REDICK Daniel

From: Sam Imperati <samimperati@icmresolutions.com>
Sent: Saturday, October 15, 2022 11:33 AM
To: ewpitera25
Cc: REDICK Daniel; Benton County Talks Trash
Subject: FW: Pitera - Suggested Addition to Common Understandings Document
Attachments: coffin_butte_landfillRepublic Services Preso.pdf; CoffinButteROD(10-05).pdf

Ed,

Daniel will upload the attachments and also post email in memo format for context.

Then, all three will be put into a Subcommittee folder for vetting.

Thanks, Sam

ICM resolutions
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From: Edward Pitera [redacted]
Sent: Saturday, October 15, 2022 11:19 AM
To: Sam Imperati <samimperati@icmresolutions.com>; bentoncountytalkstrash@co.benton.or.us
Subject: Pitera - Suggested Addition to Common Understandings Document

In reviewing records of Coffin Butte available on the internet I ran across a 2008 RSI presentation that provides information on CB operations and a DEQ regulatory action that has impacted the development and operations at the site. Brief overviews of two documents are below. The documents filled in some blanks in my understanding of the situation at CB. Please consider including these classes of information as citations with a brief synopsis in the Common Understandings Document.

Key information highlights for me include:
RSI Presentation (July 2008)

- CB has received more than just Municipal Solid Wastes. Receipts reportedly include "Special Wastes" (a regulatory category which includes Asbestos, Industrial Waste, Environmental Cleanup Material, Contaminated Soil, Wastewater Treatment Plant (WWTP) Waste.
- CB collected 25 to 30 million gallons of leachate per year.
- Site appears to be regulated under the Resource Conservation and Recovery Act (a stringent Federal Law)

DEQ Record of Decision (ROD) (October 2005)

- In 2005, DEQ required the company to perform environmental remediation. Some aspects of the required remedies are:

  • Landfill closure and cover with an engineered cap on Cell 1A and parts of Cell 1. The eastern slope of Cell 1 will retain interim plastic cover until it is covered with the base liner of Cell 3D. The Closed Landfill will be maintained with soil.

  • Surface controls to prevent surface water run-on and infiltration of surface water through the waste, and to slow down the rate of cap erosion.

  • Access restrictions to areas of waste by fencing around the landfill units.

  • Leachate collection from Cell 1 and management by various strategies.

  • Landfill gas (LFG) collection from Cell 1 and its use for supplemental electricity generation.

  • Deed restrictions on property within the "locality of the facility" (LOF) to prevent development of the groundwater resource.

  • Decommissioning two water supply wells to prevent their future use.

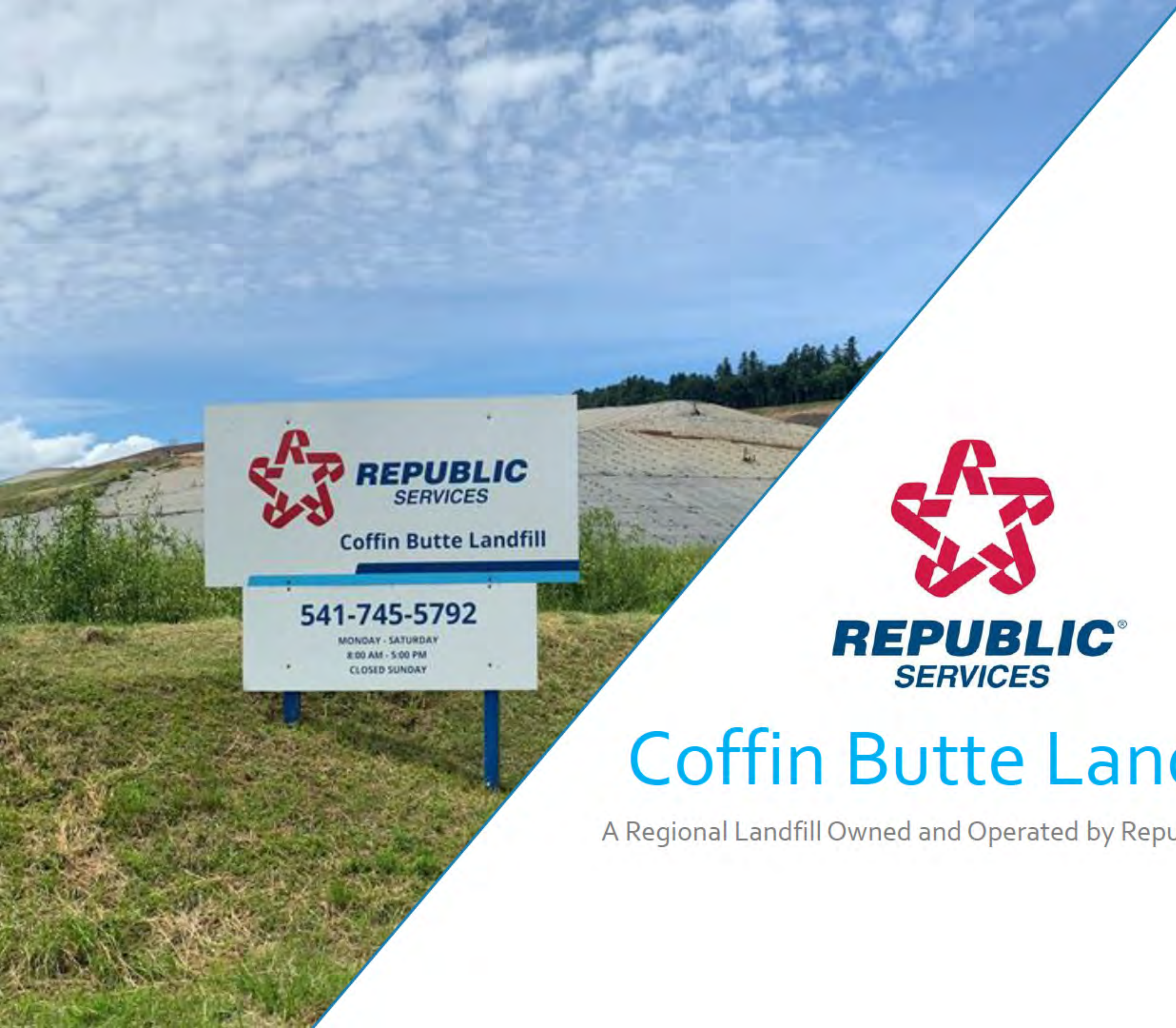
  • Property purchases as buffer around the landfill.

Examples of why this background information could be useful in a final report based on "Common Understandings" include:

- Puts some perspective on potential exposure to / burden on the public for leachate management. 25 to 30 million gallons per year equates to 50 to 100 tanker trucks per week on roads in the area. Updated information on leachate generation (examples: quantity, composition, seasonality) could put this situation in proper perspective.
- Receipt of "Special Wastes" raises questions to be answered about: what material is brought into the county; are the health risks / burdens the same as for receiving only MSW; is the funding for landfill post closure care adequate.
- The issue of CB land acquisitions impacting the availability of affordable housing in the county was raised on the 1 Oct 2020 Neighborhood Tour. The ROD seems to encourage property acquisitions by CB but closer reading of the ROD is needed to be sure.

There may be additional useful company presentations and DEQ records. A simple list of DEQ records with online access (much like what was done for County records) would be helpful.

Hope this helps,
Ed Pitera



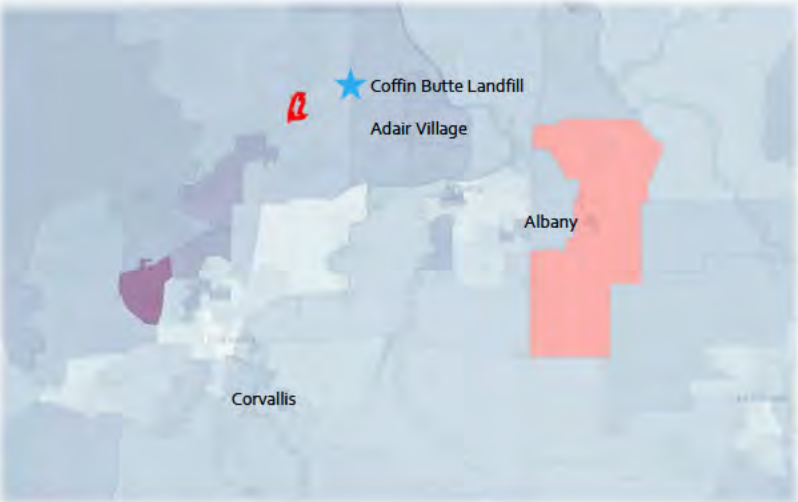
REPUBLIC SERVICES

Coffin Butte Landfill

A Regional Landfill Owned and Operated by Republic Services

Location

- 28971 Coffin Butte Road
- On Hwy 99 about 7 miles north of Corvallis
- Monday-Saturday, 8am-5pm
- Serves Benton, Linn, Polk, and Marion Counties



History

- WWII dump site – Camp

Adair 1944-45

- 40s – 70's – clay foundation laid
- 80s - Regional landfill, subtitle D, RCRA*

*The Resource Conservation and Recovery Act (RCRA) is the public law that creates the framework for the proper management of hazardous and non-hazardous solid waste. The law describes the waste management program mandated by Congress that gave EPA authority to develop the RCRA program.

- 2000 – Allied Waste Procured landfill
- 2008 – Allied Waste – Republic Services Merger

REPUBLIC SERVICES, INC.

