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July 16, 2025

Benton County Planning Commission
c/o Petra Schuetz, Community Development Director
Benton County Community Development
4500 SW Research Way
Corvallis, OR 97330-1139

Subject: Conditional Use Permit (CUP) to Expand Coffin Butte Landfill (LU-21-047)
Response to New Written Evidence

Dear Benton County Planning Commission:

We represent Valley Landfills, Inc., the Applicant for the above-referenced CUP. This letter and its enclosures are the Applicant's responses to the new written evidence submitted in connection with the July 8-9, 2025, continued hearing before you.

Commenters have raised concerns regarding alleged failures to comply with past conditions of approval at the Coffin Butte Landfill. *See*, *e.g.*, Jeffrey L. Kleinman, Supplemental Memorandum of Valley Neighbors for Environmental Quality and Safety, dated July 8, 2025, and written testimony of Mark Yeager dated July 9, 2025.

Enclosed as Applicant's Exhibit 64 is the portion of the Benton County Talks Trash ("BCTT") final report assessing past and existing conditions of approval final report. It discusses, in detail, the 99 conditions of approval imposed on the landfill since 1974. As noted in the report, BCTT concluded that the Applicant was not in compliance with only 3 or 4 conditions of approval (depending on how one counts sub-conditions).

Kleinman and Yeager have also voiced concerns regarding lack of enforcement by the County. To address these concerns, the Applicant is proposing a new OP-17, which will require it to reimburse the County for the cost of ensuring compliance with the CUP approval (up to $80,000 per year):

> ***OP-17 Compliance Enforcement***
>
> *In order to assist the County in evaluating Applicant and its compliance with conditions of approval, Applicant shall reimburse the County in an amount not to exceed $80,000 per year to enable the County to retain a qualified consultant or consultants to:*

(A) Review compliance with the Operating Conditions of Approval.

(B) Review groundwater compliance.

(C) Review sentinel well records.

(D) Be available to the County as their Coffin Butte Landfill expert.

(E) Perform a monthly inspection of the expansion area to assess compliance or more frequently on reasonable notice if necessary to address complaints or compliance issues.

(F) Perform such other service related to Coffin Butte Landfill as may be requested by the County.

(G) Produce an annual report to the County on subject matters (A) through (F).

Applicant shall reimburse the County for these costs on a monthly basis within 60 days of receipt of an invoice from the County detailing its time and materials costs for the consultant or consultants. This condition of approval shall commence on the date that the Expansion Area is opened for solid waste disposal and will cease on the date the Expansion Area is no longer used for solid waste disposal. The reimbursement cap will increase every year following commencement of the condition by the United States Bureau of Labor Statistics Consumer Price Index.

Enclosed as Applicant's Exhibit 65 is a report prepared by the Applicant (the "Report"), responding to specific items of new evidence. These responses are summarized as follows:

A. The Applicant's proposed tonnage cap is consistent with the assumptions underlying its odor study.

B. The Applicant will conduct weekly litter removal, which will address off-site litter concerns.

C. Stormwater collected in the southernmost basin will either infiltrate into the ground or evaporate. It will not travel onto rural residential property.

D. There is no evidence that the existing leachate ponds have leaked. A leak detection layer currently exists under the liner system.

E. The Applicant's assessment of groundwater and stormwater impacts is based on conservative assumptions and relevant site-specific data.

F. The Applicant's seismic study was conducted in compliance with U.S. EPA and Oregon DEQ standards.

G. The April 18, 2025, methane plume identified by Ken Eklund was caused by the Applicant's proactive drilling of additional gas wells. This drilling was limited in time and will result in reduced emissions.

H. The Applicant has timely responded to odor complaints.

I. The Applicant promptly disclosed an EPA Section 114 request.

J. The Applicant has addressed fracturing and seismic effects of blasting and there is no evidence linking blasting activities to alleged property damage.

K. Physical site constraints will ensure that expansion landfill will not exceed 450 feet above mean sea level ("MSL") for top of waste and 453 feet MSL for top of cover.

L. Concerns about liner failures and similar issues are based on outdated technology. The expansion will use high-density polyethelene ("HDPE") membranes and geosynthetic clay liners ("CGLs"), which are each expected to last several hundreds to over a thousand years without failure.

M. The proposed expansion will not obstruct the flight path of great blue herons, significantly increase the population of predatory birds, or block movement of other wildlife. In any event, the relevant area is not a major wildlife corridor.

N. There was a large fire at Coffin Butte Landfill in 1999, well before the Applicant took ownership. Because the Applicant always covers waste overnight, a fire of that size at the site is no longer possible.

O. The Applicant and Adair Fire intend to continue their strong cooperative relationship with respect to the landfill expansion.

P. The Applicant will ensure that there is always at least one water truck on site, by maintaining two water trucks and allowing only one to be off-site at any given time.

Q. Landfill operations will comply with the applicable noise standard, even with the noise generated by private and commercial haul vehicles. The Applicant's noise study took that noise into account.

Finally, in addition to the new OP-17 described above (and as set forth in more detail in Exhibit 1 to the Report), the Applicant is proposing three new or amended conditions of approval, summarized as follows:

1. Tonnage Cap. Amending OP-7(C), to include the following tonnage caps: 1.0 million tons per year of municipal solid waste ("MSW") and 1.3 million tons per year of total solid waste (inclusive of MSW). Note that this condition will apply from the date of approval of the CUP and so will replace the tonnage cap in the Franchise that will expire upon approval of the CUP under the terms of the Terms of Franchise. The Planning Commission cannot technically impose any conditions relating to the operation of the current landfill, but the Applicant is willing to accept imposition of this condition to address concerns that the expiration of the franchise tonnage cap will result in a substantial increase in solid waste disposal at the landfill.

2. Water Trucks. Replacing OP-12(A) with a requirement to maintain at least two 4000-gallon+ water trucks, with at least one of the trucks present at the landfill site at all times.

3. Off-Site Litter Management. Amending OP-15(F) to require weekly litter cleanup on adjacent property, upon request of the owner of such property. Cleanup will be performed in accordance with an access agreement that contains insurance and indemnity provisions.

Thank you for your consideration.

Very truly yours,

Jeffrey G. Condit

Assessments Of Land Use Conditions

Definitions of the Compliance Phrases Used Within The Following Table:

In Compliance = Compliance demonstrated. Basis: cite basis e.g., In County Records

Not In Compliance = Basis: cite basis e.g., Need more specific information. Explanation: provide citations. References: provide when available. Suggestions or Open Items: for coming into compliance.

Compliance Status Unclear = Assessment not made due to one or more of the following: regulatory requirements not triggered, information sources not available, condition appears to have lesser environmental / ecological / economic / public safety, etc. impact, or insufficient information available.

County Requirement Superseded = Requirement no longer relevant. Cite over-riding County land use decision, DEQ reference, LUBA opinion, state statutes or administrative rules, county code, county comprehensive plan etc.

Compliance Not Demonstrated = Additional information from the County and/or DEQ needed to assess compliance.

Use Decision Provided for Background = Information in document provides useful insight of community/governmental perspectives at the time.

Note
The format for evaluation of more complex conditions by subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager is:

Subcommittee Members
Compliance Opinion:
Basis:
Explanation:
Notes:
Open Item(s)

Table 2. Assessments of Land Use Conditions

Date	File #	Request	Result
1974	CP-74-01	Designating Coffin Butte Landfill as a regional sanitary landfill site as recommended in the Chemeketa Regional Solid Waste Program Report[122] and Sanitary Landfill expansion.	PC Approved PC Decision Appealed BOC Approved
Conditions of Approval			
1. The service area to be served by the Coffin Butte Site should be defined and the approval should be confined to serving only areas MI, WS, DA, KV, MI, CO, AL, LV, and MH, as defined on the enclosed map[123]. Expanding Coffin Butte to service additional areas should require a re-review by the Planning Commission.			
Comments <u>County</u> County Requirement Superseded. This condition was rendered unenforceable by a 1998 Supreme Court decision that found that limiting areas to be served by a regional landfill were unconstitutional violations of the Commerce Clause (see memorandum prepared by Legal Subcommittee and appended to their report). Prior to that, it was superseded by the 1983 land use decision adopting the Landfill Site zone and text amendments to the Benton County Code and Comprehensive Plan. <u>Workgroup Committee</u> • Unable to accept this assessment until additional research is complete. • Modified in 1983, but still relevant as to intent – not sure how to rank this...with every land use application there has consistently been discussion about how much Benton County residents did not want out-of-county waste being deposited into the landfill; I believe the meeting minutes reflect that the applicant stated that the landfill was just for Benton County • Republic: Republic Services acquired Coffin Butte Landfill in 2008. Certain records prior to that date may be incomplete. We agree that the changes to the County's land use regulations and subsequent conditional use approvals mean that the analysis			

[122] The Chemeketa Regional Solid Waste Program Report was produced in 1974 as part of a regional collaborative effort between Benton, Marion, Linn, Polk, and Yamhill counties (Stevens, Thompson & Runyan, Inc., 1974a). This report details recommendations and options for disposal sites, collection strategies, and other materials management approaches.

[123] The Chemeketa Regional Solid Waste Program Report labels specific Chemeketa Region Service Areas, including the general areas of Monmouth/Independence (MI), West Salem (WS), Dallas (DA), Kings Valley (KV), Corvallis (CO), Albany (AL), Lobster Valley (LV), and Monroe/Harrisburg/Halsey (MH), which are **mapped and detailed on Figure IV-7 of the Report** (Stevens, Thompson & Runyan, Inc., 1974b).

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and the conditions in the 1974 decision are no longer relevant. Further, Republic Services[124] has reported the counties of origin and tonnage for the last 20 years to the Board of Commissioners under the terms of its franchise agreement.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: Not In Compliance

Basis: RSI [Republic] Annual reports over multiple years indicate solid wastes outside of the geographical area defined in this 1974 Approval have been and continue to be disposed of at Coffin Butte e.g. (see RSI [Republic] annual report (add link to most recent report))

Explanation: Further searches of County and RSI [Republic] files are needed to establish if or when this condition was superseded to authorize landfilling materials outside of the 1974 defined area. Benton County Code 25I dated 1983 authorizes acceptance of material from Sweet Home and Lebanon. Alternatives to finding historical authorization may include BOC and Planning Commission action to void limitations on the geographic area allowed to bring material to Coffin Butte. A relevant concept is the DEQ definition of "regional" landfill. It is based on tonnage received. It does not refer to a geographic area. It is based on tonnage processed. Additional searches for State statues or regulations that prohibit counties from limiting the areas from which wastes can be received from is suggested.

Notes: Support for 1977 geographical definition found in:

- 1983 Code reference "BEFORE THE BOARD OF COMMISSIONERS FOR BENTON COUNTY, OREGON An Ordinance Amending the Benton County Comprehensive Plan and Specifically Amending the Public Facilities and Services and Environmental Quality Elements and Amending the Comprehensive Plan Map Ordinance 25I" Specific language to be inserted in the code under "Landfill and Solid Waste Policies" includes:

  "27. The Coffin Butte site shall have a landfill site designation and shall serve as a regional landfill servicing a geographical area including Linn, Polk, and Benton Counties."

[124] For ease of reference, "Republic Services" is used throughout this version of the document but depending on the topic the actual legal entity on the applicable permits documents or otherwise may be Valley Landfills, Inc.

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Note: 1974 Chemeteka report defines "regional" in physical geography terms, DEQ defines "regional" in terms of amount of tonnage received. DEQ Reference: 23) "Regional disposal site" means a disposal site that receives, or a proposed disposal site that is designed to receive more than 75,000 tons of solid waste a year from outside the immediate service area in which the disposal site is located. As used in this subsection, "immediate service area" means the county boundary of all counties except a county that is within the boundary of the metropolitan service district. For a county within the metropolitan service district, "immediate service area" means the metropolitan service district boundary. *From <https://www.oregonlegislature.gov/bills_laws/ors/ors459.html> per B Fuller to S Imperati email 110722*

Status of search for County business related documents mentioning geographic service area:

- Franchise Agreements prior to 2020 not found. Need to find this.
- No mention of geographic service area in 2020 Franchise Agreements (https://www.co.benton.or.us/sites/default/files/fileattachments/community_development/page/8136/valley_landfills_landfill_franchise_agrmt_2020.pdf
- There is a 2016 Benton County / RSI [Republic] Memorandum of Understanding the is an "...acknowledgement that Coffin Butte Landfill will be accepting municipal solid waste currently being delivered to Waste Management's Riverbed Landfill for a term of 1-2 years, beginning in January of 2017. (https://www.co.benton.or.us/sites/default/files/fileattachments/community_development/page/8136/republic_svcs_riverbend_landfill_500952_mou_120116.pdf)

Open Item: Search DEQ permits for information allowing geographic areas to use CB Landfill.

Subcommittee Member - Republic

Disagree with subcommittee members that conclude "not in compliance." This condition was superseded by the 1983 change to the County's regulatory structure as evidenced by subsequent decisions which did not carry forward this condition. It is also evidenced by the 2002 Memorandum of Understanding between Republic and Benton County, which concluded that the Republic was in full compliance with county regulations as of that date. In any event, such locational limitations were rendered

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unenforceable by a 1998 Supreme Court decision, which found that such limitations were unconstitutional violations of the Commerce Clause. (This decision is discussed in detail in a memorandum prepared by Legal Subcommittee and appended to their report.) This condition has been long superseded and any attempt to impose a similar condition would be unconstitutional (and is also now outside the County's scope of review under the Development Code.)

2. The site management activities conducted at Coffin Butte should be reviewed periodically by the County Sanitarian (ex-officio member of the Planning Commission). A report of compliance to all state and local standards should be made at least once annually to the Planning Commission by the Sanitarian.

Comments

County

County Requirement Superseded. First, this condition is directed at the county to complete, not the applicant, and should not have even been included as a Condition of Approval for the applicant. Second, staff has come across minutes and other documents that reference annual reporting by the County Sanitarian to the Planning Commission. Third, subsequent to the Solid Waste Advisory Committee being instituted, this information was relayed to that group, not the Planning Commission. Fourth, currently, the County Sanitarian has been replaced by a Solid Waste and Water Quality Program Coordinator.

Workgroup Committee

- The report was supposed to be annual but this assessment only mentions one year. More information needed to confirm compliance.
- I see annual reports dating back to 2005. Were there annual reports submitted before then?
- Replaced by DSAC in 1983, but still relevant as to intent; if DSAC had been regularly informed of non-compliance with conditions of approval, perhaps the landfill would have been more compliant

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: Compliance Status Unclear

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Basis: Reporting requirement may have been met by Disposal Site Advisory Committee in 1983 (Workgroup Committee Comments). DSAC records need review to ascertain if this condition is being met. SWAC reportedly receives annual landfill reports however neither the County Sanitarian not the Planning Commission are involved in reviewing the reports.

Note: Planning Commission review as PC and as Citizen Advisory Committee (CAC) per Oregon Statewide Land Use Planning Goal Number 1, is unclear at this time

Subcommittee Member - Republic

This condition was superseded by subsequent decisions that did not carry it forward.

3. Efficient leachate collection and treatment, including the old site, should be maintained by the applicant to insure against pollution of nearby waterways. In addition, wells should be established on the periphery of the solid waste site to monitor any potential seepage into underground aquifers (groundwater pollution).

Comments

County

County Requirement Superseded. This is an oversight function for DEQ. The applicant supplies a description of the leachate collection system and monitoring wells within their annual reports.

Workgroup Committee

- Disagree strongly with staff: "efficient leachate collection and treatment" is extremely relevant, a continuing problem, and in fact domestic wells have been contaminated, which should be noted in the "common understandings" document. Contamination of domestic wells has been a continuing concern of owners of parcels adjacent to the landfill, for good reason (see 1993 Coffin Butte Annual Report, the Helms Well, page 4). Current leachate treatment is impossible onsite, as promised in the most recent CUP (2003), it is certainly possible to argue that the intent of this provision was not to have landfill leachate treatment burden public facilities (the Corvallis water treatment facility is so overburdened by leachate that 15 million gallons/year +/- are trucked to a Salem facility). Let's have the discussion about whether it is "efficient" to import waste into

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Benton County instead of diverting it to landfills with less precipitation (which consequently produce less leachate) and whether discharging dioxins/PFAS into the Willamette is "polluting...nearby waterways"

- These requirements are still relevant. Has the original collection-retention lagoon been maintained and was it effective in iterating leachate? Past members of SWAC assessed that it was not effective.
- Wells were required to monitor potential seepage of contaminants into groundwater. "Runoff" refers to surface waters, not groundwater, so this assessment does not address the original requirement.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: The fate of leachate generated by the landfill should not simply be ignored by the County and delegated to DEQ. The requirement to "insure against pollution of nearby waterways" is very much still relevant. Trucking of leachate to Corvallis' sewage treatment plant does not result in effective treatment or insure against pollution of nearby waterways. Many of the toxic pollutants contained in leachate simply pass through the treatment plant with very little or no pollutant removal and end up in the Willamette River (PFAS, heavy metals, pesticides, pharmaceuticals, personal care products (PCP)). The Willamette River is a key recreation asset (boating, fishing, swimming, etc.) for residents of Benton County, and a source of drinking water supply for downstream residents (e.g., Adair Village).

Compliance Opinion: Compliance Not Demonstrated

Basis: A review of DEQ and RSI [Republic] records is needed. Evidence that "Efficient leachate collection and treatment..." is occurring is needed.

Explanation: It is understood from RSI [Republic] that leachate treatment no longer occurs at the landfill. Leachate is being trucked to the city sewage treatment facilities in Corvallis and Salem for treatment and discharge to the Willamette River. Evidence that treatment to levels suitable for discharge to the river is needed to confirm RSI [Republic] is in compliance.

Notes: The landfill generates about 25 million to 32 million gallons per year of leachate to be trucked off site to city treatment facilities. This volume equates to approximately twenty trucks per day traveling to Corvallis or Salem. Concerns include the impacts on county roads, road traffic, road safety and the Willamette River. Many of the toxic pollutants contained in leachate simply pass through the treatment plant with very little or no pollutant removal and end up in the Willamette River (PFAS, heavy metals, pesticides, pharmaceuticals, personal care products (PCP)). The Willamette River is a key recreation asset (boating, fishing,

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swimming, etc.) for residents of Benton County, and a source of drinking water supply for downstream residents, e.g. Adair Village.

Open Items: Staff's comments on the applicability of "later conditions for run-off" to leachate need clarification. Caution to readers, "Leachate" is not the same as "runoff". [Note Out of BCTT Charge: A review treatment system performance records would be prudent.]

Subcommittee Member - Republic

Republic agrees with Staff. Leachate regulation is within the exclusive jurisdiction of DEQ. The County has no authority or expertise to regulate leachate or to adopt or impose environmental conditions or regulations that conflict or add to DEQ's regulations. Republic has permits with the City of Corvallis and the City of Salem. The cities handle the treatment of the leachate and have and must continue to comply with permits to discharge wastewater. Republic's disposal of Leachate is in compliance with its DEQ and City of Corvallis permits.

4. The scars that erode the face of Coffin Butte, when plans meet DEQ approval, shall be filled and compacted to a condition permitting re-seeding and eventual visual reclamation of the area and including screening with natural vegetation that portion of the subject property abutting the county road.

Comments

County

County Requirement Superseded. Subsequent expansions of the footprint and additions to uses on and adjacent to the site made this condition unrealistic to fulfill until the entirety of the landfill is completed. This specific condition is no longer relevant as new reclamation plans have been approved.

Workgroup Committee

- Disagree strongly with staff. "Temporary" cover of tarp-covered closed landfill cells sitting "temporarily" for a generation is clearly not the intent of this provision. Meeting minutes and applicant statements provide clarification as to the intent of this provision. This provision additionally requires "visual reclamation" of an area which has been so deformed by an accumulation of

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garbage that is geographic in scope. This provision also addresses screening, which is also clearly a non-complied-with condition of approval.

- This was part of conditions of approval for a landfill that was then scheduled to close by 2000. The condition was not met. To date, no part of the site has been reclaimed by seeding with native vegetation. The "scars eroding the face of Coffin Butte" have in fact been increased by subsequent expansions, to a height well above the proposed grade for the currently permitted landfill design, even after expansions.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinions:

A. Physical Design Requirements: In Compliance

B. Reclamation & Visual Requirements: Compliance Status Unclear

Basis: DEQ has oversight of the geotechnical design of the landfill and has issued permits for the landfill. DEQ also regulates both the timing and scope of reclamation through closure and post closure requirements. Cessation of dumping at the landfill triggers the application of these requirements.

The appearance of the facility is the purview of Benton County. It is unclear how the County has interacted with DEQ to ensure the County's requirements for the appearance of the closed landfill are reflected in closure and post closure plans approved by DEQ.

Explanations:

- "Scars" are not defined in the CUP condition. It is presumed that "scars" refer to areas where earth or rock has been excavated from the butte. Additional landfill cells are planned to be built along this rock face. It is unclear what type of plan needs to be submitted to DEQ for approval to meet this condition?
- While this land use action is nearly 50 years old, it sets the baseline expectations for how this industrial activity can be allowed to exist as a non-compatible land use in AG, forest, and rural residential lands.

Notes:

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Ref: County File: Reclamation Plan - Closure-Post Closure Plan_Report_Final. Report Title: "Worst Case" Closure and Post-Closure Plan, Coffin Butte Landfill, Benton County, Oregon, Prepared by GeoLogic, September 2020

Open Item(s): DEQ records concerning the landfill need to be reviewed.

Subcommittee Member – Republic

Republic agrees with Staff. The landfill has changed substantially since 1974 and certain areas of the landfill have been closed and covered and seeded over time per DEQ regulations. This condition is no longer relevant. Reclamation of the site will continue as cells close and will be part of the final Closure Plan.

5. That by July 1, 1976, a plan including detailed elements on design, location, management, and financing of a solid waste resource recovery system be prepared and submitted to the Planning Commission for further consideration. Until such a plan is completed, the conditional use approval shall be limited to only the sanitary landfill method of waste disposal.

Comments

County

In Compliance. The condition was completed with the creation of the 1977 Waste Control Systems, Inc. Solid Waste Management Plan

Workgroup Committee

- Needs detail, & relevant as to intent: This plan said that the landfill would close by the year 2000 and be replaced by a waste-to-energy facility. Approval of a landfill in 1974 was not a "forever landfill" – it was a bridge to a different way of dealing with solid waste. It is important to note that, in order to not repeat prior mistakes

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: In Compliance

Basis: Document (1977 Waste Control Systems, Inc. Solid Waste Management Plan)

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Note: Not available via County records, subcommittee has procured and exists in appendix

6. The landfill operation shall be phased so that only a small acreage is used for fill at one time and then this acreage shall be returned to grazing, another farm-type operation or other permitted use as approved by the Planning Commission and the Board of County Commissioners.

Comments

County

County Requirement Superseded. Subsequent expansions of the footprint and additions to uses on and adjacent to the site made this condition unrealistic to fulfill until the entirety of the landfill is completed. This specific condition is no longer relevant as new reclamation plans have been approved.

Workgroup Committee

- DEQ approval of a reclamation plan does not supersede county conditions of approval. No part of the landfill has yet been restored to grazing, farming, or even natural alternatives such as native prairie vegetation.
- Disagree strongly with staff. Land use is land use, and is a County regulation. Unless specifically referred to in the land use language, DEQ has parallel, authority, not overriding authority. Land use policies deal with compatibility issues (i.e. generation of odors/dust); DEQ policies deal with environmental quality. Those are different regulatory bodies and one saying "this is OK" does not negate the authority of the other (Unless that is specified within the regulation itself, which in this case it is not)

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinions:

A. Physical Design Requirements: In Compliance

B. Reclamation & Visual Requirements: Compliance Status Unclear

A. Compliance Opinion for "small acreage" condition: In Compliance.

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Basis: Based on participant observations and company testimony during September 2022 County sponsored Coffin Butte Tour (see Site Tour Notes on BCTT website).

B. Compliance Opinion for "...shall be returned to grazing..." condition: Compliance Status Unclear
Basis: Per DEQ guidance, Closure of the landfill does not occur until all disposal operations cease. Potentially this is 15 or more years from now. RSI [Republic] is not required to submit a Closure Plan until 5 years prior to Closure. In the interim, if the landfill were to close today, RSI [Republic] provides a "Worst Case" Closure and Post-Closure Plan which describes the condition the site is to be left. The current "Worst Case" plan provides for a grass cover on slopes. There is no mention of visual screening.

Explanation: Landfill operations and closure are governed by DEQ requirements. Some of the landfill areas have not received wastes since the 1990s, others since 2011. RSI [Republic] has determined areas of the landfill are "In Closure" under Federal rules. Approximately 41.7 planimetric acres have already received Final Closure. This area should already have a 1.5 feet thick Vegetative Cover per Federal requirements and be suitable for reuse.

Notes: RSI [Republic] closure representations and DEQ position:

- RSI [Republic] Ref: County File: 5Reclamation Plan - Closure-Post Closure Plan_Report_Final. Report Title: "Worst Case" Closure and Post-Closure Plan, Coffin Butte Landfill, Benton County, Oregon, Prepared by GeoLogic, September 2020

  2.3 Areas to Receive Final Closure

  The present "worst case" closure scenario consists of constructing a final cover over the existing active landfill minus the areas that have already received final closures to-date. At present, landfill liner has been constructed through Cell 5C (see Figure 1), totaling 123.5 planimetric acres of lined waste footprint. Approximately 41.7 planimetric acres have already received final closure; therefore, the area still to receive final cover is 81.8 acres.

- DEQ

  Ref. From: FULLER Brian * DEQ <Brian.FULLER@deq.oregon.gov>, Sent: Monday, November 21, 2022 5:03 PM, To: Edward Pitera Subject: RE: Cells in Closure

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Conditions of Approval

Our interpretation of "MSWLF Unit" is that it applies to the entire landfill not individual cells. Being that the landfill is not yet full, the "clock" on final closure has not yet started. It is common for landfills to build new cells on top of older filled cells that are in temporary cover/closure. Final closure/capping under this scenario would occur when these uppermost cells are full or waste sequencing for an area is completed. This also allows for multiple cells to share leachate and gas collection and control systems. Approval could be considered granted via DEQ approval of the Site Development Plan and through the further refined final engineered closure plans.

CFR 258.2 Definitions

Municipal solid waste landfill (MSWLF) unit means a discrete area of land or an excavation that receives household waste, and that is not a land application unit, surface impoundment, injection well, or waste pile, as those terms are defined under § 257.2 of this chapter. A MSWLF unit also may receive other types of RCRA Subtitle D wastes, such as commercial solid waste, nonhazardous sludge, very small quantity generator waste and industrial solid waste. Such a landfill may be publicly or privately owned. A MSWLF unit may be a new MSWLF unit, an existing MSWLF unit or a lateral expansion. A construction and demolition landfill that receives residential lead-based paint waste and does not receive any other household waste is not a MSWLF unit.

Open Items: A pathway to achieve the County's expectations of what closure of the landfill will look like is needed.

Subcommittee Member – Republic

Republic agrees with staff. Republic notes that the active landfill area remains approximately the same size when the Landfill moves from one cell to another. This has been true for the life of the Landfill.

7. That efforts be made to encourage voluntary separation of recoverable materials such as tin, aluminum, paper, glass, etc. to reduce the amount of landfill materials.

Comments

County

In Compliance. The applicant has and is fulfilling this condition.

Workgroup Committee

Date	File #	Request	Result
1974	CP-74-01	Designating Coffin Butte Landfill as a regional sanitary landfill site as recommended in the Chemeketa Regional Solid Waste Program Report[122] and Sanitary Landfill expansion.	PC Approved PC Decision Appealed BOC Approved

Conditions of Approval

- Some efforts have been made but they have been largely ineffective. Benton County's ratio of recycling to landfilling has not improved appreciably since the 1970s.
- Presumably the intent of this provision was to have recycling efforts contribute to increasing the life of the landfill. Currently, Benton County could go to zero waste tomorrow, and presumably, the landfill would still take in the maximum volume cap within a short time, because of the new owner's vertical integration. This should be noted in the Common Understandings document.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: Compliance Status Unclear

Explanation: RSI [Republic] is "In Compliance" in Benton County based on personal experience but Benton County contributes less than 10% of the total volume sent to the landfill and is only one of more than 20 counties RSI [Republic] draws material from.

Subcommittee Member – Republic

Republic is in compliance with this condition, and since 1974 has gone much further in encouraging and making it easier to recycle. Goals/targets for recycling are appropriate considered as part the LTMMP process but are not appropriately considered as part of the CUP process. The regulatory framework has changed significant since 1974.

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

1. Cross reference the narrative and the map in both documents.

**Clarification On Content Needed. See Subcommittee Comments*

Comments

County

In Compliance. The narrative was updated to provide information related to conditions 1 through 7. The updated narrative is found in the document titled "PC-83-07-C(3)" starting on Page 3 of 60

Workgroup Committee

- impossible to assess with missing narrative

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager *Clarification Of Condition Content

Information in "PC-83-07-C(3)" includes requirements for terracing, post closure grazing and "...will be consistent with the expected future use of these lands as indicated by the existing farm and forest land use designations."

Note: County records incomplete although referred to in "PC-83-07-C(3)" no site plan is included.

Excerpts follow:

Reclamation, physical layout, and maintenance provisions: From pdf file pages 4 & 5 (original document page 4)

"ii. Reclamation (Conditions No. 2 and 6)

When completed the present landfill area (see site development map) will appear as a low terrace rising from Coffin Butte Road into the site. The expansion area, labelled " Additional Landfill Disposal Areas" on the site plan, will consist when completed of a series of terraces progressing up the lower south slope of Coffin Butte. Each terrace in the expansion area will consist of a +/- 12 ft, high vertical " confinement berm" sloping3/ 1, and a 10 20 ft, wide horizontal surface at 2% slope. The overall slope of the terraced hillside will be similar to the existing slope. An upgradient cutoff drainage system see site plan will be provided to intercept seasonal surface drainage and route it around the new fill

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

area. The feasibility of reclaiming the site in this manner is discussed in the attached letter dated May 23, 1983, prepared for Valley Landfills by Sweet, Edwards & Assoc., geological consultants.

All disposal areas, including the terraces, will be reclaimed for pasture. Portions of this landfill property including the completed disposal area site plan, as well as some of the outside lands in the vicinity of the landfill, are v.arrently use for this purpose. The area within the landfill reclaimed for pasture will be maintained by periodic regrading and replanting as required to compensate for settling. Otherwise, maintenance will consist of farming methods commonly used for pastureland."

Reclamation From pdf file page 4: (original document page 2)

"Reclamation of the: landfill in the manner described will be compatible with the existing predominant open space and resource lands characteristics of the adjacent and surrounding lands and the current uses of these lands, and will be consistent with the expected future use of these lands as indicated by the existing farm and forest land use designations."

Reclamation From pdf file page 18 (original document page 8):

... "Reclamation of the landfill in the manner proposed will be compatible with the predominately open space and resource lands characteristics of the adjacent and surrounding lands and the current uses of these lands, and will be consistent with the expected future use of these lands as indicated by the current farm and forest land use designations.
Based on the need to provide facilities for waste disposal, the lack of any other existing or planned disposal sites within this area, the environmental, economic, social and
energy benefits from maintaining the e fisting landfill, and the established compatibility' of the landfill with the adjacent land uses, changing the land use designation for the
Coffin Butte Landfill qualifies for an Exception to Goal 4."

Reclamation From pdf file page 16 (original document page 6):

"The long- term environmental consequences of this proposal to the region served by the landfill will be to have a recognized site for waste disposal operating under a D.E.Q.- approved development plan and meeting D.E.Q. standards."

End of quotations

Compliance Opinions:

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

A. Physical Design & Geotechnical Requirements: Compliance Status Unclear
B. Reclamation Requirements: Compliance Status Unclear (Not triggered see CP-74-01 (6))

Compliance Opinion(s):

A. Compliance Opinion for Physical Design & Geotechnical Requirements: County Requirements Superseded
   Basis: Landfill design concepts conveyed in site plans from 1983 appear to be superseded by subsequent DEQ approved Site Development Plans.
   Explanation: DEQ requirements on landfill design, operation and closure have primacy over County requirements.
   Notes: County provided records are incomplete. Although referred to in "PC-83-07-C(3)", no site plan drawing is included.
   Open Item: Referred to site plan is needed since it may point to areas where DEQ approved plans incorporate County requirements.

B. Reclamation Requirements: Compliance Status Unclear (Not triggered per DEQ. See DEQ 2022 explanation in CP-74-01 (6))
   Basis: Closure not triggered see CP-74-01 (6)
   Explanation: Site is an on-going operation and not subject to DEQ reclamation requirements at this time.
   Notes: The reclamation requirements cited in 1983 need review. Current practices to manage the risks to human health and the environment posed by a closed landfill plus current practices for maintaining the integrity of the final cap need to be considered.
   Open Item(s): None

Subcommittee Member – Republic

Republic agrees with Staff. The 1983 Narrative is no longer relevant to the current operation given the subsequent CUP approvals have changed the operation.

2. Expand the narrative statement, section (1.a.ii), on reclamation to include the physical configuration of the completed landfill areas and method of maintenance of the proposed pasture uses. Include a statement regarding the effects of methane and internal heat generation on the long-term maintenance of the pasture, and include irrigation plans if proposed.

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

Comments

County

In Compliance. The narrative was updated to provide information related to conditions 1 through 7. The updated narrative is found in the document titled "PC-83-07-C(3)" starting on Page 3 of 60

Workgroup Committee

- impossible to assess with missing narrative
- We have not been provided with the necessary information to assess whether the narrative was amended to fully address these issues, or whether the assessment of methane generation was adequate for purpose. As noted above, there is still no "pasture" on the site.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: The first narrative is not included in the record. The revised narrative does, in fact, use the words methane, heat generation, screening, leachate, etc. Reading the narrative, it can only be concluded that none of the promises in the narrative have been completed. The most obvious of these are the restoration to pastureland, grazing, and screening. Leachate is not currently being used to irrigate the trash.

*See 'Clarification Of Condition Content' under Subcommittee Comments for PC-83-07 / L-83-07 Condition 1

Compliance Opinions: County Requirements Superseded

Basis: There are three aspects of this condition: Physical Configuration, Maintenance Method, and Methane Statement. Landfill design concepts conveyed in site plans from 1983 appear to be superseded by subsequent DEQ approved Site Development Plans and site closure requirements.

Notes:
"Methane Statement"

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

From pdf file pages 5 (original document page 3) "The completed disposal areas will be covered by a minimum eight inch clay cap covered by twenty-eight inches of soil. The depth of the cover will minimize the effect of methane on the pasture grasses. Similarly the cover crop should not be affected by internal heat generation. Rather, warm subsurface temperatures have proved beneficial to root development."

Explanation: None

Open Item(s): None

Subcommittee Member – Republic

Republic agrees with staff. The 1983 narrative is no longer relevant to the operation given subsequent approvals and changes over time.

3. Describe in more detail in the narrative, the method of screening: include a description of the location, height, width, depth and physical composition of the berm; and include the type and location of vegetative screening; and include a statement regarding the long-term maintenance of the berm and vegetative screens.

Comments

County

In Compliance. The narrative was updated to provide information related to conditions 1 through 7. The updated narrative is found in the document titled "PC-83-07-C(3)" starting on Page 3 of 60

Workgroup Committee

- For this and other statements regarding "updates of the narrative, the Solid Waste working group has not been supplied with sufficient information to evaluate compliance. This same comment applies to all entries below. We are being asked to opine on these things without adequate information. I suggest that we should not be giving a rubber stamp of approval to statements that we have not actually had opportunity to examine fully -- it's both meaningless and likely to be abused in future CUP applications.

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

• impossible to assess with missing narrative

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: There is a very detailed description of the promised screening in the narrative. However, none of the promises have been kept, nor has the County taken any enforcement actions to ensure completion of screening requirements.

Compliance Opinions. There are three aspects of this condition:

Physical berm: County Requirement Superseded by subsequently issued DEQ Site Development Plans
Vegetative screening: Not In Compliance
Maintenance: Not In Compliance based on current appearance of site

Basis:

Screening Requirements: physical berm, vegetative screening, and their maintenance
From pdf file pages 6 & 7 (original document page 4 & 5)
It is recognized that these conditions are from a 1983 document. Actions may have been taken at that time but the County did not provide records to substantiate compliance at that time nor continued maintenance of screening requirements.

"iii. Screening (Condition No. 3)
Additional screening will be provided in keeping with the current site screening program used at the landfill. This program consists of a keyed berm with conifers planted 10' on center along Coffin Butte Road from 99W to the landfill entrance _road, and similar plantings extending north along 99W from Coffin Butte Road to the north landfill property line.

The permanent, fixed, keyed berm is represented. on the site development plan by the solid black line labelled " Approximate Solid Waste Disposal. Boundary." As shown, the berm encompasses the present landfill area and the existing development area. The berm is 10 - 12 feet high, 10 feet wide at the top and 60 - 70 feet wide at the base, and has an outside slope of 3/ 1. The depth of the key is three feet. The berm is composed of low permeability materials from on- site sources. The berm has been hydroseeded and will be grazed.

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

Screening plants will consist of trees from the tree farm owned by Valley Landfills on their land south of Coffin Butte Road. Initial height of the plantings will range from 6 - 10 feet. Additional plantings can be made on the terraces to screen disposal operations on the slopes, as needed. The plantings will receive ongoing maintenance by the landfill operators."

Explanation: None

Notes: 1983 site plan drawing was not provided in the County documentation.

Open Item(s): None

Subcommittee Member – Republic

The landfill site has changed substantially since 1983, so it likely impossible to determine what was done or not done in 1983.

4. Include in the narrative the anticipated chemical composition of any leachate material to be used for irrigation south of Coffin Butte Road; and include documentation that the material to be utilized as irrigation meet federal and state standards for any run-off that may leave the property lines.

Comments

County

In Compliance. The narrative was updated to provide information related to conditions 1 through 7. The updated narrative is found in the document titled "PC-83-07-C(3)" starting on Page 3 of 60

Workgroup Comments

- For this and other statements regarding "updates of the narrative, the Solid Waste working group has not been supplied with sufficient information to evaluate compliance. This same comment applies to all entries below. We are being asked to opine on these things without adequate information. I suggest that we should not be giving a rubber stamp of approval to statements that we have not actually had opportunity to examine fully -- it's both meaningless and likely to be abused in future CUP applications.

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

• impossible to assess with missing narrative

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager/

Mark Yeager: A rudimentary analysis of leachate composition is included in the revised narrative. It is now known that the chemical composition of leachate from landfills is far more complex and dangerously toxic.

Compliance Opinion: In Compliance

Basis: Analysis was provided and is still being performed on leachate sent offsite for disposal. Per RSI [Republic], leachate use for onsite irrigation ceased many years ago.

Subcommittee Member – Republic

This condition is no longer relevant because Coffin Butte no longer irrigates leachate on site. Leachate regulation has gotten stricter since 1983 and DEQ has exclusive jurisdiction over leachate. Republic continues to comply with DEQ requirements.

5. Include in the narrative review of the Environmental and Operational Factors in Art.XXX.05.A.1.(f) for the approximately 10 acres proposed for addition to the landfill area.

Comments

County

In Compliance. The narrative was updated to provide information related to conditions 1 through 7. The updated narrative is found in the document titled "PC-83-07-C(3)" starting on Page 3 of 60

Workgroup Committee

• For this and other statements regarding "updates of the narrative, the Solid Waste working group has not been supplied with sufficient information to evaluate compliance. This same comment applies to all entries below. We are being asked to opine on these things without adequate information. I suggest that we should not be giving a rubber stamp of approval to statements

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

that we have not actually had opportunity to examine fully -- it's both meaningless and likely to be abused in future CUP applications.

- impossible to assess with missing narrative, where are the 10 acres proposed for addition? need drawings

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: County Requirement Superseded

Basis: Current DEQ permits supersede this condition
From pdf file pages 7 & 8 (original document page 5 & 6)

v. Other Information Required by the Development Director (Conditions No. 5 and 7)

A review of the Environmental and Operational Factors of Art. XXX . 05. A1 is contained in a report titled Coffin Butte Sanitary Landfill Expansion Plan prepared by Randy Sweet, Geologist, and Regional Consultants, Inc. in Oct., 1977. This report was submitted to the Benton County Commissioners, Health Department, and Solid Waste Advisory Committee. A copy of this report will be made available to the Development Department if requested.

The small ponds will remain as at present for the next ten years. At the end of this period the use of the ponds and surroundings will be reevaluated and, if anything is to be done, state of the art engineering practices will be employed in conformance with the standards in effect at that time. A modified site development plan will be submitted for County review when appropriate.

Open Item: Address DEQ primacy question

Subcommittee Member – Republic

Republic Agrees with staff for some of the reasons stated above.

6. Provide a detailed reclamation plan that sets form the anticipated physical characteristics of the "terracing" including an average height and width of the terracing, provide documentation that the site is physically available to be reclaimed in this manner.

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

Comments

County

In Compliance. The narrative was updated to provide information related to conditions 1 through 7. The updated narrative is found in the document titled "PC-83-07-C(3)" starting on Page 3 of 60

Workgroup Committee

- For this and other statements regarding "updates of the narrative, the Solid Waste working group has not been supplied with sufficient information to evaluate compliance. This same comment applies to all entries below. We are being asked to opine on these things without adequate information. I suggest that we should not be giving a rubber stamp of approval to statements that we have not actually had opportunity to examine fully -- it's both meaningless and likely to be abused in future CUP applications.
- impossible to assess with missing reclamation plans (which would probably be in the form of drawings, not "narrative")

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: There is a very detailed description of the promised screening in the narrative. However, none of the promises have been kept, nor has the County taken any enforcement actions to ensure completion of screening requirements.

Compliance Opinion(s): Compliance Status Unclear

Open Item: DEQ vs. County primacy. Which organization has primacy over what? A clear understanding is needed of DEQ's and the County's role in addressing aspects of the landfill such as design, operation, monitoring (including noise, light pollution, odor, etc.), appearance, and screening from public view, etc.

Subcommittee Member – Republic

Republic agrees with Staff.

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

7. Submit for review by the Development Director a plan detailing the proposed method Valley Landfills shall use to protect the small ponds found in the Northeast corner of the property.

Comments

County

In Compliance. The narrative was updated to provide information related to conditions 1 through 7. The updated narrative is found in the document titled "PC-83-07-C(3)" starting on Page 3 of 60

Workgroup Committee

- For this and other statements regarding "updates of the narrative, the Solid Waste working group has not been supplied with sufficient information to evaluate compliance. This same comment applies to all entries below. We are being asked to opine on these things without adequate information. I suggest that we should not be giving a rubber stamp of approval to statements that we have not actually had opportunity to examine fully -- it's both meaningless and likely to be abused in future CUP applications.
- Impossible to assess with missing pond protection plans (note: presumably not in compliance since the small ponds currently appear to be buried below a large pile of waste)

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: Compliance Status Unclear

Basis:

Notes: From pages 6-8

"The small ponds will remain as at present for the next ten years. At the end of this period the use of the ponds and surroundings will be reevaluated and, if anything is to be done, state of the art engineering practices will be employed in conformance with the standards in effect at that time. A modified site development plan will be submitted for County review when appropriate."

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

Explanation: Pond location unclear.

Notes: None

Open Item(s): Address DEQ primacy question

Subcommittee Member – Republic

Republic agrees with staff.

8. The current DEQ operational permit will expire on January 31, 1984. Valley Landfills, Inc. has been requested to submit an updated, long-term leachate control plan as part of the permit renewal process. This plan must contain provisions for a leachate storage facility so leachate irrigation will not occur on pasture lands from November 1 through May 1 of each year. The control plan must also provide for a soil study that designates present and future leachate irrigation areas. This plan must show that the amount of irrigation area available is compatible with future leachate generation volumes so metal or nutrient accumulations in the soils will remain fat below any toxicity levels.

Comments

County

County Requirement Superseded. Leachate is an oversight function of DEQ.
The requirement is for a leachate control plan, there is no requirement that states that all leachate must be treated on-site. Planning staff would not have had enough expertise to be able to dictate how leachate is handled. A CUP application is a government review of a proposed use, hauling leachate is not a land use but an action that is dependent on a land use.
The soil study referenced above was in regard to leachate irrigation areas, not a general review of soil toxicity. Since leachate is no longer disposed of through irrigation, this condition is no longer applicable.

Workgroup Committee

- DEQ does not monitor soil toxicity
- request has been made of Brian fuller, DEQ to find out if DEQ monitors soil toxicity

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

- there has never been a cup submitted to Benton County that included off-haul of all leachate generated at the landfill for treatment at municipal facilities & release into the Willamette. all cup's (1974/1983/2003) where documentation is available have contained, in the application, assertions that all leachate would be treated on-site.
- This statement is not adequate to confirm that these conditions were met, or that they were fully evaluated by DEQ. Certainly in the case of "irrigation area," any such plan did not work and as a result the leachate is being hauled to wastewater treatment plants rather than being irrigated. It would be more accurate to characterize this as a failure of design that led to non-compliance, which required alternative methods to maintain DEQ permitting.
- Republic: Republic Services maintains an active solid waste permit with the Oregon Department of Environmental Quality and is in compliance with that permit. Further, leachate irrigation ceased in the late 1990s, as a result of new regulatory rules. All leachate is sent to a local wastewater treatment plant.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: The effort to absolve the County of any responsibility for ensuring proper management and treatment of leachate ignores the County's duty to ensure compatible land use in Benton County. Leachate generation is a by-product of approving the hosting a landfill in the County. Ignoring the fate of leachate generated by the landfill is akin to approving a residential subdivision without any consideration of how and where the sewage generated is safely disposed.

The fate of leachate generated by the landfill should not simply be ignored by the County and delegated to DEQ. Trucking of leachate to Corvallis' sewage treatment plant does not result in effective treatment or insure against pollution of nearby waterways. Many of the toxic pollutants contained in leachate (PFAS, heavy metals, pharmaceuticals, personal care products, etc.) simply pass through the treatment plant with very little or no pollutant removal and end up in the Willamette River. The Willamette River is a key recreation asset (boating, fishing, swimming, etc.) for residents of Benton County, and a source of drinking water supply for downstream residents e.g. Adair Village

Compliance Opinion: County Requirement Superseded (Specific requirement no Longer Relevant)

Date	File #	Request	Result
1983	~~PC-83-07~~ L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

Basis: Leachate storage exists on site for holding leachate prior to trucking to off-site locations. No leachate is currently being land applied on landfill properties. No soil study needed

Note: Leachate processing at a wastewater treatment facility may not be an appropriate or effective treatment for leachate and subcommittee recommends further evaluation

Open Item(s): Management and effectiveness of current leachate transfer/treatment at city treatment works.

