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Subject: RE: BCTT Subcommittee A.1: Questions for Size, Capacity, Longevity for 11-8-22 meeting
Date: Monday, October 31, 2022 1:47:55 PM
Attachments: [Coffin Butte Cell Capacity.xlsx](#)
[Draft BCTT Sub-Committee A1 Questions Size Capacity Longevity 10-31-22.docx](#)

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Hi All,

Please find attached draft memo of Questions and associated spreadsheet for further discussion, if time permits, for our next meeting on Nov 8, 2022.

Every question begs an answer, but the answer may need as well as the question, further revisions, deletions, or additions for better subject clarity.

I prefer to send out the original source documents instead of a pdf in order if you wish to cut, copy, delete or paste or update any information that you may deem necessary to use with the committee as things go forward.

Thanks to everyone for their assistance with the subject matter.

If I can be of any further assistance, please let me know at your earliest convenience.

Chuck

DRAFT

Memo

Chuck Gilbert – Public Community Member – BCTT Sub-Committee A-1

Capacity, Size, Longevity

10/31/2022

This memo functions as biased in the sense it does not stand for the consensus of the Sub-Committee-A1 but serves as reasonable information on the subject matter under consideration by the sub-committee A1 for distribution to members for consideration, revisions, additions or deletions.

What is an interrogative?

1. A word such as who, what, which used in asking questions.

What is an esoteric question?

1. Intended to be revealed to only initiates of a group (the esoteric doctrines of Pythagoras or esoteric questions for members of BCTT Sub-Committee A1 for vetting)

What is the game of Jeopardy?

The show is a quiz competition that reverses the traditional question-and answer format.

Are we in jeopardy?



What is a Landfill?

The term *landfill* is usually shorthand for a sanitary landfill.

These sanitary landfill facilities were first introduced early in the 20th century, but gained wide use in the 1960s and 1970s, in an effort to end open dumps and other "unsanitary" waste disposal practices.

Landfill means an engineered land burial facility for the disposal of household waste that is so located, designed, constructed, and operated to contain and isolate the waste so that it does not pose a substantial present or potential hazard to human health or the environment. A sanitary landfill also may receive other types of solid wastes, such as commercial solid waste, nonhazardous sludge, hazardous waste from conditionally exempt small quantity generators, construction, demolition, or debris waste and nonhazardous industrial solid waste. See 9VAC20-81 – Virginia

Landfill means a facility for the disposal of solid waste involving the placement of solid waste on or beneath the land surface. ORS 459.005 (14)

What is a disposal site?

Disposal site means land and facilities used for the disposal, handling or transfer of, or energy recovery, material recovery and recycling from solid wastes, including but not limited to dumps, landfills, sludge lagoons, sludge treatment facilities, disposal sites for septic tank pumping or cesspool cleaning service, transfer stations, energy recovery

facilities, incinerators for solid waste delivered by the public or by a collection service, composting plants and land and facilities previously used for solid waste disposal at a land disposal site. ORS 459.005 (8)

What is a regional disposal site?

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. ORS 459.005 (22)

What is a landfill cell?

Landfill cell means a discrete volume of a landfill which uses a liner system to provide isolation of solid waste from adjacent cells of solid waste. (RI 250-RICR=140-05-1)

For a more detail explanation of Coffin Butte liner cells, please reference the 2021 Coffin Butte Landfill Site Development Plan in Benton County’s materials management document library.

https://www.co.benton.or.us/sites/default/files/fileattachments/community_development/page/8136/2021_cb_site_development_plan_report.pdf

What is the Landfill cell capacity?

A landfill cell capacity is the volumetric measurement of the solid waste cell from the top of waste design grades to the design liner grade in an engineered landfill, usually expressed in cubic yards.

What is the airspace of a landfill cell?

Airspace in a landfill cell is defined as the volume available for waste, daily cover, and interim cover, usually expressed in cubic yards.

What is the size of a cell?

The size of the cell is the area in the plan view of the engineered landfill, usually expressed in acres.

What is the ratio of a solid waste cubic yard to a solid waste ton?

It varies because of the varying densities of solid waste.

