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DEPARTMENT OF ENVIRONMENTAL QUALITY
LAND USE COMPATIBILITY STATEMENT (LUCS)

WHAT IS A LUCS? The LUCS is the process DEQ uses to determine that DEQ permits and other approvals that affect land use are consistent with the local government comprehensive plan.

WHY IS A LUCS REQUIRED? Oregon law requires that state agency activities related to land use be consistent with local comprehensive plans. DEQ Division 18 administrative rules identify agency actions that are defined as programs affecting land use. These programs must have a process for determining local plan consistency.

WHEN IS A LUCS REQUIRED? A LUCS is required for nearly all DEQ permits, some general permits, and certain approvals of plans or related activities that affect land use. These activities are listed in this form. In cases where a source needs more than one DEQ permit or approval, a single LUCS may be used.

A permit modification requires a LUCS when:
- there is a physical expansion on the property or the use of additional land is proposed
- there is a significant increase in discharges to water
- there is a relocation of an outfall outside of the source property, or
- there is any physical change or change of operation of an air pollutant source that results in a net significant emission rate increase as defined in OAR 340-28-110.

A permit renewal requires a LUCS if one has not previously been submitted, or if one of the above four permit modification factors apply.

HOW TO COMPLETE A LUCS:
- The LUCS form is included in the DEQ permit application or approval packet.
- Applicant fills out Section 1 of the LUCS and then submits it to the city or county planning office.
- The local planning office determines if the business or facility meets all local planning requirements.
- The local planning office must attach written findings of fact for local reviews or other necessary planning approvals that are required of the applicant.
- The applicant includes the completed LUCS and attachments with the permit application or approval submittal.

WHERE TO GET HELP: Questions on the LUCS are to be directed to region staff responsible for processing the source permit or other approval application or, to Management Services Division at 800-452-4011 or (503) 229-6408.

SECTION 1 - TO BE FILLED OUT BY APPLICANT

1. Name of applicant Valley Landfills, Inc. Contact person Bill Webber
   Telephone 541-745-2018

Mailing address: Coffin Butte Landfill
28972 Coffin Butte Rd.
Corvallis, Oregon
97330

Location address: Coffin Butte Landfill
28972 Coffin Butte Rd
Corvallis, Oregon
97330

Tax Lot# 1106 + 301 10S 4W 18

Tax Acct.# _____ Tax Lot # 1000 Township 10S Range 5W Section 13

Latitude 44° 42 min. Longitude 123° 14 min.

2. Describe type of business or facility and the services or products provided:
   Disposal of Municipal Solid Waste

****PLEASE NOTE: Applications submitted without a completed LUCS are considered incomplete and can not be processed until the LUCS is received with proper signatures.**

3. Circle the type of DEQ permits or a[illegible]vals being applied for at this time:

Air Notice of Const.	(SW Disp/Auth Permit)	Fed. Permit WQ Cert.
Air Discharge Permit*	Waste Tire Storage Permit	WQ NPDES/WPCF Permit**
Title V Air Permit	HW/PCB Storage/Trmt/Disch Permit	WQ Stormwater General Permit
Air Indirect Source Permit	Pollution Control Bond Request	Wastewater/Sewer Facility Plan***
Parking/Traffic Circ. Plan	Wastewater Revolving Loan Request	Other WQ General Permit #_____****

*excluding portable facility permits ** for on-site const-installation permits use DEQ form F:\WLANDUSE.OSS
*** includes review of plan changes that require use of new land **** general permits 600,700,1200CA and 1500 are exempt

4. This application is for a: new permit___ permit renewal X permit modification___ other_____

SECTION 2 - TO BE FILLED OUT BY CITY OR COUNTY PLANNING OFFICIAL

5. The facility proposal is located: ___inside city limits ___inside UGB ✓ outside UGB

6. Name of city or county that has land use jurisdiction*: _____
*"Jurisdiction" means the legal entity that is responsible for land use decisions for the subject property or land use.