Subcommittee Member – Republic

Republic agrees with Staff. This condition is no longer relevant because Coffin Butte no longer irrigates leachate on site. Leachate regulation has gotten stricter since 1983 and Republic continues to comply with DEQ requirements.

9. As the site expands eastward, additional monitoring wells will be required. Depending on DEQ budget limitations, the permittee may have to share in the responsibility for sampling and monitoring of these wells.

Comments

County

In Compliance. This is an item under the oversight of DEQ. The Comm. Dev. Department does not confirm and inspect records to ensure that conditions such as these are completed. It is a DEQ permit and if the DEQ does not approve the permit then the applicant could not continue the use and would be out of compliance.

Workgroup Committee

- Republic: Republic Services has added additional monitoring wells as required and continues to be in compliance with its DEQ permits.
- As above, there should be a check of whether DEQ has actually evaluated this. Just because DEQ approved a permit does not necessarily mean that this condition was met.

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

- domestic wells have been contaminated. current subchapter part "d" dual landfill liners have been required since 1993. this technology is less than 30 years old, and may have to continue to perform for hundreds of years, during which time the liner can become brittle. the EPA has concluded that all landfills will eventually leak "no liner ... can keep all liquids out of the ground for all time. eventually liners will either degrade, tear, or crack and will allow liquids to migrate out of the unit. some have argued that liners are devices that provide a perpetual seal against any migration from a waste management unit. EPA has concluded that the more reasonable assumption, based on what is known about the pressures placed on liners over time, is that any liner will begin to leak eventually. "citation: EPA, 1988
- is any leachate collected in the secondary collection system? if so, the liner is already leaking

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: Compliance Status Unclear

Basis: Documentation unclear as to what wells involved and which organization is to provide it. Presumed in RSI [Republic] Annual Report.

Explanation: Presumed in RSI [Republic] Annual Report. Needs further information on how the reports are reviewed for compliance with site groundwater contamination goals.

Subcommittee Member – Republic

Republic agrees with Staff. Monitoring wells are within the jurisdiction of DEQ. The County can exercise no oversite of DEQ's responsibilities. Republic has a DEQ approved Environmental Monitoring Plan that includes a map of all monitoring wells.

10. Screen the landfill operation with fencing or berms so it cannot be seen from the County Road or adjacent properties.

Comments

County

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

Compliance Status Unclear. The screening may have been installed but has eroded or been removed during further site development. It should be recreated and maintained to be in compliance with the requirement.

Workgroup Committee

- Republic: Republic Services' records are incomplete, as this amendment is nearly 40 years old, and the company was neither the owner, nor the operator of the landfill at that time. However, Republic Services has planted trees to screen the landfill from Highway 99. Based on the age of the condition and the changing site conditions over the past four decades, Republic disagrees with the conclusion that this condition has not been completed.
- not in compliance document not included letter from the Oregon justice department regarding screening requirement per the 1967 highway beautification act
- There should be a more clear statement that the applicant is not in compliance with this requirement.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: The revised narrative submitted by the applicant is very detailed. None of the requirements have been completed or maintained. The County has not taken any enforcement action to ensure that these requirements be met.

Compliance Opinion: Not In Compliance

Basis: Personal observations

Subcommittee Member – Republic

Our comments remain the same. The site has changed so much since 1983 it is impossible to determine what might have done and any screening requirements imposed then would no longer be relevant to the current operation. And required screening will be addressed at the time of the new CUP (as occurred in the 2021 process.)

11. Daily cover of refuse with earth is not possible at this site due to the clay soils. The current (and future) permit addresses requiring daily compaction of refuse and require exposed refuse areas to not exceed 2 acres during the periods of October 15 to June 1 and to not exceed ¾ of an acre during all other periods. This shall be adhere to.

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

Comments

County

County Requirement Superseded. This is under the oversight of DEQ. The landfill uses an alternative daily cover approved by DEQ, which includes Covanta Ash material. The landfill also uses temporary cover.

Workgroup Committee

- Republic: Republic Services generally agrees with this assessment but would like the record to reflect that we do use site soils as daily cover, in addition to alternative daily covers.
- land use requirement not addressed by staff: this is a land use requirement; DEQ is not mentioned, and does not have override authority need more information: does the area of open fill exceed ¾ of an acre from June 2 through October 14? what is it now? does the area of open fill exceed 2 acres during the periods of October 15 through June 1?
- The statement here does not address whether exposed refuse areas have been limited to the acreages stated. There should be a more clear statement of whether this has been complied with, and whether the county has done any monitoring.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Using highly toxic Covanta Ash material to cover the garbage is another example of the County absolving itself from any obligation to protect Benton County residents from incompatible land uses. Oregon DEQ does not have a stellar record for effectively preventing pollution (air or water) through their permit processes.

Compliance Opinion: County Requirement Superseded by Subsequent DEQ Operating and Monitoring Permits

Notes: Unclear if there are environmental impacts of the alternative cover material used at the site such as leaching constituents in wet weather, airborne dust generation in dry weather, etc. An example issue of Covanta incinerator ash as alternate daily cover. Information on chemical composition and physical testing should be made available. Generally recognized assessments of leachable materials such as the Toxic Characteristic Leaching Procedure (TCLP) should be used.

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

Subcommittee Member – Republic

Our comments remain the same. Regulation of landfill cover is within DEQ's exclusive regulation and the County no authority to differ from DEQ. This condition is no longer relevant because DEQ now requires the landfill to fully cover the waste each day with soil or approved alternative daily cover.

12. Occasionally, leachate seeps through the site berms during heavy rainfall periods. If these occur in the future, a requirement to channel these flows into the leachate collection system within a timely period (i.e., 3 days) may be added.

Comments

County

County Requirement Superseded. Overseen by DEQ. This condition appears to be no longer be applicable. If the condition were still applicable, it authorizes the County to add a requirement in the future if leachate seeps through the berms. The applicant is in compliance unless a) the County has subsequently directed the applicant to channel leachate flows and b) the applicant has failed to do so; there is no evidence that both a) and b) have occurred, therefore the applicant is not out of compliance. Whether the County should have done more monitoring is a question that can be discussed but is not relevant to determining whether this condition has been complied with.

Workgroup Committee

- Republic: This condition was put in place prior to today's highly-engineered landfill design requirements. At the time, landfill liners were not required. Republic Services complies with all current regulatory requirements, which include liners. Leachate does not seep through perimeter berms.
- disagree with staff: DEQ not mentioned, therefore DEQ does not have regulatory authority. question: does leachate seep through site berms? is not answered
- Whether overseen by DEQ or not, there should be a clear statement of whether this condition has been complied with, and whether the county has ever checked on this.

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.

Conditions of Approval

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: Compliance Status Unclear

Basis: The locations the berms in question have not been provided. The berms may be along Coffin Butte Road between the road and three unlined areas (Old Closed Land, Cell 1, Cell 1A). It should be recognized that not all of the landfill cells constructed in the past 50 years were built to the same environmental standards and have different levels of leachate control.

Subcommittee Member – Republic

Republic complies the current DEQ requirements for leachate management.

13. DEQ permits are normally issued for a maximum of 5 years. As part of the permit renewal process, DEQ requires updated operational and construction plans to reflect the current permit period. As such, changes in environmental controls may be required to incorporate new technology into the landfill operation.

Comments

County

In Compliance. This is an advisory to the applicant rather than a condition that needed to be met.

Workgroup Committee

- As mentioned therefore it is appropriate to refer to DEQ compliance, although if the LUCS is not current, the permit may not be valid

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: Compliance Status Unclear

Basis: Compliance not demonstrated. Need DEQ solid waste permits from period 1983 to 2000.

Subcommittee Member – Republic

Date	File #	Request	Result
1983	PC-83-07 L-83-07	Amendments to the Comprehensive Plan Text and Map, amendments to the Development Code and Zoning Map, and a Site Development Plan (M-48615-83, PC-83-07-C(1)).	BOC Approved.
Conditions of Approval			
This condition is no longer relevant. There have been multiple iterations of subsequent DEQ permits since 1983.			

Date	File #	Request	Result
1994	PC-94-03	A conditional use permit for a 2.2 megawatt power generation facility. The facility would utilize the gas generated from the decomposing refuse in the landfill as the fuel source.	Community Development Department Approved

Conditions of Approval

1. The facility shall be housed in a structure approximately 50 by 100 feet or less in size, as described in the application materials.

Comments

County

In Compliance. Original generator building 3,900 square feet. Superseded by subsequent expansion approval.

Workgroup Committee

- missing information: application materials
- This is actually a really great way to answer a factual question. Allowable structure size, 5000 sf, built structure, 3,900 square feet, that's verifiable data. It would of course be good to have the application materials, since that is referenced (for example, were other building materials specified?)

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: None given as of 12/11/22

Basis: Low Priority

Subcommittee Member – Republic

Republic agrees with staff.

2. Noise levels shall comply with the New Industrial and Commercial Noise Standards (OAR 30403-355)-as measured at the nearest dwellings existing on the date of approval of this conditional use permit.

Comments

County

In Compliance. Noise testing completed in 1997.

Workgroup Committee

Date	File #	Request	Result
1994	PC-94-03	A conditional use permit for a 2.2 megawatt power generation facility. The facility would utilize the gas generated from the decomposing refuse in the landfill as the fuel source.	Community Development Department Approved

Conditions of Approval

- noise is an issue at the landfill and 1997 was a long time ago -- ensure the facility is still in compliance; verify that noise standards have not been updated
- Was there ever a follow-up study after the facility was expanded?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: To ensure land use compatibility, compliance with noise requirements cannot be a snapshot in time. Periodic testing and monitoring to ensure continued compliance is required and the County does not monitor or enforce land use (e.g., noise impacts) requirements.

Compliance Opinion: Compliance Status Unclear

Basis: County staff represent that compliance with noise limits is driven by resident complaints. More detailed information on the County process for receiving, managing, and resolving complaints of this nature is needed to establish if this condition is being met.

Subcommittee Member – Republic

Republic agrees with staff. The condition required compliance at approval. Whether other members of the committee think the condition was inadequate can't be collaterally attacked after 18 years and isn't relevant to whether the power plant complied.

3. The applicant is responsible for ongoing monitoring of noise levels. Upon request of the Planning Official, the applicant shall provide the County with sufficient information to determine whether the facility is in compliance with Condition 2 of this permit.

Comments

County

In Compliance. The applicant is only required to provide documentation at the request of the Planning Official. Available records do not indicate any such requests by the Planning Official.

Workgroup Committee

Date	File #	Request	Result
1994	PC-94-03	A conditional use permit for a 2.2 megawatt power generation facility. The facility would utilize the gas generated from the decomposing refuse in the landfill as the fuel source.	Community Development Department Approved

Conditions of Approval

- Republic: Republic Services agrees with the County's assessment. Our available records do not indicate any such requests by the Planning Department.
- County has not monitored.
- noise is an issue at the landfill: ask the applicant to demonstrate that the facility is in compliance

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: To ensure land use compatibility, compliance with noise requirements cannot be a snapshot in time. Periodic testing and monitoring to ensure continued compliance is required and the County does not monitor or enforce land use (e.g., noise impacts) requirements.

Compliance Opinion: Compliance Status Unclear

Basis: County staff represent that compliance with noise limits is driven by resident complaints. More detailed information on the County process for receiving, managing, and resolving complaints of this nature is needed to establish if this condition is being met.

Subcommittee Member – Republic

This condition is only triggered if the Planning Official so requests. If there is no evidence that the Planning Official ever made such a request, then the power plant has been in compliance.

4. The applicant shall obtain and comply with all applicable permits from Oregon Department of Environmental Quality (DEQ). The applicant shall provide copies of all DEQ permits to the County.

Comments

County

In Compliance. The requirement is that the applicant send a copy of the DEQ permit to the county, so the county is simply a receiving body for this information. This is a standard type of condition that ties a county permit to a permit issued by another agency. The County does not actively monitor compliance with outside agency permitting requirements, but if the outside agency

Date	File #	Request	Result
1994	PC-94-03	A conditional use permit for a 2.2 megawatt power generation facility. The facility would utilize the gas generated from the decomposing refuse in the landfill as the fuel source.	Community Development Department Approved

Conditions of Approval

determines that their permitting requirements have not been met then the applicant is also out of compliance with the Benton County permit.

Workgroup Committee

• when was the most recent LUCS on file at DEQ completed?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: Compliance Not Demonstrated

Basis: No record of required action provided.

Subcommittee Member – Republic

This condition was imposed on the power plant.

5. Expansion of the generating capacity of the facility is authorized under this permit as long as all conditions of approval, including those specifying building size and noise levels, are met. The Planning Official may require that the applicant obtain a new conditional use permit in order to expand the facility if, in his judgment, conditions existing at the time of the proposed expansion warrant a conditional use review.

Comments

Staff

In Compliance. The applicant submitted for a new CUP approval (S-97-58) for the expansion of the facility.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: Compliance Not Demonstrated

Basis: No record of required compliance with noise levels provided.

Note: need to add CUP document reference as notated above in staff comment

Date	File #	Request	Result
1994	PC-94-03	A conditional use permit for a 2.2 megawatt power generation facility. The facility would utilize the gas generated from the decomposing refuse in the landfill as the fuel source.	Community Development Department Approved

Conditions of Approval

6. Lighting shall be located so that it does not face directly, shine or reflect glare onto an adjacent street or property.

Comments

County

In Compliance. Monitoring of this condition is complaint driven. Staff has no records of complaints regarding lights at the power generation facility.

Workgroup Committee

- County has not monitored
- Not enough information to determine if this condition is met.
- staff comment is non-responsive; check the facility at night
- While we are on the landfill tour on Saturday, I heard you [Ian] talking with Joel Geier, and the subject of the arc lamps on the scene came up (photo attached). You told Joel that the lamps were not used mornings, only in afternoons. However, I went out this morning at 6 am and saw that the lights were indeed already on atop Coffin Butte, and there appeared to be operations going on, as I could see the red taillights of trucks moving around up there also. So it seems you are mistaken about the use of the arc lamps, and have been for some time. All last winter, for example, the lights were on every workday morning. I know this because I can see them from where I live when I go out to get the paper, weather permitting. They were on even if I got up at 5 am.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Can the County describe the system for documenting, responding to, and resolving complaints received? A complaint driven system of enforcement is unsatisfactory, particularly when Benton County residents are unaware of specific requirements and certainly rely on Benton County staff to monitor and enforce land use requirements.

Compliance Opinion: Compliance Not Demonstrated

Basis: No record of addressing compliance with lighting complaints provided.

Date	File #	Request	Result
1994	PC-94-03	A conditional use permit for a 2.2 megawatt power generation facility. The facility would utilize the gas generated from the decomposing refuse in the landfill as the fuel source.	Community Development Department Approved

Conditions of Approval

Subcommittee Member – Republic

We note that this condition only applies to lighting at the power plant. There is no evidence that power plant has ever been in violation of this condition or that there have been any complaints. We would say "in compliance" or "no evidence of non-compliance."

7. Obtain all required septic, access, building, plumbing, mechanical, electrical, and other applicable permits prior to construction.

Comments

County

In Compliance. Staff was able to find the following permits: Electrical - C9500565, C9501197, C9600514, C9600852. No building permits were found but this does not mean that they were not submitted, it is more a function of the county's issues related keeping track of old records. Ultimately, if the permits had not been submitted and approved and the building inspected then the building could not have been put into use.

Workgroup Committee

- septic/ada/building/plumbing/mechanical? certificate of occupancy?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: None given as of 12/11/22

Basis: Low Priority

Date	File #	Request	Result
1994	PC-94-10	Zone change from Rural Residential to Landfill Site Zone, Comprehensive Plan change from Rural Residential to Landfill Site.	BOC Denied

Conditions of Approval

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager believe that the record and rational of this land use proceeding is relevant to the evolution of the Coffin Butte Landfill.

Compliance Opinion: None given as of 12/11/22

Basis: Low Priority

Review of the record in this land use proceeding provides important historical context. The public comments and the Notice of Decision in this matter are critical to understanding the history of the landfill and the sentiment of the residents of Benton County at that time.

Open Items: need to review this documentation

Date	File #	Request	Result
1994	PC-94-11	A conditional use permit to expand the area approved for a landfill within the Landfill Site Zone and update the site development plan.	PC Approved; PC Decision Appealed; Application Withdrawn

Conditions of Approval

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager believe that the record and rational of this land use proceeding is relevant to the evolution of the Coffin Butte Landfill.

Review of the record in this land use proceeding provides important historical context. The public comments and the Notice of Decision in this matter are critical to understanding the history of the landfill and the sentiment of the residents of Benton County at that time.

Date	File #	Request	Result
1997	S-97-58	A conditional use permit to expand the generating capacity of the existing electric generation plant that is served by the gas produced at the Coffin Butte Landfill. Phase I of the expansion would increase the capacity of the plant from the current 2.2 MW to 5 MW and Phase II would increase the capacity to 10 MW.	Community Development and Parks Department Approved

Conditions of Approval

1. The Phase I generation facility shall be located in a structure approximately 75 by 85 feet; as shown in the application. The Phase 2 expansion shall be located in a building approximately 120 by 200 feet, as shown in the application materials. The Phase 2 expansion shall be located at least 300 feet from State Highway 99W, as shown in the application materials.

Comments

County

In Compliance. The expansion added 4,300 square feet to the original building.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: None given as of 12/11/22

Basis: Low Priority

2. Both the Phase 1 and Phase 2 expansions shall be constructed in accordance with the application materials. In addition, the siting standards of BCC 60.405 (2) and (3) and BCC 60.415(4), (5), (9), and (11) shall be met.

Comments

County

In Compliance. Staff was able to find the following permits: Permit B0700147 Phase I expansion & Permits B0700323, B0700416, B0700415, F0600068, B1400497. Zoning Compliance review occurs concurrent with the construction plan review to ensure that the site plan submitted with the building permit meets county regulations and conditions of approval.

Workgroup Committee

- certificate of occupancy?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Date	File #	Request	Result
1997	S-97-58	A conditional use permit to expand the generating capacity of the existing electric generation plant that is served by the gas produced at the Coffin Butte Landfill. Phase I of the expansion would increase the capacity of the plant from the current 2.2 MW to 5 MW and Phase II would increase the capacity to 10 MW.	Community Development and Parks Department Approved

Conditions of Approval

Compliance Opinion: None given as of 12/11/22

Basis: Low Priority

3. Noise levels for both Phase I and Phase 2 expansions shall comply with the Noise Control Regulations for Industry and Commerce in Oregon Administrative Rules 340-035- 0035 as measured at the nearest dwellings existing on the date of approval of this conditional use permit.

Comments

County

In Compliance. Noise Compliance Monitoring memorandum submitted on June 11, 1997, by Pacific Northwest Generating Cooperative. Subsequent to the compliance monitoring memorandum, the County would require additional testing only if there was reason to believe the noise standards were no longer being met, such as through a noise complaint received from an adjacent dwelling.

Workgroup Committee

- And were complaints received? Not enough information to determine if this condition was met.
- County has not monitored subsequent
- Is this document available to the public?
- noise is an issue at the landfill; ensure the facility is still in compliance; verify that noise standards have not been updated

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Can the County describe the system for documenting, responding to, and resolving complaints received? To ensure land use compatibility, compliance with noise requirements cannot be a snapshot in time. Periodic testing and monitoring to ensure continued compliance is required and the County does not monitor or enforce land use (e.g., noise impacts) requirements.

Date	File #	Request	Result
1997	S-97-58	A conditional use permit to expand the generating capacity of the existing electric generation plant that is served by the gas produced at the Coffin Butte Landfill. Phase I of the expansion would increase the capacity of the plant from the current 2.2 MW to 5 MW and Phase II would increase the capacity to 10 MW.	Community Development and Parks Department Approved

Conditions of Approval

A complaint driven system of enforcement is unsatisfactory, particularly when Benton County residents are unaware of specific requirements and certainly rely on Benton County staff to monitor and enforce land use requirements.

Compliance Opinion: Compliance Status Unclear

Basis: County staff represent that compliance with noise limits is driven by resident complaints. More detailed information on the County process for receiving, managing, and resolving complaints of this nature is needed to establish if this condition is being met.

Subcommittee Member – Republic

The Power Plant was in compliance at the time of approval and there have been no complaints since.

4. The applicant is responsible for ongoing monitoring of noise levels. Upon request of the Planning Official, the applicant shall provide the County with sufficient information to determine whether the facility is in compliance with Condition 3 of this permit.

Comments

County

In Compliance. Available records do not indicate any requests for noise monitoring by the Planning Official.

Workgroup Committee

- Republic: Republic Services agrees with the County's assessment. Our available records do not indicate any such requests by the Planning Department.
- County has not monitored
- noise is an issue at the landfill; ensure the facility is still in compliance
- Not enough information

Date	File #	Request	Result
1997	S-97-58	A conditional use permit to expand the generating capacity of the existing electric generation plant that is served by the gas produced at the Coffin Butte Landfill. Phase I of the expansion would increase the capacity of the plant from the current 2.2 MW to 5 MW and Phase II would increase the capacity to 10 MW.	Community Development and Parks Department Approved

Conditions of Approval

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Requiring the Applicant to self-monitor and regulate without any oversight by the County is ineffectual and a disservice to the residents of Benton County to whom County staff and the Board of Commissioners are accountable.

Compliance Opinion: Compliance Status Unclear

Basis: County staff represent that compliance with noise limits is driven by resident complaints. More detailed information on the County process for receiving, managing, and resolving complaints of this nature is needed to establish if this condition is being met.

Subcommittee Member – Republic

The Planning Official has never asked for additional information, so the Power Plant is in compliance or that there is no evidence of non-compliance.

5. The applicant shall continue to provide sanitation facilities for the generation plant employees that are located on site. The facilities shall include:

a) Drinking water within the generating plant building by a potable water container, refilled periodically;
b) A portable toilet located at the generating plant site;
c) Plumbed restroom facilities, with water closets and hot and cold running water shall be available for use by employees at the Coffin Butte Landfill office;
d) Generating plant employees shall have vehicles available for trips to the Coffin Butte Landfill office restroom facilities;
e) The maximum number of generating plant employees shall be five (5).

Comments

County

Date	File #	Request	Result
1997	S-97-58	A conditional use permit to expand the generating capacity of the existing electric generation plant that is served by the gas produced at the Coffin Butte Landfill. Phase I of the expansion would increase the capacity of the plant from the current 2.2 MW to 5 MW and Phase II would increase the capacity to 10 MW.	Community Development and Parks Department Approved

Conditions of Approval

In Compliance. An OSHA letter from September 29, 1997, relating to the toilet facilities and drinking water stated that the facility was compliant with OSHA standards for sanitation. The County does not monitor ongoing compliance with conditions such as this, unless there is reason to believe the operation may be out of compliance.

Workgroup Committee

- applicant "shall continue"...is the facility still in compliance? is potable water still available, are the other conditions complied with? portable toilet/available vehicles/5 maximum employees?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: None given as of 12/11/22

Basis: Low Priority

6. The applicant shall obtain and comply with all applicable permits from the Oregon Department of Environmental Quality (DEQ). The applicant shall provide copies of all DEQ permits for the generation facility to the Community Development and Parks Department.

Comments

County

In Compliance. This is a standard type of condition that ties a County permit to a permit issued by another agency. The County does not actively monitor compliance with outside agency permitting requirements, but if the outside agency determines that their permitting requirements have not been met then the applicant is also out of compliance with the Benton County permit.

Workgroup Committee

when was the most recent LUCS on file at DEQ completed?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Date	File #	Request	Result
1997	S-97-58	A conditional use permit to expand the generating capacity of the existing electric generation plant that is served by the gas produced at the Coffin Butte Landfill. Phase I of the expansion would increase the capacity of the plant from the current 2.2 MW to 5 MW and Phase II would increase the capacity to 10 MW.	Community Development and Parks Department Approved

Conditions of Approval

Compliance Opinion: Compliance Not Demonstrated

Basis: No record of required actions provided.

Subcommittee Member – Republic

This is a responsibility of the power plant.

7. Lighting shall be located so that it does not face directly, shine, or glare onto an adjacent road or property.

Comments

County

In Compliance. Monitoring of this condition is complaint driven. There are no records of any complaints. If there is current concern that the power plant lighting is out of compliance with this condition that could be investigated, but at this time there is no evidence of noncompliance.

Workgroup Committee

- check the facility at night
- County has not monitored
- Not enough information

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Can the County describe the system for documenting, responding to, and resolving complaints received? A complaint driven system of enforcement is unsatisfactory, particularly when Benton County residents are unaware of specific requirements and certainly rely on Benton County staff to monitor and enforce land use requirements to ensure compatibility.

Compliance Opinion: Compliance Not Demonstrated

Date	File #	Request	Result
1997	S-97-58	A conditional use permit to expand the generating capacity of the existing electric generation plant that is served by the gas produced at the Coffin Butte Landfill. Phase I of the expansion would increase the capacity of the plant from the current 2.2 MW to 5 MW and Phase II would increase the capacity to 10 MW.	Community Development and Parks Department Approved

Conditions of Approval

Basis: No record of addressing compliance with lighting complaints provided.

Subcommittee Member – Republic

If there is no record of complaints and, ergo, no record that the power plant has failed to respond to complaints, then there is no basis for a conclusion that the Power Plant has done anything other than comply.

8. The property owner shall submit a declaratory statement to be recorded in the Benton County Deed Records for the subject property that recognizes the rights of adjacent forest uses, consistent with BCC 620.220().

Comments

County

In Compliance. The document was submitted and recorded.

Workgroup Committee

- provide copy in documentation

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: No compliance opinion

Basis: Low priority

9. The applicant shall prepare a site-specific development plan addressing emergency water supplies for fire protection. The plan shall be submitted to the local fire protection agency for review. The plan approved by the local fire protection agency shall be shall submitted to the Community Development and Parks Department prior to the issuance of building permits for the structure for Phase 1. A revised site-specific development plan shall be completed prior to issuance of construction permits for the Phase 2 expansion. The site development plan shall address:

Date	File #	Request	Result
1997	S-97-58	A conditional use permit to expand the generating capacity of the existing electric generation plant that is served by the gas produced at the Coffin Butte Landfill. Phase I of the expansion would increase the capacity of the plant from the current 2.2 MW to 5 MW and Phase II would increase the capacity to 10 MW.	Community Development and Parks Department Approved

Conditions of Approval

a) Emergency access to the local water supply in the event of a wildfire or other fire-related emergency;
b) Provision of an all-weather road or driveway to within 10 feet of the edge of identified water supplies which contain 4,000 gallons or more and exist within 100 feet of the driveway or road at a reasonable grade (e.g. 12 percent or less);and
c) Emergency water supplies shall be clearly marked along the access route with a Fire District approved sign.

Comments

County

In Compliance. This is a standard requirement for a building permit. The site plan and construction drawings are reviewed by the applicable fire agency. The agency supplies a review based on adopted fire requirements and state fire codes. The building permit for the addition could not have been approved without fire review.

Workgroup Committee

- Republic: Republic Services is also conducting further research.
- appears to be not in compliance. these (plus assurance of power generation in an outage) would be a good start at considering requirements for the LS zone in a potential revisit of chapter 77
- This explanation of status cannot be accepted until the topic has been researched.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Landfill activities have a high potential of igniting fires and there have been fires previously at Coffin Butte. The potential for starting a wildfire is also great given the location of this industrial activity. Further, the frequency of power outages and landfill operations (e.g., pumps for water supply, leachate management and methane gas extraction) are dependent on reliable power supplies.

Compliance Opinion: Compliance Not Demonstrated

Basis: No record of required action provided.

Date	File #	Request	Result
1997	S-97-58	A conditional use permit to expand the generating capacity of the existing electric generation plant that is served by the gas produced at the Coffin Butte Landfill. Phase I of the expansion would increase the capacity of the plant from the current 2.2 MW to 5 MW and Phase II would increase the capacity to 10 MW.	Community Development and Parks Department Approved

Conditions of Approval

Subcommittee Member – Republic

This condition was imposed on expansion of the power plant, not on the landfill. We note that the landfill maintains an onsite water truck and water stand approximately 1 mile from the landfill entrance and 1.5 miles from the power plant entrance. The landfill uses daily cover to keep the amount of waste that is uncovered and available to burn to a minimum. Operators are trained on what to do if a fire starts and how to contain it.

10. The applicant shall obtain all required septic, road approach, building, plumbing, mechanical, electrical, and other applicable permits prior to commencement of construction for both the Phase I and Phase 2 expansion. Contact the Permits Clerk and Building Official at the Community Development and Parks Department regarding permits and fees.

Comments

County

In Compliance. Standard advisory condition. Completed for Phase 1. Phase 2 of the expansion has not been utilized by the applicant.

Workgroup Committee

- CO for Phase 1? CO for Phase 2?
- Republic Services' records do not show any non-compliance issues with Phase II. While the owner/operator of Coffin Butte Landfill was the applicant for this CUP request, primary responsibility for compliance would have been with Pacific Northwest Generating Cooperative, an independent third-party contractor and not a Republic Services' subsidiary.
- What about Phase 2?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: No compliance opinion

Date	File #	Request	Result
1997	S-97-58	A conditional use permit to expand the generating capacity of the existing electric generation plant that is served by the gas produced at the Coffin Butte Landfill. Phase I of the expansion would increase the capacity of the plant from the current 2.2 MW to 5 MW and Phase II would increase the capacity to 10 MW.	Community Development and Parks Department Approved
Conditions of Approval			
Basis: Low priority			

Date	File #	Request	Result
1999	PC-99-06	A Conditional Use Permit for mining and processing of mineral and aggregate resources. The proposed area consists of 1.43 acres adjacent to the existing quarry operation.	Planning Commission approved

Conditions of Approval

1. Obtain approval of a reclamation plan from the Oregon Department of Geology and Mineral Industries or the Oregon Division of State Lands. Operation and reclamation plan shall demonstrate consistency with the intended subsequent site use.

Comments

County

In Compliance. This is a standard type of condition that ties a County permit to a permit issued by another agency. The County does not actively monitor compliance with outside agency permitting requirements, but if the outside agency determines that their permitting requirements have not been met then the applicant is also out of compliance with the Benton County permit.

Workgroup Committee

- extraction believed to be completed, see next permit request, staff should verify. is there a CUP closeout process at Benton County CDD?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: What is the mechanism whereby any State agency is informed of a County land use action to allow an activity that requires a permit from a State agency? If the County issues an approval for a land use prior to the landowner getting the required permits, how will the County ensure that all the required permits have been received since the County does no monitoring or enforcement.

Compliance Status Unclear. No record of required action provided.

Subcommittee Member – Republic

The reclamation plan for the quarry is governed by DOGMI and the operation cannot close the site until those permits are obtained. The current reclamation plan is eventually landfill in the quarry area and cap it when the landfill closes.

Date	File #	Request	Result
1999	~~PC-99-06~~	A Conditional Use Permit for mining and processing of mineral and aggregate resources. The proposed area consists of 1.43 acres adjacent to the existing quarry operation.	Planning Commission approved

Conditions of Approval

2. if the mining is the primary cause of traffic on the unpaved public road, that road shall be kept dust-free by the applicant if dwellings are located within 300 feet of the roadway. The applicant and lease-holding operator shall endeavor to use only those public roads designated for truck usage, unless making local deliveries of mineral and aggregate resources to residential areas serviced by roads not designated for truck usage.

Comments

County

In Compliance. This would be Coffin Butte Road and this road is paved.

Workgroup Committee

- extraction believed to be completed, see next permit request, staff should verify. is there a CUP closeout process at Benton County CDD?
- Is there no equivalent condition about dropping rocks which create road hazards on the highway?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: This is a classic example of an unenforceable condition of approval – who or how will the "primary cause" of traffic be determined? Then the requirement that the applicant or quarry lease holder "endeavor" to use only roads designed for truck traffic, what does that mean? A meaningless condition that does not have any chance of being enforced. Issuing a land use approval to a property owner binds the property owner and that obligation cannot be transferred to the lease holder.

Compliance Status Unclear. No record of required action provided.

Subcommittee Member – Republic

There is no quarry traffic on any unpaved roads. The primary road that the quarry traffic uses is paved (Coffin Butte Rd). An occasional truck might use one of the roads to the north of the site to deliver gravel to a homeowner or if the county is doing maintenance on a gravel road, but is not very common. Rock trucks are not the primary traffic on any of the gravel roads surrounding the site. This condition has never been triggered.

Date	File #	Request	Result
1999	PC-99-06	A Conditional Use Permit for mining and processing of mineral and aggregate resources. The proposed area consists of 1.43 acres adjacent to the existing quarry operation.	Planning Commission approved

Conditions of Approval

3. The applicant or lease-holding operator shall provide screening to partially obscure the mining site from view by adjoining occupied property and public roads in Soap Creek Valley and north Benton County to the extent reasonable and practicable to do so. The screening shall consist of an ornamental fence or wall, a vegetated berm, or preservation of vegetated natural slope in character with the natural landscape of Soap Creek Valley.

Comments

County

County Requirement Superseded. The 1.43 acres is located along the north side of the quarry and the landfill. This is now part of a landfill cell so screening just this small piece of land is impracticable. The wording of this condition is unfortunately subjective, making determination of compliance not clear and objective.

Workgroup Committee

- Republic: Republic Services did not own Coffin Butte Landfill at this time. Therefore, we do not have detailed records about any screening that was done. While the owner/operator of Coffin Butte Landfill was the applicant for this CUP request, primary responsibility for compliance with these and other requirement would have been the third-party quarry contractor. It appears from Google Earth historical photos that the third-party contractor did make an attempt to construct some berms and screening, but Republic Services do not have access to those records.
- extraction believed to be completed, see next permit request, staff should verify. is there a CUP closeout process at Benton County CDD?
- Not in compliance. The quarry is visible for miles around.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: As the property owner, RS or any previous landowner cannot delegate their responsibility to comply with conditions of approval to a third-party. It is the responsibility of the landowner to comply. Further, making an attempt to provide screening is not compliance. Again, County inability or unwillingness to monitor or enforce conditions of approval makes the whole land use review and approval process meaningless.

Date	File #	Request	Result
1999	PC-99-06	A Conditional Use Permit for mining and processing of mineral and aggregate resources. The proposed area consists of 1.43 acres adjacent to the existing quarry operation.	Planning Commission approved

Conditions of Approval

Compliance Status Unclear. Field verification needed.

4. The applicant or lease-holding operator shall ensure that the mining operation does not exceed the maximum sound level permitted by the Oregon Department of Environmental Quality. The applicant or lease-holding operator shall monitor noise generated by mining activities on one randomly selected day per month when noise complaints are received, notwithstanding a minimum of one time per year. Noise data and reports of findings from this monitoring shall be placed on file, in a timely way with the Benton County Community Development Department for public inspection. A berm, or other sound-absorbing construction materials such as acoustical cinder blocks or other similar methods may be used to reduce the sound off-site to levels at or below those permitted by the Oregon Department of Environmental Quality. Any sound-reduction construction will be consistent with the visual buffering required in Condition #3 above. The applicant or lease-holding operator shall limit blasting to the hours of 9:00 a.m. to 5:00 p.m., Monday through Friday.

Comments

County

County Requirement Superseded. This 1.43 acres is no longer being quarried.

Workgroup Committee

- Republic: As noted above, the owner/operator of Coffin Butte Landfill was the applicant for this CUP only because it was the property landowner. Primary responsibility for compliance with these and other requirements would have rested with the third-party quarry contractor.
- extraction believed to be completed, see next permit request, staff should verify. is there a cup closeout process at Benton County CDD?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Date	File #	Request	Result
1999	PC-99-06	A Conditional Use Permit for mining and processing of mineral and aggregate resources. The proposed area consists of 1.43 acres adjacent to the existing quarry operation.	Planning Commission approved

Conditions of Approval

Mark Yeager: As the property owner, RS or any previous landowner cannot delegate their responsibility to comply with conditions of approval to a third-party. It is the responsibility of the landowner to comply. Again, County inability or unwillingness to monitor or enforce conditions of approval makes the whole land use review and approval process meaningless.

Compliance Status Unclear. No record of required action provided.

Subcommittee Member – Republic

As noted above, mining has long ceased at this site. There is some evidence that the berm was constructed but has since been removed. Conditions of this CUP relating to mining operation on site are no longer relevant.

5. Provide on-site parking for employees, customers, and visitors to the mining site.

Comments

County

County Requirement Superseded. This 1.43 acres is no longer being quarried.

Workgroup Committee

- Republic: As noted above, the owner/operator of Coffin Butte Landfill was the applicant for this CUP only because it was the property landowner. Primary responsibility for compliance with these and other requirements would have rested with the third-party quarry contractor.
- extraction believed to be completed, see next permit request, staff should verify. is there a cup closeout process at Benton County CDD?
- In compliance

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Date	File #	Request	Result
1999	PC-99-06	A Conditional Use Permit for mining and processing of mineral and aggregate resources. The proposed area consists of 1.43 acres adjacent to the existing quarry operation.	Planning Commission approved

Conditions of Approval

Mark Yeager: As the property owner, RS or any previous landowner cannot delegate their responsibility to comply with conditions of approval to a third-party. It is the responsibility of the landowner to comply.

Condition No. 5

No Compliance Opinion

6. Maintain a security fence between the mining operation and the public road when such road is located within 200 feet of the mining operation.

Comments

County

County Requirement Superseded. This 1.43 acres is no longer being quarried.

Workgroup Committee

- Republic: As noted above, the owner/operator of Coffin Butte Landfill was the applicant for this CUP only because it was the property landowner. Primary responsibility for compliance with these and other requirements would have rested with the third-party quarry contractor.
- extraction believed to be completed, see next permit request, staff should verify. is there a cup closeout process at Benton County CDD?
- In compliance

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: As the property owner, RS or any previous landowner cannot delegate their responsibility to comply with conditions of approval to a third-party. It is the responsibility of the landowner to comply.

No Compliance Opinion

Date	File #	Request	Result
1999	PC-99-06	A Conditional Use Permit for mining and processing of mineral and aggregate resources. The proposed area consists of 1.43 acres adjacent to the existing quarry operation.	Planning Commission approved

Conditions of Approval

7. Not excavate in a manner which would result in disturbance of perimeter fencing or screening, or would impair the intent of the reclamation plan.

Comments

County

County Requirement Superseded. This 1.43 acres is no longer being quarried.

Workgroup Committee

- Republic: As noted above, the owner/operator of Coffin Butte Landfill was the applicant for this CUP only because it was the property landowner. Primary responsibility for compliance with these and other requirements would have rested with the third-party quarry contractor.
- extraction believed to be completed, see next permit request, staff should verify. is there a cup closeout process at Benton County CDD?
- The provision for screening has not been met, as noted above.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: As the property owner, RS or any previous landowner cannot delegate their responsibility to comply with conditions of approval to a third-party. It is the responsibility of the landowner to comply.

No Compliance Opinion

8. The quarry operation hours shall occur only between 7:00 a.m. and 5:00 p.m. Monday through Friday, and 7:00 a.m. and 3:00 p.m. on Saturdays. Quarrying operations shall not be conducted on Sundays.

Comments

County

Date	File #	Request	Result
1999	PC-99-06	A Conditional Use Permit for mining and processing of mineral and aggregate resources. The proposed area consists of 1.43 acres adjacent to the existing quarry operation.	Planning Commission approved

Conditions of Approval

County Requirement Superseded. This 1.43 acres is no longer being quarried.

Workgroup Committee

- Republic: As noted above, the owner/operator of Coffin Butte Landfill was the applicant for this CUP only because it was the property landowner. Primary responsibility for compliance with these and other requirements would have rested with the third-party quarry contractor.
- extraction believed to be completed, see next permit request, staff should verify. is there a cup closeout process at Benton County CDD?
- Generally in compliance (the quarry has been a better neighbor than the landfill, in this regard).
- "Operating hours" seem to be where there is most reluctance to make a clear statement that the landfill is out of compliance. Three or four special kinds of "operations" are mentioned that take place outside of the operating hours that were stated as conditions for the permits. On this last issue, for comparison I took a look at Lane County's Short Mountain Landfill. That landfill only serves commercial account holders, yet they seem to be able to restrict those haulers to their stated operating hours (7 AM to 5 PM weekdays and Saturdays). Seems like there's a lesson for Benton County our working group in there.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: As the property owner, RS or any previous landowner cannot delegate their responsibility to comply with conditions of approval to a third-party. It is the responsibility of the landowner to comply. Again, County inability or unwillingness to monitor or enforce conditions of approval makes the whole land use review and approval process meaningless.

Limiting "quarry operations" to 7:00 am to 5:00 pm creates a potential conflict with prior condition #4.

In Compliance: Periodic County inspections are suggested to address resident concerns.

9. The applicant shall retain the dual-access road system to provide for emergency service access to the subject site.

Comments

County

Date	File #	Request	Result
1999	PC-99-06	A Conditional Use Permit for mining and processing of mineral and aggregate resources. The proposed area consists of 1.43 acres adjacent to the existing quarry operation.	Planning Commission approved

Conditions of Approval

County Requirement Superseded. This 1.43 acres is no longer being quarried.

Workgroup Committee

- Republic: As noted above, the owner/operator of Coffin Butte Landfill was the applicant for this CUP only because it was the property landowner. Primary responsibility for compliance with these and other requirements would have rested with the third-party quarry contractor.
- extraction believed to be completed, see next permit request, staff should verify. is there a cup closeout process at Benton County CDD?
- There is only one serviceable route in to the quarry site for emergency service. The bridge over Soap Creek is no longer passable for emergency vehicles (both structurally unsound and with barriers in place).

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: As the property owner, RS or any previous landowner cannot delegate their responsibility to comply with conditions of approval to a third-party. It is the responsibility of the landowner to comply. Again, County inability or unwillingness to monitor or enforce conditions of approval makes the whole land use review and approval process meaningless.

Compliance Status Unclear

10. The quarrying activity shall be limited to the 600-foot contour elevation and below, as shown by the applicant on Attachment 2 to the application.

Comments

County

County Requirement Superseded. This 1.43 acres is no longer being quarried.

Workgroup Committee

Date	File #	Request	Result
1999	PC-99-06	A Conditional Use Permit for mining and processing of mineral and aggregate resources. The proposed area consists of 1.43 acres adjacent to the existing quarry operation.	Planning Commission approved

Conditions of Approval

- Republic: As noted above, the owner/operator of Coffin Butte Landfill was the applicant for this CUP only because it was the property landowner. Primary responsibility for compliance with these and other requirements would have rested with the third-party quarry contractor.
- extraction believed to be completed, see next permit request, staff should verify. is there a cup closeout process at Benton County CDD?
- Google Earth images from 8/13/2020 show that quarrying activity extends up to approximately the 700 ft contour.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: As the property owner, RS or any previous landowner cannot delegate their responsibility to comply with conditions of approval to a third-party. It is the responsibility of the landowner to comply. Again, County inability or unwillingness to monitor or enforce conditions of approval makes the whole land use review and approval process meaningless.

Compliance Status Unclear.

Subcommittee Member – Republic

The referenced Google Images are of the LS zoned area in which quarries are an outright permitted use, not the area of this CUP. The excavation in this area complied with the 600 foot limit.

11. Copies of water quality and air quality permits, and data produced from associated monitoring programs, required of the applicant by the Oregon Department of Environmental Quality, shall be placed on file, in a timely way, with the Benton County Community Development Department for public inspection.

Comments

County

County Requirement Superseded. This 1.43 acres is no longer being quarried.

Workgroup Committee

Date	File #	Request	Result
1999	PC-99-06	A Conditional Use Permit for mining and processing of mineral and aggregate resources. The proposed area consists of 1.43 acres adjacent to the existing quarry operation.	Planning Commission approved

Conditions of Approval

- Republic: As noted above, the owner/operator of Coffin Butte Landfill was the applicant for this CUP only because it was the property landowner. Primary responsibility for compliance with these and other requirements would have rested with the third-party quarry contractor.
- extraction believed to be completed, see next permit request, staff should verify. is there a cup closeout process at Benton County CDD?
- This explanation of status cannot be accepted until the topic has been researched.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: As the property owner, RS or any previous landowner cannot delegate their responsibility to comply with conditions of approval to a third-party. It is the responsibility of the landowner to comply. Again, County inability or unwillingness to monitor or enforce conditions of approval makes the whole land use review and approval process meaningless.

Compliance Status Unclear. County records need to be reviewed

12. Copies of storm-water runoff permits and data produced from associated monitoring programs required of the applicant by the Oregon Department of Environmental Quality, shall be placed on file in a timely way, with the Benton County Community Development Department for public inspection.

Comments

County

County Requirement Superseded. This 1.43 acres is no longer being quarried.

Workgroup Committee

- Republic: As noted above, the owner/operator of Coffin Butte Landfill was the applicant for this CUP only because it was the property landowner. Primary responsibility for compliance with these and other requirements would have rested with the third-party quarry contractor.

Date	File #	Request	Result
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Conditions of Approval

- extraction believed to be completed, see next permit request, staff should verify. is there a cup closeout process at Benton County CDD?
- This explanation of status cannot be accepted until the topic has been researched.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: As the property owner, RS or any previous landowner cannot delegate their responsibility to comply with conditions of approval to a third-party. It is the responsibility of the landowner to comply. Again, County inability or unwillingness to monitor or enforce conditions of approval makes the whole land use review and approval process meaningless.

Compliance Status Unclear. County records need to be reviewed.

Date	File #	Request	Result
2002	PC-02-07	A Conditional Use Permit for landfilling of an area that will be excavated for mining of mineral and aggregate resources Approved by the Planning Commission with Conditions. (West Triangle Expansion). The proposed area consists of 1.43 acres adjacent to the existing quarrying and landfill operation, and is designed to fulfill the reclamation plan for the previously approved quarry on this site.	Planning Commission approved

Conditions of Approval

1. Obtain approval from the Oregon Department of Environmental Quality for landfill operations on this site.

Comments

County

In Compliance. This is a standard type of condition that ties a county permit to a permit issued by another agency. The County does not actively monitor compliance with outside agency permitting requirements, but if the outside agency determines that their permitting requirements have not been met then the applicant is also out of compliance with the Benton County permit.

Workgroup Committee

- Republic: Republic Services has obtained all the necessary approvals and permits from the Oregon Department of Environmental Quality and remains in compliance with these conditions and approvals.
- does the most recent LUCS on file with DEQ predate
- this cup application?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: What is the mechanism whereby any State agency is informed of a County land use action to allow an activity that requires a permit from a State agency? If the County issues an approval for a land use prior to the landowner getting the required permits, how will the County ensure that all the required permits have been received since the County does no monitoring or enforcement.

Compliance Status Unclear. Site plan for area of interest needs to be provided.

Subcommittee Member – Republic

Republic Services has obtained all the necessary approvals and permits from the Oregon Department of Environmental Quality and remains in compliance with these conditions and approvals. Republic has to have both permits in hand to begin operation in

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Conditions of Approval

a new area, and the County will know because of the requirement that the Landfill file copies of the approved permits with the County.

