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Hswa LANL 1/1071/0/0-030(g)

Date: May 6, 1999  
 Refer to: EM/ER:0



Dr. Robert S. Dinwiddie  
 NMED-HRMB  
 P.O. Box 26110  
 Santa Fe, NM 87502

**SUBJECT: RESPONSE TO RSI FOR PRS 0-030(g) SAP**

Dear Dr. Dinwiddie:

Enclosed is the Los Alamos National Laboratory Environmental Restoration (ER) Project's response to your Request for Supplemental Information (RSI) for the Sampling and Analysis Plan for Potential Release Site 0-030(g). The RSI was received at the ER Project Office on April 13, 1999.

If you have any questions, please call Dave McInroy at (505) 667-0819 or Joe Mose at (505) 667-5808.

Sincerely,

Julie A. Canepa, Program Manager  
 LANL/ER Project

Sincerely,

Theodore J. Taylor, Program Manager  
 DOE/LAAO

JC/TT/NR/dm

Enclosure: Response to RSI for PRS 0-030(g) SAP



TL

Dr. Robert S. Dinwiddie  
EM/ER:99-118

-2-

May 6, 1999

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**RESPONSE TO RSI  
FOR THE SAP FOR SWMU 0-030(g),  
OUTFALL DRAINAGE AREA,  
SUBMITTED FEBRUARY 22, 1999**

**INTRODUCTION**

This document responds to a letter titled "Request for Supplemental Information, 0-030(g) Sampling and Analysis Plan, Los Alamos National Laboratory, NM 0890010515" from the RCRA Permits Management Program (RPMP) of the Hazardous and Radioactive Materials Bureau (HRMB) of the New Mexico Environment Department (NMED) to the Los Alamos National Laboratory (LANL) Environmental Restoration (ER) Project. To facilitate review of this response, NMED's comments are included verbatim. The comments are divided into general and specific categories as presented in the letter. LANL's responses follow each NMED comment.

**GENERAL COMMENTS**

**NMED/RPMP Comment**

1. *As stated in the RPMP's review of the Revised Status Report for SWMU 0-030(g) dated February 9, 1999, RPMP is concerned with apparent lack of delineation of rate and extent of contamination beneath the former drainline. LANL should either address this issue with additional sampling at the outfall/drainage pipe or provide compelling evidence or a compelling argument that rate and extent of contamination have been determined in the final RFI report.*

**LANL Response**

Additional text is included as Attachment 1 to this response and will be carried forward to the post-fieldwork supplemental RFI report.

**NMED/RPMP Comment**

2. *Clarify the discrepancy between LANL's response (EM/ER:98-191 dated June 10, 1998) to the Request for Supplemental Information (RSI), dated May 12, 1998 and the Revised Status Report for 0-030(g), dated December 23, 1998 (EM/ER:98-484). In the LANL response to comment #3 of the RSI, it is stated that no samples taken at this site were composited and the reported depth of the sample (3-8 ft below ground surface (bgs)), AAA 1909, in the RFI Report was incorrect; the actual sample depth was 2-2.5 ft bgs. However, the Revised Status Report SWMU 0-030(g) states repeatedly that the reported depth for this sample to be 3 to 8 ft bgs. Please clarify once again the depth and provide a copy of the field documentation (e.g., field notes or log book) indicating the actual depth for sample AAA 1909.*

## LANL Response

The original RFI report was in error, as corrected in the May 12, 1998, RSI response. Unfortunately, the December 23, 1998, Revised Status Report carried forward the 1995 report error, adding to the confusion. Sample AAA 1909 was, in fact, collected per the May 12, 1998, RSI response, at 2–2.5 ft bgs. The sample collection log refers to the sample as “surface,” meaning the surface beneath the clay outfall pipe location at 2 ft bgs. Total sample depth is, therefore, 2–2.5 ft bgs, as noted in the May 12, 1998, RSI response. The sample collection log for this sample is provided as Attachment 2 to this document.

## NMED/RPMP Comment

3. *Considering the incomplete analytical suites of the previous sampling events, LANL should conduct full-suite analyses on all samples collected in the 0-030(g) outfall drainage area and Acid Canyon. Full suite analyses should include isotopic radionuclides (alpha and gamma spectroscopy), TAL metals, PCBs and pesticides.*

## LANL Response

The analytical suites proposed in the SAP were developed to include those analytes reported as detected above background values in the original 1995 RFI report (isotopic plutonium and americium, PCB/pesticides, lead, and mercury), as well as physical characteristics of the samples such as grain size, thickness, etc., during a site tour with LANL staff by Neelam Dawhan of the NMED HRMB and Darlene Williams of the DOE OB on October 16, 1998. The analytical suite was subsequently amended to include TAL metals based on a telephone conversation with DOE OB on October 26, 1998, and discussed in a meeting on February 8, 1999. In order to eliminate further delays in the implementation of this SAP, LANL will document any further changes to the agreement in the supplemental RFI report for this phase of the investigation. They will be noted there as deviations to the SAP.

## SPECIFIC COMMENTS

### NMED/RPMP Comment

4. *Section 2.2.1.2, Sampling, Page 9*

**LANL Statement:** *The 1993 analytical results from the samples collected in the outfall drainage showed concentrations in surface sediment (0–6 in.) above background for isotopic plutonium and americium.*

**RPMP Comment:** *The above statement refers to background values for isotopic plutonium and americium. There are no background values for these isotopes, only fallout values, please correct the above statement as well as similar references in the text.*

### **LANL Response**

In the case of these isotopes, LANL was using worldwide fallout values in the 1995 report as a *de facto* background data set. This distinction will be addressed and clarified in the supplemental RFI report.

