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**SAMPLING AND ANALYSIS PLAN ADDENDUM
FOR THE WESTERN DOG PENS REMOVAL ACTION**

at the

**LABORATORY FOR ENERGY-RELATED HEALTH RESEARCH
UNIVERSITY OF CALIFORNIA, DAVIS**

Prepared for:

United States Department of Energy
Oakland Operations Office
1301 Clay Street
Oakland, California 94612-5208

Prepared by:

Weiss Associates
5801 Christie Ave., Suite 600
Emeryville, California 94608-1827

December 12, 2001
Rev. 0

DOE Oakland Operations Contract DE-AC03-96SF20686

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Approvals Page

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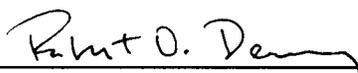
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December 12, 2001

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Figure 2.	Additional Western Dog Pens Proposed Sample Locations, LEHR Site, UC Davis, California

ACRONYMS

LEHR	Laboratory for Energy-Related Health Research
RA	removal action
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
WDPs	Western Dog Pens

1. SAMPLING AND ANALYSIS PLAN ADDENDUM

This Sampling and Analysis Plan (SAP) is prepared as an addendum to the *Dog Pens Removal Action Work Plan* (WA, 2001). Three confirmation samples collected from the Western Dog Pens (WDPs) removal action (RA) excavation had elevated chlordane concentrations. At the request of the Remedial Project Managers, these locations will be re-sampled. Additional samples will also be collected from the areas surrounding each "hot spot" to determine the extent of contamination. The objective of this sampling and analysis is to obtain additional information on the lateral and vertical extent of chlordane.

1.1 Background

Research at the Laboratory for Energy-Related Health Research (LEHR) from 1958 through the mid-1980s focused on the health effects from chronic exposure to radionuclides, primarily strontium-90 and radium-226. During this time period, beagles, the primary laboratory test animals, were housed in outdoor areas known as the WDPs.

The dogs were dipped in chlordane to control fleas from 1960 until 1968, when excess exposure to chlordane appeared to have impacted the health of the dogs (DOE archive records). Chlordane was also sprayed in and around the dog pens for additional flea control (Ballard, 1997). Chlordane use continued until the early 1970s with an annual usage estimated to be between 25 and 50 gallons (Dames & Moore, 1993).

Aisle 3 of the WDPs was used to store stockpiles containing chlordane-impacted soil from the Southwest Trenches. The soil stockpiles were generated during the Southwest Trenches RA in the summer of 1998, and were loaded for off-site hazardous waste disposal in the summer of 1999. During this loading process, residual soil was left on the surface of Aisle 3. The Aisle 3 asphalt, residual soil and underlying soil were removed during the 2001 WDPs RA. However, the confirmation sample with the highest combined concentration of alpha and gamma chlordane, sample SSWDC033, was located on the eastern side of Aisle 3 (Figure 1).

The original four rows of the WDPs contain sub-grade, gravel-filled trenches that are oriented in an east-west direction. Construction drawings indicate that these trenches contained a water line (WA, 2001). The gravel-filled trenches were not removed during the WDPs RA because they were sampled during the WDPs investigation and found to be free of radiological and chemical impacts. (WA, 2001). Samples SSWDC023 and SSWDC029, which had elevated concentrations of alpha- and gamma-chlordane, were collected from beneath two of these gravel-filled trenches (Figure 1).

1.2 Sampling Plan

Sample locations SSWDC023, SSWDC029 and SSWDC033 will be re-sampled to confirm the initial laboratory results. Additional samples will also be collected around these areas to further define the vertical and lateral extents of contamination at the three locations. A sample will be collected one foot below each of the original locations. Samples will be collected five lateral feet from sample SSWDC033 in all four compass directions, and five feet east and west from the locations for samples SSWDC023 and SSWDC029. Samples will not be collected north and south of these locations for samples SSWDC023 and SSWDC029, because it is assumed that any lateral migration of contamination would have been along the trench running in the east-west direction. The fourteen sample locations are shown on Figure 2.

1.3 Sampling Procedures

Prior to sample collection, a land survey crew will locate the three previously surveyed sample locations. The soil samples will be collected in accordance with LEHR Standard Operating Procedure (SOP) 3.1, Surface and Shallow Subsurface Soil Sampling. The sample container types are listed on Table 1. Sample chain-of-custody records will be prepared according to SOP 1.1, Chain of Custody. Sample handling, packaging, and shipping will be conducted in accordance with SOP 2.1, Sample Handling, Packaging and Shipping.

1.4 Analysis Plan

The fourteen soil samples will be analyzed for total alpha- and gamma-chlordane on a rush 15-day turn around time. The analytical methods and holding times are shown on Table 1.

1.5 Quality Control

Field duplicates will be collected at a rate of 10%. Two field duplicates will be collected and analyzed for total chlordane and alpha- and gamma-chlordane.