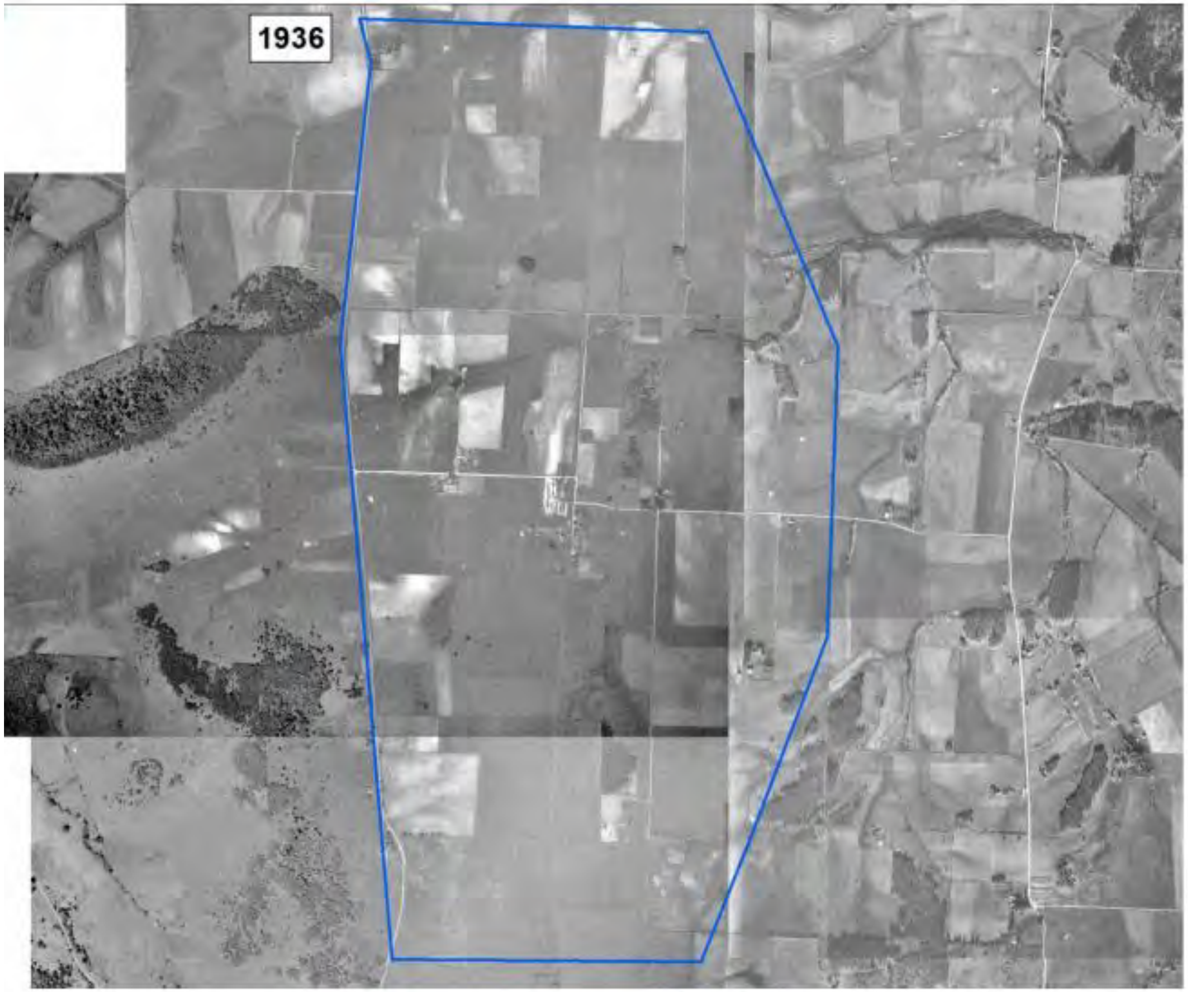
ALLIED WASTE

Creating an Environmental Services Leader

July 2008

REPUBLIC SERVICES

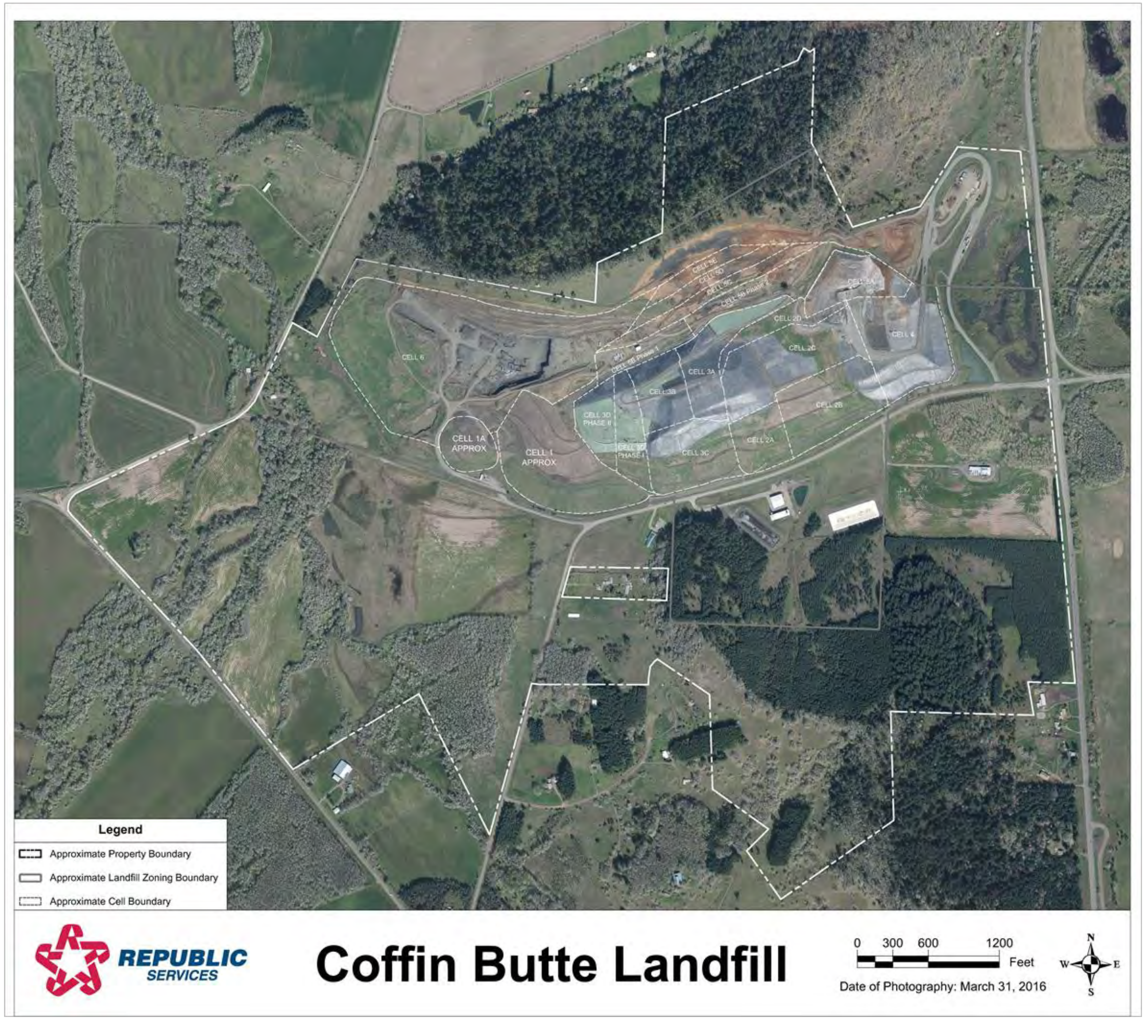
1936



1944

1955

Current

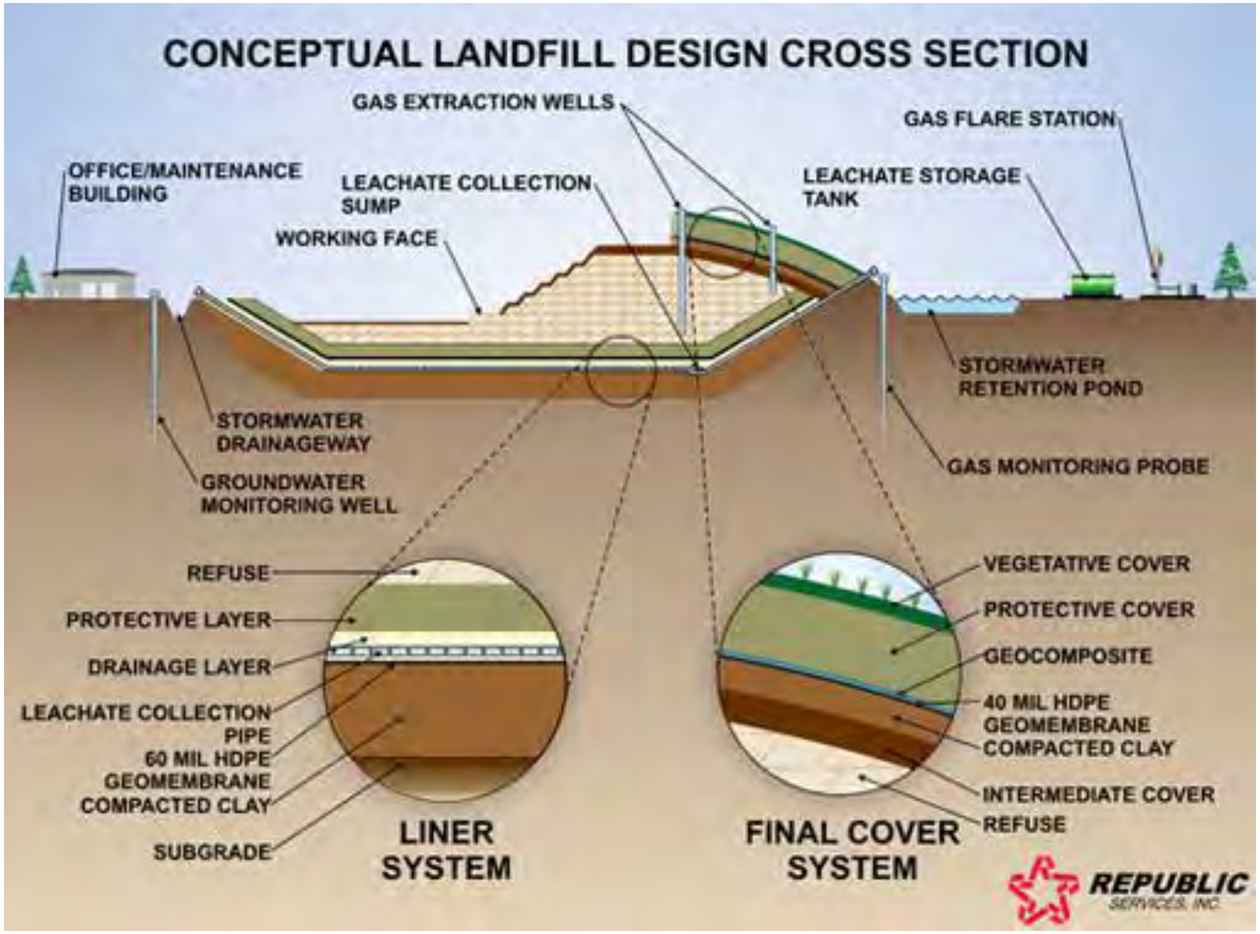

Legend
Approximate Property Boundary
Approximate Landfill Zoning Boundary
Approximate Cell Boundary
REPUBLIC SERVICES
Coffin Butte Landfill
0 300 600 1200
Feet
Date of Photography: March 31, 2016
N
W
E
S
CELL 1A APPROX
CELL 1 APPROX

What is a cell?

- Leachate collection
- Life span
- Cells
- Liner heat welded, pressure/stress test
- ADC

REPUBLIC SERVICES

Cell Design



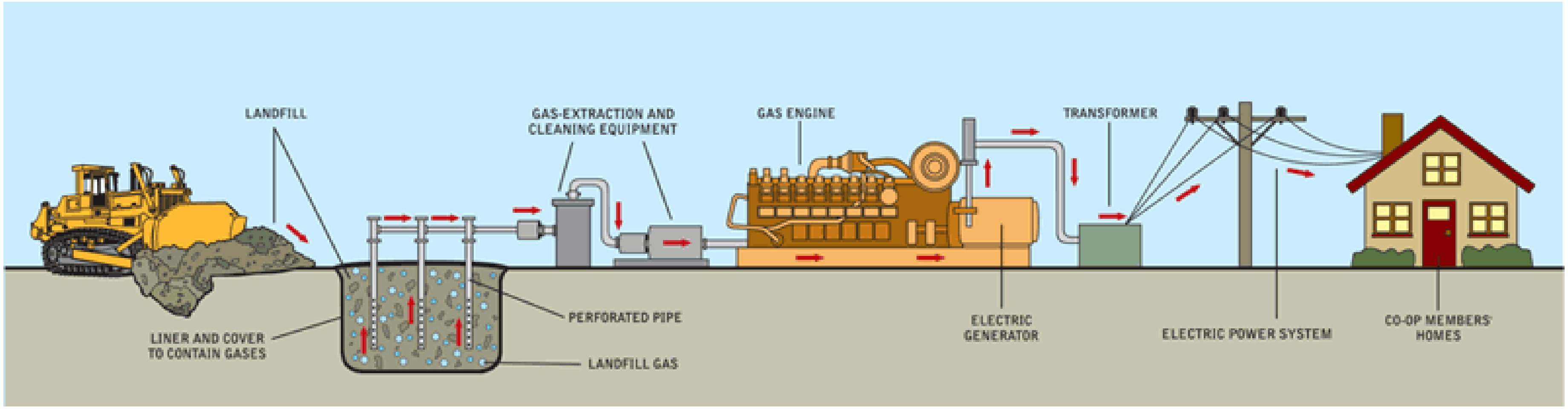
REPUBLIC SERVICES

Gas Collection System

- 275 Gas Collecting Wells located on Coffin Butte Landfill
- Gas goes to PNGC, energy co-operative.
- Landfill Gas collected powers 5 large generators.
- Enough gas is collected to power 4,000 homes annually.
- Coffin Butte was the second landfill in Oregon to install a gas collection system.
- A flair, located at the PNGC facility removes any excess gas.