7. The business or facility complies with all applicable local land use requirements: ___yes ___no

7a. List all local reviews or approvals that were required of the applicant before the LUCS consistency was determined *(This does not include past requirements that do not relate to the pending DEQ permit request.)*:

7b. If no, identify reasons for noncompliance or list requirement(s) that the applicant must comply with before LUCS consistency can be determined:
Land use compatibility at the land fill is contingent on the continued compliance with all other county codes and agreements including but not limited to Benton County Code Chapter 23, the operators franchise agreement, and the Environmental Trust Agreement

7c. Is local government currently processing remaining requirements to attain LUCS consistency: ___yes ✓ no
Anticipated date of decision _____

7d. Is a public notice and hearing required? ___yes ✓ no hearing date_____

8. Planning official reviewer's telephone number: 541-766-6819

SIGNATURES

_____ Peter Idema Title Planning Director Date 12-20-00
Planning official (print planning official's name)

_____ _____ Title_____ Date_____
Planning official (print planning official's name)
(depending upon city/county agreement on jurisdiction outside city limits but within UGB)

ATTENTION: A LUCS approval cannot be accepted by DEQ until all local requirements have been met. Written findings of fact for all local decisions addressed under 7 thru 7b must be attached to the LUCS.

X:\DAL\BRYOUNG\LUCS\WP51 WPS 1/23/15

located from WQ 7/8/10 FHC
+ scanned to Art Mains@CIS

Evaluation and Overview
Coffin Butte Landfill – Permit 306

Oregon Department of Environmental Quality
Western Region - Eugene Office
165 E. Seventh Ave, Suite 100
Eugene, OR 97401

April 16, 2020

Contact: Hugh Gao, 503-378-4977, gao.hugh@deq.state.or.us

Proposed Permit
The Department of Environmental Quality proposes to issue a solid waste renewal permit for the landfill. The facility is an active municipal solid waste disposal landfill. This permit authorizes the permittee to operate and maintain to the facility.

A DEQ solid waste permit for this facility was initially issued on June 3, 1985, and the current permit expires on July 31, 2020. The permit is administratively extended until action is taken on the proposed renewal application.

Permit Writer
Hugh Gao
Western Region –Salem Office
503-378-4977
gao.hugh@deq.state.or.us

Permit Category
Solid waste disposal site – Municipal Solid Waste Landfill Permit Application

Activities Covered Under this Permit
The facility is an active municipal solid waste disposal landfill. This permit authorizes the permittee to operate and maintain to the facility.

Source Location
Coffin Butte Landfill
28972 Coffin Butte Road
Corvallis, OR 97330
Section 13&18, T10S, R5&4W, Benton County

Coverage and Eligibility
The permit is effective on the date it is signed by DEQ and is proposed to expire on June 30, 2030. The permit is issued in accordance with the provisions of Oregon Revised Statutes Chapter 459; Oregon Administrative Rules 340 Divisions 93, 95 and 97 and subject to the Land Use Compatibility Statement issued by Benton County dated Dec. 20, 2000, as referenced in the permit.

Introduction: What is DEQ Proposing?
DEQ is proposing to issue a Solid Waste Disposal Renewal Permit for the Coffin Butte Landfill.

The facility is an active municipal solid waste disposal landfill. This permit authorizes the permittee to operate and maintain to the facility.

Conditions contained in the permit and DEQ-approved landfill Operation Plan require activities conducted at the disposal site to be implemented in a manner that protects the environment.

Regulatory Context
Oregon Revised Statutes Chapter 459 requires a DEQ permit for any solid waste disposal site. OAR Chapter 340 Divisions 93-97 provides further clarification of requirements for permitted facilities.

Permit and Site History
The Coffin Butte Landfill disposal site has been permitted by DEQ since 1985. The proposed permit renewal will extend the permit for approximately 10 years.

The most recent permit for the site was issued on Nov. 24, 2010, which expires on July 31, 2020. On Dec. 12, 2019, Valley Landfills, Inc. applied for a renewal permit for this facility.