As such, Geo-Logic Associates report of Coffin Butte solid waste development plan for Year ending 2021 compared the aerial volumetric survey data in cubic yards at Coffin Butte landfill with the correlating gate tonnage for the same year to derive the ratio for the conversion of solid waste cubic yard to solid waste tons. For all express purposes, Geo-Logic Associates report may be used as a standard for volumetric and area computations of solid waste in Coffin Butte disposal site and engineered sanitary landfill.

What is a Regional Disposal Site Size?

The regional disposal site size is the total land tract areas of the regional disposal site expressed in acreage.

What is Coffin Butte?

Coffin Butte is a regional disposal site and an engineered sanitary landfill in Benton County, north of Corvallis, located off of Coffin Butte Road.

What is a sanitary landfill decomposition cycle?

The sanitary landfill is an engineered facility that separates and confines waste.

Sanitary landfills are intended as biological reactors ([bioreactors](#)) in which microbes will break down complex organic waste into simpler, less toxic compounds over time. These reactors must be designed and operated according to regulatory standards and guidelines (See [environmental engineering](#)).^{Wikipedia}

Usually, aerobic decomposition is the first stage by which wastes are broken down in a landfill. These are followed by four stages of anaerobic degradation. Usually, solid organic material in solid phase decays rapidly as larger organic molecules degrade into smaller molecules. These smaller organic molecules begin to dissolve and move to the liquid phase, followed by hydrolysis of these organic molecules, and the hydrolyzed compounds then undergo transformation and volatilization as carbon dioxide (CO₂) and methane (CH₄), with rest of the waste remaining in solid and liquid phases.

During the early phases, little material volume reaches the [leachate](#), as the biodegradable organic matter of the waste undergoes a rapid decrease in volume. Meanwhile, the leachate's [chemical oxygen demand](#) increases with increasing concentrations of the more recalcitrant compounds compared to the more reactive compounds in the leachate. Successful conversion and stabilization of the waste depend on how well microbial populations function in [syntrophy](#), i.e. an interaction of different populations to provide each other's nutritional needs.:^[4] [Wikipedia](#)

The decomposition cycle of an engineered sanitary landfill undergoes five distinct phases:^[5]^[4] [Wikipedia](#)

Initial adjustment (Phase I)

As the waste is placed in the landfill, the void spaces contain high volumes of molecular oxygen (O₂). With added and compacted wastes, the O₂ content of the landfill bioreactor strata gradually decreases. Microbial populations grow, density increases. Aerobic biodegradation dominates, i.e. the primary electron acceptor is O₂.

Transition (Phase II)

The O₂ is rapidly degraded by the existing microbial populations. The decreasing O₂ leads to less aerobic and more anaerobic conditions in the layers. The primary electron acceptors during transition are nitrates and sulphates since O₂ is rapidly displaced by CO₂ in the effluent gas.

Acid formation (Phase III)

Hydrolysis of the biodegradable fraction of the solid waste begins in the acid formation phase, which leads to rapid accumulation of [volatile fatty acids](#) (VFAs) in the leachate. The increased organic acid content decreases the leachate [pH](#) from approximately 7.5 to 5.6. During this phase, the decomposition intermediate compounds like the VFAs contribute much [chemical oxygen demand](#) (COD). Long-chain volatile organic acids (VOAs) are converted to acetic acid (C₂H₄O₂), CO₂, and hydrogen gas (H₂). High concentrations of VFAs increase both

the [biochemical oxygen demand](#) (BOD) and VOA concentrations, which initiates H₂ production by fermentative bacteria, which stimulates the growth of H₂-oxidizing bacteria. The H₂ generation phase is relatively short because it is complete by the end of the acid formation phase. The increase in the biomass of [acidogenic](#) bacteria increase the amount of degradation of the waste material and consuming nutrients. Metals, which are generally more water-soluble at lower pH, may become more mobile during this phase, leading to increasing metal concentrations in the leachate.

Methane fermentation (Phase IV)

The acid formation phase intermediary products (e.g., acetic, propionic, and butyric acids) are converted to CH₄ and CO₂ by methanogenic microorganisms. As VFAs are metabolized by the methanogens, the landfill water pH returns to neutrality. The leachate's organic strength, expressed as oxygen demand, decreases at a rapid rate with increases in CH₄ and CO₂ gas production. This is the longest decomposition phase.