REPUBLIC® SERVICES

Energy Generation



REPUBLIC SERVICES

Monitoring and Other Requirements

- Ground and surface/storm water
- Air quality
- ADC 12”
- Leachate collection/disposal

State of Oregon
Department of
Environmental
Quality

By the Numbers

Regional Landfill

- 780 acres in total
- Waste on about 250 acres
- 3 restored wetland areas
- 2 leachate collection ponds, collecting 25-30 Million gallons per year.

- 4,000 tons of waste per day
- 1,000,000 tons/year, including;
  - MSW: (Municipal Solid Waste)
  - C&D: (Construction & Demolition Waste)
  - Special Waste: Asbestos, Industrial Waste, Environmental Clean up, Contaminated Soils and sludge from waste water treatment plants.

REPUBLIC SERVICES

MSW & Special Waste

- Municipal Solid Waste
- Special Waste
  - Asbestos
  - Industrial Waste
  - Environmental Cleanup Material
  - Contaminated Soil
  - WWTP Waste

REPUBLIC SERVICES

Life Span and Future

Knife River: Currently mining our next cell on the West side of the landfill.

Life Span: *30 - 50 years
*Reducing, Reusing, and Recycling play a big role in extending the life span of Coffin Butte.

KNIFE RIVER
AN MDU RESOURCES COMPANY

REPUBLIC SERVICES

Recycling

- Commingle
- Glass
- Cardboard
- Tires*
- Oregon E-Cycles
- Car batteries
- Motor oil
- Appliances*
- Yard debris*
- Scrap metal

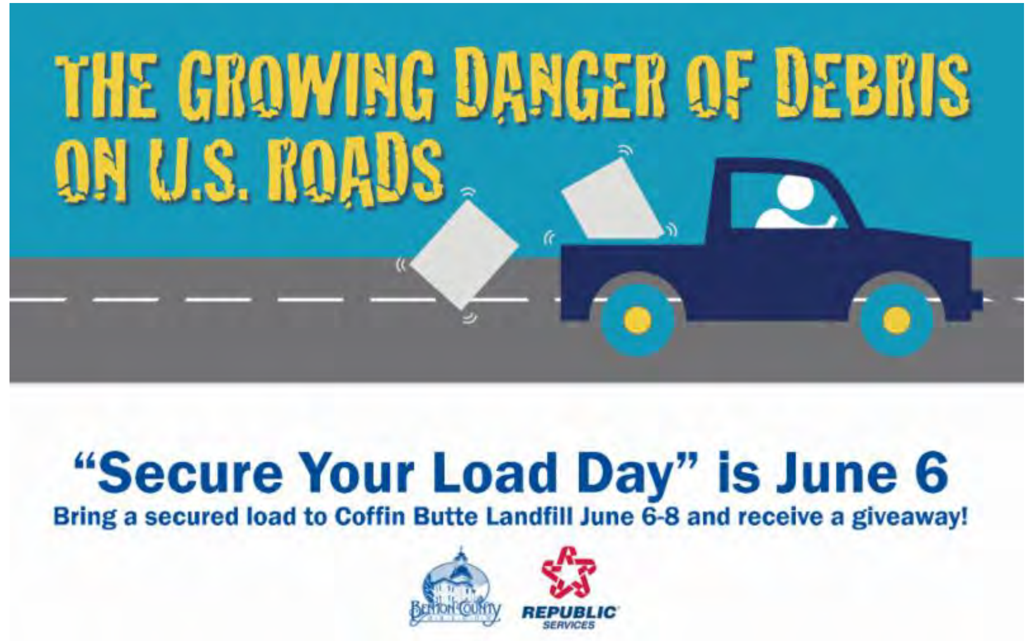
**for a fee*

REPUBLIC SERVICES

Beyond the Landfill

- Secure Your Load initiative – in partnership with Benton Count, Republic promotes the Secure your Load day, where customers who have properly secure loads receive a free rachet strap. Future Plans in the making.

- Litter Pickup – monthly Republic Services and Benton County employees work together to ensure the road near the landfill is clear of debris.



Questions?

RECORD OF DECISION

For

COFFIN BUTTE LANDFILL
Corvallis, Oregon

State of Oregon
Department of Environmental Quality

Prepared By

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY
Western Region Office

October, 2005

TABLE OF CONTENTS

1. INTRODUCTION

Coffin Butte Landfill, located at 28972 Coffin Butte Road, north of Corvallis, Oregon (Figure 1-1), underwent a series of groundwater investigations beginning in 1992 that characterized the site in response to a number of Oregon Department of Environmental Quality (DEQ) solid waste permit requirements. The principal objective of the investigations was to further characterize the hydrogeology and groundwater quality downgradient of inactive and active areas of the landfill where volatile organic compounds had been detected (EMCON, 1994a, 1996a, 1996b; DEQ, 1995). At the conclusion of the investigations, it appeared that the preventative actions taken in response to the discovery of these releases (such as capping, leachate collection, and landfill gas collection) were successful in reducing the amounts of chemicals further released from the landfill cells. Until now, however, DEQ had not formally accepted these preventative actions as the final remedy for the site.

DEQ has two primary sets of rules used to remediate contaminated sites. The Environmental Cleanup Rules (OAR 340-122 et seq.) focus on “hazardous” (e.g., solvents, heavy metals) substance remedial action, while the Groundwater Quality Protection Rules (OAR 340-040 et seq.) apply to both “hazardous” and “non-hazardous” (e.g., calcium, iron, nitrate) substances. Historically, remedial action at landfills in Oregon have been addressed using the Groundwater Quality Protection Rules via DEQ’s Solid Waste Program, whereas the majority of cleanups conducted in the state are accomplished using the Environmental Cleanup Rules via DEQ’s Cleanup Program.

Based on DEQ’s strategic efforts to better coordinate between programs, to provide consistent cleanup decisions across program boundaries, and to reduce the amount of duplicative efforts, DEQ is selecting a set of remedial alternatives so they are consistent with both regulations. In addition, we have closely coordinated this Selected Remedial Action with modifications to the existing solid waste disposal permit so that site-wide sampling and analysis is consistent with the recommendations in this document.

Because Valley Landfills, Inc. (VLI; owner of the Coffin Butte Landfill) recognizes that the landfill will be in place for a long period of time and is interested protecting human health and the environment to a greater degree than required by DEQ rules, they proposed to implement supplemental remedial options and to voluntarily adopt groundwater cleanup goals that will meet federal drinking water standards.

1.1 PURPOSE

This document presents the selected remedial action for the Coffin Butte Landfill. As discussed above, the remedial action was developed in accordance with Oregon’s environmental cleanup law and rules (Oregon Revised Statutes (ORS) 465.200 et seq. and Oregon Administrative Rules (OAR) Chapter 340, Division 122, Sections 010 through 115) and with Oregon’s Groundwater

Protection Act and Groundwater Quality Protection Rules (ORS, 468B.150 to 468B.190 and OAR 340-0040-0001 through -0060).

The selected remedial action is based on the administrative record for this site. A copy of the Administrative Record Index is attached as Appendix A. This report summarizes more detailed information contained in the Remedial Investigation (RI) and Additional Hydrogeologic Investigation (AHI) and supplemental reports, and the Focused Risk Assessment and Feasibility Study (RA/FS) completed under the Oregon Department of Environmental Quality (DEQ) Solid Waste Permit No. 306.

1.2 SUMMARY OF THE SELECTED REMEDIAL ACTION

The selected remedial action addresses the presence of volatile organic compounds (VOCs) in contaminated groundwater at the Coffin Butte Landfill. The existing remedial actions (e.g., landfill capping, leachate collection) implemented under the site's Solid Waste Disposal Permit are protective of present public health, safety, and welfare and the environment because there were no current unacceptable risks identified by the risk screening for the exposure pathways. However, to maintain a high level of protectiveness and to provide for further improvement in groundwater quality beyond the intent of the Groundwater Quality Protection Rules (GWQPRs), VLI voluntarily has supplemented these existing remedial actions with additional actions. The overall remedy employs the following existing and additional elements:

- Landfill closure and cover with an engineered cap on Cell 1A and parts of Cell 1. The eastern slope of Cell 1 will retain interim plastic cover until it is covered with the base liner of Cell 3D. The Closed Landfill will be maintained with soil.
- Surface controls to prevent surface water run-on and infiltration of surface water through the waste, and to slow down the rate of cap erosion.
- Access restrictions to areas of waste by fencing around the landfill units.
- Leachate collection from Cell 1 and management by various strategies.
- Landfill gas (LFG) collection from Cell 1 and its use for supplemental electricity generation.
- Deed restrictions on property within the "locality of the facility" (LOF) to prevent development of the groundwater resource.
- Decommissioning two water supply wells to prevent their future use.
- Property purchases as buffer around the landfill.

In addition to these actions, the solid waste permit requires groundwater monitoring downgradient of the landfill cells and LFG monitoring around the landfill cells and in structures to assess protectiveness between the landfill and potential receptors.

2. SITE HISTORY AND DESCRIPTION

2.1 SITE LOCATION

Coffin Butte Landfill is approximately 10 miles north of Corvallis, just west of State Highway 99W in Benton County (Figure 1-1). The landfill takes its name from Coffin Butte, a hill that rises north of the landfill to an elevation of over 700 feet above mean sea level (msl). Elevations in flat valley areas south of the butte are approximately 250 feet msl. Access is via Coffin Butte Road (oriented roughly east-west), which runs just south of the active landfill cells. The facility is in Section 18, Township 10 South, Range 4 West and Section 13, Township 10 South, Range 5 West, Willamette Meridian and Baseline.

2.2 SITE HISTORY

Landfilling first began in the 1940s by the Army as part of waste disposal for Camp Adair, just east of State Highway 99W. Waste was placed in a quarry on the southwest flank of Coffin Butte, where the landfill operated as an open burn dump (referred to as the "Closed Landfill"). Wastes were received in that area until approximately 1975, when VLI purchased the Coffin Butte site. In 1977, the Closed Landfill was officially capped with soil and closed. Subsequent landfill development progressed eastward across the site. Since 1975, VLI has filled in Cells 1A and 1, with most waste being placed in Cell 1 beginning in 1977. Cell 1A (approximately 4 acres) primarily handled waste from Teledyne Wah Chang and was not used for disposal after 1988. Cell 1 (approximately 30 acres) has a clay bottom liner and leachate collection system that conveyed the leachate to an adjacent holding pond. Placement of waste in Cell 1 stopped in early 1993, when cell 2B was constructed. Cell 1A has gone through final closure, and Cell 1 has been closed along the southern, central, and western parts. Interim cover will continue to blanket the eastern part of Cell 1 until it is tied into the western part of Cell 3.

Cells 1, 1A, and the Closed Landfill are collectively referred to as the west-side cells and the subject of this staff report. Active landfilling in Subtitle D-designed cells (Cells 2 and 3), is currently proceeding on the southeast slope of Coffin Butte in the east-side cells and is outside the area requiring remedial action. Figure 2-1 shows the facility layout and monitoring points.