Coffin Butte Landfill is a regional landfill. Based on the historical records, approximately 80 percent of the waste comes from a four-county area consisting of Benton, Linn, Lincoln, and Polk counties. Another 10 percent of the waste comes from Marion County. The remaining 10 percent of the waste comes from Lane, Yamhill, Douglas, Washington and Clackamas counties. Historically the landfill has also served Tillamook County.

The Coffin Butte Landfill began accepting waste around 1945. The landfill was originally developed to serve the old Camp Adair Army Base and later was expanded to serve Benton County and the Albany area. Plans for these early operations are not available; however, the operations were located on the western boundary of the current landfill complex (on Tax Lot 1000). The total filled area was approximately 23 acres, and these operations were phased out upon Valley Landfills, Inc. acquiring control of the site in the mid 1970's.

Landfill Cell Construction and Development
Valley Landfills, Inc. started their operation with Cell 1a (industrial landfill cell formerly referred to as the Wah Chang area) which received waste from 1977 through 1985. Cell 1, which is located east of Cell 1a, accepted waste from 1978 through early 1993. Cell 1 is approximately 30 acres in size. Cell 1a is 4.5 acres in size. Cell 1a was completely covered and closed in 1996. Cell 1 was partially closed (7.4 acres) in 1991. Additional 9.7 acres on the south and west sides of Cell 1 was closed in 1996. The cover system over the interim cover consisted of topsoil, vegetative layer, drainage layer and geomembrane liner. The final thickness of the combined vegetative layer and topsoil were not less than 18 inches. Cell 1 was partially closed (9.7 acres on the south and west sides). The eastern slope of Cell 1 has in interim cover. A future cell (Cell 3) is proposed to be constructed over and against the eastern slope. The plans and specifications and the Construction Quality Assurance Manual for the closure of Cell 1a and partial closure of Cell 1 were approved on June 21, 1996.

At the time of construction, Cells 1 and Cell 1a were not required to have a liner and leachate collection and removal system. Based on an older design, Cell 1a is unlined and is not provided with a leachate collection and removal system.

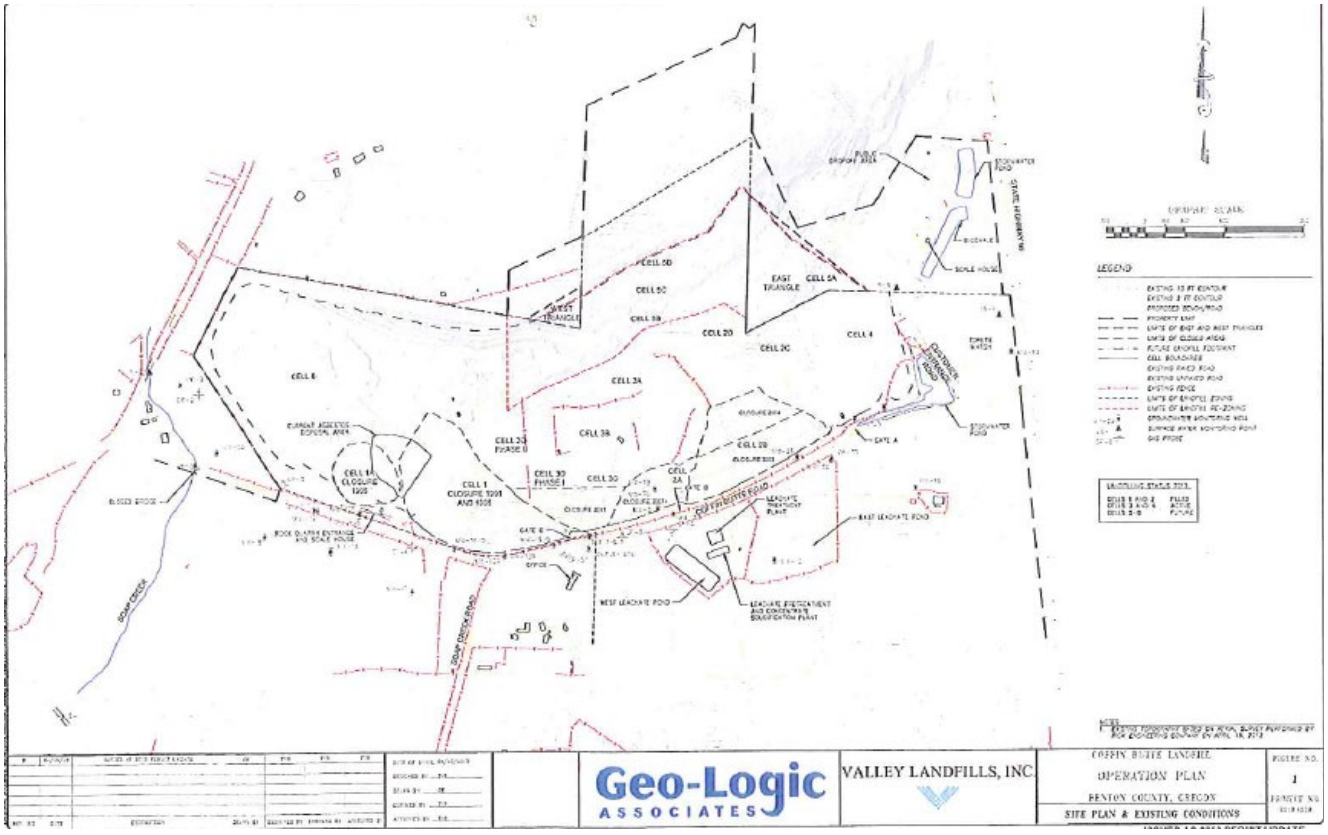
Valley Landfills, Inc. opened up the Cell 1 landfill area using the state-of-the art pollution control designs. This involved construction of a compacted bottom soil liner using naturally occurring onsite silty clay and clay soils with the bottom sloped to drain to a leachate collection line constructed along the downgradient toe of the fill. A key site containment berm was provided around all basal areas, and the fill progressed as a series of terrace lifts that were developed along the edge of Coffin Butte Road and back into the southwestern areas of Coffin Butte. Passive gas collection systems were provided with each terrace lift and were vented to the atmosphere. Upon completion of Cell 1 in early 1993, the operations relocated to Cell 2 east to a new cell.