2. In cases where landfill operations are the primary cause of traffic on unpaved public roads in the area, those roads shall be kept dust-free by the applicant.

Comments

County

In Compliance. No longer applicable. Coffin Butte Road is entirely paved. The county considers this condition to be completed.

Workgroup Committee

- See previous comment on this issue re: Robison Rd. and Wiles Rd.
- The public section of Coffin Butte Road is entirely paved.
- there continue to be unpaved public roads in the vicinity of the landfill. does the landfill contribute to traffic on those roads? if so, how much?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: This is a classic example of an unenforceable condition of approval – who or how will the "primary cause" of traffic be determined? Many roads in the vicinity of the landfill are unpaved and are likely to receive traffic headed to the landfill.

No Compliance Opinion

Subcommittee Member – Republic

This condition is moot. There are no unpaved public roads serving the landfill; this condition is not applicable.

Date	File #	Request	Result
2002	PC-02-07	A Conditional Use Permit for landfilling of an area that will be excavated for mining of mineral and aggregate resources Approved by the Planning Commission with Conditions. (West Triangle Expansion). The proposed area consists of 1.43 acres adjacent to the existing quarrying and landfill operation, and is designed to fulfill the reclamation plan for the previously approved quarry on this site.	Planning Commission approved

Conditions of Approval

3. The applicant or lease-holding operator shall ensure that the landfill operation does not exceed the maximum sound level permitted by the Oregon Department of Environmental Quality.

Comments

County

County Requirement Superseded. This condition is only applicable to the 1.43-acre site, not the entire landfill. Since the site was incorporated into a cell, this condition is no longer relevant.

Workgroup Committee

- noise is an issue at the landfill; ensure the facility is still in compliance
- Not enough information.
- Not monitored by the county.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: How and when does the County ensure that the maximum sound level has not been exceeded. Since this is another example of complaint-based enforcement, what system is in place to document, respond to, and resolve noise related complaints? The landowner cannot delegate regulatory compliance or accountability with these types of requirements to a lease-holding operator.

Compliance Not Demonstrated. No evidence of County process to capture / respond to action provided.

Subcommittee Member – Republic

There is no evidence that Republic is not in compliance.

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Conditions of Approval			
4. Provide on-site parking for employees, customers, and visitors to the landfill site.			
Comments County In Compliance. Workgroup Committee • truck traffic to the landfill begins backing up HWY 99 beginning before 4:30am; ensure that traffic to the landfill does not pose a safety hazard Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager No compliance opinion **Subcommittee Member – Republic** Republic has multiple parking spots at its office and scale house.			
5. Maintain a security fence between the landfill operation and the public road when such road is located within 200 feet of the landfill operation.			
Comments County In Compliance. Security fence is present Workgroup Committee			

Date	File #	Request	Result
2002	PC-02-07	A Conditional Use Permit for landfilling of an area that will be excavated for mining of mineral and aggregate resources Approved by the Planning Commission with Conditions. (West Triangle Expansion). The proposed area consists of 1.43 acres adjacent to the existing quarrying and landfill operation, and is designed to fulfill the reclamation plan for the previously approved quarry on this site.	Planning Commission approved

Conditions of Approval

- check fence perimeter to ensure fencing is intact and surrounds the entire perimeter; from a casual inspection, it appears deferred maintenance may be in order

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

No Compliance Opinion

Subcommittee Member – Republic

The subject property is more than 200 feet from any public road.

6. The landfill operation hours shall occur between 8:00 a.m. and 5:00 p.m. Monday through Saturday, and 12:00 p.m. through 5:00 p.m. on Sundays, with 24-hour access for commercial customers.

Comments

County

County Requirement Superseded. This condition only applies to the 1.43-acre site, not the entire landfill so cannot be enforced.

Workgroup Committee

- Republic: Republic Services is in compliance with this requirement, which governs landfill operations. However, it's important to note that internal operations, which include the arrival of field personnel on-site, begins at 4:30 a.m., Monday through Friday, and at 7:30 a.m. on Saturday. Additional operations not governed by the conditional use permit include work by third party contractors on landfill infrastructure, and commercial customers, who have 24-hour access to the Landfill.
- "Operating hours" seem to be where there is most reluctance to make a clear statement that the landfill is out of compliance. Three or four special kinds of "operations" are mentioned that take place outside of the operating hours that were stated as conditions for the permits. On this last issue, for comparison I took a look at Lane County's Short Mountain Landfill. That landfill

Date	File #	Request	Result
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Conditions of Approval

only serves commercial account holders, yet they seem to be able to restrict those haulers to their stated operating hours (7 AM to 5 PM weekdays and Saturdays). Seems like there's a lesson for Benton County our working group in there.

- How does 24 hour access work with compliance to noise complaints?
- Not in compliance
- Not in compliance. See previous note regarding operating hours.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Not in Compliance. Staff and RS do not get to interpret operating hours to mean something different than what was imposed as a written condition of approval. The words are the words. By definition the industrial activity of operating an active landfill is an incompatible use in an agricultural, forest and rural residential area. As such, operating hours are critical to mitigation of the numerous deleterious effects of the landfill operation. Requiring the landfill to limit operations to mitigate impacts "The landfill operation hours shall occur between 8:00 a.m. and 5:00 p.m. Monday through Saturday, and 12:00 p.m. through 5:00 p.m. on Sundays, with 24-hour access for commercial customers" means what it says, and the condition of approval was adopted by the Planning Commission. The public has a right to expect the operating hours to be enforced as approved and adopted. Beginning operations at 4:30 a.m. is a violation of this condition of approval. Under staff and RS interpretation, could the landfill operate 24 hours a day?

No Compliance Consensus for Subcommittee

Note: Condition is written poorly and would be improved with better clarification on Hours of Operation

Subcommittee Member – Republic

Republic agrees that the condition could be better written, but County's interpretation that "operating" means open to the public is at least as plausible as Mark's interpretation, particularly given the second part of the sentence which creates an exception for industrial customers. Text has to be interpreted in context, particularly given that some staff obviously have to be there 24/7.

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Conditions of Approval

Historically the site did operate 24 hours a day for commercial customers. That ceased in the early 2000s, but it was Republic's choice to do so and not a county requirement. We operate 5am-5pm for commercial customers. The landfill does have to have staff onsite from 4:30am-5:30pm to support the customers. This is no different than any other business that needs staff before and after their operating hours. Public customers are limited to 8am-5pm.

7. The applicant shall retain the dual-access road system to provide for emergency service access to the subject site.

Comments

County

In Compliance. Complete. The landfill is accessible from Tampico Road (via Soap Creek Road) and from Hwy 99W (via Coffin Butte Road).

Workgroup Committee

- Republic: Republic Services is in compliance with this requirement and has made a dual-access road system. Access is available via Highway 99 and Tampico Road.
- good candidate for Chapter 77 review
- This explanation of status cannot be accepted until the topic has been researched.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

No Compliance Opinion

Subcommittee Member – Republic

Republic agrees with staff.

Date	File #	Request	Result
2002	PC-02-07	A Conditional Use Permit for landfilling of an area that will be excavated for mining of mineral and aggregate resources Approved by the Planning Commission with Conditions. (West Triangle Expansion). The proposed area consists of 1.43 acres adjacent to the existing quarrying and landfill operation, and is designed to fulfill the reclamation plan for the previously approved quarry on this site.	Planning Commission approved

Conditions of Approval

8. The landfill activity shall be limited to the 600-foot contour elevation and below, as shown by the applicant on the Site Development Plan in the application.

Comments

County

In Compliance. The applicant indicates they are in compliance with this condition.

Workgroup Committee

- Republic: Republic Services is in compliance and operating within the 600-foot contour elevation as specified in the Site Development Plan.
- applicant should provide lidar, coordinate & verify with county GIS
- Not in compliance. The south face of Coffin Butte is scarred/eroded by excavations above the landfill up to approximately 675 ft elevation, per GoogleEarth images dated 8/13/2020

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Compliance Not Demonstrated. Did the staff do any independent verification that the landfill is operating within the 600-foot contour?

Compliance Opinion: Compliance Status Unclear

Subcommittee Member – Republic

Republic is in compliance with 600 foot limit; the condition does not apply to parts of the landfill outside of the 1.43 acres.

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2002	PC-02-07	A Conditional Use Permit for landfilling of an area that will be excavated for mining of mineral and aggregate resources Approved by the Planning Commission with Conditions. (West Triangle Expansion). The proposed area consists of 1.43 acres adjacent to the existing quarrying and landfill operation, and is designed to fulfill the reclamation plan for the previously approved quarry on this site.	Planning Commission approved

Conditions of Approval

9. Copies of water quality and air quality permits, and data produced from associated monitoring programs, required of the applicant by the Oregon Department of Environmental Quality, shall be placed on file, in a timely way, with the Benton County Community Development Department for public inspection.

Comments

County

In Compliance. The condition only requires that copies of documentation are given to the County, not that the county review and ensure that the applicant is in compliance with DEQ conditions. The county regularly receives copies of these documents.

Workgroup Committee

- Are these available for inspection, and if so, where?
- landfill not in compliance with June surface emission methane monitoring required by DEQ; Benton County should obtain an independent assessment of overall methane emissions, arsenic levels in monitoring wells are high, odor: per public records requests, odor complaints to DEQ are not documented/investigated/logged to the extent that residents have given up on making complaints to DEQ. per testimony at CU-21-047, odors are significant enough at the landfill that people sometimes cannot leave their homes; DEQ is apparently unaware of this situation, suggested action: ask DEQ how better to communicate current odor problems at the landfill to DEQ, annual report to DEQ: for many years, the reports required by Benton County DSAC to DEQ "documenting local citizens' concerns and the manner in which the owner or operator [of the landfill] is addressing those concerns" (ORS 459.325) have not been completed and submitted as required by Oregon statute. even now, there is no DSAC meeting dedicated to this required activity. as a result, DEQ has not been informed of many of the problems that citizens experience at coffin butte landfill. dedicated DSAC meeting to which the public are invited to air landfill concerns, include the results of this meeting in DEQ annual report

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Date	File #	Request	Result
2002	PC-02-07	A Conditional Use Permit for landfilling of an area that will be excavated for mining of mineral and aggregate resources Approved by the Planning Commission with Conditions. (West Triangle Expansion). The proposed area consists of 1.43 acres adjacent to the existing quarrying and landfill operation, and is designed to fulfill the reclamation plan for the previously approved quarry on this site.	Planning Commission approved

Conditions of Approval

Mark Yeager: Are the reports reviewed? Any independent verification by staff that the monitoring requirements for both air quality and water quality are being met and reported as required? The June 2022 report of methane exceedances and re-testing looks suspect – 7 hours to perform first test, just over an hour for the re-test?

Compliance Status Unclear. County records need to be reviewed

Subcommittee Member – Republic

Republic is in compliance with this condition. The condition does not require (nor does the County have the authority to require) oversight of DEQ's administration of its permits.

10. Copies of storm-water runoff permits and data produced from associated monitoring programs required of the applicant by the Oregon Department of Environmental Quality, shall be placed on file in a timely way, with the Benton County Community Development Department for public inspection.

Comments

County

In Compliance. The condition only requires that copies of documentation are given to the County, not that the county review and ensure that the applicant is in compliance with DEQ conditions. The county regularly receives copies of these documents.

Workgroup Committee

- Are these available for inspection, and if so, where?
- see CUP LU-15-001 the area zoned LS is inadequate to fully contain landfill operations and as a result ancillary landfill operations spill out onto properties not zoned for landfill operations (forest conservation/exclusive farm use/rural residential). this is why the landfill has had so many applications for non-by-right land uses over the past 50 years. this is a question that should be addressed holistically, not piecemeal. once landfill operations begin to be allowed on non-landfill parcels, those non-landfill

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Conditions of Approval

parcels, over time, become indistinguishable from landfill parcels. this incrementally blights the neighborhood and should be addressed in a bcc code revamp

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Are the reports reviewed? Any independent verification by staff that the monitoring requirements for both air quality and water quality are being met and reported as required?

Compliance Status Unclear. County records need to be reviewed

Subcommittee Member – Republic

Republic is in compliance with this condition. The condition does not require (nor does the County have the authority to require) oversight of DEQ's administration of its permits.

Date	File #	Request	Result
2003	PC-03-11	A Conditional Use Permit for excavation and landfilling of 9.45 acres adjacent to the existing landfill operation, approved by planning commission with conditions. This portion of the landfill would represent an addition to the existing, previously approved, Landfill Site Zone. (East triangle).	Planning Commission approved

Conditions of Approval

1. The applicant shall continue to operate within the approval of the Oregon Department of Environmental Quality Solid Waste Disposal Permit No 306.

Comments

County

In Compliance. The Comm. Dev. Department does not confirm and inspect records to ensure that conditions such as these are completed. It is a DEQ permit and if the DEQ does not approve the permit then the applicant could not continue the use and would be out of compliance with the County land use approval as well as DEQ rules.

Workgroup Committee

- Republic: Republic Services has obtained all the necessary approvals and permits from the Oregon Department of Environmental Quality and remains in compliance with these conditions and approvals.
- when was the most recent LUCS on file at DEQ completed?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Compliance Opinion: In Compliance

2. In cases where landfill operations are the primary cause of traffic on unpaved public roads in the area, those roads shall be kept dust-free by the applicant.

Comments

County

In Compliance. Coffin Butte Road was paved.

Date	File #	Request	Result
2003	PC-03-11	A Conditional Use Permit for excavation and landfilling of 9.45 acres adjacent to the existing landfill operation, approved by planning commission with conditions. This portion of the landfill would represent an addition to the existing, previously approved, Landfill Site Zone. (East triangle).	Planning Commission approved

Conditions of Approval

Workgroup Committee

- See previous notes re: Robison Rd. and Wiles Rd.
- there continue to be unpaved public roads in the vicinity of the landfill. does the landfill contribute to traffic on those roads? if so, how much?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Compliance Not Demonstrated. Same comment as before – who and how is "primary cause" defined and enforced?

Compliance Opinion: Compliance Status Unclear

Subcommittee Member – Republic

Republic agrees with Staff. All county roads to and from the landfill are paved, so this condition is moot.

3. The applicant or lease-holding operator shall ensure that the landfill operation does not exceed the maximum sound level permitted by the Oregon Department of Environmental Quality.

Comments

County

County Requirement Superseded. County monitoring of this condition is complaint-based and this condition would only have applied to landfill uses on the 9.45 acre property which has been incorporated into a larger landfill cell.

Workgroup Committee

- County does not monitor.
- noise is an issue at the landfill; ensure the facility is still in compliance

Date	File #	Request	Result
2003	PC-03-11	A Conditional Use Permit for excavation and landfilling of 9.45 acres adjacent to the existing landfill operation, approved by planning commission with conditions. This portion of the landfill would represent an addition to the existing, previously approved, Landfill Site Zone. (East triangle).	Planning Commission approved

Conditions of Approval

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Compliance Not Demonstrated. How and when does the County ensure that the maximum sound level has not been exceeded. Since this is another example of complaint-based enforcement, what system is in place to document, respond to, and resolve noise related complaints? The landowner cannot delegate regulatory compliance or accountability with these types of requirements to a lease-holding operator.

Compliance Not Demonstrated. No evidence of County process to capture / respond to action provided.

Subcommittee Member – Republic

Republic is in compliance, there is no evidence of any formal complaints about noise levels.

4. Provide on-site parking for employees, customers, and visitors to the landfill site.

Comments

County

In Compliance. Complied with.

Workgroup Committee

- truck traffic to the landfill begins backing up hwy 99 beginning before 4:30am; ensure that traffic to the landfill does not pose a safety hazard

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

No Compliance Opinion.

Subcommittee Member – Republic

Date	File #	Request	Result
2003	PC-03-11	A Conditional Use Permit for excavation and landfilling of 9.45 acres adjacent to the existing landfill operation, approved by planning commission with conditions. This portion of the landfill would represent an addition to the existing, previously approved, Landfill Site Zone. (East triangle).	Planning Commission approved

Conditions of Approval

Queuing onto 99 happens rarely, usually doing big projects. Our gates don't open until 5:00 a.m.

5. Maintain a security fence between the landfill operation and the public road when such road is located within 200 feet of the landfill operation.

Comments

County

County Requirement Superseded. This condition was only applicable to the 9.45 acre site. But, all landfill areas adjacent to public roads have a security fence. Complied with.

Workgroup Committee

- check fence perimeter to ensure fencing is intact and there are no deferred maintenance issues

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

No Compliance Opinion.

Subcommittee Member – Republic

This area is more than 1000 feet from any public road.

6. The landfill operation hours shall occur between 8:00 a.m. and 5:00 p.m. Monday through Saturday, and 12:00 p.m. through 5:00 p.m. on Sundays, with 24-hour access for commercial customers.

Comments

Date	File #	Request	Result
2003	PC-03-11	A Conditional Use Permit for excavation and landfilling of 9.45 acres adjacent to the existing landfill operation, approved by planning commission with conditions. This portion of the landfill would represent an addition to the existing, previously approved, Landfill Site Zone. (East triangle).	Planning Commission approved

Conditions of Approval

County

County Requirement Superseded. This condition only applied to the 9.45-acre site that has been incorporated into a larger landfill cell. No operating hour requirement has been applied to the entirety of the landfill.

Workgroup Committee

- Republic: Republic Services is in compliance with this requirement, which governs landfill operations. However, it's important to note that internal operations, which include the arrival of field personnel on-site, begins at 4:30 a.m., Monday through Friday, and at 7:30 a.m. on Saturday. Additional operations not governed by the conditional use permit include work by third party contractors on landfill infrastructure, and commercial customers, who have 24-hour access to the Landfill.
- not in compliance
- Not in compliance, see previous notes on operating hours.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Not In Compliance. Staff and RS do not get to interpret operating hours to mean something different than what was imposed as a written condition of approval. The words are the words. By definition the industrial activity of operating an active landfill is an incompatible use in an agricultural, forest and rural residential area. As such, operating hours are critical to mitigation of the numerous deleterious effects of the landfill operation. Requiring the landfill to limit operations to mitigate impacts "The landfill operation hours shall occur between 8:00 a.m. and 5:00 p.m. Monday through Saturday, and 12:00 p.m. through 5:00 p.m. on Sundays, with 24-hour access for commercial customers" means what it says, and the condition of approval was adopted by the Planning Commission. The public has a right to expect the operating hours to be enforced as approved and adopted. Beginning operations at 4:30 a.m. is a violation of this condition of approval. Under staff and RS interpretation, could the landfill operate 24 hours a day?

No Compliance Consensus for Subcommittee

Date	File #	Request	Result
2003	PC-03-11	A Conditional Use Permit for excavation and landfilling of 9.45 acres adjacent to the existing landfill operation, approved by planning commission with conditions. This portion of the landfill would represent an addition to the existing, previously approved, Landfill Site Zone. (East triangle).	Planning Commission approved

Conditions of Approval

Note: Condition is written poorly and would be improved with better clarification on Hours of Operation

Subcommittee Member – Republic

Republic agrees that the condition could be better written, but County's interpretation that "operating" means open to the public is at least as plausible as Mark's interpretation, particularly given the second part of the sentence which creates an exception for industrial customers. See further discussion above.

7. The applicant may relocate the eastern haul road, and shall retain the dual-access road system to provide for emergency service access to the subject site.

Comments

County

In Compliance. The landfill is accessible from Tampico Road (via Soap Creek Road) and from Hwy 99W (via Coffin Butte Road)

Workgroup Committee

- Republic: Republic Services is in compliance with this requirement. The eastern haul access road was relocated, per county regulations, during the construction of Cell 4 in 2012. Access is maintained today.
- good candidate for chapter 77 review
- This explanation of status cannot be accepted until the topic has been researched

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

No Compliance Opinion

Subcommittee Member – Republic

Republic is in compliance.

Date	File #	Request	Result
2003	PC-03-11	A Conditional Use Permit for excavation and landfilling of 9.45 acres adjacent to the existing landfill operation, approved by planning commission with conditions. This portion of the landfill would represent an addition to the existing, previously approved, Landfill Site Zone. (East triangle).	Planning Commission approved

Conditions of Approval

8. Copies of water quality, stormwater runoff, and air quality permits; and data produced from associated monitoring programs, required of the applicant by the Oregon Department of Environmental Quality, shall be placed on file in a timely way with the Benton County Community Development Department for public inspection.

Comments

County

In Compliance. The requirement for the county to receive copies of the documents and the county regularly receives copies. Appendix I
https://www.co.benton.or.us/sites/default/files/fileattachments/community_development/page/8136/2021_cbl_site_development_plan_appendix_g_i.pdf

Workgroup Committee

- Are these documents available for public inspection, and it so, where?
- landfill not in compliance with June surface emission methane monitoring required by DEQ; Benton County should obtain an independent assessment of overall methane emissions, arsenic levels in monitoring wells are high, odor: per public records requests, odor complaints to DEQ are not documented/investigated/logged to the extent that residents have given up on making complaints to DEQ, annual report to DEQ: for many years, the reports required by Benton County DSAC to DEQ "documenting local citizens' concerns and the manner in which the owner or operator [of the landfill] is addressing those concerns" (ORS 459.325) have not been completed and submitted as required by Oregon statute. even now, there is no DSAC meeting dedicated to this required activity. as a result, DEQ has not been informed of many of the problems that citizens experience at coffin butte landfill. contamination: domestic wells have been contaminated

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Date	File #	Request	Result
2003	PC-03-11	A Conditional Use Permit for excavation and landfilling of 9.45 acres adjacent to the existing landfill operation, approved by planning commission with conditions. This portion of the landfill would represent an addition to the existing, previously approved, Landfill Site Zone. (East triangle).	Planning Commission approved

Conditions of Approval

Mark Yeager: Are the reports reviewed? Any independent verification by staff that the monitoring requirements for both air quality and water quality are being met and reported as required? The June 2022 report of methane exceedances and re-testing looks suspect – 7 hours to perform first test, just over an hour for the re-test?

Compliance Status Unclear. County records need to be reviewed

Subcommittee Member – Republic

Republic is in compliance, and you can review the County records at the link provided by staff. The condition does not purport to give the County any oversight role with regard with DEQ's administration of its owner permits and could not do so.

9. A plan for a landscape buffer to mitigate visual impacts shall be approved by the Community Development Department. Landscape screening in the form of deciduous trees between the east triangle and Highway 99W, and a mixed deciduous/evergreen buffer shall be planted and maintained in good health by the applicant.

Comments

County

Compliance Status Unclear. The applicant indicates they placed a screen between the triangle and Hwy 99W but it either died or was destroyed by subsequent development.

Workgroup Committee

- Republic: Republic Services was unable to find records relating to this requirement, nor does it have any indication that there was any enforcement action from the County. Republic Services did plant a mitigating/vegetative buffer in 2016.
- Not in compliance
- not in compliance

Date	File #	Request	Result
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Conditions of Approval

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Not In Compliance. The County freely admits that it does no monitoring or enforcement of its adopted conditions of approval, and the County states that it relies on the applicant to comply with the requirements. Republic says they can't find their records related to the screening requirements and states further "nor does it have any indication that there was any enforcement action from the County." Review of this extensive record of land use actions for the landfill demonstrates this exact circumstance over and over. Apparently, the conditions of approval have absolutely no meaning and cannot be relied on to mitigate the impacts of incompatible land use activities performed at the landfill.

Compliance Opinion: Not In Compliance

Basis: Visual inspection.

Subcommittee Member – Republic

As noted previously, Republic did plant a buffer in 2016.

10. Approval shall be obtained from the Oregon Division of State Lands for any activities on the subject property that affect designated wetlands.

Comments

County

In Compliance. This is a standard type of condition that ties a County permit to a permit issued by another agency. The County does not actively monitor compliance with outside agency permitting requirements, but if the outside agency determines that their permitting requirements have not been met then the applicant is also out of compliance with the Benton County permit.

Workgroup Committee

Date	File #	Request	Result
2003	PC-03-11	A Conditional Use Permit for excavation and landfilling of 9.45 acres adjacent to the existing landfill operation, approved by planning commission with conditions. This portion of the landfill would represent an addition to the existing, previously approved, Landfill Site Zone. (East triangle).	Planning Commission approved

Conditions of Approval

- Republic: Republic Services has obtained all the necessary approvals and permits from the Oregon Department of Environmental Quality and remains in compliance with these conditions and approvals.
- Must be active monitor
- verification of compliance should be obtained. did the wetlands formerly include the small ponds that were slated for protection in the 1983 rezone

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Compliance Not Demonstrated. Obviously there are or were wetlands on the property in the vicinity of the activity otherwise the County would not have added this condition of approval. It is again inexplicable that these types of requirements are not monitored or enforced. What is the point?

Compliance Opinion: Compliance Not Demonstrated.

Basis: No record of required action provided.

Subcommittee Member – Republic

Republic has obtained approval from DSL for any wetland disturbances on sit. Republic did construct mitigation wetlands as required and DSL gave their full approval that the wetlands met all requirements in 2017. That concluded Republic obligations under the permit

Date	File #	Request	Result
2011	LU-11-016	Conditional Use Permit for the construction of a new public recycling and refuse transfer facility at Coffin Butte Landfill. The request also includes enhancements to the stormwater conveyance and detention system, as well as a container and drop box storage area, and a landfill construction staging and storage area in FC zone.	Planning Commission approved

Conditions of Approval

1. Development shall comply with the plans and narrative in the applicant's proposal identified as Attachment 'A' except as modified by the approval or the conditions below. Modifications to the operation of the facility other than those addressed through this decision, including, but not limited to, the relocation of additional activities, or the configuration of relocated activities in a manner not substantially in conformance with the submitted conceptual site plan, shall require approval through a Modification of a Conditional Use Permit request (BCC 53.225).

Comments

County

In Compliance. Standard condition requiring the applicant to implement the conditional use permit as described in their application. Planning staff reviews the building permit to ensure that the site plan meets county code requirements and Conditions of Approval. The building permit would not have been issued without planning staff approval.

Workgroup Committee

- Republic: Republic Services believes it is in compliance with the terms of the 2011 conditional use permit.
- narrative not provided, attachment A not provided
- Why doesn't the county monitor compliance. considering that the county receives $X million per biennium which originally was supposed to be dedicated to issues associated with hosting a landfill?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Compliance Not Demonstrated. It is again inexplicable that these types of requirements are not monitored or enforced. What is the point of having this condition?

Compliance Opinion: Compliance Not Demonstrated.

Date	File #	Request	Result
2011	LU-11-016	Conditional Use Permit for the construction of a new public recycling and refuse transfer facility at Coffin Butte Landfill. The request also includes enhancements to the stormwater conveyance and detention system, as well as a container and drop box storage area, and a landfill construction staging and storage area in FC zone.	Planning Commission approved

Conditions of Approval

Basis: No record of required action provided.

Subcommittee Member – Republic

Republic is in compliance with this site plan.

2. As required by BCC 60.220 (2) the applicant shall record a declaratory statement acknowledging the rights of adjacent and nearby property owners to conduct forest operations consistent with the Forest Practices Act and Rules prior to issuance of building permits.

Comments

County

In Compliance. Completed. Issuance of the building permit is confirmation that the declaratory statement was signed.

Workgroup Committee

- has staff verified documentation

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Compliance Not Demonstrated. No record presented. In a earlier condition of this nature, staff indicated they did not know whether this action was completed. Where is this statement in the record?

Compliance Opinion: Compliance Not Demonstrated.

Basis: No record of required action provided.

Date	File #	Request	Result
2011	LU-11-016	Conditional Use Permit for the construction of a new public recycling and refuse transfer facility at Coffin Butte Landfill. The request also includes enhancements to the stormwater conveyance and detention system, as well as a container and drop box storage area, and a landfill construction staging and storage area in FC zone.	Planning Commission approved
Conditions of Approval			
3. The applicant shall demonstrate compliance with the applicable siting standards specified in BCC 60.405 through materials submitted for issuance of building permits.			
Comments County In Compliance. Standard advisory condition. Issuance of the building permit is confirmation that the siting standards were met. Workgroup Committee • certificate of occupancy? ADA compliance? Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager No Compliance Opinion			
4. All new facilities constructed under this approval shall comply with the applicable provisions of Building Code, Electrical Code, Plumbing Code, Mechanical Code, Fire Code, and rules and regulations imposed by state and federal agencies.			
Comments County In Compliance. Standard advisory condition. Workgroup Committee • certificate of occupancy?			

Date	File #	Request	Result
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Conditions of Approval

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

No Compliance Opinion

Conditions of Approval from PC-03-11 that remain applicable and should be continued (as of the time of this decision):	*References Conditions #'s 1 through 8 of PC-03-11*

1. (5)Obtain necessary approvals from the Oregon Department of Environmental Quality for landfill operations on this site.

Comments

County

In Compliance. Standard advisory condition. The Comm. Dev. Department does not confirm and inspect records to ensure that conditions such as these are completed. It is a DEQ permit and if the DEQ does not approve the permit then the applicant could not continue the use and would be out of compliance.

Workgroup Committee

- Republic: Republic Services is in compliance with the DEQ requirement.
- DEQ permit approvals should be listed here. Are all of them up to date?
- when was the most recent LUCS on file at DEQ completed?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Date	File #	Request	Result
2011	LU-11-016	Conditional Use Permit for the construction of a new public recycling and refuse transfer facility at Coffin Butte Landfill. The request also includes enhancements to the stormwater conveyance and detention system, as well as a container and drop box storage area, and a landfill construction staging and storage area in FC zone.	Planning Commission approved

Conditions of Approval

Mark Yeager: Compliance Not Demonstrated. How do state agencies like DEQ become aware of some pending or approved land use action by Benton County? Having these types of requirements with no monitoring or enforcement is inexplicable. (MARK YEAGER 121622)

Compliance Opinion: Compliance Not Demonstrated.

Basis: No record of required action provided.

Subcommittee Member – Republic

As noted above several times, Republic cannot proceed with any development requiring a DEQ until it has obtained the permit. And Republic cannot get the permit from DEQ until it has obtained the County permit. The County has no authority to enforce or have any oversight over a DEQ permit. This condition is self-enforcing.

2. (6)In cases where landfill operations are the primary cause of traffic on unpaved public roads in the area, those roads shall be kept dust-free by the applicant.

Comments

County

In Compliance. Coffin Butte Road is entirely paved.

Workgroup Committee

- The status assessment here does not address whether unpaved public roads were kept dust-free prior to paving. For example, Tampico Road has only been fully paved within the past 3 years, and received frequent landfill traffic. Did the applicant demonstrate compliance by performing dust suppression on that road prior to the recent paving by the county? Robison Road,

Date	File #	Request	Result
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Conditions of Approval

Wiles Road, and Rifle Range Road still receives frequent traffic associated with the landfill, as well as frequent illegal dumping. All of these are still unpaved, except for small sections of Robison Rd. east of Military Rd and at the Soap Creek crossing.

- there continue to be unpaved public roads in the vicinity of the landfill. does the landfill contribute to traffic on those roads? if so, how much?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Compliance Not Demonstrated (121622) The comments above capture the concern – there are several unpaved roads in the vicinity of the landfill that receive landfill traffic. Who determines "primary cause" and what does the County do about it?

No Compliance Opinion Edward Pitera (112322)

Subcommittee Member – Republic

Republic agrees with staff; this condition is moot.

3. (7)The applicant or lease-holding operator shall ensure that the landfill operation does not exceed the maximum sound level permitted by the Oregon Department of Environmental Quality.

Comments

County

In Compliance. This condition only applies to the recycling and transfer station which is unlikely to create more noise than the landfilling activities.

Workgroup Committee

Date	File #	Request	Result
2011	LU-11-016	Conditional Use Permit for the construction of a new public recycling and refuse transfer facility at Coffin Butte Landfill. The request also includes enhancements to the stormwater conveyance and detention system, as well as a container and drop box storage area, and a landfill construction staging and storage area in FC zone.	Planning Commission approved

Conditions of Approval

- It should be stated more clearly that compliance cannot be confirmed, as the county has never checked.
- noise is an issue at the landfill; ensure the facility is still in compliance

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Compliance Not Demonstrated (121622) How and when does the County ensure that the maximum sound level has not been exceeded. Since this is another example of complaint-based enforcement, what system is in place to document, respond to, and resolve noise related complaints? The landowner cannot delegate regulatory compliance or accountability with these types of requirements to a lease-holding operator.

Compliance Opinion: Compliance Not Demonstrated.

Basis: No record of County process to capture / respond to complaints provided.

Subcommittee Member – Republic

There is no evidence to indicate that Republic is not in compliance with this requirement. We note that this CUP is specific to the public drop off facility. It is only in operation M-S 8am-5pm. It consists of customers hand unloading material into trailers so it is relatively quiet compared to the main landfill operation.

4. (8)Provide on-site parking for employees, customers, and visitors to the landfill site.

Comments

County

In Compliance.

Date	File #	Request	Result
2011	LU-11-016	Conditional Use Permit for the construction of a new public recycling and refuse transfer facility at Coffin Butte Landfill. The request also includes enhancements to the stormwater conveyance and detention system, as well as a container and drop box storage area, and a landfill construction staging and storage area in FC zone.	Planning Commission approved

Conditions of Approval

Workgroup Committee

- truck traffic to the landfill begins backing up HWY 99 beginning before 4:30am; ensure that traffic to the landfill does not pose a safety hazard

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

No Compliance Opinion Edward Pitera (112322)

Subcommittee Member – Republic

Republic is in compliance; all staff and visitors have space to park on site.

5. (9)Maintain a security fence between the landfill operation and the public road when such road is located within 200 feet of the landfill operation.

Comments

County

In Compliance.

Workgroup Committee

- check fence perimeter to ensure fencing is intact and there are no deferred maintenance issues

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

No Compliance Opinion (Mark Yeager 121622 & Edward Pitera (112322))

Subcommittee Member – Republic

Date	File #	Request	Result
2011	LU-11-016	Conditional Use Permit for the construction of a new public recycling and refuse transfer facility at Coffin Butte Landfill. The request also includes enhancements to the stormwater conveyance and detention system, as well as a container and drop box storage area, and a landfill construction staging and storage area in FC zone.	Planning Commission approved

Conditions of Approval

Republic is in compliance. The closest public road (HW 99) is more than 200 feet away from the public drop off facility.

6. (10)The landfill operation hours shall occur between 8:00 a.m. and 5:00 p.m. Monday through Saturday, and 12:00 p.m. through 5:00 p.m. on Sundays, with 24-hour access for commercial customers.

Comments

County

This condition should have been revised to apply directly to the recycling and transfer station, not the entire landfill. This condition, as written, is unenforceable.

Workgroup Committee

- Republic Services: Republic Services is in compliance with this requirement, which governs landfill operations. However, it's important to note that internal operations, which include the arrival of field personnel on-site, begins at 4:30 a.m., Monday through Friday, and at 7:30 a.m. on Saturday. Additional operations not governed by the conditional use permit include work by third party contractors on landfill infrastructure, and commercial customers, who have 24-hour access to the Landfill.
- Clearly not in compliance. if landfill operations routinely start at 4:30 am M-F. Operations are operations, no way to spin this.
- Not in Compliance

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Not In Compliance (121622) Staff and RS do not get to interpret operating hours to mean something different than what was imposed as a written condition of approval. The words are the words. By definition the industrial activity of operating an active landfill is an incompatible use in an agricultural, forest and rural residential area. As such, operating hours are critical to mitigation of the numerous deleterious effects of the landfill operation. Requiring the landfill to limit operations to mitigate impacts "The landfill operation hours shall occur between 8:00 a.m. and 5:00 p.m. Monday through Saturday, and 12:00 p.m.

Date	File #	Request	Result
2011	LU-11-016	Conditional Use Permit for the construction of a new public recycling and refuse transfer facility at Coffin Butte Landfill. The request also includes enhancements to the stormwater conveyance and detention system, as well as a container and drop box storage area, and a landfill construction staging and storage area in FC zone.	Planning Commission approved

Conditions of Approval

through 5:00 p.m. on Sundays, with 24-hour access for commercial customers" means what it says, and the condition of approval was adopted by the Planning Commission. The public has a right to expect the operating hours to be enforced as approved and adopted. Beginning operations at 4:30 a.m. is a violation of this condition of approval. Under staff and RS interpretation, could the landfill operate 24 hours a day?

In Compliance Edward Pitera (112322)

Subcommittee Member – Republic

Same comment as above; the Staff interpretation is more plausible than Mark's when read in context (and the County does in fact get to interpret its conditions in the first instance).

7. (11)The applicant shall retain the dual-access road system to provide for emergency service access to the subject site.

Comments

County

In Compliance.

Workgroup Committee

- Republic: Republic Services is in compliance with this requirement. The eastern haul access road was relocated, per county regulations, during the construction of Cell 4 in 2012. Access is maintained today.
- good candidate for chapter 77 review
- This assessment of status is not possible for the working group to confirm until research has been completed.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Date	File #	Request	Result
2011	LU-11-016	Conditional Use Permit for the construction of a new public recycling and refuse transfer facility at Coffin Butte Landfill. The request also includes enhancements to the stormwater conveyance and detention system, as well as a container and drop box storage area, and a landfill construction staging and storage area in FC zone.	Planning Commission approved

Conditions of Approval

No Compliance Opinion (Mark Yeager 121622 & Edward Pitera (112322))

Subcommittee Member – Republic

Republic agrees with staff.

8. OMITTED	*N/A*

9. (12)Copies of water quality and air quality permits, and data produced from associated monitoring programs, required of the applicant by the Oregon Department of Environmental Quality, shall be placed on file, in a timely way, with the Benton County Community Development Department for public inspection.

Comments

County

In Compliance. The county regularly receives copies. Appendix I
https://www.co.benton.or.us/sites/default/files/fileattachments/community_development/page/8136/2021_cbl_site_development_plan_appendix_g_i.pdf

Workgroup Committee

- landfill not in compliance with June surface emission methane monitoring required by DEQ; Benton County should obtain an independent assessment of overall methane emissions, arsenic levels in monitoring wells are high, odor: per public records requests, odor complaints to DEQ are not documented/investigated/logged to the extent that testimony has been given that residents have given up on making complaints to DEQ, annual report to DEQ: for many years, the reports required by Benton County DSAC to DEQ "documenting local citizens' concerns and the manner in which the owner or operator [of the landfill] is

Date	File #	Request	Result
2011	LU-11-016	Conditional Use Permit for the construction of a new public recycling and refuse transfer facility at Coffin Butte Landfill. The request also includes enhancements to the stormwater conveyance and detention system, as well as a container and drop box storage area, and a landfill construction staging and storage area in FC zone.	Planning Commission approved

Conditions of Approval

addressing those concerns" (ORS 459.325) have not been completed and submitted as required by Oregon statute. even now, there is no DSAC meeting dedicated to this required activity. as a result, DEQ has not been informed of many of the problems that citizens experience at coffin butte landfill. contamination: domestic wells have been contaminated

- These have not all been made available for public inspection. Whether this is the fault of the applicant or the county is impossible to judge, as a member of the interested public. During the 2021 CUP process, I had to use Public Information Request procedures to obtain information from DEQ that was not available from Benton County.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Compliance Not Demonstrated. Are the reports reviewed? Any independent verification by staff that the monitoring requirements for both air quality and water quality are being met and reported as required?

Compliance Opinion: Compliance Status Unsure

Basis: Insufficient information provided to demonstrate compliance e.g. a documented work process, summary reports, etc.

Subcommittee Member – Republic

Republic is in compliance and the committee review the County records at the link provided by staff. The condition does not purport to give the County any oversight role with regard with DEQ's administration of its owner permits and the County has no jurisdiction to do so.

10. (13)Copies of storm-water runoff permits and data produced from associated monitoring programs required of the applicant by the Oregon Department of Environmental Quality, shall be placed on file in a timely way, with the Benton County Community Development Department for public inspection.

Comments

Date	File #	Request	Result
2011	LU-11-016	Conditional Use Permit for the construction of a new public recycling and refuse transfer facility at Coffin Butte Landfill. The request also includes enhancements to the stormwater conveyance and detention system, as well as a container and drop box storage area, and a landfill construction staging and storage area in FC zone.	Planning Commission approved

Conditions of Approval

County

In Compliance. The county regularly receives copies.
https://www.co.benton.or.us/sites/default/files/fileattachments/community_development/page/8136/2021_cbl_site_development_plan_appendix_g_i.pdf

Workgroup Committee

- During the July 2022 DSAC meeting, Applicant's representative stated that runoff reports for the PRC composting facility were provided to DEQ but not to Benton County, because the county had never requested those explicitly. This needs to be clarified.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Compliance Not Demonstrated. Are the reports reviewed? Any independent verification by staff that the monitoring requirements for both air quality and water quality are being met and reported as required?

Compliance Opinion: Compliance Status Unsure

Basis: Insufficient information provided to demonstrate compliance e.g. a documented work process, summary reports, etc.

Subcommittee Member – Republic

Republic is in compliance and the Committee can review the County records at the link provided by staff. The condition does not purport to give the County any oversight role with regard with DEQ's administration of its owner permits and the County could not do so.

Date	File #	Request	Result
2013	LU-13-061	Conditional Use Permit for "minor additions and modifications" at Coffin Butte Landfill to change the location of a construction staging and storage area in the vicinity of the existing office structure.	Planning Commission approved

Conditions of Approval

1. Development shall comply with the plans and narrative in the applicant' s proposal identified as Attachment 'A', except as modified by the approval or the conditions below. Modifications to the operation of the facility other than those addressed through this decision, including, but not limited to, the relocation of additional activities, or the configuration of relocated activities in a manner not substantially in conformance with the submitted conceptual site plan, shall require approval through a Modification of a Conditional Use Permit request (BCC 53. 225).

Comments

County

In Compliance. This would have been checked through site plan review.

Workgroup Committee

- narrative not provided, attachment a not provided

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: This list of standard conditions that never get reviewed for compliance or enforced does not build confidence in the land use planning process in Benton County.

No Compliance Opinion

Subcommittee Member – Republic

In the absence of any evidence that Republic in not in compliance, the assumption should be that it is in compliance.

2. As required by BCC 60.220 (2), the applicant shall record a declaratory statement acknowledging the rights of adjacent and nearby property owners to conduct forest operations consistent with the Forest Practices Act and Rules prior to issuance of building permits.

Comments

Date	File #	Request	Result
2013	LU-13-061	Conditional Use Permit for "minor additions and modifications" at Coffin Butte Landfill to change the location of a construction staging and storage area in the vicinity of the existing office structure.	Planning Commission approved

Conditions of Approval

County

In Compliance. This was recorded as required.

Workgroup Committee

- Republic: Republic Services understands this requirement. At this juncture, no building permits have been issued for this area.
- This explanation of status cannot be accepted until the topic has been researched.
- unknown compliance

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: This list of standard conditions that never get reviewed for compliance or enforced does not build confidence in the land use planning process in Benton County.

No Compliance Opinion

3. Any new access to a county road or change to an existing access shall require a permit issued through the Benton County Public Works Department.

Comments

County

In Compliance. Standard advisory condition.

Workgroup Committee

- Republic: Republic Services has not added or requested additional access and understands the stated requirement.
- have changes in landfill access received a public works permit?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

No Compliance Opinion

Date	File #	Request	Result
2013	LU-13-061	Conditional Use Permit for "minor additions and modifications" at Coffin Butte Landfill to change the location of a construction staging and storage area in the vicinity of the existing office structure.	Planning Commission approved

Conditions of Approval

4. Disturbance of 1 Acre or More. A National Pollutant Discharge Elimination System NPDES) permit is required for all construction activities that disturb one acre or more. The NPDES permit must be obtained through Benton County Public Works and the Oregon Department of Environmental Quality.

Comments

County

In Compliance. Standard advisory condition.

Workgroup Committee

- Republic: Republic Services has not added or requested additional access and understands the stated requirement.
- have there been construction activities that disturb one acre or more? if so, have NPDES permits been obtained?
- No evidence of compliance.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Compliance Not Demonstrated. This is a new requirement and will likely make the list of standard conditions of approval that will not be monitored or enforced.

Compliance Not Demonstrated. County records need to be reviewed.

Subcommittee Member – Republic

The access and NPES are independent permitting requirements; Republic must comply with these requirements regardless of whether they are imposed as a condition of approval. That is why staff call them "advisory." The purpose of these kinds of condition is put the applicant on notice that could be additional permitting requirements. As noted above, Republic's operation hasn't triggered either of these permitting requirements, so we shouldn't be expected to prove a negative.

Conditions of Approval from prior approvals that remain in effect *(as of the time of this decision)*:	*References Conditions #'s 1 through 8 of PC-03-11*

Date	File #	Request	Result
2013	LU-13-061	Conditional Use Permit for "minor additions and modifications" at Coffin Butte Landfill to change the location of a construction staging and storage area in the vicinity of the existing office structure.	Planning Commission approved

Conditions of Approval

1. (5)Obtain necessary approvals from the Oregon Department of Environmental Quality for Landfill operations on this site.

Comments

County

In Compliance. The Comm. Dev. Department does not confirm and inspect records to ensure that conditions such as these are completed. It is a DEQ permit and if the DEQ does not approve the permit then the applicant could not continue the use and would be out of compliance.

Workgroup Committee

- Republic: This is not part of the Landfill and DEQ permits are not required. If such approvals become necessary in the future, Republic Services will obtain them.
- when was the most recent LUCS on file at DEQ completed? if the landfill is not compliant with land use conditions of aprroval, would DEQ still approve all necessary permits?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Compliance Not Demonstrated. This list of standard conditions that never get reviewed for compliance or enforced does not build confidence in the land use planning process in Benton County.

Compliance Opinion: Compliance Not Demonstrated.

Basis: No record of required action provided.

Subcommittee Member – Republic

As noted, if DEQ permits are required, then Republic must obtain those permits to proceed. The County does not need to nor has the authority to enforce DEQ's permitting requirements. This condition is only violated if DEQ finds Republic in violation. This in turn would allow the County to consider revoking the CUP. That is the purpose of these "comply with state law" requirements. More to the point, there haven't been any landfill operations on this CUP area that would trigger any permit requirements.

Date	File #	Request	Result
2013	LU-13-061	Conditional Use Permit for "minor additions and modifications" at Coffin Butte Landfill to change the location of a construction staging and storage area in the vicinity of the existing office structure.	Planning Commission approved

Conditions of Approval

2. (6)In cases where Landfill operations are the primary cause of traffic on unpaved public roads in the area, those roads shall be kept dust -free by the applicant.

Comments

County

In Compliance. Coffin Butte Road is entirely paved.

Workgroup Committee

- No evidence of compliance.
- there continue to be unpaved public roads in the vicinity of the landfill. does the landfill contribute to traffic on those roads? if so, how much?

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Compliance Not Demonstrated. Many previous comments submitted regarding this condition of approval. Many unpaved roads still exist in the vicinity of the landfill.