### **NMED/RPMP Comment**

5. *Section 2.2.1.2, Sampling, Page 9*

**LANL Statement:** *The analytical results from 1993 indicate that the samples collected in the outfall drainage showed concentrations above background for isotopic plutonium and americium in surface sediment (0–6 in.).*

**RPMP Comment:** *Above statement should include uranium, lead, and mercury, which were also found above background and fallout values in the outfall area.*

### **LANL Response**

Lead was reported (maximum in sample AAB 0275R at 22 mg/kg) at levels below the 1995 UTL value (considered background when the report was written) of 39 mg/kg and just slightly below the current (1998) background value of 22.3 mg/kg for soils. One uranium value (6.82 pCi/g) was reported slightly above the 1995 UTL value (5.71 pCi/g), with the remaining 12 analyses at approximately 60% or less of the UTL value. All mercury results were reported at the UTL value (.1 mg/kg) except one replicate value reported at .2 mg/kg. LANL will document these, and any further changes, in the post-fieldwork supplemental RFI report.

### **NMED/RPMP Comment**

6. *Section 2.2.2.1, Nature and extent of Contamination, Page 9*

**LANL Statement:** *The radionuclide contaminants detected above LANL background levels included isotopic plutonium and americium.*

**RPMP Comment:** *See Specific Comment 4.*

### **LANL Response**

See Specific Comment 4 response.

## NMED/RPMP Comment

### 7. Section 2.2.2.1, Nature and extent of Contamination, Page 9

**LANL Statement:** *One of three replicate analyses (i.e., three analyses run on the same sample) of mercury reported a detection of 0.2 mg/kg in one sample. The other two replicate analyses were reported as not detected.*

**RPMP Comment:** *According to the RFI report (LANL 1995) and the raw data provided to RPMP, the results of three replicate analyses for sample AAB 0275 were 0.1, 0.1 and 0.2 mg/kg of mercury, none of the results were qualified as non-detect. Please revise the statement to reflect the possible detection of mercury.*

## LANL Response

This will be corrected in the supplemental RFI report.

## NMED/RPMP Comment

### 8. Section 2.2.2.1, Nature and extent of Contamination, Page 9

**LANL Statement:** *Lead was not detected in the two samples for which analyses were conducted.*

**RPMP Comment:** *This statement is not accurate, lead was detected in both samples (AAB 0275-22 mg/kg and AAB 0278-11 mg/kg), however, one sample did have a value below the background concentration. LANL's Draft background paper titled "Inorganic and Radionuclide Background Data for Soils, Canyon Sediments, and Bandelier Tuff", September 22, 1998, indicates the background value for lead in canyon sediment is 19.7 mg/kg. Please clarify the discrepancy between Table A-1 of the RFI report (LANL 1995) and the above comment.*

*In addition, Table A-1 indicates that all eleven outfall samples were analysed for TAL metals, but the data only indicates results for two samples. Clarify if full suite of analyses were performed on all eleven samples or only two samples (i.e. AAB 0275 & AAB 0278). Provide the results for the other nine samples or the rationale for not analyzing all samples for TAL metals when the waste indicated the presence of these contaminants.*

## LANL Response

Lead was detected in 1994 samples AAB 0275 at 15 ppm, AAB 0275R (a replicate of AAB 0275) at 22 ppm, and AAB 0278 at 11 ppm. The referenced statement in the SAP for the outfall drainage area refers to detections above background values as indicated earlier in the paragraph. The UTL value (used for background value comparisons) at the time the report was written and submitted was 39 ppm. Comparison of the 1993 data to the 1995 background data set (represented in the 1995 report as the UTL value) indicates that lead values detected were below the 1995 background. Using

the draft 1998 background data set referenced above, the background value for soil of 22.3 mg/kg indicates that none of these three 1993 results were detected above background.

Table A-1 in the 1995 RFI report indicates a full TAL metals suite was specified; however, a limited suite (lead and mercury) was actually performed on 9 of the 11 samples. This decision was made after consultation with, and concurrence from, EPA Region 6 (the administrative authority at the time) while the field investigation was ongoing. LANL regrets that Table A-1 in the 1995 RFI report is in error and it will be corrected in the supplemental RFI report.

### **NMED/RPMP Comment**

9. *Section 2.2.3.2, Discussion of Geomorphic Mapping and Analyses, Page 10*

**LANL Statement:** *It is also assumed that all chemicals of potential concern (COPCs) along this drainage were identified during previous sampling events.*

**RPMP Comment:** *See general comment # 3.*

### **LANL Response**

See response to General Comment 3.

### **NMED/RPMP Comment**

10. *Figure 2.2-1, Geomorphology and proposed sample location, 0-030(g) drainage and Acid Canyon, Page 12*

**RPMP Comment:** *The proposed number of samples illustrated on Figure 2.2-1 may not be sufficient to define the rate and extent of contamination (e.g. a potentially important data gap exists between sample locations 4 and 6 in the drainage area). RPMP recommends at least two additional sample locations. One location between sample locations 4 and 6 in the c2c unit (this sample should include a vertical profile if possible) as well as an additional sample(s) in the c1 unit upgradient of sample location 5. In addition, RPMP also suggests that an additional sample(s) be collected in the vicinity of sample location AAB0275, due to the lack of information of sample characteristics (i.e., grain-size, thickness of the unit sampled, etc.) from previous investigations of the immediate outfall area.*

### **LANL Response**

The approach to selecting sampling locations, the potential contaminants to be analyzed for, and the number of samples to be collected were determined during a site visit with the NMED HRMB and DOE OB on October 16, 1998, and were reconfirmed during a telephone conversation on October 26, 1998. During the review of the draft SAP by the NMED and DOE OB, this approach was

reconfirmed via telephone on November 19, 1998. Due to the small size of the sediment pockets nestled in the rocks at the upper end of the drainage, supplemental sampling in the area of the 1993 sample AAB 0275 may not be practical at this point, but the location will be evaluated in the field to determine if any meaningful information can be collected regarding grain size, thickness, etc. Results of this effort will be documented as a deviation from the SAP and included in the supplemental RFI report.

### **NMED/RPMP Comment**

11. Section 2.2.3.2, Sampling Design, Page 15

**LANL Statement:** COPCs previously detected in the drainage include: PCBs, pesticides, mercury, and isotopic plutonium and americium.

**RPMP Comment:** The statement should be modified to include uranium and lead. In addition, the proposed analyses for pesticides and PCBs should include all associated constituents such as chlordane [alpha-], chlordane [gamma-], 000, DDE, DDT, Dieldrin, Endosulfan, Endrin aldehyde and the various Aroclors identified in previous investigations.