2.3 PHYSICAL SETTING

2.3.1 Climate

The area receives approximately 42 inches of precipitation annually. The majority of the precipitation falls between November and March, with monthly totals during those months from 4.5 to over 7 inches, the highest typically occurring in January. The annual average temperature is approximately 52°F.

2.3.2 Hydrogeologic Setting

The landfill is situated along the south flank of Coffin Butte (Figure 2-1). The upper third (approximately) of the butte consists of steep grass-covered slopes, the middle third of exposed bedrock with little vegetation, and the lower third of gentle, soil-covered slopes. Generally, the steeper slopes are underlain by basalt bedrock and the lower, flatter slopes on the flanks of Coffin Butte are underlain by alluvium that generally consists of silty clay to clayey silt with variable amounts of thin, interbedded sands and silty to sandy gravels (commonly referred to as Willamette Silt). The lower slopes transition to relatively flat valleys where alluvium is transected by small drainages or creeks. Solid waste in Cells 1/1A and the Closed Landfill is generally inferred to rest on bedrock, which in places was lined with clay (e.g., in Cell 1).

There are two principal water-bearing units: unconsolidated alluvium and bedrock volcanics. Groundwater occurs in both units, although the alluvial deposits are absent or unsaturated over much of the site where landfill occurs. Where both units are present, they are not separated by a confining layer but are hydraulically interconnected. The two units are monitored separately by groundwater monitoring wells.

2.3.3 Groundwater Occurrence and Flow

Depth to groundwater depends on season and topography. In site wells, the groundwater depths range from over 80 feet below the ground surface midway up the slopes of Coffin Butte (in bedrock) to less than 5 feet in flat lowland areas southwest of the butte (in alluvium near the creek). Seasonal fluctuations vary, depending on the hydrogeologic position of the monitoring point. In 2002, the seasonal changes downgradient of Cells 1/1A averaged approximately 4 feet (consistent with past years), with the lowest groundwater elevations in late summer to fall and the highest in winter and spring.

The direction of groundwater flow is controlled by the topographic setting of Coffin Butte and Poison Oak Hill and the intervening low areas. Groundwater in the bedrock generally flows downslope from the hills until it reaches a groundwater divide near the southeast corner of Cell 1 and the leachate lagoon. At the divide, groundwater flows toward the east and west, generally following the long axes of the valleys. Groundwater flow direction in the saturated portion of the alluvium mimics the underlying bedrock. In areas dissected by surface drainages, groundwater in the upper part of the alluvial aquifer discharges to surface creeks (such as Soap Creek) and during the summer months provides base flow. Near upland areas, groundwater in bedrock also can provide base flow to surface creeks. In Soap Creek, between sampling points S-2 and S-4, weathered basalt bedrock is exposed in the stream bed just below alluvial sediments.

Groundwater contours for the western part of the site are illustrated on Figure 2-2. Horizontal gradients measured downgradient of Cells 1 and 1A in 2002 were between 0.01 and 0.002 foot per foot. This results in estimates of groundwater velocity downgradient of Cell 1 between 40 to 180 feet per year (ft/yr) in the spring and 50 to 240 ft/yr in the fall. Downgradient of the Closed Landfill, groundwater velocity estimates range in the alluvium from less than 10 up to 500 ft/yr, and in bedrock from 400 to over 1,900 ft/yr.

3. RESULTS OF INVESTIGATIONS

3.1 CHRONOLOGY OF SITE INVESTIGATIONS

Coffin Butte Landfill underwent a series of groundwater investigations beginning in 1992 that characterized the site in response to a number of DEQ solid waste permit requirements. The principal objective of the investigations (referred to as RI/AHI) was to further characterize the hydrogeology and groundwater quality downgradient of inactive and active areas of the landfill where VOCs had been detected. After submitting the RI and AHI report (EMCON, 1994a), the DEQ suspended review by the solid waste program until the agency's site assessment section (SAS) could review past reports on Coffin Butte Landfill and determine if the groundwater impacts related to the landfill posed a significant threat to public health, safety, welfare, or the environment. The SAS completed its review in July 1995, at which time it provided findings of its review and recommendations (DEQ, 1995). Subsequent investigations in response to the SAS review and comments on the original RI report included a Preliminary Assessment (EMCON, 1996a) that discussed the source and extent of groundwater impacts downgradient of the closed landfill and a revised addendum to the RI (EMCON, 1996b), which focused on supplementing findings and conclusions for the area downgradient of Cells 1 and 1A, and the leachate lagoon.

3.2 NATURE AND EXTENT OF CONTAMINATION

The following discussion, which is based on the 2002 annual report (McKenna Environmental, 2003), focuses on defining the locality of facility (LOF). The data set relevant to the discussion can be found in Appendix A of the RA/FS (Tuppan Consultants, 2003).

3.2.1 Cells 1 and 1A

Groundwater quality along the compliance boundary[1] of Cells 1 and 1A has been relatively stable the past few years. Downgradient of Cell 1A, VOCs that continue to be detected include chloroethane, *cis*-1,2-dichloroethene (*cis*-1,2,-DCE), 1,1-dichloroethane (1,1-DCA), and vinyl chloride. Each of the VOC concentrations has peaked and stabilized or is declining, with some no longer being detected (e.g., chloroethane and vinyl chloride in MW-10D). Downgradient of Cell 1, tetrachloroethene (PCE) had been routinely detected in well MW-12S, and since 1994 had shown an upward trend. In October 2000, the concentration peaked at 25 micrograms per liter (µg/L). Since then, concentrations appear to have stabilized between 17 and 27 µg/L. Trichloroethene (TCE) is also still being detected in MW-12S at concentrations up to 3.4 µg/L.

[1] The term "compliance boundary" is defined in OAR 340-0040 as the "vertical plane along the waste management area boundary". The current solid waste permit uses the following interim compliance wells to monitor the compliance boundary: MW-1D, MW-3D, MW-10S, MW-10D, MW-11S, MW-11D, MW12S, and MW-12D. Groundwater quality in the vicinity of the closed landfill will be monitored for compliance at wells MW-20 and MW-21.

Approximately 300 to 400 feet downgradient of the compliance boundary, groundwater quality shows a distinct improvement in detection wells MW-17 through MW-19. VOCs have not been detected in these wells indicating attenuation between the compliance boundary and the downgradient detection wells.

With respect to inorganic compounds, groundwater in this area is characterized by elevated concentrations of dissolved metals (e.g., calcium and magnesium), chloride, and total dissolved solids (TDS) downgradient of Cell 1A and low concentrations of inorganic compounds downgradient of Cell 1. Trace metals concentrations are low to nondetect in this area, both along the compliance boundary wells and in the detection wells farther downgradient.

3.2.2 Closed Landfill

The Closed Landfill is monitored by two detection wells: one completed in the alluvium (MW-20), and one completed in bedrock (MW-21). Of three historically detected VOCs in MW-21, *cis*-1,2-DCE has not been detected since May 1995, 1,2-dichlorobenzene has been nondetect the last three years, and chlorobenzene declined to nondetect in 2001. No VOCs have been detected in MW-20 since 1995.

For inorganic compounds, the alluvial well typically shows variable water quality associated with seasonal fluctuations of the water table. Water quality for the indicator parameters such as chloride has trended downward the last ten years and is currently stable. The bedrock well does not exhibit seasonal fluctuation. Trace metals in groundwater downgradient of the Closed Landfill have been low to nondetect throughout the history of monitoring, and do not suggest trends related to landfill-related impacts.

3.2.3 Surface Water

Surface water is monitored upstream (S-1) and downstream (S-2) in Soap Creek to test for potential impacts from the west side of the facility. Historically, inorganic parameters (chloride, Ca, Mg, and sodium [Na]) show seasonal changes in concentration as great as 8 mg/L (e.g., for chloride), with low concentrations in April (high stream flow) and higher concentrations in October (low stream flow). There are no statistically significant differences between upstream and downstream points for those parameters, with most concentration differences less than 1 mg/L. Inorganic water quality between the two monitoring stations is virtually identical and suggests that discharge of groundwater (from both the alluvium and bedrock) to Soap Creek does not affect surface water quality.

3.3 LOCALITY OF FACILITY (LOF)

Delineation of the LOF is based on the extent of impacts and potential migration pathways of site-related chemicals for each affected environmental medium. The LOF for a particular environmental medium includes both the current extent of hazardous substances and the projected future extent if chemicals are expected to migrate. Groundwater is the only medium of concern at the Coffin Butte Landfill. Surface water in Soap Creek is unaffected by the more mobile and higher concentration inorganic compounds, and therefore was eliminated as a medium of concern. VLI owns all of the property within the proposed LOF.

Downgradient of Cells 1/1A, the LOF in groundwater is defined by the distribution of VOCs. Detection wells MW-17, -18, and -19, where VOCs are not present and inorganic compounds are similar to background, define the downgradient limits of impacts. The static to declining VOC concentrations in compliance wells at the edge of waste indicate that the VOC plume has stabilized and is not expected to migrate farther downgradient with time. Therefore, the LOF is drawn between the set of compliance and detection wells.

Southwest and downgradient of the Closed Landfill, VOCs are present in MW-21, but not in MW-20. However MW-20 has in the distant past had isolated detections of VOCs and is affected by landfill-related inorganic compounds. Both of these wells were therefore included in the LOF. The downgradient extent of the LOF in groundwater terminates just northeast of Soap Creek, which is not included in the LOF because it does not show impacts from the landfill

3.4 LAND AND BENEFICIAL WATER USE

3.4.1 Land Use

The LOF is zoned Landfill Site (LS) and Exclusive Farm Use (EFU). The LS zone recognizes the existing landfill and quarry operations in the Coffin Butte area, and allows for its continued use pursuant to DEQ permits, Benton County Code Chapter 23, and an approved Site Development Plan. As defined by Benton County, the EFU zone preserves and protects lands for continued and future commercial agricultural production and related uses, and conserves and protects open space, wildlife habitats, and other uses associated with agriculture. On the basis of LS zoning as defined in the comprehensive plan, and the need to maintain adequate buffer consisting of EFU downgradient of the landfill, the future land use of the LOF is not expected to change.

3.4.2 Beneficial Water Use

Groundwater is currently used by two residences in the area, as well as by the landfill office and scale house for water supply. The status of these current water supply wells, as well as former water supply wells as shown in Figures 2-1 and 2-2, are listed as follows:

- A production well (PW-2) supplies the scale house washroom and is located on the east flank of Coffin Butte. The "Berkland" well supplies water to the landfill office. Both wells are owned by VLI and outside of the LOF, and are classified as non-transient community wells, certified and tested under the drinking water program overseen by Benton County Health Department and the state Department of Human Services.

- The “Merril” well, owned by VLI and outside of the LOF, is used for irrigation of the lawns at the office.
- An older production well (PW-1), located at the southwest corner of Cell 1, was decommissioned in May 2004.
- The “Duplex” well is used as an observation well for groundwater levels only.
- A domestic well, referred to as the Helms well, is southwest of Soap Creek (outside the LOF) and will be used on a short-term basis. This well will be decommissioned as a part of the selected remedial action.

The only other domestic well south of the property is the Phillips well, which is used for domestic supply and limited irrigation during the summer months. Hydraulically, the Phillips well is downgradient of Poison Oak Hill and across a groundwater drainage divide that protects the well from groundwater that could potentially migrate from the landfill. The Phillips well is also outside the LOF.

The primary aquifer is basalt bedrock. The alluvium can also provide limited domestic production. In addition to providing beneficial uses via well pumping, the alluvial and bedrock groundwater discharges to Soap Creek and contributes to the beneficial uses (such as habitat of aquatic life, recreational activities, and the aesthetic appeal of the rivers) of that creek and downstream tributaries.