During this time, the mode of disposal has shifted from an open burning dump in an old quarry to a modern landfill with a high-quality liner system and a leachate collection system in compliance with requirements and rules.

Cell 2a, which was constructed with a composite clay/geomembrane liner system in 1987, began receiving waste in late 1992. Cell 2a incorporated a leachate collection system. Cell 2b was constructed and began receiving waste in 1993. Cell 2c was constructed and began receiving waste in 1995. Electrical resistance moisture monitoring sensors were installed as part of the Coffin Butte Cell 2C bottom liner. However, the

sensors did not work properly, and readings indicated that the geosynthetic clay liner was hydrating at an excessive rate even in areas where waste was not yet placed. Excavation in one location and visual observation indicated that the liner system was performing well and that the geosynthetic clay liner was staying dry as designated. Therefore, in November 1996, DEQ approved the discontinuing of monitoring of the geosynthetic clay liner moisture sensor and the permanent abandonment of the related monitoring network. Cell 2d was constructed and began receiving waste in 1997.

Cells 2b, 2c and 2d were constructed with a double liner system, incorporating a secondary leachate collection system. The primary leachate collection system is used for leachate collection while the secondary system is used as a leak detection system. Cells 2c and 2d also have a ground water relief underdrain, and an alternative bottom liner design geosynthetic clay liner that affects slope stability analyses. The degree of hydration of the geosynthetic clay liner governs the stability of the landfill. The landfill liner was designed with an underdrain blanket layer and pipe network to continue to allow groundwater to gravity drain below the landfill.



The liner system tie-ins of Cell 2c with Cells 2a and 2b encountered several problems due to heterogeneity of liner system make-up. Stormwater entered the Cell 2b LDS. A routine quarterly monitoring in 1996 indicated that a leak occurred. During the summer of 1997 and 1998, corrective action measures were implemented to reconstruct the entire east and south side of Cell 2b and east side of Cell 2c. The primary and secondary geomembranes were extrusion-welded together along these areas. New soil components were installed to reconstruct the composite liner systems, including the leak detection system layer and leachate collection system layer. The Cell 2b clay liner was replaced with new geosynthetic clay liner. Also, a 6-foot-high containment berm was constructed along the east side of Cell 2b and part of Cell 2c. A gravel-filled toe drain was installed in the waste along the entire south side of Cell 2. Finally, approximately 60 feet of primary and secondary geomembranes were extrusion welded along the west side of Cell 2c.