2. REFERENCES

- Ballard, Don, 1997, University of California at Davis (UC Davis), personal conversation with Alison Watts of Weiss Associates, October 8.
- Dames and Moore, 1993, Phase II Site Characterization Report for the LEHR Environmental Restoration, UC Davis, February.
- United States Department of Energy (DOE), Various DOE Records Archived at the Federal Records Center, 1000 Commodore Drive, San Bruno, California.
- Weiss Associates (WA), 2001, Dog Pens Removal Action Work Plan for the Laboratory for Energy-Related Health Research, University of California, Davis, June, Rev. 0.

TABLE

Table 1. Containers and Holding Times for Soil Laboratory Analytical Methods

Constituent	Analytical Method	Container and Volume	Holding Time
Chlordane	SW-846 Method 8081	G / 4 oz.	14 days to extraction, 40 days to analysis of extracts
Alpha- and Gamma-Chlordane	CLP SOW OLM 03.1	G / 4 oz.	14 days to extraction, 40 days to analysis of extracts

Abbreviations

G glass container
oz. ounces

FIGURES

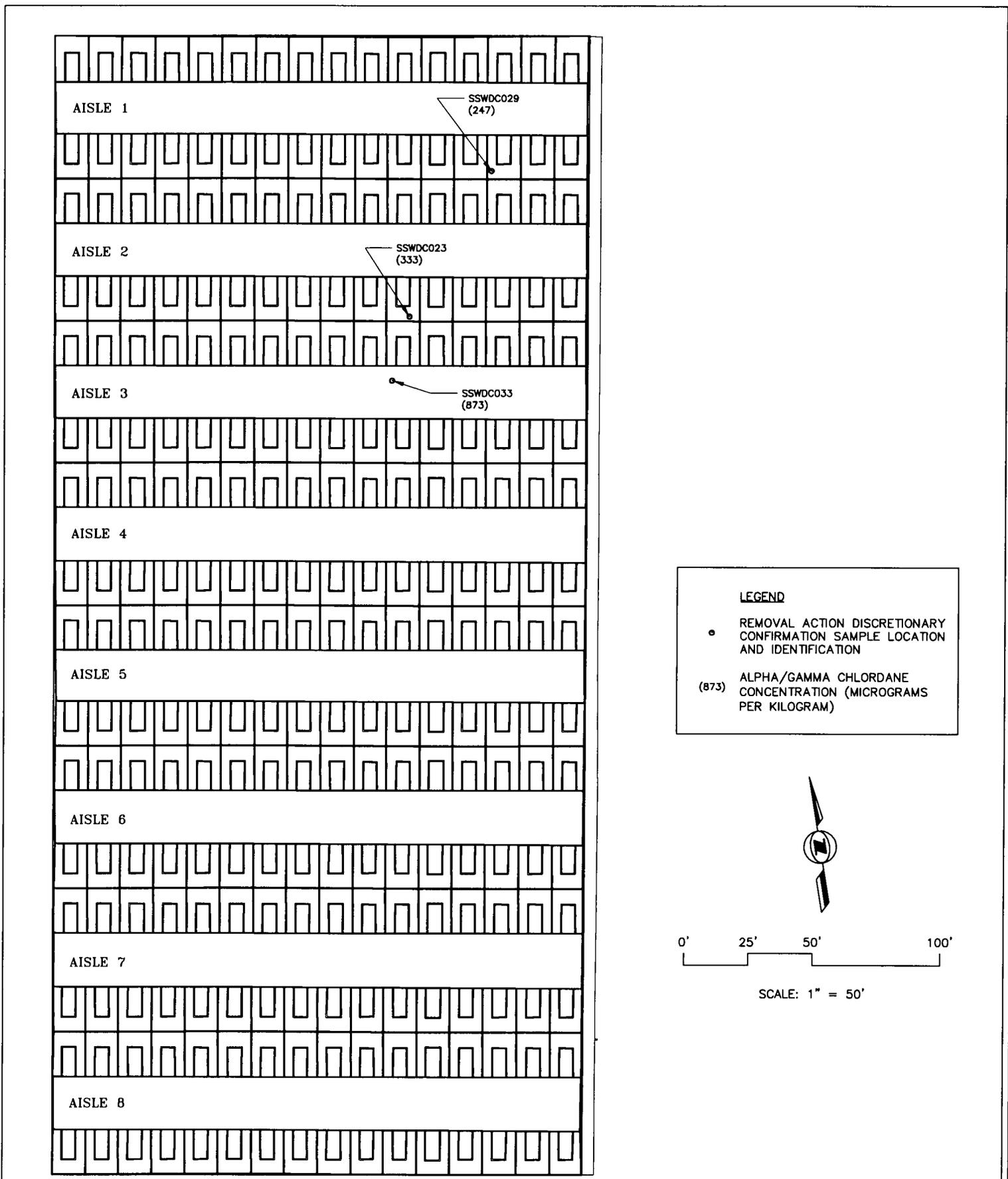
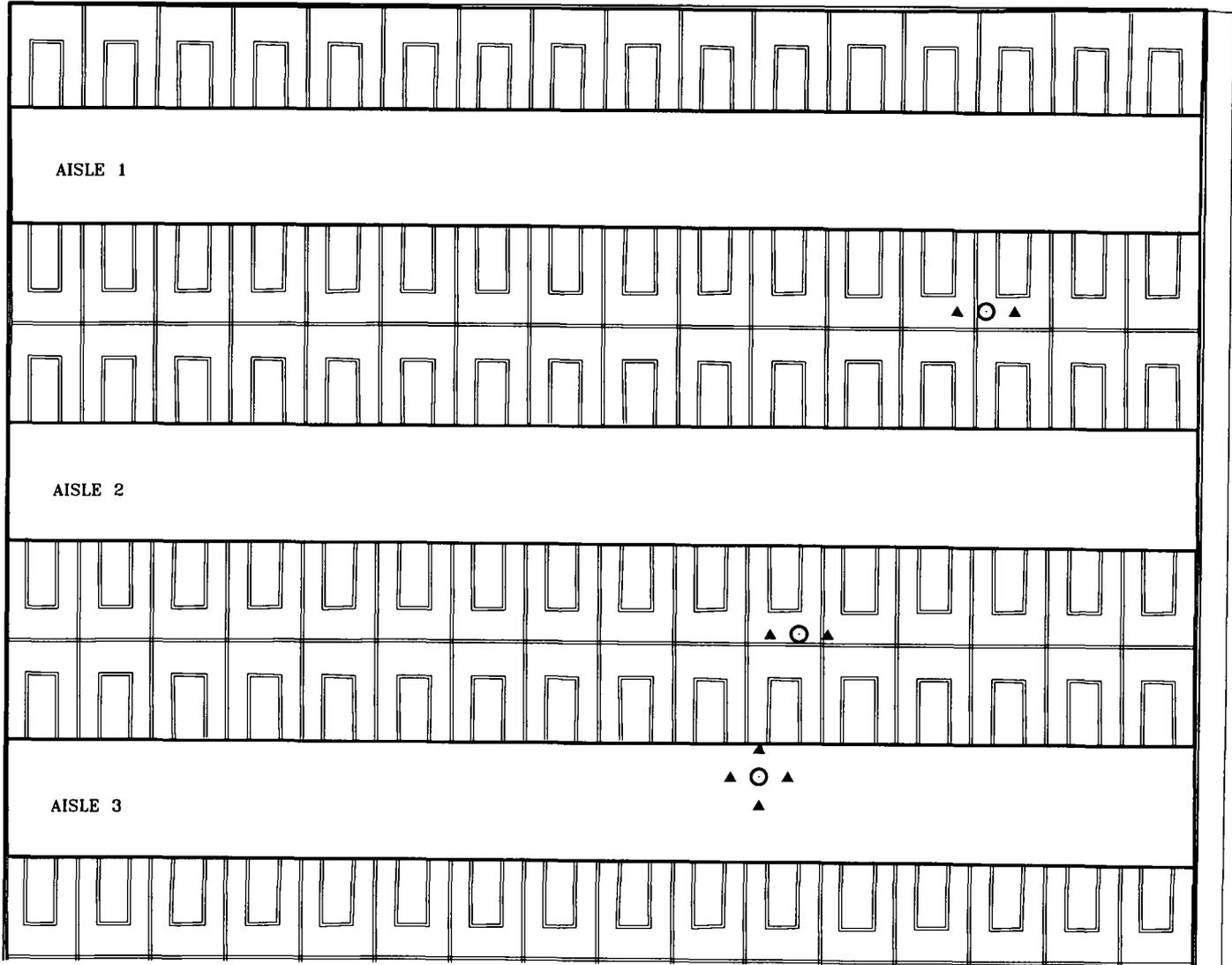


Figure 1. Western Dog Pens Confirmation Sample Locations and Chlordane Concentrations, LEHR Site, UC Davis, California



LEGEND

- REPEAT OF ORIGINAL CONFIRMATION SAMPLE LOCATION AND NEW SAMPLE 1 FT BELOW ORIGINAL SAMPLE LOCATION
- ▲ LATERAL SAMPLE LOCATION

A north arrow pointing upwards, with the letter 'N' inside a circle. Below it is a scale bar with markings at 0', 7.5', 15', 30', and 20'. Below the scale bar is the text "SCALE: 1" = 30'".

Figure 2. Additional Western Dog Pens Chlordane Sample Locations, LEHR Site, UC Davis, California