Mark Yeager: Compliance Not Demonstrated (121622) The comments above capture the concern – there are several unpaved roads in the vicinity of the landfill that receive landfill traffic. Who determines "primary cause" and what does the County do about it?
No Compliance Opinion- Edward Pitera (112322)

Subcommittee Member – Republic

Republic agrees with staff. The public roads are paved; this condition is moot.

3. (7)The applicant or lease - holding operator shall ensure that the Landfill operation does not exceed the maximum sound level permitted by the Oregon Department of Environmental Quality.

Date	File #	Request	Result
2013	LU-13-061	Conditional Use Permit for "minor additions and modifications" at Coffin Butte Landfill to change the location of a construction staging and storage area in the vicinity of the existing office structure.	Planning Commission approved

Conditions of Approval

Comments

County

In Compliance. This condition is only applicable to the staging and storage area which is unlikely to create noise greater than the landfill operation.

Workgroup Committee

- Republic: Republic Services has no record of complaints on this parcel.
- County cannot confirm compliance.
- noise is an issue at the landfill; ensure the facility is still in compliance

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Compliance Not Demonstrated. Property owner cannot delegate compliance to 3rd party This list of standard conditions that never get reviewed for compliance or enforced does not build confidence in the land use planning process in Benton County.

Compliance Opinion: Compliance Not Demonstrated.

Basis: No record of County process to capture / respond to complaints provided.

Subcommittee Member – Republic

As noted above, there is no evidence complaint or violation of this standard.

4. (8)Provide on-site parking for employees, customers, and visitors to the Landfill site.

Comments

County

Date	File #	Request	Result
2013	LU-13-061	Conditional Use Permit for "minor additions and modifications" at Coffin Butte Landfill to change the location of a construction staging and storage area in the vicinity of the existing office structure.	Planning Commission approved

Conditions of Approval

In Compliance.

Workgroup Committee

- truck traffic to the landfill begins backing up HWY 99 beginning before 4:30am; ensure that traffic to the landfill does not pose a safety hazard

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

No Compliance Opinion -Edward Pitera (112322)

Subcommittee Member – Republic

Republic agrees with Staff.

5. (9)Maintain a security fence between the Landfill operation and the public road when such road is located within 200 feet of the Landfill operation.

Comments

County

In Compliance.

Workgroup Committee

- check fence perimeter to ensure fencing is intact and there are no deferred maintenance issues

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

No Compliance Opinion (Mark Yeager 121622 & Edward Pitera (112322))

Subcommittee Member – Republic

Republic agrees with staff.

Date	File #	Request	Result
2013	LU-13-061	Conditional Use Permit for "minor additions and modifications" at Coffin Butte Landfill to change the location of a construction staging and storage area in the vicinity of the existing office structure.	Planning Commission approved

Conditions of Approval

6. (10)The Landfill operation hours shall occur between 8: 00 a.m. and 5: 00 p.m. Monday through Saturday, and 12: 00 p.m. through 5: 00 p.ni. on Sundays, with 24 -hour access for commercial customers.

Comments

County

This condition should have been revised to only apply to the staging and storage area. As written, it is unenforceable.

Workgroup Committee

- Republic: This is not part of Coffin Butte Landfill operations. It is a material storage facility. There are no operating hours here.
- Clearly not in compliance
- not in compliance

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Not In Compliance (121622) Staff and RS do not get to interpret operating hours to mean something different than what was imposed as a written condition of approval. The words are the words. By definition the industrial activity of operating an active landfill is an incompatible use in an agricultural, forest and rural residential area. As such, operating hours are critical to mitigation of the numerous deleterious effects of the landfill operation. Requiring the landfill to limit operations to mitigate impacts "The landfill operation hours shall occur between 8:00 a.m. and 5:00 p.m. Monday through Saturday, and 12:00 p.m. through 5:00 p.m. on Sundays, with 24-hour access for commercial customers" means what it says, and the condition of approval was adopted by the Planning Commission. The public has a right to expect the operating hours to be enforced as approved and adopted. Beginning operations at 4:30 a.m. is a violation of this condition of approval. Under staff and RS interpretation, could the landfill operate 24 hours a day?

In Compliance_-Edward Pitera (112322)

Date	File #	Request	Result
2013	LU-13-061	Conditional Use Permit for "minor additions and modifications" at Coffin Butte Landfill to change the location of a construction staging and storage area in the vicinity of the existing office structure.	Planning Commission approved

Conditions of Approval

Subcommittee Member – Republic

Republic references our prior comments on the same condition.

7. (11)The applicant shall retain the dual - access road system to provide for emergency service access to the subject site.

Comments

County

In Compliance.

Workgroup Committee

- Awaiting additional research.
- Republic: Republic Services is in compliance with this requirement. The eastern haul access road was relocated, per county regulations, during the construction of Cell 4 in 2012. Access is maintained today.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

No Compliance Opinion (Mark Yeager 121622 & Edward Pitera (112322))

Subcommittee Member – Republic

Republic is in compliance

8. *OMITTED*	N/A

9. (12)Copies of water quality and air quality permits, and data produced from associated monitoring programs, required of the applicant by the Oregon Department of Environmental Quality, shall be placed on file, in a timely way, with the Benton County Community Development Department for public inspection.

Comments

Date	File #	Request	Result
2013	LU-13-061	Conditional Use Permit for "minor additions and modifications" at Coffin Butte Landfill to change the location of a construction staging and storage area in the vicinity of the existing office structure.	Planning Commission approved

Conditions of Approval

County

In Compliance.

Workgroup Committee

- Republic: There are no permits or monitoring data as this relates to a material storage facility.
- As noted above, these are not available for public inspection as required.
- landfill not in compliance with June surface emission methane monitoring required by DEQ; Benton County should obtain an independent assessment of overall methane emissions, arsenic levels in monitoring wells are high, odor: per public records requests, odor complaints to DEQ are not documented/investigated/logged to the extent that testimony has been given that residents have given up on making complaints to DEQ, annual report to DEQ: for many years, the reports required by Benton County DSAC to DEQ "documenting local citizens' concerns and the manner in which the owner or operator [of the landfill] is addressing those concerns" (ORS 459.325) have not been completed and submitted as required by Oregon statute. even now, there is no DSAC meeting dedicated to this required activity. as a result, DEQ has not been informed of many of the problems that citizens experience at coffin butte landfill. contamination: domestic wells have been contaminated

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Compliance Not Demonstrated Material storage areas can and do generate stormwater runoff unless they are completely covered. How and when does the County know if permits for this facility are procured from DEQ?

Compliance Opinion: Compliance Status Unsure

Basis: Insufficient information provided to demonstrate compliance e.g. a documented work process, summary reports, etc.

Subcommittee Member – Republic

The enumerated permits and monitoring information is on file at the link previously provided by staff, which is all this condition requires. The County has no authority to conduct oversight over DEQ's permitting requirements. Further, this condition is not currently relevant to this CUP because the subject property is a grassy field that Republic might need to use someday for storage.

Date	File #	Request	Result
2013	LU-13-061	Conditional Use Permit for "minor additions and modifications" at Coffin Butte Landfill to change the location of a construction staging and storage area in the vicinity of the existing office structure.	Planning Commission approved

Conditions of Approval

In addition, the way the methane monitoring works is that if a methane detector registers over a certain level, Republic has to complete remediation within a set period of time and then re-monitor several times at that location. As long as the landfill follows these prescribed steps it is not out of compliance. The whole point of surface monitoring is to try to find detections and fix them. This is why the permit is structured that way.

10. (13)Copies of storm -water runoff permits and data produced from associated monitoring programs required of the applicant by the Oregon Department of Environmental Quality, shall be placed on file in a timely way, with the Benton County Community Development Department for public inspection.

Comments

County

In Compliance.

Workgroup Committee

- Republic: There are no permits or monitoring data as this relates to a material storage facility.
- As noted above, these are not available for public inspection as required.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Compliance Not Demonstrated. Material storage areas can and do generate stormwater runoff unless they are completely covered. How and when does the County know if permits for this facility have been issued by DEQ?

Compliance Opinion: Compliance Status Unsure

Basis: Insufficient information provided to demonstrate compliance e.g. a documented work process, summary reports, etc.

Date	File #	Request	Result
2015	LU-15-001	Alteration of a nonconforming use to continue and enhance a stormwater treatment facility in the Exclusive Farm Use Zone, associated with Coffin Butte Landfill.	Community Development Department Approved

Conditions of Approval	Current Status
1. Development shall substantially comply with the plans and narrative in the applicant' s proposal identified as Attachment A. Significant modifications to the construction or operation of the stormwater system other than those addressed through this decision shall require additional approval.	

Comments

County

In Compliance. This is a standard condition requiring applicant to implement the land use as they proposed it in the application. The County has no evidence that implementation was significantly modified from what was approved.

Workgroup Committee

- Republic: This development condition was at the County's discretion. However, as it relates to stormwater system construction and monitoring, Republic Services has all the DEQ permits necessary and is in compliance.
- attachment a is not provided
- We are missing a clear statement from the county on whether the site is in compliance, independent of DEQ. See previous comments.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Mark Yeager: Compliance Not Demonstrated. Nonagricultural uses in the EFU zone are specifically limited by ORS. Whether the continuation and alteration of a non-conforming use in the EFU zone is appropriate may be beyond the scope of this review. However, that fact that this action was approved at the staff level, and apparently at the behest of the department, requires further review. More time is needed to review the record. Was Oregon Department of Land Conservation and Development (DLCD) notified of this land use action?

Compliance Opinion: Compliance Not Demonstrated.

Basis: No record of required action provided.

Subcommittee Member – Republic

Republic is in compliance

2. The applicant shall obtain and maintain compliance with the terms of all necessary federal, state, and local permits for construction and operation of the stormwater system described in this application.

Comments

County

In Compliance. This is a standard type of condition that ties a County permit to a permit issued by another agency. The County does not actively monitor compliance with outside agency permitting requirements, but if the outside agency determines that their permitting requirements have not been met then the applicant is also out of compliance with the Benton County permit.

Workgroup Committee

- Republic: This development condition was at the County's discretion. However, as it relates to stormwater system construction and monitoring, Republic Services has all the DEQ permits necessary and is in compliance.
- the stormwater system is in an area identified as "wetlands" – does this trigger additional permitting requirements
- We are missing a clear statement from the county on whether the site is in compliance, independent of DEQ. See previous comments.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

(Mark Yeager) Many previous comments regarding lack of system or follow up to ensure that applicant secures permits for approved activities. Meaningless condition with no follow up or enforcement.

Compliance Opinion: Compliance Not Demonstrated.

Basis: No record of required action provided

Subcommittee Member – Republic

Republic is in compliance.

Date	File #	Request	Result
2021	LU-21-047	Conditional Use Permit to expand Coffin Butte Landfill. Republic Services proposed: to create a new disposal cell for the Coffin Butte Landfill which will extend from the current cell south of Coffin Butte Road; close Coffin Butte Road to public traffic (vacate the right-of-way*) so the new cell can cover the road; relocate a replacement roadway (for landfill and quarry traffic only) around the area of the new disposal cell; relocate the leachate ponds south of Coffin Butte Road, and move some other structures. Closing Coffin Butte Road will likely require improvement of at least one other roadway in the area to accommodate increased traffic—potentially Tampico Road or Wiles and Robison Roads.	Planning Commission Denied; PC Decision Appealed; Application Withdrawn

Comments

Workgroup Comments

- Republic Services appealed the Planning Commission's decision, but voluntarily withdrew that appeal to engage with the community and participate in the Oregon Consensus process. Republic Services and Coffin Butte Landfill remain committed to the Oregon Consensus process and this group's work. We look forward to being part of Benton County's long-term solid waste management and diversion solution strategy.

Subcommittee Members Edward Pitera, Catherine Biscoe, Mark Yeager

Use Decision Provided for Background
Subcommittee believes that the record and rational of this land use proceeding is relevant to the evolution of the Coffin Butte Landfill.
Review of the record in this land use proceeding provides important historical context. The public comments and the Notice of Decision in this matter are critical to understanding the history of the landfill and the sentiment of the residents of Benton County at that time.
Open Items: Subcommittee needs to review this documentation

Subcommittee Member – Republic

Any new CUP application filed by Republic will be a new application accompanied the appropriate studies and justifications.

Conditional Use Permit land use applications that were NOT APPROVED

Date	File #	Request	Result
1994	PC-94-10	Zone change from Rural Residential to Landfill Site Zone, Comprehensive Plan change from Rural Residential to Landfill Site.	BOC Denied
There are no conditions proposed for a zone change.			

Date	File #	Request	Result
1994	PC-94-11	A conditional use permit to expand the area approved for a landfill within the Landfill Site Zone and update the site development plan.	PC Approved; PC Decision Appealed; Application Withdrawn

Planning Commission approved Conditions of Approval – as the application was withdrawn, these conditions hold no authority.

1. Limit the extent of the fill to be sited on the property to the north and east of the ridge line.
2. Limit the extent of the fill to be sited on the property to be no greater than the existing elevation of the ridge line.
3. Submit a copy of the final approved site plan map to the Development Department that shows the provisions of the site plan in BCC 77.310(2) have been met. The approved site plan shall be signed by the Planning Official when approved.
4. Submit documentation to the Development Department showing the existing fill and proposed plan would be in compliance with Department of Environmental Quality standards.

Coffin Butte Landfill CUP application

REPUBLIC SERVICES

Sustainability in Action

Response to Evidence

Submitted during July 8-9 Continued Hearing

Responses

Tonnage Cap

Mark Yeager asserts that the Applicant's proposed tonnage cap will not address odor impact (Beyond Toxics Testimony Dated July 8, 2025).

The Applicant's odor model assumed 930,373 TPY of organic waste disposed at the landfill, and the County's staff is recommending that 930,373 TPY of organic waste be set as a limit which the applicant has agreed to.

However, not all material entering the landfill is organic waste, i.e. waste likely to produce odors.

Indeed around 86.4% of MSW disposed in Oregon is organic. Oregon Department of Environmental Quality, Waste Composition Study, Oregon Solid Waste Characterization and Composition Study, https://www.oregon.gov/deq/mm/Pages/Waste-Composition-Study.aspx, 2016-2017 Study, Statewide results 2016, Tab No. F16TOTMIX, *Statewide Mixed Route Trucks* attached as Exhibit 2.

In addition, other waste that has low potential to produce odor is received at the landfill, such as soil, white goods, and C&D debris.

For consistency with its odor model, the Applicant is proposing an amendment to OP-7(C), as set forth in the attached Exhibit 1. As proposed, the amended OP-7(C) would include a cap of 1.0 million tons of MSW (86.4% of which would be 864,000 tons) and 1.3 million tons of total solid waste averaged over a 12 month period.

Beginning on the date of approval of the CUP, these caps would increase annually by an amount equal to the change in CPI, except that organic waste shall not exceed the modeled 930,373 tons by more than 10% per year through 2052.

With the proposed amendment, OP-7(C) will ensure consistency with the Applicant's odor model, is easily interpreted, and will allow the facility to meet area-wide needs.

Litter

Mekenna Bradley and Mark Yeager raise concerns about windblown litter from the landfill affecting property and livestock (Mekenna Bradley Letter dated July 9, 2025) (Mark Yeager Letter dated July 9, 2025).

- The Applicant is proposing an amendment to OP-15(F), as set forth in the attached Exhibit 1. As described in this proposed condition, Republic Services will patrol the adjacent and nearby property identified in the attached Exhibit 3 on a weekly basis to ensure that any windblown litter is promptly collected and removed.
- Republic Services will perform litter collection on the adjacent and nearby property upon request by and with permission of the owner of such property
- This commitment is intended to directly address and mitigate the impacts of off-site litter.

Stormwater and Groundwater

Mark Yeager asserts that the Applicant's drainage plan directs runoff from the southernmost stormwater basin onto rural residential property (Mark Yeager Letter dated July 9, 2025). This is incorrect.

- The stormwater collected in this basin is designed to either infiltrate into the ground or evaporate.
- This basin treats stormwater through infiltration and evaporation, with overflow discharged to the wetlands north of Coffin Butte Road as intended. This design effectively manages and treats stormwater in accordance with its purpose. An overflow pipe directs excess stormwater to the detention pond near the entrance.

Beyond Toxics questions what will happen to the existing leachate ponds and suggests that they may have leaked in the past, potentially contaminating surrounding soils (Beyond Toxics Letter dated July 8, 2025).

- A leak detection layer beneath the liner system has been in place since construction, and no leaks have been indicated to date.
- The current leachate ponds will be closed in accordance with DEQ regulations, which require removal of leachate and any remaining sediment. After removal, the liners will be taken out and the underlying soil will be tested to determine whether any leakage occurred. If testing confirms the underlying soil is clean, the material may be safely reused as daily or intermediate cover.

Joel Geier submitted 12 general comments followed by three Annexes with more detailed assertions (Joel Geier Testimony dated July 8, 2025).

Geier asserts that staff has not identified specific regulatory steps to assess groundwater risks, nor contacted the Oregon Water Resources Department (Geier Annex 1, Comment 6).

- The Applicant must comply with all applicable site-specific, state, and federal landfill regulations.
- Oversight includes:
    - U.S. EPA Title 40 CFR Part 258 (Sections 258.50–258.58)
    - OAR Chapter 340, Division 40 and Division 94 (e.g., OAR 340-094-0080)
    - Site-specific Permit No. 306 and the Environmental Monitoring Plan
- Oregon DEQ—not the Oregon Water Resources Department—is the responsible regulatory agency.

Geier asserts that the Applicant did not provide calculations or parameters used in estimating dewatering impacts (Geier Annex 1, Comment 9b).

- To the contrary, the Applicant used the Dupuit solution with conservative assumptions on hydraulic properties.
- A hydrogeologic investigation will provide site-specific data to inform a groundwater model and sentry well design.
- Groundwater will be monitored and if impacts are observed, the Applicant will work with the community on mitigation.

Geier asserts that the Applicant cherry-picked from Stephen R. Hinkle & Danial J. Polette, U.S. Geological Survey, U.S. Department of the Interior, *Arsenic in Ground Water of the Willamette Basin, Oregon, Water-Resources Investigations Report 98-4205* (1999) (the "Ground Water Study") and misled the County on arsenic data (Geier Annex 1, Comment 9c). A copy of the Ground Water Study is attached as Exhibit 4.

- The Applicant used the most relevant data for conditions at Coffin Butte Landfill; arsenic is naturally present in many Oregon aquifers.
- Arsenic occurrence is due to local geology and low dissolved oxygen levels. The Ground Water Study did not measure oxygen.
- The site is underlain by Siletz River Volcanics, not the Eugene/Fisher formations. Comparisons are not appropriate.
- Arsenic-bearing soils in the Siletz formation have been documented west of Corvallis.
- Graph scales were consistent for comparison. Newer data were pending update but do not change interpretations.
- Testimony about no seepage from lined cells is accurate. Past seepage occurred at an open face of Cell 2, which occurred before the Applicant took ownership of Coffin Butte Landfill.
- Elevated chloride levels in MW-9S reflect historic sampling practices, not current conditions.
- Arsenic is monitored along with 60+ parameters. Levels in MW-9S, MW-26, and MW-27 are stable and tied to dissolved oxygen.
- A leachate plume has not been detected. Groundwater flow conditions are stable and reviewed by ODEQ annually.

Geier asserts that a single severe storm could cause catastrophic surface water and groundwater contamination if the landfill fails (Kate Harris Testimony, Dated July 8, 2025).

- The landfill is required to comply with stringent design standards under federal (40 CFR Part 258) and Oregon regulations (OAR 340-094).
- Stormwater and leachate containment systems are engineered to withstand severe weather events, including the 25-year, 24-hour storm for surface water and 100-year, 24-hour storm for leachate design.
- The landfill has never experienced a failure that resulted in contamination of offsite surface water or groundwater.

Seismic

Rana Foster asserts that the Applicant's seismic study fails to define the earthquake magnitude used in the slope stability analysis (Rana Foster Letter dated July 8, 2025).

- The slope stability analysis will incorporate the maximum probable earthquake, as defined by the USGS Seismic Probability Map.
- This approach is consistent with requirements under Title 40 CFR Part 258 and OAR 340-094, as permitted by the U.S. EPA and Oregon DEQ.

Air Quality and Odor

Ken Eklund submitted exhibits in connection with written testimony, showing an uncontextualized large methane plume originating from the Coffin Butte Landfill on April 18, 2025 (exhibit to Ken Eklund written testimony dated July 9, 2025).

- Republic Services was actively drilling gas wells in that area on April 14 and 15, 2025, as part of legally required gas collection system improvements. Although regulations allow 60 months to install gas wells after leaving an area with fresh waste, the Applicant initiated drilling just 4 months after operations moved, demonstrating a proactive approach. Additional gas wells capture more gas, reducing emissions.
- By April 25, 2025, Carbon Mapper imagery shows that the methane plume had diminished and was limited to the landfill footprint.
- Daily Construction Quality Assurance (CQA) reports for that period are available to document this activity.

Figure 1, Coffin Butte Plume (Carbon Mapper, April 25, 2025)

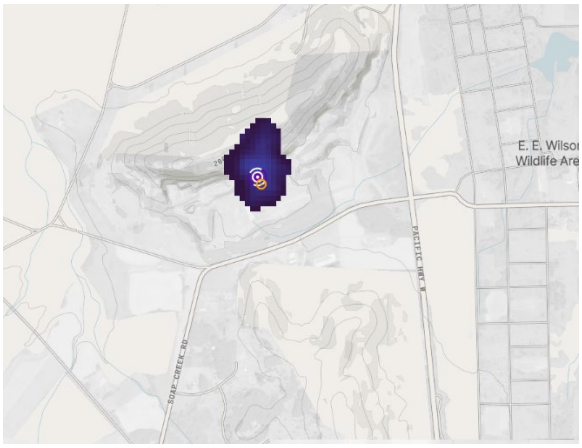
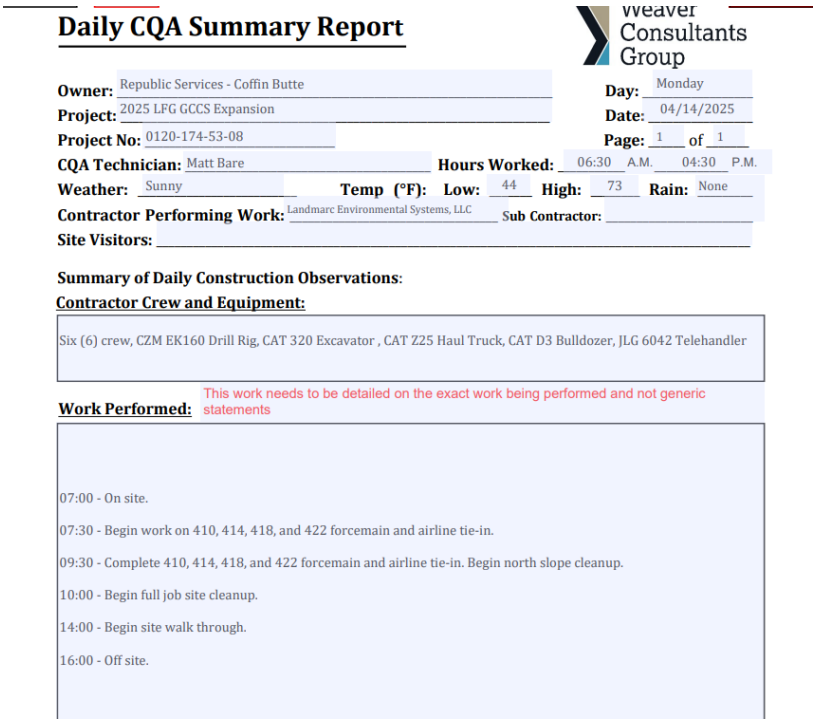


Figure 2, Relevant CQA Records



Daily CQA Summary Report

Weaver Consultants Group

Owner: Republic Services - Coffin Butte
Project: 2025 LFG GCCS Expansion
Project No: 0120-174-53-08
Day: Monday
Date: 04/14/2025
Page: 1 of 1
CQA Technician: Matt Bare
Hours Worked: 06:30 A.M. 04:30 P.M.
Weather: Sunny
Temp (°F): Low: 44 High: 73
Rain: None
Contractor Performing Work: Landmarc Environmental Systems, LLC
Sub Contractor:
Site Visitors:

Summary of Daily Construction Observations:

Contractor Crew and Equipment:

Six (6) crew, CZM EK160 Drill Rig, CAT 320 Excavator , CAT Z25 Haul Truck, CAT D3 Bulldozer, JLG 6042 Telehandler

Work Performed: This work needs to be detailed on the exact work being performed and not generic statements

07:00 - On site.

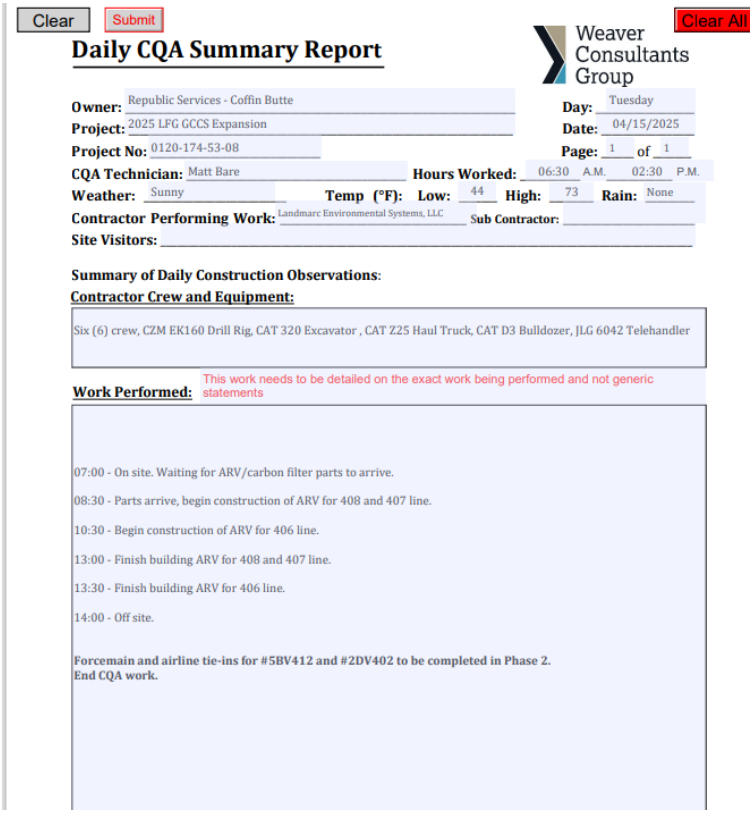
07:30 - Begin work on 410, 414, 418, and 422 forcemain and airline tie-in.

09:30 - Complete 410, 414, 418, and 422 forcemain and airline tie-in. Begin north slope cleanup.

10:00 - Begin full job site cleanup.

14:00 - Begin site walk through.

16:00 - Off site.



Clear Submit Clear All

Daily CQA Summary Report

Weaver Consultants Group

Owner: Republic Services - Coffin Butte
Project: 2025 LFG GCCS Expansion
Project No: 0120-174-53-08
Day: Tuesday
Date: 04/15/2025
Page: 1 of 1
CQA Technician: Matt Bare
Hours Worked: 06:30 A.M. 02:30 P.M.
Weather: Sunny
Temp (°F): Low: 44 High: 73
Rain: None
Contractor Performing Work: Landmarc Environmental Systems, LLC
Sub Contractor:
Site Visitors:

Summary of Daily Construction Observations:

Contractor Crew and Equipment:

Six (6) crew, CZM EK160 Drill Rig, CAT 320 Excavator , CAT Z25 Haul Truck, CAT D3 Bulldozer, JLG 6042 Telehandler

Work Performed: This work needs to be detailed on the exact work being performed and not generic statements

07:00 - On site. Waiting for ARV/carbon filter parts to arrive.

08:30 - Parts arrive, begin construction of ARV for 408 and 407 line.

10:30 - Begin construction of ARV for 406 line.

13:00 - Finish building ARV for 408 and 407 line.

13:30 - Finish building ARV for 406 line.

14:00 - Off site.

Forcemain and airline tie-ins for #5BV412 and #2DV402 to be completed in Phase 2.
End CQA work.

Tremaine and Gail Arkley state that they have smelled landfill odors on their farm in Independence, Oregon, over 7.5 miles from Coffin Butte Landfill (Tremaine and Gail Arkley Testimony dated July 8, 2025).

- Without specific dates, times, and conditions, the claim cannot be fully evaluated, but the likelihood of landfill odors traveling over 7 miles under normal meteorological conditions is low.
- Odor modeling and on-site monitoring indicate that detectable odors are typically confined much closer to the landfill.

Nancy Yialouris states that she filed three odor complaints with Coffin Butte Landfill and DEQ and did not receive any response from landfill staff (Nancy Yialouris Testimony dated July 8, 2025).

- Paul Koster reports that he personally responded to all three complaints and visited the location within 1–2 hours each time.
- On each visit, no landfill odor was detected, and these findings were documented with photos and timestamps.
- While he did not enter private property, he submitted responses to DEQ when the complaints were forwarded through that channel, and those records are on file.

Legal

Ken Ecklund also claims that the Applicant failed to disclose the EPA Section 114 request and that the Disposal Site Advisory Committee (DSAC) uncovered it through a Freedom of Information Act (FOIA) request (Ken Ecklund Testimony dated July 9, 2025).

- This is incorrect. Republic's General Manager informed the DSAC of the Section 114 request and stated during the February 12, 2025 meeting that he would seek approval to provide a copy.
- A copy of the request was subsequently sent to Bailey Payne on February 28, 2025.
- During a following March 12, 2025 DSAC meeting, Mr. Ecklund inaccurately stated that DSAC "found" the records, at which point the General Manager clarified that Republic had voluntarily disclosed the request and provided the document in a timely manner.

Blasting

Geier asserts that the Applicant failed to address the distance and strength of seismic waves from blasting and misrepresented seismic metrics (Geier Annex 1, Comment 9a).

- Blasting-induced fracturing effects are limited to about 15 feet from the borehole.
- Monitoring of seismic effect at 1,100 feet showed PPV well below structural damage thresholds.
- PPV is the correct metric for blasting effects—not shear wave velocity.
- Earthquakes and blasting differ in duration and energy. Groundwater levels have not shown long-term effects from blasting.
- The Applicant will install and monitor sentry wells and nearby residential wells (with permission) to assess any impacts.

Erin Bradley states that she requested blasting be moved to Fridays for scheduling convenience and that communication regarding blasting notifications was inconsistent (Erin Bradley Testimony dated July 8, 2025).

- The drilling contractor would not commit to changing the blasting schedule without first consulting their client. Emails from the contractor confirm that no one from their office stated that blasting would be moved to Fridays.
- Paul Koster informed Ms. Bradley that limiting blasting to Fridays would delay the project and prolong construction, but committed to asking the contractor to blast as late in the day as possible.
- The contractor has verified on multiple occasions that they are calling at least 24 hours in advance of blasting. They have indicated that sometimes calls go unanswered or voicemails cannot be left due to recipients not having voicemail set up.

Camille Hall states that blasting near Cell 6 caused damage to Bill Briskey's property, including the loss of a livestock pond and cracks in a building foundation, and that the Applicant failed to address these issues (Camille Hall Testimony dated July 9, 2025).

- To date, there are no records of any complaints or legal claims submitted regarding property damage caused by Knife River's blasting activities near Cell 6.

- There has been no formal documentation or substantiation provided linking blasting to the alleged damage.

Landfill Height

Rana Foster raises concerns that Condition OP-5, which limits the landfill elevation to 450 feet, lacks enforcement tools and has already been disregarded at the North Landfill (Rana Foster Testimony dated July 8, 2025).

- The expansion landfill will not exceed 450 feet MSL for the top of waste and 453 feet MSL for the top of final cover.
- Due to the geometry of the site and the use of 3H:1V slopes, it is not physically possible for the expansion to exceed the 450-foot elevation limit.
- CUP design drawings show that the expansion area will remain at least 100 to 150 feet below the top of Tampico Ridge, ensuring it will not be visible from properties on the south side of the ridge.

Liner Life

Rana Foster stated that she believes that liner failures or other issues with plastics and chemicals may lead to drainage of landfill leachate into the ground from the leachate storage pond and landfill (Rana Foster Letter dated July 8, 2025).

- Peer-reviewed studies and predictive models indicate that buried **HDPE geomembranes can last several hundred to over 1,000 years under typical landfill conditions**. (Hsuan & Koerner, 1998; Koerner et al., 2005, Rowe et al., 2009; Tian et al., 2016 and 2017; Benson et al., 2016).
- Properly installed GCLs in composite systems (as proposed for the Coffin Butte Landfill expansion) are also expected to have a **very long service life of several hundreds or thousands of years, provided that they are installed correctly** (Rowe, K.R., Orsini, R.B., and Booker, 2004; Benson, C. H., Daniel, D. E., Shackelford, C. D., & Karol, R. H., 2016).
- Composite liner systems containing both an HDPE and GCL, as proposed for the Coffin Butte Landfill expansion, are proven to effectively contain waste and leachate over the long term, countering unsupported concerns about groundwater contamination.
- These liner systems have been extensively studied and are specifically required and approved by the United States Environmental Protection Agency as part of its Subtitle D regulations (40 CFR Part 258).
- The proposed Coffin Butte Landfill expansion will exceed Subtitle D requirements, incorporating three HDPE liners (where only one is required by Subtitle D regulations), a GCL, and a secondary leachate collection and removal system.
- The liner system will be installed with rigorous third-party quality assurance, ensuring compliance with design and regulatory standards and minimizing the risk of failure.
- Construction includes subgrade preparation, wrinkle minimization, seam testing, and cushioning layers to prevent punctures and protect system integrity during waste placement.

Rookeries

Joel Geier raised concerns that conditions of approval recommended by Benton County are poorly considered and are likely to exacerbate impacts on wildlife and adjacent properties. In particular, OP-15(E) (which calls for the entire landfill property including portions zoned as Forest Conservation to be enclosed with a chain link fence) will block movement of elk, deer, and other wildlife through Forest Conservation lands, in direct conflict with the purpose of the FC zone. This condition, proposed by the County to mitigate one demonstrated impact of the landfill (windblown trash), will foreseeably create its own impacts, as elk, deer and the predators which follow them (in particular cougars) will be diverted through agricultural and residential properties. (Joel Geier Testimony dated July 8, 2025).

- The proposed fencing would keep wildlife away from the project area with active landfill operations, including leachate ponds, which are proposed to be constructed in areas that are not currently used for forest operations.
- This area was not found to be a major wildlife corridor. Cougar was observed only one day on the property when trail cameras were installed for over 12 months.

Joel Geier asserts that in Exhibit 43, the applicant's wildlife consultant acknowledges "the landfill can attract a high density of eagles" and that "the high density of eagles and large flocks of other predatory birds" may pose a threat to heron rookeries near the landfill. We agree that the concentrations of eagles and other predatory birds drawn to the landfill pose a risk not just to herons but also to other bird species of concern, in particular Oregon vesper sparrows (candidate for federal listing) and Streaked horned lark (federally listed as Threatened), which are documented to nest within 2 miles and 4 miles of the landfill, respectively (Joel Geier Testimony dated July 8, 2025).

- The proposed development would not significantly increase the population of predatory birds in the area.
- The Oregon Department of Forestry (ODF) and the Oregon Department of Fish and Wildlife (ODFW) wildlife biologists visited the landfill site and noted that it is not suitable habitat for the Oregon vesper sparrow or the streaked horned lark. Potentially, the landfill is drawing predatory birds away from the known sites located over 2 miles away.

Geier asserts that on other matters related to the nesting herons, the applicant's wildlife consultant has demonstrated a poor record (Joel Geier Testimony dated July 8, 2025). To wit:

- In 2021 this same consultant undercounted the number of active nests in the poplar grove ("east rookery") by more than a factor of two, as documented by community members.
- During 2022 this consultant did not record a visit during the month of May when the colony underwent a nesting failure; again, community members noticed and investigated the failure before the applicant's consultant.
- During 2023 through May 2025, the same consultant failed to notice or document heron nesting activity in the Oregon ash grove just across Hwy 99W from one of their observation points.

Geier raised concerns that in their most recent opinion responding to VNEQS concerns (Exhibit 53), the consultant suggests that the new rookery location that they previously failed to notice might be more favorable for heron colony survival because "it is in a mixed conifer/deciduous stand." (Joel Geier Testimony dated July 8, 2025).

- In 2021, Turnstone initially reported the rookery met the minimum threshold number of active nests. 2022 surveys for great blue herons followed the monitoring protocol established in the survey plan approved by ODF and ODFW wildlife biologists. The new nesting area is in close proximity to the collapsed nest but is not necessarily the same individuals.
- If a mitigation and protection plan is needed for the new great blue heron rookery, then the applicant will conduct a full investigation into the structure of the nesting area. Turnstone biologists were not tasked with searching the E.E. Wilson Wildlife Area for new great blue heron nests since the collapse of the east rookery. The rookery should not be approached by curious neighbors or biologists during the breeding period.

Geier commenter raised concerns that the applicant's wildlife consultant also fails to address the impact that a new landfill would have, as a major new topographic obstruction in the herons' flight paths to documented foraging areas in Soap Creek Valley. Heron experts including Dr. Ann Eissinger (cited in previous testimony) have identified flight paths to multiple foraging areas as a critical factor in heron rookery success. (Joel Geier Testimony dated July 8, 2025).

- The new proposed development would not obstruct the flight path of great blue herons to foraging areas west of the project area.

Fire

Mardi Bisland reported that they recall some time ago a huge fire at Coffin Butte Landfill that lit up the night sky. (Mardi Bilsland Letter dated July 11, 2025)

- This must have been the large fire known to occur at the landfill in 1999, as was described in the Coffin Butte fire consultant’s report. At that time the landfill was owned and operated by another party, years prior to Republic Services assuming operations. The only way a fire of that size could have developed would be for tens of acres of landfill waste to be exposed overnight and likely left exposed that way for an extended time of weeks or months without cover. Republic Services limits exposed waste at the working face to under 2 acres during operations each day. Exposed waste is always covered overnight. A fire of that size simply cannot occur now with Republic Services at Coffin Butte Landfill.
- Conditions in 1999 are anecdotal from those familiar with the landfill’s operations and that fire in 1999. Current conditions are facts of current operation and commitments made by Republic Services in the landfill’s operating plan.

Beyond Toxics asserts that proposed landfill expansion will significantly increase fire risks beyond those at the landfill now. The burdens of fire control may be beyond that of Adair Fire Department. The landfill needs a complete log of landfill fire incidents at the site. (Beyond Toxics Letter dated July 9, 2025)

- The proposed landfill expansion and attendant fire risks are the same as those now. They have been and will be adequately managed by on-site staff. There is no reason to believe the future operations will pose any change in attendant landfill fire risks.
- Landfill staff met with Adair Fire in March 2025. Each party agreed they have had a strong history of working well together to mitigate fires and fire risks. Each party pledged to continue that working relationship. Adair Fire did not express concerns regarding ongoing support at that time.
- The Applicant has committed going forward to compile a log and description of any and all landfill fires, no matter how brief and small. Reports will be provided to both DSAC and ODEQ.
- The March 2025 meeting between Adair Fire and Coffin Butte Landfill was recorded in meeting notes and follow-up communication from each side. The Applicant has committed on the record to compiling a complete log of all landfill fires going forward and reporting such fires to DSAC and ODEQ.

Ken Eklund contends that under ODEQ regulation, Republic Services should have replaced landfill gas open flares with an enclosed flare earlier than when they did so. An enclosed flare would have prevented the open flare from causing a grass fire that posed a danger to at least one off-site resident. (Ken Eklund Testimony dated July 9, 2025)

- The open flare was replaced with an enclosed flare timely enough to comply with ODEQ regulations. The grass fire was small and limited in size. It never posed a threat to any off-site properties. Shortly after the grass fire occurred, the grass around the open flare was immediately replaced by gravel, so that a fire like this could not reoccur.
- Facts on written record.

Kate Harris asserts that Adair Fire was never contacted by the county regarding this landfill expansion. (Kate Harris Testimony dated July 9, 2025)

- Landfill staff met with Adair Fire personnel in March 2025. Each side observed that a strong cooperative relationship existed up to that time, and the parties further pledged to continue that relationship and mutual support going forward, including for the expansion.
- The March 2025 meeting between Adair Fire and Coffin Butte was recorded in meeting notes and follow-up communications from each side. Coffin Butte has committed on the record to compiling a complete log of all landfill fires and reporting such to DSAC and ODEQ.

Jeffrey L. Kleinman, on behalf of Valley Neighbors for Environmental Quality, asserts that the history of landfill fires at Coffin Butte is significant. Past fires and future fire risks impose serious interference to adjacent property and the character of the area. Monitoring and logging of landfill fires is deficient. (Jeffrey L. Kleinman Memorandum dated July 8, 2025).

- With the exception of the 1999 landfill fire that occurred with the prior operator, no fire has risen to a level of significance, nor has it ever run the risk of migrating off-site. The 1999 fire cannot possibly reoccur at anywhere near that size with the way Republic Services operates Coffin Butte today.
- Republic Services will compile a log and description of any and all landfill fires going forward, no matter how small, and report them to DSAC and ODEQ. The risks of fires at Coffin Butte going forward cannot and will not impose serious interference to adjacent property nor to the character of the area.

- Historical facts on the written record, along with the professional opinion of the landfill fire consultants, both for P&Z Staff and Coffin Butte.

Rana Foster posed several fire-related questions: What fire control support is available specific to the landfill expansion? Is the water supply of adequate capacity? Who is available to observe landfill fires that break out in off-hours? (Rana Foster Letter dated July 8, 2025)

- The Coffin Butte Landfill's fire consultant report describes the resources that are available to identify, manage, and extinguish landfill fires now. And that these resources and plans will remain in place for the expansion, and will be adequate for the expansion.
- The water source for the water truck is of sufficient capacity to fill the water truck quickly. The spray flow rate on the water truck is also adequate to quickly extinguish any grass fire, as has been demonstrated several times in the past.
- With all waste covered at the end of the day, off-hour fires are rare and not likely to occur. Coffin Butte staff stay on site for a few hours after site closing each day to make sure a hot load received an hour prior does not cause a fire.
- Coffin Butte is investigating technologies that can identify landfill fires and notify the appropriate personnel. Such technologies have not yet been adapted to landfills.
- As reported in the landfill fire consultant's report and in prior rebuttals from the consultant during the P&Z Commission review process.
- Additionally, the Applicant is proposing an amendment to OP-12(A), as set forth in the attached Exhibit 2, which **will require the Applicant to maintain two fire trucks at the site.**

Noise

Rana Foster claims that noise conditions will not be enforceable or have any penalties (Rana Foster Letter dated July 8, 2025).

- This is incorrect. The Applicant will be subject to conditions if approval stated in the CUP and would be enforced by the County. Noncompliance could ultimately result in revocation of the CUP, which would be a substantial penalty.

Camille Hall claims that the noise modeling is inaccurate due to the interaction of on-site equipment noise interacting with atmospheric conditions (Camille Hall Testimony dated July 9, 2025).

- This is misleading. Even though noise models use predictive scenarios to generate results, input assumptions have been validated and the noise model uses a proven international computation standard (ISO 9613 Part 2) to account for atmospheric conditions.

Jeffrey L. Kleinman, on behalf of Valley Neighbors for Environmental Quality, claims that the noise study relies on an outdated and unenforced noise standard that is not entirely applicable to the proposed application (Jeffrey L. Kleinman Memorandum dated July 8, 2025).

- This is misleading, since even though regulation has been defunded by the state legislature, it continues to be updated. The DEQ noise regulations are one of the most comprehensive set of

noise regulations in the pacific northwest. They were developed in response to the Noise Control Act of 1972 and are consistent with the federal guidance published by the EPA following the Act. Community noise regulation has not evolved much since the EPA was defunded in 1982, and as a result, many communities have not updated their regulations, but DEQ continues to update its noise policy, with many updates in the last ten years as recently as 2024 (DEQ17-2024, DEQ25-2018, DEQ24-2018, DEQ23-2018, DEQ22-2018, DEQ 21-2018, DEQ5-2018, DEQ25-2017, DEQ24-2017, DEQ22-2017, DEQ21-2017, DEQ20-2017, DEQ19-2017, and DEQ14-2017).

- The original staff report and supplemental staff report concur with application of the DEQ noise policy to this application.

Kleinman also claims that since the Applicant will not have control over private and commercial haul vehicles, the proposed mitigation to reduce noise from on-site equipment fails to demonstrate compliance (Jeffrey L. Kleinman Memorandum dated July 8, 2025). This claim is also made by Mark Yeager (Mark Yeager Letter dated July 9, 2025).

- This is misleading, since the noise analysis did account for this condition. The 10 dB reduction in on-site equipment emissions is not expected to reduce offsite emissions by 10 dB due to the contributions from haul vehicles that could not reasonably be modified to reduce sound emissions. The overall reduced level at the nearest noise-sensitive property by 5 dB, which accounts for unaltered noise emissions from these haul vehicles.

Mark Yeager claims noise levels from the proposed expansion will affect properties closer than those used in the analysis (Mark Yeager Letter dated July 9, 2025).

- This is misleading, since the DEQ noise standard only applies at properties that are defined as “noise sensitive” and those properties were analyzed, including those immediately adjacent to the site.

Exhibit 1

Proposed Conditions

Amend OP-7(C) as follows (added language underlined, deleted language ~~strikethrough~~):

(C) Applicant's evidence submitted to support the conclusion that the proposed expansion will not seriously interfere with uses on adjacent properties or with the character of the area with regard to odor impacts is based on Applicant's submitted odor studies' assumption that the maximum organic waste acceptance will be no more than 41,110,068 tons by 2052. Accordingly, upon approval of this Conditional Use Permit, Applicant shall comply with the following tonnage caps on annual waste deposited in the landfill evaluated on a twelve-month average basis: Municipal solid waste (MSW) shall not exceed 1.0 million tons per year, and total solid waste inclusive of MSW shall not exceed 1.3 million tons per year. This does not include non-deplete waste (waste that is not deposited in the cell, such as cover materials). These caps shall increase annually following approval of the CUP by the United States Bureau of Labor Statistics Consumer Price Index, except that Applicant shall not accept organic waste exceeding 10% of the modeled 930,373 tons per year through 2052. With County approval these tonnage caps may be exceeded when an extraordinary event, such as fire, floods, and similar events, results in increased waste. ~~.Accordingly, a condition of approval is appropriate to align with the Applicant's studies assumed total organic waste acceptance volume, with provision that the annual organic waste acceptance volumes are within 10% of the modeled 930,373 tons per year through 2052.~~

Replace OP-12 (A) as follows:

(*A) Applicant shall maintain at least two 4,000-gallon+ water trucks at the landfill in good repair so that they are always fully available to help extinguish fires. No more than one of the trucks may leave the landfill property at any given time. At such time as Applicant may replace or update the water trucks or other firefighting infrastructure in the expansion area, such new truck or equipment will provide protection equal to or better than the truck or equipment being replaced.*

Amend OP-15(F) as follows (added language underlined):

(F) Off-Site Litter Management.