Cell 3 is located west of Cell 2 and constructed over the existing leachate lagoon and against the eastern slope of Cell 1. This disposal Cell 3 was developed in parts: Cell 3a, Cell 3b (Phase I and II), Cell 3c (Phase I and II), and Cell 3d (Phase I and II).

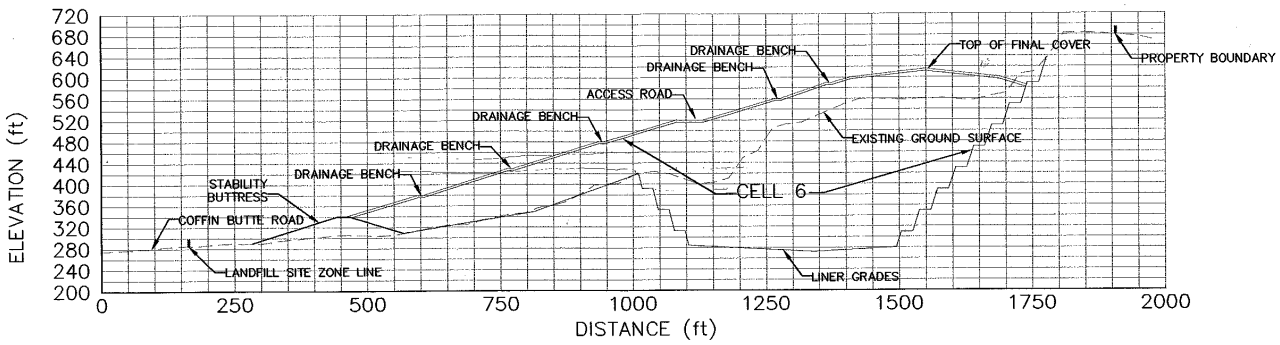
Cell 4 is located east of Cell 2. The landfill liner system has been constructed through Cell 5 (5a, 5b, and 5c). Cell 5 is located north of Cells 2, 3 and 4. The Cell 5c was the latest disposal cell constructed and approved for use in September 2019. The Cell 3 (a, b, c, and d), Cell 4, and Cell 5 (a, b, c) are designed and constructed using current engineering technologies, and meet the standards specified in Sub-Title D requirements. The cells are equipped with a dual liner system, a leachate collection system, and a landfill gas extraction system. The landfill gas collection system consists of a series of gas extraction wells, well laterals and valves, and main headers that deliver landfill gas to a Landfill-Gas-to-Energy-Facility in the southeast part of the site. The system actively removes landfill gases from the landfill and is expanded as the landfill expands.

Cell 5d, Cell 5e, and Cell 6 will also be designed and constructed using current engineering technologies to meet standards specified in Sub-Title D requirements. These cells will be immediately located at south edge of the Butte projected in the 2000 Site Development Plan. As estimated, construction of Cells 5 (d and e) and Cell 6 would occupy approximately 71 additional acres, for a total footprint area covered of approximately 184.7 acres.

The cell's subgrade would be excavated into the butte by the rock quarrying. The quarrying activities would create near vertical faces and benches (40 feet vertical and 20 feet wide) on the north rock wall of the quarry. The quarrying activities are regulated by the Oregon Department of Geology and Mining Industries (DOGAMI).

According to Site Development Plan 2013 updated by Theil Engineering, the landfill capacity and life projections for the Coffin Butte Landfill are presented that there was approximately 24.8 million cubic yards of airspace remaining as of May 23, 2013. Using an effective waste density of 0.8 tons/cubic yard1, and a disposal rate of 475,000 tons per year, and allowing for some slope settlement, results in an estimated life of approximately 42 years. Therefore, the landfill is estimated to reach its full capacity in 2055.

