informal **memorandum**

TO: Distribution

DATE: November 1, 1994

FROM: Alison Dorries, TSA-11

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SUBJECT: **Polycylic Hydrocarbon (PCB) Guidance Draft**

Attached for internal review is the Assessment Council's first draft of a guidance document establishing a standardized process for evaluating PCBs at LANL potential release sites, written by John McCann. Please review and return your commented draft to Linda Nonno, MS M 769 by COB, Thursday, November 10. If you know of anyone not on the distribution list that may like to review the document at this time, feel free to let us know. Thank you.

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DRAFT

GUIDANCE FOR EVALUATION AND CLEANUP OF PCB s IN SOIL

for the

LOS ALAMOS NATIONAL LABORATORY ENVIRONMENTAL RESTORATION PROJECT

Prepared by:

ER Assessments Council

October 28, 1994

1.0 INTRODUCTION

The purpose of this guidance document is to establish a standardized process for evaluating LANL potential release sites (PRSs) contaminated with polychlorinated biphenyls (PCBs). The principal objectives of this guidance are to:

- Present the regulatory basis for characterizing sites and formulating alternatives designed to address PCB contamination in soils;

- provide Field Project Leaders (FPLs) and other task managers guidance in the investigation and remedy selection process for PCB-contaminated sites by determining screening action levels and the appropriate concentration of PCBs that can remain at a site under various use assumptions; and

- provide a basis for integrating the investigation and remedy selection process with the ongoing PCB material compliance program in place at the Laboratory. This program manages PCB inventories and spill cleanups around electrical equipment in strict compliance with requirements promulgated under the Toxic Substances Control Act (TSCA). **Becky, help here describing this program and the office/division that it is managed under.**

It should be noted that much of the material presented in this guidance document is in agreement with the position formally taken and communicated in a letter, dated May 19, 1992, written from Thomas C. Gunderson, former Environmental Management Division Leader, to Karl J. Twombly, Chief, DOE Environment, Safety & Health Branch, Los Alamos Area Office. The letter addressed PCB issues in detail and made Solid Waste Management Unit (SWMU) remedial action recommendations for PCB contaminated soil.

2.0 BACKGROUND

PCBs are complex chemical mixtures composed of two connected benzene rings with 1 to 10 chlorine atoms attached. The chemical, physical, and biological properties of these materials depend to a large degree on the amount and location of the chlorine atoms on the two benzene rings of each specific PCB and on the particular mixture of individual chlorobiphenyls that comprise the mixture. The CAS Number for PCBs is 1336-36-3. Important synonyms and trade names used include: chlorinated biphenyls, polychlorobiphenyls, Aroclor, Kanechlor, and Clophen.

PCBs are relatively inert, and therefore, persistent compounds in the environment with low vapor pressure, low water solubility, and high octanol/water partition coefficients. Reported adverse effects in humans exposed to PCBs include chloracne, impairment of liver function, a variety of

neurobehavioral and affective symptoms that include probable increased incidence of cancer. PCBs are carcinogenic in rats and mice, and in appropriate circumstances, may enhance the effects of other carcinogens. PCBs are bioaccumulated and can be biomagnified. Therefore, their eco-toxicity increases with length of exposure and position of the exposed species in the food chain.

PCBs are classified as B2; Probable Human Carcinogen. The basis for this classification are liver carcinomas in rats and mice. The carcinogenic oral slope factor for PCBs is 7.7 $(mg/kg\text{-}day)^{-1}$. This toxicity factor was used to calculate the environmental action levels and cleanup goals discussed in the following section.

3.0 SUMMARY OF REGULATIONS AND GUIDANCE GOVERNING THE MANAGEMENT OF PCB MATERIALS AND THE CLEANUP OF PCBs IN THE ENVIRONMENT

3.1 TSCA REGULATIONS

Regulations promulgated under the Toxic Substances Control Act (TSCA) provide requirements for PCB storage and disposal (40 CFR 761.60 - 761.79), and PCB spill cleanup policy (40 CFR 761.125 - 761.135). PCB storage and disposal regulations specify requirements based on PCB form and concentration. These regulations do not apply to PCBs at concentrations less than 50 ppm; however, PCBs cannot be diluted to escape TSCA requirements. Consequently, under TSCA regulations, PCBs that have been deposited in the environment after the effective date of the regulation (February 17, 1978) are treated, for the purposes of determining disposal requirements, as if they were at the concentration of the original material.