3.5 RISK ASSESSEMENT

3.5.1 Conceptual Site Model

The impacted medium of concern has been identified as groundwater. Based on the identified medium of concern and reasonably likely future land and water use, the potential receptors were identified as current and future on-site occupational workers, trenchworkers or trespassers by volatilization of VOCs from groundwater to outdoor or indoor air. One building is present within the LOF, a scale house, which consists of a trailer placed above and separated from the ground by an air space.

Use of groundwater for domestic or industrial purposes is not reasonably likely within the LOF or even within the buffer property downgradient of the LOF, which is owned by VLI. Outside the LOF, domestic and limited summer time irrigation groundwater use occurs at the Phillips well; however it is protected from the landfill impacts by a groundwater drainage divide. Groundwater will be used at the Helms wells for a limited duration at which time it is planned for decommissioning, tentatively in September 2006. There are no other nearby receptors outside the LOF that could potentially be exposed to groundwater from the landfill.

3.5.2 Chemicals of Potential Concern (COPCs)

Chemicals of potential concern (COPCs) were identified to evaluate risks for human and ecological exposure scenarios that may be currently complete and to select chemicals that would act as surrogates for tracking improvement in water quality and for setting long-term water quality goals. Groundwater COPCs are listed below. No COPCs were identified for surface water.

- **VOCS.** COPCs were identified on the basis of detections that exceeded the October 2002 EPA Region 9 preliminary remediation goals (PRGs) for tap water: 1,4-dichlorobenzene (1,4-DCB), chloroethane, PCE, TCE, and vinyl chloride.
- **Trace Metals.** Cadmium was identified as a COPC for trace metals on the basis of exceeding the PRG, even though it also occurs naturally up to 0.69 µg/L. Arsenic was identified as a COPC because it occurs naturally at the site and is potentially mobilized in landfill conditions.
- **Dissolved Metals.** Iron and manganese exceeded secondary maximum contaminant levels (SMCLs) in groundwater and were identified as COPCs by exceeding those criteria for aesthetics.
- **Inorganic Compounds.** Chloride and TDS were identified as COPCs, also by exceeding criteria for aesthetics.

3.5.3 Human Health Data Screening Evaluation

The only pathways by which human receptors may be exposed to landfill-related chemicals involve migration of VOCs to either outdoor air or indoor air. Human receptors are unlikely to have direct contact with impacted groundwater, and it is unlikely that these exposure conditions will change in the foreseeable future. To evaluate potential risks that occupational workers may experience if they were to inhale VOCs that have migrated to outdoor or indoor air, the maximum concentrations of COPCs in groundwater were screened against generic risk-based concentrations (RBCs) calculated for volatilization to outdoor air and vapor intrusion into buildings in the DEQ's Risk Based Decision Making Guidance (DEQ, 2003). RBCs not shown in that document for chloroethane and 1,4-DCB were calculated using spreadsheets provided in that guidance. No other COPCs identified (neither inorganic nor metals) volatilize and therefore were not considered further in screening the receptor pathway.

The use of maximum concentrations in groundwater represented a highly conservative screen. None of the concentrations exceeded the screening values and therefore concentrations of VOCs in groundwater are within acceptable risk values. No other chemicals or exposure scenarios were identified in the conceptual site model.

Comparison of COPC Concentrations with RBCs

Compound	Maximum (µg/L)	Outdoor Air RBC (µg/L)	Indoor Air RBC (µg/L)
1,4-Dichlorobenzene	2.1	15,000	4,300
Chloroethane	7.2	30,000	5,100
Tetrachloroethene (PCE)	27	8,600	1,300
Trichloroethene (TCE)	3.9	650	110
Vinyl chloride	5	6,200	840

3.5.4 Ecological Scoping Assessment

The ecological scoping assessment (ESA) was completed in accordance with *Oregon Department of Environmental Quality, Guidance For Ecological Risk Assessment, April 1997.* The ESA found that terrestrial wildlife can potentially contact volatile chemicals that migrate from groundwater to either outdoor air or the air of a burrow. In general, the VOCs and inorganic compounds measured at elevated levels in groundwater at the site have little potential to bioaccumulate in ecological food chains. VOCs tend to rapidly dissipate once present on the surface, and tend not to accumulate in plant or animal tissues. Similarly, if impacted groundwater were to enter Soap Creek, it is possible that aquatic and benthic organisms could contact chemicals in surface water or sediment pore water. Available evidence indicates that these potential ecological exposure scenarios are either incomplete or insignificant. As a result, no further ecological evaluations were completed.

3.5.5 Hot Spot Determination

Oregon cleanup rule OAR 340-122-080(7) requires the identification of “hot spots” of contamination. The rules also require that the remedial action selected for a site treat hot spots to the extent feasible (OAR 340-122-090(4)). Based on the results of the environmental investigations and the risk assessment, no hot spots were identified at the site.

4. REMEDIAL ACTION OBJECTIVES AND CLEANUP LEVELS

4.1 Remedial Action Objectives

Remedial action objectives (RAOs) are media-specific goals for protecting human health and the environment. They provide the framework for developing and evaluating remedial action options. RAOs developed for the landfill are based on those typical for municipal landfill sites and will maintain protectiveness currently present at the site and attend to further improvements in groundwater quality needed to meet proposed remedial action concentration limits (RACLs). For Coffin Butte, RAOs include:

- Preventing direct contact with landfill contents.
- Reducing contaminant leaching to groundwater.
- Preventing exposure to contaminated groundwater.
- Controlling surface water runoff and erosion.
- Collecting and treating leachate.
- Controlling and treating landfill gas.

4.2 Remedial Action Concentration Limits (RACLs)

The site does not pose an unacceptable risk on the basis of identified exposure pathways and concentrations of constituents in groundwater, and for that reason would not necessarily require establishing cleanup levels with the existing remedy in place. However, VOCs and inorganic compounds have affected groundwater quality within the LOF and, therefore, DEQ and VLI agreed that RACLs would be established as the mechanism to measure progress in cleanup of the site.

With the existing remedy being protective, the presumption of setting a RACL is based on the hypothetical and unlikely exposure scenario of domestic use within the LOF. Current ownership and anticipated institutional controls limiting the future residential development on VLI-owned property that buffers the landfill will make it extremely unlikely for domestic use to occur. However, in keeping with a restoration goal to protect groundwater beneficial uses of the highest quality, drinking water standards were selected. The selection is premised on a number of factors. Establishing drinking water standards as RACLs is consistent with OAR-340-40-050(2), which states that concentration limits for existing facilities can be established at any level between background water quality and the numerical groundwater quality reference levels or guidance levels listed in Tables 1 through 3 of the GWQPR. Second, Federal solid waste regulations (CFR 258.55[h]), specifically note that corrective actions at landfills should meet a groundwater protection standard, which should be set at the maximum contaminant levels

(MCLs) for those constituents for which MCLs have been promulgated under the Safe Drinking Water Act. Lastly, MCLs provide concentrations that are consistently measurable at achievable reporting limits with reliable analytical methods.

For these reasons, drinking water MCLs and secondary MCLs have been established as RACLs at the site. Parameters are shown in Table 4-1 with the relevant RACL. In addition to the COPCs listed, additional RACLs are designated for metals commonly tested at the landfill and for which primary drinking water MCLs are established. These additional metals are included because the objective of the cleanup strategy is to maintain concentrations of all potential contaminants at the site that may be present in leachate or waste under drinking water standards.

Table 4-1: Remedial Action Concentration Limits

Compound	RACL	Basis	COPC
Volatile Organic Compounds (µg/L)			
1,4-Dichlorobenzene (1,4-DCB)	75	MCL/RL	Yes
Chloroethane	—	—	Yes
Tetrachloroethene (PCE)	5	MCL	Yes
Trichloroethene (TCE)	5	MCL/RL	Yes
Vinyl chloride	2	MCL/RL	Yes
Trace Metals (µg/L)			
Antimony	6	MCL	No
Arsenic	10	MCL	Yes
Barium	1,000	RL	No
Beryllium	4	MCL	No
Cadmium	5	MCL	Yes
Chromium	50	RL	No
Lead	50	RL	No
Nickel	100	MCL	No
Selenium	10	RL	No
Silver	50	RL	No
Thallium	2	MCL	No
Dissolved Metals (µg/L)			
Iron	300	SMCL	Yes
Manganese	50	SMCL	Yes
Inorganic Compounds (mg/L)			
Chloride	250	SMCL	Yes
Total Dissolved Solids (TDS)	500	SMCL	Yes
Basis: The lower of either Federal primary Maximum Contaminant Level (MCL) or State Reference Level (OAR 340-040-0020, Tables 1 through 3).			
SMCL: Secondary MCL.			
COPC: Chemical of Potential Concern			
RACL: Remedial Action Concentration Limit			

5. DESCRIPTION OF REMEDIAL ACTION ALTERNATIVE

The remedy for Coffin Butte Landfill's west side is an aggregate of elements already in place and new actions. This section summarizes the extent of actions already implemented at the landfill, and describes the technologies, both existing and proposed, that will comprise the landfill remedy. A full description of technologies is provided in the RA/FS.

As allowed by OAR 340-40-040(4)(a) and consistent with 340-0122-0085(1), development and evaluation of the remedial action option was limited to the substantive elements already implemented at the landfill as supplemented by other readily accepted and reliable measures typically incorporated in landfill remedies under CERCLA (USEPA, 1991).

5.1 Background of Actions Implemented to Date

Primary elements of the remedy are the result of site operations since landfilling first began over 50 years ago. As a result of the progression in site development (described in Section 2.2), the following technologies have been employed in site operations as part of permit requirements.

- Landfill closure and cover with engineered cap has been performed on Cell 1A and parts of Cell 1. The eastern slope of Cell 1 will retain interim plastic cover until it is covered with the base liner of Cell 3D. The Closed Landfill was covered with soil in 1977.
- Surface controls to prevent surface water run-on and infiltration of surface water through the waste, and to slow down the rate of cap erosion.
- Access restrictions to areas of waste by fencing around the landfill units.
- Leachate collection from Cell 1 and management by various leachate control strategies.
- Landfill gas collection from Cell 1 and use for supplemental electricity generation.

5.2 Elements of Landfill Remedy

This section will describe the specific actions either planned or already taken at the landfill that comprise the different elements of the remedy. A number of these are termed presumptive by the USEPA for landfills since they are associated with containment, which the USEPA presumes is an appropriate response action for landfills. The presumptive remedy for landfills relates primarily to containment of the landfill mass and collection and/or treatment of LFG. In addition, measures to control landfill leachate are commonly employed.

5.2.1 Access Restrictions

Access restrictions at landfills are intended to prevent or reduce exposure to on-site contamination. The two types of access restrictions most used at landfills included deed restrictions and fencing.

Deed restrictions. VLI currently owns the property on which landfill is placed as well as property downgradient of the landfill that contains the LOF. Since contamination associated with the landfill is primarily in groundwater, the intent of the deed restriction is to prevent future use of groundwater for domestic consumption or for any other use. The area south of Coffin Butte Road up to wells MW-17, MW-18, MW-19, and P-8 will be restricted with respect to future construction of water supply wells. For this type of restriction, a DEQ-approved "Easement and Equitable Servitude" will be applied.

Other mechanisms to protect the integrity of the cap of the closed cells already are a standard part of permit operating conditions and do not require imposition of further restrictive covenants.

Fencing. Fencing is used to physically limit access to the landfill site. It is currently in place along Coffin Butte Road to prevent access to Cells 1/1A and the Closed Landfill, particularly where gas collection is active (Cell 1) and to prevent the public from accessing roads that lead to the rock quarry, uphill of the landfill.