The rock wall on the south side of the butte would be 100 feet south from the property boundary line, and down toward south with a slope of approximate 53 degrees, as show in the drawing in the plan (figure below). The liner system would be installed at the rock wall on the bench anchors.



The quarry reclamation plan is to convert the quarry into additional landfill space for future cells as approved by DOGAMI.

Rock quarry operations occurred at the west end of Coffin Butte before 1977. Coordination between the rock quarry and landfill operations have resulted in a plan to remove the old, closed landfill to allow quarry expansion. This will result in a potential footprint for future landfill airspace.

With a workplan approved by DEQ on Jan. 23, 2019, the landfill has excavated to clean up the "burn dump" area, formally known as army landfill, located in the westernmost portion of the site's zoning boundary at the landfill. This old disposal area is an unlined cell with an unengineered soil cover, which has been identified to contain non-hazardous waste as indicated in a site investigation report. Disposal of the excavated waste from

the area is allowed into an active filling area, most likely in the Cell 5c at this time, according to the Work Plan. The cleaned-up area will be developed into a future cell(s) (likely a portion of Cell 6) as planed in the Site Development Plan.

The original leachate management design consisted of two lagoons lined with compacted clay at the facility. In 1993, the two lagoons were combined into one large (15-million gallon) lagoon and reconstructed with a double-geomembrane lining and leak-detection system installed over the existing clay liner. In 1996, the perimeter of the lagoon was raised three feet for an additional 5-million-gallon capacity. A new 5 million-gallon leachate collection pond was constructed to provide additional volume for leachate storage in 2004.

Environmental Monitoring

Groundwater near the Coffin Butte landfill site has been monitored for more than 30 years. The geological units at this site include Willamette Silts overlying weathered bedrock, which consists primarily of marine basalt.

The water quality monitoring network has five components:

(1) groundwater monitoring wells, which include compliance and detection wells
(2) water level observation wells and piezometers
(3) the secondary leachate collection system
(4) leachate sumps
(5) surface water monitoring points
(6) In addition to water quality, landfill gas is monitored at probes surrounding the landfill, and in buildings or structures near the landfill.

According to the Environmental Monitoring Plan (Tuppan, 2014), the water quality monitoring locations are summarized on Table 3-1. A summary of the well construction, survey information, and lithologic completion interval is provided in Table 3-2. Well construction diagrams and boring logs are provided in Appendix B.

Compliance wells monitor groundwater along the compliance boundary as defined in the solid waste permit. These wells are used to assess achievement in meeting remedial action concentration limits (west side) and the compliance of groundwater quality with concentration limits (east side) under the detection monitoring program. Compliance locations include well pairs immediately downgradient of Cells 1 and 1a along Coffin Butte Road (west side), two wells approximately 200 feet downgradient of the closed landfill, and monitoring wells MW-26 and MW-27 which are downgradient of Cell 4 and serve as the compliance wells for the multiunit east-side landfill (Figure 3-1).

Detection wells monitor groundwater near potential sources of contamination and at other critical locations throughout the facility, thereby augmenting the monitoring network. Water quality data from wells next to waste management units (e.g., MW-23 and MW-24) give an indication of potential contamination before it reaches the compliance boundary. Other wells with this designation provide water quality information for background, and domestic use (to verify drinking water quality).

Groundwater wells and piezometers that are not designated as compliance or detection monitoring wells are used primarily to collect groundwater level data. These assist in evaluating the direction and rate of groundwater flow at the facility. Locations are shown on Figure 2-1.

During comprehensive split sampling events, selected observation wells are sampled to better understand water quality along the perimeter of the landfill. Data have, in the past, been acquired from these monitoring points, but they are not critical for assessing compliance with the permit or for tracking constituent trends near source areas.

