LANL HSWA FU1 TA3 11

Los Alamos National Laboratory

ENVIRONMENTAL RESTORATION

LIBRARY COPY

University of California
Environmental Restoration, MS M992
Los Alamos, New Mexico 87545
505-665-4557
FAX 505-665-4747

U. S. Department of Energy
Los Alamos Area Office, MS A316
Los Alamos, New Mexico 87544
505-665-7203
FAX 505-665-4504

Date: December 6, 1995
Refer to: EM/ER:95-685

RECEIVED
DEC 1 1 1995

Mr. David Neleigh
NM Federal Facilities Section
EPA, Region 6, 6PD-N
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

SUBJECT: STATUS REPORT FOR SOLID WASTE MANAGEMENT UNIT (SMWU) 3-056(c) AND PROPOSAL OF CLEANUP LEVEL

Dear Mr. Neleigh:

This letter presents a status report for the remedial activities currently being performed at SWMU 3-056(c). An expedited cleanup (EC) plan for the removal of polychlorinated biphenyl (PCB) contaminated soil was submitted to your office on June 2, 1995. Barbara Driscoll of your office responded with a notice of deficiency (NOD) on August 9, 1995, indicating that the cleanup levels proposed in the plan, 25 ppm for the mesa top and 10 ppm for the slope below the mesa, were not in accordance with the Toxic Substances Control Act (TSCA) Region 6 policy of 1 mg/kg for PCB spills in a drainage area. Ms. Driscoll also made note of the fact that extent of contamination had not been defined at SWMU 3-056(c). The NOD was not resolved before proceeding at risk with the removal, without a temporary authorization, on August 21, 1995. This status report is being submitted because the removal activities and associated characterization to define extent strongly indicate that a cleanup level of 10 ppm is protective of human health and the environment, while a cleanup level of 1 ppm will be difficult, if not impossible, to achieve without a prohibitive volume of soil removal, excessive costs, and significant natural resource damage associated with a large area of excavation in the drainage area. The following review of the site background and discussion of activities performed since the initiation of the removal explain why negotiation of a cleanup level is appropriate.

Proceeding at risk was initiated for primarily two reasons. First, the New Mexico Environment Department (NMED) Surface Water Quality Bureau was notified on

Environmental Restoration

May 16, 1995 of the spill which is in a water course and would require removal of contaminated material as expeditiously as possible [New Mexico Water Quality Control Commission Regulation 1-203(5)]. Expedient removal is also in accordance with the TSCA Spill Cleanup Policy at 40 CFR 761.125(b)(1)(ii).

Secondly, the extent of contamination was projected to be limited to 30 cubic yards with the contingency, given the lack of the definition of extent, that the volume could increase to 45 cubic yards with further characterization during removal. The basis for the estimation of extent is reviewed in the Resource Conservation and Recovery Act facility investigation work plan for Operable Unit 1114 and the EC Plan.

After remediation was initiated, however, the characterization performed during the removal revealed that the extent of contamination was underestimated horizontally as well as vertically. It was therefore necessary to perform, concurrently, several efforts, described below, during August through November of 1995 in an effort to achieve final remedy for the site.

As required by the TSCA Spill Cleanup Policy at 40 CFR 761.125(a)(3), definition of the area of the spill to the target level of the Region 6 policy of 1 ppm was initiated. The use of a mobile chemistry van made it possible to determine fairly rapidly that PCB contamination of 1 ppm and above was widespread both up gradient and down gradient of the site. The enclosed maps (Figures 2 through 4) show the large area over which the contamination was found to be present. In light of the fact that other SWMUs and Laboratory operations known to have managed PCBs are located up gradient of SWMU 3-056(c), this widespread contamination is not unanticipated. The map (Figure 2) also shows the presence of two drainage areas located to the north of the storage area where contamination above 10 ppm PCBs was discovered.

Also, the continued removal of material on the slope to achieve, at least as a minimum, the original cleanup of level of 10 ppm was also performed and still continues at the time of this submittal. Very conservative storm water pollution prevention controls are in place to prevent migration of contaminated material directly into the drainage. Over 770 cubic yards of material have been removed by conventional excavation methods. An additional 220 cubic yards is currently being removed via vacuuming methods to reduce cross contamination over the main slope and to reach the relatively inaccessible drainages to the north of the storage area. The cost for the removal of the total volume of soil, approximately 1000 cubic yards, at a cleanup level of 10 ppm is nearly one million dollars total.

In addition, a human health and ecological risk assessment was initiated because of the strong indication that a 1 ppm cleanup level could not be achieved without the impacts outlined above. Sampling of wetlands below the site was performed to directly evaluate the ecological risk and validate the model results. The results of the human health risk assessment indicate that a cleanup level of 10 ppm is very conservatively protective for the industrial use of the site. The ecological risk assessment and the results of sampling in the wetlands support the conclusions of the human health risk assessment. A summary of both risk assessments is attached for your review. Also enclosed is a copy of all Chem Van data to date, including figures representing the site and excavated areas.

Teri Susan Ron K Barbara

We would like to arrange a conference call with yourself, Region 6 TSCA, and NMED Surface Water Quality Bureau as soon as possible to discuss our proposal of a 10 ppm cleanup level. Slope stabilization must be imminent upon completion of the removal to prevent erosion and migration of material into the adjacent drainage. A statement of work for the stabilization project is attached. Because the stabilization includes backfilling with clean soil over most of the slope area, as well as the mesa top, it is important to reach a decision on the final cleanup level for site before the stabilization is implemented. As the soil vacuuming is currently being implemented and is projected to be complete within the next two weeks, we propose to have a meeting on or before December 15, 1995.

FILE
Form 4
3-056 (c)
PCBs

We greatly appreciate early review of this material. Please call Garry Allen at (505) 667-3394 or Bonnie Koch at (505) 665-7202, if you have any questions during your review of this material. We will call you, the TSCA Bureau, and NMED Surface Water Bureau before our proposed meeting date to see if you are available to discuss the site. Again, thank you for your time in this matter.

Sincerely,

Jorg Jansen, Program Manager
Environmental Restoration

Sincerely,

CAR

FOR

Theodore J. Taylor, Program Manager
Los Alamos Area Office

JJ/TT/bp

Enclosures: a/s

Cy (w/enc.):
G. Allen, CST-18, MS E525
B. Garcia, NMED-HRMB
D. Griswold, ERD, AL, MS A906
B. Hoditschek, NMED-HRMB
R. Kern, NMED-HRMB
B. Koch, LAAO, MS A316
E. Merrill, EM-453, DOE-HQ
L. Roberts, EPA Region 6
T. Taylor, LAAO, MS A316
N. Weber, Bureau Chief, NMED-AIP
J. White, ESH-19, MS K490
S. Yanicak, NMED-AIP, MS J993
EM/ER File, MS M992
RPF, MS M707

Cy (w/o enc.):
T. Baca, EM, MS J591
T. Glatzmaier, DDEES/ER, MS M992
D. McInroy, EM/ER, MS M992
J. Plum, DOE/LAAO EP, MS A316
A. Puglisi, ESH-19, MS K487
G. Rael, ERD, AL, MS A906
W. Spurgeon, DOE-HQ, EM-453
J. Vozella, LAAO, MS A316
R. Wechsler, ESH-19, MS K498
K. Zamora, DOE/LAAO EP, MS A316

RECEIVED
DEC 1 1 1995

SWMU 3-056(c)

Figures 1 - 5

12

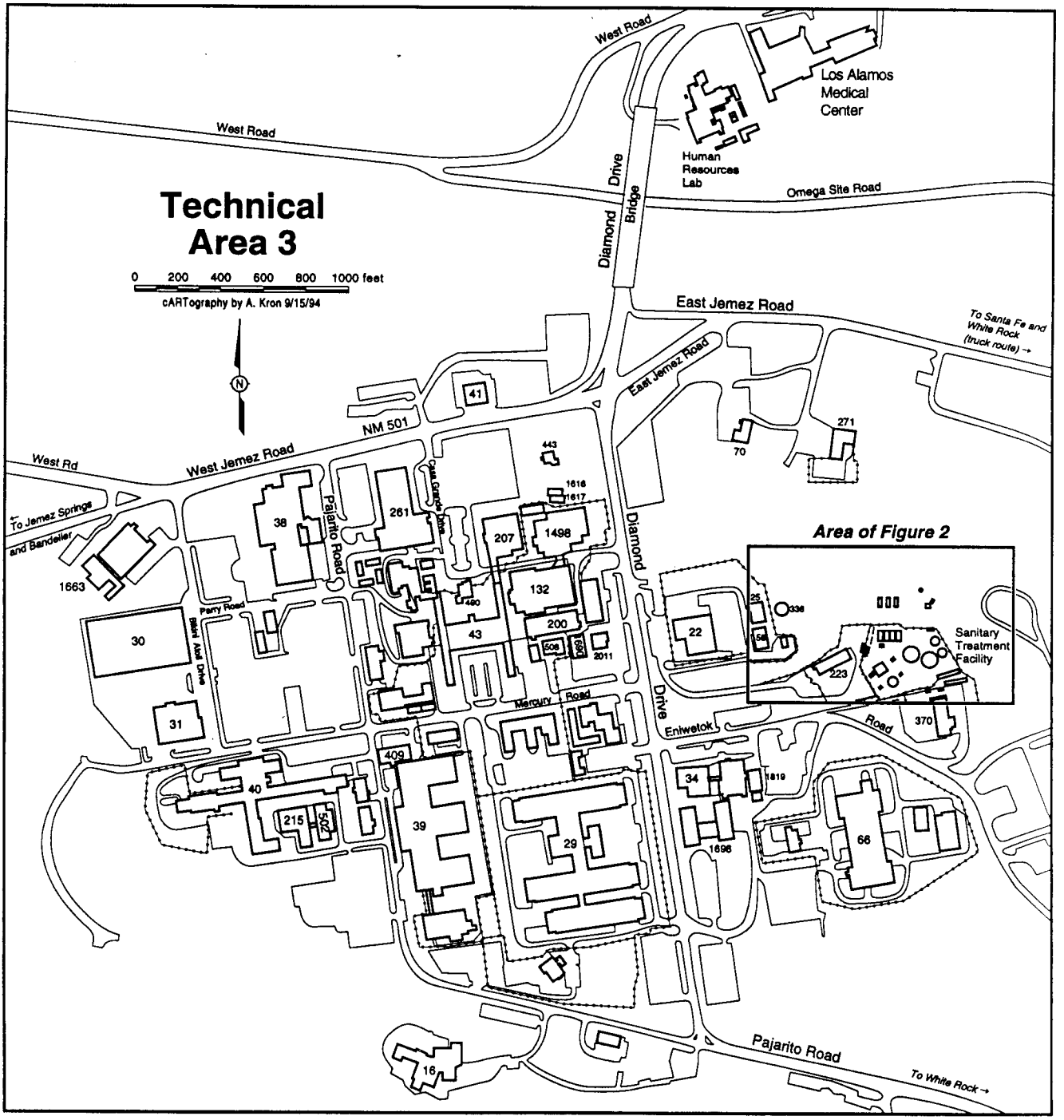


Fig. 1. Location map.

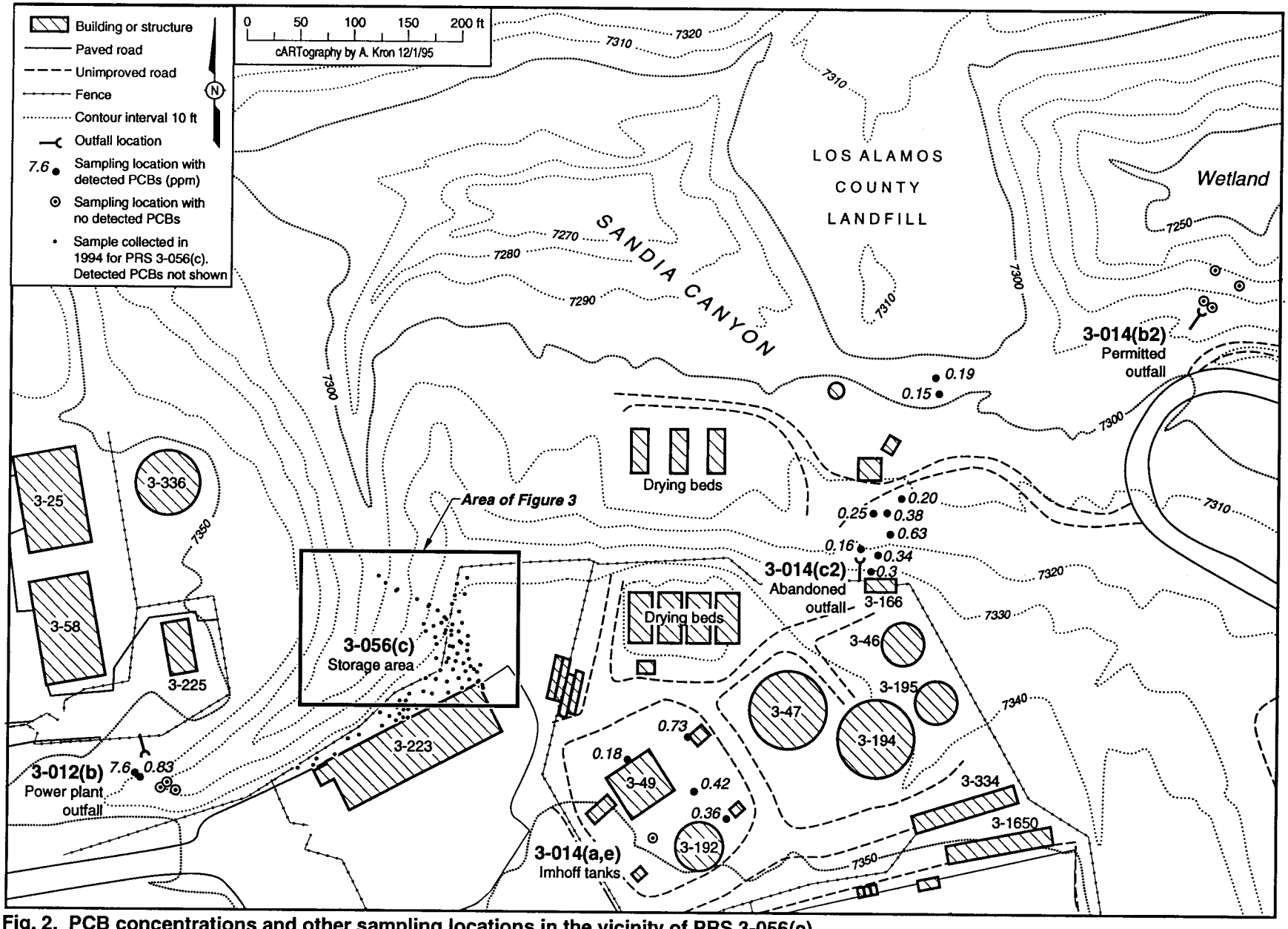


Fig. 2. PCB concentrations and other sampling locations in the vicinity of PRS 3-056(c).

