

***HUMBOLDT ROAD BURN DUMP
CONFIRMATION SAMPLING REPORT
CHICO REDEVELOPMENT AGENCY PARCELS
LOCATED EAST OF BRUCE ROAD***

Assessor's Parcel Numbers:

011-030-137

011-030-015

Prepared for:

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1.0 INTRODUCTION

1.1 Purpose of the Report

The purpose of this report is to document and summarize the confirmation sampling activities and results conducted on the parcels controlled by the Chico Redevelopment Agency (RDA) located east of Bruce Road that are included in the Humboldt Road Burn Dump (HRBD) remediation project, located at the intersection of Humboldt Road and Bruce Road in Chico, California, as shown in Figure 1: *Site Location Map*. For the purposes of remediation and confirmation sampling, the RDA parcels at HRBD were divided into two separate areas, west of Bruce Road (WBR) and east of Bruce Road (EBR). The RDA parcels were divided into these two separate areas for several reasons: (1) the difference in the nature and volume of waste, (2) the difference in the underlying soils, and (3) the difference in the condition of the parcels after remediation is concluded. Concerning this difference, the WBR parcels controlled by the RDA contained a thin veneer of waste material over unconsolidated clayey gravel, the waste material at WBR does not contain elevated levels of constituents other than metals, and after remediation is completed, the WBR parcels will not contain any waste cells or monitoring systems. In contrast, the EBR parcels controlled by the RDA contained a large quantity of waste material overlying volcanic bedrock. Testing of waste material EBR during the Remedial Investigation suggested that elevated levels of dioxins may be present in this area of the HRBD. After remediation is completed, the EBR parcels will contain the consolidation cell and several monitoring systems related to the cell.

For the purposes of confirmation sampling, the following three zones were identified for the EBR area:

- Zone 2E: The thin areas of exposed soil within the Public Rights-of-Way along the east side of Bruce Road and the north side of Humboldt Road that are located between the edge of the right-of-way and the edge of pavement.
- Zone 3: Includes all of the RDA parcels located east of Bruce Road. (APN 011-030-015 and 011-030-137).
- Zone 4: Sewer alignment; a twenty foot easement that runs the length of the sewer pipe.

The confirmation activities described in this report were conducted in the area east of Bruce Road. A separate report for west of Bruce Road was issued in early October 2005 (Humboldt Road Burn Dump Confirmation Sampling Report Chico Redevelopment Agency Parcels Located West of Bruce Road, Vector Engineering, Inc. , October 2005).

1.2 Project Description

Investigation and remediation of the HRBD are being conducted under California Assembly Bill 2061 (AB 2061), with the Regional Water Quality Control Board, Central Valley Region (RWQCB) as the Administering Agency. In 2001 and 2002 the City of Chico completed remedial investigations, a baseline risk assessment, and a feasibility study for the HRBD. In June 2003, RWQCB issued Cleanup and Abatement Order No. R5-2003-0707 to the parties potentially responsible for the site. In response to the Cleanup and Abatement Order, the RDA submitted a Remedial Action Plan to the RWQCB in April 2004. The remedial design package was submitted to RWQCB in October 2004. The Remedial Action Plan and the remedial design package submitted by the RDA address the six parcels at HRBD controlled by the RDA. Appendix H of the October 2004 Remedial Design Report

presents the details of the Confirmation Sampling Plan, which confirm that the remediation activities achieve the cleanup goals set forth in the Remedial Action Plan.

The Contractor, Performance Excavators, Inc. of San Rafael, California, excavated the waste material from the EBR area and transferred the material to an engineered landfill also located in the EBR area. Prior to the excavation, confirmation sampling was conducted along the Zone 2E and Zone 4 to determine what areas of the right-of-way and the sewer alignment, if any, required remediation. After excavation was completed, the Contractor conducted subsequent confirmation sampling of soil from the excavated areas of EBR. Vector Engineering, Inc. (Vector) observed the excavation and confirmation sampling after excavation was complete.

1.3 Confirmation Sampling Objectives

Confirmation sampling was conducted prior to and after excavation to establish that the EBR area had been remediated appropriately, and that residual concentrations of site-related constituents did not exceed the risk-based remediation goals (RBRGs) established for solid media (soil, sediment, and waste) at the site.

The objectives of the confirmation sampling were to:

- Confirm that waste was removed from all areas of EBR not designated as landfill;
- Use an iterative procedure to remediate and sample areas to achieve final acceptance;
- Collect and analyze samples using specific established requirements; and

- Document that residual concentrations of chemical of concern (COCs) were below the RBRGs or excavation was performed until bedrock was encountered in remediated areas.

