 (TW-4) and Test Well DT-9, Los Alamos National Laboratory (LANL)

Dear Mr. Trujillo:

The New Mexico Environment Department (NMED) Department of Energy Oversight Bureau (DOE OB) conducted split sampling of LANL's Environmental Surveillance (ES) test well TW-4 on June 6, 1994, and results indicate elevated concentrations (6.59 pCi/L ±1.00) of strontium-90. The DOE OB data were confirmed by LANL's ESH-18 hydrology group. LANL's ES test well DT-9 showed elevated levels of plutonium-238 (0.135 pCi/L ±0.065) and plutonium-239/240 (0.045 pCi/L ±0.036), americium-241 (0.117 ±0.073), alpha (9.35 pCi/L ±1.37) and beta (14.19 pCi/L ±1.92). The above DOE OB data warrants our recommendation for quarterly sampling of the referenced test wells.

The above DOE OB data are being submitted for your thirty-day review as stated in the Agreement-in-Principle Umbrella Protocol. After you have had the opportunity to review and comment on the data, it will be released to applicable agencies within thirty (30) days of receipt of this letter. Please contact Michael Dale at 672-0449 if you have any questions concerning this matter.

Sincerely,

Stephen Yanicak

Steve Yanicak, POC LANL, DOE OB
New Mexico Environment Department

SY:mrd

cc: Matt Johansen, DOE LAAO, MS A316
Bob Simeone, DOE LAAO, MS A316
Steve Rae, LANL, ESH-18, MS K490
Allyn Pratt, LANL, EES-13, MS J521
Neil Weber, NMED, Chief, DOE OB

Facsimile Copy

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6 December 1995

Mr. Ivan Trujillo, LAAO AIP
Point of Contact
Department of Energy
Los Alamos Area Office
MS A316
Los Alamos, NM 87544

RE: Ground-water and surface-water flow measurements and recommendations, Los Alamos National Laboratory, New Mexico

Dear Mr. Trujillo:

The New Mexico Environment Department (NMED) Department of Energy Oversight Bureau (DOE OB) staff conducted quantitative and visual estimate flow measurements (Tables 1 and 2) in Pajarito Canyon, Canon de Valle, Threemile Canyon, Water Canyon and two (2) unnamed tributaries (Drop Tower and Fish Ladder Canyons) during 1994 and 1995 (Figure 1). Flow data were obtained by measuring the volume of water collected via natural or man-made water fall (e.g., culvert) or temporary water-diversion structure during a given time interval and by visual estimations. Water was collected in either a 1 or 5 gallon plastic container and timed using a stopwatch. Mean flow measurements at each location were calculated using multiple measurements. The number of flow measurements taken at each station varied from three to nine. Our measurements indicate that several perennial reaches and springs or seeps exist within the laboratory boundary. Surface-water flow from a number of the perennial springs is lost within several hundred feet; however, some of the perennial springs support surface-water flow at distances greater than one mile.

It should be noted that these perennial reaches and springs are viable recharge zones for perched ground water within the canyon alluvium and possibly deeper ground-water zones. Hence, these possible perched zones should be characterized.

NMED DOE OB is recommending monitoring (e.g., flow measurements, water quality) of the springs and surface waters within the referenced canyons. The attached data are being submitted for your thirty-day review as stated in the Agreement-in-Principle Umbrella Protocol. After you have had the opportunity to review and comment on the data, it will be released to applicable agencies within thirty (30) days of receipt of this letter.

Contact Michael Dale at 672-0449 or Ralph Ford-Schmid at 827-1536 if you have any questions concerning this matter.

Sincerely,

Stephen Yanicak

Steve Yanicak, DOE Oversight Bureau, LANL POC
New Mexico Environment Department

attachments
SY:mrd
cc: Matt Johansen, DOE LAAO, MS A316
Bob Simeone, DOE LAAO, MS A316
Bonnie Koch, DOE LAAO, MS A316
Everett Trollinger, DOE LAAO, MS A316
Mike Gilgosch, DOE LAAO, MS A316
Gary Allen, LANL, CST-18, MS E525
Gene Gould, LANL, ESA-DE, MS G787
Brad Martin, LANL, CST-18, MS E525
Cheryl Rofer, LANL, EES-1, MS D462
Allyn Pratt, LANL, EES-13, MS J521
Steve Rae, LANL, ESH-18, MS K490
Neil Weber, NMED, Chief, DOE Oversight Bureau

Table 1. Flow observations and measurements obtained from several on-site surface-water reaches, Los Alamos National Laboratory, New Mexico