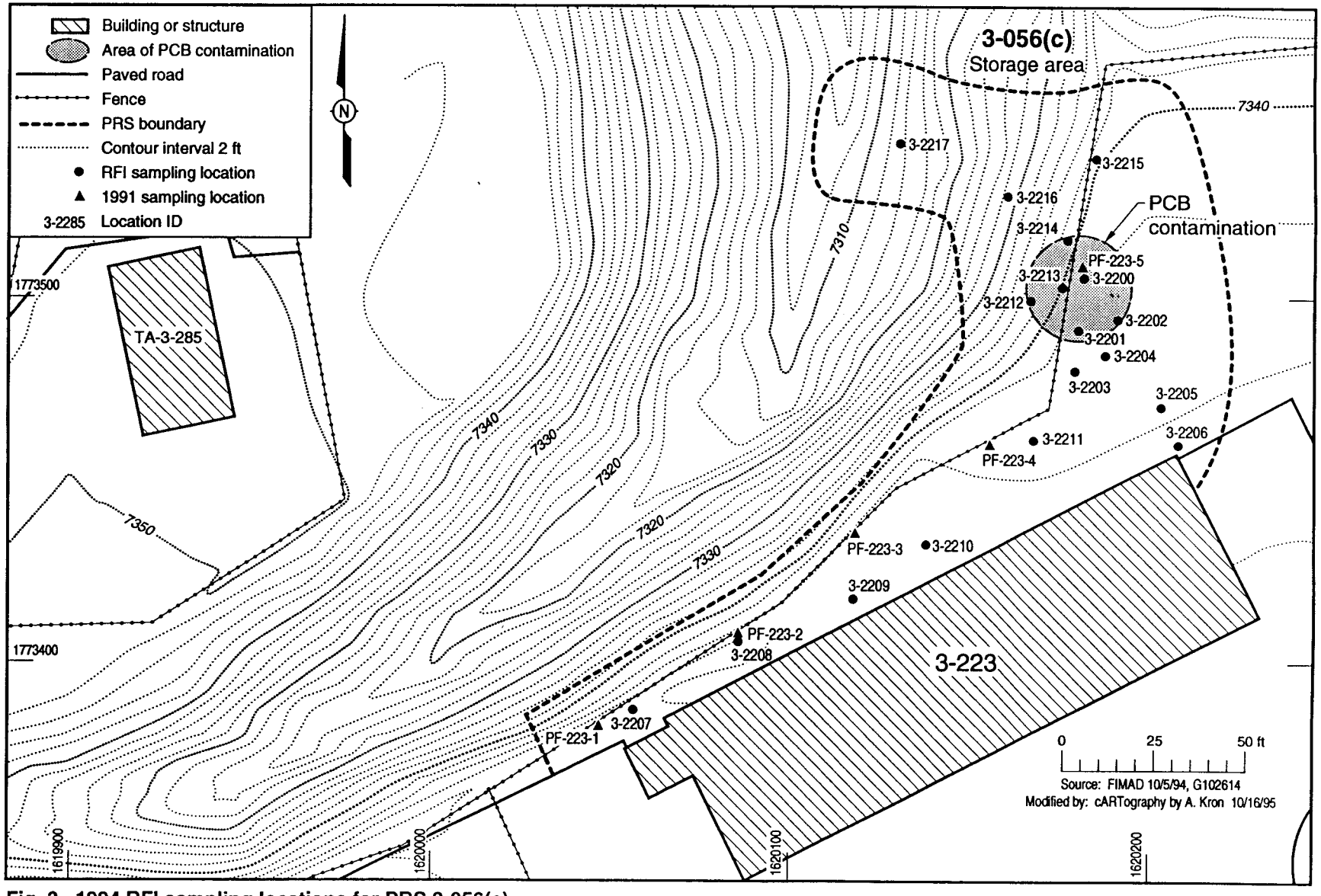


Fig. 3. 1994 RFI sampling locations for PRS 3-056(c).

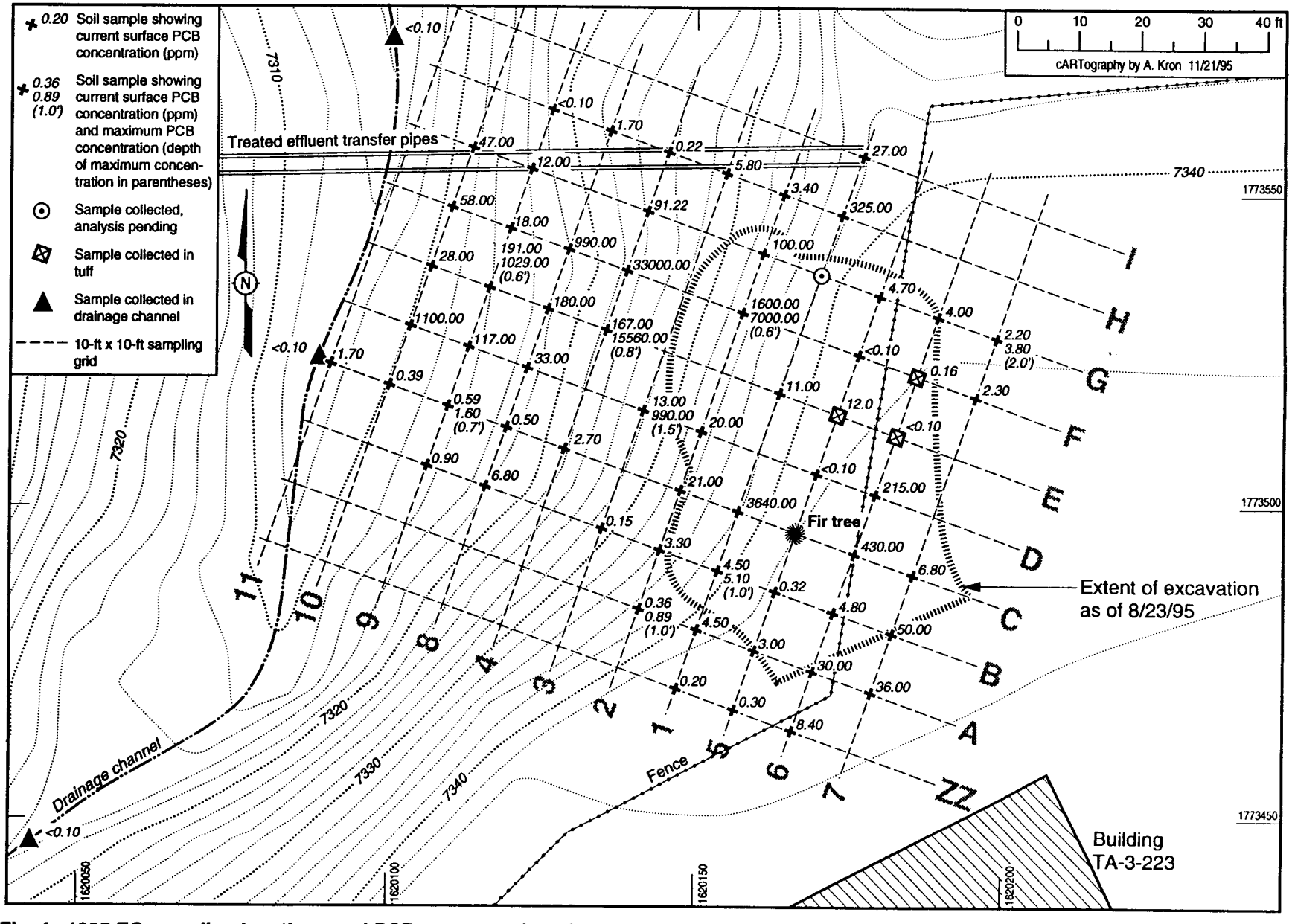


Fig. 4. 1995 EC sampling locations and PCB concentrations for PRS 3-056(c).

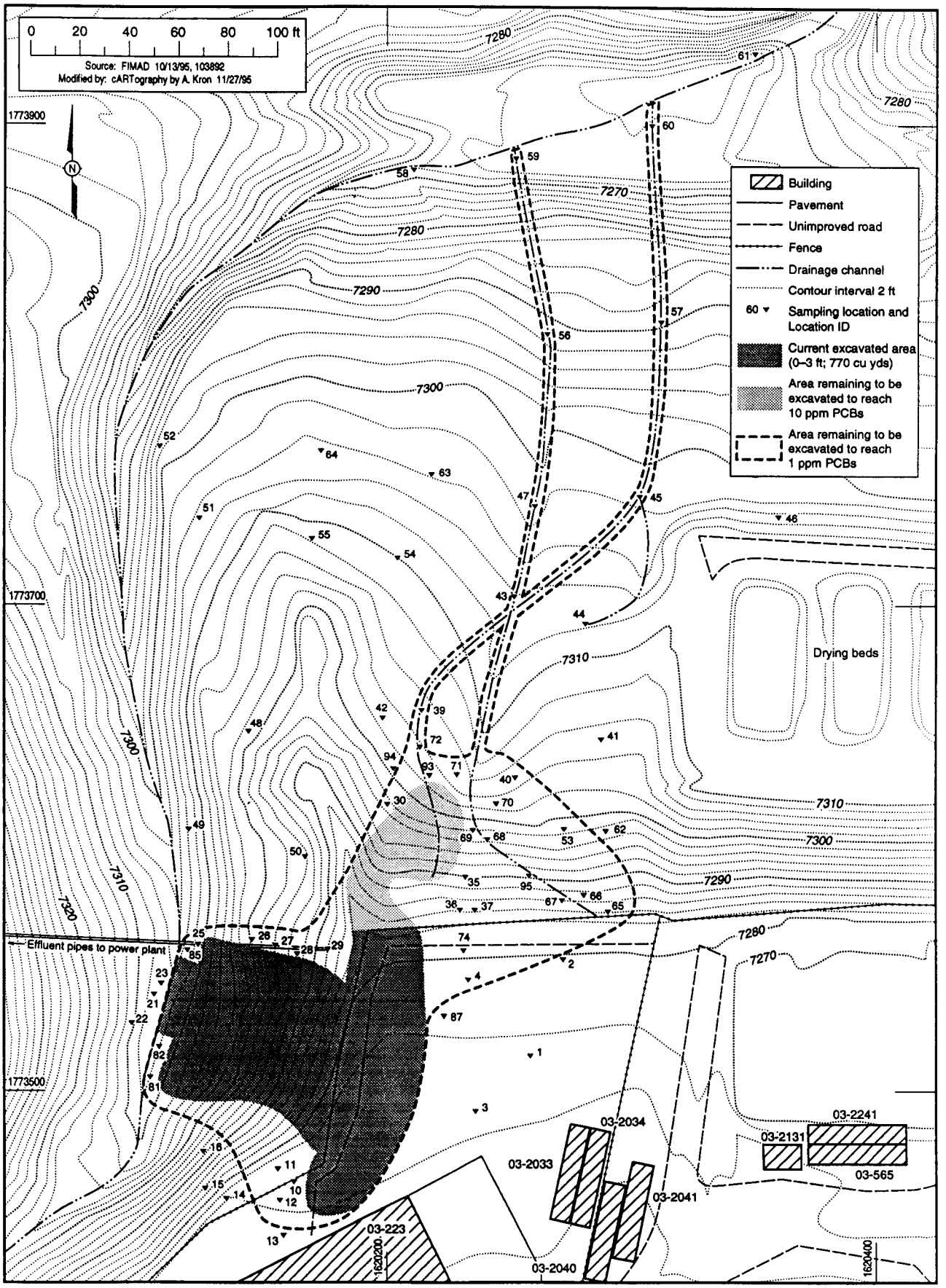


Fig. 5. 1995 EC sampling locations and areas of excavation for PRS 3-056(c).

SWMU 3-056(c)

Table of Sample Results

Solid Waste Management Unit 3-056(c)

Sample results

Figure 5 Sample Location Number	Sample Number	Color Code	Sample Date	Grid Location (not on Figure 5)	Max. Sample Depth (feet)	PCB Conc. (ppm)	PCE Conc. (ppm)	Comments
Pre-excavation West Slope and Mesa Top Samples (dark grey area in Figure 5)								
3001	0070	Dark grey	8/3/95	3001	0.5	**8.5**	<0.01	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3002	0071	Dark grey	8/3/95	3002	0.5	**3.1**	<0.01	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3003	0072	Dark grey	8/3/95	3003	0.5	**11**	<0.01	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3004	0073	Dark grey	8/3/95	3004	0.25	**176**	<0.01	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3005	0074	Dark grey	8/3/95	3005	0.6	**54**	<0.01	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3005	0084	Dark grey	8/3/95	3005	1.5	**2.2**	<0.01	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3006	0075	Dark grey	8/3/95	3006	0.5	**12**	<0.01	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3006	0085	Dark grey	8/3/95	3006	1.5	**0.09**	0.051	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3006	0080	Dark grey	8/3/95	3006	2.6	**0.38**	<0.01	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3007	0076	Dark grey	8/3/95	3007	1.1	<0.5	0.018	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3007	0086	Dark grey	8/3/95	3007	2.0	**0.06**	<0.01	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3007	0090	Dark grey	8/21/95	3007	0.5	**3.6**	<0.01	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3008	0077	Dark grey	8/3/95	3008	1.0	**81**	<0.01	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3008	0087	Dark grey	8/3/95	3008	2.0	**2.4**	<0.01	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3008	0081	Dark grey	8/3/95	3008	3.0	**2.7**	<0.01	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3009	0078	Dark grey	8/3/95	3009	1.0	<0.5	0.21	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3009	0088	Dark grey	8/3/95	3009	2.0	<0.5	0.023	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3009	0091	Dark grey	8/21/95	3009	0.5	**17**	<0.01	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4
3010	0079	Dark grey	8/3/95	3010	1.0	**2101**	0.061	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4

Figure 5 Sample Location Number	Sample Number	Color Code	Sample Date	Grid Location (not on Figure 5)	Max. Sample Depth (feet)	PCB Conc. (ppm)	PCE Conc. (ppm)	Comments
3010	0089	Dark grey	8/3/95	3010	2.0	**13**	<0.01	Samples were taken from area within "extent of excavation as of 8/23/95" as shown on Fig. 4

West Slope Samples Collected During Excavation Activities
(dark grey area in Figure 5)

	0099	Dark grey	8/23/95	A1	0.5	**4.5**	<0.05	
	0391	Dark grey	9/15/95	A12	0.33	**10**	<0.05	Surface sample
	0392	Dark grey	9/15/95	A12	1.0	<0.10	0.57	Also 84 ppb 1,1,1-Trichloroethene
	0393	Dark grey	9/15/95	A12	2.0	<0.10	0.051	Refusal at 2.0 feet.
	0668	Dark grey	10/4/95	A14	0.2	**6.7**	<0.05	
	0669	Dark grey	10/4/95	A14	1.0	**9.5**	<0.05	
	0670	Dark grey	10/4/95	A14	2.0	**2.1**	<0.05	
	0671	Dark grey	10/4/95	A14	2.8	**0.86**	<0.05	Refusal at 2.8 feet.
	0250	Dark grey	8/30/95	A2	0.5	**0.36**	NA	
	0254	Dark grey	8/30/95	A2	1.0	**0.89**	NA	
	0255	Dark grey	8/30/95	A2	2.0	<0.10	NA	
	0249	Dark grey	8/30/95	A5	0.5	**4.2**	NA	
	0251	Dark grey	8/30/95	A5	1.0	**2.2**	NA	
	0252	Dark grey	8/30/95	A5	2.0	**1.2**	NA	
	0253	Dark grey	8/30/95	A5	3.0	**1.6**	NA	
	0332	Dark grey	9/5/95	A5	0.5	**2.9**	NA	Post-Excavation Sample
	0231	Dark grey	8/31/95	A6	0.5	**15**	<0.05	
	0232	Dark grey	8/31/95	A6	1.0	0.25	<0.05	
	0233	Dark grey	8/31/95	A6	2.0	<0.10	<0.05	
	0234	Dark grey	8/31/95	A6	2.5	**6.5**	<0.05	Refusal at 2.5 feet
	0331	Dark grey	9/5/95	A6	0.5	**30**	NA	Post-Excavation Sample. Possible cross-contamination
	0322	Dark grey	9/5/95	A7	0.5	**36**	NA	
	0319	Dark grey	9/5/95	A7	1.0	**29**	NA	
	0320	Dark grey	9/5/95	A7	2.0	<0.10	NA	
	0279	Dark grey	9/12/95	A7	0.33	**169**	NA	Re-sample at this location.
	0280	Dark grey	9/12/95	A7	0.33	**155**	NA	Field duplicate of 0279
	0100	Dark grey	8/24/95	B1	0.5	**4.5**	<0.05	
	0265	Dark grey	8/30/95	B1	1.0	**5.1**	NA	
	0266	Dark grey	8/30/95	B1	2.0	**21**	NA	
	0267	Dark grey	8/30/95	B1	3.0	**0.8**	NA	
	0268	Dark grey	8/30/95	B1	4.0	<0.10	NA	
		Dark grey		B10			NA	No sample this location.
	0394	Dark grey	9/15/95	B12	0.5	**0.39**	<0.05	
	0395	Dark grey	9/15/95	B12	0.9	<0.10	<0.05	Refusal at 0.9 feet.
	0102	Dark grey	8/24/95	B2	0.5	**3.3**	<0.05	
	0248	Dark grey	8/30/95	B3	0.5	**0.15**	NA	
	0256	Dark grey	8/30/95	B3	1.0	<0.10	NA	
	0257	Dark grey	8/30/95	B3	2.0	<0.10	NA	Refusal at 2 feet
	0121	Dark grey	8/28/95	B5	0.5	**3.3**	NA	