The clean-up criteria for this project were:

- Verification that concentrations of site-related constituents in the confirmation samples are below the RBRGs, or
- Excavation to bedrock.

If sample concentrations exceeded the RBRGs, further excavation was conducted until the concentrations were below the RBRGs or the bedrock was encountered. The table below summarizes the RBRGs that were reported in the Feasibility Study Report (EMKO and Brown and Caldwell, 2002) and used as the clean-up criteria for EBR.

RBRGs FOR COCs

COCs	RBRG (mg/kg)
Lead	224
Arsenic	6
Dioxin (TEQ)	0.0005

During the Remedial Investigation, lead was the most frequently detected site-related constituent, and was the constituent detected at the highest concentrations relative to its RBRG. Because lead is considered the primary indicator of the presence of waste at the HRBD, all confirmation samples were analyzed for lead. During confirmation sampling, the analysis frequency for antimony, arsenic, and dioxin were matched with the frequency at which these constituents exceeded the RBRGs in the samples collected during the Remedial Investigation.

1.4 Personnel / Role

The following table lists the names and functions of all project participants.

ORGANIZATION/NAME	FUNCTION
Chico Redevelopment Agency – John Vonderhaar, P.E	Owner, Senior Construction Engineer/Inspector
EMKO Environmental, Inc. – Dr. Andrew Kopania	Owners' Representative, Regulatory Liaison
Brown and Caldwell – Linda Roe and Tom Fojut, P.E.	Design Engineer
Performance Excavators Principal: Mark Warner	Contractor
CSS Environmental Services – Terrance Carter	Confirmation Sampling – Subcontractor of Performance Excavators
Vector Engineering, Inc. – Bryan Fritzler, P.E. and Vince Suryasmita, P.E.	Construction Quality Assurance Consultant

1.5 Controlling Documents

The pertinent documents regarding confirmation sampling of the HRBD are:

- Brown and Caldwell: *Appendix H, Confirmation Sampling Plan, Humboldt Road Burn Dump, Chico, California, 2004.*
- *Revised - Sampling and Analysis Plan (SAP) – City of Chico – Humboldt Road Disposal Site and Remediation Project, Chico, CA,* prepared by CSS Environmental Services, Inc. for Performance Excavators, Inc. dated May 29, 2005. This document is attached in Appendix A.

2.0 SCOPE OF WORK - CQA CONFIRMATION SAMPLING

Vector implemented the following construction quality assurance (CQA) activities during the confirmation sampling, as required in the Confirmation Sampling Plan:

- Visual observation of the clean-up;
- Random selection of the sample locations for each zone;
- Observation of the Contractor's sampling activities for compliance with the SAP;
- Review of the analytical test results and chain of custody of the samples;
- Review of field Quality Control samples and CQA conformance samples; and
- Preparation of a final report documenting the results of the confirmation sampling.

2.1 Visual Observation of Clean-Up

Vector personnel were on site to observe and document the clean-up activities conducted by the Contractor, including excavation of impacted soil and waste, transfer of impacted material to the engineered landfill, confirmation sampling, and QA/QC sampling. Upon completion of excavation, the Contractor, Vector, and Brown and Caldwell performed a walk-through of the completed excavation to visually confirm that the excavation had been completed as per the project specifications. Based on their visual observations, all parties in the walk-through agreed that the excavation had in fact fulfilled these specifications.

2.2 Random Sampling Procedure

A random sample generating procedure (Super Cool Software Output Version 1.04) was used during the confirmation sampling of the HRBD site in order to select random sample sites at the three zones.

The random sampling program employs statistically random strategies that use a grid to select unbiased sampling points, as well as statistical tools to evaluate the results. These sampling strategies provide a 95% level of accuracy in identifying the absence or presence of “hot spots” in remediated areas. Grid intervals are calculated based on the length of the area to be included in the grid, and the size of the area to be remediated.

A 25-foot grid interval was selected for EBR. The individual nodes are identified by the Cartesian coordinate system (X-Y) with the origin located southwest of the project site, as shown in Figure 2: *Grid and Nodes for Possible Confirmation Sampling*. The grid was established by a surveyor prior to sampling and was maintained throughout remediation.