The TSCA PCB spill cleanup regulations apply to spills that occurred on or after May 4, 1987, the effective date of the regulation. The regulations establish PCB cleanup levels in soil and on solid surfaces based on concentration of PCBs in the soil, and the use of the property upon which the spill occurred. The most stringent spill cleanup level for soil is 10 parts per million (ppm). This level applies to non-restricted access property provided that the soil is excavated to a minimum depth of 10 inches and replaced with clean soil (defined as containing < 1 ppm PCBs). Cleanup levels ranging from 25 to 50 ppm in soil are specified for electrical substations, while a cleanup level of 25 ppm in soil is specified for other restricted access areas. The preamble to the TSCA Spill Policy states that the Policy does not affect cleanup requirements under other statutes (including RCRA Corrective Action). For instances in which more than one standard applies, the more stringent standard must be met. The preamble explains that TSCA cleanup levels were developed assuming exposures typically linked with sites having spills associated with electrical equipment. These sites may differ greatly from sites requiring corrective action under RCRA or CERCLA. Therefore, RCRA corrective actions may result in different outcomes depending on the type of PCB spill and ultimate land use of the site.

3.2 RCRA REGULATIONS

In 1990, the EPA proposed requirements under RCRA for corrective actions for SWMUs at facilities seeking a permit under Section 3005(c) of RCRA. The intent of this proposal was to create a new subpart of the RCRA Part 264 regulations (Subpart S) to define requirements for conducting RCRA Facility Investigations (RFI), Corrective Measure Studies (CMS), and implementing remedies at RCRA facilities [FR 55(145):30798, July 1990]. As part of the proposed rule, EPA established methodologies to calculate action levels to be used as triggers for further study {LANL refers to these action levels as Screening Action Levels (SALs)}. EPA clearly states that action levels are levels of contamination, which if exceeded, present a potential threat to human health or the environment and may require further evaluation. Action levels are not cleanup standards, which are determined later in the corrective action process. For PCBs in soil, which the Laboratory must address, the action level proposed in Subpart S and adopted by the ER Project, is 0.09 ppm.

It is important to note that despite the action level of 0.09 ppm listed for PCBs in soil, the preamble to Subpart S, Sections VI.E.2.f. and VII.B., refers to the TSCA cleanup standards described above and states that the EPA has determined that the use of TSCA standards as action levels and cleanup standards are relevant to RCRA corrective actions.

3.3 CERCLA GUIDANCE ON REMEDIAL ACTIONS FOR SUPERFUND SITES WITH PCB CONTAMINATION

EPA's "Guidance on Remedial Actions for Superfund Sites with PCB Contamination" (August 1990) recommends preliminary remediation goals (PRGs) for PCBs in soil of 1 ppm for residential sites and 10-25 ppm for industrial/remote sites. The primary application of PRGs is to provide long-term, risk-based targets to remedial design engineers for use during analysis and selection of remedial alternatives during early stages of the RI/FS process. PRGs, used either during or after the scoping process, are initial guidelines. PRGs do not necessarily establish levels to which eventual clean-up will be warranted. EPA states that the PCB PRG for residential sites corresponds to a 1 in 100,000 excess cancer risk, which EPA considers acceptable because it falls within the 1 in 10,000 to 1 in 1,000,000 risk range specified in the National Contingency Plan. The range of 10-25 ppm for industrial/remote sites was based on a qualitative estimate of reduced exposure under conditions other than residential.

4.0 RECOMMENDATIONS

In the ER Project, the dual regulatory requirements under RCRA and TSCA have resulted in confusion between action levels and cleanup levels that need to be followed for sites contaminated with PCBs. The challenge is to

recommend an approach that allows the ER Project to handle PCB-contaminated sites in a way that satisfies both RCRA and TSCA requirements.

The concentration of PCBs in soil above which some action should be considered will depend primarily on the exposure estimated in the action level derivation based on current and potential future land use, and on the presence of other environmental contaminants at the site. Other factors influencing the concentration to which soils should be remediated may include the impact that residual concentrations will have on groundwater and surface water, and potential environmental impacts. The potential for these other factors to impact soil concentration levels will be evaluated by the ER Project on a site-by-site basis. **Orrin, some discussion on ecological considerations and the threat to wildlife may be appropriate here. The bottom line still remains however, it will have to be addressed on a site-by-site basis.**

In addition to land use, type of release is a primary driver for evaluating sites contaminated with PCBs. In this document, a PCB-only release is defined as a site having PCB contamination only and of the type considered in developing TSCA requirements (i.e., release from electrical equipment). For PCB-only releases, ER Project personnel should notify the ESH-? PCB management team and handle the situation in strict compliance with TSCA requirements. Action levels have been derived to trigger further evaluation for release sites that contain contaminants additional to PCBs. Further evaluation is defined as the next steps to occur in the ER Project risk-based decision making approach to RCRA corrective action, and may include the performance of a baseline risk assessment or a CMS. A summary of the guidance developed in this Section is presented in the following Table.