Figure 5 Sample Location Number	Sample Number	Color Code	Sample Date	Grid Location (not on Figure 5)	Max. Sample Depth (feet)	PCB Conc. (ppm)	PCE Conc. (ppm)	Comments
	0302	Dark grey	9/5/95	B5	0.5	**0.32**	<0.05	
	0303	Dark grey	9/5/91	B6	0.5	**4.8**	0.296	
	0158	Dark grey	8/31/95	B7	0.5	**38**	<0.05	
	0159	Dark grey	8/31/95	B7	1.0	**1.3**	<0.05	
	0160	Dark grey	8/31/95	B7	1.8	<0.10	0.34	Refusal at 1.8 feet
	0306	Dark grey	9/5/95	B7	0.5	**234**	NA	Resample this location.
	0118	Dark grey	8/25/95	B8	0.5	**3.7**	NA	Sampled prior to excavation in this area.
	0259	Dark grey	8/30/95	B8	0.5	**6.8**	NA	Refusal at 0.5 feet. Sampled prior to excavation.
	0247	Dark grey	8/30/95	B9	0.5	**0.8**	NA	Sampled prior to excavation in this area.
	0107	Dark grey	8/24/95	C1	0.5	**3640**	NA	
	0355	Dark grey	9/12/95	C10	0.25	**0.39**	NA	
	0356	Dark grey	9/12/95	C11	0.3	**1.7**	NA	
	0717	Dark grey	10/3/95	C11.A	0.25	**2.2**	NA	Located between C11 and D11.
	0411	Dark grey	9/15/95	C12	0.5	**1.9**	0.15	
	0402	Dark grey	9/15/95	C12	1.0	<0.10	<0.05	Refusal at 1.0 feet.
	0105	Dark grey	8/24/95	C2	0.5	**21**	NA	
	0106	Dark grey	8/24/95	C4	0.5	**2.7**	NA	
	0258	Dark grey	8/30/95	C4	0.5	**1.7**	NA	Refusal at 0.5 feet
	0304	Dark grey	9/5/95	C6	0.1	**1810**	<0.05	
	0305	Dark grey	9/5/95	C7	0.1	**6.8**	<0.05	
	0113	Dark grey	8/25/95	C8	0.5	**1.6**	NA	
	0246	Dark grey	8/30/95	C9	0.5	**0.59**	NA	
	0260	Dark grey	8/30/95	C9	0.7	**1.6**	NA	Refusal at 0.7 feet
	0336	Dark grey	9/6/95	D10	0.5	**1100**	NA	
	0361	Dark grey	9/21/95	D11	0.5	**91**	NA	
	0718	Dark grey	10/3/95	D11.A	0.25	**650**	NA	Located between D11 and E11.
	0108	Dark grey	8/24/95	D2	0.5	**20**	NA	
	0104	Dark grey	8/24/95	D3	0.5	**13**	<0.05	
	0270	Dark grey	8/30/95	D3	1.0	**153**	NA	
	0271	Dark grey	8/30/95	D3	1.5	**990**	NA	Refusal at 1.5 feet
	0122	Dark grey	8/28/95	D5	0.5	<0.10	NA	
	0307	Dark grey	9/5/95	D6	0.5	**416**	NA	
	0114	Dark grey	8/25/95	D8	0.5	**33**	NA	
	0245	Dark grey	8/30/95	D9	0.5	**117**	NA	
	0298	Dark grey	9/1/95	E1	0.5	**11**	<0.05	
	0314	Dark grey	9/5/95	E1	0.5	**143**	NA	
	0337	Dark grey	9/6/95	E10	0.5	**28**	NA	
	0716	Dark grey	10/3/95	E11	0.25	**14**	NA	Collected at lip of earthen berm just above the water.
	0680	Dark grey	10/6/95	E12	1.0	<0.10	0.47	Peeled back asphalt. No surface sample due to possible asphalt contamination. Need to clean off area (excavate <0.5 ft.)

Figure 5 Sample Location Number	Sample Number	Color Code	Sample Date	Grid Location (not on Figure 5)	Max. Sample Depth (feet)	PCB Conc. (ppm)	PCE Conc. (ppm)	Comments
	0103	Dark grey	8/24/95	E4	0.5	**167**	<0.05	
	0272	Dark grey	8/30/95	E4	0.8	**15560**	NA	Refusal at 0.8 feet
	0237	Dark grey	9/8/95	E4	0.7	**2060**	<0.05	Resample with VOCs. Refusal at 0.7 ft.
	0110	Dark grey	8/24/95	E5	0.5	**31**	NA	
	0111	Dark grey	8/24/95	E5	0.5	**4.5**	NA	Field duplicate of 0110. Sample not homoginized
	0123	Dark grey	8/28/95	E5	0.08	**15**	NA	
	0297	Dark grey	9/1/95	E5	0.5	**25**	<0.05	
	0309	Dark grey	9/5/95	E5	0.5	**12**	NA	
	0296	Dark grey	9/1/95	E6	0.1	<0.10	<0.05	Scraped tuff sample
	0308	Dark grey	9/5/95	E6	0.5	**31**	NA	Possible cross-contamination.
	0115	Dark grey	8/25/95	E8	0.5	**180**	NA	
	0244	Dark grey	8/30/95	E9	0.5	**191**	NA	
	0261	Dark grey	8/30/95	E9	0.6	**1029**	NA	Refusal at 0.6 feet
	0338	Dark grey	9/6/95	F10	0.5	**58**	NA	
	0109	Dark grey	8/24/95	F2	0.5	**1600**	<0.05	
	0269	Dark grey	8/30/95	F2	0.6	**7000**	NA	
	0116	Dark grey	8/25/95	F4	0.5	**33000**	NA	
	0112	Dark grey	8/24/95	F5	0.5	**2**	NA	
	0124	Dark grey	8/28/95	F5	0.08	<0.10	NA	
	0300	Dark grey	9/1/95	F5	0.5	**76**	NA	
	0301	Dark grey	9/1/95	F6	0.1	**0.16**	<0.05	
	0310	Dark grey	9/5/95	F6	0.5		NA	Held by chem van. Already sampled this location - exceeded holding times.
	0311	Dark grey	9/5/95	F6	0.5		NA	Field duplicate of 0310. Held by chem van.
	0380	Dark grey	9/8/95	F7	0.25	**2.3**	<0.01	
	0381	Dark grey	9/8/95	F7	1.0	<0.10	<0.05	
	0342	Dark grey	9/6/95	F8	0.25	**990**	NA	
	0243	Dark grey	8/30/95	F9	0.5	**18**	NA	
	0299	Dark grey	9/1/95	G1	0.5	**3.8**	NA	
	0681	Dark grey	10/6/95	G12	0.2	**27.4**	NA	Surface sample.
	0682	Dark grey	10/6/95	G12	1.0	<0.10	NA	
	0683	Dark grey	10/6/95	G12	1.6	<0.10	NA	Refusal at 1.6 feet.
	0119	Dark grey	8/25/95	G2	0.5	**100**	NA	
	0117	Dark grey	8/25/95	G4	0.5	**91**	NA	
	0313	Dark grey	9/5/95	G5	0.5	**4.7**	NA	
	0316	Dark grey	9/5/95	G5	0.5	**3.2**	NA	Field duplicate of 0313.
	0235	Dark grey	8/31/95	G6	0.5		<0.05	
	0236	Dark grey	8/31/95	G6	0.8	**4**	<0.05	Refusal at 0.8 feet
	0382	Dark grey	9/8/95	G7	0.3	**2.2**	<0.01	Surface Sample
	0383	Dark grey	9/8/95	G7	1.0	<1.0	<0.05	
	0384	Dark grey	9/8/95	G7	2.0	**3.8**	<0.05	
	0242	Dark grey	8/30/95	G9	0.5	**12**	NA	

Figure 5 Sample Location Number	Sample Number	Color Code	Sample Date	Grid Location (not on Figure 5)	Max. Sample Depth (feet)	PCB Conc. (ppm)	PCE Conc. (ppm)	Comments
	0262	Dark grey	8/30/95	G9	0.6	**2.4**	NA	Refusal at 0.6 feet
	0339	Dark grey	9/6/95	G10	0.25	**47**	NA	
	0373	Dark grey	9/7/95	H1	0.5	**325**	<0.01	Surface sample
	0374	Dark grey	9/7/95	H1	1.0	**3.8**	<0.01	
	0375	Dark grey	9/7/95	H1	2.0	**0.55**	<0.01	
	0376	Dark grey	9/7/95	H1	3.0	**1.2**	<0.01	
	0276	Dark grey	9/12/95	H1	0.33	**18**	NA	Re-sample at this location.
	0239	Dark grey	8/30/95	H2	0.5	**3.4**	NA	
	0404	Dark grey	9/18/95	H6	0.25	**14**	<0.05	Hard packed gravel surface.
	0405	Dark grey	9/18/95	H6	1.0	**0.17**	<0.05	
	0406	Dark grey	9/18/95	H6	2.0	<0.10	<0.05	Difficult augering, but can go deeper.
	0341	Dark grey	9/6/95	H9	0.25	<0.10	NA	
	0377	Dark grey	9/7/95	I1	0.5	**27.0**	<0.01	Surface sample
	0378	Dark grey	9/7/95	I1	1.0	**1.2**	<0.01	
	0379	Dark grey	9/7/95	I1	2.0	<1.0	<0.01	
	0281	Dark grey	9/7/95	I1	2.5	**1.6**	NA	
	0277	Dark grey	9/12/95	I1	0.33	**11**	NA	Re-sample at this location.
	0362	Dark grey	9/21/95	J1	0.33	**2.9**	NA	
	0363	Dark grey	9/21/95	J2	0.25	**7.7**	NA	
	0400	Dark grey	9/18/95	J5	0.33	**8.4**	<0.05	Adjacent to transformer storage area.
	0401	Dark grey	9/18/95	J5	1.0	<0.10	<0.05	
	0403	Dark grey	9/18/95	J5	1.8	**0.21**	<0.05	Refusal at 1.8 feet.
	0283	Dark grey	9/7/95	K1	0.5		NA	Broken sample jar. Not submitted.
	0385	Dark grey	9/8/95	K1	1.0	<0.10	<0.01	Edge of transformer storage area
	0416	Dark grey	9/19/95	K1	0.25	**2.6**	<0.05	Surface sample. Replaces lost sample.
	0498	Dark grey	9/25/95	K12	0.2	**1.5**	NA	Middle of former transformer storage area.
	0120	Dark grey	8/25/95	ZZ1	0.5	**0.2**	NA	
	0291	Dark grey	8/31/95	ZZ1	1.0	<0.10	<0.05	
	0292	Dark grey	8/31/95	ZZ1	1.9	<0.10	<0.05	Refusal at 1.9 feet
	0665	Dark grey	10/4/95	ZZ12	0.2	**0.41**	<0.05	
	0666	Dark grey	10/4/95	ZZ12	1.0	<0.10	<0.05	
	0667	Dark grey	10/4/95	ZZ12	1.4	<0.10	<0.05	Refusal at 1.4 feet.
	0408	Dark grey	9/15/95	ZZ7	0.33	**5.4**	<0.05	
	0409	Dark grey	9/15/95	ZZ7	1.0	<0.10	<0.05	
	0410	Dark grey	9/15/95	ZZ7	2.0	<0.10	56	

West Slope Samples ranging from 1 to 10 ppm PCBs Surrounding Dark Grey Area in Figure 5

1	0458		9/23/95	J17	0.33	<0.10	NA	Outside exclusion zone near debris pile. Refusal at 0.33 feet.
2	0462		9/23/95	N16	0.5	**0.49**	NA	FD of 0103-95-0459.

Figure 5 Sample Location Number	Sample Number	Color Code	Sample Date	Grid Location (not on Figure 5)	Max. Sample Depth (feet)	PCB Conc. (ppm)	PCE Conc. (ppm)	Comments
2	0459		9/23/95	N16	0.5	**0.64**	NA	Located outside exclusion zone - 4 ft from equipment shed.
2	0460		9/23/95	N16	1.0	<0.10	NA	Refusal at 1.2 feet.
3	0457		9/23/95	G16	0.25	**0.5**	NA	Refusal at 0.3 feet. Five feet outside of exclusion zone. 10 ft. from edge of pavement.
4	0557		9/26/95	K7	1.0	**3.4**	<0.05	
4	0558		9/26/95	K7	2.0	**7.3**	<0.05	Refusal at 2 feet.
4	0364		9/21/95	K7	0.25	**0.23**	NA	Middle of current transformer storage area.
10	0278		9/12/95	ZZ6	0.33	**3.3**	NA	Re-sample at this location.
10	0321		9/5/95	ZZ6	0.5	**8.4**	NA	
10	0317		9/5/95	ZZ6	1.0	**0.10**	NA	
10	0318		9/5/95	ZZ6	2.0	**0.43**	NA	
11	0293		8/31/95	ZZ5	0.5	**0.3**	<0.05	
11	0294		8/31/95	ZZ5	1.0	<0.10	<0.05	
11	0295		8/31/95	ZZ5	2.0	<0.10	<0.05	Refusal at 2.0 feet
12	0431		9/22/95	YY6	0.2	**3.9**	NA	
12	0432		9/22/95	YY6	1.0	<0.10	NA	
12	0433		9/22/95	YY6	2.0	<0.10	NA	
12	0434		9/22/95	YY6	2.8	<0.10	NA	Refusal at 2.8 feet.
13	0427		9/22/95	XX7	0.25	<0.10	NA	
13	0428		9/22/95	XX7	1.0	<0.10	NA	
13	0429		9/22/95	XX7	2.0	<0.10	NA	
13	0430		9/22/95	XX7	3.0	<0.10	NA	
14	0484		9/23/95	XX1	0.25	**0.14**	NA	Edge of mesa.
15	0461		9/23/95	XX2	0.25	<0.10	NA	Surface sample on steep slope west of excavation.
16	0483		9/23/95	YY3	0.25	**0.23**	NA	Very steep slope.
21	0358		9/21/95	C13	0.25	**0.34**	NA	Surface sample, west stream bank, across stream from site.
22	0357		9/21/95	B13	0.25	<0.10	NA	Surface sample, west stream bank, across stream from site.
23	0359		9/21/95	D13	0.25	**0.32**	NA	Surface sample, west stream bank, across stream from site.
25							NA	Survey point for west end of effluent pipe
26	0312		9/6/95	H8	0.5	**1.8**	NA	FD of 0103-95-0340. Homogenized in stainless steel bowl
26	0340		9/6/95	H8	0.5	**1.7**	NA	
27	0241		8/30/95	H4	0.5	**0.22**	NA	
27	0263		8/30/95	H4	1.0	<0.10	NA	
27	0264		8/30/95	H4	2.0	<0.10	NA	Refusal at 2 feet
28	0240		8/30/95	H3	0.5	**5.8**	NA	
29							NA	Survey point for east end of effluent pipe