5.2.2 Containment

Containment refers to technologies that isolate the landfill contents and mitigate off-site migration through the use of engineering controls such as surface controls and capping.

Surface Controls. Surface controls consist of grading and revegetation. At Coffin Butte, runoff from the site flows down to the perimeter of the landfill. Cell 1 and areas west of Cell 1 drain to the west towards Soap Creek. As part of operations required by the solid waste and stormwater permits, the Coffin Butte Landfill regularly maintains adequate grading to achieve these objectives and to segregate surface water from the active or closed areas of the landfill from surface water that originates at the rock quarry.

Revegetation stabilizes the soil surface of the landfill site, promotes evapotranspiration, decreases erosion of the soil by wind and water, reduces sedimentation in stormwater runoff, and improves the aesthetics of the landfill. Areas that have undergone final closure, Cell 1A and parts of Cell 1, have been planted with shallow rooted grasses. The soil cover on the Closed Landfill has naturally revegetated with grasses and small shrubs.

Landfill Cover. Three types of cover are currently employed at the Coffin Butte Landfill. 1) Interim cover will be used along the eastern slope of Cell 1 until that side of the landfill is covered by the base liner of Cell 3. The interim cover is constructed of plastic fabric that is secured in place with ropes and sandbags to provide ballast. 2) Native soil caps are used to prevent erosion, to prevent direct contact with the waste, and to provide a vegetative layer. The soil that covers the Closed Landfill was constructed in 1977 and is currently well vegetated with native grasses and shrubs. 3) Single barrier landfill caps are the final covers over Cell 1A and the west and south half of Cell 1. These caps, which are designed to reduce surface infiltration, prevent direct contact, limit gas emissions, and control erosion, incorporate a 60-mil geomembrane barrier layer overlain by a 12-inch granular drainage layer and 18 inches of planted vegetative soil. For Cell 1, which is a municipal solid waste cell, a gas-relief layer was also installed below the geomembrane.

5.2.3 Leachate Collection

Leachate from landfills is a product of natural biodegradation, infiltration, and groundwater migrating through waste. The function of the leachate collection and removal system is to minimize or eliminate the migration of leachate away from the solid waste unit.

Leachate Collection. Leachate collection is usually accomplished with a liner system under the landfill. No lining system exists under the Closed Landfill that was closed in 1977 or under Cell 1A. A limited clay liner and leachate collection system exists under Cell 1, which was constructed in 1977. The Cell 1 collection system collects approximately 1.6 million gallons of leachate per year based on flow meter data reported by site personnel.

Leachate Treatment. The current leachate management strategy employed by the landfill uses four methods to manage leachate:

- **Recirculation.** Leachate is spray-irrigated onto the waste mass of active landfill cells in accordance with a DEQ-approved plan. Leachate recirculation has been used in a pilot program for bioreactor landfills consistent with the project objectives of accelerated waste degradation and gas production.

- **Spray Evaporation.** Leachate within the leachate surge ponds can be spray evaporated within the pond during hot summer months in accordance with a DEQ-approved plan.

- **POTW.** Leachate is trucked to the publicly operated treatment works (POTWs) at the cities of Albany and Corvallis throughout the year. The primary limitation to this method is that the cities are not willing to commit to long-term contracts whereby trucking to the POTW is the only treatment option. This option is used continuously throughout the year, but can be restricted by the POTW depending on the time of year and available plant capacity.

- **Treatment at LTF.** The leachate treatment facility (LTF) treats leachate based on the principle of direct and reverse osmosis. The system was installed during the 1997-98 winter, and began treating leachate by June 1998.

5.2.4 Landfill Gas Control

Landfill gas (LFG) is produced naturally when organic material from a landfill decomposes. Some of the byproducts of this decomposition are methane, carbon dioxide, and other trace gases, including VOCs. Therefore, landfill gas migration via the air pathway poses a health and safety concern for Cell 1. Landfill gas control is governed by existing solid waste regulations and operations for its collection and treatment are overseen by the DEQ. At Coffin Butte, LFG is collected from Cell 1 and the east side cells (e.g., Cells 2 and 3) and then delivered to a gas-to-electric (GTE) plant that produces electricity.

5.2.5 Water Well Removal

Decommissioning water wells within the LOF or in areas potentially downgradient of impacts removes potential exposure to contaminants in groundwater. Two wells currently proposed for decommissioning include PW-1, which is within the LOF, but currently unused, and the Helms well, which is outside and downgradient of the LOF. The Helms well will be used (with carbon filter unit) until September 2006 at which time it will be disconnected from use and scheduled for decommissioning.

5.2.6 Property Purchase

Property purchase near the landfill is an effective means of preventing groundwater use and minimizing land uses not compatible with landfill operations. Such purchases can have a secondary benefit of providing additional buffer area around the landfill and long-term access to groundwater monitoring wells. As property adjacent to the landfill property comes on the market, VLI will pursue negotiations with the owners to buy the property. Properties of current interest to the VLI include the Phillips property south of the landfill and the small rectangular piece of property immediately west of the Closed Landfill, east of Wiles Road.

6. EVALUATION OF REMEDIAL ACTION ALTERNATIVE

This section reviews basic evaluation criteria from OAR 340-040-0050 and 340-122-090 and then describes how the remedy meets each requirement. Table 6-1 summarizes how remedy elements address evaluation criteria.

6.1 OVERVIEW OF EVALUATION CRITERIA

The criteria defined below were used to evaluate the remedy elements described in Section 5. OAR 340-122-090(1) and (2) provide that the remedy should accomplish the following:

- Protect present and future public health, safety, and welfare, and the environment.

- Is based on balancing of remedy selection factors such as effectiveness, long-term reliability, implementability, implementation risk, reasonableness of cost

OAR 340-40-050(1) provides that the remedy should accomplish the following:

- Protect present and future public health, safety, and welfare, and the environment.

- To the maximum extent practicable, be cost effective, use permanent solutions and alternative technologies or resource recovery technologies, be implementable, and be effective.

6.1.1 Protectiveness

Protectiveness considers the present and future public health, safety, and welfare and the welfare of the environment. Since none of the concentrations exceed screening levels for receptors identified in the conceptual site model, the actions already taken at the site are protective.

However, to advance the objective of improving aquifer water quality consistent with general policies of the groundwater quality protection rules, RACLs were developed as water quality goals for the site. So, even though concentrations of contaminants are above the RACLs, the remedy is still considered protective because residual risk is adequately managed and exposure to contaminants is prevented.

Protectiveness was also considered in the context of implementation risk. Implementation risk is potential adverse impacts to the community, workers, or the environment while the remedy is being implemented (e.g., construction hazards or release of contamination to the environment). This is discussed as it relates to ongoing operations and maintenance (O&M) and for other planned actions such as decommissioning water supply wells.

6.1.2 Balancing Factors

The selected remedy must meet, to the maximum extent practicable, the requirements, criteria, preferences, and factors defined in OAR-340-40-050. These include:

Cost Effectiveness/Reasonableness of Cost. Cost was not considered in this evaluation because most of the remedy elements have already been implemented. The remaining remedy elements with ongoing O&M costs are considered in long-term planning or closure budgets that are financed by the landfill.

Permanent Solutions and Alternative Technologies or Resource Recovery Technologies. The remedial action was evaluated with respect to its use of permanent solutions or alternative technologies in addition to any added benefits of transport and treatment of contaminated materials off site.

Implementability. The ease or difficulty of implementing the remedy was evaluated against the following criteria:

- Practical, technical, and legal difficulties and unknowns associated with the construction and implementation of a technology, engineering control, or institutional control.

- Expected operational reliability of the technology.

- Need to coordinate with and obtain necessary approvals or permits from other agencies.

- Availability of necessary services, materials, equipment, and specialists.

- Available capacity and location of needed treatment, storage, and disposal services.

- Any other information relevant to implementability.

Implementation Risk. As explained above, this factor includes evaluation of the potential risks and the effectiveness and reliability of protective measures related to implementation of the remedial action, including the following receptors: the community, workers involved in implementing the remedial action, and the environment; and the time until the remedial action is complete.

Effectiveness/Long-Term Reliability. Effectiveness is the remedy's ability to achieve the RAOs. Effectiveness was evaluated against the following criteria:

- Expected reduction in the toxicity, mobility, and volume of the contaminant substances.

- Length of time until full protection (i.e., achieving RAOs) is achieved.

- Magnitude of residual risks in terms of amounts and concentrations of contaminant substances remaining following implementation of a remedial action.

- Type and degree of long-term management required, including monitoring, and O&M.

- Long-term potential for exposure of human and environmental receptors to remaining contaminants.

- Long-term reliability of engineering and institutional controls, including long-term uncertainties associated with land disposal, treated or untreated waste, and residuals.

- Potential for failure of the remedy or potential need for replacement of the remedy.

- Any other information relevant to effectiveness.

6.2 EVALUATION OF PROTECTIVENESS

The remedy is presumed to be protective if it achieves the RBCs specified for exposure scenarios under the conceptual site model. Using this criterion, the existing remedy satisfies the requirement for protectiveness consistent with OAR 340-40-050(5) and OAR 340-122-0040.

Moreover, the measures taken and proposed in the remedy should ultimately result in groundwater concentrations well below the RBCs specified; consequently the remedy can be considered more protective and therefore preferable over one of no action. Overall, a high level of protectiveness is provided by the remedy elements in the following manner:

- Restricting access by fencing and maintaining a cover over the landfill contents prevents personal contact.
- Minimizing generation and infiltration of leachate to groundwater by capping the landfill and collecting/treating leachate reduces groundwater impacts and associated potential for exposure at downgradient locations.
- Limiting the use of groundwater by deed restrictions within the LOF prevents the hypothetical exposure to contaminants through domestic use of groundwater.
- Collecting and treating LFG removes potential migration of contaminants to groundwater and minimizes the potential migration and accumulation of LFG to nearby properties or buildings where it could stress vegetation or create hazardous conditions.
- Decommissioning water supply wells within the LOF or on adjacent property removes potential exposure to groundwater.
- Purchasing nearby property adds a buffer zone, thereby minimizing uses that are incompatible with landfill operations and increasing the safety zone of the landfill.

In addition to these remedy elements, groundwater and LFG monitoring will be conducted according to solid waste permit requirements. Monitoring LFG in site structures provides an additional degree of protectiveness to the remedy. Monitoring the groundwater provides both early warning of potential off-site contaminant migration as well as documents aquifer restoration and performance of the remedy in meeting RACLs.

6.3 EVALUATION OF BALANCING FACTORS

6.3.1 Cost Effectiveness/Reasonableness of Cost

As stated in section 6.1.2, cost was not considered in the evaluation. The only additional cost to the proposed remedy is for decommissioning water supply wells, instituting deed restrictions to prevent future water wells, and property purchase. Costs associated with other elements of the remedy having to do with O&M are considered in long-term planning and closure budgets that are financed by operations of the active landfill.

6.3.2 Permanent Solutions and Alternative Technologies or Resource Recovery Technologies

To the extent practicable, the remedy employs permanent solutions or alternative technologies. Capping landfill Cells 1/1A with a final cover provides a permanent solution given routine inspection and maintenance of the cover. Continual removal of leachate and LFG are reliable technologies but only permanent as long as they operate. Performance monitoring of the systems will help achieve this goal. Leachate treatment strategies involve alternative technologies such as landfill recirculation and direct/reverse osmosis, and transport and treatment of contaminated material off site which help expedite cleanup. Conversion of LFG to electricity can be considered recovery of a resource.