Land Use	Type of Release	PCB Action Level PPM	Determination
Residential	PCB-Only	10	Cleanup Goal. If < 10 ppm - No Further Action.
	PCB + Others	1	Action Level. If > 1 ppm - further evaluation required.
Industrial	PCB-Only	25	Cleanup Goal. If < 25 ppm, No Further Action.
	PCB + Others	10	Action Level. If > 10 ppm - further evaluation required.

4.1 RECOMMENDATIONS FOR RESIDENTIAL AREAS OR OTHER PROPERTY TO BE RELINQUISHED BY DOE

For LANL sites remediated under the RCRA Corrective Action Project, the risk remaining after remediation should generally fall within the range of 10^{-4} to 10^{-6} individual excess cancer risk. Individual excess cancer risks less than 10^{-6} are not a concern for the ER Project. Based on the standard assumptions associated with residential land use, concentrations of 0.1 ppm to 10 ppm PCBs

generally fall within the protective range. A concentration of 1 ppm PCB approximately equates to a 10^{-5} excess cancer risk assuming no soil cover or management controls. The 1 ppm starting point for residential scenarios at sites with PCBs and other contaminants reflects a protective concentration for soils. This level is also consistent with the CERCLA guidance previously described. **Note: this proposed guidance, if accepted and approved, will require revising the existing SAL for PCBs from 0.09 to 1 ppm.**

The exception to this approach is LANL sites with PCB contamination only. For these sites, the LANL PCB management group should be notified and remediation based on strict TSCA compliance should be commenced. This approach is consistent with RCRA corrective action as the EPA considers TSCA standards to be relevant as previously described.

4.2 RECOMMENDATIONS FOR INDUSTRIAL (CONTINUED LABORATORY OPERATIONS) AREAS

For LANL sites or areas at which land use will remain under Laboratory operations control, 10 ppm is a more appropriate concentration at which to trigger further evaluation when other contaminants are present. This conclusion was derived because direct exposure is less frequent than in residential land use and higher concentrations will be protective. This level is still within the acceptable risk range (approximately 10^{-4}) when exposure equivalent to that in residential areas is assumed.

For those release sites under Laboratory control with PCB contamination only, a cleanup goal of 25 ppm is recommended. This level is consistent with the TSCA PCB Spill Cleanup Policy which recommends a cleanup level of 25 to 50 ppm for sites in industrial or other reduced access areas.

Table 3-5. PCBS Detected in Sludge Samples

Sample Location [a]	Mixed Aroclor, mg/kg	Aroclor 1242, mg/kg	Aroclor 1254, mg/kg	Total PCB
Subpart S Action Level	0.09			
1993 SAL	0.09			
40 CFR 761	10			
April 1992 Samples				
53-NE-C1-S	0.57	0.31	0.26	1.14
53-NE-Y-S	0.33	0.17	0.16	0.66
53-NE-Z-S	0.27	0.14	0.13	0.54

Notes:

(a) NE indicates northeast impoundment, C, Y, and Z indicate sample block locations shown in Figure 3-2, S indicates sludge sample.

(b) Shaded values are above proposed RCRA Subpart S action levels and 1993 SALs.