In Zone 2E, Zone 3, and Zone 4 there are a total of 84, 412, and 52 nodes, respectively. Based on the statistical procedures used for the confirmation sampling, 25 percent of the total number of nodes were selected as sampling locations. Therefore, Zone 2E contains 21 confirmation sampling points, Zone 3 contains 103 confirmation sampling points, and Zone 4 contains 13 sampling points, for a total of 137 confirmation sampling points in EBR. Results of random node selection of EBR are tabulated in Table 1: *Random Sample Locations for East of Bruce Road* and graphically presented in Figure 3: *Sample Locations for East of Bruce Road*.

Each of the sample nodes established at EBR were analyzed for lead, the primary site indicator. Based on the frequency of arsenic detections above the RBRG during the Remedial Investigation, 49 of the total sample nodes were analyzed for arsenic, all of which were selected from Zone 3. Based on the frequency of dioxin detections above the RBRG during the Remedial Investigation, 9 of the total sample nodes were analyzed for dioxin, all of which were also selected from Zone 3. Elevated

levels of antimony were not detected at EBR during the Remedial Investigation, so confirmation sampling for antimony was not conducted at EBR.

2.3 Observation of Sampling

Sampling was performed by CSS Environmental Services, Inc. (CSS) of San Rafael, California. Vector's personnel were present to observe the sampling procedures employed, to ensure that sampling was performed as outlined in the SAP. Vector's personnel observed that samples were taken at the appropriate sample locations using a sealed disposable polystyrene sterile scoop, were placed into a pre-cleaned sealed container (4-oz glass jar) supplied by the analytical testing laboratory, and were then immediately placed into a chilled container for shipment. Because a new sealed disposable polystyrene sterile scoop was used for each sample location, the need for decontamination procedures between each sampling was eliminated. Additionally, Vector's personnel reviewed the chain-of-custody records, sample labeling, and packaging for shipment. Copies of the chain-of-custody are presented in Appendix B. Based on its observation of the sampling activities, Vector confirmed that the samplings were performed in general conformance with the approved SAP.

2.4 Review of Results

Vector reviewed the results of the confirmation sampling and testing activities to verify that the randomly selected sample nodes within the EBR area had been sampled and analyzed. Results of our review are discussed in detail in Section 3 of this report.

2.5 Field Quality Control Samples

As required by the SAP, to produce data of known quality that satisfy the standard methods for analysis, the laboratory crushed and homogenized each sample prior analysis. To ensure that the laboratory had properly prepared the samples, selected homogenized samples were split and tested for quality assurance/quality control

(QA/QC). QA/QC samples consisted of matrix spikes/matrix spike duplicates (MS/MSD) and field duplicates. Results of MS/MSD are included in Appendix B and results of field duplicates are presented in Appendix C. Based on the data presented, the QA/QC procedures that were followed were in compliance with the approved SAP.

Additionally, as required by the Confirmation Sampling Plan, after homogenizing the samples, the laboratory sent one sample from EBR to a laboratory specified by the CQA Consultant. Duplicate of sample X36Y12 was sent to Frontier Analytical Laboratories. Test results are presented in Appendix C.

3.0 DISCUSSION OF SAMPLING AND TEST RESULTS

Sampling of Zone 2E was performed prior to the excavation activities. Twenty one samples were taken from this area on May 26, 2005. Results of this sampling are tabulated in Table 2: *Summary of Confirmation Sample Results for Zone 2E*. As shown in this table, 5 of the 21 samples indicated a higher lead concentration than the allowable value (224 mg/kg).

All five of the samples in Zone 2E that exceeded the RBRG were collected from the area located along the north side of Humboldt Road, east of Stilson Canyon Road. A significant amount of construction activity occurred in this area of the site, including the transport of waste material from other areas EBR. Therefore, although not all of the samples in Zone 2E along the north side of Humboldt Road, east of Stilson Canyon Road, contained elevated levels of lead, the entire area was excavated after waste removal activities were completed. Excavation occurred to the native soils or the native soil/bedrock interface. Photographs of the bedrock surface at the locations in Zone 2E where bedrock was encountered are included in Appendix C. These procedures satisfied the Confirmation Sampling Plan, therefore sampling in Zone 2E is deemed completed. Photographs taken on the last day of the site observation (November 8, 2005) of this area are presented in Figure 4.