6.3.3 Implementability/Implementation Risk

The remedy is considered easy to implement. Because the majority of the engineering controls are in place, the implementation risk is low.

Practical, technical, and legal difficulties. Difficulties and unknowns are few. Each of the technologies already in place or proposed to be implemented have been used before with success. Property purchase depends on the willingness of the seller to negotiate; however, over the long-term the landfill will continue to purchase buffer property. Institutional controls are easy to implement since VLI owns the property where the controls are proposed.

Expected operational reliability of the technology. Landfill cover, leachate removal and treatment, and LFG collection and treatment are all reliable with routine inspection and maintenance of the equipment. The degree of reliability of institutional controls is high since they will be enacted on property owned by the landfill.

Need to coordinate with other agencies. There are no perceived difficulties to implement with agencies given past implementation success both with the DEQ and Benton County.

Availability of necessary services, materials, equipment, and specialists. Services, materials, equipment and specialists are all readily available.

Available capacity and location of needed treatment, storage, and disposal services. Ongoing transport of leachate to off-site treatment facilities is occasionally limited by available capacity at the POTW. POTWs are located nearby and roads can easily handle the truck traffic.

Short-term risks associated with implementing the remedial action, including potential impacts to the community, workers, and the environment. There would be low risk to the community or environment associated with implementing the remedy since the primary construction activities are completed. Any risks during O&M of the remedy are managed by worker health and safety practices aimed at reducing exposure to contaminants. Decommissioning wells is done with proven technology and safeguards that protect the workers and environment.

6.3.4 Effectiveness

The remedy is considered effective in that is already provides a high degree of protectiveness and is restoring the aquifer as demonstrated by reductions in the concentrations of VOCs downgradient of the landfill.

Expected reduction in the toxicity, mobility, and volume of the contaminant substances. Capping the landfills reduces the mobility of contaminants. Removal of leachate and landfill gas reduces the volume of contaminants in Cell 1. While not part of the remedy, natural attenuation has reduced the volume of contaminants in groundwater.

Length of time until full protection (i.e., achieving RAOs) is achieved. The remedy meets the RAOs and therefore has achieved full protection for current conditions. Supplemental actions, such as water supply well decommissioning, will be effective in protecting against future exposure pathways.

Magnitude of residual risks in terms of amounts and concentrations of contaminant substances remaining following implementation of a remedial action. Residual contaminants are those present in the waste mass that could potentially migrate in groundwater from the landfill. Risks associated with exposure to residual contamination are considered low since the landfill contents are covered with soil or engineered cap. There are no exposure pathways to groundwater because the property is controlled by VLI.

Type and degree of long-term management required, including monitoring, and O&M. Long-term management is required by the solid waste permit and funded through tipping fees and other financial mechanisms. The O&M for the contaminant recovery technologies (e.g., leachate and LFG collection) and monitoring (LFG and water quality) are currently being done and documented annually.

Long-term potential for exposure of human and environmental receptors to remaining contaminants. This potential is low given the effectiveness of the remedial technologies in limiting exposure to contaminants and long-term management required by the solid waste permit.

Long-term reliability of engineering and institutional controls, including long-term uncertainties associated with land disposal, treated or untreated waste, and residuals. The engineering controls in place are reliable in the long term as long as they are inspected and maintained. For instance the cap over Cell 1, parts of which have been closed for nearly a decade, has displayed excellent durability, with no erosion problems and few maintenance needs. Institutional controls would provide a reliable control of residual risk.

Potential for failure of the remedy or potential need for replacement of the remedy. There is low potential for failure of the remedy as long as it is maintained as required by the solid waste permit.

7. SELECTED REMEDIAL ACTION ALTERNATIVE

The DEQ selected the following remedial action alternative for the Coffin Butte site on the basis of the detailed evaluation of the alternatives in Sections 5 and 6.

7.1 DESCRIPTION OF THE SELECTED ALTERNATIVE

The remedial actions have already met the protectiveness standard since there were no unacceptable risks identified by the risk screening for the exposure pathways. However, to maintain this level of protectiveness and to provide for further improvement in groundwater quality consistent with the intent of groundwater quality protection rules, maintenance of the remedy as supplemented by additional actions was recommended. The remedy employs the following elements:

- Landfill closure and cover with engineered cap on Cell 1A and parts of Cell 1. The eastern slope of Cell 1 will retain interim plastic cover until it is covered with the base liner of Cell 3D. The Closed Landfill was covered with soil in 1977.
- Surface controls to prevent surface water run-on and infiltration of surface water through the waste, and to slow down the rate of cap erosion.
- Access restrictions to areas of waste by fencing around the landfill units.
- Leachate collection from Cell 1 and management by various strategies.
- Landfill gas collection from Cell 1 and use for supplemental electricity generation.
- Deed restrictions on property within the LOF to prevent development of groundwater resource.
- Decommissioning two water supply wells to prevent their future use.
- Property purchases as buffer around the landfill.

In addition to these actions, the solid waste permit requires groundwater monitoring downgradient of the landfill cells and LFG monitoring around the landfill cells and in structures to assess protectiveness between the landfill and potential receptors.

7.2 REMEDIAL ACTION CONCENTRATION LIMITS

The site is currently protective of human health and the environment with the remedial actions in place and DEQ does not foresee changes either in land use or property ownership that would alter hypothetical routes of exposure to impacted groundwater within the LOF. With the existing remedy being protective, the presumption of setting a RACL is based on the hypothetical and unlikely exposure scenario of domestic use within the LOF. Current ownership and anticipated institutional controls limiting the future residential development on VLI-owned property that buffers the landfill will make it extremely unlikely for domestic use to occur. However, in keeping with a restoration goal to protect groundwater beneficial uses of the highest quality, drinking water standards were selected. For these reasons, remedial action concentration limits have been established at drinking water MCLs and secondary MCLs. These are listed in Table 4-1.

7.3 POINTS OF COMPLIANCE

Points of compliance are currently designated by the solid waste permit as wells along the compliance boundary downgradient of Cells 1 and 1A. These include wells: MW-1S/1D, MW-3S/3D, MW-10S/10D, MW-11S/11D, and MW-12S/12D. Permit Addendum No. 1 designates wells MW-20 and MW-21 as the compliance points for the area downgradient of the Closed Landfill.

7.4 PERFORMANCE MONITORING

Environmental monitoring and reporting are part of solid waste permit requirements. The existing monitoring program as described in the environmental monitoring plan tracks the limits of contamination and allows evaluation of the effectiveness of the remedy. The sampling program is assessed once a year in the annual monitoring report. The monitoring program will be reviewed in the context of the remedy described in this document and modified as needed in an update to the environmental monitoring plan.

8. PEER REVIEW SUMMARY

Technical documents produced during the investigation of the Coffin Butte site were reviewed by a technical team at DEQ. The team consisted of the project manager, a hydrogeologist, and a toxicologist. The team unanimously supports the selected remedial action. Refer to the administrative record for more detailed information.

9. PUBLIC NOTICE AND COMMENTS

A public comment period was held from September 1 through October 4, 2004 to provide the public an opportunity to comment on DEQ's proposed remedy. A notice of the proposed remedial action was published on September 1, 2004 in the Oregon Secretary of State's Bulletin and was published in the Corvallis Gazette Times on September 3, 2004. Copies of the Remedial Action Recommendation Staff Report and other documents that make up the

Administrative Record for the site were made available for public review via DEQ's web site and at DEQ's Western Region Office in Eugene. No comments were received.

10. DOCUMENTATION OF SIGNIFICANT CHANGES

No significant changes were made to the recommended remedial action as described in the August 2004 Remedial Action Recommendation Staff Report as a result of public comments.

11. STATUTORY DETERMINATIONS

The selected remedial action for the Coffin Butte Landfill site is protective and is based on balancing of remedy selection factors. The selected remedial action, therefore, satisfies the requirements of Oregon's environmental cleanup law and rules (Oregon Revised Statutes (ORS) 465.200 et seq. and Oregon Administrative Rules (OAR) Chapter 340, Division 122, Sections 010 through 115) and with Oregon's Groundwater Protection Act and Groundwater Quality Protection Rules (ORS, 468B.150 to 468B.190 and OAR 340-0040-0001 through -0060).

12. SIGNATURE OF WESTERN REGION ADMINISTRATOR

[signature] 11-2-05

Kerri L. Nelson — Date

Western Region Administrator
Department of Environmental Quality

APPENDIX A

ADMINISTRATIVE RECORD INDEX

Coffin Butte Landfill
Corvallis, Oregon

The Administrative Record consists of the documents on which the selected remedial action for the site is based. The primary documents used in evaluating remedial action alternatives for the Coffin Butte site are listed below. Additional background and supporting information can be found in the Coffin Butte project file located at DEQ Western Region Office, 1102 Lincoln Street, Suite 210, Eugene, Oregon.

SITE-SPECIFIC DOCUMENTS

DEQ. 1995. Strategy Recommendation. Coffin Butte Landfill, CERCLIS number ORD990751950, ECSI number 832. July 25.

DEQ. Solid Waste Disposal Site Permit No. 306. Issued March 9, 1999.

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Table 6-1
Evaluation of Remedial Technologies
Coffin Butte Landfill

Technology	Applicable Area	Cost Effectiveness and Reasonableness of Cost	Permanence	Implementability and Implementation Risk	Effectiveness
Access Restrictions					
Deed Restrictions	Cells 1/1A; Closed Landfill	Low cost.	Restrictions stay in place over long term.	Easy to implement because property owned by landfill.	High effectiveness because property owned by landfill and can be reviewed on routine basis.
Fencing	Cells 1/1A; Closed Landfill	Low cost.	Long-term effectiveness depends on continued maintenance.	Easy to implement, equipment readily available.	Relies on limiting access to manage residual risk from direct contact. Fencing limits access but trespassing is possible.
Containment					
Grading/Revegetation	Cells 1/1A; Closed Landfill	Low cost.	Continued maintenance required to achieve long-term reliability.	Easy to implement.	Minimal reduction of residual risk; may reduce leachate formation by controlling run-on; increases permanence of cap.
Interim Cover	Cell 1	Low cost.	Not a permanent solution; will be maintained on eastern slope of Cell 1 until Cell 3 is overlapped on slope.	Easy to implement, equipment and materials readily available.	Reduction of risk from direct contact; minimizes future leachate generation, however must be maintained periodically.
Soil Cover	Closed Landfill	Low to moderate.	With proper maintenance, is reliable in long term;	Easy to implement depending on availability of soil.	Reduction of risk from direct contact. Less effective in reducing leachate generation because it is relatively permeable to infiltration.
Composite Barrier Cap	Cells 1/1A	Medium to high cost; part of closure requirement; cost covered by in-place funding mechanism.	Will last for life of landfill if properly designed and maintained.	Synthetic liners require specialty contractors to assure proper installation; natural soil requirements may be augmented by GCL to reduce need to import large quantities of clay.	Reduction of risk from direct contact; minimizes future leachate formation and groundwater impacts by eliminating infiltration; high reliability because of redundancy of barriers.
Leachate					
Leachate Collection	Cell 1	No additional cost as leachate collection system is already in place for Cell 1.	Leachate collection layer may clog, but otherwise should maintain long-term effectiveness; collection piping external to landfill needs periodic maintenance.	Easy, leachate collection system already in place.	Effectiveness to control leachate releases depends on thickness of clay liner and original construction specifications.