### **LANL Response**

These constituents will be reported, if detected, as a part of the generically specified "pesticide/PCB" analysis called for in the SAP. They will be specifically reported, if detected, in the supplemental RFI report to be submitted upon conclusion of RFI sampling.

### **NMED/RPMP Comment**

12. Section 2.2.3.2, Sampling Design, Page 15

**LANL Statement:** Fourteen samples will be collected and analyzed for pesticides, PCBs, TAL metals, and isotopic plutonium and americium.

**RPMP Comment:** Although U-234, U-235, and U-238 were found in the 0-030(g) septic tank at elevated levels, isotopic uranium analyses have not been performed during previous investigations of the outfall/drainage area nor are proposed in this SAP. LANL should add isotopic uranium to the analyte list since uranium (total) was identified above background concentrations in the waste, at the mesa top and in the outfall/drainage area. The concentrations of uranium (total) identified in the drainage/outfall area ranged from 1.42 to 6.82 mg/kg (Sample AAB 3581 identified uranium (total) at 6.82 mg/kg). See also general comment 3 and specific comment 10.

## **LANL Response**

Total uranium was reported in sample AAB 3581 at 6.82 pCi/g in the 1995 RFI report; this value is only slightly above the UTL value (used as a background value in the 1995 report) of 5.71 pCi/g and well below the SAL of 160 pCi/g. The tank contents sampled for waste characterization in 1995 were not representative of potential operational releases, and there is little reason to believe the fill material that was used during the abandonment of the septic tank in the 1940s and which was removed in the 1993 fieldwork would migrate. Therefore, it is reasonable to limit the analyte suite to the agreed-upon uranium (total) analysis. However, in order to avoid additional delays, the isotopic uranium analysis will be included and reported as a deviation from the SAP in the supplemental RFI report for this phase of field sampling.

**ATTACHMENT 1**

## ATTACHMENT 1

[0-030(g) Nature and Extent text ; note final figures will be drafted at time of supplemental RFI report]

**Mesa-top Nature and Extent.** Sixteen additional samples (Figure 1) were collected during the 1998 mesa-top investigation to reconfirm and supplement the results obtained during the original 1993 RFI. These additional reconfirmation sample locations were arrived at with the concurrence of the NMED and were selected to resolve questions arising from the 1993 RFI Report (i.e. provide additional verification and supplemental information on extent of contamination). All original 1993 sample locations were relocated by surveying techniques prior to 1998 sampling effort in order to collect reconfirmation samples as close as possible to the 1993 locations. All samples collected during the 1998 investigation were analyzed for target analyte list (TAL), metals, polychlorinated biphenyls (PCBs)/pesticides, semivolatile organic compounds (SVOCs), volatile organic compounds (VOCs), isotopic americium, plutonium, and uranium (via alpha spectroscopy) and other radiochemicals via gamma spectroscopy. Hexavalent chromium was added to the analytical suite for two samples.

**Inorganic COPCs.** Nine metals were determined to exceed background values (BV) during the 1998 background comparison. Of these nine metals, antimony and silver were carried forward in the screening evaluation because their 1998 reporting limits exceeded background values. However, the 1993 investigation achieved reporting limits below background and showed these metals not to be present. Therefore, discussion of nature and extent do not appear to be applicable for antimony and silver. Three other metals, calcium, selenium, and copper were detected in random samples and do not lend themselves to discussion of nature and extent either because they are bracketed by levels below BV or they fall within natural variations observed at the site. These elements are also essential nutrients that are commonly found at these levels in soils. The remaining four metals however, were detected at levels that potentially indicate a release and warrant discussion of their extent.

Chromium was reported at above background levels, during the 1993 investigation, at sample locations 3671, 3669, 3670, and 3668 (see Figure 2 and Table 1). At location 3670, chromium was detected in sample AAA4375 at 360 mg/kg. This value exceeded the level of chromium found in samples collected from material inside the septic tank that was removed during the 1993 remediation, by an order of magnitude. Sample location 3670 was specifically chosen to be resampled in the 1998 investigation because of the level detected during 1993. In addition, hexavalent chromium was added to the analytical suite at this location after discussions with Allen Chang, Region 6 EPA, to evaluate what valence state the chromium exists at this location. Resampling at the same approximate location and depth did not confirm the level encountered in 1993; a deeper sample collected from tuff at this location also did not confirm the levels originally found. The 1998 sample locations were located as close to previous locations (typically

within one foot) as possible with standard survey techniques. The 1998 data show that any release indicated by the elevated 1993 chromium levels were localized and therefore could not be duplicated by resampling. The 1993 and 1998 sample results and the proximity of the sampled locations clearly indicate that the extent of elevated chromium has been defined.

Table 1: Chromium Sample Comparison

Chromium (Cr)		SAL 210 mg/kg		Soil BV 19.3 mg/kg		Qbt BV 7.14 mg/kg	
Location ID	Sample ID	Result (mg/kg)		Media	Depth (feet)	Comment(s)	
		1993	1998				
3670	AAA4375	360	--	Soil	2.0-2.5		
	98-0031	--	2.8	Soil	2.0-3.0	Failed to substantiate the 1993 results; 1998 results < BV	
	98-0032	--	2.3	Tuff	6.0-7.0	Decreasing vertical trend; 1998 result < BV.	

Mercury was reported at levels above background under the drain line, at locations 3678, 3677, 3676, 3675 and 3671 (see Figure 3 and Table 2). At location 3678, mercury was detected at 0.63 mg/kg at a depth of 8.5 to 9.0 feet bgs. Resampling from 8.5 to 9.5 feet at the same location during the 1998 investigation resulted in mercury at undetectable levels, with a reporting limit of 0.1 mg/kg, with the same result also at a depth of 12.5 to 13.5 feet. Resampling at location 3678 provided information showing decreasing vertical extent, as well as horizontal extent.