Table 3-10. Summary of Samples and Analyses

Sample	Type	Metals	Volatile Organics	Semivolatile Organics	Organochlorine Pesticides/PCBs	Chlorinated Herbicides	Reactive Cyanide/Sulfide	Gross Alpha	Gross Beta	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Strontium-90	Tritium
Duplicate Sludge, NE Impoundment	Vertical Composite	1	1	1	1	1	1							
Matrix Spike Sludge, NE Impoundment	Vertical Composite	1	1	1	1	1	1							
Sludge Samples, NW Impoundment (a)	Vertical Composite	29	29	29	29	29	29							
Duplicate Sludge, NW Impoundment	Vertical Composite	1	1	1	1	1	1							
Matrix Spike Sludge, NW Impoundment	Vertical Composite	1	1	1	1	1	1							
Liner Samples, NE Impoundment (a)	Vertical Composite	29	29	29	29	29		29	29	29	29	29	29	29
Duplicate Liner, NE Impoundment	Vertical Composite	1	1	1	1	1		1	1	1	1	1	1	1
Matrix Spike Liner, NE Impoundment	Vertical Composite	1	1	1	1	1		1	1	1	1	1	1	1
Liner Samples, NW Impoundment (a)	Vertical Composite	29	29	29	29	29		29	29	29	29	29	29	29
Duplicate Liner, NW Impoundment	Vertical Composite	1	1	1	1	1		1	1	1	1	1	1	1
Matrix Spike Liner, NW Impoundment	Vertical Composite	1	1	1	1	1		1	1	1	1	1	1	1
Sub-Liner Samples, NE Impoundment (b)	Grab, 18-24 in.	45	45	45	45	45		45	45	45	45	45	45	45
Duplicate Sub-Liner, NE Impoundment	Grab, 18-24 in.	2	2	2	2	2		2	2	2	2	2	2	2
Matrix Spike Sub-Liner, NE Impoundment	Grab, 18-24 in.	2	2	2	2	2		2	2	2	2	2	2	2
Sub-Liner Samples, NW Impoundment (b)	Grab, 18-24 in.	45	45	45	45	45		45	45	45	45	45	45	45
Duplicate Sub-Liner, NW Impoundment	Grab, 18-24 in.	2	2	2	2	2		2	2	2	2	2	2	2
Matrix Spike Sub-Liner, NW Impoundment	Grab, 18-24 in.	2	2	2	2	2		2	2	2	2	2	2	2

(a) See Figure 3-3 for sample locations.
(b) This number includes the 29 samples of the subsoil below the bentonite lilner plus up to a maximum of 16 samples of the subsoil below the gunite liner.

Table 3-10. Summary of Samples and Analyses

Sample	Type	Metals	Volatile Organics	Semivolatile Organics	Organochlorine Pesticides/PCBs	Chlorinated Herbicides	Reactive Cyanide/Sulfide	Gross Alpha	Gross Beta	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Strontium-90	Tritium
Phase I														
Sludge Samples, NE Impoundment	Grab, 0-6 in.							17	17	17	17	17	17	17
Duplicate Sludge, NE Impoundment	Grab, 0-6 in.							1	1	1	1	1	1	1
Sludge Samples, NW Impoundment	Grab, 0-6 in.							17	17	17	17	17	17	17
Duplicate Sludge, NW Impoundment	Grab, 0-6 in.							1	1	1	1	1	1	1
Total Sludge Samples								36	36	36	36	36	36	36
Water Samples, NE Impoundment	Grab							1	1	1	1	1	1	1
Duplicate Water, NE Impoundment	Grab							1	1	1	1	1	1	1
Water Samples, NW Impoundment	Grab							1	1	1	1	1	1	1
Duplicate Water, NW Impoundment	Grab							1	1	1	1	1	1	1
Rinsate Blank, NE Sludge Sampler								1	1	1	1	1	1	1
Rinsate Blank, NW Sludge Sampler								1	1	1	1	1	1	1
Rinsate Blank, NW Water Sampler								1	1	1	1	1	1	1
Total Water Samples								7	7	7	7	7	7	7
Phase II														
Sludge Samples, NE Impoundment (a)	Vertical Composite	29	29	29	29	29	29							

(a) See Figure 3-3 for sample locations.
(b) This number includes the 29 samples of the subsoil below the bentonite lilner plus up to a maximum of 16 samples of the subsoil below the gunite liner.

Table 3-10. Summary of Samples and Analyses

Sample	Type	Metals	Volatile Organics	Semivolatile Organics	Organochlorine Pesticides/PCBs	Chlorinated Herbicides	Reactive Cyanide/Sulfide	Gross Alpha	Gross Beta	Gamma Spectroscopy	Isotopic Uranium	Isotopic Plutonium	Strontium-90	Tritium
Total Sludge/Soil Samples		222	222	222	222	222	62	154	154	154	154	154	154	154
Rinsate Blank, NE Sludge Sampler		1	1	1	1	1								
Rinsate Blank, NW Sludge Sampler		1	1	1	1	1								
Rinsate Blank, NE Liner Sampler		1	1	1	1	1		1	1	1	1	1	1	1
Rinsate Blank, NW Liner Sampler		1	1	1	1	1		1	1	1	1	1	1	1
Rinsate Blank, NE Sub-Liner Sampler		2	2	2	2	2		2	2	2	2	2	2	2
Rinsate Blank, NW Sub-Liner Sampler		2	2	2	2	2		2	2	2	2	2	2	2
Total Water Samples		8	8	8	8	8		6	6	6	6	6	6	6

(a) See Figure 3-3 for sample locations.
(b) This number includes the 29 samples of the subsoil below the bentonite lilner plus up to a maximum of 16 samples of the subsoil below the g[illegible]te liner.