Figure 5 Sample Location Number	Sample Number	Color Code	Sample Date	Grid Location (not on Figure 5)	Max. Sample Depth (feet)	PCB Conc. (ppm)	PCE Conc. (ppm)	Comments
30							NA	No sample this location.
50	0282		9/7/95	K4	0.5	<1.0	NA	Surface sample only.
61							NA	Survey point for west end of culvert underlying landfill
65	0569		9/29/95	Q15	1.6	**0.17**	<0.05	Refusal at 1.6 ft.
67	0551		9/26/95	P12	1.0	<0.10	<0.05	Augering vertically on steep slope.
67	0552		9/26/95	P12	2.0	<0.10	<0.05	
67	0553		9/26/95	P12	3.0	<0.10	<0.05	
67	0554		9/26/95	P12	3.8	<0.10	<0.05	Refusal at 3.8 feet. Acetone as lab contam. in sample.
68	0564		9/29/95	P5	0.25	**0.81**	<0.05	Acetone as lab contaminant.
68	0565		9/29/95	P5	1.0	<0.10	<0.05	
68	0566		9/29/95	P5	2.0	<0.10	<0.05	Refusal at 2.0 ft. Difficult augering beyond 1.8 feet.
69	0563		9/29/95	P1	1.0	<0.10	<0.05	Refusal at 1 ft. Deepest penetration out of four attempts. Acetone as lab contaminant in sample.
69	0487		9/25/95	P1	0.25	**0.18**	NA	Surface sample.
72	0675		10/4/95	Q8	0.25	<0.10	<0.05	
72	0676		10/4/95	Q8	1.0	<0.10	<0.05	Refusal at 1.2 feet.
74	0687		10/6/95	L6	0.25	**1.7**	NA	Surface sample
74	0688		10/6/95	L6	1.0	**2.8**	NA	
74	0690		10/6/95	L6	3.0	**4.4**	NA	Refusal at 3.2 feet
74	0689		10/6/95	L6	2.0	**0.5**	NA	
81	0715		10/3/95	A11	0.25	**0.19**	<0.05	SW end of earthen berm under straw bales.
82	0360		9/21/95	B11	0.5	**0.52**	NA	Surface sample, east stream bank.
85	0719		10/3/95	F11	0.25	**1.6**	NA	Collected in cut bank approx. 4 inches below grade and below grass root zone. Just below effluent pipe.
87	0684		10/6/95	I12	0.2	**0.6**	NA	Surface sample
87	0685		10/6/95	I12	1.0	<0.10	NA	
87	0686		10/6/95	I12	1.6	<0.10	NA	Refusal at 1.7 feet
93	0496		9/25/95	P4	0.2	**8.8**	NA	In drainage channel just above junction with main channel.
94	0672		10/4/95	O8	0.25	<0.10	<0.05	
94	0673		10/4/95	O8	1.0	<0.10	<0.05	
94	0674		10/4/95	O8	2.0	<0.10	<0.05	Refusal at 2.4 feet. Difficult augering beyond 1.5 feet. Augering through cobbles and boulders.
95	0488		9/25/95	P7	0.3	**0.18**	NA	Difficult access. Middle of patch of wild roses.

Figure 5 Sample Location Number	Sample Number	Color Code	Sample Date	Grid Location (not on Figure 5)	Max. Sample Depth (feet)	PCB Conc. (ppm)	PCE Conc. (ppm)	Comments
	0454		9/22/95	P14	0.25	<0.10	NA	In drainage channel, 5 ft. from fence. Sampled in sidewall of erosional cut. Originally labeled as R15. Re-labeled after checking grid.

North Slope Samples Collected From Light Grey Shaded Area in Figure 5

	0438	Light grey	9/21/95	M1	1.0	**3.7**	NA	
	0439	Light grey	9/21/95	M1	2.0	**1.6**	NA	
	0437	Light grey	9/21/95	M1	0.5	**1.5**	NA	1 foot from edge of drainage channel.
	0440	Light grey	9/21/95	M1	3.0	**1.3**	NA	
	0349	Light grey	9/21/95	M2	1.0	<0.10	NA	
	0350	Light grey	9/21/95	M2	2.0	<0.10	NA	
	0351	Light grey	9/21/95	M2	3.0	<0.10	NA	
	0352	Light grey	9/21/95	M2	4.0	<0.10	NA	
	0348	Light grey	9/21/95	M2	0.5	**1.1**	NA	Located in drainage and small catchment.
	0346	Light grey	9/21/95	O2	3.0	<0.10	NA	
	0344	Light grey	9/21/95	O2	1.0	**360**	NA	
	0343	Light grey	9/21/95	O2	0.5	**16**	NA	3 feet from edge of drainage channel.
	0345	Light grey	9/21/95	O2	2.0	**2.1**	NA	
	0347	Light grey	9/21/95	O2	4.0	**1.2**	NA	
	0452	Light grey	9/22/95	N4	0.3	**32**	NA	Located 3 to 4 feet from drainage channel. Originally labeled as M4. Re-labeled after checking grid.
	0561	Light grey	9/29/95	K3	0.25	**81**	NA	Refusal at 0.5 feet.
	0720	Light grey	10/3/95	J4	0.25	**1.1**	NA	Surface sample.
	0721	Light grey	10/3/95	K2	0.25	**7.4**	NA	Surface sample.
	0723	Light grey	10/3/95	L4	0.25	**85**	NA	Surface sample.
	0724	Light grey	10/3/95	L4	0.25	**76**	NA	FD of 1013-95-0723
	0722	Light grey	10/3/95	N3	0.25	**0.57**	NA	Located in middle of drainage channel.
	0679	Light grey	10/4/95	J3	0.25	**16**	NA	Surface sample only.
	0850	Light grey	10/27/95	3-056-AI	2.0	<0.10	NA	
	0851	Light grey	10/27/95	3-056-AI	3.0	<0.10	NA	
	0848	Light grey	10/27/95	3-056-AI	0.2	**65**	NA	
	0849	Light grey	10/27/95	3-056-AI	1.0	2.3	NA	
	0766	Light grey	10/27/95	3-056-AI	1.0	1.6	NA	FD of 0103-95-0849
	0711	Light grey	10/27/95	3-056-AJ	0.5	**4.5**	NA	Approx. 8 ft. E-NE of N4. West bank of drainage channel. 6 in. below top of cut bank.

Figure 5 Sample Location Number	Sample Number	Color Code	Sample Date	Grid Location (not on Figure 5)	Max. Sample Depth (feet)	PCB Conc. (ppm)	PCE Conc. (ppm)	Comments
	0710	Light grey	10/27/95	M4	0.5	**160**	NA	Base of rock wall. Soil is 0.5 ft. thick.
	0846	Light grey	10/27/95	N2	0.2	**11**	NA	Near drainage channel.
	0847	Light grey	10/27/95	N2	0.6	8.3	NA	Refusal at 0.6 ft.
	0748	Light grey	10/27/95	N3	2.0	<0.10	NA	
	0749	Light grey	10/27/95	N3	3.0	<0.10	NA	
	0746	Light grey	10/27/95	N3	0.2	7.8	NA	Catchment in drainage channel.
	0747	Light grey	10/27/95	N3	1.0	0.33	NA	
	0745	Light grey	10/27/95	N4	3.0	<0.10	NA	Collected at soil/tuff interface.
	0712	Light grey	10/27/95	N4	0.25	**81**	NA	
	0714	Light grey	10/27/95	N4	2.0	2.7	NA	
	0713	Light grey	10/27/95	N4	1.0	0.67	NA	
	0863	Light grey	10/31/95	O1	2.1	**850**	NA	
	0860	Light grey	10/31/95	O1	0.2	**15**	NA	Surface sample
	0862	Light grey	10/31/95	O1	1.1	10	NA	
	0864	Light grey	10/31/95	O1	3.1	9.9	NA	
	0867	Light grey	10/31/95	O3	3	<0.10	NA	
	0861	Light grey	10/31/95	O3	0.2	7.7	NA	Surface sample
	0865	Light grey	10/31/95	O3	1	6.8	NA	
	0866	Light grey	10/31/95	O3	2	0.7	NA	
	0856	Light grey	10/31/95	P2	0.2	<0.10	NA	Edge of small drainage.
	0858	Light grey	10/31/95	P2	2	<0.10	NA	
	0859	Light grey	10/31/95	P2	3	<0.10	NA	
	0857	Light grey	10/31/95	P2	1	2.2	NA	
	0900	Light grey	11/1/95	M3	0.2	<0.10	NA	Surface sample.
	0919	Light grey	11/1/95	M3	2.1	<0.10	NA	
	0920	Light grey	11/1/95	M3	3.0	<0.10	NA	
	0921	Light grey	11/1/95	M3	3.0	<0.10	NA	
	0918	Light grey	11/1/95	M3	1.0	0.64	NA	
	0898	Light grey	11/1/95	N1	3.1	<0.10	NA	
	0896	Light grey	11/1/95	N1	1.1	**40**	NA	
	0897	Light grey	11/1/95	N1	2.1	1.5	NA	
	0895	Light grey	11/1/95	N1	0.2	0.47	NA	Surface sample. Near large fir tree.
	0893	Light grey	11/1/95	O4	2.1	5.3	NA	
	0891	Light grey	11/1/95	O4	0.2	2.4	NA	Surface sample. Under small tree.
	0892	Light grey	11/1/95	O4	1.0	2.2	NA	
	0894	Light grey	11/1/95	O4	3.0	2.2	NA	
	0899	Light grey	11/1/95	O5	0.2	7.6	NA	Surface sample.
	0916	Light grey	11/1/95	O5	0.8	2.7	NA	
	0917	Light grey	11/1/95	O5	2.0	0.13	NA	
	0932	Light grey	11/2/95	3-056-AK	0.1	<0.10	NA	Ridge sample. 18 feet N. of L8.
	0931	Light grey	11/2/95	3-056-AL	0.1	<0.10	NA	L8.
	0928	Light grey	11/2/95	K4a	0.25	**69**	NA	Ridge sample.
	0930	Light grey	11/2/95	L2	0.2	**22**	NA	Head of small drainage on N. slope.
	0929	Light grey	11/2/95	L8	0.15	3	NA	Ridge sample. West edge of ridge.
	0938	Light grey	11/2/95	M5	0.05	3.4	NA	FD of 0103-95-0937

Figure 5 Sample Location Number	Sample Number	Color Code	Sample Date	Grid Location (not on Figure 5)	Max. Sample Depth (feet)	PCB Conc. (ppm)	PCE Conc. (ppm)	Comments
	0937	Light grey	11/2/95	M5	0.05	2.9	NA	very little overburden at this
	0935	Light grey	11/2/95	N5	2.3	<0.10	NA	
	0936	Light grey	11/2/95	N5	3	<0.10	NA	Powdery tuff.
	0933	Light grey	11/2/95	N5	0.2	**27**	NA	
	0934	Light grey	11/2/95	N5	1.3	**19**	NA	
		Light grey		L3			NA	No sample this location.

North Slope Samples Ranging From 1 to 10 ppm PCBs Surrounding the Light Grey Shaded Area in Figure 5

37	0453		9/22/95	N6	0.2	4.2	NA	In drainage channel, 4 ft. from fence.
37	0562		9/29/95	N6	0.25	4	<0.05	Refusal at 0.25 ft. Tuff or boulders everywhere in vicinity. Acetone as lab contaminant in sample.
39	0449		9/22/95	3-056-I	0.2	4.3	NA	Located in drainage channel. Shallow sediment.
40	0448		9/22/95	3-056-H	0.25	2.4	NA	Located in drainage channel
41	0450		9/22/95	3-056-J	0.2	<0.10	NA	
42	0471		9/23/95	3-056-M	0.25	<0.10	NA	Next to ridge; 20 feet west of 3-056-I.
43	0446		9/22/95	3-056-F	0.2	2.7	NA	Located in drainage channel.
44	0447		9/22/95	3-056-G	0.2	0.16	NA	Located in old drainage channel.
45	0445		9/22/95	3-056-E	0.25	3.2	NA	Located in drainage channel.
46	0472		9/23/95	3-056-N	0.2	<0.10	NA	N. edge of berm surrounding evap. ponds.
47	0441		9/22/95	3-056-A	0.25	4.3	NA	Located in main drainage channel.
48	0481		9/23/95	3-056-W	0.25	<0.10	NA	On west side of ridge.
49	0482		9/23/95	3-056-X	0.25	0.29	NA	70 feet downstream of steam pipes. Steam bank sample.
50	0282		9/7/95	K4	0.5	<0.10	NA	Near surface sample
51	0480		9/23/95	3-056-V	0.25	<0.10	NA	Minor channel draining off of ridge. 20 feet from stream.
52	0476		9/23/95	3-056-R	0.25	<0.10	NA	Bottom of cliff just below drainage. Approx. 15 feet from stream.
53	0451		9/22/95	3-056-K	0.25	1.4	NA	Located in drainage channel
53	0556		9/26/95	3-056-K	1.6	<0.10	<0.05	Refusal at 1.6 feet.
53	0555		9/26/95	3-056-K	1.0	0.2	<0.05	
54	0443		9/22/95	3-056-C	0.25	<0.20	NA	
55	0444		9/22/95	3-056-D	0.2	<0.10	NA	May be in minor drainage channel.
56	0474		9/23/95	3-056-P	0.2	5.6	NA	In main drainage channel insmall catchment basin.
57	0473		9/23/95	3-056-O	0.25	1.3	NA	In drainage channel.
58	0479		9/23/95	3-056-U	0.25	3.2	NA	Stream bank. 50 ft. upstream of 3-056-S.

Figure 5 Sample Location Number	Sample Number	Color Code	Sample Date	Grid Location (not on Figure 5)	Max. Sample Depth (feet)	PCB Conc. (ppm)	PCE Conc. (ppm)	Comments
59	0477		9/23/95	3-056-S	0.25	5.1	NA	Base of cliff in catchment just above stream.
60	0478		9/23/95	3-056-T	0.2	<0.10	NA	At base of cliff ~40 feet upstream of culvert. In east drainage
61								Survey point for west end of culvert under landfill
62	0470		9/23/95	3-056-L	0.25	<0.10	NA	Located in small drainage.
63	0442		9/22/95	3-056-B	0.3	<0.10	NA	
64	0475		9/23/95	3-056-Q	0.2	<0.10	NA	Located at tip of ridge.
65	0567		9/29/95	Q15	0.25	**1.2**	<0.05	
65	0568		9/29/95	Q15	1.0	**1.0**	NA	
66	0489		9/25/95	Q14	0.2	**4.2**	NA	Edge of drainage channel. ~15 feet below north fenceline.
67	0497		9/25/95	P12	0.2	**6.7**	NA	Located in drainage approx. 2 feet NE of P12 grid point in undisturbed area.
70	0678		10/4/95	Q1	0.25	**3.8**	NA	Surface sample only.
71	0677		10/4/95	Q3	0.25	**2.0**	NA	Surface sample only.

Tributary Sediment Samples

Shown on Figure 4	0333		9/15/95	Tributary		<0.10	NA	Streambed sediment sample, 40 ft upstream of effluent pipes
Shown on Figure 4	0334		9/15/95	Tributary		<0.10	NA	Streambed sediment sample, 140 ft upstream of effluent
Shown on Figure 4	0335		9/15/95	Tributary		<0.10	NA	Streambed sediment sample, 25 ft downstream of effluent pipes

Wetland Sediment Samples

Wetland area shown on Fig. 2	0725		10/11/95	Wetland	0.5	<0.10	NA	Wetlands sediment. Collected at west edge of bar 20 downstream of culvert.
Wetland area shown on Fig. 2	0726		10/11/95	Wetland	0.5	<0.10	NA	Wetlands sediment. Collected in point bar 50 feet downstream of culvert. North bank.
Wetland area shown on Fig. 2	0727		10/11/95	Wetland	0.5	**3.3**	NA	Wetlands sediment. Collected from south bank across from 3-056-AD.
Wetland area shown on Fig. 2	0728		10/11/95	Wetland	0.5	<0.10	NA	Wetlands sediment. Collected from south bank 70 feet downstream of culvert.

Figure 5 Sample Location Number	Sample Number	Color Code	Sample Date	Grid Location (not on Figure 5)	Max. Sample Depth (feet)	PCB Conc. (ppm)	PCE Conc. (ppm)	Comments

PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethylene
b.o.g.s.	Below Original Ground Surface
ppm	parts per million
ppb	parts per billion
NA	NA indicate that PCE analysis was not requested.
Note 1:	All analyses performed by the ATI or the LANL Mobile Chemical Analytical Laboratories.