Final maturation and stabilization (Phase V)

The rate of microbiological activity slows during the last phase of waste decomposition as the supply of nutrients limits the chemical reactions, e.g. as [bioavailable](#) phosphorus becomes increasingly scarce. CH₄ production almost completely disappears, with O₂ and oxidized species gradually reappearing in the gas wells as O₂ permeates downwardly from the troposphere. This transforms the [oxidation–reduction](#) potential (ORP) in the leachate toward oxidative processes. The residual organic materials may incrementally be converted to the gas phase, and as organic matter is composted; i.e. the organic matter is converted to [humic](#)-like compounds. ^{Wikipedia}

What is Coffin Butte sanitary landfill capacity and projected life – longevity?

Below is paraphrased from Geo-Logic Associates site development plan (SDP).

Site life calculations were performed by Geo-Logic Associates for the Coffin Butte Landfill to estimate the overall life span of the landfill and the general schedule needed for construction of the major individual phases.

The site life calculations performed by Geo-Logic Associates are available in their report filed at the below listed webaddress at Benton County:

<https://www.co.benton.or.us/cd/page/materials-management-document-library>

The site life calculations were based on (1) the volumetric capacities of the phases as shown on the Site development plan (SDP) drawings in Appendix A, (2) an operational density of 1,600 lbs/cy, (3) a soil to waste ratio of 15% (for daily cover), and (4) an incoming tonnage of 2,959 tons per day (projected average daily tonnage). The capacity of each phase was volumetrically calculated from the top of waste design grades to the design liner grade using AutoCAD Civil 3D software.

The volume of soil for the operations layer was subtracted from the gross air space. Supporting documentation for the site life calculations are presented in Appendix B.

The net available airspace volume available for disposal in Cell 5D/5E and Cells 6A – 6I, as of the March 30, 2021, topographical map, totals approximately 18,645,000 cy. For the purposes of this report, airspace is defined as the volume available for waste, daily cover, and interim cover.

Soil for daily and intermediate cover is estimated to consume approximately 2,797,000 cy of this volume, with an assumed soil to waste ratio of 15% by volume. Using the above stated parameters, the current fill area was calculated to reach final grades during the middle of the year 2039.

Table 1 summarizes the site life projections for the landfill for open and future cells as well as a partial history of closed cells that needs further research, if needed.

The below table used data for open and future cells from Geo-Logic Associates site development report, while the closed cells where in part supplied by other historical

Information compiled by Benton County in the Materials Management Document library.

	Plan View Footprint (Acres)	Capacity (CY)	Cumulative Capacity (CV)	Total Life of Cell (Years)	Year Capacity is Reached	Status	Remarks
Cell 1						Closed	
Cell 1a						Closed	1977
Cell 2						Closed	2002
Cell 2b	11					Closed	
Cell 2c	14.4					Closed	
Cell 2d						Closed	2011
Cell 3						Closed	2007 Phase 1 2010 Phase 2
Cell 3a	7.5					Closed	
Cell 3b						Closed	
Cell 3c						Closed	
Cell 3d						Closed	
cell 4	14					Closed	
Cell 5a						Closed	
Cell 5b	11					Closed	
Cell 5c	5.5					Closed	
Cell 5D/5E	6.1	4,834,330	4,834,330	4	2025	Open	
Cell 6A	19.8	1,482,260	6,316,590	1	2026	future	
Cell 6B	11.3	1,029,430	7,346,020	1	2027	future	
Cell 6C	4.3	1,742,130	9,088,150	2	2029	future	
Cell 6D	11.0	1,859,820	10,947,970	2	2031	future	
Cell 6E	3.9	1,078,420	12,026,390	1	2032	future	
Cell 6F	5.1	1,686,070	13,712,460	2	2034	future	
Cell 6G	2.4	2,015,260	15,727,720	2	2036	future	
Cell 6H	1.1	1,295,450	17,023,170	1	2037	future	
Cell 6I	1.2	1,622,130	18,645,300	2	2039	future	
Listed	129.6						
Projected	178						
Cells 5D/5E	6.1		4,834,330	4	2025	Coffin Butte	
Cells 6A-6I	21		13,810,970	14	2029	Disposal Site Acres	740

What is cell phasing?