(i) Applicant shall expand its litter collection program to include Tampico Road and Soap Creek Road, conducting regular patrols and cleanup operations to address any landfill-related litter.

(ii) Subject to the request and consent of the property owner, Applicant shall clean up litter on a weekly basis on any property that is an "adjacent property" as defined in the Staff Report at a time and day mutually agreeable to Applicant and the property owner. Applicant will ensure that Applicant's employees or contractors are adequately insured and will agree in an access agreement to defend and indemnify the property owner for any damage to their property caused by Applicant's employees or contractors while on the property.

Add a new OP-17 as follows:

OP-17 Compliance Enforcement

In order to assist the County in evaluating Applicant and its compliance with conditions of approval, Applicant shall reimburse the County in an amount not to exceed $80,000 per year to enable the County to retain a qualified consultant or consultants to:

(A) Review compliance with the Operating Conditions of Approval.

(B) Review groundwater compliance.

(C) Review sentinel well records.

(D) Be available to the County as their Coffin Butte Landfill expert.

(E) Perform a monthly inspection of the expansion area to assess compliance or more frequently on reasonable notice if necessary to address complaints or compliance issues.

(F) Perform such other service related to Coffin Butte Landfill as may be requested by the County.

(G) Produce an annual report to the County on subject matters (A) through (F).

Applicant shall reimburse the County for these costs on a monthly basis within 60 days of receipt of an invoice from the County detailing its time and materials costs for the consultant or consultants, This condition of approval shall commence on the date that the Expansion Area is opened for solid waste disposal and will cease on the date the Expansion Area is no longer used for solid waste disposal. The reimbursement cap will increase every year following commencement of the condition by the United States Bureau of Labor Statistics Consumer Price Index.

Exhibit 2

ODEQ Composition Table

Statewide Mixed Route Trucks **Total Tons ==> 420,098**

Material	Field Results	Field Results 90% Conf. Interval	Contam. Corrected	Contam. Corrected 90% Conf. Interval	Clean Tons	Clean Tons 90% Conf. Interval	# Present / # Samps	% Present	Present
TOTAL PAPER	**22.64%**	**(20.41 - 25.39%)**	**16.58%**	**(14.35 - 19.42%)**	**69,665**	**(60,279 - 81,602)**	**94/ 94**	**100.00%**	**94**
Packaging Paper	**11.30%**	**(9.98 - 12.62%)**	**8.54%**	**(7.44 - 9.81%)**	**35,894**	**(31,242 - 41,213)**	**94/ 94**	**100.00%**	**94**
Cardboard incl. wine boxes	**5.38%**	**(4.35 - 6.44%)**	**3.97%**	**(3.14 - 4.90%)**	**16,661**	**(13,194 - 20,576)**	**92/ 94**	**97.87%**	**92**
Wine boxes	0.00%	(0.00 - 0.01%)	0.00%	(0.00 - 0.01%)	11	(0 - 33)	1/ 94	1.06%	1
Cardboard/brown bags	5.38%	(4.34 - 6.43%)	3.96%	(3.14 - 4.90%)	16,650	(13,181 - 20,576)	92/ 94	97.87%	92
Low grade Not OK With ONP	1.59%	(1.40 - 1.80%)	1.16%	(0.97 - 1.37%)	4,888	(4,073 - 5,771)	93/ 94	98.94%	93
Polycoats +bleached drink boxes	**1.59%**	**(1.39 - 1.79%)**	**1.12%**	**(0.95 - 1.30%)**	**4,720**	**(3,994 - 5,458)**	**90/ 94**	**95.74%**	**90**
Milk cartons/Drink boxes	**0.15%**	**(0.10 - 0.19%)**	**0.11%**	**(0.08 - 0.15%)**	**470**	**(320 - 623)**	**60/ 94**	**63.83%**	**60**
Gable top (milk) cartons	0.09%	(0.05 - 0.12%)	0.07%	(0.04 - 0.10%)	283	(171 - 423)	43/ 94	45.74%	43
Aseptic drink boxes	0.06%	(0.04 - 0.10%)	0.04%	(0.02 - 0.07%)	187	(99 - 300)	41/ 94	43.62%	41
Other Polycoated paper	1.44%	(1.25 - 1.63%)	1.01%	(0.84 - 1.19%)	4,249	(3,545 - 4,986)	89/ 94	94.68%	89
Nonrecyclable (packaging) paper	**2.74%**	**(1.87 - 3.73%)**	**2.29%**	**(1.55 - 3.18%)**	**9,625**	**(6,508 - 13,360)**	**90/ 94**	**95.74%**	**90**
Waxed corrugated cardboard	0.69%	(0.22 - 1.38%)	0.53%	(0.15 - 1.13%)	2,222	(633 - 4,753)	12/ 94	12.77%	12
Non-compost., non-recycl. paper	2.04%	(1.40 - 2.77%)	1.76%	(1.20 - 2.43%)	7,404	(5,033 - 10,190)	90/ 94	95.74%	90
Other (Non-packaging) Paper	**11.34%**	**(9.37 - 13.94%)**	**8.04%**	**(6.03 - 10.52%)**	**33,772**	**(25,339 - 44,198)**	**94/ 94**	**100.00%**	**94**
Hi grade paper	2.63%	(0.86 - 5.57%)	2.72%	(0.84 - 5.30%)	11,437	(3,535 - 22,263)	81/ 94	86.17%	81
Newspaper	0.62%	(0.49 - 0.75%)	0.46%	(0.35 - 0.58%)	1,944	(1,487 - 2,453)	65/ 94	69.15%	65
Magazines	0.54%	(0.35 - 0.78%)	0.57%	(0.34 - 0.84%)	2,382	(1,438 - 3,539)	37/ 94	39.36%	37
Low grade OK With ONP	1.23%	(1.01 - 1.46%)	0.98%	(0.79 - 1.20%)	4,123	(3,313 - 5,029)	83/ 94	88.30%	83
Hardcover books	0.02%	(0.00 - 0.04%)	0.02%	(0.00 - 0.03%)	71	(5 - 147)	3/ 94	3.19%	3
Other compostable nonrecycl. paper	6.31%	(5.58 - 6.98%)	3.29%	(2.86 - 3.73%)	13,815	(11,998 - 15,655)	93/ 94	98.94%	93
Low-grade paper combined	*2.99%*	*(2.67 - 3.33%)*	*2.27%*	*(1.99 - 2.59%)*	*9,552*	*(8,351 - 10,889)*	*93/ 94*	*98.94%*	*93*
Non-recyclable paper combined	*10.48%*	*(9.41 - 11.71%)*	*6.59%*	*(5.77 - 7.60%)*	*27,690*	*(24,248 - 31,934)*	*93/ 94*	*98.94%*	*93*
Paper drink cartons	*0.15%*	*(0.11 - 0.20%)*	*0.11%*	*(0.08 - 0.15%)*	*481*	*(332 - 637)*	*60/ 94*	*63.83%*	*60*
All recyclable paper	*12.16%*	*(9.88 - 14.91%)*	*9.99%*	*(7.70 - 12.62%)*	*41,975*	*(32,336 - 53,019)*	*94/ 94*	*100.00%*	*94*
TOTAL PLASTIC	**14.15%**	**(12.63 - 15.85%)**	**10.31%**	**(9.01 - 11.68%)**	**43,321**	**(37,848 - 49,071)**	**94/ 94**	**100.00%**	**94**
Rigid Plastic Containers (RPCs)	**2.60%**	**(2.26 - 2.98%)**	**1.94%**	**(1.69 - 2.26%)**	**8,159**	**(7,079 - 9,487)**	**93/ 94**	**98.94%**	**93**
Deposit plastic soft drink/beer bottles	0.09%	(0.08 - 0.11%)	0.07%	(0.06 - 0.08%)	291	(236 - 353)	71/ 94	75.53%	71
Plastic deposit water	0.10%	(0.08 - 0.13%)	0.08%	(0.06 - 0.10%)	322	(250 - 404)	81/ 94	86.17%	81
Plastic deposit in 2018 (juice, etc)	0.23%	(0.17 - 0.33%)	0.17%	(0.12 - 0.25%)	735	(515 - 1,031)	79/ 94	84.04%	79
No-deposit plastic beverage bots.	0.32%	(0.21 - 0.45%)	0.24%	(0.16 - 0.34%)	1,003	(654 - 1,412)	61/ 94	64.89%	61
Other plastic bottles	0.59%	(0.50 - 0.70%)	0.44%	(0.37 - 0.53%)	1,868	(1,559 - 2,211)	85/ 94	90.43%	85
5 Gallon buckets/ Flower Pots	0.14%	(0.04 - 0.26%)	0.10%	(0.03 - 0.19%)	441	(127 - 814)	7/ 94	7.45%	7
Plastic tubs, curb-OK 8oz to 4 gal	0.23%	(0.16 - 0.30%)	0.17%	(0.12 - 0.23%)	707	(500 - 951)	70/ 94	74.47%	70
Other RPCs - tubs, etc.	0.89%	(0.74 - 1.08%)	0.66%	(0.55 - 0.81%)	2,792	(2,299 - 3,402)	91/ 94	96.81%	91
Other rigid plastic packaging	**1.14%**	**(1.01 - 1.28%)**	**1.11%**	**(0.93 - 1.25%)**	**4,646**	**(3,905 - 5,264)**	**93/ 94**	**98.94%**	**93**
Plastic bev. bots. <8oz or >5 gal	0.01%	(0.00 - 0.01%)	0.01%	(0.00 - 0.01%)	24	(1 - 52)	4/ 94	4.26%	4
Small tubs 6+oz but <8oz	0.02%	(0.02 - 0.03%)	0.02%	(0.01 - 0.03%)	89	(62 - 117)	43/ 94	45.74%	43
Bulky other rigid plastic packaging	0.04%	(0.01 - 0.08%)	0.04%	(0.01 - 0.07%)	169	(40 - 311)	6/ 94	6.38%	6
All other rigid plastic packaging	1.07%	(0.94 - 1.21%)	1.04%	(0.87 - 1.19%)	4,363	(3,637 - 5,009)	93/ 94	98.94%	93
Rigid plastic products	**3.68%**	**(2.53 - 4.91%)**	**3.40%**	**(2.33 - 4.56%)**	**14,284**	**(9,802 - 19,159)**	**90/ 94**	**95.74%**	**90**
Polyurethane foam carpet pad	0.39%	(0.01 - 0.80%)	0.37%	(0.01 - 0.78%)	1,551	(23 - 3,266)	4/ 94	4.26%	4
Bulky rigid plastic products	1.67%	(0.83 - 2.65%)	1.53%	(0.73 - 2.44%)	6,409	(3,086 - 10,257)	38/ 94	40.43%	38
Other rigid plastic products	0.75%	(0.60 - 0.90%)	0.73%	(0.56 - 0.88%)	3,061	(2,369 - 3,699)	85/ 94	90.43%	85
Mixed plastic / materials	0.87%	(0.38 - 1.65%)	0.78%	(0.35 - 1.55%)	3,262	(1,450 - 6,524)	64/ 94	68.09%	64
Plastic film - combined	**6.74%**	**(5.85 - 7.66%)**	**3.86%**	**(3.30 - 4.46%)**	**16,231**	**(13,884 - 18,720)**	**94/ 94**	**100.00%**	**94**
Plastic Film - Recyclable	**2.23%**	**(1.90 - 2.59%)**	**1.48%**	**(1.24 - 1.76%)**	**6,211**	**(5,211 - 7,390)**	**93/ 94**	**98.94%**	**93**
Plastic grocery/merchandise bags	0.51%	(0.38 - 0.65%)	0.25%	(0.18 - 0.33%)	1,037	(747 - 1,375)	84/ 94	89.36%	84
Plastic other film recyclable	1.72%	(1.43 - 2.04%)	1.23%	(1.01 - 1.49%)	5,174	(4,244 - 6,272)	92/ 94	97.87%	92
Plastic film - non-recyclable	**4.51%**	**(3.85 - 5.20%)**	**2.39%**	**(2.01 - 2.83%)**	**10,021**	**(8,426 - 11,872)**	**94/ 94**	**100.00%**	**94**
Plastic beverage pouches	0.01%	(0.00 - 0.02%)	0.01%	(0.00 - 0.01%)	33	(11 - 62)	27/ 94	28.72%	27
Plastic garbage bags	2.44%	(1.96 - 2.95%)	1.14%	(0.90 - 1.41%)	4,788	(3,771 - 5,924)	94/ 94	100.00%	94
Plastic film- other nonrecyclable	2.05%	(1.74 - 2.44%)	1.24%	(1.01 - 1.50%)	5,200	(4,262 - 6,292)	93/ 94	98.94%	93
Plastic film packaging - estimated	*2.97%*	*(2.64 - 3.33%)*	*1.86%*	*(1.61 - 2.14%)*	*7,813*	*(6,747 - 8,984)*	*94/ 94*	*100.00%*	*94*
Plastic film products - estimated	*3.76%*	*(3.20 - 4.36%)*	*2.00%*	*(1.68 - 2.36%)*	*8,418*	*(7,059 - 9,900)*	*94/ 94*	*100.00%*	*94*
Plastic beverage containers	*0.77%*	*(0.59 - 0.99%)*	*0.57%*	*(0.44 - 0.75%)*	*2,408*	*(1,850 - 3,136)*	*91/ 94*	*96.81%*	*91*
All recyclable plastic	*3.97%*	*(3.53 - 4.45%)*	*2.78%*	*(2.44 - 3.16%)*	*11,691*	*(10,246 - 13,294)*	*94/ 94*	*100.00%*	*94*
All curbside plastic bottles	*1.35%*	*(1.14 - 1.60%)*	*1.01%*	*(0.85 - 1.21%)*	*4,243*	*(3,564 - 5,073)*	*92/ 94*	*97.87%*	*92*
All curbside plastic tubs	*0.39%*	*(0.28 - 0.53%)*	*0.29%*	*(0.21 - 0.40%)*	*1,237*	*(883 - 1,682)*	*79/ 94*	*84.04%*	*79*
Plastic acceptable at the curb	*1.74%*	*(1.49 - 2.02%)*	*1.30%*	*(1.11 - 1.54%)*	*5,480*	*(4,671 - 6,456)*	*92/ 94*	*97.87%*	*92*
Plastic Packaging	*6.71%*	*(6.11 - 7.41%)*	*4.91%*	*(4.40 - 5.47%)*	*20,618*	*(18,478 - 22,966)*	*94/ 94*	*100.00%*	*94*
Plastic Products	*7.44%*	*(6.29 - 8.73%)*	*5.40%*	*(4.36 - 6.56%)*	*22,703*	*(18,332 - 27,543)*	*94/ 94*	*100.00%*	*94*
OTHER ORGANICS	**48.05%**	**(44.62 - 50.88%)**	**47.78%**	**(44.47 - 50.42%)**	**200,716**	**(186,820 - 211,798)**	**94/ 94**	**100.00%**	**94**
Yard Debris	**2.44%**	**(1.08 - 3.97%)**	**2.51%**	**(1.12 - 4.09%)**	**10,530**	**(4,700 - 17,191)**	**56/ 94**	**59.57%**	**56**
Leaves and grass	**2.17%**	**(0.82 - 3.69%)**	**2.24%**	**(0.86 - 3.82%)**	**9,408**	**(3,633 - 16,047)**	**42/ 94**	**44.68%**	**42**
Grass clippings	0.92%	(0.01 - 2.64%)	0.93%	(0.01 - 2.64%)	3,901	(42 - 11,084)	6/ 94	6.38%	6
Leaves / weeds	1.24%	(0.58 - 2.02%)	1.31%	(0.62 - 2.17%)	5,507	(2,603 - 9,131)	38/ 94	40.43%	38
All prunings and stumps	**0.27%**	**(0.13 - 0.43%)**	**0.27%**	**(0.12 - 0.40%)**	**1,123**	**(493 - 1,698)**	**22/ 94**	**23.40%**	**22**
Small prunings under 2"	0.27%	(0.13 - 0.43%)	0.27%	(0.12 - 0.40%)	1,123	(493 - 1,698)	22/ 94	23.40%	22
Prunings and stumps	**0.00%**	**(0.00 - 0.00%)**	**0.00%**	**(0.00 - 0.00%)**	**0**	**(0 - 0)**	**0/ 94**	**0.00%**	**0**
Large prunings over 2"	0.00%	(0.00 - 0.00%)	0.00%	(0.00 - 0.00%)	0	(0 - 0)	0/ 94	0.00%	0
Stumps	0.00%	(0.00 - 0.00%)	0.00%	(0.00 - 0.00%)	0	(0 - 0)	0/ 94	0.00%	0
All Wood	**8.63%**	**(5.74 - 11.83%)**	**8.36%**	**(5.43 - 11.36%)**	**35,120**	**(22,820 - 47,715)**	**80/ 94**	**85.11%**	**80**
Clean lumber & hogged fuel	**1.19%**	**(0.80 - 1.61%)**	**1.09%**	**(0.74 - 1.48%)**	**4,567**	**(3,097 - 6,210)**	**43/ 94**	**45.74%**	**43**
Unpainted lumber	**0.74%**	**(0.41 - 1.11%)**	**0.64%**	**(0.36 - 0.99%)**	**2,709**	**(1,516 - 4,170)**	**33/ 94**	**35.11%**	**33**
Reusable lumber: unpainted	0.17%	(0.01 - 0.34%)	0.17%	(0.01 - 0.34%)	718	(33 - 1,445)	3/ 94	3.19%	3
Clean sawn lumber	0.57%	(0.32 - 0.87%)	0.47%	(0.28 - 0.74%)	1,991	(1,165 - 3,116)	33/ 94	35.11%	33
"Hogged fuel" lumber	**0.46%**	**(0.25 - 0.66%)**	**0.44%**	**(0.24 - 0.64%)**	**1,858**	**(1,004 - 2,677)**	**19/ 94**	**20.21%**	**19**
Clean engineered wood	0.46%	(0.25 - 0.66%)	0.44%	(0.24 - 0.64%)	1,857	(1,003 - 2,675)	18/ 94	19.15%	18
Cedar shakes and shingles	0.00%	(0.00 - 0.00%)	0.00%	(0.00 - 0.00%)	1	(0 - 4)	2/ 94	2.13%	2
Painted & treated lumber	**1.26%**	**(0.69 - 1.91%)**	**1.20%**	**(0.65 - 1.82%)**	**5,030**	**(2,747 - 7,625)**	**31/ 94**	**32.98%**	**31**
Painted lumber	**1.09%**	**(0.51 - 1.77%)**	**1.04%**	**(0.50 - 1.71%)**	**4,386**	**(2,099 - 7,198)**	**29/ 94**	**30.85%**	**29**
Reusable lumber: painted	0.20%	(0.03 - 0.46%)	0.20%	(0.03 - 0.46%)	849	(126 - 1,913)	5/ 94	5.32%	5
Other painted lumber	0.88%	(0.45 - 1.40%)	0.84%	(0.43 - 1.35%)	3,537	(1,794 - 5,655)	27/ 94	28.72%	27
Chemically-treated lumber	0.17%	(0.00 - 0.37%)	0.15%	(0.00 - 0.33%)	644	(7 - 1,381)	3/ 94	3.19%	3
Wood pallets and crates	1.09%	(0.43 - 1.82%)	1.09%	(0.42 - 1.84%)	4,584	(1,780 - 7,727)	10/ 94	10.64%	10
Wood furniture	3.10%	(1.00 - 5.62%)	3.04%	(0.98 - 5.48%)	12,773	(4,113 - 23,041)	17/ 94	18.09%	17
Other wood products	0.22%	(0.11 - 0.35%)	0.21%	(0.10 - 0.33%)	863	(424 - 1,390)	51/ 94	54.26%	51
Mixed wood / materials	1.77%	(0.67 - 3.05%)	1.74%	(0.66 - 3.00%)	7,303	(2,776 - 12,613)	25/ 94	26.60%	25
All food	**20.19%**	**(17.87 - 22.73%)**	**21.20%**	**(18.73 - 23.84%)**	**89,059**	**(78,681 - 100,137)**	**93/ 94**	**98.94%**	**93**
Non-packaged bakery goods	0.99%	(0.68 - 1.35%)	1.04%	(0.71 - 1.41%)	4,385	(2,971 - 5,917)	64/ 94	68.09%	64
Packaged bakery goods	0.91%	(0.71 - 1.12%)	0.95%	(0.75 - 1.17%)	4,000	(3,145 - 4,910)	72/ 94	76.60%	72
Non-packaged other veget. Food	**11.35%**	**(9.29 - 13.54%)**	**11.92%**	**(9.70 - 14.23%)**	**50,064**	**(40,770 - 59,784)**	**89/ 94**	**94.68%**	**89**
Unpackaged veg edible	3.22%	(2.23 - 4.36%)	3.38%	(2.34 - 4.59%)	14,201	(9,832 - 19,272)	76/ 94	80.85%	76
Unpackaged veg nonedible	8.13%	(6.54 - 9.98%)	8.54%	(6.84 - 10.46%)	35,863	(28,723 - 43,922)	88/ 94	93.62%	88
Packaged other vegetative food	2.41%	(1.93 - 2.91%)	2.53%	(2.04 - 3.07%)	10,612	(8,549 - 12,882)	78/ 94	82.98%	78
Non-packaged non-vegetative food	**3.15%**	**(2.53 - 3.77%)**	**3.30%**	**(2.65 - 3.95%)**	**13,883**	**(11,146 - 16,609)**	**80/ 94**	**85.11%**	**80**
Unpkg edible meat, eggs, dairy	1.24%	(0.86 - 1.64%)	1.30%	(0.90 - 1.73%)	5,448	(3,790 - 7,273)	59/ 94	62.77%	59
Unpkg nonedible animal food-related	0.92%	(0.64 - 1.19%)	0.96%	(0.67 - 1.25%)	4,048	(2,824 - 5,262)	63/ 94	67.02%	63
Mixed unpackaged foods	0.99%	(0.73 - 1.26%)	1.04%	(0.77 - 1.32%)	4,386	(3,242 - 5,550)	53/ 94	56.38%	53
Packaged non-vegetative food	**1.39%**	**(1.09 - 1.67%)**	**1.46%**	**(1.14 - 1.76%)**	**6,115**	**(4,810 - 7,408)**	**65/ 94**	**69.15%**	**65**
Packaged meat, eggs	0.51%	(0.37 - 0.67%)	0.53%	(0.38 - 0.71%)	2,241	(1,609 - 2,965)	45/ 94	47.87%	45
Packaged dairy	0.40%	(0.30 - 0.51%)	0.42%	(0.31 - 0.54%)	1,778	(1,310 - 2,265)	42/ 94	44.68%	42
Mixed packaged foods	0.48%	(0.29 - 0.67%)	0.50%	(0.30 - 0.71%)	2,097	(1,258 - 2,981)	36/ 94	38.30%	36
All edible food	*11.14%*	*(9.74 - 12.66%)*	*11.70%*	*(10.22 - 13.34%)*	*49,147*	*(42,940 - 56,027)*	*91/ 94*	*96.81%*	*91*

Statewide Mixed Route Trucks **Total Tons ==> 420,098**

Material	Field Results	Field Results 90% Conf. Interval	Contam. Corrected	Contam. Corrected 90% Conf. Interval	Clean Tons	Clean Tons 90% Conf. Interval	# Present / # Samps	% Present	Present
All non-edible food	*9.05%*	*(7.36 - 10.95%)*	*9.50%*	*(7.71 - 11.56%)*	*39,912*	*(32,384 - 48,567)*	*89/ 94*	*94.68%*	*89*
Tires	**0.39%**	**(0.00 - 0.82%)**	**0.39%**	**(0.00 - 0.82%)**	**1,619**	**(0 - 3,431)**	**3/ 94**	**3.19%**	**3**
Automotive Tires	0.39%	(0.00 - 0.82%)	0.39%	(0.00 - 0.82%)	1,619	(0 - 3,431)	2/ 94	2.13%	2
Other tires	0.00%	(0.00 - 0.00%)	0.00%	(0.00 - 0.00%)	0	(0 - 0)	1/ 94	1.06%	1
Other rubber products	0.76%	(0.34 - 1.28%)	0.79%	(0.34 - 1.30%)	3,302	(1,439 - 5,460)	55/ 94	58.51%	55
Disposable diapers	5.89%	(4.82 - 6.99%)	5.90%	(4.82 - 7.00%)	24,775	(20,253 - 29,416)	67/ 94	71.28%	67
Carpet, Rugs, fiber pads	**1.92%**	**(1.10 - 2.87%)**	**1.80%**	**(1.03 - 2.66%)**	**7,551**	**(4,339 - 11,181)**	**24/ 94**	**25.53%**	**24**
Carpet	1.14%	(0.52 - 1.84%)	1.08%	(0.48 - 1.73%)	4,532	(2,023 - 7,266)	14/ 94	14.89%	14
Rugs	0.67%	(0.26 - 1.16%)	0.61%	(0.23 - 1.05%)	2,546	(979 - 4,415)	12/ 94	12.77%	12
Other carpet/rug pad	0.11%	(0.03 - 0.23%)	0.11%	(0.03 - 0.23%)	474	(109 - 947)	3/ 94	3.19%	3
Textiles & mixed	**5.32%**	**(3.19 - 7.63%)**	**4.20%**	**(2.50 - 6.20%)**	**17,629**	**(10,504 - 26,031)**	**91/ 94**	**96.81%**	**91**
Other textiles	4.67%	(2.56 - 6.89%)	3.68%	(1.99 - 5.68%)	15,467	(8,371 - 23,878)	86/ 94	91.49%	86
Mixed textile / material	0.65%	(0.51 - 0.79%)	0.51%	(0.40 - 0.65%)	2,163	(1,701 - 2,729)	79/ 94	84.04%	79
Asphalt roofing & tarpaper	**0.06%**	**(0.00 - 0.16%)**	**0.06%**	**(0.00 - 0.16%)**	**252**	**(1 - 652)**	**4/ 94**	**4.26%**	**4**
Asphalt roofing - recyclable	0.06%	(0.00 - 0.16%)	0.06%	(0.00 - 0.16%)	251	(0 - 652)	3/ 94	3.19%	3
Asphalt roofing - nonrecyclable	0.00%	(0.00 - 0.00%)	0.00%	(0.00 - 0.00%)	1	(0 - 2)	1/ 94	1.06%	1
Furniture + Mattresses	**1.46%**	**(0.29 - 2.45%)**	**1.43%**	**(0.29 - 2.41%)**	**6,024**	**(1,205 - 10,128)**	**7/ 94**	**7.45%**	**7**
Matresses & box springs	0.00%	(0.00 - 0.00%)	0.00%	(0.00 - 0.00%)	0	(0 - 0)	0/ 94	0.00%	0
Furniture (mixed material)	*1.46%*	*(0.29 - 2.45%)*	*1.43%*	*(0.29 - 2.41%)*	*6,024*	*(1,205 - 10,128)*	*7/ 94*	*7.45%*	*7*
Other miscellaneous organics	**1.00%**	**(0.63 - 1.48%)**	**1.16%**	**(0.70 - 1.71%)**	**4,855**	**(2,930 - 7,200)**	**74/ 94**	**78.72%**	**74**
Paper composite ceiling tiles	0.05%	(0.00 - 0.16%)	0.05%	(0.00 - 0.15%)	223	(0 - 610)	1/ 94	1.06%	1
Compostable other organics	0.17%	(0.01 - 0.47%)	0.22%	(0.01 - 0.60%)	931	(51 - 2,521)	6/ 94	6.38%	6
Non-compostable other organics	0.78%	(0.49 - 1.17%)	0.88%	(0.55 - 1.33%)	3,702	(2,298 - 5,567)	73/ 94	77.66%	73
GLASS	**2.56%**	**(1.39 - 4.13%)**	**2.58%**	**(1.40 - 4.16%)**	**10,857**	**(5,876 - 17,485)**	**80/ 94**	**85.11%**	**80**
Deposit beverage glass	0.30%	(0.20 - 0.41%)	0.30%	(0.20 - 0.42%)	1,263	(821 - 1,773)	45/ 94	47.87%	45
No-deposit glass containers	**0.83%**	**(0.65 - 1.02%)**	**0.85%**	**(0.65 - 1.05%)**	**3,551**	**(2,738 - 4,393)**	**70/ 94**	**74.47%**	**70**
Deposit beverage glass in 2018	0.09%	(0.05 - 0.13%)	0.09%	(0.05 - 0.13%)	362	(208 - 525)	22/ 94	23.40%	22
Other clear beverage bottles	0.16%	(0.09 - 0.25%)	0.16%	(0.09 - 0.24%)	669	(372 - 1,021)	20/ 94	21.28%	20
Other colored beverage bottles	0.10%	(0.04 - 0.15%)	0.10%	(0.04 - 0.15%)	402	(183 - 633)	13/ 94	13.83%	13
Clear container glass	0.44%	(0.33 - 0.57%)	0.45%	(0.33 - 0.59%)	1,908	(1,387 - 2,496)	47/ 94	50.00%	47
Colored container glass	0.04%	(0.02 - 0.06%)	0.05%	(0.03 - 0.08%)	209	(110 - 333)	15/ 94	15.96%	15
Window and other glass	**1.43%**	**(0.25 - 3.12%)**	**1.44%**	**(0.25 - 3.14%)**	**6,042**	**(1,064 - 13,184)**	**47/ 94**	**50.00%**	**47**
Flat window glass	0.99%	(0.00 - 2.96%)	1.00%	(0.00 - 2.97%)	4,201	(3 - 12,491)	5/ 94	5.32%	5
Total fluorescents	**0.01%**	**(0.00 - 0.01%)**	**0.01%**	**(0.00 - 0.01%)**	**30**	**(6 - 58)**	**5/ 94**	**5.32%**	**5**
Fluorescent tubes	0.00%	(0.00 - 0.00%)	0.00%	(0.00 - 0.00%)	0	(0 - 0)	0/ 94	0.00%	0
Compact fluorescent lights	0.01%	(0.00 - 0.01%)	0.01%	(0.00 - 0.01%)	30	(6 - 58)	5/ 94	5.32%	5
Other nonrecyclable glass	0.43%	(0.15 - 0.77%)	0.43%	(0.16 - 0.77%)	1,811	(654 - 3,240)	41/ 94	43.62%	41
Glass Beverage bottles	*0.64%*	*(0.44 - 0.87%)*	*0.64%*	*(0.44 - 0.87%)*	*2,697*	*(1,837 - 3,663)*	*61/ 94*	*64.89%*	*61*
METAL	**5.92%**	**(4.75 - 7.13%)**	**5.74%**	**(4.45 - 6.97%)**	**24,126**	**(18,698 - 29,269)**	**93/ 94**	**98.94%**	**93**
Aluminum	**0.43%**	**(0.34 - 0.53%)**	**0.30%**	**(0.23 - 0.40%)**	**1,265**	**(967 - 1,664)**	**89/ 94**	**94.68%**	**89**
Aluminum beverage cans	**0.16%**	**(0.14 - 0.18%)**	**0.14%**	**(0.12 - 0.16%)**	**587**	**(498 - 686)**	**88/ 94**	**93.62%**	**88**
Deposit aluminum bev. cans	0.14%	(0.12 - 0.17%)	0.12%	(0.10 - 0.15%)	520	(436 - 617)	86/ 94	91.49%	86
Deposit Alum. In 2018	0.02%	(0.01 - 0.02%)	0.02%	(0.01 - 0.02%)	67	(45 - 87)	34/ 94	36.17%	34
Other Aluminum bev. cans	0.00%	(0.00 - 0.00%)	0.00%	(0.00 - 0.00%)	0	(0 - 0)	0/ 94	0.00%	0
Aluminum foil / food trays	0.19%	(0.15 - 0.24%)	0.09%	(0.06 - 0.12%)	364	(258 - 522)	81/ 94	86.17%	81
Other aluminum	**0.08%**	**(0.02 - 0.16%)**	**0.07%**	**(0.02 - 0.15%)**	**315**	**(65 - 635)**	**10/ 94**	**10.64%**	**10**
Other Aluminum curbside OK	0.07%	(0.02 - 0.15%)	0.07%	(0.01 - 0.14%)	290	(55 - 599)	9/ 94	9.57%	9
Large Aluminum not curbside OK	0.01%	(0.00 - 0.01%)	0.01%	(0.00 - 0.01%)	24	(7 - 45)	4/ 94	4.26%	4
Other nonferrous metal	**0.04%**	**(0.01 - 0.07%)**	**0.04%**	**(0.02 - 0.07%)**	**163**	**(63 - 288)**	**13/ 94**	**13.83%**	**13**
Nonferrous Metal curbside-OK	0.01%	(0.00 - 0.02%)	0.01%	(0.00 - 0.02%)	42	(11 - 81)	5/ 94	5.32%	5
Nonferrous Metal not curbside-OK	0.03%	(0.01 - 0.06%)	0.03%	(0.01 - 0.06%)	121	(31 - 245)	9/ 94	9.57%	9
Steel (tinned) cans	**0.81%**	**(0.61 - 1.02%)**	**0.76%**	**(0.55 - 0.99%)**	**3,181**	**(2,322 - 4,142)**	**81/ 94**	**86.17%**	**81**
Steel beverage cans	**0.01%**	**(0.00 - 0.02%)**	**0.01%**	**(0.00 - 0.02%)**	**46**	**(17 - 79)**	**8/ 94**	**8.51%**	**8**
Steel/Bimetal Deposit Cans	0.00%	(0.00 - 0.00%)	0.00%	(0.00 - 0.00%)	0	(0 - 0)	0/ 94	0.00%	0
Steel/Bimetal Deposit 2018	0.01%	(0.00 - 0.02%)	0.01%	(0.00 - 0.01%)	28	(6 - 56)	6/ 94	6.38%	6
Steel/Bimetal Other Bev. Cans	0.00%	(0.00 - 0.01%)	0.00%	(0.00 - 0.01%)	18	(0 - 39)	2/ 94	2.13%	2
Other steel cans	0.79%	(0.61 - 1.01%)	0.75%	(0.54 - 0.97%)	3,135	(2,278 - 4,094)	80/ 94	85.11%	80
White goods	0.15%	(0.00 - 0.44%)	0.15%	(0.00 - 0.44%)	612	(0 - 1,835)	1/ 94	1.06%	1
Used oil filters	0.00%	(0.00 - 0.01%)	0.00%	(0.00 - 0.01%)	19	(0 - 56)	1/ 94	1.06%	1
Empty aerosol cans	0.10%	(0.06 - 0.14%)	0.09%	(0.06 - 0.13%)	382	(252 - 535)	41/ 94	43.62%	41
Other ferrous metal	**1.04%**	**(0.73 - 1.39%)**	**1.06%**	**(0.74 - 1.40%)**	**4,437**	**(3,113 - 5,893)**	**73/ 94**	**77.66%**	**73**
Other ferrous metal curb-OK	0.73%	(0.48 - 1.04%)	0.74%	(0.49 - 1.05%)	3,119	(2,066 - 4,425)	70/ 94	74.47%	70
Other ferrous metal not curb-OK	0.31%	(0.13 - 0.51%)	0.31%	(0.13 - 0.51%)	1,318	(547 - 2,155)	15/ 94	15.96%	15
Mixed ferrous/non-ferrous	**0.10%**	**(0.03 - 0.20%)**	**0.10%**	**(0.03 - 0.20%)**	**434**	**(130 - 852)**	**7/ 94**	**7.45%**	**7**
Mixed ferrous/non-ferr. curb-OK	0.04%	(0.00 - 0.12%)	0.04%	(0.00 - 0.12%)	175	(3 - 492)	4/ 94	4.26%	4
Mixed ferrous/non-ferr. not curb-OK	0.06%	(0.00 - 0.13%)	0.06%	(0.00 - 0.13%)	259	(12 - 526)	4/ 94	4.26%	4
Mixed Metal / Material	1.36%	(0.84 - 1.92%)	1.17%	(0.61 - 1.76%)	4,930	(2,574 - 7,381)	45/ 94	47.87%	45
Computers, brown goods, small apl.	**1.90%**	**(1.11 - 2.76%)**	**2.07%**	**(1.17 - 2.93%)**	**8,703**	**(4,927 - 12,315)**	**30/ 94**	**31.91%**	**30**
Computers & monitors	**0.01%**	**(0.00 - 0.04%)**	**0.01%**	**(0.00 - 0.04%)**	**59**	**(0 - 166)**	**2/ 94**	**2.13%**	**2**
Computers CPU Units	0.01%	(0.00 - 0.04%)	0.01%	(0.00 - 0.04%)	59	(0 - 166)	2/ 94	2.13%	2
Computer monitor CRTs	0.00%	(0.00 - 0.00%)	0.00%	(0.00 - 0.00%)	0	(0 - 0)	0/ 94	0.00%	0
TVs, other CRTs, brown goods	**1.40%**	**(0.74 - 2.17%)**	**1.49%**	**(0.77 - 2.22%)**	**6,246**	**(3,253 - 9,321)**	**21/ 94**	**22.34%**	**21**
TVs	0.62%	(0.05 - 1.34%)	0.62%	(0.05 - 1.34%)	2,619	(219 - 5,630)	3/ 94	3.19%	3
Printers	0.39%	(0.06 - 0.72%)	0.39%	(0.06 - 0.72%)	1,630	(242 - 3,018)	4/ 94	4.26%	4
Computer mice+keyboards	0.01%	(0.00 - 0.02%)	0.01%	(0.00 - 0.02%)	37	(3 - 95)	3/ 94	3.19%	3
Microwaves	0.21%	(0.00 - 0.43%)	0.21%	(0.00 - 0.43%)	887	(0 - 1,817)	2/ 94	2.13%	2
Other consumer elect./brown goods	0.17%	(0.07 - 0.30%)	0.26%	(0.09 - 0.44%)	1,074	(378 - 1,850)	14/ 94	14.89%	14
Small Appliances-non electronic	0.49%	(0.08 - 0.96%)	0.57%	(0.09 - 1.10%)	2,397	(383 - 4,625)	11/ 94	11.70%	11
Total ferrous	*2.14%*	*(1.75 - 2.61%)*	*2.11%*	*(1.69 - 2.58%)*	*8,847*	*(7,119 - 10,833)*	*90/ 94*	*95.74%*	*90*
Total non-ferrous	*0.52%*	*(0.41 - 0.63%)*	*0.39%*	*(0.30 - 0.50%)*	*1,646*	*(1,262 - 2,102)*	*89/ 94*	*94.68%*	*89*
Recycl. metal excl. electronics, sm. apl.	*2.66%*	*(2.22 - 3.17%)*	*2.50%*	*(2.06 - 3.01%)*	*10,493*	*(8,657 - 12,657)*	*92/ 94*	*97.87%*	*92*
OTHER INORGANICS	**5.04%**	**(3.69 - 6.55%)**	**5.15%**	**(3.79 - 6.70%)**	**21,640**	**(15,923 - 28,147)**	**75/ 94**	**79.79%**	**75**
Rock, dirt, litter	3.66%	(2.62 - 5.02%)	3.77%	(2.69 - 5.18%)	15,834	(11,298 - 21,763)	65/ 94	69.15%	65
Rock, brick, dirt	0.99%	(0.47 - 1.57%)	1.10%	(0.50 - 1.80%)	4,631	(2,118 - 7,546)	31/ 94	32.98%	31
Rock, concrete, brick	0.24%	(0.07 - 0.43%)	0.24%	(0.07 - 0.44%)	1,020	(301 - 1,845)	10/ 94	10.64%	10
Soil, sand, dirt	0.75%	(0.27 - 1.37%)	0.86%	(0.30 - 1.59%)	3,612	(1,260 - 6,659)	23/ 94	24.47%	23
Pet litter, animal feces	2.67%	(1.69 - 3.84%)	2.67%	(1.69 - 3.84%)	11,203	(7,093 - 16,114)	53/ 94	56.38%	53
Gypsum wallboard	**0.20%**	**(0.06 - 0.37%)**	**0.20%**	**(0.05 - 0.36%)**	**823**	**(231 - 1,524)**	**10/ 94**	**10.64%**	**10**
Gypsum wallboard NEW	0.00%	(0.00 - 0.00%)	0.00%	(0.00 - 0.00%)	0	(0 - 0)	0/ 94	0.00%	0
Gypsum wallboard OLD	0.20%	(0.06 - 0.37%)	0.20%	(0.05 - 0.36%)	823	(231 - 1,524)	10/ 94	10.64%	10
Fiberglass Insulation	0.24%	(0.04 - 0.49%)	0.23%	(0.04 - 0.47%)	986	(156 - 1,979)	5/ 94	5.32%	5
Other miscellaneous inorganics	0.94%	(0.34 - 1.64%)	0.95%	(0.34 - 1.65%)	3,996	(1,427 - 6,942)	34/ 94	36.17%	34
"MEDICAL WASTES"	1.23%	(0.49 - 2.08%)	1.23%	(0.49 - 2.08%)	5,173	(2,047 - 8,721)	25/ 94	26.60%	25

Statewide Mixed Route Trucks **Total Tons ==> 420,098**

Material	Field Results	Field Results 90% Conf. Interval	Contam. Corrected	Contam. Corrected 90% Conf. Interval	Clean Tons	Clean Tons 90% Conf. Interval	# Present / # Samps	% Present	Present
HAZARDOUS MATERIALS	**0.41%**	**(0.18 - 0.65%)**	**0.42%**	**(0.18 - 0.67%)**	**1,745**	**(760 - 2,811)**	**45/ 94**	**47.87%**	**45**
Lead-acid batteries	0.00%	(0.00 - 0.00%)	0.00%	(0.00 - 0.00%)	0	(0 - 0)	0/ 94	0.00%	0
Dry-cell batteries	0.05%	(0.02 - 0.08%)	0.06%	(0.02 - 0.09%)	244	(96 - 392)	28/ 94	29.79%	28
Latex paint	0.24%	(0.01 - 0.48%)	0.24%	(0.01 - 0.48%)	1,004	(24 - 2,007)	4/ 94	4.26%	4
Oil paints	0.00%	(0.00 - 0.01%)	0.00%	(0.00 - 0.01%)	17	(0 - 36)	2/ 94	2.13%	2
Motor oil	0.00%	(0.00 - 0.01%)	0.00%	(0.00 - 0.01%)	12	(0 - 28)	2/ 94	2.13%	2
Other flammables	0.01%	(0.00 - 0.01%)	0.01%	(0.00 - 0.01%)	28	(0 - 57)	2/ 94	2.13%	2
Pesticides / herbicides	0.01%	(0.00 - 0.01%)	0.01%	(0.00 - 0.01%)	29	(7 - 59)	3/ 94	3.19%	3
Corrosive cleaners	0.02%	(0.00 - 0.04%)	0.02%	(0.00 - 0.04%)	74	(9 - 147)	5/ 94	5.32%	5
Asbestos	0.00%	(0.00 - 0.00%)	0.00%	(0.00 - 0.00%)	0	(0 - 0)	0/ 94	0.00%	0
Mercury-containing items	0.00%	(0.00 - 0.00%)	0.00%	(0.00 - 0.00%)	0	(0 - 0)	0/ 94	0.00%	0
Ammunition and fireworks	0.01%	(0.00 - 0.03%)	0.01%	(0.00 - 0.03%)	42	(0 - 127)	1/ 94	1.06%	1
Compressed gas cylinders	0.00%	(0.00 - 0.01%)	0.00%	(0.00 - 0.01%)	20	(0 - 51)	2/ 94	2.13%	2
Other hazardous chemicals	0.05%	(0.02 - 0.08%)	0.05%	(0.02 - 0.08%)	189	(69 - 337)	13/ 94	13.83%	13
Unknown hazardous chemicals	0.02%	(0.00 - 0.04%)	0.02%	(0.00 - 0.04%)	84	(12 - 176)	4/ 94	4.26%	4
Total packaging	*24.11%*	*(21.56 - 27.09%)*	*19.49%*	*(16.90 - 22.40%)*	*81,880*	*(70,995 - 94,095)*	*94/ 94*	*100.00%*	*94*
Total products	*48.66%*	*(44.66 - 52.40%)*	*41.88%*	*(38.00 - 45.35%)*	*175,943*	*(159,644 - 190,505)*	*94/ 94*	*100.00%*	*94*
Total non-manufactured	*27.23%*	*(24.46 - 30.02%)*	*28.43%*	*(25.62 - 31.32%)*	*119,420*	*(107,617 - 131,580)*	*93/ 94*	*98.94%*	*93*
Total organic	*86.40%*	*(84.41 - 88.21%)*	*76.23%*	*(74.09 - 77.97%)*	*320,240*	*(311,260 - 327,558)*	*94/ 94*	*100.00%*	*94*
Total non-organic	*13.60%*	*(11.79 - 15.59%)*	*13.57%*	*(11.66 - 15.52%)*	*57,003*	*(48,965 - 65,179)*	*93/ 94*	*98.94%*	*93*
Compostable	*57.24%*	*(53.82 - 60.57%)*	*52.47%*	*(48.81 - 55.79%)*	*220,436*	*(205,050 - 234,372)*	*94/ 94*	*100.00%*	*94*
Compostable-target	*34.73%*	*(31.29 - 38.35%)*	*32.52%*	*(29.19 - 35.86%)*	*136,624*	*(122,621 - 150,661)*	*94/ 94*	*100.00%*	*94*
Curbside recyclables	*16.96%*	*(14.64 - 19.68%)*	*14.25%*	*(11.86 - 16.86%)*	*59,881*	*(49,814 - 70,832)*	*94/ 94*	*100.00%*	*94*
Recoverable (recycl., compost, energy)	*65.05%*	*(62.24 - 67.73%)*	*58.19%*	*(55.22 - 60.91%)*	*244,440*	*(231,989 - 255,889)*	*94/ 94*	*100.00%*	*94*
Recyclable (incl. energy, not compost)	*35.24%*	*(32.30 - 38.13%)*	*30.44%*	*(27.51 - 33.15%)*	*127,883*	*(115,561 - 139,270)*	*94/ 94*	*100.00%*	*94*
Compostable but not recyclable	*29.80%*	*(26.88 - 32.83%)*	*27.75%*	*(24.75 - 30.79%)*	*116,557*	*(103,978 - 129,337)*	*94/ 94*	*100.00%*	*94*
Not recoverable (inverse of recoverable)	*34.95%*	*(32.27 - 37.76%)*	*31.61%*	*(28.87 - 34.30%)*	*132,802*	*(121,285 - 144,081)*	*94/ 94*	*100.00%*	*94*
Water and Residue (Contamination)	*0.00%*	*(0.00 - 0.00%)*	*10.20%*	*(9.15 - 11.71%)*	*42,855*	*(38,428 - 49,179)*	*0/ 0*	*0.00%*	*0*
Supermix & fines	*1.10%*	*(0.00 - 0.00%)*	*1.10%*	*(0.00 - 0.00%)*	*4,607*	*(0 - 0)*	*90/ 94*	*95.74%*	*90*
Supermix	*0.54%*	*(0.00 - 0.00%)*	*0.54%*	*(0.00 - 0.00%)*	*2,288*	*(0 - 0)*	*66/ 94*	*70.21%*	*66*
Fines	*0.55%*	*(0.00 - 0.00%)*	*0.55%*	*(0.00 - 0.00%)*	*2,319*	*(0 - 0)*	*87/ 94*	*92.55%*	*87*