SWMU 3-056(c)
West Slope Post-Excavation Samples (10/26/95)

(If location is sampled more than once, subsequent sampling information is shaded, listed below first sampling)

Sample Number	Date Collected	Grid Location*	Sample Depth (feet)	PCB Conc. (ppm)	Comments
0761	10/26/95	A2	0.1	4.9	Edge of excavation.
0756	10/26/95	A5	0.1	**150**	
0875	10/31/95	A5	1.1	<0.10	Augered.
0881	10/31/95	A5	2.2	5.8	Augered. Refusal at 2.9 ft.
0755	10/26/95	A7	0.1	**9.4**	South end of excation on mesa-top
0762	10/26/95	B9	0.1	**14**	
		B9			No sample at this location.
0758	10/26/95	C2	0.1	4.9	
0759	10/26/95	C4	0.1	**74**	
0878	10/31/95	C4	0.6	<0.10	Chip sample of tuff surface
0753	10/26/95	C5	0.1	**370**	Former location of fir tree.
0876	10/31/95	C5	0.25	1.4	Chip sample of tuff surface
0754	10/26/95	C7	0.1	**180**	Mesa-top location. Near edge of asphalt.
0872	10/31/95	C7	0.5	5.5	Augered. Refusal at 0.5 ft. Sample taken in tuff.
0707	10/26/95	C9	0.1	**240**	Surface sample. Approx. 0.1 ft. of pulverized tuff on bedrock.
0879	10/31/95	C9	0.33	<0.10	Chip sample of tuff surface
0709	10/26/95	D11	0.1	**340**	Near toe of slope.
0880	10/31/95	D11	0.33	<0.10	Chip sample of tuff surface
0760	10/26/95	E2	0.1	2.7	
0752	10/26/95	E5	0.1	**290**	Upper slope, middle of excav.
0877	10/31/95	E5	0.25	<0.10	Chip sample of tuff surface
0750	10/26/95	E7	0.1	**690**	Edge of asphalt.
0870	10/31/95	E7	1.2	<0.10	Augered.
0871	10/31/95	E7	1.6	<0.10	Augered. Refusal at 1.6 ft.
0708	10/26/95	E9	0.1	**260**	
0882	10/31/95	E9	0.3	0.49	Chip sample of tuff surface
0695	10/26/95	F4	0.1	**6600**	Base of steep cut at north end of exc. Location of 33K hit.
0765	10/26/95	F4	0.1	**9200**	FD of 0695.
0888	11/1/95	F4	1.16	4.1	Chip sample of tuff surface
0889	11/1/95	F4		4.6	FD of 0103-95-0888.
0890	11/1/95	F4	1.92	1.4	Composited from 0.5 to 0.92 ft below tuff surface.
0757	10/26/95	G2	0.1	**8400**	
0886	11/1/95	G2	0.47	4.6	Chip sample of tuff surface
0887	11/1/95	G2	1.75	0.75	Composited from 0.5 to 0.83 ft. below tuff surface
0751	10/26/95	G5	0.1	**700**	

Sample Number	Date Collected	Grid Location*	Sample Depth (feet)	PCB Conc. (ppm)	Comments
0884	10/31/95	G5	0.5	**414**	Chip sample of tuff surface
0922	11/1/95	G5	0.5	**110**	Re-sample
0939	11/3/95	G5	0.8	**100**	Hand auger. Sampled 0.33 to 0.5 ft. below tuff surf.
0940	11/3/95	G5	1.5	**200**	Hand auger. Sampled 1.0 to 1.16 ft. below tuff surf.
0941	11/3/95	G5	2.3	2.7	Hand auger. Sampled 1.75 to 2.0 ft. below tuff surf.
0946	11/8/95	G5-A	1.0	**208**	Edge of mesa. Sample collected 1 ft. below top of overburden in sidewall of excavated trench.
0948	11/8/95	G5-A	2.0	**209**	Sample collected 2 ft. below top of overburden in sidewall of excavated trench.
0950	11/8/95	G5-A	3.0	0.08	Hand augered through bottom of trench. Tuff surface at 2.4 ft. Collected sample 0.4 to 0.6 ft. below tuff surface.
0925	11/8/95	G5-B	0.58	<0.05	Chip sample of tuff surface.
0926	11/8/95	G5-B	0.91	<0.05	Hand augered into tuff.
0927	11/8/95	G5-B	1.6	<0.05	Hand augered into tuff.
0923	11/8/95	G5-C	0.5	0.08	Chip sample of tuff surface
0924	11/8/95	G5-C	0.83	0.09	Hand augered into tuff. Refusal at 0.83 ft.
0945	11/8/95	G5-C	1.5	<0.05	Chip sample. Chiseled beyond bottom of hand augered hole.
0947	11/8/95	G5-D	1.08	3.35	Chip sample of tuff surface
0949	11/8/95	G5-D	2.1	1.98	Hand augered into tuff. Refusal at 2.2 feet.
0764	10/26/95	G7	0.1	**820**	Mesa top. East edge of excavation.
0873	10/31/95	G7	1.0	3.6	Augered.
0874	10/31/95	G7	1.6	**15**	Augered. Refusal at 1.6 ft.
0763	10/26/95	G9	0.1	5.8	North edge of slope near effluent pipes.
0741	10/25/95	H1	0.1	**42.2**	
0883	10/31/95	H1	0.5	<0.10	Chip sample of tuff surface
0740	10/25/95	I1	0.1	**25.6**	Newly excavated area. Inside fence.
0868	10/31/95	I1	1.0	<0.10	Augered. Penetrated 0.16 ft. into tuff.
0744	10/25/95	I2	0.1	**27.1**	
0742	10/25/95	J5	0.1	**11.8**	
0869	10/31/95	J5	0.9	<0.10	Augered. Refusal at 0.83 ft.
0743	10/25/95	K1	0.2	**13.3**	
0703	10/26/95	SB-C	0.5	<0.10	Stream bank sample on C-line. Freshly cut area.
0704	10/26/95	SB-D	0.5	**74**	Stream bank sample on D-line. 10 feet downstream of SB-C.
0705	10/26/95	SB-E	0.5	0.44	Stream bank sample on E-line.
0706	10/26/95	SB-F	0.5	2.4	Steam bank sample. ~10 downstream of SB-E. Under south effluent pipe.

*All data listed was gathered from the west slope in the dark grey shaded area on Figure 5, grid locations are not shown on Figure 5

SWMU 3-056(c)

Slope Stabilization

Statement of Work

XV

Statement of Work for Slope Stabilization
for
PRS 3-056(c)

General Requirements:

1. Contractor personnel must meet all Lab training requirements (GET, 40 hr. Hazwoper)

2. Costs are based on a 40-hr work week

3. Utilities (electric, water, sanitary) will be provided by LANL.

4. The Los Alamos City and County Tax is included in the total price at a rate of 5.9375%.

5. LANL will mark existing underground utilities.

6. Contractor will prepare a single site-specific health and safety plan, with task hazards analysis, for the work area. Contractor will also provide their own SSO.

7. Contractor will provide all equipment and materials for the site restoration.

8. Contractor must specify which items in bid are accepted verbatim. Contractor must also specify details of bid where asked for. Contractor must state all deviations from bid and explain deviation.

9. Storm water run-off prevention measures shall be maintained in accordance with the University Storm Water Pollution Prevention Control Plan. Further, Contractor shall follow the Spill Prevention Control and Countermeasures Plan for the site in accordance with the University Spill Prevention Control Plan.

Site Specific Statement of Work:

10. Contractor must complete a site inspection and propose volume of soil needed to apply to slope for vegetation purposes. Estimate volume to cover two adjacent areas (100' x 60 ') and (50' x 20"). Assume at least 6 in of top soil needed. Topsoil shall have a minimum of 30% organic material. Organic material being leaves, manure and or dead vegetation.

11. Slope will need contouring (terracing) if greater than a 2:1 slope ratio, and possibly water bars for erosion control. If slope ratio is less than 2:1, seeding and Curlex blankets (seed blankets) or equivalent may be used. American Excelsior Company is a recommended source. American Excelsior Company can be reached at 4019 Edith Blvd. NE, PO Box 6879, Albuquerque, NM 87197-6879, (505) 345-3459 Contractor must specify the engineered slope stabilization techniques to promote vegetation and prevent erosion. Contractor must also state if plan will need periodic maintenance and what that entails. All plans will be reviewed by ESH-18 storm water pollution prevention plan team, and FSS-8, Engineering. LANL landscaping standards require seeding to follow Civil Eng. standards 216.7 with a suggested medium maintenance, per FSS-8.

216.6.3 - Medium maintenance zones are visually important areas where pedestrian use is moderate. In general, medium maintenance zones are transition zones between the intensive landscaping of the high maintenance zone, and the low maintenance zones. Plants in medium maintenance zones should require only monthly or seasonal maintenance. The plant selection shall emphasize plant species that have a proven history of low maintenance and drought tolerance. Irrigation may or may not be included.

216.6.4 - Low maintenance zones are the remaining portions of the project site which are not in the high or medium vegetation zones. Landscape low maintenance zones in a manner that allows them to be treated as native vegetation requiring little or no maintenance. Limit plants to natives and drought tolerant ornamentals that are acclimated to existing environmental conditions. Irrigation normally will not be provided.

216.7.3 - Seeding mixtures and rates for medium maintenance zones: The areas under this category can be irrigated or non-irrigated. The standard seed mix is as follows:

3% - 7%	Sand Drop Seed
8% - 12%	Galleta Grass
6% - 10%	Alkali Sacaton
10% - 14%	Sideoats Grama
13% - 17%	Indian Ricegrass
18% - 22%	Sheep Fescue
8% - 12%	Blue Grama
18% - 22%	Western Wheatgrass

Suggested grass mixture by FSS-8

Plants of the Southwest in Santa Fe and Granite Seed Co. in Lehi Utah have seed mixtures that are similar and are suggested sources. Plants of the Southwest can be reached at Rt. 6 Box 11A Agua Fria, Santa Fe, NM 87501, (505) 438-8888. Granite Seed Co. can be reached at PO Box 177, 1897 W. 2100 N., Lehi, UT 84043, (801) 768-4422.

12 Contractor shall provide evidence that soil used for backfill is from a non-contaminated source.

13. Contractor will contour mesa top to force water drainage to the northeast. Pre-bid site visit is required. Mesa top contouring will be bid for 2 kinds of cover:

(a) gravel type material (size specified by Contractor)
(b) asphalt with a (6-8 in?, contractor to specify) curb along the top of the western slope.

14. Riprap will have to be applied to the major site drainage pathway where the water flows off the mesa top to prevent water from undercutting the existing soil, and to prevent future erosion. Approximately 1250 sq.-ft. of riprap is estimated, but Contractor shall complete a pre-bid site visit for determination of actual amount. Class A riprap as described by the New Mexico State Highway and Transportation Department will be used. Refer to section 602 of the NMSHTD specification book.

15. Existing straw bales and silt fencing will be secured (or added to) along the eastern edge of the tributary to Sandia Canyon until the new vegetation reaches 70 % of its final cover.

16. Contractor shall remove all debris associated with remediation activities to the county landfill (plastic sheeting, cut shrubbery and trees).

17. Contractor will provide sketch of proposed stabilization as it pertains to slope, including cross section.

SWMU 3-056(c)

Human Health Risk Assessment

Summary

Human Health Risk Assessment for SWMU 3-056(c)

Discussion

A range of cleanup levels are proposed below that may be applicable to PCBs in soil at TA3, SWMU 0-056(c). These cleanup levels are based on a series of assumptions, including the level of risk that may be considered acceptable by the regulatory agencies and the extent to which long-term workers or trespassers may be exposed to soil at the site. Ultimately, the cleanup level for this site will be based on a level of acceptable risk set by the regulatory agencies and their acceptance of the exposure assumptions used in the calculations.

In general, regulatory agencies use an acceptable risk level of one-in-one million (1×10^{-6}) as a point of departure. Higher risk levels may be considered acceptable if the size of the potentially exposed population is small, the exposure assumptions are demonstrably conservative, or the cost of remediation is high compared to the level of risk reduction achieved. In this analysis, the majority of the exposure assumptions, as cited in the 1993 IWP, are taken from U. S. EPA guidance documents. The remaining assumptions attempt to account for site-specific considerations at the Laboratory as a whole or at TA-3, SWMU 3-056(c) in particular. We believe that the final, selected cleanup level for this site will fall within the range of cleanup levels presented herein.

Exposure Scenarios and Assumptions

Soil cleanup levels were calculated separately for the mesa top and hillside, because potential exposure to PCBs in soil is expected to be different in these two areas. Cleanup levels for the mesa top were based on a long-term worker scenario, whereas cleanup levels for the hillside were based on a trespasser scenario. For both scenarios, it was assumed that exposure to PCBs could occur via incidental soil ingestion, dermal contact with soil, and inhalation of resuspended soil particulates.

Standard exposure assumptions have been established for the Environmental Restoration Project based on residential, industrial, and recreational land uses. The assumptions are intended to represent a "reasonable maximum exposure" (RME), and are presented in Appendix K of the 1993 Installation Work Plan (IWP; Los Alamos National Laboratory, 1993). For purposes of this analysis, the exposure assumptions for a long-term worker were adopted for the RME scenario. Exposure assumptions for a trespasser are not included in the 1993 IWP; however, it is expected that a trespasser in the vicinity of the hillside would engage in activities similar to those described in the 1993 IWP for a trail user. Therefore, the exposure assumptions for a trail user have been

adapted to represent a trespasser based on site-specific information and professional judgment. For both the long-term worker and trespasser exposures, an alternative scenario that is based on more realistic estimates of exposure was also developed. This scenario is referred to as the "most likely exposed individual" (MLEI). The exposure assumptions for the long-term worker and trespasser RME and MLEI scenarios are summarized in Attachment 1.

PCB Cleanup Levels in Soil

Soil cleanup levels for PCBs were calculated based on an acceptable excess cancer risk of one-in-one million (1×10^{-6}), which represents the lower end of the acceptable risk range established by the U.S. EPA in the *National Oil and Hazardous Substances Pollution Contingency Plan* (U.S. EPA, 1990) and the *RCRA Proposed Rule: Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities* (U.S. EPA, 1990). In both policy statements, excess cancer risks of up to one-in-ten thousand (1×10^{-4}) may be considered acceptable under some circumstances. Therefore, PCB soil cleanup levels based on a one-in-one hundred thousand (1×10^{-5}) and one-in-ten thousand (1×10^{-4}) have also been calculated. The cleanup levels are summarized in Table 1 below; the calculated spreadsheets used to calculate these values are included in Attachment 2.

Table 1
Range of PCB Cleanup Levels in Soil Based on Excess Cancer Risk

Scenario	1×10^{-4} Risk	1×10^{-5} Risk	1×10^{-6} Risk
Long-Term Worker - RME	33 ppm	3 ppm	0.3 ppm
Long-Term Worker - MLEI	1460 ppm	146 ppm	15 ppm
Trespasser - RME	781 ppm	78 ppm	8 ppm
Trespasser - MLEI	4642 ppm	464 ppm	46 ppm

Shaded area represents range from which we selected the proposed 10 ppm PCB cleanup level.