An arrangement of sequencing cell construction for optimum disposal operations for a given cell.

What is synchronization?

The concurrence of events in respect of time

Synchronization is the coordination of events to run a system in unison.

What is equilibrium?

A condition in which all acting influences are canceled by other, resulting in a stable, balanced, or unchanging system.

What is a landfill resource?

Resource is something that is available for use or that can be used for support or help

Cofin Butte disposal site and sanitary lanfill is a practical and benefical resource of Benton County.

Knife River is also a practical and benefical resource of both Benton County and Coffin Butte

What is a transfer station?

Transfer station means a fixed or mobile facility other that a collection vehicle where solid wase is deposited temporarily after being removed from the site of generation but before being transported to a final disposal location.

A transfer station in context with solid waste commercial transfer to disposal sites use an upper structure dump floor for inbound traffic, and then channel the solid waste into a down chute into a compactor on the first floor whereby the solid waste is compacted to a required weight to be placed into a rail container or truck van for forwarding to the disposal site via railway or highway.

What is Intermodal freight transport

Intermodal freight transport involves the transportation of freight in an intermodal container or vehicle, using multiple modes of transportation (e.g., rail, ship, aircraft, and truck), without any handling of the freight itself when changing modes. The method reduces cargo handling, and so improves security, reduces damage and loss, and allows freight to be transported faster. Reduced costs over road trucking is the key benefit for inter-continental use. This may be offset by reduced timings for road transport over shorter distances.

What is a rail intermodal center?

A rail intermodal center (sometimes referred to as an inland port) is an inland intermodal terminal for transloading containers directly to road

carriers or rail carriers for forwarding cargo or merchandize to/from a seaport, or operating as a center for the transshipment of cargo to inland destinations such as rail served solid waste disposal sites locate in Oregon and Washington.

The Mid-Willamette Valley Intermodal Center in Millersburg OR will be opening next month for intermodal freight transport.

What is Sustainability?

Sustainability is simply defined as using, developing, and protecting resources in a manner that enables people to meet current needs and provides that future generations can also meet future needs, from the joint perspective of environmental, economic, and community objectives. (ORS 184.421)

Where Sustainability thrives, so does Longevity. Sustainability is the key to not only community longevity, but also community success and flourishing.

What is Murphys' Law?

Anything that can go wrong will go wrong, and at the worst possible time.

Corn and soybeans harvest shipped from the heartland of America by river barges to seaports at the mouth of the Mississippi risk running aground with low river water levels this year causing barge backups.

What is Plan B?

It takes an average of 3 trains per barge or 1,050 highway trucks per barge to transport the products to and from the seaports.

A ton of bulk product can be transported 675 miles by barge inland on a gallon of fuel, compared to 472 miles by railcar or 151 miles by truck, but the water levels need to be sufficient for water travel.

Needless to say, for coordination of transportation goods, it is perceptive to have alternative transport modes and disposal sites available for work interruptions.

Resolution for Consideration

A. Resources – Synchronization – Cell Reservation - Coffin Butte Landfill

An inquiry and understanding by the Sub-Committee A-1 of the multiple resources are needed that are interwoven with the rate of solid waste going into Coffin Butte's landfill cells.

In other words, there is a synchronization process of three resources that needs to be researched for a potential imbalance of cell reservation at Coffin Butte land fill.

The first resource is the landfill with enumerated solid waste cells designed and allowed for solid waste disposal.

The cells are finite in number, space, and volume for solid waste disposal and are operationally divided into closed, active, and future active cells.

The enumeration of cells, statuses, and capacities is documented in a report by Geo-Logic Associates, professional engineers, of Bend, Oregon for the site development plan of Coffin Butte Landfill, updated December 2021 for Valley Landfills.