Statewide Mixed Route Trucks

Material	Field Low 5%	Field High 5%	Corrected Low 5%	Corrected High 5%	Clean Tons Low 5%	Clean Tons High 5%	Group	EOrd	TonsAlloc	ChProb
TOTAL PAPER	**20.41%**	**25.39%**	**14.35%**	**19.42%**	**60,279**	**81,602**	**F16TOTMIX**	**201**	**420,098**	**0**
Packaging Paper	**9.98%**	**12.62%**	**7.44%**	**9.81%**	**31,242**	**41,213**	**F16TOTMIX**	**202**	**420,098**	**0**
Cardboard incl. wine boxes	**4.35%**	**6.44%**	**3.14%**	**4.90%**	**13,194**	**20,576**	**F16TOTMIX**	**207**	**420,098**	**0**
Wine boxes	0.00%	0.01%	0.00%	0.01%	0	33	F16TOTMIX	3	420,098	0
Cardboard/brown bags	4.34%	6.43%	3.14%	4.90%	13,181	20,576	F16TOTMIX	4	420,098	0
Low grade Not OK With ONP	1.40%	1.80%	0.97%	1.37%	4,073	5,771	F16TOTMIX	10	420,098	0
Polycoats +bleached drink boxes	**1.39%**	**1.79%**	**0.95%**	**1.30%**	**3,994**	**5,458**	**F16TOTMIX**	**206**	**420,098**	**0**
Milk cartons/Drink boxes	**0.10%**	**0.19%**	**0.08%**	**0.15%**	**320**	**623**	**F16TOTMIX**	**208**	**420,098**	**0**
Gable top (milk) cartons	0.05%	0.12%	0.04%	0.10%	171	423	F16TOTMIX	1	420,098	0
Aseptic drink boxes	0.04%	0.10%	0.02%	0.07%	99	300	F16TOTMIX	2	420,098	0
Other Polycoated paper	1.25%	1.63%	0.84%	1.19%	3,545	4,986	F16TOTMIX	11	420,098	0
Nonrecyclable (packaging) paper	**1.87%**	**3.73%**	**1.55%**	**3.18%**	**6,508**	**13,360**	**F16TOTMIX**	**287**	**420,098**	**0**
Waxed corrugated cardboard	0.22%	1.38%	0.15%	1.13%	633	4,753	F16TOTMIX	5	420,098	0
Non-compost., non-recycl. paper	1.40%	2.77%	1.20%	2.43%	5,033	10,190	F16TOTMIX	14	420,098	0
Other (Non-packaging) Paper	**9.37%**	**13.94%**	**6.03%**	**10.52%**	**25,339**	**44,198**	**F16TOTMIX**	**203**	**420,098**	**0**
Hi grade paper	0.86%	5.57%	0.84%	5.30%	3,535	22,263	F16TOTMIX	6	420,098	0
Newspaper	0.49%	0.75%	0.35%	0.58%	1,487	2,453	F16TOTMIX	7	420,098	0
Magazines	0.35%	0.78%	0.34%	0.84%	1,438	3,539	F16TOTMIX	8	420,098	0
Low grade OK With ONP	1.01%	1.46%	0.79%	1.20%	3,313	5,029	F16TOTMIX	9	420,098	0
Hardcover books	0.00%	0.04%	0.00%	0.03%	5	147	F16TOTMIX	12	420,098	0
Other compostable nonrecycl. paper	5.58%	6.98%	2.86%	3.73%	11,998	15,655	F16TOTMIX	13	420,098	0
Low-grade paper combined	*2.67%*	*3.33%*	*1.99%*	*2.59%*	*8,351*	*10,889*	*F16TOTMIX*	*204*	*420,098*	*0*
Non-recyclable paper combined	*9.41%*	*11.71%*	*5.77%*	*7.60%*	*24,248*	*31,934*	*F16TOTMIX*	*205*	*420,098*	*0*
Paper drink cartons	*0.11%*	*0.20%*	*0.08%*	*0.15%*	*332*	*637*	*F16TOTMIX*	*209*	*420,098*	*0*
All recyclable paper	*9.88%*	*14.91%*	*7.70%*	*12.62%*	*32,336*	*53,019*	**F16TOTMIX**	**210**	**420,098**	**0**
TOTAL PLASTIC	**12.63%**	**15.85%**	**9.01%**	**11.68%**	**37,848**	**49,071**	**F16TOTMIX**	**211**	**420,098**	**0**
Rigid Plastic Containers (RPCs)	**2.26%**	**2.98%**	**1.69%**	**2.26%**	**7,079**	**9,487**	**F16TOTMIX**	**213**	**420,098**	**0**
Deposit plastic soft drink/beer bottles	0.08%	0.11%	0.06%	0.08%	236	353	F16TOTMIX	15	420,098	0
Plastic deposit water	0.08%	0.13%	0.06%	0.10%	250	404	F16TOTMIX	16	420,098	0
Plastic deposit in 2018 (juice, etc)	0.17%	0.33%	0.12%	0.25%	515	1,031	F16TOTMIX	17	420,098	0
No-deposit plastic beverage bots.	0.21%	0.45%	0.16%	0.34%	654	1,412	F16TOTMIX	18	420,098	0
Other plastic bottles	0.50%	0.70%	0.37%	0.53%	1,559	2,211	F16TOTMIX	20	420,098	0
5 Gallon buckets/ Flower Pots	0.04%	0.26%	0.03%	0.19%	127	814	F16TOTMIX	21	420,098	0
Plastic tubs, curb-OK 8oz to 4 gal	0.16%	0.30%	0.12%	0.23%	500	951	F16TOTMIX	22	420,098	0
Other RPCs - tubs, etc.	0.74%	1.08%	0.55%	0.81%	2,299	3,402	F16TOTMIX	23	420,098	0
Other rigid plastic packaging	**1.01%**	**1.28%**	**0.93%**	**1.25%**	**3,905**	**5,264**	**F16TOTMIX**	**215**	**420,098**	**0**
Plastic bev. bots. <8oz or >5 gal	0.00%	0.01%	0.00%	0.01%	1	52	F16TOTMIX	19	420,098	0
Small tubs 6+oz but <8oz	0.02%	0.03%	0.01%	0.03%	62	117	F16TOTMIX	24	420,098	0
Bulky other rigid plastic packaging	0.01%	0.08%	0.01%	0.07%	40	311	F16TOTMIX	25	420,098	0
All other rigid plastic packaging	0.94%	1.21%	0.87%	1.19%	3,637	5,009	F16TOTMIX	26	420,098	0
Rigid plastic products	**2.53%**	**4.91%**	**2.33%**	**4.56%**	**9,802**	**19,159**	**F16TOTMIX**	**218**	**420,098**	**0**
Polyurethane foam carpet pad	0.01%	0.80%	0.01%	0.78%	23	3,266	F16TOTMIX	67	420,098	0
Bulky rigid plastic products	0.83%	2.65%	0.73%	2.44%	3,086	10,257	F16TOTMIX	27	420,098	0
Other rigid plastic products	0.60%	0.90%	0.56%	0.88%	2,369	3,699	F16TOTMIX	28	420,098	0
Mixed plastic / materials	0.38%	1.65%	0.35%	1.55%	1,450	6,524	*F16TOTMIX*	29	420,098	0
Plastic film - combined	**5.85%**	**7.66%**	**3.30%**	**4.46%**	**13,884**	**18,720**	***F16TOTMIX***	**220**	**420,098**	**0**
Plastic Film - Recyclable	**1.90%**	**2.59%**	**1.24%**	**1.76%**	**5,211**	**7,390**	***F16TOTMIX***	**295**	**420,098**	**0**
Plastic grocery/merchandise bags	0.38%	0.65%	0.18%	0.33%	747	1,375	*F16TOTMIX*	31	420,098	0
Plastic other film recyclable	1.43%	2.04%	1.01%	1.49%	4,244	6,272	*F16TOTMIX*	32	420,098	0
Plastic film - non-recyclable	**3.85%**	**5.20%**	**2.01%**	**2.83%**	**8,426**	**11,872**	***F16TOTMIX***	**221**	**420,098**	**0**
Plastic beverage pouches	0.00%	0.02%	0.00%	0.01%	11	62	F16TOTMIX	30	420,098	0
Plastic garbage bags	1.96%	2.95%	0.90%	1.41%	3,771	5,924	F16TOTMIX	33	420,098	0
Plastic film- other nonrecyclable	1.74%	2.44%	1.01%	1.50%	4,262	6,292	F16TOTMIX	34	420,098	0
Plastic film packaging - estimated	*2.64%*	*3.33%*	*1.61%*	*2.14%*	*6,747*	*8,984*	*F16TOTMIX*	*216*	*420,098*	*0*
Plastic film products - estimated	*3.20%*	*4.36%*	*1.68%*	*2.36%*	*7,059*	*9,900*	*F16TOTMIX*	*219*	*420,098*	*0*
Plastic beverage containers	*0.59%*	*0.99%*	*0.44%*	*0.75%*	*1,850*	*3,136*	*F16TOTMIX*	*222*	*420,098*	*0*
All recyclable plastic	*3.53%*	*4.45%*	*2.44%*	*3.16%*	*10,246*	*13,294*	*F16TOTMIX*	*224*	*420,098*	*0*
All curbside plastic bottles	*1.14%*	*1.60%*	*0.85%*	*1.21%*	*3,564*	*5,073*	*F16TOTMIX*	*225*	*420,098*	*0*
All curbside plastic tubs	*0.28%*	*0.53%*	*0.21%*	*0.40%*	*883*	*1,682*	*F16TOTMIX*	*226*	*420,098*	*0*
Plastic acceptable at the curb	*1.49%*	*2.02%*	*1.11%*	*1.54%*	*4,671*	*6,456*	*F16TOTMIX*	*227*	*420,098*	*0*
Plastic Packaging	*6.11%*	*7.41%*	*4.40%*	*5.47%*	*18,478*	*22,966*	*F16TOTMIX*	*212*	*420,098*	*0*
Plastic Products	*6.29%*	*8.73%*	*4.36%*	*6.56%*	*18,332*	*27,543*	*F16TOTMIX*	*217*	*420,098*	*0*
OTHER ORGANICS	**44.62%**	**50.88%**	**44.47%**	**50.42%**	**186,820**	**211,798**	**F16TOTMIX**	**228**	**420,098**	**0**
Yard Debris	**1.08%**	**3.97%**	**1.12%**	**4.09%**	**4,700**	**17,191**	**F16TOTMIX**	**229**	**420,098**	**0**
Leaves and grass	**0.82%**	**3.69%**	**0.86%**	**3.82%**	**3,633**	**16,047**	**F16TOTMIX**	**230**	**420,098**	**0**
Grass clippings	0.01%	2.64%	0.01%	2.64%	42	11,084	F16TOTMIX	35	420,098	0
Leaves / weeds	0.58%	2.02%	0.62%	2.17%	2,603	9,131	F16TOTMIX	36	420,098	0
All prunings and stumps	**0.13%**	**0.43%**	**0.12%**	**0.40%**	**493**	**1,698**	**F16TOTMIX**	**232**	**420,098**	**0**
Small prunings under 2"	0.13%	0.43%	0.12%	0.40%	493	1,698	F16TOTMIX	37	420,098	0
Prunings and stumps	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**0**	**0**	**F16TOTMIX**	**231**	**420,098**	**1001**
Large prunings over 2"	0.00%	0.00%	0.00%	0.00%	0	0	F16TOTMIX	38	420,098	0
Stumps	0.00%	0.00%	0.00%	0.00%	0	0	F16TOTMIX	39	420,098	0
All Wood	**5.74%**	**11.83%**	**5.43%**	**11.36%**	**22,820**	**47,715**	**F16TOTMIX**	**233**	**420,098**	**0**
Clean lumber & hogged fuel	**0.80%**	**1.61%**	**0.74%**	**1.48%**	**3,097**	**6,210**	**F16TOTMIX**	**234**	**420,098**	**0**
Unpainted lumber	**0.41%**	**1.11%**	**0.36%**	**0.99%**	**1,516**	**4,170**	**F16TOTMIX**	**235**	**420,098**	**0**
Reusable lumber: unpainted	0.01%	0.34%	0.01%	0.34%	33	1,445	F16TOTMIX	40	420,098	0
Clean sawn lumber	0.32%	0.87%	0.28%	0.74%	1,165	3,116	F16TOTMIX	41	420,098	0
"Hogged fuel" lumber	**0.25%**	**0.66%**	**0.24%**	**0.64%**	**1,004**	**2,677**	**F16TOTMIX**	**236**	**420,098**	**0**
Clean engineered wood	0.25%	0.66%	0.24%	0.64%	1,003	2,675	F16TOTMIX	42	420,098	0
Cedar shakes and shingles	0.00%	0.00%	0.00%	0.00%	0	4	F16TOTMIX	47	420,098	0
Painted & treated lumber	**0.69%**	**1.91%**	**0.65%**	**1.82%**	**2,747**	**7,625**	**F16TOTMIX**	**237**	**420,098**	**0**
Painted lumber	**0.51%**	**1.77%**	**0.50%**	**1.71%**	**2,099**	**7,198**	**F16TOTMIX**	**238**	**420,098**	**0**
Reusable lumber: painted	0.03%	0.46%	0.03%	0.46%	126	1,913	F16TOTMIX	43	420,098	0
Other painted lumber	0.45%	1.40%	0.43%	1.35%	1,794	5,655	F16TOTMIX	44	420,098	0
Chemically-treated lumber	0.00%	0.37%	0.00%	0.33%	7	1,381	F16TOTMIX	45	420,098	0
Wood pallets and crates	0.43%	1.82%	0.42%	1.84%	1,780	7,727	F16TOTMIX	46	420,098	0
Wood furniture	1.00%	5.62%	0.98%	5.48%	4,113	23,041	F16TOTMIX	48	420,098	0
Other wood products	0.11%	0.35%	0.10%	0.33%	424	1,390	F16TOTMIX	49	420,098	0
Mixed wood / materials	0.67%	3.05%	0.66%	3.00%	2,776	12,613	F16TOTMIX	50	420,098	0
All food	**17.87%**	**22.73%**	**18.73%**	**23.84%**	**78,681**	**100,137**	**F16TOTMIX**	239	420,098	0
Non-packaged bakery goods	0.68%	1.35%	0.71%	1.41%	2,971	5,917	F16TOTMIX	51	420,098	0
Packaged bakery goods	0.71%	1.12%	0.75%	1.17%	3,145	4,910	F16TOTMIX	52	420,098	0
Non-packaged other veget. Food	**9.29%**	**13.54%**	**9.70%**	**14.23%**	**40,770**	**59,784**	**F16TOTMIX**	**289**	**420,098**	**0**
Unpackaged veg edible	2.23%	4.36%	2.34%	4.59%	9,832	19,272	F16TOTMIX	53	420,098	0
Unpackaged veg nonedible	6.54%	9.98%	6.84%	10.46%	28,723	43,922	F16TOTMIX	54	420,098	0
Packaged other vegetative food	1.93%	2.91%	2.04%	3.07%	8,549	12,882	F16TOTMIX	55	420,098	0
Non-packaged non-vegetative food	**2.53%**	**3.77%**	**2.65%**	**3.95%**	**11,146**	**16,609**	**F16TOTMIX**	**291**	**420,098**	**0**
Unpkg edible meat, eggs, dairy	0.86%	1.64%	0.90%	1.73%	3,790	7,273	F16TOTMIX	56	420,098	0
Unpkg nonedible animal food-related	0.64%	1.19%	0.67%	1.25%	2,824	5,262	F16TOTMIX	57	420,098	0
Mixed unpackaged foods	0.73%	1.26%	0.77%	1.32%	3,242	5,550	F16TOTMIX	60	420,098	0
Packaged non-vegetative food	**1.09%**	**1.67%**	**1.14%**	**1.76%**	**4,810**	**7,408**	**F16TOTMIX**	**292**	**420,098**	**0**
Packaged meat, eggs	0.37%	0.67%	0.38%	0.71%	1,609	2,965	F16TOTMIX	58	420,098	0
Packaged dairy	0.30%	0.51%	0.31%	0.54%	1,310	2,265	F16TOTMIX	59	420,098	0
Mixed packaged foods	0.29%	0.67%	0.30%	0.71%	1,258	2,981	F16TOTMIX	61	420,098	0
All edible food	*9.74%*	*12.66%*	*10.22%*	*13.34%*	*42,940*	*56,027*	*F16TOTMIX*	*293*	*420,098*	*0*

Statewide Mixed Route Trucks

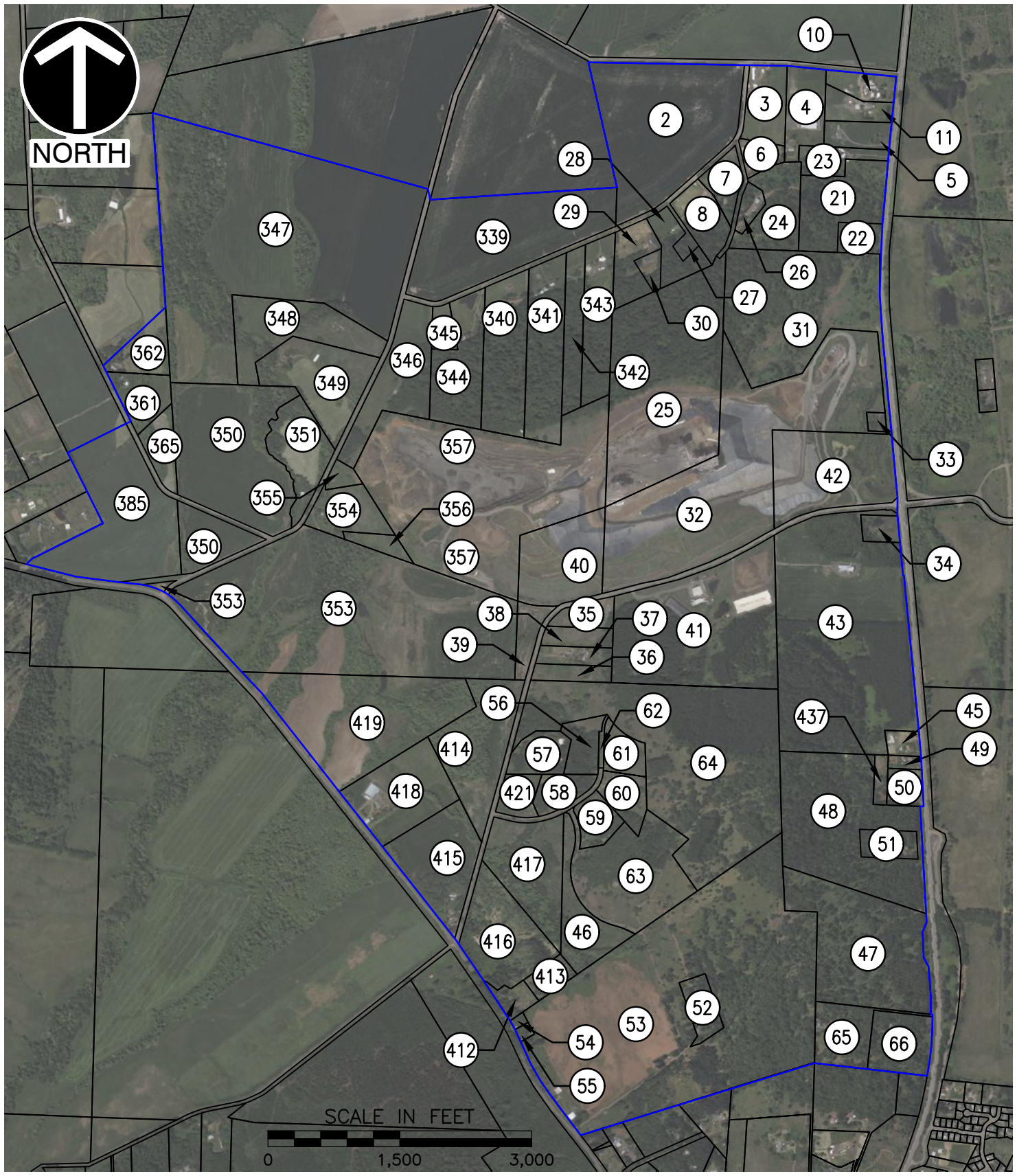
Material	Field Low 5%	Field High 5%	Corrected Low 5%	Corrected High 5%	Clean Tons Low 5%	Clean Tons High 5%	Group	EOrd	TonsAlloc	ChProb
All non-edible food	*7.36%*	*10.95%*	*7.71%*	*11.56%*	*32,384*	*48,567*	*F16TOTMIX*	*294*	*420,098*	*0*
Tires	**0.00%**	**0.82%**	**0.00%**	**0.82%**	**0**	**3,431**	**F16TOTMIX**	**284**	**420,098**	**46**
Automotive Tires	0.00%	0.82%	0.00%	0.82%	0	3,431	F16TOTMIX	69	420,098	0
Other tires	0.00%	0.00%	0.00%	0.00%	0	0	F16TOTMIX	70	420,098	0
Other rubber products	0.34%	1.28%	0.34%	1.30%	1,439	5,460	F16TOTMIX	71	420,098	0
Disposable diapers	4.82%	6.99%	4.82%	7.00%	20,253	29,416	F16TOTMIX	62	420,098	0
Carpet, Rugs, fiber pads	**1.10%**	**2.87%**	**1.03%**	**2.66%**	**4,339**	**11,181**	**F16TOTMIX**	**285**	**420,098**	**0**
Carpet	0.52%	1.84%	0.48%	1.73%	2,023	7,266	F16TOTMIX	65	420,098	0
Rugs	0.26%	1.16%	0.23%	1.05%	979	4,415	F16TOTMIX	66	420,098	0
Other carpet/rug pad	0.03%	0.23%	0.03%	0.23%	109	947	F16TOTMIX	68	420,098	0
Textiles & mixed	**3.19%**	**7.63%**	**2.50%**	**6.20%**	**10,504**	**26,031**	**F16TOTMIX**	**240**	**420,098**	**0**
Other textiles	2.56%	6.89%	1.99%	5.68%	8,371	23,878	F16TOTMIX	63	420,098	0
Mixed textile / material	0.51%	0.79%	0.40%	0.65%	1,701	2,729	F16TOTMIX	64	420,098	0
Asphalt roofing & tarpaper	**0.00%**	**0.16%**	**0.00%**	**0.16%**	**1**	**652**	**F16TOTMIX**	**241**	**420,098**	**21**
Asphalt roofing - recyclable	0.00%	0.16%	0.00%	0.16%	0	652	F16TOTMIX	72	420,098	0
Asphalt roofing - nonrecyclable	0.00%	0.00%	0.00%	0.00%	0	2	F16TOTMIX	73	420,098	0
Furniture + Mattresses	**0.29%**	**2.45%**	**0.29%**	**2.41%**	**1,205**	**10,128**	**F16TOTMIX**	**286**	**420,098**	**0**
Matresses & box springs	0.00%	0.00%	0.00%	0.00%	0	0	F16TOTMIX	74	420,098	0
Furniture (mixed material)	*0.29%*	*2.45%*	*0.29%*	*2.41%*	*1,205*	*10,128*	*F16TOTMIX*	75	420,098	0
Other miscellaneous organics	**0.63%**	**1.48%**	**0.70%**	**1.71%**	**2,930**	**7,200**	**F16TOTMIX**	**242**	**420,098**	**0**
Paper composite ceiling tiles	0.00%	0.16%	0.00%	0.15%	0	610	F16TOTMIX	76	420,098	0
Compostable other organics	0.01%	0.47%	0.01%	0.60%	51	2,521	F16TOTMIX	77	420,098	0
Non-compostable other organics	0.49%	1.17%	0.55%	1.33%	2,298	5,567	F16TOTMIX	78	420,098	0
GLASS	**1.39%**	**4.13%**	**1.40%**	**4.16%**	**5,876**	**17,485**	**F16TOTMIX**	**243**	**420,098**	**0**
Deposit beverage glass	0.20%	0.41%	0.20%	0.42%	821	1,773	F16TOTMIX	79	420,098	0
No-deposit glass containers	**0.65%**	**1.02%**	**0.65%**	**1.05%**	**2,738**	**4,393**	**F16TOTMIX**	**245**	**420,098**	**0**
Deposit beverage glass in 2018	0.05%	0.13%	0.05%	0.13%	208	525	F16TOTMIX	80	420,098	0
Other clear beverage bottles	0.09%	0.25%	0.09%	0.24%	372	1,021	F16TOTMIX	81	420,098	0
Other colored beverage bottles	0.04%	0.15%	0.04%	0.15%	183	633	F16TOTMIX	82	420,098	0
Clear container glass	0.33%	0.57%	0.33%	0.59%	1,387	2,496	F16TOTMIX	83	420,098	0
Colored container glass	0.02%	0.06%	0.03%	0.08%	110	333	F16TOTMIX	84	420,098	0
Window and other glass	**0.25%**	**3.12%**	**0.25%**	**3.14%**	**1,064**	**13,184**	**F16TOTMIX**	**246**	**420,098**	**0**
Flat window glass	0.00%	2.96%	0.00%	2.97%	3	12,491	F16TOTMIX	85	420,098	0
Total fluorescents	**0.00%**	**0.01%**	**0.00%**	**0.01%**	**6**	**58**	**F16TOTMIX**	**247**	**420,098**	**2**
Fluorescent tubes	0.00%	0.00%	0.00%	0.00%	0	0	F16TOTMIX	86	420,098	0
Compact fluorescent lights	0.00%	0.01%	0.00%	0.01%	6	58	F16TOTMIX	87	420,098	0
Other nonrecyclable glass	0.15%	0.77%	0.16%	0.77%	654	3,240	F16TOTMIX	88	420,098	0
Glass Beverage bottles	*0.44%*	*0.87%*	*0.44%*	*0.87%*	*1,837*	*3,663*	*F16TOTMIX*	*244*	*420,098*	*0*
METAL	**4.75%**	**7.13%**	**4.45%**	**6.97%**	**18,698**	**29,269**	**F16TOTMIX**	**248**	**420,098**	**0**
Aluminum	**0.34%**	**0.53%**	**0.23%**	**0.40%**	**967**	**1,664**	**F16TOTMIX**	**249**	**420,098**	**0**
Aluminum beverage cans	**0.14%**	**0.18%**	**0.12%**	**0.16%**	**498**	**686**	**F16TOTMIX**	**251**	**420,098**	**0**
Deposit aluminum bev. cans	0.12%	0.17%	0.10%	0.15%	436	617	F16TOTMIX	89	420,098	0
Deposit Alum. In 2018	0.01%	0.02%	0.01%	0.02%	45	87	F16TOTMIX	90	420,098	0
Other Aluminum bev. cans	0.00%	0.00%	0.00%	0.00%	0	0	F16TOTMIX	91	420,098	0
Aluminum foil / food trays	0.15%	0.24%	0.06%	0.12%	258	522	F16TOTMIX	92	420,098	0
Other aluminum	**0.02%**	**0.16%**	**0.02%**	**0.15%**	**65**	**635**	**F16TOTMIX**	**250**	**420,098**	**0**
Other Aluminum curbside OK	0.02%	0.15%	0.01%	0.14%	55	599	F16TOTMIX	93	420,098	0
Large Aluminum not curbside OK	0.00%	0.01%	0.00%	0.01%	7	45	F16TOTMIX	94	420,098	0
Other nonferrous metal	**0.01%**	**0.07%**	**0.02%**	**0.07%**	**63**	**288**	**F16TOTMIX**	**254**	**420,098**	**0**
Nonferrous Metal curbside-OK	0.00%	0.02%	0.00%	0.02%	11	81	F16TOTMIX	99	420,098	0
Nonferrous Metal not curbside-OK	0.01%	0.06%	0.01%	0.06%	31	245	F16TOTMIX	100	420,098	0
Steel (tinned) cans	**0.61%**	**1.02%**	**0.55%**	**0.99%**	**2,322**	**4,142**	**F16TOTMIX**	**253**	**420,098**	**0**
Steel beverage cans	**0.00%**	**0.02%**	**0.00%**	**0.02%**	**17**	**79**	**F16TOTMIX**	**252**	**420,098**	**0**
Steel/Bimetal Deposit Cans	0.00%	0.00%	0.00%	0.00%	0	0	F16TOTMIX	95	420,098	0
Steel/Bimetal Deposit 2018	0.00%	0.02%	0.00%	0.01%	6	56	F16TOTMIX	96	420,098	0
Steel/Bimetal Other Bev. Cans	0.00%	0.01%	0.00%	0.01%	0	39	F16TOTMIX	97	420,098	0
Other steel cans	0.61%	1.01%	0.54%	0.97%	2,278	4,094	F16TOTMIX	98	420,098	0
White goods	0.00%	0.44%	0.00%	0.44%	0	1,835	F16TOTMIX	103	420,098	0
Used oil filters	0.00%	0.01%	0.00%	0.01%	0	56	F16TOTMIX	104	420,098	0
Empty aerosol cans	0.06%	0.14%	0.06%	0.13%	252	535	F16TOTMIX	105	420,098	0
Other ferrous metal	**0.73%**	**1.39%**	**0.74%**	**1.40%**	**3,113**	**5,893**	**F16TOTMIX**	**255**	**420,098**	**0**
Other ferrous metal curb-OK	0.48%	1.04%	0.49%	1.05%	2,066	4,425	F16TOTMIX	101	420,098	0
Other ferrous metal not curb-OK	0.13%	0.51%	0.13%	0.51%	547	2,155	F16TOTMIX	102	420,098	0
Mixed ferrous/non-ferrous	**0.03%**	**0.20%**	**0.03%**	**0.20%**	**130**	**852**	**F16TOTMIX**	**256**	**420,098**	**1**
Mixed ferrous/non-ferr. curb-OK	0.00%	0.12%	0.00%	0.12%	3	492	F16TOTMIX	106	420,098	0
Mixed ferrous/non-ferr. not curb-OK	0.00%	0.13%	0.00%	0.13%	12	526	F16TOTMIX	107	420,098	0
Mixed Metal / Material	0.84%	1.92%	0.61%	1.76%	2,574	7,381	F16TOTMIX	108	420,098	0
Computers, brown goods, small apl.	**1.11%**	**2.76%**	**1.17%**	**2.93%**	**4,927**	**12,315**	**F16TOTMIX**	**260**	**420,098**	**0**
Computers & monitors	**0.00%**	**0.04%**	**0.00%**	**0.04%**	**0**	**166**	**F16TOTMIX**	261	420,098	120
Computers CPU Units	0.00%	0.04%	0.00%	0.04%	0	166	F16TOTMIX	110	420,098	0
Computer monitor CRTs	0.00%	0.00%	0.00%	0.00%	0	0	F16TOTMIX	109	420,098	0
TVs, other CRTs, brown goods	**0.74%**	**2.17%**	**0.77%**	**2.22%**	**3,253**	**9,321**	**F16TOTMIX**	**262**	**420,098**	**0**
TVs	0.05%	1.34%	0.05%	1.34%	219	5,630	F16TOTMIX	113	420,098	0
Printers	0.06%	0.72%	0.06%	0.72%	242	3,018	F16TOTMIX	111	420,098	0
Computer mice+keyboards	0.00%	0.02%	0.00%	0.02%	3	95	F16TOTMIX	112	420,098	0
Microwaves	0.00%	0.43%	0.00%	0.43%	0	1,817	F16TOTMIX	114	420,098	0
Other consumer elect./brown goods	0.07%	0.30%	0.09%	0.44%	378	1,850	F16TOTMIX	115	420,098	0
Small Appliances-non electronic	0.08%	0.96%	0.09%	1.10%	383	4,625	F16TOTMIX	116	420,098	0
Total ferrous	*1.75%*	*2.61%*	*1.69%*	*2.58%*	*7,119*	*10,833*	*F16TOTMIX*	*258*	*420,098*	*0*
Total non-ferrous	*0.41%*	*0.63%*	*0.30%*	*0.50%*	*1,262*	*2,102*	*F16TOTMIX*	*259*	*420,098*	*0*
Recycl. metal excl. electronics, sm. apl.	*2.22%*	*3.17%*	*2.06%*	*3.01%*	*8,657*	*12,657*	*F16TOTMIX*	*257*	*420,098*	*0*
OTHER INORGANICS	**3.69%**	**6.55%**	**3.79%**	**6.70%**	**15,923**	**28,147**	**F16TOTMIX**	**263**	**420,098**	**0**
Rock, dirt, litter	2.62%	5.02%	2.69%	5.18%	11,298	21,763	F16TOTMIX	268	420,098	0
Rock, brick, dirt	0.47%	1.57%	0.50%	1.80%	2,118	7,546	F16TOTMIX	267	420,098	0
Rock, concrete, brick	0.07%	0.43%	0.07%	0.44%	301	1,845	F16TOTMIX	117	420,098	0
Soil, sand, dirt	0.27%	1.37%	0.30%	1.59%	1,260	6,659	F16TOTMIX	118	420,098	0
Pet litter, animal feces	1.69%	3.84%	1.69%	3.84%	7,093	16,114	F16TOTMIX	119	420,098	0
Gypsum wallboard	**0.06%**	**0.37%**	**0.05%**	**0.36%**	**231**	**1,524**	**F16TOTMIX**	**269**	**420,098**	**0**
Gypsum wallboard NEW	0.00%	0.00%	0.00%	0.00%	0	0	F16TOTMIX	120	420,098	0
Gypsum wallboard OLD	0.06%	0.37%	0.05%	0.36%	231	1,524	F16TOTMIX	121	420,098	0
Fiberglass Insulation	0.04%	0.49%	0.04%	0.47%	156	1,979	F16TOTMIX	122	420,098	0
Other miscellaneous inorganics	0.34%	1.64%	0.34%	1.65%	1,427	6,942	F16TOTMIX	123	420,098	0
"MEDICAL WASTES"	0.49%	2.08%	0.49%	2.08%	2,047	8,721	F16TOTMIX	124	420,098	0

Statewide Mixed Route Trucks

Material	Field Low 5%	Field High 5%	Corrected Low 5%	Corrected High 5%	Clean Tons Low 5%	Clean Tons High 5%	Group	EOrd	TonsAlloc	ChProb
HAZARDOUS MATERIALS	**0.18%**	**0.65%**	**0.18%**	**0.67%**	**760**	**2,811**	**F16TOTMIX**	**270**	**420,098**	**0**
Lead-acid batteries	0.00%	0.00%	0.00%	0.00%	0	0	F16TOTMIX	125	420,098	0
Dry-cell batteries	0.02%	0.08%	0.02%	0.09%	96	392	F16TOTMIX	126	420,098	0
Latex paint	0.01%	0.48%	0.01%	0.48%	24	2,007	F16TOTMIX	127	420,098	0
Oil paints	0.00%	0.01%	0.00%	0.01%	0	36	F16TOTMIX	128	420,098	0
Motor oil	0.00%	0.01%	0.00%	0.01%	0	28	F16TOTMIX	129	420,098	0
Other flammables	0.00%	0.01%	0.00%	0.01%	0	57	F16TOTMIX	130	420,098	0
Pesticides / herbicides	0.00%	0.01%	0.00%	0.01%	7	59	F16TOTMIX	131	420,098	0
Corrosive cleaners	0.00%	0.04%	0.00%	0.04%	9	147	F16TOTMIX	132	420,098	0
Asbestos	0.00%	0.00%	0.00%	0.00%	0	0	F16TOTMIX	133	420,098	0
Mercury-containing items	0.00%	0.00%	0.00%	0.00%	0	0	F16TOTMIX	134	420,098	0
Ammunition and fireworks	0.00%	0.03%	0.00%	0.03%	0	127	F16TOTMIX	135	420,098	0
Compressed gas cylinders	0.00%	0.01%	0.00%	0.01%	0	51	F16TOTMIX	136	420,098	0
Other hazardous chemicals	0.02%	0.08%	0.02%	0.08%	69	337	F16TOTMIX	137	420,098	0
Unknown hazardous chemicals	0.00%	0.04%	0.00%	0.04%	12	176	F16TOTMIX	138	420,098	0
Total packaging	*21.56%*	*27.09%*	*16.90%*	*22.40%*	*70,995*	*94,095*	*F16TOTMIX*	272	420,098	0
Total products	*44.66%*	*52.40%*	*38.00%*	*45.35%*	*159,644*	*190,505*	*F16TOTMIX*	273	420,098	0
Total non-manufactured	*24.46%*	*30.02%*	*25.62%*	*31.32%*	*107,617*	*131,580*	*F16TOTMIX*	*274*	*420,098*	*0*
Total organic	*84.41%*	*88.21%*	*74.09%*	*77.97%*	*311,260*	*327,558*	*F16TOTMIX*	*275*	*420,098*	*0*
Total non-organic	*11.79%*	*15.59%*	*11.66%*	*15.52%*	*48,965*	*65,179*	*F16TOTMIX*	*276*	*420,098*	*0*
Compostable	*53.82%*	*60.57%*	*48.81%*	*55.79%*	*205,050*	*234,372*	*F16TOTMIX*	*277*	*420,098*	*0*
Compostable-target	*31.29%*	*38.35%*	*29.19%*	*35.86%*	*122,621*	*150,661*	*F16TOTMIX*	*278*	*420,098*	*0*
Curbside recyclables	*14.64%*	*19.68%*	*11.86%*	*16.86%*	*49,814*	*70,832*	*F16TOTMIX*	*279*	*420,098*	*0*
Recoverable (recycl., compost, energy)	*62.24%*	*67.73%*	*55.22%*	*60.91%*	*231,989*	*255,889*	*F16TOTMIX*	*280*	*420,098*	*0*
Recyclable (incl. energy, not compost)	*32.30%*	*38.13%*	*27.51%*	*33.15%*	*115,561*	*139,270*	*F16TOTMIX*	*281*	*420,098*	*0*
Compostable but not recyclable	*26.88%*	*32.83%*	*24.75%*	*30.79%*	*103,978*	*129,337*	*F16TOTMIX*	*282*	*420,098*	*0*
Not recoverable (inverse of recoverable)	*32.27%*	*37.76%*	*28.87%*	*34.30%*	*121,285*	*144,081*	*F16TOTMIX*	*283*	*420,098*	*0*
Water and Residue (Contamination)	*0.00%*	*0.00%*	*9.15%*	*11.71%*	*38,428*	*49,179*	*F16TOTMIX*	*150*	*420,098*	*0*
Supermix & fines	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0*	*0*	*F16TOTMIX*	*271*	*420,098*	*0*
Supermix	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0*	*0*	*F16TOTMIX*	*139*	*420,098*	*0*
Fines	*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0*	*0*	F16TOTMIX	*140*	*420,098*	*0*

Exhibit 3

Adjacent Parcels



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VALLEY LANFDFILLS, INC.
COFFIN BUTTE LANDFILL
CONDITIONAL USE PERMIT APPLICATION
CORVALLIS, OR 97330

ADJACENT PROPERTIES FOR LITTER CONTROL

DRAWN BY:	JS	CHECKED BY:	JAS	APPROVED BY:	JAS	FIGURE NO.:	Exhibit 5
DATE:	JULY. 2025	DWG SCALE:	AS SHOWN	PROJECT NO:	322-142		

P:\320-000\322-142\-CADD\Dwg\SW01\322142-SW01-2-Benton County Tax Lots Exhibit.dwg{29} LS:(1/22/2025 - jshah) - LP: 7/15/2025 9:25 AM

NO.	TAX LOT NO.	OWNER NAME	CURRENT ZONING
1	104070000100	OREGON STATE GAME COMMISSION	OS
2	104070000300	R B WEBBER DEVELOPMENT LLC	EFU
3	104070000400	WILFONG TRISHA M	RR-5
4	104070000500	BURDOCK GARLAND R	RR-5
5	104070000601	RINKER TRISTA M	RR-5
6	104070000700	CLEARY BRYCE LAWRENCE	RR-5
7	104070000800	SCOTT DARCI L	RR-5
8	104070000900	WHITE JASON BYRON & JULIE B	RR-5
10	104070001100	AMADOR MARIBEL	RR-5
11	104070001200	LEAVENWORTH EDYNE	RR-5
12	104080000100	OREGON STATE GAME COMMISSION	OS
13	104170000100	OREGON STATE GAME COMMISSION	OS
18	104180000100	OREGON STATE GAME COMMISSION	OS
19	104180000101	CONSUMERS POWER INC	OS
20	104180000102	BUREAU OF LAND MANAGEMENT	OS
21	104180000200	PELTIER REAL ESTATE CO	FC
22	104180000201	POWELL LYNN MAY & HEALD NATHAN LESLIE	FC
23	104180000202	GOETZINGER DALE L & MONA G	RR-5
24	104180000300	DUBIKIN ALEXANDRE & POLUSHKIN GLIKERIA	FC
25	104180000301	VALLEY LANDFILLS INC	FC
26	104180000400	DUBIKIN ALEXANDRE & POLUSHKIN GLIKERIA	RR-5
27	104180000500	YOUNG CAROLYN	RR-5
28	104180000600	YOUNG CAROLYN	RR-5
29	104180000700	HOCKEMA JOSEPH E & JASMINE L	RR-5
30	104180000701	HOCKEMA JOSEPH E & JASMINE L	RR-5
31	104180000800	OREGON STATE FISH & WILDLIFE	FC
32	104180000801	VALLEY LANDFILLS INC	FC
33	104180000900	VALLEY LANDFILLS INC	FC
34	104180001000	VALLEY LANDFILLS INC	FC
35	104180001101	VALLEY LANDFILLS INC	FC
36	104180001102	VALLEY LAND FILLS INC	FC
37	104180001103	PHILLIPS SAMUEL F & CHERYL G	FC
38	104180001104	VALLEY LANDFILLS INC	FC
39	104180001105	PELTIER REAL ESTATE CO	EFU
40	104180001106	VALLEY LANDFILLS INC	LS
41	104180001107	VALLEY LANDFILLS INC	LS
42	104180001108	VALLEY LANDFILLS INC	LS
43	104180001200	VALLEY LANDFILLS INC	FC
44	104190000100	OREGON STATE GAME COMMISSION	OS
45	104190000200	BRADLEY LOWELL THOMAS & MARY ERIN	RR-10
46	104190000301	HOLDORF CATHERINE E, TR	EFU
47	104190000400	TAMPICO RIDGE LLC	RR-10
48	104190000402	KIPPER ROBERT J & JULIE A, TR	RR-10
49	104190000500	GEIER JOEL E & REBECCA S SHERMAN	RR-10
50	104190000600	CRESS MERRILL	RR-10
51	104190000700	MORRELL JEFFREY J & PATRICIA D	RR-10
52	104190001700	CLAPP CYNTHIA R	EFU & RR-10
53	104190001800	KEN & SARAH EDWARDSSON RL TRUST	EFU
54	104190001801	SLABAUGH ROGER L & MICHELLE V	EFU
55	104190001900	HERNANDEZ VICTOR	EFU
56	10419B000300	PELTIER REAL ESTATE CO	RR-10
57	10419B000400	CARLIN KATHERYN L, TR	RR-10
58	10419B000500	FRAZIER STEVEN & DAVIS LUE ANN	RR-10
59	10419B000600	GIBBS LANCE A	RR-10
60	10419B001200	BARBARA FICK LIVING TRUST	RR-10
61	10419B001300	BARBARA FICK LIVING TRUST	RR-10
62	10419B001301	VALLEY LANDFILLS INC	RR-10
63	10419B001500	CATHERINE E HOLDORF LIVING TRUST	RR-10
64	10419B001600	VALLEY LANDFILLS INC	RR-10
65	10419D000100	POSTLEWAIT JACOB EDWARD & ELIZABETH REGA	RR-10
66	10419D000200	HOLMES RICHARD H & CHARLCY L	RR-10
109	10419DD03700	YANEZ ERIC & BETHANY J	RR-5
110	10419DD03800	LOPEZ OMAR GENARO	RR-5
111	10419DD03900	ANTONIO & ELIZABETH AMANDI REVOCABLE LIV	RR-5
112	10419DD04000	ANTONIO & ELIZABETH AMANDI REVOCABLE LIV	RR-5
119	104200000300	OREGON STATE GAME COMMISSION	OS
339	105130000100	R B WEBBER DEVELOPMENT LLC	EFU
340	105130000200	DAVID & DEBRA HACKLEMAN TRUST	FC
341	105130000201	DAVID & DEBRA HACKLEMAN TRUST	FC
342	105130000202	BERKLUND HARRISUE, TR	FC
343	105130000203	BERKLUND HARRISUE, TR	FC
344	105130000300	DENOMA JOHN T JR & SEARS DONNA J	FC
345	105130000301	SEARS ROLLIN & DONNA JEANNE	FC
346	105130000400	BRISKEY JOINT REVOCABLE LIVING TRUST	FC
347	105130000500	DAVID A PLANT TRUST	EFU
348	105130000501	MARCUM DONALD R JR	EFU
349	105130000502	LINDSEY RICHARD T & KAREN J	EFU
350	105130000600	WINN TERRILL JAMES & APRIL DOVE	EFU
351	105130000601	GOETZINGER DALE L & MONA G	EFU
352	105130000700	OSC	FC
353	105130000800	VALLEY LANDFILLS INC	EFU
354	105130000900	VALLEY LANDFILLS INC	EFU
355	105130000901	VALLEY LANDFILLS INC	EFU
356	105130000902	VALLEY LANDFILLS INC	EFU
357	105130001000	VALLEY LANDFILLS INC	LS
361	105140000105	HARLAN ANNE M	EFU
362	105140000107	EDWARD L PORTZ & JOANN PORTZ TRUST	EFU
365	105140000111	HARLAN ANNE M	EFU
385	105140001400	BUCKOVIC FAMILY TRUST	EFU
411	105230000100	OREGON STATE BOARD HIGHER ED	FC
412	105240000101	JOHNSON DEBORA LEE, TR	EFU
413	105240000102	JOHNSON DEBORA LEE, TR	EFU
414	105240000103	VALLEY LANDFILLS INC	EFU
415	105240000104	LABRASSEUR GEORGE F & YOLANDE	EFU
416	105240000105	MASON FAMILY LIVING TRUST	EFU
417	105240000106	HOLDORF CATHERINE E, TR	EFU
418	105240000190	STAHL DEE M & WAYNE A	EFU
419	105240000200	VALLEY LANDFILLS INC	EFU
420	105240000300	OREGON STATE BOARD HIGHER ED	FC
421	105240000400	FLAK TIMOTHY A & LIND GINA M	RR-10
437	104190000401	SEARLS JAMES CLUETT	RR-10

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ADJACENT PROPERTIES FOR LITTER CONTROL

DRAWN BY:	JS	CHECKED BY:	JAS	APPROVED BY:	JAS	FIGURE NO.:	Exhibit 29A
DATE:	JULY. 2025	DWG SCALE:	AS SHOWN	PROJECT NO:	322-142		

Exhibit 4

Hinkle and Polette (1999)

U.S. Department of the Interior
U.S. Geological Survey

Arsenic in Ground Water of the Willamette Basin, Oregon

Water-Resources Investigations Report 98–4205

Prepared in cooperation with
OREGON WATER RESOURCES DEPARTMENT

U.S. Department of the Interior
U.S. Geological Survey

Arsenic in Ground Water of the Willamette Basin, Oregon

BY STEPHEN R. HINKLE AND DANIAL J. POLETTE

Water-Resources Investigations Report 98–4205

Prepared in cooperation with
OREGON WATER RESOURCES DEPARTMENT

Portland, Oregon: 1999

U.S. DEPARTMENT OF THE INTERIOR
BRUCE BABBITT, Secretary

U.S. GEOLOGICAL SURVEY
Charles G. Groat, Director

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10615 South East Cherry Blossom Drive
Portland, Oregon 97216
E-mail: info-or@usgs.gov

Copies of this report can be purchased from:

U.S. Geological Survey
Branch of Information Services
Box 25286
Denver, CO 80225-0286
E-mail: infoservices@usgs.gov

Information regarding the Willamette Ground-Water Project is available at:
<http://wwworegon.wr.usgs.gov/projs_dir/willgw/willpage.html>

Information regarding Oregon District activities is available at:
<http://oregon.usgs.gov/>

CONTENTS

PLATE

FIGURES

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Acknowledgments

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Arsenic in Ground Water of the Willamette Basin, Oregon

By Stephen R. Hinkle *and* Danial J. Polette

SUMMARY AND CONCLUSIONS

Arsenic concentrations exceeding the U.S. Environmental Protection Agency (USEPA) current Maximum Contaminant Level (MCL) of 50 µg/L (micrograms per liter) are widespread in ground water in the Willamette Basin. The Oregon Water Resources Department and the U.S. Geological Survey began a cooperative study in the Willamette Basin in 1996. One goal of this study is to characterize the regional distribution of naturally occurring poor-quality ground water, such as ground water with high concentrations of arsenic. Characterization of the regional distribution of arsenic concentrations in the Willamette Basin will be useful to public health officials, water-resource managers, the medical community, and those using ground water for drinking and cooking.