ATTACHMENT 1

EXPOSURE PARAMETERS

Attachment 1
Exposure Parameters for Long-Term Worker Scenario

Exposure Parameter	Units	Reasonable Maximum Exposed Individual (RME)	Most-Likely Exposed Individual (MLEI)
General Exposure Parameters:			
Exposure Frequency (EF)	days/year	Value: 250 Rationale: LANL, 1993	Value: Same Rationale: Same
Exposure Duration (ED)	years	Value: 25 Rationale: LANL, 1993	Value: 4.5 Rationale: Median value; Bureau of Labor Statistics, 1992
Body Weight (BW)	kg	Value: 70 Rationale: LANL, 1993	Value: Same Rationale: Same
Averaging Time (AT)	days	Value: 25,550 Rationale: LANL, 1993	Value: Same Rationale: Same

Attachment 1
Exposure Parameters for Long-Term Worker Scenario

Exposure Parameter	Units	Reasonable Maximum Exposed Individual (RME)		Most-Likely Exposed Individual (MLEI)	
Pathway-Specific Parameters:					
Incidental Soil Ingestion					
Soil Ingestion Rate (SIR)	mg/day	Value:	100	Value:	50
		Rationale:	Upper end of range; LANL, 1993	Rationale:	Lower end of range; LANL, 1993
Bioavailability (B)	unitless	Value:	0.3	Value:	Same
		Rationale:	Guidance on Remedial Actions for Superfund Sites with PCB Contamination; USEPA, 1990	Rationale:	Same
Percentage Of Workday Spent Outdoors (%OUT)	unitless	Value:	0.5	Value:	0.125
		Rationale:	4 hours/day; LANL, 1993	Rationale:	1 hour/day; professional judgment

Attachment 1
Exposure Parameters for Long-Term Worker Scenario

Exposure Parameter	Units	Reasonable Maximum Exposed Individual (RME)		Most-Likely Exposed Individual (MLEI)	
Dermal Contact with Soil					
Exposed Skin Surface Area (SSA)	cm^2	Value:	3200	Value:	Same
		Rationale	Mean surface area for upper extremities; LANL, 1993	Rationale:	Same
Soil-to-Skin Adherence Factor (SAF)	mg/cm^2	Value:	1	Value:	0.5
		Rationale:	LANL, 1993	Rationale:	Midpoint of range recommended in *Dermal Exposure Assessment: Principles and Applications*; USEPA, 1992
Absorption Fraction (ABS)	unitless	Value:	0.06	Value:	Same
		Rationale:	*Dermal Exposure Assessment: Principles and Applications*; USEPA, 1992	Rationale:	Same

Attachment 1
Exposure Parameters for Long-Term Worker Scenario

Exposure Parameter	Units	Reasonable Maximum Exposed Individual (RME)	Most-Likely Exposed Individual (MLEI)
Percentage Of Workday Spent Outdoors (%OUT)	unitless	Value: 0.5 Rationale: 4 hours/day; LANL, 1993	Value: 0.125 Rationale: 1 hour/day; professional judgment
Inhalation of Suspended Soil Particulates			
Exposure Time (ET)	hours/day	Value: 8 Rationale: LANL, 1993	Value: Same Rationale: Same
Inhalation Rate (IR)	m^3/hour	Value: 1.3 Rationale: Weighted average; 4 hours outdoors @ 1.7 m^3/hour and 4 hours @ 0.83 m^3/hour; LANL, 1993	Value: 0.93 Rationale: Weighted average; 1 hour outdoors @ 1.7 m^3/hour and 7 hours @ 0.83 m^3/hour; LANL, 1993
Respirible Suspended Particles (PM_{10})	mg/m^3	Value: 0.09 Rationale: LANL, 1993	Value: Same Rationale: Same

Attachment 1
Exposure Parameters for Trespasser Scenario

Exposure Parameter	Units	Reasonable Maximum Exposed Individual (RME)	Most-Likely Exposed Individual (MLEI)
General Exposure Parameters:			
Exposure Time (ET)	hours/day	Value: 2 Rationale: LANL, 1993	Value: 1 Rationale: Professional Judgment
Exposure Frequency (EF)	days/year	Value: 10 Rationale: Professional Judgment	Value: 5 Rationale: Professional Judgment
Exposure Duration (ED)	years	Value: 9 Rationale: LANL, 1993	Value: 9 Rationale: Same
Body Weight (BW)	kg	Value: 70 Rationale: LANL, 1993	Value: Same Rationale: Same
Averaging Time (AT)	days	Value: 25,550 Rationale: LANL, 1993	Value: Same Rationale: Same

Attachment 1
Exposure Parameters for Trespasser Scenario

Exposure Parameter	Units	Reasonable Maximum Exposed Individual (RME)	Most-Likely Exposed Individual (MLEI)
Pathway-Specific Parameters:			
Incidental Soil Ingestion			
Soil Ingestion Rate (SIR)	mg/day	Value: 100 Rationale: LANL, 1993	Value: 50 Rationale: Professional Judgment
Bioavailability (B)	unitless	Value: 0.3 Rationale: Guidance on Remedial Actions for Superfund Sites with PCB Contamination; USEPA, 1990	Value: Same Rationale: Same
Dermal Contact with Soil			
Exposed Skin Surface Area (SSA)	cm^2	Value: 5000 Rationale 25% of mean total body surface area; LANL, 1993	Value: 3200 Rationale: Mean surface area for upper extremities; LANL, 1993

Attachment 1
Exposure Parameters for Trespasser Scenario

Exposure Parameter	Units	Reasonable Maximum Exposed Individual (RME)	Most-Likely Exposed Individual (MLEI)
Soil-to-Skin Adherence Factor (SAF)	mg/cm^2	Value: 1 Rationale: LANL, 1993	Value: 0.5 Rationale: Midpoint of range recommended in *Dermal Exposure Assessment: Principles and Applications*; USEPA, 1992
Absorption Fraction (ABS)	unitless	Value: 0.06 Rationale: *Dermal Exposure Assessment: Principles and Applications*; USEPA, 1992)	Value: Same Rationale: Same
Inhalation of Suspended Soil Particulates			
Inhalation Rate (IR)	m^3/hour	Value: 2.1 Rationale: LANL, 1993	Value: Same Rationale: Same
Respirable Suspended Particles (PM_{10})	mg/m^3	Value: 0.09 Rationale: LANL, 1993	Value: Same Rationale: Same

ATTACHMENT 2

CALCULATION SPREADSHEETS

Preliminary Cleanup Level Calculations for PCBs in Soil
Laboratory Worker Scenario
TA-3, SWMU 3-056(c)
Project No. 2853

Incidental Soil Ingestion

Hypothetical Excess Cancer Risk = {(Hypothetical [Soil]*SIR*CF*EF*ED*B*%OUT)/(BW*AT)}*SFo

Scenario	Hypothetical [Soil] (mg/kg)	Soil Ing. Rate (SIR) (mg/day)	Conversion Factor (CF) (kg/mg)	Exposure Frequency (EF) (days/year)	Exposure Duration (ED) (years)	Bioavailability (B)	% of Workday Spent Outdoors (%OUT)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Oral Slope Factor (SFo) (mg/kg-day)-1	Hypothetical Excess Cancer Risk
RME	1	100	1.00E-06	250	25	0.3	0.5	70	25550	7.7	4.04E-07
MLEI	1	50	1.00E-06	250	4.5	0.3	0.125	70	25550	7.7	9.08E-09

Dermal Contact with Soil

Hypothetical Excess Cancer Risk = {(Hypothetical [Soil]*SSA*SAF*CF*ABS*EF*ED*%OUT)/(BW*AT)}*SFo

Scenario	Hypothetical [Soil] (mg/kg)	Skin Surface Area (SSA) (cm2/day)	Soil Adherence Factor (SAF) (mg/cm2)	Conversion Factor (CF) (kg/mg)	Dermal Absorption Factor (ABS)	Exposure Frequency (EF) (days/year)	Exposure Duration (ED) (years)	% of Workday Spent Outdoors (%OUT)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Oral Slope Factor (SFo) (mg/kg-day)-1	Hypothetical Excess Cancer Risk
RME	1	3200	1	1.00E-06	0.06	250	25	0.5	70	25550	7.7	2.58E-06
MLEI	1	3200	0.5	1.00E-06	0.06	250	4.5	0.125	70	25550	7.7	5.81E-08

Inhalation of Resuspended Particulates

Hypothetical Excess Cancer Risk = {(Hypothetical [Soil]*PM10*CF*IR*ET*EF*ED*%DUST)/(BW*AT)}*SFI

Scenario	Hypothetical [Soil] (mg/kg)	Respirable Suspended Particles (PM10) (mg/m3)	Conversion Factor (CF) (kg/mg)	Inhalation Rate (IR) (m3/hour)	Exposure Time (ET) (hours/day)	Exposure Frequency (EF) (days/year)	Exposure Duration (ED) (years)	% Dust from Outdoors (%DUST)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Inhalation Slope Factor (SFI) (mg/kg-day)-1	Hypothetical Excess Cancer Risk
RME	1	0.09	1.00E-06	1.3	8	250	25	0.4	70	25550	7.7	1.01E-08
MLEI	1	0.09	1.00E-06	0.94	8	250	4.5	0.4	70	25550	7.7	1.31E-09

Preliminary Cleanup Levels Target [Soil] = (Target Risk*Hypothetical [Soil])/Hypothetical Risk

	Target [Soil] (mg/kg)		
Scenario	10-4 Risk	10-5 Risk	10-6 risk
RME	33	3	0.3
MLEI	1460	146	15

Notes:
RME = Reasonable Maximum Exposure
MLEI = Most Likely Exposed Individual
Inhalation rates represent weighted averages:
RME assumes 4 hours @ 1.7 m3/hr and 4 hours @ 0.83 m3/hr.
MLEI assumes 1 hour @ 1.7 m3/hr and 7 hours @ 0.83/hr.

Preliminary Cleanup Level Calculations for PCBs in Soil
Trespasser Scenario
TA-3, SWMU 3-056(c)
Project No. 2853

Incidental Ingestion

Hypothetical Excess Cancer Risk = ((Hypothetical [Soil]*SIR*CF*ET*EF*ED*B)/BW*AT))*SFo

Scenario	Hypothetical [Soil] (mg/kg)	Soil Ing. Rate (SIR) (mg/day)	Conversion Factor (CF) (kg/mg)	Exposure Frequency (EF) (days/year)	Exposure Duration (ED) (years)	Bioavailability (B)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Oral Slope Factor (SFo) (mg/kg-day)-1	Hypothetical Excess Cancer Risk
RME	1	100	1.00E-06	10	9	0.3	70	25550	7.7	1.16E-08
MLEI	1	50	1.00E-06	5	9	0.3	70	25550	7.7	2.91E-09
Region VI	1	100	1.00E-06	60	10	1	43	25550	7.7	4.21E-07

Dermal Contact with Soil

Hypothetical Excess Cancer Risk = ((Hypothetical [Soil]*SSA*SAF*CF*ABS*EF*ED)/BW*AT))*SFo

Scenario	Hypothetical [Soil] (mg/kg)	Skin Surface Area (SSA) (cm2/day)	Soil Adherence Factor (SAF) (mg/cm2)	Conversion Factor (CF) (kg/mg)	Dermal Absorption Factor (ABS)	Exposure Frequency (EF) (days/year)	Exposure Duration (ED) (years)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Oral Slope Factor (SFo) (mg/kg-day)-1	Hypothetical Excess Cancer Risk
RME	1	5000	1	1.00E-06	0.06	10	9	70	25550	7.7	1.16E-07
MLEI	1	3200	0.5	1.00E-06	0.06	5	9	70	25550	7.7	1.86E-08
Region VI	1	5000	1	1.00E-06	0.06	60	10	43	25550	7.7	1.26E-06

Inhalation of Resuspended Particulates

Hypothetical Excess Cancer Risk = ((Hypothetical [Soil]*PM10*CF*IR*ET*EF*ED)/BW*AT))*SFo

Scenario	Hypothetical [Soil] (mg/kg)	Respirible Suspended Particles (PM10) (mg/m3)	Conversion Factor (CF) (kg/mg)	Inhalation Rate (m3/day)	Exposure Time (ET) (hours/day)	Exposure Frequency (EF) (days/year)	Exposure Duration (ED) (years)	Body Weight (BW) (kg)	Averaging Time (AT) (days)	Inhalation Slope Factor (SFo) (mg/kg-day)-1	Hypothetical Excess Cancer Risk
RME	1	0.09	1.00E-06	2.1	2	10	9	70	25550	7.7	1.46E-10
MLEI	1	0.09	1.00E-06	2.1	1	5	9	70	25550	7.7	3.66E-11
Region VI	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Preliminary Cleanup Levels

Target [Soil] = (Target Risk*Hypothetical [Soil])/Hypothetical Risk

Scenario	Target [Soil] (mg/kg) 10-4 Risk	10-5 Risk	10-6 Risk
RME	781	78	7.8
MLEI	4642	464	46
Region VI	59	5.9	0.6

Notes:
RME = Reasonable Maximum Exposure
MLEI = Most Likely Exposed Individual

SWMU 3-056(c)

Ecological Risk Assessment

Summary

Preliminary Ecological Risk Assessment for PRS 3-056(c)

Modeled PCB Sediment and Soil Concentrations

The ECOTRAN transport model was used as an initial indication of the potential impact of residual PCB concentration on aquatic receptors and terrestrial wildlife.

ECOTRAN is an ecological transport (contaminant transport), ecological population dynamic, and contaminant uptake (pharmacokinetic) model. The ECOTRAN model was developed over the last 20 years by Anthony F. Gallegos of EES-15 at Los Alamos National Laboratory. The model follows the model used by L. J. Lane, of EES-14, and published in Los Alamos National Laboratory reports on sediment transport in canyons, and on estimating procedures for surface runoff, sediment yield and contaminant transport in Los Alamos County, New Mexico (L.J. Lane, 1995, LA-10335-MS) Many portions of the model have been or are being validated by different projects where it has been used, such as: nuclide transport (bioconcentration through the food chain) of beef cows to humans at Pantex (beef cow concentrations were validated), Uranium transport in small mammals (mouse concentrations were validated) at Los Alamos Nation Laboratory, etc. The latter report will be submitted for publication in the next month.

The ECOTRAN model was used to evaluate what may happen in the future to sediments in the tributary west and north of PRS 3-056(c), based on different PCB cleanup levels, i.e., what concentration of PCBs could be left at the site without harming the ecosystem within the watershed that contains the PRS. ECOTRAN was set up to model a 239 acre ecosystem, which included a 2.1 acre contaminated source area. Downgradient of the source area, two stream channel segments were modeled. The predicted sediment concentrations are compared to sediment screening criteria derived from the Oak Ridge National Laboratory ecological screening benchmarks. The predicted intakes for wildlife species are compared to mammalian toxicological dose limits derived from the EPA's Integrated Risk Information System (IRIS) database.

Potential Aquatic Receptor Impacts

ECOTRAN modeled PCB concentrations in sediments for seven years. Seven years is based on the life spans of the animals evaluated. In addition, there is a decreasing trend over this time period, which indicates that longer simulation periods would reduce the average intakes and sediment concentrations. The arithmetic average of these seven simulation years are summarized in Table 1. The sediment concentrations scale linearly with concentration in the source area. Most of the toxicity data for PCBs in "sediments" really are for sediment-dwelling organisms. The Oak Ridge Ecological Risk Assessment Screening Benchmark database contains an Estimated Equivalent Sediment Quality Criterion for PCBs of 20.52 mg/kg dry weight. The Oak Ridge sediment value is equivalent to an ESAL. This estimated

value is derived from the National Ambient Water Quality Criterion for PCBs using an Equilibrium Partitioning approach based on the octanol-water partitioning coefficient for PCBs and an assumed sediment organic carbon content of 1%. Thus, this sediment criterion implies that PCB concentrations as high as 1000 mg/kg are not damaging to potential aquatic receptors downgradient of the source area.

Table 1
Predicted downgradient PCB sediment concentrations for three residual concentrations in the 2.1 acre source area.