Table 6-1
Evaluation of Remedial Technologies
Coffin Butte Landfill

Technology	Applicable Area	Cost Effectiveness and Reasonableness of Cost	Permanence	Implementability and Implementation Risk	Effectiveness
Leachate Treatment					
Leachate Treatment Facility (LTF)	NA	High cost associated with treating leachate at LTF.	Treatment permanently removes contaminants which are then stabilized and added to the active landfill.	Easy to implement because treatment system is already constructed.	Proven and reliable as long as O&M is continued; effluent is clean water.
Recirculation	NA	Low cost associated with recirculating leachate to active cells.	Ability to recirculate leachate in active landfill cell is limited by capacity of waste and results of monitoring effects with respect to performance criteria.	Easy, already being implemented on pilot scale.	Does not treat leachate, and therefore not effective in removing contaminants.
Evaporation	NA	Low cost associated with sprinklers used to spray on pond; low maintenance cost.	Reduces the amount of liquid, but liquid remaining in pond still needs to be managed by other technologies.	Easy, already being implemented during summer months.	Does not treat leachate, and therefore not effective in removing contaminants.
Publicly Owned Treatment Works (POTW)	NA	Low to moderate cost; primarily from trucking and POTW fees.	POTW may not be available for future acceptance of leachate depending on capacity, changes in minimum quality requirements of leachate, and politics.	Easy to implement although can be restricted by receiving POTW depending on time of year and available capacity.	May not be as reliable as on-site treatment since POTWs do not remove all hazardous constituents.
Landfill Gas (LFG)					
LFG Collection	Cell 1	Low cost because collection wells have already been installed.	Is effective for long-term collection of gas, although volumes decline with age.	Easy, LFG collection wells are already in place.	Removes most risk associated with migration of LFG; can be limited by internal lithology and quantity of liquids within landfill.
LFG Treatment	NA	Low cost, gas is sold to electrical generation company.	Reduces toxicity of gas and treatment by burning is irreversible; volume is reduced.	Easy, contracts with PNGC are already in place and gas is being burned to produce electricity.	Effective technology burns LFG.
Water Well Removal	Cell 1; Closed Landfill	Low to moderate cost for drilling contractor.	Fully removes exposure point to groundwater and provides permanence.	Easy to implement with existing contractors and equipment.	Very effective by removing means to come in contact with groundwater.
Property Purchase	Cell 1/1A; Closed Landfill	Moderate.	Permanent buffer zone for landfill prevents potential for incompatible use near landfill.	Moderate to difficult depending on willingness of property owner to sell land.	Effective in minimizing development and access to areas of concern near the landfill.

0 2000 4000

SCALE IN MILES

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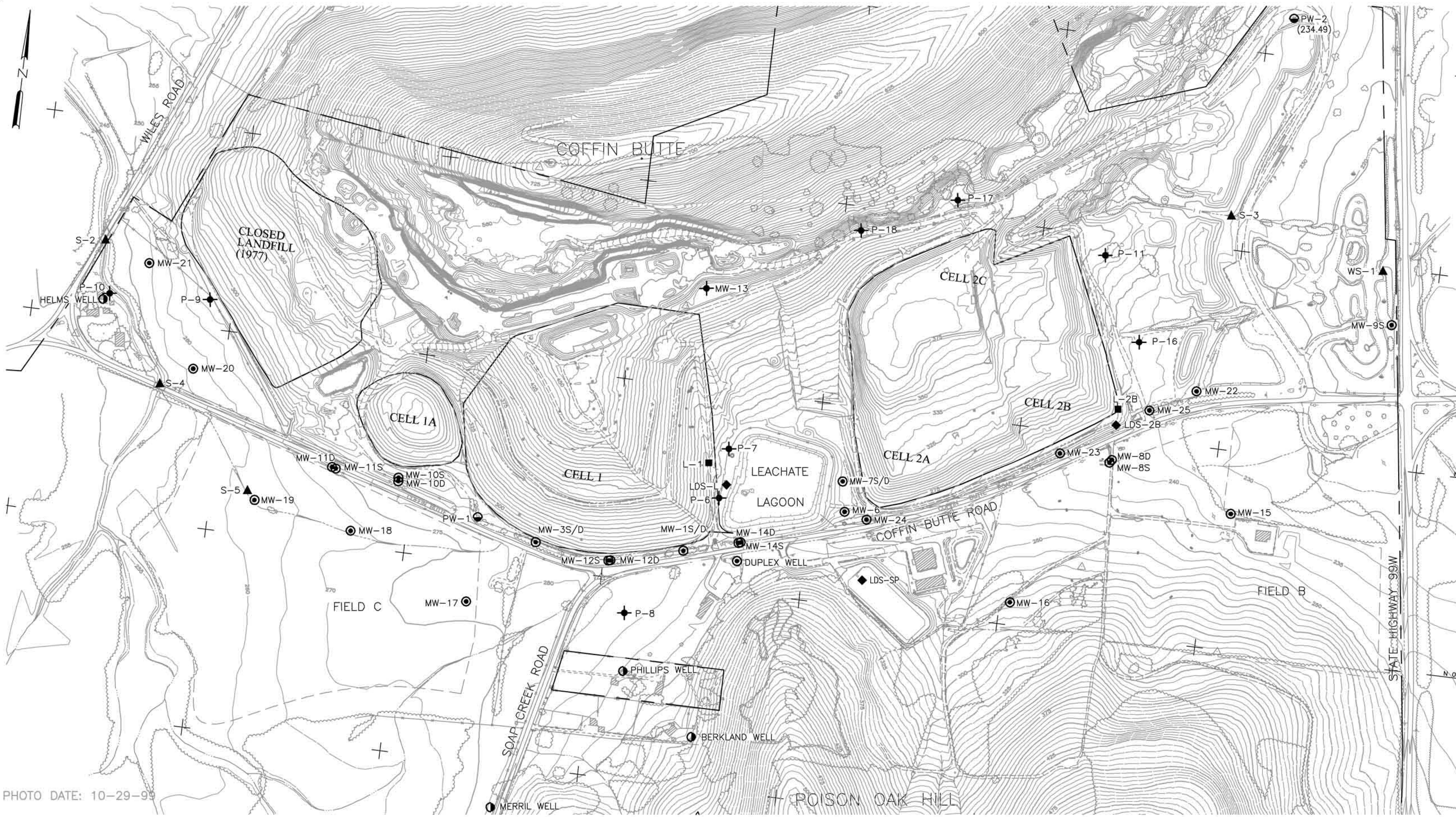
DATE 9-22-03
DWN GRH
APP
REV
DRAWING NO.
VU-001-005

FIGURE 1-1
COFFIN BUTTE LANDFILL
BENTON COUNTY, OREGON

SITE LOCATION

Sept. 22, 2003
C:\000Projects\DOWcKenna\Coffin Butte\Workplan Fall 2003\fig1r14.dwg



◉	MONITORING WELL
◐	PRIVATE WELL
✦	OBSERVATION WELL/PIEZOMETER
⊖	LANDFILL WATER SUPPLY WELL
▲	SURFACE WATER MONITORING STATION
— — —	PROPERTY LINE

0 500 1000

SCALE IN FEET

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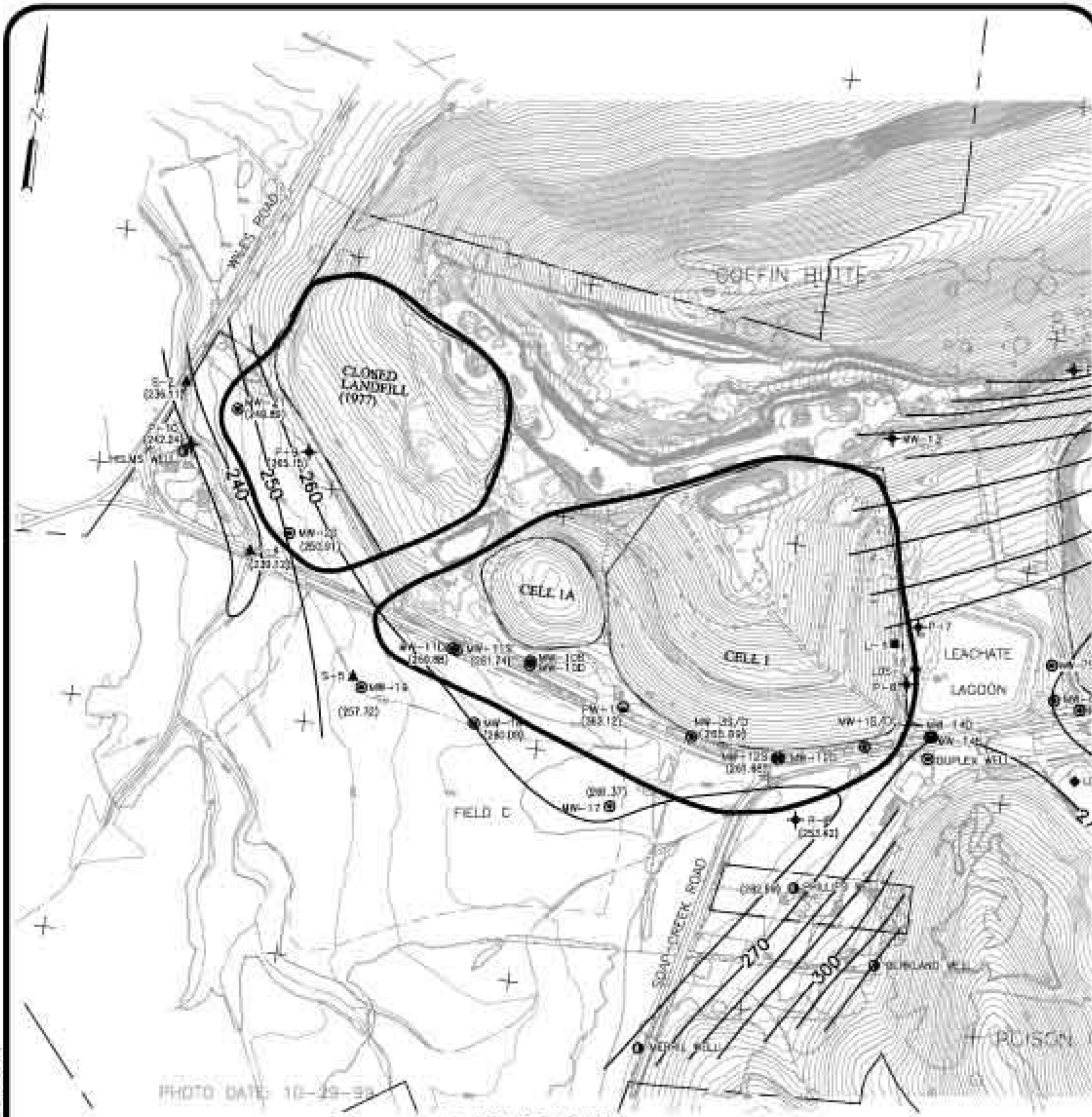
DATE 8-19-04
DWN GRH
APP
REV
PROJECT NO.
VL1-001-005

FIGURE 2-1

COFFIN BUTTE LANDFILL
BENTON COUNTY, OREGON

SITE PLAN

August 19, 2004
C:\000Projects\00Tuppan\Coffin Butte\fig2-1.dwg



PROPERTY LINE
LOCALITY OF FACILITY
250 GROUNDWATER CONTOUR

MONITORING WELL
PRIVATE WELL
OBSERVATION WELL/PIEZOMETER
LANDFILL WATER SUPPLY WELL
SURFACE WATER MONITORING STATION

0 600 1200
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DATE 8-19-04
DWN GRH
APP
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PROJECT NO.
VL1-001-005

FIGURE 2-2
COFFIN BUTTE LANDFILL
BENTON COUNTY, OREGON

LOCALITY OF FACILITY

August 19, 2004
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