Table 2: Mercury Sample Comparison

Mercury (Hg)		SAL 22 mg/kg		Soil BV 0.1 mg/kg		Qbt BV 0.1 mg/kg	
Location ID	Sample ID	Result (mg/kg)		Media	Depth (feet)	Comment(s)	
		1993	1998				
3678	AAA4393	0.63	--	Tuff	8.5-9.0		
	98-0022	--	0.1	Tuff	8.5-9.5	1998 results < BV	
	98-0025	--	0.1	Tuff	12.5-13.5	1998 result < BV.	
						Offset and deeper borings show Hg < BV	

Lead was reported at levels above background during the 1993 investigation, however it did not exceed 0.1 of SALs. The elevated level detected at location 3678, sample AAA4393 (see Figure 4 and Table 3) was not verified by resampling in 1998. A deeper sample collected provided evidence of decreasing vertical trend.

Table 3: Lead Sample Comparison

Lead (Pb)		SAL 400 mg/kg		Soil BV 22.3 mg/kg		Qbt BV 11.2 mg/kg	
Location ID	Sample ID	Result (mg/kg)		Media	Depth (feet)	Comment(s)	
		1993	1998				
3665	AAA4407	12	--	Tuff	9.0-9.5		
	98-0027	--	3.5	Tuff	9.0-10.0	1998 results < BV	
	98-0024	--	2.5	Tuff	13.0-14.0	Decreasing vertical trend; 1998 result < BV.	
3678	AAA4393	26	--	Tuff	8.5-9.0		
	98-0022	--	2.4	Tuff	8.5-9.5	1998 results < BV	
	98-0025	--	2.2	Tuff	12.5-13.5	Decreasing vertical trend; 1998 result < BV.	
						Offset and deeper borings show Pb < BV.	

Nickel was reported above background at two locations, 3670 and 3668 (see Figure 5 and Table 4). At location 3670, nickel was detected in sample AAA4375 at 118 mg/kg. This value also slightly exceeded the level of nickel found in samples collected from media inside the septic tank. Nickel was not detected (reporting limit of 2.1 mg/kg) in the 1998 resampling at this location. The 1998 data show that extent has been defined and any release was of limited quantity and remained highly localized.

Table 4: Nickel Sample Comparison

Nickel (Ni)		SAL 1500 mg/kg		Soil BV 15.4 mg/kg		Qbt BV 6.58 mg/kg	
Location ID	Sample ID	Result (mg/kg)		Media	Depth (feet)	Comment(s)	
		1993	1998				
3670	AAA4375	118	--	Soil	2.0-2.5		
	98-0031	--	2.1 <sup>(1)</sup>	Soil	2.0-3.0	Failed to substantiate the 1993 results; 1998 results < BV	
	98-0032	--	2.1 <sup>(1)</sup>	Tuff	6.0-7.0	1998 result < BV.	
						Offset and deeper borings show Ni < BV.	

(1) Reporting Limit.

**Radiochemical COPCs.** All reconfirmation sampling showed decreasing trends of radiochemicals with depth where sampled. At locations that were not resampled, offset borings indicated that horizontal and vertical extent was defined. All detected radiochemicals were well below SALs by at least an order of magnitude.

Americium-241 was reported above fallout values at two locations, 3663 and 3668 (see Figure 6 and Table 5), and was detected in 5 out of 19 samples collected. At location 3663, Am-241 was reported in sample AAA3563 at 0.073 pCi/g. A sample collected at approximately the same location, but at depth was reported at 0.0033 pCi/g, thus establishing a decreasing vertical trend. At location 3668, Am-241 was reported at 0.105 pCi/g. Although not resampled at the same location, an offset boring reported Am-241 at

0.04 from 2.0 to 3.0 feet bgs, and at 0.013 from 6.0 to 7.0 feet bgs, thus establishing vertical and horizontal extent. The 1998 data show that the extent has been defined and any release was of limited quantity and remained highly localized.

Table 5: Americium-241 Sample Comparison

Americium-241		SAL 22 pCi/g		Soil FV <sup>(1)</sup> 0.013 pCi/g		Obj FV <sup>(1)</sup> 0.05 pCi/g	
Location ID	Sample ID	Result (pCi/g)		Media	Depth (feet)	Comment(s)	
		1993	1998				
3663	AAA3563	0.073	--	Tuff	9.0-9.5		
	98-0026	--	0.0033	Tuff	12.5-13.5	Decreasing vertical trend; 1998 result < BV.	
3668	AAA1909	0.105	--	Tuff	2.0-2.5	Offset boring shows decreased levels.	
3670	98-0031	--	0.04	Tuff	2.0-3.0	Offset to sample location 3668	
	98-0032	--	0.013	Tuff	6.0-7.0	Offset to sample location 3668	

(1) Fallout Value

Plutonium-239 was reported above fallout values at five locations (seven samples) (see Figure 7 and Table 6). At locations 3662, 3663, 3670, and 10120 decreasing vertical trends were established with the 1998 data. At location 3668, deeper samples were not collected, however, samples from offset borings showed vertical trends to be defined. The 1998 data show that extent has been defined.

Table 6: Plutonium-239 Sample Comparison

Plutonium-239		SAL 24 pCi/g		Soil FV <sup>(1)</sup> 0.54 pCi/g		Obj FV <sup>(1)</sup> 0.05 pCi/g	
Location ID	Sample ID	Result (pCi/g)		Media	Depth (feet)	Comment(s)	
		1993	1998				
10120	98-0015	--	1.104	Tuff	3.5-4.0		
	98-0014	--	0.929	Tuff	5.0-5.5	Decreasing vertical trend.	
3662	AAA1910	0.839	--	Tuff	9.0-9.5		
	98-0019	--	-0.0027	Tuff	10.0-11.0	Decreasing vertical trend. 1998 results < BV.	
	98-0002	--	0.0044	Tuff	14.0-15.0		
3663	AAA3563	2.469	--	Tuff	9.0-9.5		
	98-0026	--	0.0035	Tuff	12.5-13.5	Decreasing Vertical trend. 1998 result < BV.	
3670	98-0031	--	1.338	Soil	2.0-3.0		
	98-0032	--	0.339	Tuff	6.0-7.0	Decreasing vertical trend.	
						Offset borings and deeper borings define extent.	