Source area concentration (mg/kg)	Tributary (mg/kg)	Wetlands (mg/kg)
1	0.020	0.0035
10	0.20	0.035
100	2.0	0.35

Potential Terrestrial Wildlife Impacts

For initial screening purposes, three species were selected that represent significant variation in home range size, feeding habits, and potential ecological importance. The species were deer-mice (*Peromyscus maniculatus*), coyotes (*Canis latrans*), and deer (*Odocoileus hemionus*). Birds could have been used except all the toxicity data is related to mammals. In addition, birds would have much lower exposure factors (larger home range than deer-mouse, not resident in Los Alamos year-long, and less contact with contaminated soil and sediment). Deer-mice have the greatest contact with the contaminated media, and the smallest home range. The "worst-case" of deer-mice resident on the contaminated source area was evaluated. For all three species, the population average for the 239 area ecosystem was calculated. The home range of the coyote and deer is larger than the modeled area, and this ecosystem average represents a "worst-case" scenario for these species. The coyote provides information on potential bioconcentration through the food chain. The deer provide information on an endpoint of greater human consumptive relevance. The reference dose (RfD) was used as a base toxicological benchmark. ECOTRAN simulations provided estimates of the PCB intakes (mg/kg/day) for these three species over seven years. The average intake was used to estimate the source term concentration needed to equal the reference dose or the no observed adverse effect level (NOAEL = RfD/100). These soil concentrations of potential adverse ecological effects are summarized in Table 2. The most ecologically defensible toxicological effect level is the reference dose for the deer-mouse population directly resident at the source area, but the NOAEL may be a reasonable ecotoxicological value for impacts to the entire 239 acre ecosystem. Thus PCB soil concentrations of 100 to 200 mg/kg should not be harmful to terrestrial wildlife receptors.

Table 2
Predicted PCB source area (2.1 acre) concentrations that produce intakes equal to the NOAEL (0.0007 mg/kg/day) or the reference dose (0.07 mg/kg/day).

	PCB source area soil concentration by ecological receptor (mg/kg)			
	Deer-mouse in 239 acre area	Deer-mouse at source area	Coyotes in 239 acre area	Deer in 239 acre area
Soil concentration at source where intake = NOAEL	240	2.1	480	92
Soil concentration at source where intake = RfD	24000	210	48000	9200

Synopsis

Receptors at the wetlands are being evaluated throughout the estimated sediment concentrations in the wetlands and comparing this information to the Oak Ridge derived sediment screening value listed above. All that the model is doing is to allow sheetflow and channel erosion of the source area, and transporting this sediment down stream. This contaminated sediment is being diluted by erosion of clean sediment in other areas. In addition, the channel and wetlands are periodically purged of PCBs and sediments by high water flow, hence the stream channel creates a natural dilution effect which ECOTRAN models. The model has relevant climateological parameters for Los Alamos and is based on erosional information from Mortandad Canyon (A.F. Gallegos, 1984, LA-11851-MS).

Although the average from the model is the most reasonable summary statistic to use, the model actually predicts a very dynamic (temporally) system. Since the average ECOTRAN results are presented, they can be compared to the average wetland concentration. Although our intent was not to characterize the wetlands with our current set of four samples, these data can provide some estimates of variability and concentration of PCBs downgradient. Based on the current limited data (Table 3), the average concentration in the wetlands is less than 1 ppm (three out of four samples were non-detects, the fourth sample had 3.3 ppm PCBs). A value of 1 ppm corresponds to a source term concentration between 100 and 1000 ppm (see Table 1), which roughly corresponds to the concentrations of PCBs recently removed from SWMU 3-056(c). However, we do not know if the single PCB detect in the wetlands is even associated with 3-056(c). Other complications in evaluating impacts to the wetland is that there are documented water quality gradients, poor, closer to the landfill, and better downgradient. The wetland is downgradient of a heavily

industrialized part of the Laboratory with possible multiple PCB source areas, in addition to other chemicals from such an area.

Table 3
Wetland Sediment Sample Results

Sample Number	Date	Maximum Sample Depth (feet)	PCB Conc. (ppm)	Comments
0725	10/11/95	0.5	<0.10	Wetlands sediment. Collected at west edge of bar 20 downstream of culvert.
0726	10/11/95	0.5	<0.10	Wetlands sediment. Collected in point bar 50 feet downstream of culvert. North bank.
0727	10/11/95	0.5	**3.3**	Wetlands sediment. Collected from south bank
0728	10/11/95	0.5	<0.10	Wetlands sediment. Collected from south bank 70 feet downstream of culvert.

The ECOTRAN model allowable PCB soil concentration at the source are lower for the deer-mouse living at the source than an aquatic receptor living in the wetland (2.1 ppm compared to 1000 ppm). This is due to the natural dilution of sediments during sheet flow and to sediment loading/scouring through the wetlands from high water flow.

Literature References to past used of ECOTRAN, (Formerly BIOTRAN)

LITERATURE REFERENCES TO PAST USES OF ECOTRAN (FORMERLY BIOTRAN)

Gallegos, A. F., M. L. Wheeler, W. Whitty, and W.J. Smith, 1975. Environmental evaluation of solid radioactive waste disposal areas. Abstract publications. In: Bulletin, New Mexico Academy of Sciences, Vol. 15, No. 2, pp 46.

Gallegos, A.F., and L.J. Johnson, 1976. A simulation study of mineral recycling in Ponderosa pine forests, Abstract publication. In: Proceedings Supplement, Journal, Arizona Academy of sciences. (11).

Gallegos, A.F., Garcia, B. J., and C. M. Sutton, 1980. Documentation of transuranic (TRU) biological transport model (BIOTRAN). Informal Report. Los Alamos Scientific Laboratory, (LA-8213-MS).

Gallegos, A.F., and W.J. Wenzel, 1984. HUMTRN: Documentation and verification for an ICRP-based age, and sex specific human simulation model for radionuclide dose assessment. Los Alamos National Laboratory, pp 83 (LA-9994-MS).

Gallegos, A.F., and W.J. Wenzel, 1989. HUMTRN and EFFECTS: age and sex specific dosimetric and physiological human population dynamics models for dose assessment. Health Physics. Special Supplement. "Modeling for Scaling to Man." Vol. 57, Supplement 1, pp 443-453.

Gallegos, A.F., and W.J. Wenzel, 1990. Runoff and sediment yield model for predicting nuclide transport in watersheds using BIOTRAN. Los Alamos National Laboratory (LA-11851-MS). 118p.

Gallegos, A.F., and W.J. Wenzel, 1992. BIOTRAN users manual, second edition, Los Alamos National Laboratory (unpublished manuscript).

Hansen, W.R., and J.C. Rodgers, 1983. Risk analysis for shallow land burial and greater confinement of alpha-contaminated wastes. Nuclear and Chemical Waste Management 4:81-94.

Kelly, E., M. Kramer, C. McDaniel, P. Newell, K. Sasser, D. Stack, and A. Gallegos, 1995. Integrating ecological risk assessment and hazards analysis: a pilot project for the proposed Los Alamos Waste Treatment and Storage Facilities, Los Alamos National Laboratory (LA-UR-95-2555). 62p.

Lane, L. J., et al., 1985. New Estimating Procedures for Surface Runoff, Sediment Yield and Contaminant Transport in Los Alamos County, new Mexico. Los Alamos National Laboratory Report, LA-10335-MS, Los Alamos National Laboratory, Los Alamos, New Mexico.

Onishi, Y., et. al., 1982. Development of multimedia radionuclide exposure assessment methodology for low-level waste management. Pacific Northwest Laboratory, Report PNL-3370.

Ryti, R.T., and A.F. Gallegos,1995. Comparison of models used for ecological and human health risk assessment at Los Alamos National Laboratory (unpublished manuscript).

Smith, W.J., A.F. Gallegos, and L.J. Johnson, 1977. LASL models for environmental transport of radionuclides in forests. Modeling and Simulation, Instrument Society of America (9).

Walker, L.W., Hansen, W.R., Wilson, D.C., G. Maestas, W.J. Wenzel, and F.A. Guevarra, 1981. Alternative transuranic waste management strategies at Los Alamos National Laboratory. Los Alamos National Laboratory (LA-8982-MS).

Wenzel, W.J., A.F. Gallegos, and W.R. Hansen, 1982. Supplementary documentation for an Environmental Impact Statement (EIS) regarding Pantex Site. Los Alamos National Laboratory (LA-9445-PNTX-0).

Wenzel, W.J., and A.F. Gallegos, 1985. EFFECTS: Documentation and verification for a BEIR III cancer risk model based on age, sex, and population dynamics for BIOTRAN. Los Alamos National Laboratory, pp 100 (LA-10371-MS).

Wenzel, W.J., Fox, T.S., Gallegos, A.F., Tierney, G., and J.C. Rodgers, 1987. Cs-137, Pu-239/240, Total uranium, and scandium in tress and shrubs growing in transuranic waste at Area B, Los Alamos National Laboratory (LA-11126-MS)

Wheeler, M.L., Smith, W.J., and A.F. Gallegos, 1977. Preliminary evaluations of the potential for plutonium release from burial grounds at Los Alamos Scientific Laboratory (LASL), pp 19 (LA-6694-MS).

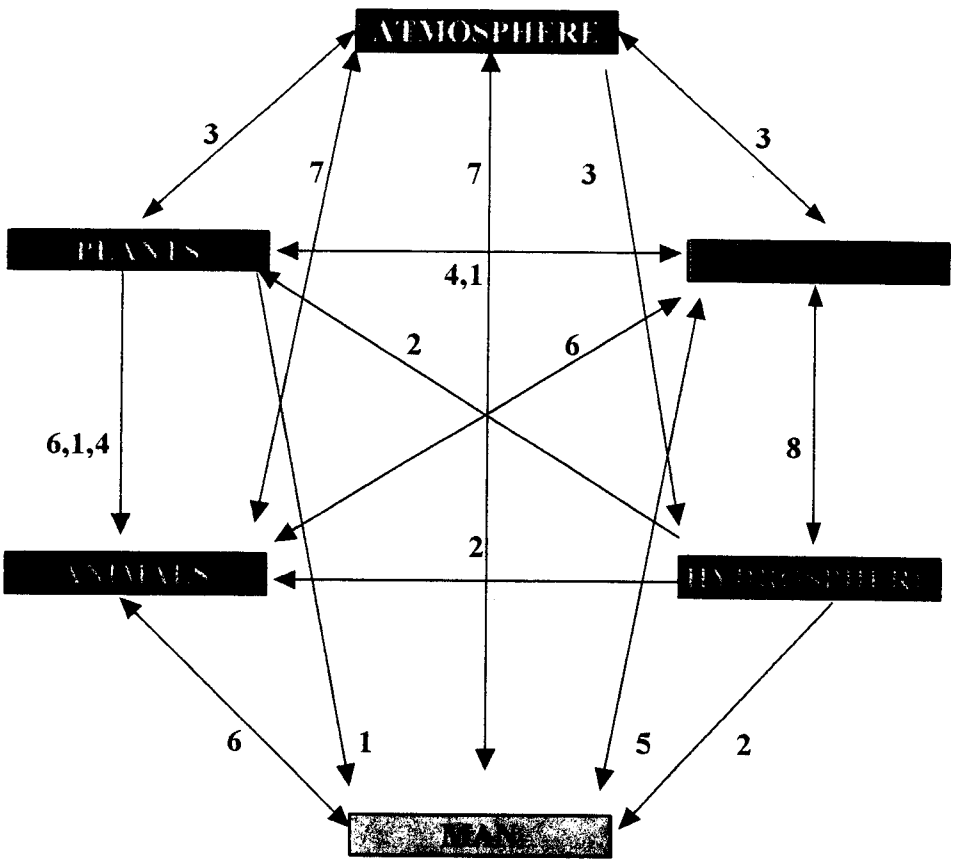
ECOTRAN Simulation of Upper Sandia Canyon PCB Transport to Channel Alluvium and Selected Animals

Anthony F. Gallegos
Kathleen P. McGee

Environmental Sciences Group
EES-15

Los Alamos National Laboratory
Los Alamos, New Mexico

Ecological Transport Model



LEGEND:

1 = Agricultural growth module

2 = Aquatic and soil water modules

3 = Atmospheric, resuspension, and saltation-creep modules

4 = Forage and tree growth modules

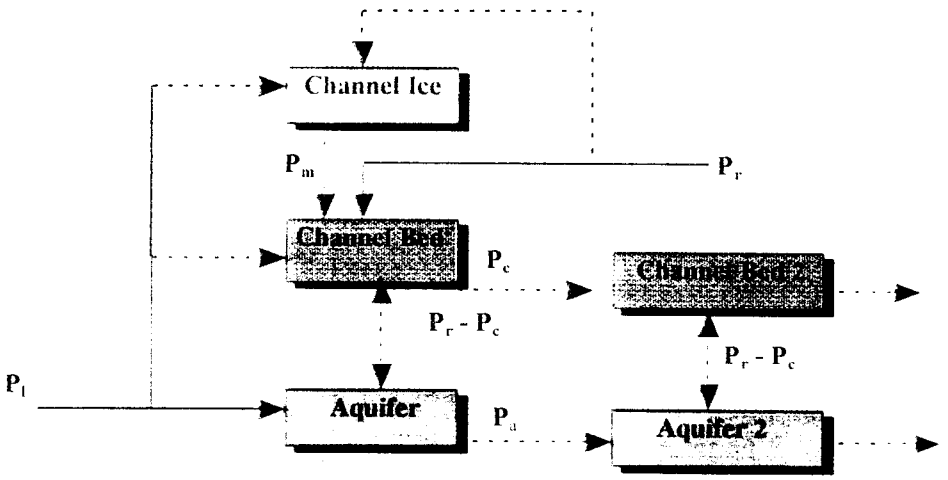
5 = Human module

6 = Herbivore module

7 = Inhalation module

8 = Erosion and surface runoff module

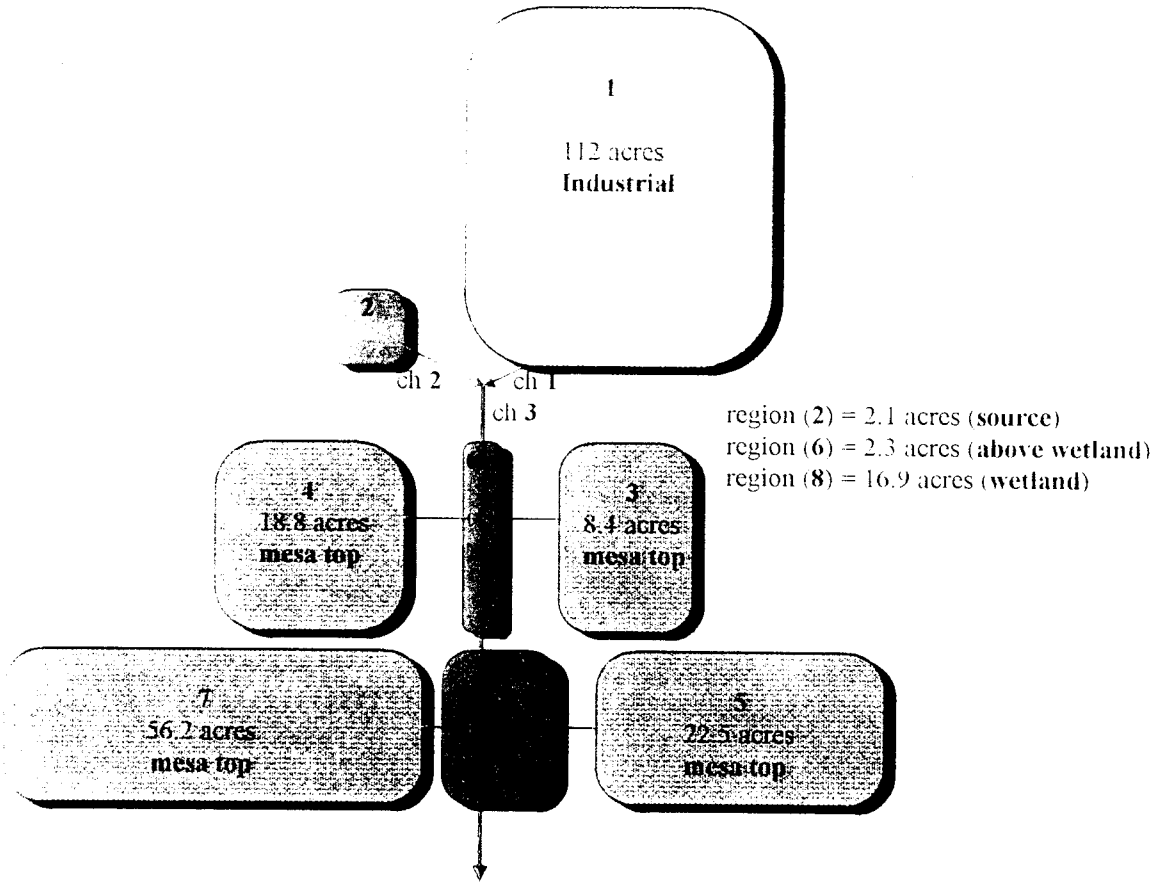
Modeled Moisture Runoff and Transmission Processes Below a Channel or Channel Segment Using ECOTRAN