The spatial distribution of arsenic concentrations in ground water of the Willamette Basin was assessed by combining historical data from 597 sites with data from 131 sites collected for this study. A total of 728 spatially distinct samples thus were available. Additional data also were collected to evaluate temporal variability of arsenic concentrations on a seasonal timescale. Samples were collected quarterly from 17 sites for 1 year for this purpose. Temporal variability was addressed for two reasons: First, characterization of temporal variability allowed evaluation of the acceptability of combining arsenic-concentration data collected during different seasons for determining the spatial distribution of arsenic concentrations. Second, knowledge of temporal variability will benefit well owners and water managers who require guidance on timing for sampling.

During the course of quarterly sampling, arsenic concentrations in water from many wells remained essentially constant, but variations of up to almost a factor of three were observed in other wells. No obvious correlation with season was apparent. Analytical accuracy, as determined from 11 standard reference samples submitted during the course of project work, generally was within ±10 percent, and always ±20 percent. Thus, analytical variability can only explain some of the observed temporal variability. One possible explanation for observed temporal variability in arsenic concentrations is that differences in the amount of pumpage prior to sampling may lead to variations in the amounts of water pumped from different sources (different aquifers or parts of aquifers), and thus, differences in water chemistry.

For a regional assessment of arsenic concentrations in ground water, where arsenic concentrations may vary in space by several orders of magnitude, the relatively smaller temporal variations such as those observed in the quarterly samples are not a significant limitation, and the aggregation of data collected at different times is justified. However, this conclusion may not necessarily apply to all investigations of arsenic concentrations in ground water. For some purposes, site-specific characterization may require characterization of temporal variability. Such characterization may require evaluation over a range of well uses and seasons.

Concentrations of arsenic in the 728 spatially distributed samples ranged from less than 1 to 2,000 µg/L. Concentrations in 58 (8.0 percent) of the samples exceeded the USEPA current MCL.

Regionally, the distribution of arsenic concentrations in ground water of the Willamette Basin appears to be primarily related to aquifer geology. High arsenic concentrations (concentrations exceeding the USEPA current MCL) are widespread in bedrock areas in south-central and eastern Lane County, and Linn County. High concentrations of arsenic also are present in some ground water in the Tualatin Basin (a subbasin in the northwestern part of the Willamette Basin). High arsenic concentrations in Lane and Linn Counties appear to be associated with two regionally extensive associations of rocks, (1) the Fisher and Eugene Formations and correlative rocks, and (2) the undifferentiated tuffaceous sedimentary rocks, tuffs, and basalt. (These rock associations are defined by Walker and MacLeod, 1991. The undifferentiated tuffaceous sedimentary rocks, tuffs, and basalt are approximately equivalent to the Little Butte Volcanic Series of Peck and others, 1964.) At land surface, these two rock associations cover 24 percent of the Willamette Basin. These associations of rocks include extensive volumes of silicic (rhyolitic) volcanic rocks, which are commonly associated with high concentrations of arsenic. High concentrations in the Tualatin Basin are associated with alluvial deposits. At a regional scale, well depth does not appear to be a useful predictor of arsenic concentration in the Willamette Basin. However, depth may be an important parameter on a local scale, particularly where wells of different depth tap aquifers in different geologic units.

Ground waters in bedrock areas in south-central and eastern Lane County, bedrock areas in Linn County, and alluvial areas in the Tualatin Basin may be more likely to yield water high in arsenic than ground water elsewhere in the basin. However, it cannot be assumed that these areas are the only areas in the basin that contain ground water with high concentrations of arsenic. Little or no data exist for many parts of the basin. Even in areas that have been sampled, geohydrologic heterogeneity makes it difficult to formulate meaningful generalizations regarding the likelihood of finding high-arsenic ground water. There is no substitute for actual sampling.

Available information, in combination with an understanding of processes known to promote arsenic mobilization, is sufficient to formulate hypotheses that explain arsenic sources and mobilization in the Willamette Basin. However, available geochemical data and interpretations are sparse. Thus, these hypotheses are preliminary, serving mainly to help direct future geochemical investigation in the Willamette Basin.

Anthropogenic sources of arsenic can be significant in some settings. Arsenical pesticides such as lead arsenate have been used in the basin, and arsenic can be released into the environment from industrial sources. However, regional patterns of arsenic occurrence in Willamette Basin ground water are not consistent with either industrial or agricultural sources of arsenic.

Naturally occurring arsenic commonly is found in a variety of solid phases. Arsenic can be a component of volcanic glass in volcanic rocks of rhyolitic to intermediate composition, adsorbed to and coprecipitated with metal oxides (especially iron oxides), adsorbed to clay-mineral surfaces, and associated with sulfide minerals and organic carbon. Examination of these potential arsenic sources for arsenic availability in the Willamette Basin apparently has never been done.

Two categories of processes largely control arsenic mobility in aquifers: (1) adsorption and desorption reactions and (2) solid-phase precipitation and dissolution reactions. Arsenic adsorption and desorption reactions are influenced by changes in pH, occurrence of redox (reduction/oxidation) reactions, presence of competing anions, and solid-phase structural changes at the atomic level. Solid-phase precipitation and dissolution reactions are controlled by solution chemistry, including pH, redox state, and chemical composition.

Several species of arsenic occur in nature, but arsenate (arsenic V) and arsenite (arsenic III) are the two forms commonly found in ground water. For this study, samples from five domestic wells were analyzed for arsenic species. Two additional analyses for arsenic species in ground water from the Willamette Basin were available in the literature. Arsenite was the predominant species of arsenic in six of these seven samples. The predominance of arsenite has both geochemical and toxicological implications. From a geochemical standpoint, mobility of arsenite differs from that of arsenate. From a public-health perspective, arsenite is more toxic than arsenate, and arsenite also is more difficult to remove from drinking-water supplies than is arsenate. Seven samples do not characterize regional arsenic speciation patterns. However, if the predominance of arsenite in Willamette Basin samples is substantiated by additional speciation work, public health officials and water managers may need to evaluate the scope of the arsenic problem with regard not only to arsenic concentrations, but also to arsenic speciation.

Existing data, including the speciation data, and published interpretations were used to establish preliminary hypotheses for the evolution of high-arsenic ground water in the Willamette Basin. For ground water in bedrock areas of Lane and Linn Counties, existing information suggests that at least some of the following controlling factors likely are important in adsorption and desorption reactions that often control arsenic mobility: (1) high pH, (2) presence of competing anions, and (3) occurrence of reducing conditions. Existing information did not allow for evaluation of the potential importance of adsorption and desorption reactions related to solid-phase structural changes at the atomic level, or solid-phase precipitation and dissolution reactions.

For alluvial ground water of the Tualatin Basin, presence of competing anions and occurrence of reducing conditions may be important controlling factors in arsenic adsorption and desorption reactions. These two factors might be more important than pH controls over arsenic adsorption and desorption. Reducing conditions and high concentrations of dissolved iron also suggest that dissolution of iron oxides, with subsequent release of adsorbed and (or) coprecipitated arsenic, may play a role in arsenic mobility in the Tualatin Basin.

Although the regional distribution of arsenic concentrations in ground water of the Willamette Basin has been evaluated by this study, an understanding of how ground water in parts of the basin evolved to contain high concentrations of arsenic has not yet been developed. Limited geochemical data have allowed establishment of preliminary hypotheses to explain the evolution of high-arsenic ground water. Developing an understanding of arsenic sources and processes responsible for evolution of high concentrations of arsenic, though, will require additional geochemical investigation. In particular, thermodynamic evaluation of ground water chemistry and study of solid phases present in aquifers would facilitate development of an understanding of adsorption and desorption and precipitation and dissolution reactions controlling arsenic mobility in the Willamette Basin. A key benefit of detailed geochemical study of arsenic in ground water of the Willamette Basin would be increased predictability of areas likely to yield ground water with high arsenic concentrations. Such increased predictability would be likely to have transfer value beyond the Willamette Basin.

INTRODUCTION

In response to increasing demands on ground-water resources in the Willamette Basin, Oregon (fig. 1), the Oregon Water Resources Department (OWRD) and the U.S. Geological Survey (USGS) began a cooperative study of the basin's ground-water resources in 1996. This study was designed to increase the current understanding of the ground-water resource, and to better characterize the distribution of naturally occurring poor-

Figure 1. Location of the Willamette Basin, Oregon.

quality ground water in the basin. Essential components of the study of the physical ground-water resource are the development of a quantitative understanding of regional ground-water availability and flow, and of ground-water/surface-water interactions. Of paramount interest in the characterization of naturally occurring poor-quality ground water in the Willamette Basin is the distribution of arsenic in ground water, the subject of this report.

Arsenic contaminates many regional aquifer systems worldwide (Cantor, 1996; Thornton, 1996), and arsenic commonly is detected in ground water of the Willamette Basin at concentrations exceeding the U.S. Environmental Protection Agency (USEPA) current drinking water Maximum Contaminant Level (MCL) of 50 µg/L (micrograms per liter) (U.S. Environmental Protection Agency, 1996). Arsenic is associated with a number of adverse effects on human health. The USEPA considers arsenic to be a human carcinogen (U.S. Environmental Protection Agency, 1996). Examples of other adverse health effects attributed to consumption of arsenic range from weakness and abdominal pain to neurological and cardiovascular problems. A review of health effects associated with consumption of arsenic is given in a report by World Health Organization (1996).

Purpose and Scope

The primary purpose of this report is to describe the spatial distribution of arsenic concentrations in ground water of the Willamette Basin. Both historical data and data collected for this study (henceforth, "project data") were used for this purpose. Project data also were used to evaluate temporal variability of arsenic concentrations. It is useful to have an understanding of temporal variability before arsenic-concentration data, collected at different times, is used to evaluate spatial distributions. Evaluation of temporal variability may also benefit well owners and water managers, who may require guidance on timing for sampling.

A secondary purpose of this report is to briefly summarize current knowledge of the geochemistry of arsenic in the Willamette Basin. Relevant geochemical data are few, so this discussion is inherently general, serving mainly to outline future research needs. Possible sources of arsenic are evaluated, and geochemical processes that may control arsenic mobilization are briefly discussed.

Location and Description of the Willamette Basin

The Willamette Basin is an approximately 12,000-square-mile basin in northwestern Oregon. Primary drainage is by the Willamette River, but for the purposes of the study, the basin is defined to also include the region drained by the Sandy River; both rivers are tributary to the Columbia River. The Willamette Basin was home to 69 percent of the State's population in 1990 (Broad and Collins, 1996).

The crests of two north-south trending mountain ranges, the Coast and the Cascade Ranges, respectively define the western and eastern edges of the Willamette Basin. The Willamette Valley, an elongated, structural and erosional lowland, lies between these mountain ranges. The Coast Range is composed of marine sedimentary rocks and associated volcanic rocks. The Cascade Range is composed of lava flows and pyroclastic and epiclastic rocks. The Willamette Valley is filled with clastic basin-fill sediments of primarily alluvial origin; these alluvial sediments form the most important aquifers in the Willamette Basin. The geologic framework of the basin is described by Gannett and Caldwell (in press), and a regional representation of the surficial geology of the Willamette Basin is given on the geologic map of Oregon compiled by Walker and MacLeod (1991). Usage of geologic names in this report is consistent with that of Walker and MacLeod (1991).

STUDY DESIGN AND METHODS

The overall approach used to collect, assemble, and analyze data for this report is described in this section. First, a description of the sources of historical data is given, followed by a description of the sampling design for project data. Approaches used to define the quality of both historical and project data are discussed, as are collection and analytical methods used for project data. Finally, benchmarks for comparison of arsenic-concentration data, and methods for identification of well locations, are described.

Historical Data

Analysis of historical data (arsenic concentrations and site locations, and in most cases, well depths) from regional ground-water investigations was the starting point for evaluation of distribution of arsenic in the Willamette Basin. Some wells were sampled more than once; in these cases, the first-in-time sample was selected. Four sets of historical data used in this report are described below.

Historical data from the USGS National Water Information System (NWIS) database (Maddy and others, 1990) (271 wells). These data were collected between 1971 and 1997 as parts of various USGS projects. Many of these projects were regional in scope, and thus these data cover large areas in the Willamette Basin. In addition to arsenic concentrations, depth data also were retrieved. Data from both unfiltered and filtered samples were found in NWIS. Some of these NWIS data are discussed in the following reports: Frank and Collins, 1978; Gonthier, 1983; Leonard and Collins, 1983; Hinkle, 1997. Project data, although stored in NWIS, are discussed separately (see section "Sampling Design for Project Data").

Data from four USGS studies (Frank, 1973, 1974, 1976; Helm and Leonard, 1977), not entered into NWIS (89 wells). These data, also from regional-scale projects, encompass large areas in the southern part of the basin. The data were collected between 1964 and 1973 by USGS personnel. Well depths were obtained from tables in the reports. Techniques used to process these samples (in particular, filtering or a lack thereof) are not known.

Data from a USGS study in Lane County, not entered into NWIS (171 wells; 1 nonthermal spring). These data were collected during 1962–63, and summarized by Goldblatt and others (1963). Many of these wells withdraw water from the arsenic-rich Fisher Formation (Goldblatt and others, 1963). Arsenic concentrations and well depths were compiled from original project notes from USGS files. Samples were collected and analyzed as unfiltered samples (A.S. Van Denburgh, U.S. Geological Survey, oral commun., 1997).

Data from Linn County Department of Health Services, Environmental Health Program (65 wells). More than 100 wells were sampled for arsenic by the Environmental Health Program in 1987. Most of these wells were located near Sweet Home, an area that received little coverage in the three regional data sets listed above. Drillers' logs were on file with the Environmental Health Program for many of these wells. In 1996, USGS personnel were able to locate 65 homes corresponding to addresses from well drillers' logs for sampled wells. Arsenic concentrations from Environmental Health Program files and well depths from well drillers' logs were matched with the home locations to create a data coverage. Samples were probably collected and analyzed as unfiltered samples.

Sampling Design for Project Data

Project data were collected for several purposes. Ground-water samples were collected to fill gaps in the spatial distribution of the historical data and to illustrate the magnitude of temporal variability in arsenic concentrations. In addition, five ground-water samples were analyzed for arsenic species. Quality-control (QC) data were collected to evaluate the quality of project data, evaluate the quality of historical data (by resampling selected historical sites), and compare results obtained by different processing and analytical methods.

Samples from 125 wells and 6 nonthermal springs were collected during 1996 and 1997 to complement the spatial distribution of historical data. The wells and springs sampled were distributed throughout the lower elevation areas of the Willamette Basin, which are areas of greatest ground-water use. These sites had not previously been sampled for arsenic by the USGS. Some wells were sampled more than once during the course of this project; in these cases, the first-in-time samples were used to define the spatial distribution of arsenic.

To evaluate temporal variability of arsenic concentrations, samples were collected quarterly for 1 year from each of 17 sites. These samples also were collected during 1996 and 1997. A subset (5) of these 17 sites were sampled for arsenic species.

QC samples were used to evaluate the quality of techniques used to collect and analyze project samples. Twelve field equipment blanks, 6 sets of triplicate split samples, and 11 standard reference samples (SRSs) were analyzed over the course of the project. Field equipment blanks allow evaluation of the extent of any sample contamination

resulting from sample collection, processing, and analysis. Replicate samples allow evaluation of the reproducibility (precision) of analyses. SRSs facilitate evaluation of analytical accuracy. The USGS SRS program, an interlaboratory testing program, is described in a report by Long and Farrar (1995). Preparation, description, and most probable values (MPVs) of constituents of individual SRSs used in this study are described by U.S. Geological Survey (1990) and Long and Farrar (1991, 1993, 1995). An MPV for an analyte is the median of the concentrations determined by the participating laboratories. Analytical results are reported as percentages of SRS-program MPVs.

Additional quality assurance included resampling 11 historical sites. Comparison between historical arsenic concentrations and concentrations determined upon resampling offers a measure of the reliability of historical data.

Comparisons between filtered and unfiltered samples, and between USGS and USEPA analytical methods, also were made. Characterization of differences in arsenic concentrations among unfiltered and filtered samples helps quantify the effect of sample filtering, and increases the transfer value of the data and interpretations presented in this report. Data from comparison of USGS and USEPA analytical methods facilitate comparison of arsenic concentrations determined by USGS methods with USEPA water-quality criteria.

Project Sample Collection Methods

Project samples from wells and springs used for evaluation of spatial distribution of arsenic were not filtered. Unfiltered samples, in addition to being more economical to collect than samples filtered through 0.45-µm (micrometer) filters, also have the advantage of being more representative of the water being consumed by most well owners. Another justification for collection of unfiltered samples is that many of the historical data, with which project data were combined, were from analyses of unfiltered samples. Furthermore, USEPA and World Health Organization (WHO) guidelines for water quality (see section "Comparisons with Water-Quality Criteria") apply to "finished water." For most project wells, which were primarily domestic wells, "finished water" generally is equivalent to unfiltered water. However, because unfiltered samples may contain more colloids and (or) more sediment entrained during pumping, unfiltered samples are less representative of water actually moving through an aquifer than are 0.45-µm-filtered samples. Thus, the use of unfiltered samples in characterization of ground-water quality represents an approximation. Additional, quantitative discussion on this topic is presented in the section, "Comparison of Processing and Analytical Methods."

Of the 125 project wells used for evaluation of spatial distribution of arsenic, 116 were actively used domestic wells. The remaining 9 wells included 3 public-water-supply wells, 3 industrial wells, 2 irrigation wells, and 1 livestock well. Of these nine wells, those that were not actively used were purged a minimum of three casing volumes prior to sampling to remove standing water from the well. Samples from actively used wells were collected following a minimum purge time of 1 minute. Longer purge times, characteristic of most USGS ground-water-quality work, were deemed unnecessary for actively used wells in this project because these wells experienced a degree of regular purging from the frequent use of the wells. A resulting limitation, however, is that samples from these wells may lose arsenic by way of adsorption to iron casing or precipitation as ground water undergoes geochemical changes while residing in a well bore or casing. Thus, arsenic concentrations in samples from these wells may be biased toward low arsenic concentrations relative to water actually moving through the aquifer. The extent of this possible bias has not been quantified, but because these wells were actively used, this potential bias is likely to be small.

Project samples collected from springs were collected from flowing springs. Fine sediment was present along with the water in several of the springs, so spring samples were filtered through 0.45-µm nominal-pore-size filters.

Project wells sampled for evaluation of temporal variability in arsenic concentrations were actively used wells, sampled using the same methods as for project wells sampled for evaluation of spatial distribution of arsenic.

Project wells sampled for arsenic speciation also were actively used wells. Samples were collected as unfiltered samples following a minimum well purge time of 1 minute. Samples were col-

lected without headspace in brown glass vials, wrapped in aluminum foil (to prevent photooxidation), and shipped on ice to the laboratory.

Eleven wells represented in the historical data set were resampled. All were actively used wells and were sampled using the same methods as for project wells sampled for evaluation of spatial distribution of arsenic.

Samples for comparison between filtered and unfiltered samples, and comparison of USGS and USEPA methods, were collected from a subset of the wells sampled for temporal variability. Each 10-liter sample was split in the field by mechanical agitation into four subsamples. One subsample was filtered through a 0.10-µm nominal-pore-size 47-mm-diameter filter. One subsample was filtered through a 0.45-µm nominal-pore-size 142-mm-diameter filter. Two subsamples were collected as unfiltered samples. For each set of the four subsamples, both of the filtered samples and one of the unfiltered samples were analyzed by USGS methods (see section "Project Analytical Methods"). The other unfiltered sample was analyzed by USEPA methods (see section "Project Analytical Methods").

All arsenic samples, except samples collected for analysis of arsenic species, were field-acidified to below pH 2 with nitric acid. Samples for analysis of arsenic species were not acidified.

Project Analytical Methods

Arsenic analyses were done at the USGS National Water Quality Laboratory (NWQL) in Arvada, Colorado. Most arsenic determinations were done by hydride atomic absorption with a 3-minute sulfuric acid and potassium persulfate digestion (Fishman and Friedman, 1989). This is the standard USGS method, and it is referred to as the "USGS method" in this report. Ten analyses were done by graphite furnace atomic absorption with a 2-hour hydrochloric acid and nitric acid digestion (U.S. Environmental Protection Agency, 1994). This method is referred to as the "USEPA method" in this report. The analytical minimum reporting level (MRL) was 1 µg/L for both methods.

Samples for arsenic speciation were analyzed by the USGS Methods Research and Development Program at the USGS NWQL. Samples were analyzed for two inorganic species, arsenite (arsenic III) and arsenate (arsenic V), and two organic species, monosodium methylarsonate (CH_3AsO_3HNa) and sodium dimethylarsinate ($(CH_3)_2AsO_2Na$). Analyses were done by direct injection high-performance liquid chromatography/hydride generation/inductively coupled plasma-mass spectrometry. Method detection limits (MDLs) were 0.2 µg/L (expressed as mass of arsenic per liter). Samples were analyzed within 48 hours of collection.

Comparisons with Water-Quality Criteria

To provide benchmarks against which arsenic-concentration data can be compared, arsenic-concentration data are compared with USEPA and WHO drinking-water standards. Concentrations of arsenic are compared to the USEPA current drinking water MCL for arsenic of 50 µg/L (U.S. Environmental Protection Agency, 1996). The USEPA current MCL is the maximum concentration of a contaminant allowed in a public water system. This MCL is under review (U.S. Environmental Protection Agency, 1996). Bagla and Kaiser (1996) report that the USEPA is considering reducing the current MCL by 90 percent. However, until any such reduction in the MCL occurs, the current MCL remains a logical benchmark for comparison. As an alternative benchmark, concentrations of arsenic also are compared to the WHO provisional guideline of 10 µg/L (World Health Organization, 1996).

Water with an arsenic concentration below the USEPA current MCL or WHO provisional guideline is not necessarily free from health risks. For example, arsenic concentrations may be below the USEPA current MCL and WHO provisional guideline, but still be greater than the USEPA drinking-water Risk-Specific-Dose Health Advisory (RSDHA) of 2 µg/L (U.S. Environmental Protection Agency, 1996). (The RSDHA is defined as the concentration of a contaminant in drinking water that is expected to result in a specified increased risk of cancer. The USEPA RSDHA for arsenic is calculated at the 1-in-10,000 cancer risk level. Consumption of water containing a contaminant at the RSDHA 1-in-10,000 risk level is expected to be associated with the following risk: a 70-kg adult drinking 2 L of such water per day for 70 years faces an increased risk of cancer of

approximately 1 in 10,000.) Furthermore, effects of arsenic consumption on human health are not uniform among different people, and no single threshold can be defined as the dividing line between "safe" and "unsafe." Comparison of arsenic data to the USEPA current MCL and WHO provisional guideline are done solely for illustrative purposes; no implication of "safety" or lack thereof is implied.

Methods of Identifying Wells

All wells discussed in this report were assigned well location names corresponding to well locations. Well locations generally were determined when the wells were first visited. Well locations were identified using the Township, Range, and Section method of land subdivision. Two methods are shown on figure 2. Most wells were identified with a system that uses nested groups of the letters A, B, C, and D for section subdivision. Prior to about 1967, wells were identified with an alternative system, using letters A through R (excluding I and O) for section subdivision. To preserve linkage to historical data sources, all wells discussed in this report are referred to by the well location names originally assigned to them. It should be noted, however, that in some cases, the original well location names do not accurately describe the true locations of the wells. To provide accurate locational and identifying information for wells discussed in this report, corrected well locations, and additional identifying information (USGS site identification number and OWRD well log identification number), are listed along with original well locations in the

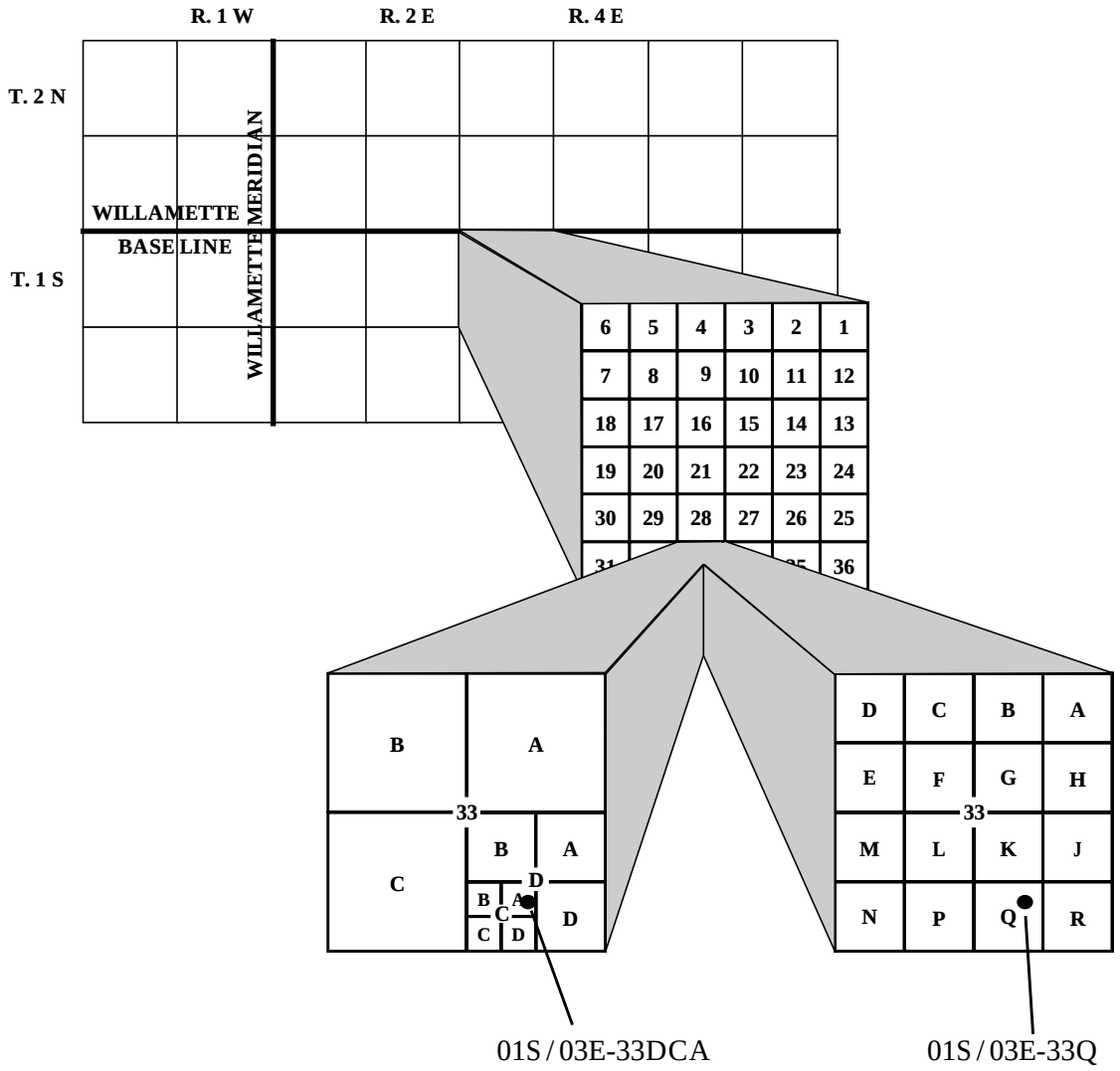

Figure 2. Well-location system.

Appendix. Note that in the project data report (Orzol and others, in press), wells are listed by corrected well location names.

DATA QUALITY: SAMPLING AND ANALYTICAL VARIABILITY VERSUS ENVIRONMENTAL VARIABILITY

In this section, project QC data are evaluated to characterize sampling and analytical variability. Sampling and analytical variability must be evaluated before environmental variability can be addressed. Three sets of QC data were collected as part of project data-collection activities. First, sampling and analytical variability of project data are evaluated. Second, the quality of historical data is discussed. Evaluation of historical data is difficult because few historical quality-control data are available. However, resampling of historically sampled sites provides insight into the quality of the historical data. Third, a comparison of sample processing and analytical methods is presented; these data illustrate the magnitude of the differences that can arise from use of various sample processing and analytical methods.

Quality of Project Data

All 12 project field equipment blanks yielded arsenic concentrations below the MRL of 1 µg/L. These results indicate that field and laboratory methods were noncontaminating.

The coefficient of variation (CV) (standard deviation divided by mean, expressed in percent) for each of the six sets of project triplicate split samples ranged from 0.0 to 14 percent. The median CV was 6.0 percent.

Analytical accuracy of project data was quantified with data from 11 SRSs. Analytical accuracy ranged from 92 to 110 percent for nine of the SRSs, but was 82 and 120 percent for the other two SRSs. In other words, reported concentrations were in error by up to about ±20 percent.

Contamination-free sampling and analysis, and reasonable analytical precision and accuracy, indicate that project data were adequate for definition of patterns of regional arsenic occurrence. However, because analytical accuracy was observed to range up to about ±20 percent, definitive characterization of temporal variability at individual sites is compromised where temporal variability also is on the order of ±20 percent or less.

Quality of Historical Data

The quality of project data is well characterized, so comparison of project and historical arsenic concentrations yields a measure of the quality of the historical data. Evaluation of the analytical accuracy of historical data is particularly desirable. However, arsenic concentrations determined in original studies and determined again during this study may differ for a variety of reasons unrelated to differences in data quality. Notably, differences between historical arsenic concentrations and arsenic concentrations determined from sampling during this project may reflect changes in the source of water being sampled at different times. Changes in the source of water being sampled can arise for a number of reasons. Ground-water flowpaths in aquifers can change over seasonal or longer time scales. Also, water often flows into wells from more than one permeable zone, and the relative contributions from different zones can change as pumping stresses change. Thus, changes in type of well use (for example, change from domestic use to lawn-watering use) or differences in the history of well use prior to sampling can result in changes in the source of water being withdrawn from wells. Finally, changes in well construction or well characteristics (for example, well cave-in over time) can result in changes in source water for wells. (Note, however, that none of the 11 wells were known to have been deepened between the time of historical sampling and the time of project resampling.) In addition to changes in source water to wells, variability in arsenic concentrations can arise from differences in sample processing prior to analysis, or, especially in the case of unfiltered samples, differences in the amount of colloid- or sediment-bound arsenic. Therefore, an absence of strong correlation between historical and project arsenic concentrations is not necessarily cause for rejection of the historical data. Because differences between historical and project data can arise from a number of factors in addition to differences in data quality, the central purpose for which the resampling data were collected was to determine if the magnitudes of the historical data are adequate

for definition of patterns of regional arsenic occurrence.

Data from the 11 sites with historical data that were resampled are presented in table 1. Differences between historical and project data are variable. For example, a difference of less than 10 percent was observed for well 19S/03W-31E1, whereas an order-of-magnitude difference was observed for well 22S/03W-17N. However, historical and project arsenic concentrations were in agreement when interpreted relative to exceedances of the USEPA current MCL. Sites at which historical arsenic concentrations exceeded the USEPA current MCL also yielded water exceeding the USEPA current MCL upon sampling during this project, and sites at which historical arsenic concentrations were less than the USEPA current MCL also yielded water below the USEPA current MCL upon sampling during this project. The historical data therefore indicate a similar pattern of spatial variability of arsenic concentrations as the project data.

Closer examination of these data indicates that data from the early 1960s generally correlate poorly with project data, whereas later data demonstrate reasonably good correlation. This pattern may reflect improvements in analytical techniques since the early 1960s.

Because two historical samples dating from the mid- to late-1960s (wells 12S/01W-29N1 and 18S/04W-14ACB) had both arsenic and chloride data, these sites were sampled for chloride as well as arsenic during project sampling (table 1). For well 12S/01W-29N1, both the arsenic and chloride concentrations were slightly lower upon project sampling: the arsenic concentration upon project sampling was 86 percent of the historical concentration, and the chloride concentration, 88 percent of the historical concentration. For well 18S/04W-14ACB, both the arsenic and the chloride concentrations were considerably lower upon project sampling: the arsenic concentration upon project sampling was 60 percent of the historical concentration, and the chloride concentration, 33 percent of the historical concentration. Historical chloride concentrations would be expected to be reliable, and would have been negligibly affected by sample processing or the presence of colloids and sediment. Thus, the changes in chloride concentrations suggest that changes in the source of water being pumped by these two wells have occurred over time. If historical chloride concentrations had been similar to project chloride concentrations, then the historical arsenic analyses might be suspect. However, differences in chloride concentrations between historical and project sampling suggest that differences in arsenic concentrations between historical and project sampling were a result, at least in part, of changes in the source of water being pumped by these wells.

Comparison of historical arsenic concentrations and arsenic concentrations determined upon project sampling indicate that historical arsenic concentrations will not necessarily reflect current arsenic concentrations. Use of historical data in process-oriented geochemical studies could be problematic. However, the comparison does

Table 1. Comparison of historical arsenic concentrations with arsenic concentrations measured during this project
[Well location as recorded in original data source; arsenic concentrations in micrograms per liter; "--", unknown]

		Historical data		Project resampling	
Source for historical data	Well location	Date	Arsenic concentration	Date	Arsenic concentration
USGS files; Goldblatt and others, 1963	18S/04W-22B	10/04/62	160	08/20/97	820
USGS files; Goldblatt and others, 1963	18S/04W-10D	10/17/62	120	08/20/97	520
USGS files; Goldblatt and others, 1963	22S/03W-17N	10/25/62	32	09/05/96	3
USGS files; Goldblatt and others, 1963	19S/03W-11E2	01/08/63	420	11/13/96	700
USGS files; Goldblatt and others, 1963	19S/03W-31E1	03/29/63	120	11/13/96	130
Frank, F.J., 1973	18S/04W-14ACB	06/12/69	500[a]	09/06/96	300[b]
Helm and Leonard, 1977	12S/01W-29N1	06/24/65	70[c]	08/29/96	60[d]
Linn County Dept. of Health Services	13S/01E-33	--/--/87	10	09/06/96	4
Linn County Dept. of Health Services	14S/01E-05	--/--/87	74	09/06/96	89
Linn County Dept. of Health Services	13S/01E-33AC	04/09/87	900	09/06/96	790
Linn County Dept. of Health Services	13S/01E-35	07/06/87	<5	09/06/96	3

[a]Chloride concentration 43 milligrams per liter.
[b]Chloride concentration 14 milligrams per liter.
[c]Chloride concentration 26 milligrams per liter.
[d]Chloride concentration 23 milligrams per liter.

suggest that the historical data are adequate for definition of patterns of regional arsenic occurrence.

Comparison of Processing and Analytical Methods

Hydrologists employ a variety of sample processing and analytical methods in geochemical and water-quality studies. Samples may be collected as unfiltered or as filtered samples. Filtering may be done using any of a variety of pore sizes, but 0.10-µm and 0.45-µm pore sizes are most commonly used. Analysis of arsenic usually is done using either hydride atomic absorption (commonly used by the USGS) or by graphite furnace atomic absorption (commonly used by the USEPA).

When combining data collected by a number of investigators using a variety of sample processing and analytical methods, questions about the comparability of data arise. Furthermore, comparison of analyses performed using non-USEPA analytical methods against USEPA water-quality criteria raises questions about comparability of analytical techniques. Information on comparability of different sample processing and analytical methods is given in this section. Data from split samples that were (1) filtered through 0.10-µm nominal-pore-size filters and analyzed by hydride atomic absorption, (2) filtered through 0.45-µm nominal-pore-size filters and analyzed by hydride atomic absorption, (3) analyzed as unfiltered samples using hydride atomic absorption, and (4) analyzed as unfiltered samples using graphite furnace atomic absorption are shown in table 2 and on figure 3.

Differences in reported arsenic concentrations between unfiltered and filtered samples generally were small. However, one set of samples (from well 21S/03E-08CBD2) demonstrated that concentrations of arsenic in unfiltered samples can be considerably greater (factor of three) than those in filtered samples. Differences between unfiltered and filtered samples may result from differences in the amount of colloid- or sediment-associated arsenic in the samples. Concentrations in both the unfiltered and the filtered samples from this site were greater than the USEPA current MCL, so interpretation was not affected significantly. However, interpretation of data from other sites could conceivably be affected by such differences between unfiltered and filtered samples and investigators will need to bear such potential differences in mind. Overall, however, combining filtered and unfiltered samples appears to be acceptable for definition of patterns of regional arsenic occurrence.

Differences in reported arsenic concentrations between the two analytical methods were small. Arsenic concentrations reported for samples analyzed by the USEPA method were slightly higher than those analyzed by the USGS method. These differences could be a result of differences in analytical methods. The longer digestion associated with the USEPA method could result in differences in reported arsenic concentrations. Different reagents used in sample digestion in the two methods also could result in differences in reported arsenic concentrations. However, the observed differences also could simply represent analytical variability.

Table 2. Comparison of arsenic concentrations for various processing and analytical methods

[USGS, U.S. Geological Survey; USEPA, U.S. Environmental Protection Agency; arsenic concentrations in micrograms per liter; processing and analytical methods described in text]

Well location	Filtered, 0.10-micrometer filter	Filtered, 0.45-micrometer filter	Unfiltered (USGS method)	Unfiltered (USEPA method)
01N/03W-04CCC	54	57	53	64
01N/03W-07CCD1	17	17	16	22
01N/03W-15ADB1	47	47	53	60
01S/03W-10BCA1	55	57	59	64
02S/02W-11CCD1	16	16	20	24
15S/01W-23CCA	18	18	18	21
17S/01W-24DCA	70	75	70	82
19S/01W-03ADB	41	43	40	46
21S/03E-08CBD2	62	64	180	180
18S/04W-14BBA	1,100	1,100	1,100	1,200

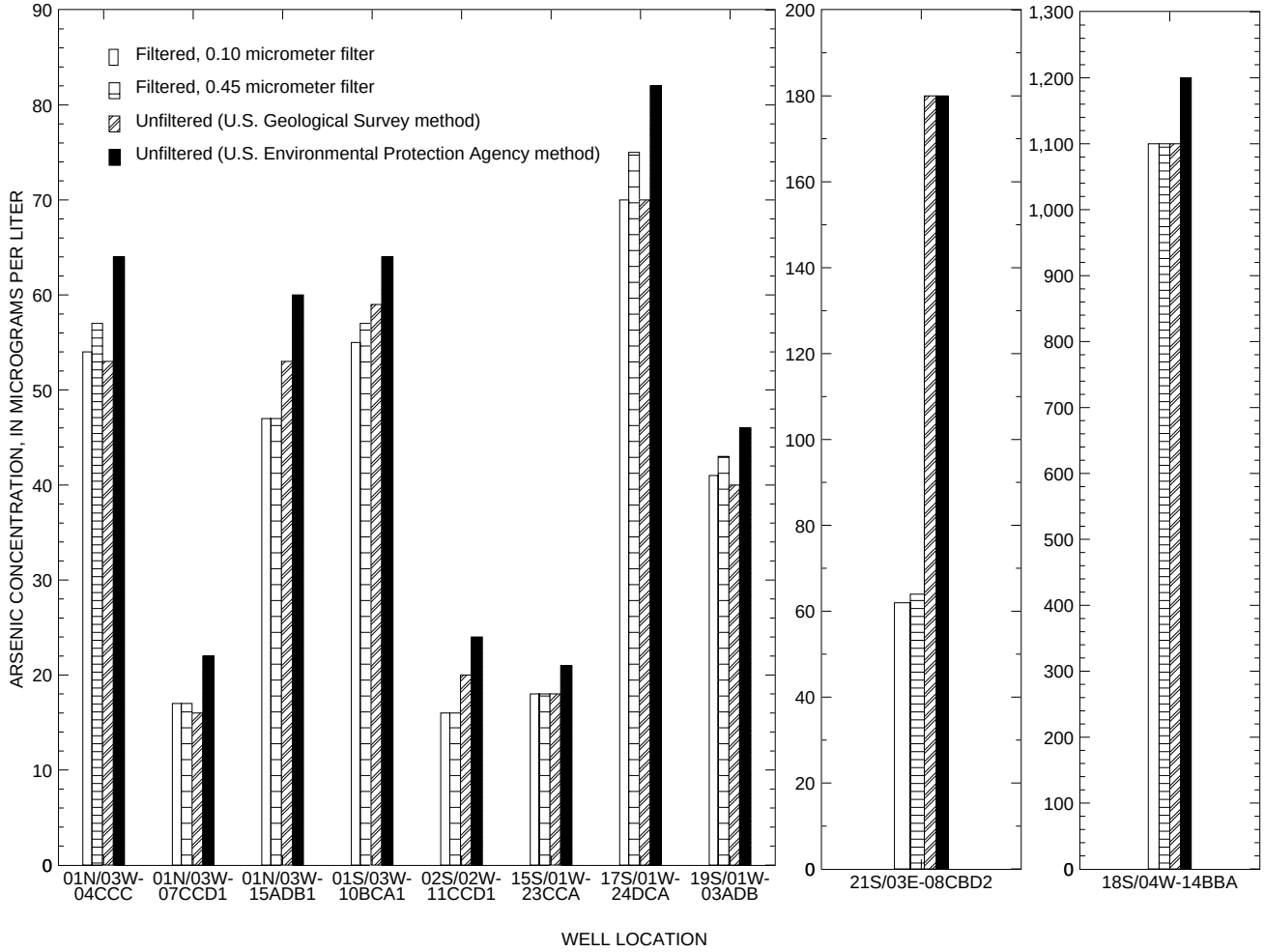

Figure 3. Comparison of arsenic concentrations determined by various processing and analytical methods.

DISTRIBUTION OF ARSENIC

The distribution of arsenic in ground water of the Willamette Basin is discussed in terms of temporal and spatial variability. First, project data are used to assess temporal variability. It is useful to assess temporal variability before arsenic-concentration data collected at different times is used to evaluate spatial distribution. Also, assessment of temporal variability should benefit well owners and water managers who desire guidance on when to sample for arsenic. Second, historical and project data are used to define spatial variability of arsenic concentrations in ground water in the Willamette Basin.

Temporal Variability

Project data were used to evaluate temporal variability of arsenic concentrations in ground water during a 1-year period. These data help characterize variability resulting from seasonal and other short- to medium-term factors. Characterization of temporal variability in arsenic concentrations over longer periods of time was not explicitly done, but long-term variability was discussed qualitatively in a previous section of this report, “Quality of Historical Data.”

Arsenic concentrations measured quarterly over a period of 1 year at 17 sites are given in table 3 and shown on figure 4. Field-measured specific conductance, a surrogate for dissolved solids, also is given in table 3. Arsenic concentrations did exhibit temporal variability. Although arsenic concentrations in water from many wells remained essentially constant over the course of sampling, concentrations at some sites varied by up to almost ±50 percent from mean concentrations, and arsenic concentrations in samples from well 19S/01W-

Table 3. Temporal variations in arsenic concentrations and specific conductance

["As", arsenic concentration in µg/L (micrograms per liter); "SC", field-measured specific conductance in µS/cm (microsiemens per centimeter) at 25 degrees Celsius; "--", not measured]

Well location	Date	As	SC	Date	As	SC	Date	As	SC	Date	As	SC	Date	As	SC
01N/03W-04CCC	11/21/96	53	587	02/20/97	52	585	05/15/97	82	496	08/19/97	97	522	12/05/97	72	616
01N/03W-07CCD1	11/19/96	16	345	02/20/97	17	357	05/15/97	19	345	08/19/97	26	314	12/05/97	18	345
01N/03W-15ADB1	11/21/96	53	1,220	02/20/97	47	1,300	05/15/97	64	1,390	08/19/97	63	1,500	12/05/97	52	1,450
01S/02W-29DBD	11/12/96	33	--	02/20/97	28	194	05/15/97	35	193	08/19/97	41	195	12/05/97	29	192
01S/02W-33BBA	11/12/96	12	--	02/20/97	10	274	05/15/97	12	272	08/19/97	13	275	12/05/97	12	274
01S/03W-10BCA1	11/19/96	59	341	02/20/97	52	340	05/15/97	62	339	08/19/97	56	339	12/05/97	56	341
02S/02W-11CCD1	11/19/96	20	335	02/20/97	16	335	05/15/97	18	334	08/19/97	19	336	12/05/97	18	336
15S/01W-23CCA	08/14/96	19	268	11/15/96	18	263	02/18/97	19	261	05/13/97	17	262	08/20/97	19	262
15S/01W-23CCC2	08/14/96	11	164	11/15/96	11	167	02/18/97	10	163	05/13/97	9	161	08/20/97	12	164
17S/01W-24DCA	09/06/96	85	194	11/15/96	70	198	02/19/97	74	195	05/13/97	84	191	08/21/97	69	193
18S/04W-14ACA	09/05/96	9	319	11/14/96	6	293	02/18/97	5	253	05/14/97	6	250	08/21/97	10	320
18S/04W-14BBA	09/04/96	830	1,040	11/15/96	1,100	1,070	02/20/97	640	797	[a]	[a]	[a]	08/20/97	1,100	1,060
19S/01W-03ADB	09/04/96	15	188	11/14/96	40	329	02/18/97	23	193	05/13/97	33	237	08/21/97	28	205
19S/03W-11E2	11/13/96	700	389	02/19/97	710	393	05/14/97	740	396	08/20/97	850	391	12/04/97	800	390
19S/03W-31E1	11/13/96	130	295	02/19/97	130	295	05/14/97	140	291	08/20/97	130	285	12/04/97	130	292
21S/03E-08CBD2	09/05/96	140	1,590	11/14/96	180	1,460	02/18/97	130	1,120	05/13/97	100	1090	09/04/97	69	1,450
22S/03W-17N	09/05/96	3	298	11/13/96	3	292	02/19/97	4	276	05/14/97	4	295	09/04/97	4	381

[a]Four samples within 37 hours:
05/13/97 at 7 p.m., As, 1100 µg/L; SC, 1090 µS/cm
05/14/97 at 10 a.m., As, 810 µg/L; SC, 952 µS/cm
05/14/97 at 8 p.m., As, 880 µg/L; SC, 809 µS/cm
05/15/97 at 8 a.m., As, 600 µg/L; SC, 877 µS/cm.