Location	Number on Map	Date	Mean Measured Flow (cfs)	Number of Measurements	Estimated Flow (cfs)
SURFACE WATER					
Pajarito Canyon					
PA 7.0	1	7/22/94	-	-	0.033
		10/27/95	-	-	0.078
PA 8.9	2	2/10/95	0.134	3	-
		2/25/95	0.267	3	-
		4/28/95		-	0.401
		5/19/95		-	0.357
		6/20/95	0.446	3	-
		8/9/95	0.212	4	-
		10/27/95	0.094	4	-
		11/16/95	0.086	5	-
PA 9.05	3	8/9/94		-	0.007
		2/24/95		-	0.022
		4/28/95		-	0.022
		5/19/95		-	0.022
		7/7/95		-	0.011
		11/9/95	0.011	7	-
Starmer's Gulch					
ST 0.05	4	8/9/94		-	0.045
		2/24/95		-	0.045
		4/28/95		-	0.067
		5/19/95		-	0.067
		7/7/95		-	0.045
		10/27/95		-	0.045
		11/9/95	0.050	7	-
Bulldog Tributary					
BU 0.1	5	8/9/94		-	0.022
		2/10/95		-	0.022
		2/24/95		-	0.022
		4/28/95		-	0.033
		5/19/95		-	0.033
		6/20/95		-	0.033
		7/7/95		-	0.022
		8/9/95		-	0.022
		10/20/95		-	0.022
		11/9/95	0.035	9	-
Canon de Valle					
VA 1.85	6	6/16/95		-	0.022
		8/31/95		-	0.007
		11/16/95	0.021	5	-
VA 2.1	7	11/16/95	0.018	6	-
VA 2.6	8	11/16/95		-	0.038

Table 1 (cont.). Flow observations and measurements obtained from several on-site surface-water reaches, Los Alamos National Lat tory, New Mexico

Location	Number on Map	Date	Mean Measured Flow (cfs)	Number of Measurements	Estimated Flow (cfs)
SURFACE WATER (cont.)					
Canon de Valle (cont.)					
VA 2.7	9	6/20/95	0.040	3	-
		3/17/95	0.154	3	-
		3/22/95	0.159	3	-
		3/30/95	0.166	3	-
		5/5/95	0.178	3	-
		6/16/95	0.103	3	-
		8/8/95	0.040	3	-
		8/31/95	0.088	3	-
		11/16/95	0.035	5	-

Note: See Figure 1 for location and data correlation.

Table 2. Flow observations and measurements obtained from several on-site springs, Los Alamos National Laboratory, New Mexico