P_r = moisture runoff from adjacent regional surfaces
P_m = moisture addition to channel bed from melting ice
P_l = subsurface or lateral moisture flow from adjacent regions
P_c = stream flow of moisture from channel bed
P_a = flow of moisture downslope from aquifer

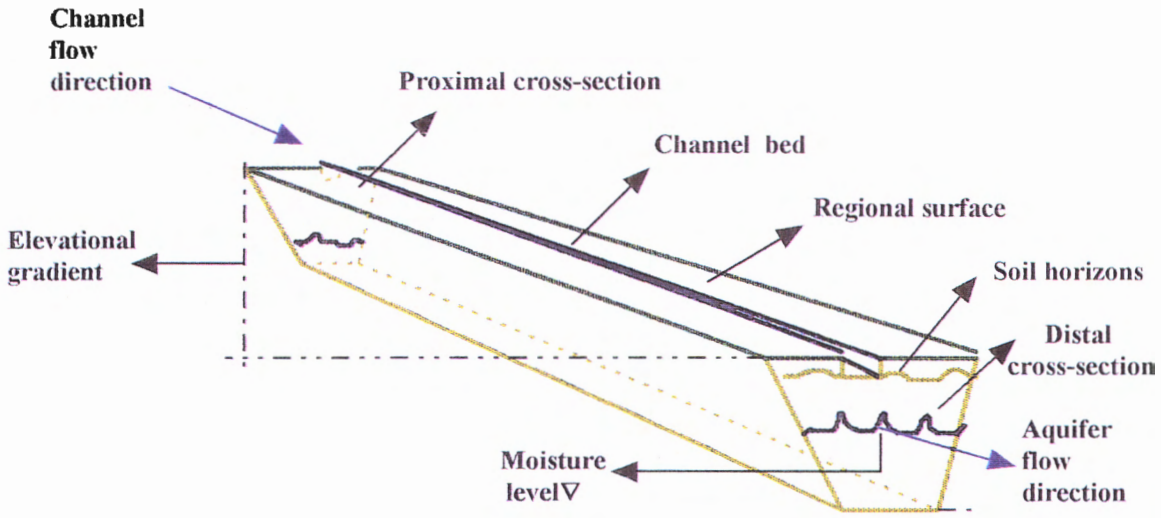
- dotted lines indicate conditional flows
- (P_r) flows to channel bed or forms channel ice at sub-freezing temperatures

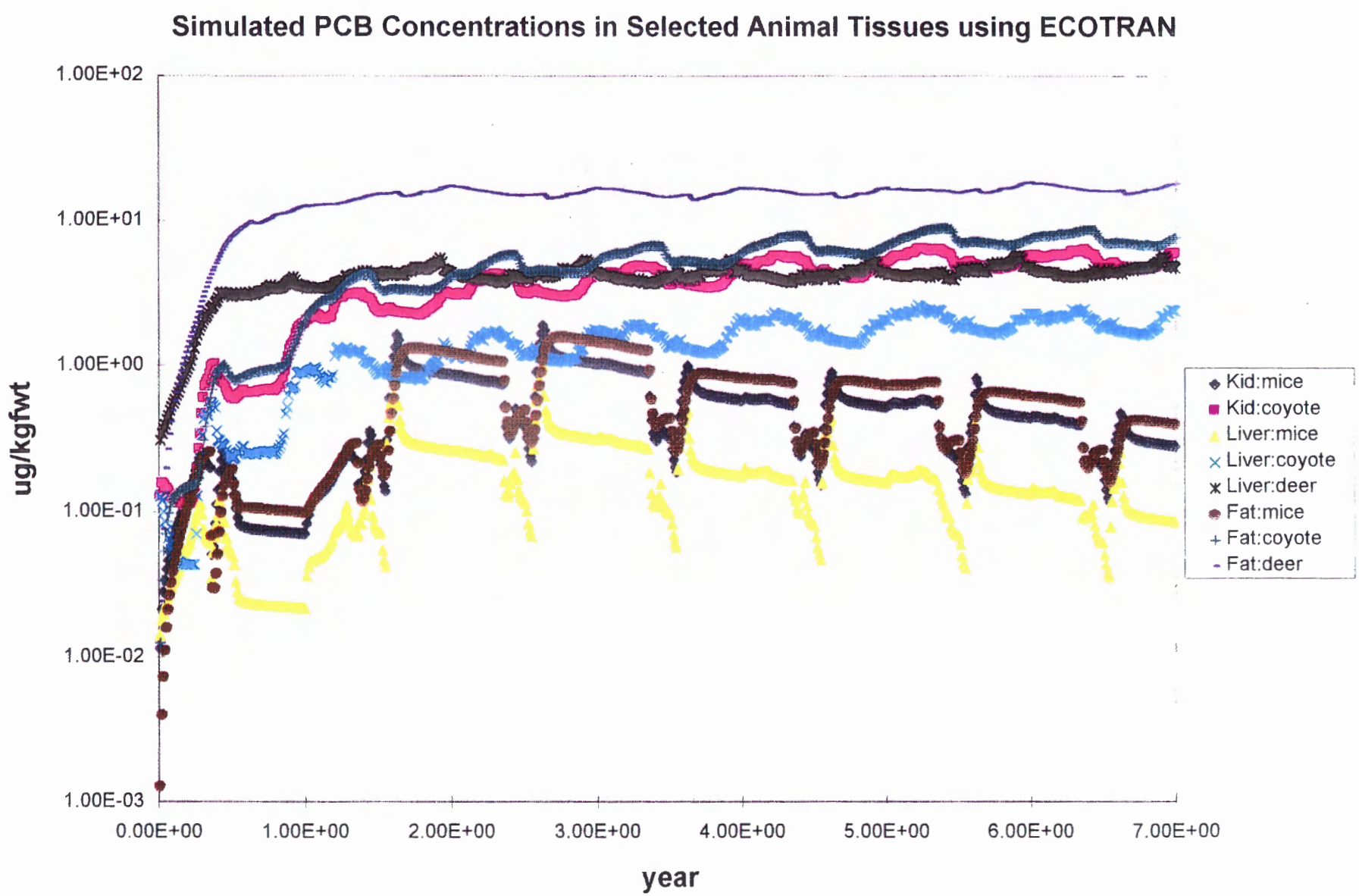
Upper Sandia Canyon PCB Transport Analysis using ECOTRAN

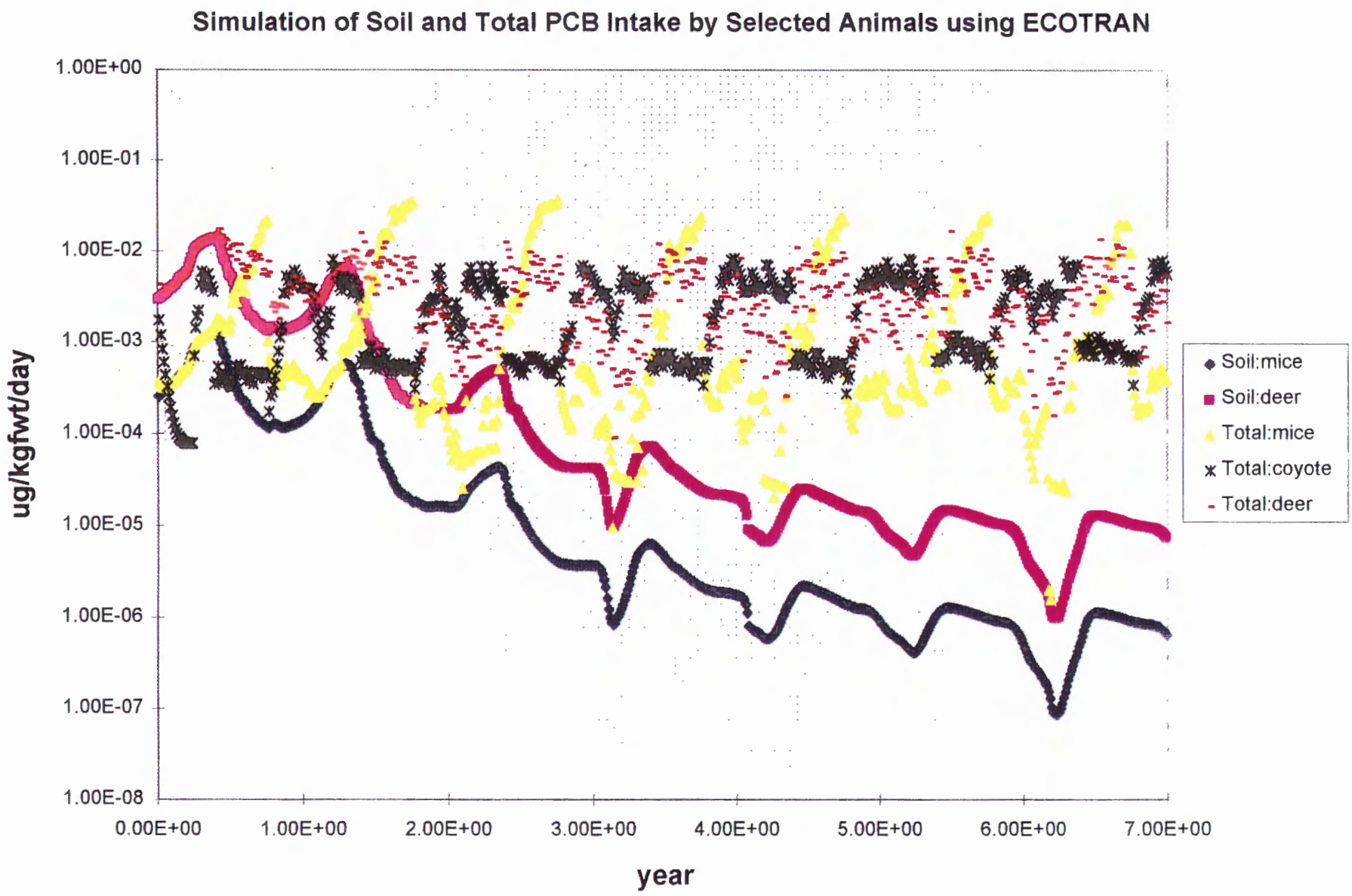
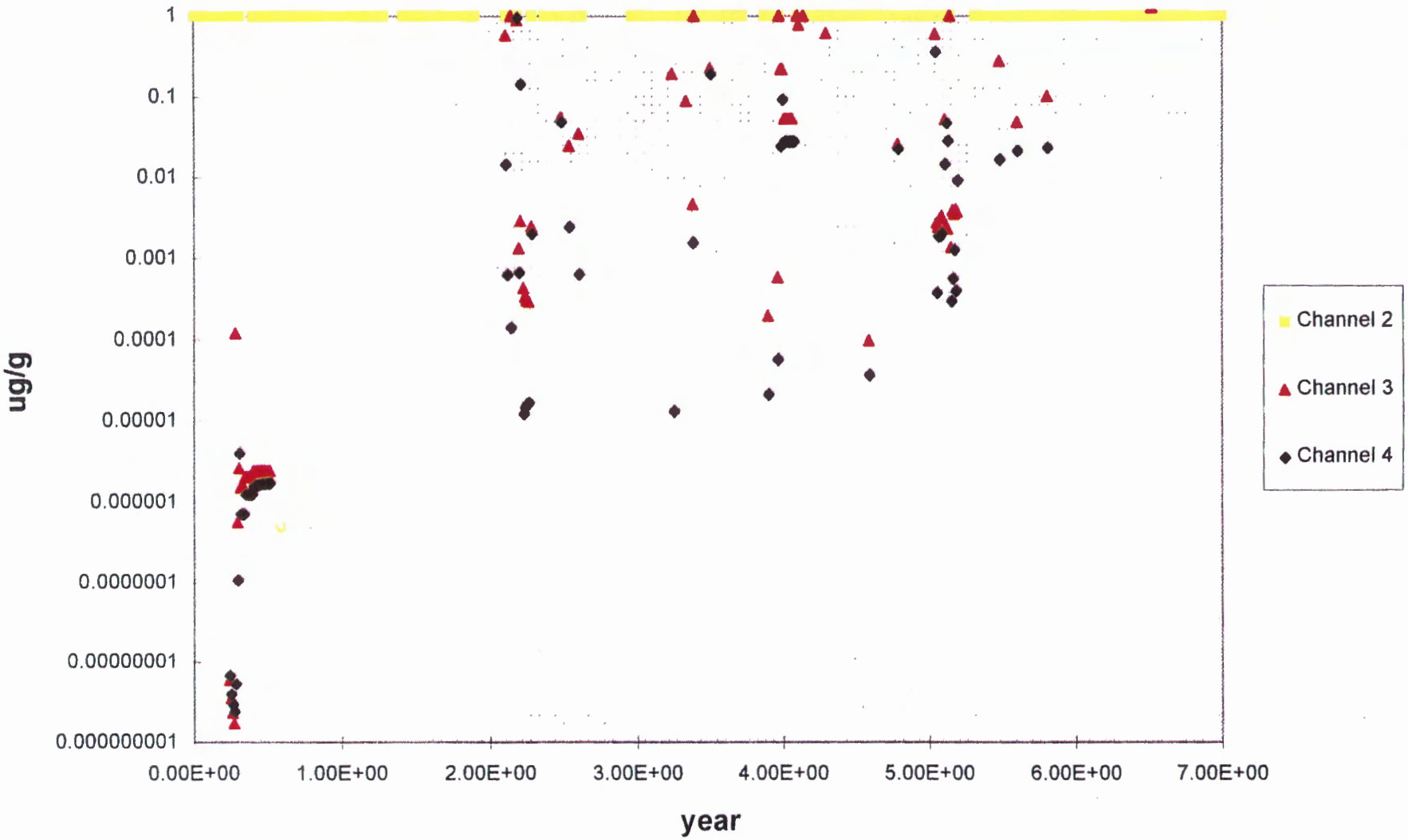


- channel (1) receives storm surface runoff and **8960 cfd** moisture from man-made sources
- channel (2) receives storm surface runoff from contaminated site
- channel (3) receives storm surface runoff from regions (3,4,6) and from channels (1,2), and **31000** cfd moisture from man-made sources
- channel (4) receives storm surface runoff from regions (5,7,8), and from channel (3)
- channel (4) exits **wetlands**
- source term soil in region (2) set at 1μg/gdwt **PCB's**; this region modeled as wooded like the mesa tops

Regional Channel and Aquifer Structure in ECOTRAN




Simulated PCB Concentrations in Selected Animal Tissues using ECOTRAN
1.00E+02
1.00E+01
1.00E+00
1.00E-01
1.00E-02
1.00E-03
ug/kgfwt
0.00E+00
1.00E+00
2.00E+00
3.00E+00
4.00E+00
5.00E+00
6.00E+00
7.00E+00
year
Kid:mice
Kid:coyote
Liver:mice
Liver:coyote
Liver:deer
Fat:mice
Fat:coyote
Fat:deer


Simulation of Soil and Total PCB Intake by Selected Animals using ECOTRAN
1.00E+00
1.00E-01
1.00E-02
1.00E-03
1.00E-04
1.00E-05
1.00E-06
1.00E-07
1.00E-08
ug/kgfwt/day
0.00E+00
1.00E+00
2.00E+00
3.00E+00
4.00E+00
5.00E+00
6.00E+00
7.00E+00
year
Soil:mice
Soil:deer
Total:mice
Total:coyote
Total:deer

Sandia Canyon PCB Simulation of Channel Alluvium using ECOTRAN