03ADB varied by a factor of 2.7 between the lowest and highest concentrations. The data as a whole demonstrate no obvious correlation with seasons. Analytical variability may be responsible for some of the observed variability, but can only explain up to about ±20-percent variation among samples. Differences in arsenic concentrations also could be due, in part, to temporally varying amounts of colloid- or sediment-bound arsenic. However, 10 of the 17 wells used for quarterly sampling also were used in the comparison of unfiltered and filtered samples. The resulting data showed little colloid- or sediment-bound arsenic present in samples from those wells at that time, except for well 21S/03E-08CBD2. Clearly, other factors are responsible for some of the observed temporal variability in arsenic concentrations.

It is likely that temporal variability in project data reflects variation in contributing sources of water to wells, and in the absence of seasonal patterns in temporal data, variation in contributing sources to wells is probably largely due to short-term (hour-to-hour or day-to-day) variations in well use prior to sampling. Relatively heavy well use can temporarily deplete water from parts of an aquifer adjacent to the well, and thus the well can yield water of different chemical quality than when sampled after a period of relatively light use. Two pieces of evidence suggest that some of the 17 wells sampled for temporal variability yield water from different sources at different times, although a relation between differences in contributing sources to wells and differences in well use remains only a hypothesis. One piece of evidence for changing water sources to wells lies in the specific conductance data. Specific conductance generally was less variable in samples where arsenic concentrations were less variable (table 3). Furthermore, specific conductance had the greatest relative temporal variability for water from well 19S/01W-03ADB; the same site also had the greatest relative temporal variability in arsenic concentrations (table 3). Because large changes in the chemistry of individual bodies of ground water generally take place over a period of years, it is difficult to explain large seasonal changes in specific conductance of well water by processes other than changing water sources to wells. A second piece of evidence suggesting changing water sources to wells is derived from examination of data from well 18S/04W-14BBA. Maximum and minimum arsenic concentrations in samples from this site varied by nearly a factor of two over the course of a year. At this site, some additional temporal sampling was conducted. Four samples were collected over one 37-hour period. The observed variability during a

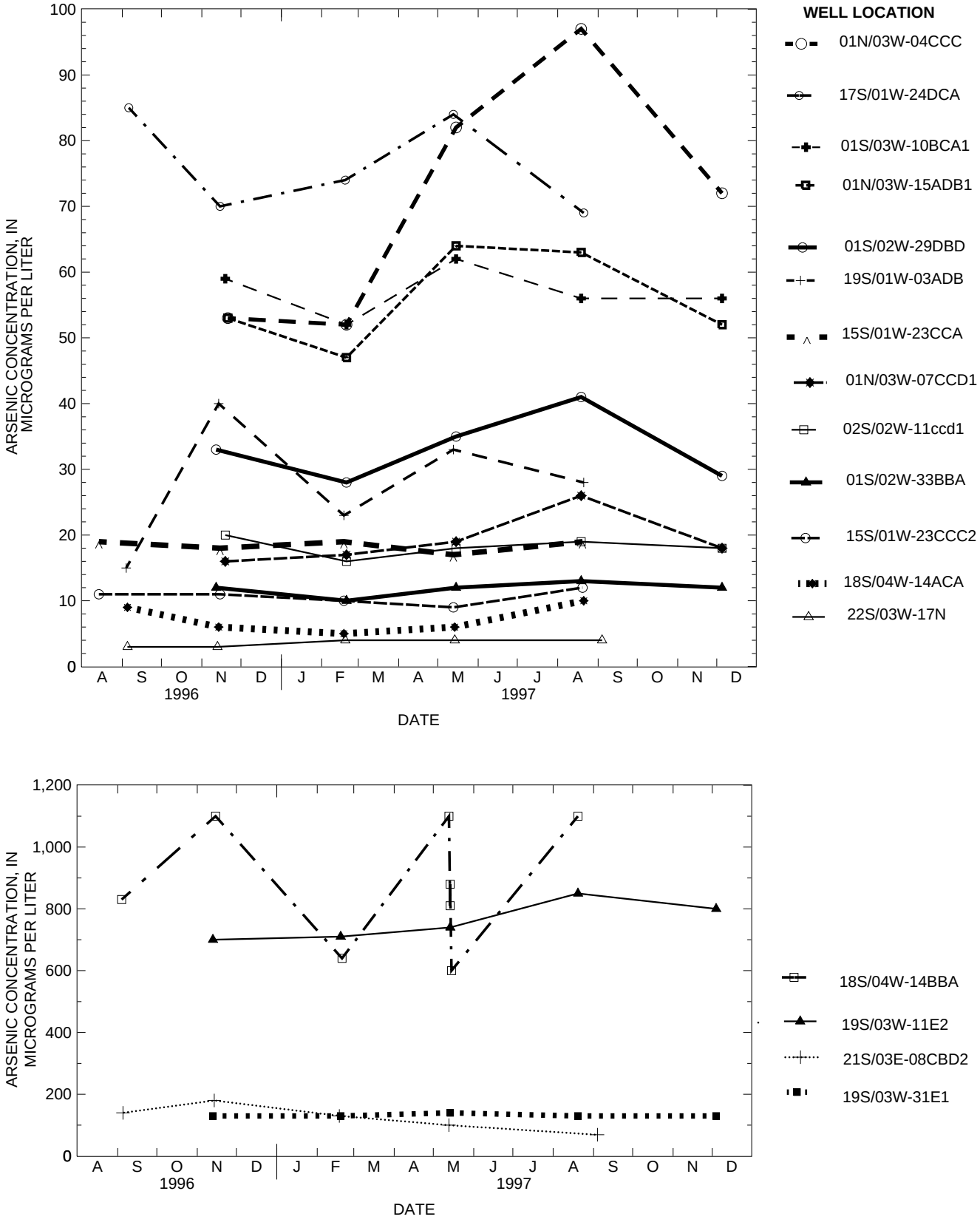

Figure 4. Temporal variations in arsenic concentrations.

37-hour period was as great as the variability observed during the course of a year (table 3, fig. 4). Such variability over the course of 37 hours cannot be ascribed to seasonal factors.

Certainly, a relationship between arsenic concentrations and well use prior to sampling remains only a hypothesis. But regardless of the processes resulting in the observed temporal variability, the data demonstrate that short-term variability in arsenic concentrations can be similar in magnitude to variability observed during the course of quarterly sampling.

The temporal variability of the project data (less than a factor of three) contrasts greatly with temporal variability in arsenic concentrations reported by Nadakavukaren and others (1984) for some wells in Lane County in the southern part of the Willamette Basin. Nadakavukaren and others (1984) reported temporal variability of up to about three orders of magnitude over the course of a year for some of the 14 wells sampled. Such variability is intriguing, because temporal variability of this magnitude in ground-water chemistry at individual sites is unusual.

Nadakavukaren and others (1984) noted that arsenic concentrations often were low (relative to mean concentrations) during the winter (rainy) season. However, they also reported that equally low concentrations were observed during other seasons, including the summer (dry) season, at several sites. Thus, although they observed temporal variability in arsenic concentrations, Nadakavukaren and others (1984) reported that they were unable to relate temporal variability to environmental factors. Unfortunately, sample-collection procedures were not defined in the paper. One aspect of the data not discussed in the original paper, but that may have significant bearing on interpretation of temporal variability, is that most of the wells sampled were irrigation wells. Irrigation wells tend to be unused during the rainy season, and frequently remain idle for long periods during other parts of the year. Recall that it was proposed that temporal variability of project data was related, at least in part, to well use prior to sampling, and recall, also, that project wells either were actively used domestic wells or were sampled after purging three well-bore volumes. It is possible that the extreme variability in arsenic concentrations reported by Nadakavukaren and others (1984) could be related to previous well use (or lack of well use), especially if the wells were not purged prior to sampling. Certainly, the use of irrigation wells for most of the work presented by Nadakavukaren and others (1984), and the absence of documentation of well-purging criteria, make interpretation of their temporal data difficult. Data of Nadakavukaren and others (1984) suggest that caution be applied when using historical data for which both well-use and well-purging information are unavailable.

The absence of seasonal trends in project data suggests that data collected at different times in the Willamette Basin can be combined for use in definition of spatial variability in arsenic concentrations. However, data of Nadakavukaren and others (1984), although difficult to interpret, suggest that historical data for which the history of well use and well purging are unknown may not always be sufficient for site-specific characterization. Thus, although temporal variability is not likely to be a significant problem for a regional evaluation of ground-water arsenic concentrations, the quality of historical data should be evaluated. Most of the historical data compiled for use in this report were from samples collected by USGS personnel. The remainder of the data (from Linn County Department of Health Services, Environmental Health Program) were collected from domestic wells, which presumably were actively used wells. USGS protocols have long required (at least as far back as 1960; Rainwater and Thatcher, 1960) that groundwater samples be collected from purged or actively used wells. Thus, from a standpoint of well use/well purging, the historical data used in this report are believed to be of adequate quality for a regional assessment of arsenic concentrations in ground water. Resampling of selected wells represented in the historical data supports this assumption, as was shown in the section “Quality of Historical Data.”

Spatial Distribution

Historical and project data were combined and used to evaluate the spatial distribution of arsenic concentrations in ground water of the Willamette Basin. A total of 728 spatially distinct samples thus were available—597 historical and 131 project samples. Of these 728 samples, 721 were from wells, and 7 were from nonthermal springs. These data are available in digital format

(CD-ROM) in a separate data report (Orzol and others, in press).

Concentrations of arsenic in the 728 samples ranged from < 1 to 2,000 µg/L. A histogram of these data is shown on figure 5. Concentrations in 58 samples (8.0 percent) exceeded the USEPA current MCL (50 µg/L), and 158 (21.7 percent) exceeded the WHO provisional guideline (10 µg/L). The 728 samples were not randomly distributed throughout the basin, so it does not follow that 8 percent of all wells in the basin will exceed the USEPA current MCL. Furthermore, because some of the data (in particular, data of Goldblatt and others, 1963, and data from Linn County Department of Health Services) were collected to address suspected arsenic problems, the cumulative data set contains a bias towards high arsenic concentrations (exceeding the USEPA current MCL). The data do, however, indicate the existence of extensive bodies of high-arsenic ground water in the basin.

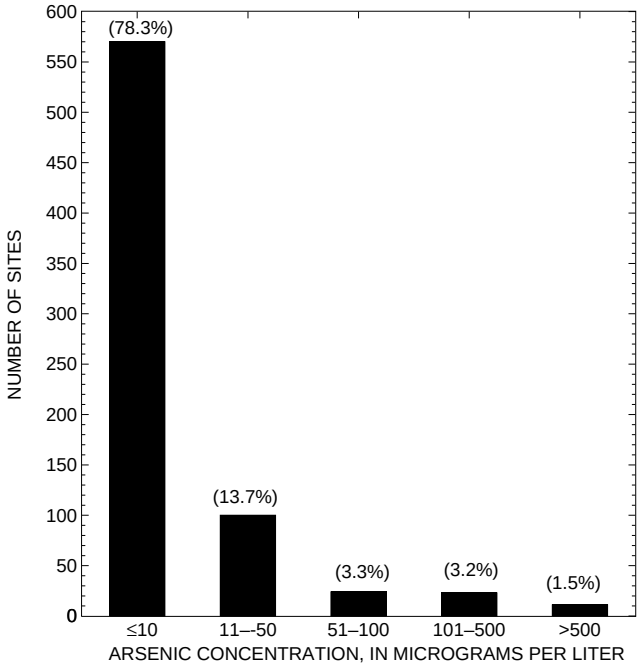

Figure 5. Arsenic concentrations for sites sampled in the Willamette Basin, Oregon. (Number in parentheses is percentage of the total number of sites.)

Depth data were available for 651 of the 728 sites. The relation of arsenic concentration to depth is shown on figure 6. Data from springs were included on this figure; springs were assigned a "well depth" of zero. (For plotting purposes, censored data [concentrations below reporting levels] were arbitrarily plotted at one-half of the reporting

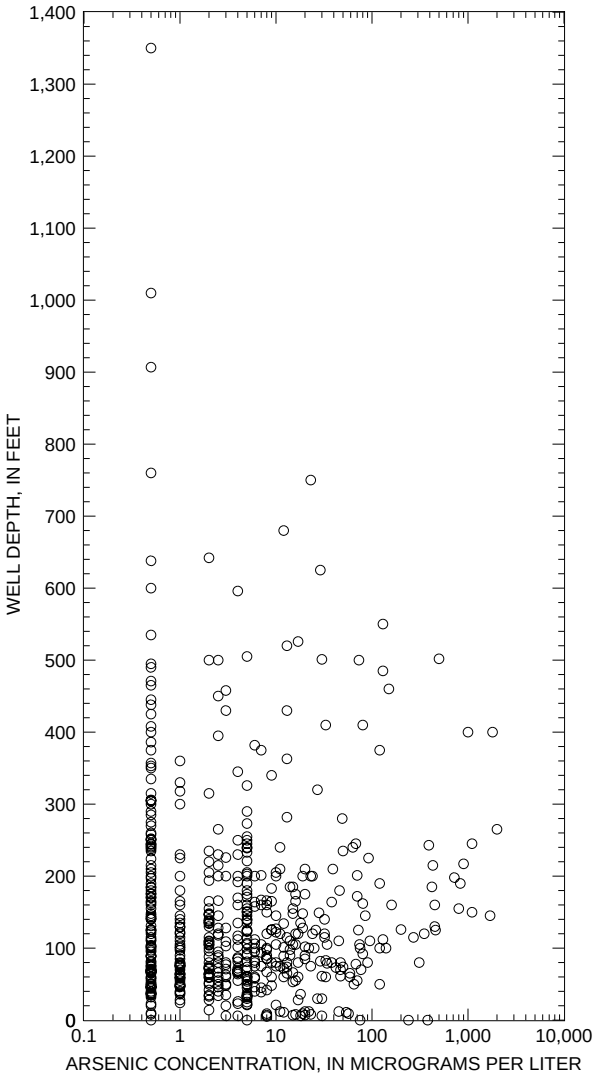

Figure 6. Relation of arsenic concentration to well depth. (Data from six springs also are included; "well depth" is set to zero for springs.)

levels. Censoring occurred at three concentration levels: 1, 5, and 10 µg/L.) No obvious relation of arsenic concentration to well depth was observed. On a regional scale, depth does not appear to be a useful parameter for predicting arsenic concentrations. However, depth may be an important parameter on a local scale.

The spatial distribution of arsenic concentrations is shown on plate 1. Patterns of arsenic occurrence are apparent. Most (53) of the 58 samples with high concentrations of arsenic came from wells and springs in bedrock areas (areas where bedrock is exposed at land surface or is covered by thin layers of alluvium) in south-central and eastern Lane County, and Linn County (pl. 1). The remain-

ing 5 (of the 58) samples came from wells near the center of the Tualatin Basin in Washington County (northwestern part of the Willamette Basin) (pl. 1). These five wells produce water from alluvial deposits. Not only were most of the 58 occurrences of high arsenic concentrations in Lane and Linn Counties, but the highest concentrations also were found there. Arsenic concentrations ranged up to 2,000 µg/L in Lane and Linn Counties, and six samples contained ≥1,000 µg/L. In contrast, the maximum concentration of arsenic in the Tualatin Basin, 77 µg/L, was substantially smaller than many of the concentrations found in Lane and Linn Counties, although still a concentration of considerable concern.

All five exceedances of the USEPA current MCL in the Tualatin Basin were from filtered samples. Many of the exceedances of the USEPA current MCL in Lane and Linn Counties were from unfiltered samples, but concentrations in filtered samples from that part of the Willamette Basin have been observed to exceed 1,000 µg/L. Because filtered samples generally contain primarily dissolved constituents, the presence of high concentrations of arsenic in filtered samples suggests that geochemical conditions can be favorable for development of high dissolved-arsenic concentrations both in the Tualatin Basin and in bedrock areas of Lane and Linn Counties.

Intermediate arsenic concentrations (>10 µg/L and ≤ 50 µg/L) were widespread in the Willamette Basin (pl. 1). As might be expected, many of the occurrences of intermediate arsenic concentrations were located in the same regions where high arsenic concentrations were found. However, intermediate arsenic concentrations were found in many other areas as well, and in a variety of geologic materials.

Occurrence of high concentrations of arsenic in bedrock areas of Lane and Linn Counties appears to be related to the areal extent of two associations of older volcanic rocks: (1) the Fisher and Eugene Formations and correlative rocks (Oligocene and upper Eocene epochs), and (2) undifferentiated tuffaceous sedimentary rocks, tuffs, and basalt (Miocene and Oligocene epochs). (The undifferentiated tuffaceous sedimentary rocks, tuffs, and basalt are approximately equivalent to the Little Butte Volcanic Series of Peck and others [1964].) The surficial extent of these two rock associations is shown on plate 1. At land surface, the two rock associations cover 24 percent of the Willamette Basin. All detections of high concentrations of arsenic in Lane and Linn Counties occur in or very close to places where these volcanic rocks crop out, or in areas where thin layers of alluvial materials cover the rocks. These rocks include extensive volumes of silicic (rhyolitic) volcanic rocks. Ground water high in naturally occurring arsenic commonly is associated with volcanic rocks silicic to intermediate in composition (Welch and others, 1988). Thus, the apparent relationship between high concentrations of arsenic and geologic unit is not unexpected.

Interpretation of relationships between high concentrations of arsenic in ground water and geologic units could be improved upon at a local scale by use of more detailed (local) geologic maps. For example, although high concentrations of arsenic often occur in water within the Fisher and Eugene Formations and correlative rocks, Goldblatt and others (1963) suggest that the Fisher Formation, and not the Eugene Formation, is the source of most of the arsenic in that area. Similarly, water within basalt flows in the undifferentiated tuffaceous sedimentary rocks, tuffs, and basalt is not a likely candidate for high concentrations of arsenic because basalt typically yields water low in arsenic (Welch and others, 1988). The regional nature of the work presented in this report, with the requisite use of regional-scale rock associations, did not allow for finer-scale interpretation of the occurrence of high concentrations of arsenic relative to geologic characteristics. However, investigators involved in local-scale ground-water assessments should be able to make use of more detailed geologic mapping to help guide sampling.

Large portions of the area covered by the Fisher and Eugene Formations and correlative rocks, and the undifferentiated tuffaceous sedimentary rocks, tuffs, and basalt, are not represented by data collected and compiled for this report. Although most of the unsampled areas underlain by these rocks are not densely populated, they are not uninhabited, and the potential for impacts to human health are not insignificant. The surface exposure of these rocks alone represents 24 percent of the area of the Willamette Basin, and their full extent is greater. Additional sampling of wells completed in these arsenic-containing rocks would better define

the spatial distribution of high-arsenic water in areas not sampled during this study. Further, the presence of high arsenic concentrations in other aquifers in the Willamette Basin (pl. 1) suggests that additional sampling might reveal still more problem areas.

GEOCHEMISTRY OF ARSENIC

An understanding of factors controlling the distribution of arsenic in ground water requires a knowledge of arsenic sources and of processes controlling arsenic mobility. To that end, possible sources of arsenic in Willamette Basin ground water are discussed in this section. Processes that have been shown to control arsenic mobility in other natural systems are discussed next. Then, arsenic speciation data collected as part of this project, along with some historical speciation data, are presented. Finally, geochemical data (including the speciation data) and information from existing interpretive reports are used to construct preliminary hypotheses regarding possible geochemical controls over mobilization of arsenic in the Willamette Basin. An understanding of arsenic sources and geochemistry in the basin could help guide future monitoring efforts both in the basin and elsewhere. However, rigorous geochemical investigation of reasonable hypotheses will be required before an adequate understanding of arsenic geochemistry in the Willamette Basin can be said to exist. Thus, this discussion may serve future research.

Sources of Arsenic

Arsenic can be introduced into ground water from anthropogenic and natural sources. Anthropogenic sources may be important in some settings. Because industrial activity tends to be localized, it would be difficult to explain regional patterns of arsenic occurrence in the Willamette Basin by introduction from industrial sources. However, arsenical pesticides such as lead arsenate were historically used in large quantities in agricultural areas of the Willamette Basin (Rinehold and Jenkins, 1993). High-arsenic ground water in bedrock areas of Lane and Linn County tends to occur in nonagricultural areas, so it is unlikely that the observed high concentrations of arsenic in ground water in those areas can be attributed to historical use of arsenical pesticides. However, in contrast to land-use patterns in the bedrock areas of Lane and Linn Counties, land use in alluvial portions of the Tualatin Basin includes a variety of agricultural land uses, and high-arsenic ground water in alluvium in the Tualatin Basin does generally coincide with occurrence of agricultural areas. Closer inspection of the data, however, shows that detections of high concentrations of arsenic in Tualatin Basin ground water generally are near rivers and streams (pl. 1). Ground water near these rivers and streams likely represents ground water near the end of ground-water flowpaths. Occurrence of high concentrations of arsenic in downgradient parts of ground-water flowpaths could result from transport of arsenic from upgradient areas where arsenical pesticides historically had been applied, or from mobilization of naturally occurring arsenic during geochemical evolution as ground water moves along flowpaths. Arsenic is nearly immobile in topsoils, and arsenic in arsenical-pesticide-contaminated topsoil leaches on timescales of decades or more (Aten and others, 1980). Thus, occurrence of high concentrations of arsenic primarily in downgradient areas, and not more uniformly distributed in the Tualatin Basin, is more consistent with a natural source than an anthropogenic source. However, no rigorous ground-water flowpath analysis has been done for arsenic transport in the Tualatin Basin, and instances of leaching of arsenic from sites of historical arsenical use into ground water of the Tualatin Basin cannot be ruled out. Nonetheless, regional patterns of arsenic concentrations in ground water of the Willamette Basin as a whole probably reflect primarily natural sources.

Naturally occurring arsenic commonly is found in volcanic glass in volcanic rocks of rhyolitic to intermediate composition; adsorbed to and coprecipitated with metal oxides, especially iron oxides; adsorbed to clay-mineral surfaces; and associated with sulfide minerals and organic carbon (Welch and others, 1988). Sulfide minerals can contain arsenic either as a dominant mineral-forming element or as an impurity; sulfide minerals are found locally in the Western Cascades (U.S. Geological Survey, 1969). Metal oxides and clay minerals are ubiquitous in the Willamette Basin. Organic carbon is widespread in many parts

of the Willamette Basin, especially in alluvial deposits. Volcanic glass, commonly a major component of volcanic rocks, also is widely found in Willamette Basin aquifers, although much of the original glass in older volcanic rocks has been devitrified (Peck and others, 1964). Thus, arsenic originally associated with such volcanic glass either will have become associated with devitrification alteration products such as clays and metal oxides, or will have been released into solution and subsequently adsorbed or precipitated elsewhere or flushed from the aquifer. However, volcanic glass is still abundant in the Willamette Basin, and thus may constitute a current source of arsenic. At a minimum, the apparent relationship between rock associations containing silicic volcanic rocks and the occurrence of high concentrations of arsenic in ground water in Lane and Linn Counties described earlier in this report suggests that considerable amounts of arsenic might ultimately have come from volcanic glass. Thus, several sources of naturally occurring arsenic dispersed in aquifer materials can reasonably be postulated. However, examination of these various potential arsenic sources for arsenic availability in the Willamette Basin apparently has never been done.

Review of Geochemical Processes Controlling Arsenic Mobility

Two categories of processes largely control arsenic mobility in aquifers: (1) adsorption and desorption reactions and (2) solid-phase precipitation and dissolution reactions. Attachment of arsenic to an iron oxide surface is an example of an adsorption reaction. The reverse of this reaction, arsenic becoming detached from such a surface, is an example of desorption. Solid-phase precipitation is the formation of a solid phase from components present in aqueous solution. Precipitation of the mineral calcite, from calcium and carbonate present in ground water, is an example of solid-phase precipitation. Dissolution of volcanic glass within an aquifer is an example of solid-phase dissolution.

Arsenic adsorption and desorption reactions are influenced by changes in pH, occurrence of redox (reduction/oxidation) reactions, presence of competing anions, and solid-phase structural changes at the atomic level. Solid-phase precipitation and dissolution reactions are controlled by solution chemistry, including pH, redox state, and chemical composition.

Adsorption and Desorption Processes

Arsenic is a redox-sensitive element. This means that arsenic may gain or lose electrons in redox reactions. As a result, arsenic may be present in a variety of redox states. Arsenate and arsenite are the two forms of arsenic commonly found in ground water (Masscheleyn and others, 1991). Arsenate generally predominates under oxidizing conditions. Arsenite predominates when conditions become sufficiently reducing. Under the pH conditions of most ground water, arsenate is present as the negatively charged oxyanions $H_2AsO_4^-$ or $HAsO_4^{2-}$, whereas arsenite is present as the uncharged species $H_3AsO_3^0$ (Hem, 1985). The strength of adsorption and desorption reactions between these different arsenic species and solid-phase surfaces in aquifers varies, in part, because of these differences in charge. Differences in species charge affect the character of electrostatic interactions between species and surfaces.

Arsenate and arsenite adsorb to surfaces of a variety of aquifer materials, including iron oxides, aluminum oxides, and clay minerals. Adsorption and desorption reactions between arsenate and iron-oxide surfaces are particularly important controlling reactions because iron oxides are widespread in the hydrogeologic environment as coatings on other solids, and because arsenate adsorbs strongly to iron-oxide surfaces in acidic and near-neutral-pH water (Dzombak and Morel, 1990; Waychunas and others, 1993). However, desorption of arsenate from iron-oxide surfaces becomes favored as pH values become alkaline (Fuller and Davis, 1989; Dzombak and Morel, 1990). The pH-dependence of arsenate adsorption to iron-oxide surfaces appears to be related to the change in iron-oxide net surface charge from positive to negative as pH increases above the zero-point-of-charge (pH at which the net surface charge is equal to zero) of about 7.7 for goethite (crystalline iron oxide) (Stumm and Morgan, 1996) or 8.0 for ferrihydrite (amorphous iron oxide) (Dzombak and Morel, 1990). Where pH values are above about 8, the negative net surface charge of

iron oxide can repel negatively charged ions such as arsenate.

Iron-oxide surfaces also adsorb arsenite, and both arsenate and arsenite adsorb to aluminum oxides and clay-mineral surfaces. However, these adsorption reactions appear generally to be weaker than is the case for arsenate adsorption to iron-oxide surfaces under typical environmental pH conditions (Manning and Goldberg, 1997). Nevertheless, pH-dependent adsorption and desorption reactions other than those between arsenate and iron-oxide surfaces may be important controls over arsenic mobility in some settings. As is the case for adsorption of arsenate to iron-oxide surfaces, adsorption of arsenite to iron-oxide surfaces tends to decrease as pH increases, at least between the range from pH 6 to pH 9 (Dzombak and Morel, 1990). Unfortunately, arsenate and arsenite adsorption and desorption reactions with other common surfaces are less well characterized, and apparently more complex than is the case for adsorption and desorption reactions with iron-oxide surfaces (Manning and Goldberg, 1997).

As a result of the pH dependence of arsenic adsorption, changes in ground-water pH can promote adsorption or desorption of arsenic. Because solid-phase diagenesis (water-rock interaction) typically consumes H^+ (Stumm and Morgan, 1996), the pH of ground water tends to increase with residence time, which, in turn, increases along ground-water flowpaths. Because iron-oxide surfaces can hold large amounts of adsorbed arsenate, geochemical evolution of ground water to high (alkaline) pH can induce desorption of arsenic sufficient to result in exceedances of the USEPA current MCL in some environments (see, for example, Robertson, 1989).

Similarly, redox reactions can control aqueous arsenic concentrations by their effects on arsenic speciation, and hence, arsenic adsorption and desorption. For example, reduction of arsenate to arsenite can promote arsenic mobility because arsenite is generally less strongly adsorbed than is arsenate. Redox reactions involving either aqueous or adsorbed arsenic can affect arsenic mobility (Manning and Goldberg, 1997).

Arsenic adsorption also can be affected by the presence of competing ions. In particular, phosphate and arsenate have similar geochemical behavior, and as such, both compete for sorption sites (Hingston and others, 1971; Livesey and Huang, 1981; Manning and Goldberg, 1996). Oxyanions in addition to phosphate also may compete for sorption sites. For example, Robertson (1989) suggested that correlation of arsenate with oxyanions of molybdenum, selenium, and vanadium in ground water of the Southwestern United States may be evidence for competitive adsorption among those oxyanions.

Finally, structural changes in solid phases at the atomic level also affect arsenic adsorption and desorption. For example, conversion of ferrihydrite to goethite or to other crystalline iron-oxide phases may occur gradually over time (Dzombak and Morel, 1990). Fuller and others (1993) demonstrated that as ferrihydrite crystallizes into goethite, the density of arsenic adsorption sites decreases. This decrease in density of adsorption sites can result in desorption of adsorbed arsenic. Structural changes in other solid phases may possibly affect arsenic mobility, too. The role of such solid-phase structural changes on ground-water arsenic concentrations has, however, received little attention to date.

Precipitation and Dissolution Processes

The various solid phases (minerals, amorphous oxides, volcanic glass, organic carbon) of which aquifers are composed exist in a variety of thermodynamic states. At any given time, some aquifer solid phases will be undergoing dissolution, whereas others will be precipitating from solution. Arsenic contained within solid phases, either as a primary structural component of or an impurity in any of a variety of solid phases, is released to ground water when those solid phases dissolve. Similarly, arsenic is removed from ground water when solid phases containing arsenic precipitate from aqueous solution. As an example, because arsenic often coprecipitates with iron oxide (Waychunas and others, 1993), iron oxide may act as an arsenic source (case of dissolution) or a sink (case of precipitation) for ground water. Furthermore, solid-phase dissolution will contribute not only arsenic contained within that phase, but also any arsenic adsorbed to the solid-phase surface. The process of release of adsorbed arsenic as a result of solid-phase dissolution is distinct from the process of desorption from stable solid phases.

The interplay of redox reactions and solid-phase precipitation and dissolution may be particularly important with regard to aqueous arsenic and solid-phase iron oxides and sulfide minerals. High concentrations of arsenic often are associated with iron oxides and sulfide minerals (Thornton, 1996). Iron oxides frequently dissolve under reducing conditions, but often precipitate under oxidizing conditions. Sulfide minerals generally are unstable under oxidizing conditions, but may precipitate under reducing conditions. Thus, as a result of the redox-sensitive nature of iron oxides and sulfide minerals, transfer of large amounts of arsenic between these solid phases and neighboring water may result from redox-facilitated precipitation and dissolution reactions.

Arsenic Speciation in the Willamette Basin

Three samples from alluvial wells in the Tualatin Basin and two from bedrock wells in Lane County were analyzed for four common species of arsenic. Concentrations of the two organic species of arsenic analyzed (monosodium methylarsonate, or CH_3AsO_3HNa, and sodium dimethylarsinate, or $(CH_3)_2AsO_2Na$) were below MDLs, so only the data for the two inorganic species are tabulated. These speciation data are given in table 4.

Two additional analyses for arsenic species in ground water from the Willamette Basin were available in the literature. Welch and others (1988) reported arsenite and arsenate concentrations for water from two wells in Lane County. Arsenite represented 7 percent and 62 percent of the total arsenic in these samples (total arsenic concentrations being 25 and 45 µg/L, respectively).

The most striking feature of the data from the two studies is the predominance of arsenite. The predominance of arsenite has both geochemical and toxicological implications. From a geochemical standpoint, the speciation data are of interest because mobility of arsenite differs from that of arsenate (see section "Review of Geochemical Processes Controlling Arsenic Mobility"). From a public-health perspective, the speciation data are interesting because arsenite is more toxic than arsenate in at least some of its effects. In human acute toxicity studies, arsenite has been shown to be more potent than arsenate (U.S. Environmental Protection Agency, 1988). With regard to human chromosome breakage, arsenite is about an order of magnitude more potent than arsenate (U.S. Environmental Protection Agency, 1988). Morrison and others (1989) report that arsenite is 50 times as toxic as arsenate, but do not report the organisms studied. Also, arsenite is more difficult to remove from drinking-water supplies than is arsenate (Gupta and Chen, 1978; Schneiter and Middlebrooks, 1983). However, it would be premature to make generalizations regarding arsenic toxicity in the Willamette Basin based upon such limited speciation data (seven samples). Complicating the matter, in the benchmarks against which drinking water arsenic concentration data commonly are compared—the USEPA current MCL and the WHO provisional guideline—no differen- tiation is made between arsenite and arsenate. But if the apparent predominance of arsenite in Willamette Basin ground water is confirmed by additional speciation work, public health officials and water managers may need to evaluate the scope of the arsenic problem with regard not only to arsenic concentrations, but also to arsenic speciation.

Table 4. Speciation of arsenic

[Total arsenic concentration is from a separate analysis of a separate sample, and differs from the total of arsenite-plus-arsenate because of sampling and (or) analytical variability. Recovery, total of arsenite-plus-arsenate divided by total arsenic; µg/L, micrograms per liter]

Well location	Date	Arsenite (percent of total of arsenite-plus-arsenate)	Arsenate (percent of total of arsenite-plus-arsenate)	Arsenite (µg/L)	Arsenate (µg/L)	Total of arsenite-plus-arsenate (µg/L)	Total arsenic concentration (µg/L)	Recovery (percent)
01N/03W-04CCC	08/19/97	76	24	61.1	18.9	80.0	97	82
01S/03W-10BCA1	08/19/97	96	4	58.8	2.3	61.1	56	110
02S/02W-11CCD1	08/19/97	94	6	15.3	.9	16.2	19	85
18S/04W-14BBA	08/20/97	>99	<1	1,200	6.1	1,210	1,100	110
19S/03W-31E1	08/20/97	68	32	61.5	29.4	90.9	130	70

Geochemistry of Arsenic in the Willamette Basin

Few routine chemical analyses (of major ions and field parameters) are available for high-arsenic ground water from bedrock areas of Lane and Linn Counties. Goldblatt and others (1963) noted that high-arsenic ground water tended to have high pH (>8.0) and high orthophosphate concentrations, although only two routine chemical analyses for high-arsenic ground water were published. Reliable measures of redox conditions were not collected. However, the observation was made during site visits that water from many of the wells in bedrock areas of Lane and Linn Counties that yielded high-arsenic ground water during project sampling also had sulfide odors. The presence of sulfide in water indicates chemically reducing conditions. The observation of sulfide, along with the detection of arsenite (the more reduced of the two major arsenic species) in some ground-water samples, indicates the presence of reducing conditions in some ground water in these areas.

Together, these data suggest that for ground water in bedrock areas of Lane and Linn Counties, one or more of the following controlling factors likely are important in adsorption and desorption reactions that in turn often control arsenic mobility: (1) high pH, (2) presence of competing anions, and (3) occurrence of reducing conditions. The sparse available data do not allow even for speculation about adsorption and desorption reactions related to solid-phase structural changes at the atomic level in ground water of bedrock areas of Lane and Linn Counties. Similarly, evidence is lacking to even begin to develop hypotheses about solid-phase precipitation and dissolution reactions.

Previous investigations of the quality of Tualatin Basin ground water provide some preliminary insight into arsenic geochemistry there. Rounds and others (1994) reported that high phosphorus concentrations (up to 2.9 mg/L [milligrams per liter]) are common in Tualatin Basin ground water. In an analysis of 47 filtered ground-water samples from the Tualatin Basin, Hinkle (1997) reported that the median arsenic concentration in low-dissolved-oxygen samples (dissolved oxygen concentrations < 1.0 mg/L) was greater than the median arsenic concentration in well-oxygenated samples. The difference was statistically significant. Of the 47 samples, the 4 that exceeded the USEPA current MCL not only had low dissolved-oxygen concentrations, but also had high concentrations of orthophosphate (0.36 to 2.0 mg/L) and iron (160 to 1,900 µg/L). However, pH was not unusually high; pH of three of the four high-arsenic samples ranged from 7.5 to 7.6, and was 8.1 for the fourth sample.

These data suggest that for alluvial ground water in the Tualatin Basin, presence of competing anions and occurrence of reducing conditions may be important controlling factors in arsenic adsorption and desorption reactions. These two factors might be more important than pH controls over arsenic adsorption and desorption. Reducing conditions and high concentrations of dissolved iron also suggest that dissolution of iron oxides, with subsequent release of adsorbed or coprecipitated arsenic, may play a role in arsenic mobility in the Tualatin Basin.

Hypotheses about factors affecting arsenic adsorption and desorption reactions should account for arsenic speciation. Limited geochemical data suggest that desorption of arsenic from solid phases may be an important process in ground water both in bedrock areas of Lane and Linn Counties and in alluvium in the Tualatin Basin. Desorption of arsenate from iron oxides commonly results from high pH or the presence of competing ions. Such processes, of course, require the presence of arsenate on solid-phase surfaces. Because redox reactions often are slow and frequently far from equilibrium, it would not be unexpected to find arsenate adsorbed to solid-phase surfaces in chemically reducing environments. It might appear, though, that the predominance of arsenite relative to arsenate in aqueous speciation samples would be inconsistent with a hypothesis of desorption of arsenate from iron-oxide surfaces. However, it may be that arsenate is desorbed from aquifer surfaces and subsequently reduced to arsenite.

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APPENDIX

APPENDIX

Table 1. Wells discussed in report text, tables, and figures, listed by well location name from original source, and cross-referenced by recalculated well location and by U.S. Geological Survey site identification number and Oregon Water Resources Department well log identification number

["--", identical to "Well location (original source)"; N/A, none or not determined].

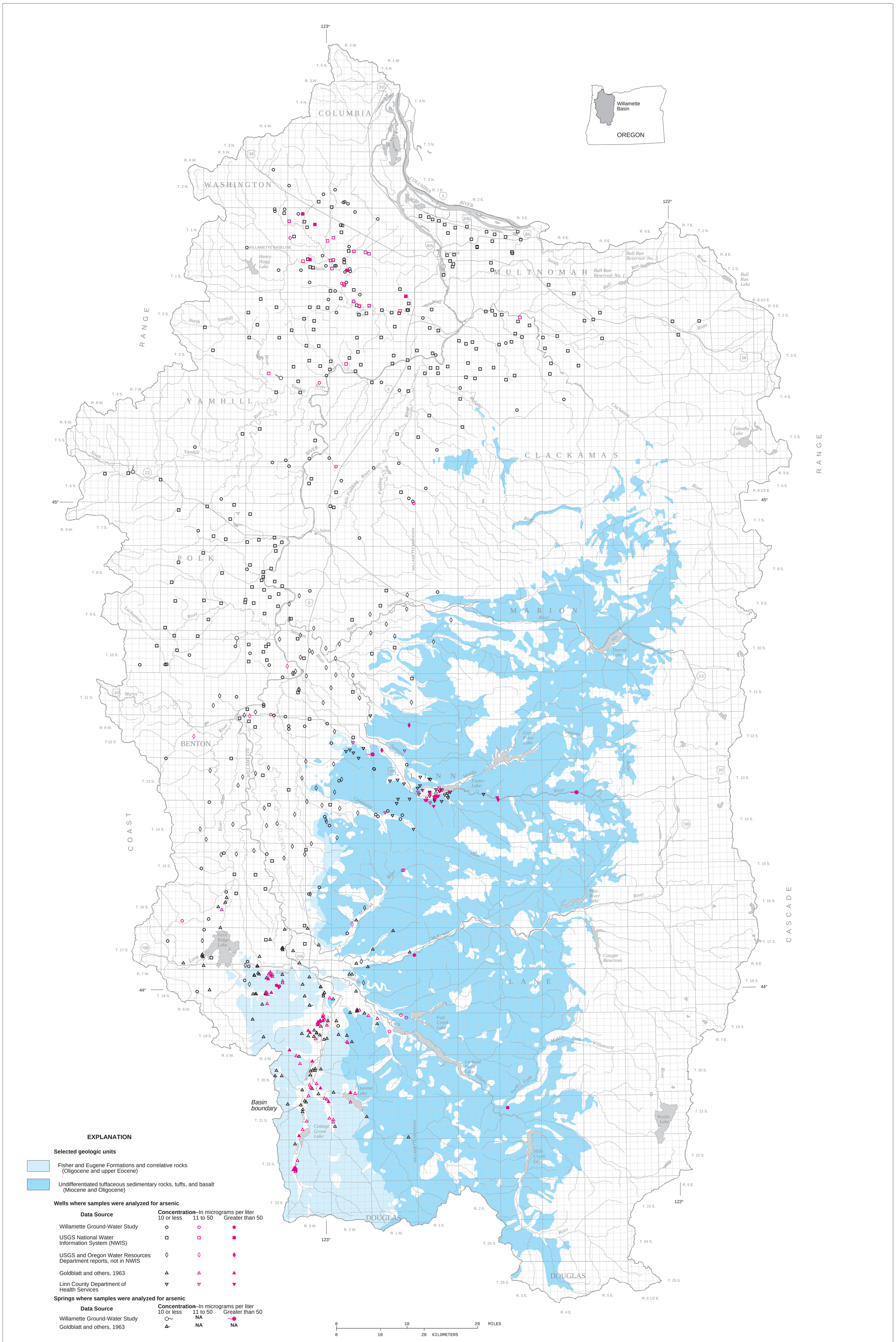
Well location (original source)	Well location (recalculated)	U.S. Geological Survey site identification number	Oregon Water Resources Department well log identification number
01N/03W-04CCC	--	453540123041101	WASH 5967
01N/03W-07CCD1	--	453445123063201	WASH 6037
01N/03W-15ADB1	--	453422123020201	N/A
01S/02W-29DBD	--	452707122572201	WASH 10406
01S/02W-33BBA	--	452651122565001	WASH 10475
01S/03W-10BCA1	--	453002123025301	WASH 143
02S/02W-11CCD1	--	452416122541601	WASH 12572
12S/01W-29N1	12S/01W-29CCA	442934122502801	LINN 9588
13S/01E-33	13S/01E-33DB1	442332122412701	LINN 12832
13S/01E-33AC	--	442348122412301	LINN 12776
13S/01E-35	13S/01E-35BD1	442347122391001	LINN 12914
14S/01E-05	13S/01E-32CD1	442323122424801	LINN 10997
15S/01W-23CCA	--	441447122464501	LANE 50736
15S/01W-23CCC2	--	441446122465701	LANE 5873
17S/01W-24DCA	--	440420122445701	LANE 2085
18S/04W-10D	18S/04W-10BB1	440125123095901	N/A
18S/04W-14ACA	--	440029123080301	LANE 17048
18S/04W-14ACB	--	440024123080901	LANE 17052
18S/04W-14BBA	--	440036123083201	LANE 16780
18S/04W-22B	18S/04W-22BA1	435942123092501	N/A
19S/01W-03ADB	--	435656122471801	LANE 19429
19S/03W-11E2	19S/03W-11BC3	435606123012501	N/A
19S/03W-31E1	19S/03W-31BB1	435237123061801	N/A
21S/03E-08CBD2	--	434528122290901	LANE 23527
22S/03W-17N	22S/03W-17CC1	433859123045601	N/A

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with
OREGON WATER RESOURCES DEPARTMENT

WATER-RESOURCES INVESTIGATIONS REPORT 98-4205
Arsenic concentrations in ground water, and selected geologic units—PLATE 1

Hinkle, S.R. and Polette, D.J.
Arsenic in Ground Water of the Willamette Basin, Oregon



EXPLANATION

Selected geologic units

Fisher and Eugene Formations and correlative rocks (Oligocene and upper Eocene)

Undifferentiated tuffaceous sedimentary rocks, tuffs, and basalt (Miocene and Oligocene)

Wells where samples were analyzed for arsenic

Data Source	Concentration—In micrograms per liter: 10 or less	11 to 50	Greater than 50
Willamette Ground-Water Study	○	○	●
USGS National Water Information System (NWIS)	□	□	■
USGS and Oregon Water Resources Department reports, not in NWIS	◊	◊	♦
Goldblatt and others, 1963	△	△	▲
Linn County Department of Health Services	▽	▽	▼

Springs where samples were analyzed for arsenic

Data Source	Concentration—In micrograms per liter: 10 or less	11 to 50	Greater than 50
Willamette Ground-Water Study	○~	NA	~●
Goldblatt and others, 1963	△-	NA	NA

Base modified from U.S. Geological Survey Digital base from
U.S. Geological Survey Digital Line Graphs published at 1:100,000, 1987;
U.S. Bureau of the Census, TIGER/Line(R), published at 1:100,000, 1990;
U.S. Geological Survey Digital Line Graphs published at 1:100,000, 1988
and modified by the State of Oregon. 1994;
U.S. Geological Survey quadrangle maps published at 1:24,000
as digitized by Oregon Department of Transportation;
Universal Transverse Mercator projection, Zone 10
1927 North American Datum

Geology from Walker and MacLeod, U.S. Geological Survey Digital Line G
published at 1:500,000, 1991 and modified by the State of Oregon, 199

DISTRIBUTION OF ARSENIC CONCENTRATIONS IN GROUND WATER, AND SELECTED GEOLOGIC UNITS OF THE WILLAMETTE BASIN, OREGON

By
Danial J. Polette and Stephen R. Hinkle