(1) Fallout Value

Uranium-234 was reported above background at one location. At location 3663 (Table 7), U-234 was reported at 3.005 pCi/g for sample AAA3563. A deeper sample (98-0026)

collected during the 1998 investigation reported U-234 at 0.564 pCi/g. The 1998 data show that extent has been defined.

Table 7: Uranium-234 Sample Comparison

Uranium-234		SAL 13 pCi/g		Soil BV 2.59 pCi/g		Qbt BV 1.98 pCi/g	
Location ID	Sample ID	Result (pCi/g)		Media	Depth (feet)	Comment(s)	
		1993	1998				
3663	AAA3563	3.005	--	Tuff	9.0-9.5		
	98-0026	--	0.564	Tuff	12.5-13.5	Decreasing vertical trend. 1998 result < BV.	
						Offset and deeper borings define extent.	

Uranium-235 was reported above background at two locations. At location 3662 (Table 8), U-235 was reported at 0.109 pCi/g for sample AAA1910. A deeper sample (98-0019) collected one half foot deeper during the 1998 investigation reported U-235 at 0.048 pCi/g. At location 3663 U-235 was reported at 0.194 pCi/g for sample AAA3563. A deeper sample collected during the 1998 investigation reported U-235 at 0.044 pCi/g for sample 98-0026. The 1998 data show that extent has been defined.

Table 8: Uranium-235 Sample Comparison

Uranium-235		SAL 10 pCi/g		Soil BV 0.20 pCi/g		Qbt BV 0.09 pCi/g	
Location ID	Sample ID	Result (pCi/g)		Media	Depth (feet)	Comment(s)	
		1993	1998				
3662	AAA1910	0.109	--	Tuff	9.0-9.5		
	98-0019	--	0.048	Tuff	10.0-11.0	Decreasing vertical trend. 1998 result < BV.	
	98-0002	--	0.0261	Tuff	14.0-15.0	1998 result < BV.	
3663	AAA3563	0.194	--	Tuff	9.0-9.5		
	98-0026	--	0.044	Tuff	12.5-13.5	Decreasing vertical trend. 1998 result < BV.	
						Offset and deeper borings define extent.	

Uranium-238 was reported above background at one location. At location 3663 (Figure 8 and Table 9), U-234 was reported at 2.111 pCi/g for sample AAA3563. A deeper sample (98-0026) collected during the 1998 investigation reported U-234 at 0.589 pCi/g. The 1998 data show that extent has been defined.

Table 9: Uranium-238 Sample Comparison

Uranium-238		SAL 67 pCi/g		Soil BV 2.29 pCi/g		Obj BV 1.93 pCi/g	
Location ID	Sample ID	Result (pCi/g)		Media	Depth (feet)	Comment(s)	
		1993	1998				
3663	AAA3563	2.111	--	Tuff	9.0-9.5		
	98-0026	--	0.589	Tuff	12.5-13.5	Decreasing vertical trend. 1998 result < BV.	
						Offset and deeper borings define extent.	

**Organic COPCs.** At locations where organics (DDT) were reported in 1993, 1998 data showed non-detected levels (Table 10). The 1998 data show that extent has been defined.

Table 10: DDT Sample Comparison

DDT		SAL 1.3mg/kg		Soil BV 0		Obj BV 0	
Location ID	Sample ID	Result (pCi/g)		Media	Depth (feet)	Comment(s)	
		1993	1998				
3662	AAA1910	0.044	--	Tuff	9.0-9.5		
	98-0019	--	0.0038	Tuff	10.0-11.0	Not Detected (reporting limit)	
	98-0002	--	0.0037	Tuff	14.0-15.0	Not Detected (reporting limit)	
3663	AAA3563	0.017	--	Tuff	9.0-9.5		
	98-0026	--	0.0035	Tuff	12.5-13.5	Not Detected (reporting limit)	

**Summary and Conclusion.** To summarize, the following statements can be made about the 1993 and 1998 data and data collection procedures:

- ❖ 1998 sample locations, analytical suites, and number of samples were approved by HRMB to address specific concerns regarding 1993 contaminant levels and distribution.
- ❖ the original 1993 sample locations were re-located by surveying techniques, with 1998 reconfirmation samples located accordingly.
- ❖ the original sample locations were spaced five feet apart, with some as close as 2.5 feet, thus providing control on horizontal extent when contaminants were detected.
- ❖ the 1998 sample results did not provide verification of the elevated 1993 data results (e.g. chromium). This should be attributed to the non-uniform nature of the sample media and, further, it demonstrates the limited extent of certain contaminants.

Comparison of analytes levels from the 1998 data set with the 1993 data set show that vertical extent of contaminants has been defined based on deeper sampling at the same locations where detects were reported in 1993, and in deeper offset borings sampled in

1998. Horizontal extent has been defined by virtue of the close spacing of sampling locations, some as close together as 2.5 feet.

Concentrations of contaminants could not be verified in some instances, even though surveying methods relocated the approximate 1993 sample locations. In this instance it is reasonable to conclude that those contaminants detected in 1993 were of such limited extent that confirmation by resampling was not possible. No additional sampling is warranted on the mesa-top portion of the site.