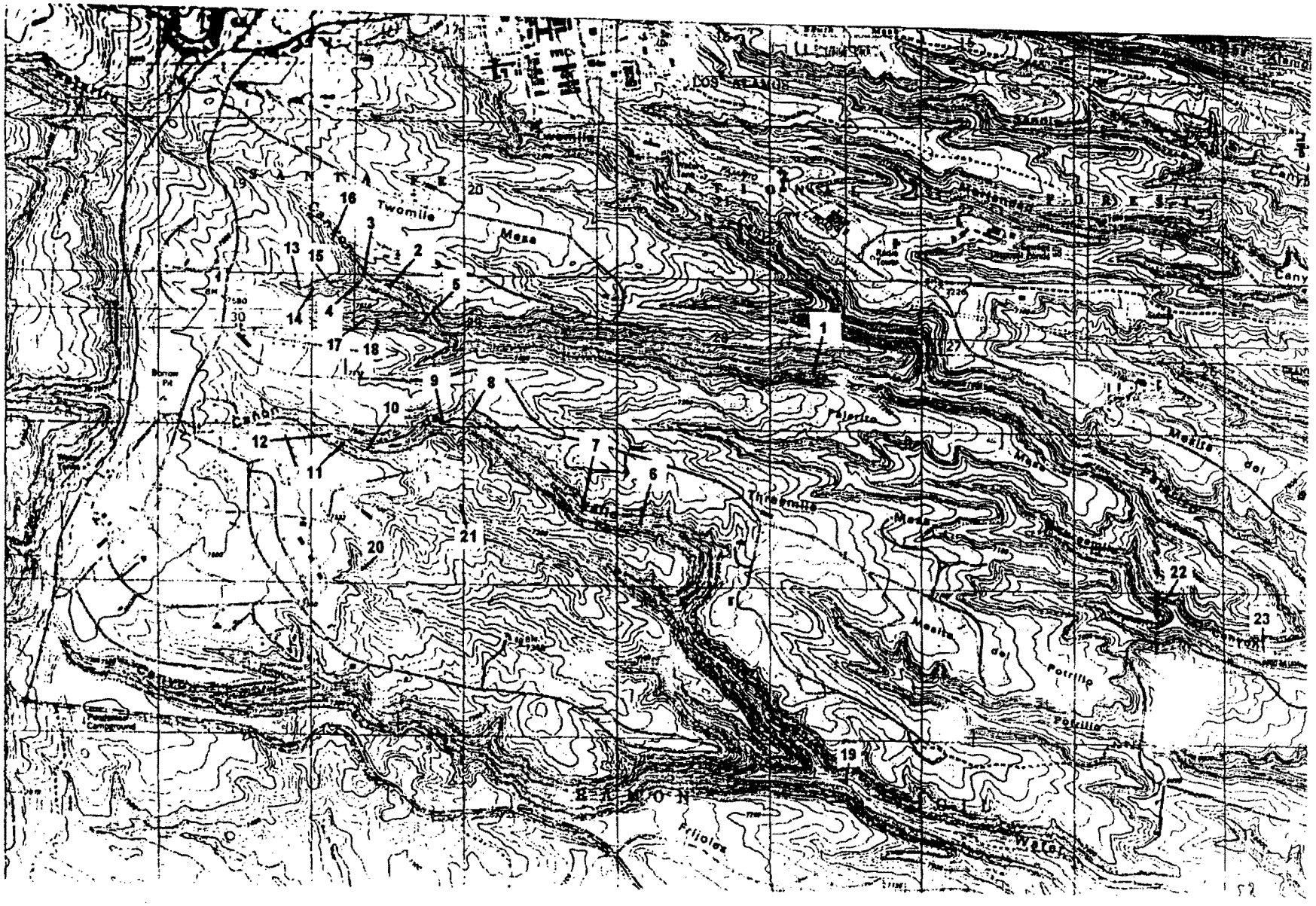
Location	Number on Map	Date	Mean Measured Flow (gpm)	Number of Measurements	Estimated Flow (gpm)
SPRINGS/SEEPS					
Canon de Valle					
Burning Ground Spring	10	8/12/94	-	-	10-15
		3/17/95	-	-	10-15
		3/22/95	-	-	10-15
		5/12/95	-	-	10-15
		8/31/95	13.4	4	-
SWSC Spring	11	8/12/94	-	-	3-5
		3/17/95	-	-	3-5
		3/22/95	-	-	3-5
		5/12/95	-	-	3-5
		8/31/95	-	-	3-5
Peter Spring	12	8/12/94	-	-	3-5
		3/17/95	-	-	5-7
		3/22/95	-	-	5-7
		5/12/95	-	-	7-10
		8/31/95	-	-	3-5
Starmer's Gulch					
Charlie's Spring	13	7/22/94	-	-	2-4
		2/24/95	-	-	2-4
		4/28/95	-	-	2-4
		5/19/95	-	-	2-4
		6/14/95	-	-	2-4
		6/22/95	-	-	2-4
		7/7/95	-	-	2-4
		10/20/95	-	-	2-4
		11/9/95	-	-	2-4
Starmer's Spring	14	7/22/94	-	-	15-20
		2/24/95	-	-	15-20
		4/28/95	-	-	15-20
		6/14/95	-	-	15-20
		6/22/95	-	-	15-20
		7/7/95	-	-	15-20
		10/20/95	-	-	15-20
		11/9/95	-	-	15-20
Bryan Spring	15	5/19/95	-	-	3-5
		6/22/95	-	-	3-5
		7/7/95	-	-	3-5
		10/20/95	-	-	3-5
		11/9/95	-	-	3-5
Pajarito Canyon					
Homestead Spring	16	8/9/94	-	-	3-5
		2/24/95	-	-	3-5
		4/28/95	-	-	3-5
		5/19/95	-	-	3-5
		6/22/95	-	-	3-5
		7/7/95	-	-	3-5
		10/20/95	-	-	3-5
		11/9/95	-	-	3-5

Table 2 (cont.). Flow observations and measurements obtained from several on-site springs, Los Alamos National Laboratory, New Mexico

Location	Number on Map	Date	Mean Measured Flow (gpm)	Number of Measurements	Estimated Flow (gpm)
SPRINGS/SEEPS (cont.)					
Bulldog Tributary					
Kieling Spring	17	5/19/95	-	-	3-5
		7/7/95	-	-	3-5
		10/20/95	-	-	3-5
Bulldog Spring	18	8/9/94	-	-	10-15
		2/24/95	-	-	10-15
		4/28/95	-	-	15-20
		5/19/95	-	-	15-20
		7/7/95	-	-	10-15
		10/20/95	-	-	10-15
		11/9/95	-	-	10-15
Water Canyon					
WC 6.25 Seep	19	8/4/95	-	-	1-3
Drop Tower Canyon					
Martin Spring	20	5/12/95	-	-	2-3
		7/21/95	-	-	2-3
Fish Ladder Canyon					
FL Seep	21	5/12/95	-	-	2-4
		6/2/95	-	-	1-3
Threemile Canyon					
Threemile Spring	22	3/13/95	-	-	10-15
		6/23/95	-	-	5-10
		8/18/95	-	-	5-10
		11/9/95	7.3	8	-
TA-18 Spring	23	3/21/95	-	-	2-4
		3/13/95	-	-	2-4
		11/9/95	1.6	8	-

Note: See Figure 1 for location and data correlation.

Figure 1. [illegible]ED DOE OB's ground-water and surface-water flow measr[illegible]ent locations, Los Alamos National Laboratory, New Mexico (n[illegible]ified from USGS, Frijoles 7.5 Quadrangle)



Note: locations approximate

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