This report is in the materials management document library at Benton County's web address: <https://www.co.benton.or.us/cd/page/materials-management-document-library>

Excerpts from the report are listed above in this memo for convenience which illustrates the numbers for the active and future cells and their lifespans based on the design space and volume of each cell. (*Reference table1*)

The intent here for the first resource is not to weigh the solid waste going into the landfill cells into tons, pounds, and ounces, but hopefully the Sub-Committee instead may work on an agreeable cell life expectancy with the design volume capacities that are referenced in the aforementioned report.

Nonetheless, it is to also to recognize any imbalances in the resources that may be resolved equitably within the solid waste management of Benton County, which also includes the regional waste streams going into Coffin Butte landfill from neighboring counties and municipalities.

The second resource is the parcel of lands in the southerly portion of the Coffin Butte disposal site which is also in part reflected in the aforementioned site plan for Coffin Butte but is limited in design and focus.

Customarily, expansion of a land fill is triggered when solid waste input exceeds reservation ability of disposal cells.

In other words, there are no rooms at the inn.

With no vacancies or limited vacancies of cells, it evokes expansion, which in part is the discourse of the workgroup and the sub-committee-2 to seek collective understanding of the processes of solid waste management by incorporating the overarching goals and tenets of sustainability for expansion or other practical options possible as an alternative to expansion of a landfill but realizing also that the landfill is a viable and beneficial resource in both Benton County and neighboring counties and municipalities.

The third resource is the rock and gravel aggregates being quarried in Coffin Butte.

It is not the intent to value one resource over another, but instead seek a balance that assures equity and sustainability of all resources where equilibrium is possible.

Knife River supplies stone, sand, and gravel which are the aggregates of the foundation of Benton County's and Oregon's infrastructure for highways, bridges, railways, airport runways, or even sand for the sandbox at home. Within this context, Knife River is a major resource of aggregate in the community.

Conversely, Knife River appears as the minor resource when compared to Coffin Butte's major resource of municipal solid waste within the perimeters of the landfill.

Although a resource hierarchy comparison may assign one resource to be minor while another resource is major, the interdependency of each other makes the overall homeostasis functionable.

In other words, by design Knife River quarries the rock for the landfill cells to the required sub-grade elevation for Coffin Butte use.

Coffin Butte landfill then builds upon the cell floor with geotextile fabric liner, bentonite, and courses of drain rock before placement of solid waste into the cell until filled, then finishing with soil and fabric top layers to the design elevation for closure of cells.

Equilibrium is kept as long as Knife River has adequate time to quarry the rock thereby keeping ahead of the landfill cells disposal operations.

However, in the site development plan paraphrased below for Coffin Butte reflects the current use of Cells 5D/5E for placement of solid waste has a 4-year cell life reaching capacity in Year 2025.

Likewise, future compartmental Cells 6A -6I slated into the primary Cell 6 being also the Knife River quarry excavation site that needs a reported 8-year more excavation time, even though the site development plan reflects a start date of Year 2026.

In earlier testimony at the planning commission, Knife River alluded quarry production was down due to market conditions and also alleged a possible 8-year more excavation may be needed to reach subgrade elevation for the quarry floor.

Projecting the 8-year timeline below appears to be:

B. Timeline – Work Interruptions

Recapitulating by years, the current Cells 5D/5E service life would be from:	Years 2022 -2025	4 Years
Knife River quarrying of Cell 6 needs an alleged 8 more years to finish	Years 2022- 2029	8 years
Cells 6A-6I then would have a service life from	Years 2029-2042	13 years
Work Interruptions at Coffin Butte for Years 2026-2029 - no cell vacancy	4 years	

Questions: May Geo-Logic Associates with Republic agreement and the Sub-committee A-1 consensus reaffirm with the existing LiDAR survey data updated December 2021 to compute with their AutoCad Civil 3D the volume of quarry rock needed to be excavated to reach the design cell floor elevation in Cell 6?

With the quantity rock volume yardage then known, can Kinfe River with Republic agreement and Sub-Committee A-1 consensus reaffirm the years Kinfe River needs to excavate the yardage?

Contingent on the above, a more in depth inquiry may be needed for a practical resolution for the work timeline interruptions, if any.

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