*DRAFT*

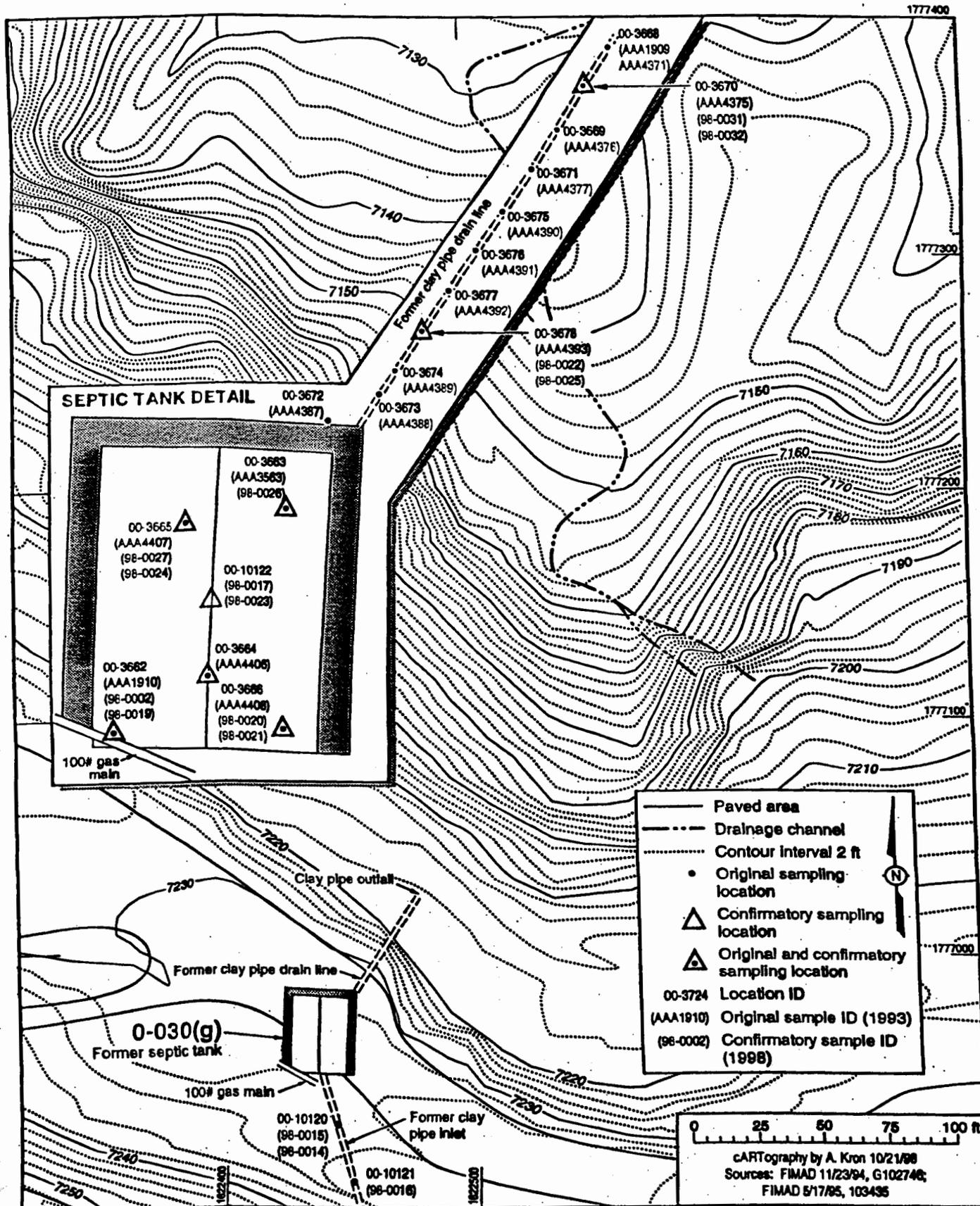
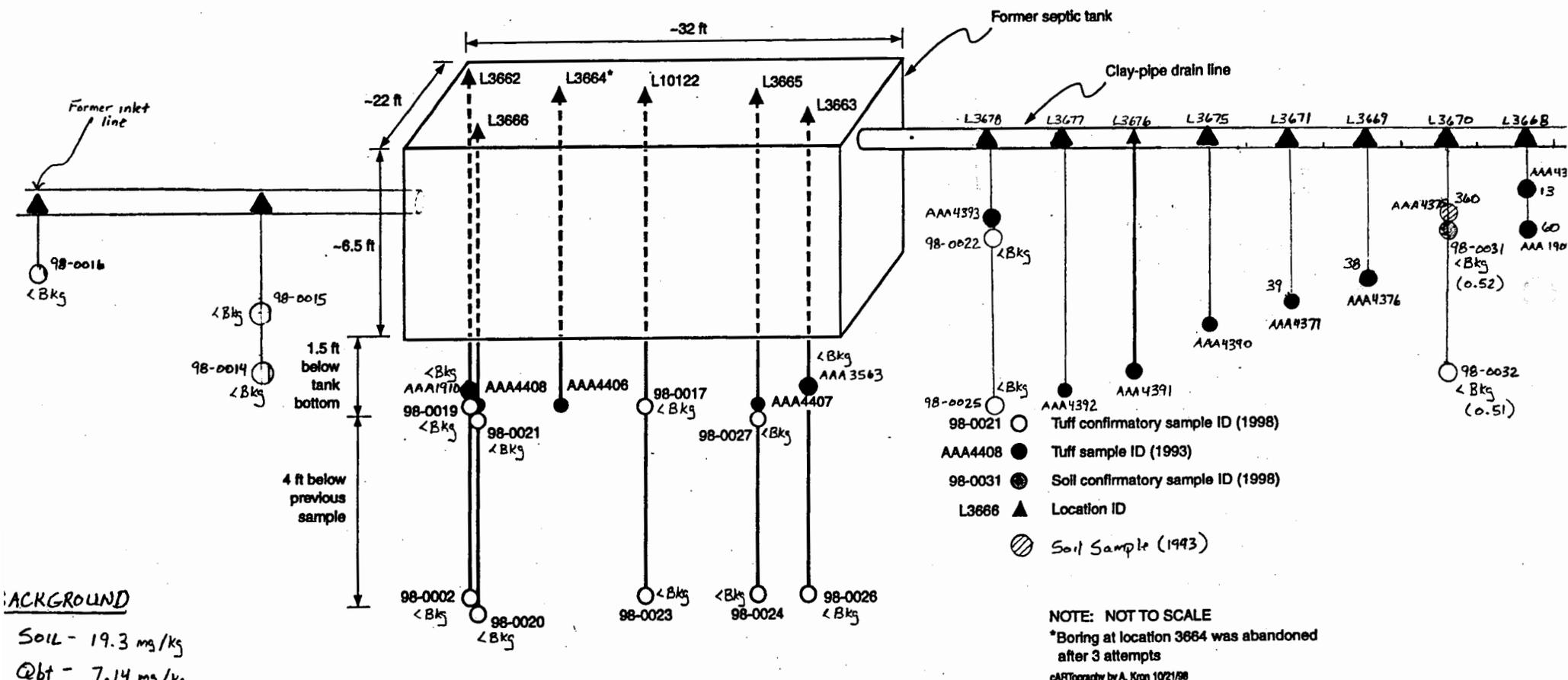


Fig. 1 Locations of confirmatory samples for SWMU 0-030(g).