Upon completion of the initial excavation in Zone 3, the first round of sampling was performed during the second and third week of July 2005. Results of these samplings are presented in Table 3: *Summary of Confirmation Sample Results for Zone 3*. As specified in the Confirmation Sampling Plan, additional samples (step-out samples) were collected from four nodes adjacent to the nodes with a higher concentration than the RBRG's, in order to define the extent of the impacted area that needed to be excavated. Results of the re-sampling are presented in Table 3. As per the design plan, in order not to damage the sewer line, no excavation was planned for the sewer line; therefore potential step-out samples located on the

sewer line were not collected. Based on the test results and/or the presence of bedrock, the extent of the contamination was outlined and excavated as specified in the Confirmation Sampling Plan.

The remediation plans call for the soils in the sewer line easement to remain in place during excavation to maintain the integrity of the sewer line. During excavation along the edge of the sewer line easement on the north side of the containment cell, a one to two-inch thick layer of ash was observed near the base of the vertical cut on both the north and south sides of the easement. The thin layer of ash is approximately three to four feet below the ground surface. The ash is not present within the trench excavated for the sewer line at the time it was installed or in the backfill within the trench. This ash material was not observed along the sewer line easement on the west side of the consolidation cell. The approximate extent of the waste material is shown on Figure 5 and the coordinates (California State Plane Coordinate) are:

N 8323 and E 47634

N 8503 and E 48046

N 8160 and E 47506

During excavation along Bruce Road, a similar thin layer of ash was observed at the base of the road base extending under the adjacent utility corridor. The approximate extent of the waste material is shown on Figure 5. The northern and southern edges, respectively, of the observed ash material along Bruce Road are defined by the following coordinates:

Northern Boundary: N 8125 and E 47252

Southern Boundary: N 8091 and E47289

Waste and soil abutting the backfill of the sewer line easement and the utility corridor along Bruce Road were excavated to a vertical plane in order to preserve the utility backfill and protect the utilities from damage. Residual ash was observed near the base of the vertical cut along portions of both easements. Consistent with the design plans and contract specifications and per an agreement with the RWQCB, the thin residual ash layer within the utility easements was left in place, and capped with soil during restoration of the utility backfill. The utility easements located within the site will be deed restricted and a Soil Management Plan will be prepared to address protection of construction workers during future maintenance activities on the utilities. Figure 5 shows the extent of the areas to be covered by the Soil Management Plan.

During sampling events on July 15, July 27, and August 5, 2005, Ms. Karen Clementsen of California Regional Water Quality Control Board (RWQCB) Central Valley Region also took several split samples in the field from the contractor's samples. Results for all samples collected in Zone 3, including field duplicate and RWQCB samples, which determine compliance with the project specifications, are summarized in Table 3. As shown in this table, all sample locations indicated values below the RBRGs, or were excavated to bedrock. Therefore sampling in Zone 3 is deemed completed.

Thirteen surface-soil samples were taken from the Zone 4 (sewer line) areas on June 1, 2005. Results of this sampling are tabulated in Table 4: *Summary of Confirmation Sample Results for Zone 4*. As shown in this table, all sample locations indicated values below the RBRGs. Therefore sampling in Zone 4 is deemed completed. As mentioned previously, in order to protect the sewer line, no excavation was performed in this area and some residual ash present at depth in this area was covered and protected. Photographs taken on the last day of the site observation (November 8, 2005) of this area are presented in Figure 6.

As the excavation was completed, final walk-through was performed by a representative of Brown and Caldwell (Linda Roe) and Vector's certifying engineer (Vince Suryasasmita, P.E.) on the completed areas. Based on their visual observations, both parties in the walk-through agreed that the excavation had been completed as per the project specifications. No residual waste or burn ash was visible on the excavation areas. In addition, no residual waste or burn ash was visible along the Bruce Road right-of-way and the Humboldt Road right-of-way in Zone 2E except from the areas noted above.

4.0 CONCLUSIONS

Based on Vector's (1) observation upon completion of excavation, (2) observation of sampling procedures during sampling, (3) observation of the procedures employed during re-excavation and subsequent re-sampling and/or the bedrock encountered, observation of the QA/QC procedures employed, and (4) analysis of the sampling results and photographs of the bed rock encountered as presented in this report, it is Vector's professional opinion that the Confirmation Sampling Plan in East of Bruce Road of the Humboldt Road Burn Dump was implemented in accordance with the SAP and RBRGs for this project.

This report was prepared in accordance with generally accepted engineering practices applicable at the time the report was prepared. Vector makes no other warranties, either express or implied, as to the professional advice provided under the terms of this agreement, and as described in this report.

VECTOR ENGINEERING, INC.



Vince Suryasmita, P.E. No. C49773
Certifying Engineer