TOTAL Cr

(Cr+6)



**BACKGROUND**  
 Soil - 19.3 mg/kg  
 Qbt - 7.14 mg/kg  
 SAL 210 mg/kg

Fig. 2 Schematic drawing of confirmatory sample locations and depths.



LEAD

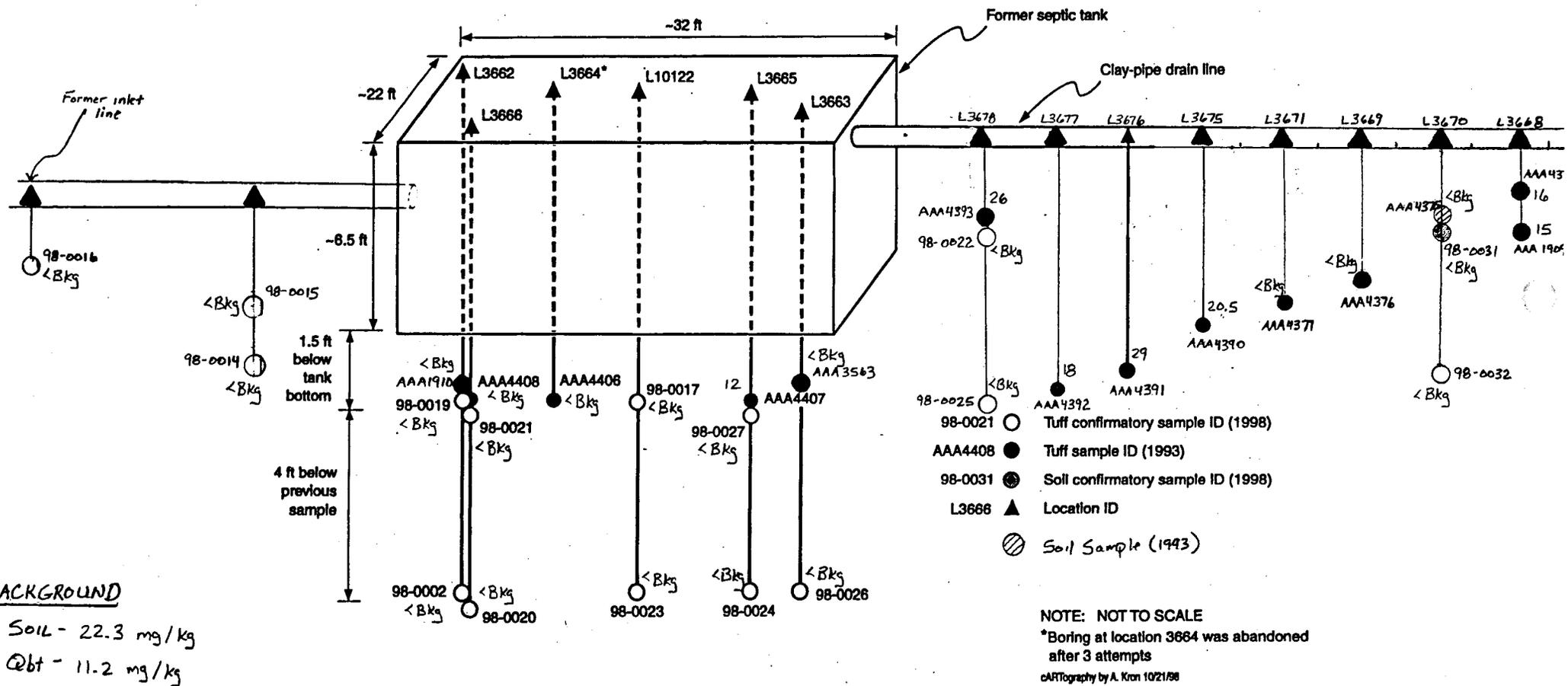


Fig. 4 Schematic drawing of confirmatory sample locations and depths.

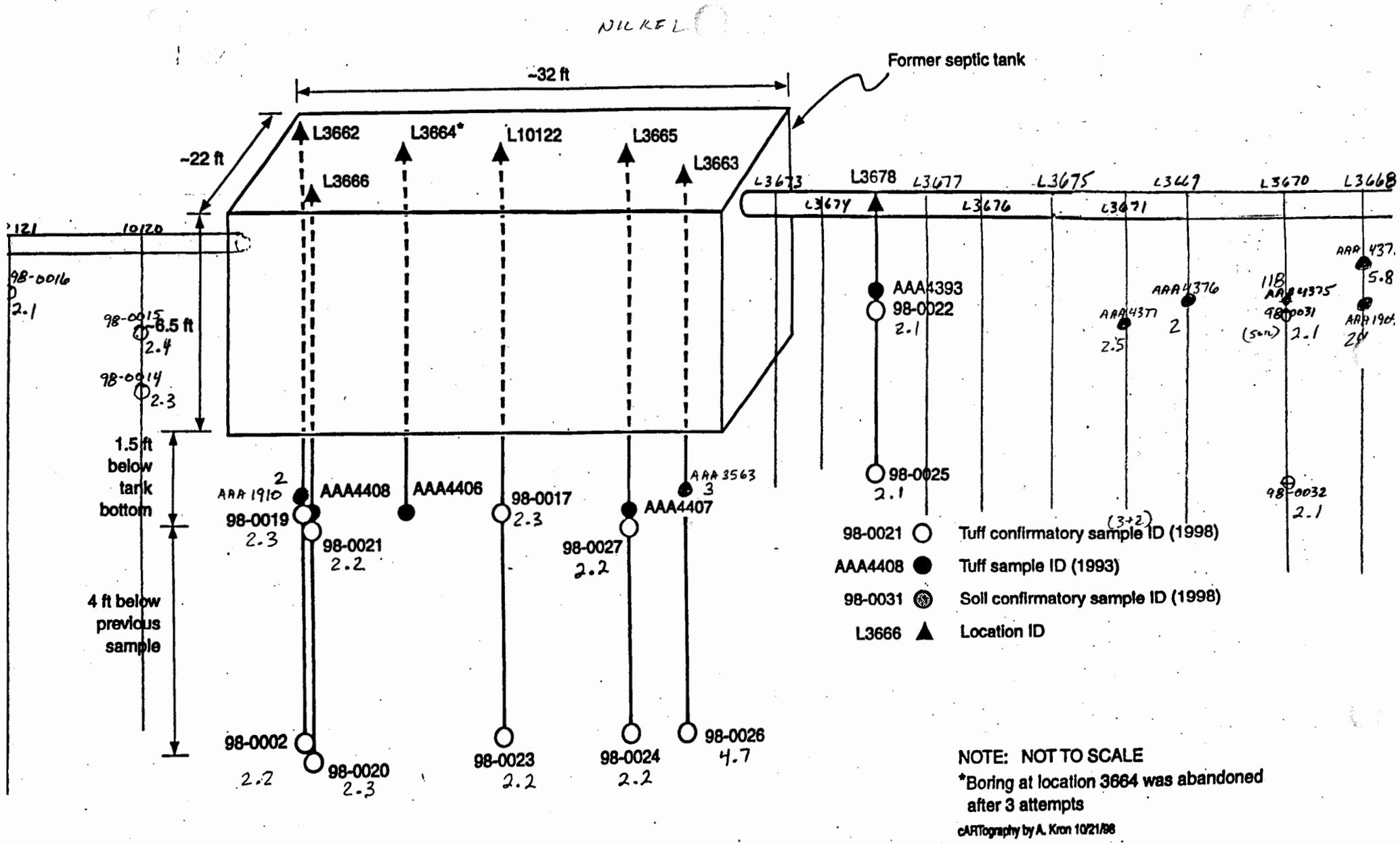


Fig. 5 Schematic drawing of confirmatory sample locations and depths.

61 SAL 150 mg/kg

BACKGROUND SOIL 15.4

Qbt 6.58





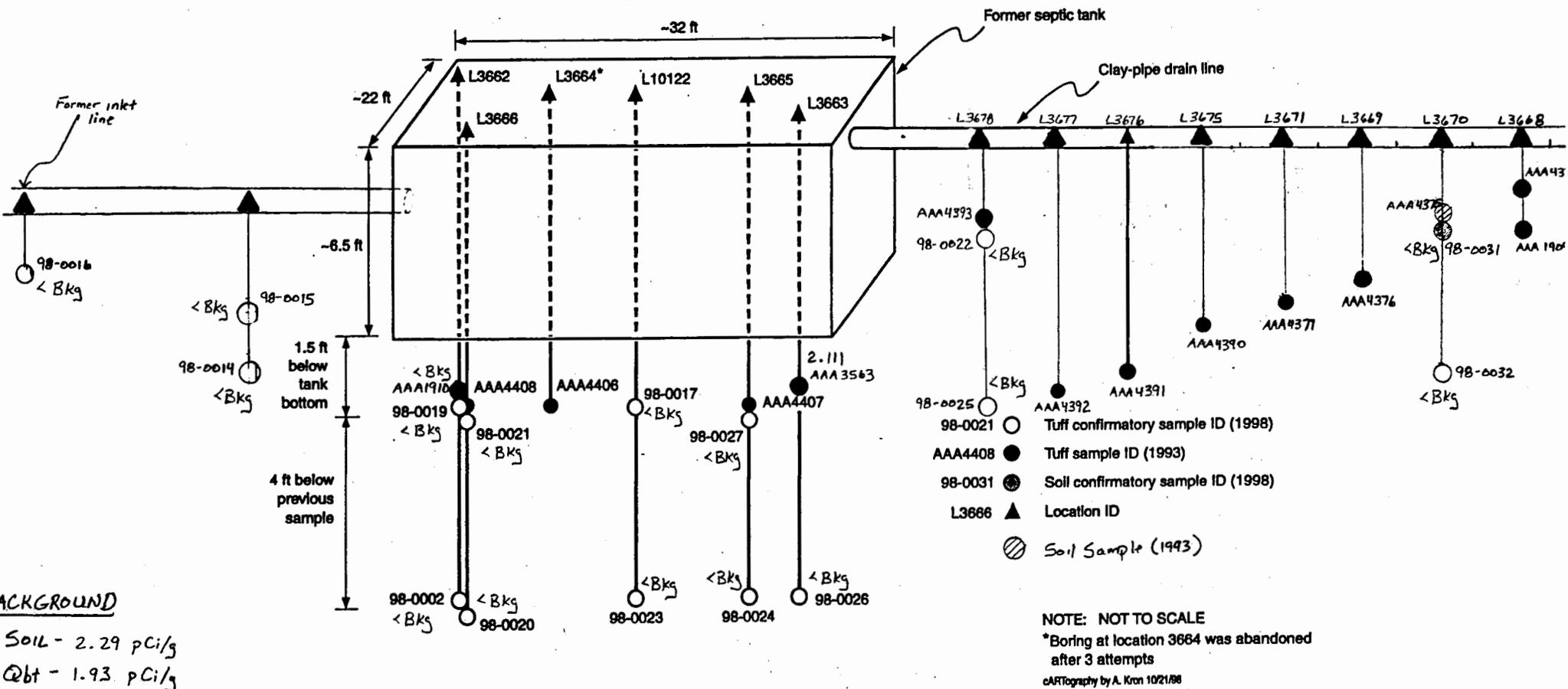


Fig. 8 Schematic drawing of confirmatory sample locations and depths.

**BACKGROUND**  
 Soil - 2.29 pCi/g  
 Qbt - 1.93 pCi/g

SAL 67 pCi/g

**ATTACHMENT 2**