Surface water is monitored upstream (S-1) and downstream (S-2 and S-4) in Soap Creek to test for potential impacts from the landfill or from residual impacts from past leachate spray irrigation on the west side of the facility. Location S-3 was eliminated for Cell 4 construction, and monitoring on this side of the landfill is directed toward the stormwater sampling locations required by DEQ's General 1200-Z Permit. Five other sites

monitor landfill or leachate pond underdrains where groundwater collected from the drainage layer beneath newer cells discharges to surface water. These are identified as S-U3 (Cell 3), S-U4 (LDS-ELP), S-U5 (LDS-WLP), S-U6 (Cell 4), and S-U7 (Cell 5). Locations are shown on Figure 2-1.

The secondary leachate collection system underlies each of the landfill cells, beginning with Cell 2b, and the leachate ponds. It is designed to collect liquid that enters between the primary and secondary liners of each unit. It was previously referred to as the leak detection system, and sampling point designations retain the leak detection system identifier for continuity in the database and on-site drawings:

- Landfill Cells 2b, 2c, 2d (LDS-2B)
- Cell 3 (LDS-3)
- Cell 4 (LDS-4)
- Cell 5 (LDS-5)
- East and West Leachate Ponds (LDS-ELP and LDS-WLP)

The presence of liquid is checked routinely either by bubbler (Cell 2b, Cell 3) or transducer (Cell 4, Cell 5) or by recording the liquid volume removed (LDS-ELP and LDS-WLP). When present, liquid is pumped out (to the respective sump or leachate pond) and the volume recorded. A detailed description of the SLCS monitoring points is provided in the SAP (Appendix C).

Samples of leachate from individual sumps in Cell 1 (L-1), Cell 2 (L-2B), Cell 3 (L-3), Cell 4 (L-4), and Cell 5 (L-5) were historically collected to assess leachate constituents that might be detected in groundwater or in the secondary leachate collection system beneath possible source areas. Samples were collected from stopcocks connected in-line with the sump discharge pipe. Beginning with this Environmental Monitoring Plan, VLI began to collect a composite sample of leachate from the currently active leachate pond (L-Pond) rather than samples from each of the five sumps. A review of historical leachate data collected from each of the sumps shows generally comparable quality (Appendix F) and for the purpose of characterizing the range of possible constituent concentrations, one composite location is sufficient.

Valley Landfills routinely monitors a total of six landfill gas probes (GP-2 through GP-6) around the perimeter of the landfill (Figure 2-1), in addition to the interior of eight site buildings and structures. Monitored parameters include lower explosive limit, methane and oxygen. Landfill gas probes are monitored to:

- Evaluate the performance of the landfill gas control measures.
- Provide accurate, representative field measurements of methane and oxygen concentrations away from the landfill.
- Monitor the effectiveness of landfill gas migration control wells.

Additional monitoring to evaluate the efficiency of the landfill gas recovery and control system is performed routinely by operators (Pacific Northwest Generating Cooperative) of the gas-to-electric plant.

Alternative Daily Cover Material

Due to the shortage of soil at the landfill, DEQ approved Coffin Butte Landfill to use shaker screen residuals as alternative daily cover material for long term use, after an evaluation of a 12-month trial period. The application of the material demonstrated that it was adequate for use as cover material, comparable to soil. The material is from WRI (Wilsonville) Material Recovery Facility with an average particle size between one eighth and one inch (1/8 to 1 inch) – a supplemental material, mixed at a 4:1 ratio with earthen materials (e.g. onsite soils). The permittee proposed to use other materials such as auto shredder residue material and roofing material as alternative daily cover material. Despite the fact that applications for testing auto shredder residuals and roofing materials as alternative daily cover material were approved for trial periods in 2008, the permittee never had the opportunity to test these materials, due to unresolved issues from the material's supplier. The permittee was informed that an application for this particular material use for alternative daily care material needs to be resubmitted to DEQ for review and approval based on current requirements and policies if the permittee intends to test these materials in future.

A trial application submitted to DEQ for 12 months testing of combustion ash from the Covanta incinerator, and a report for the ash test provided operational and monitoring results upon the ash test completion. The trial period started after DEQ approved the application on March 4, 2011 and was completed in February 2012. DEQ approved the landfill to use combustion ash from Covanta incineration facility in May 2012.

Compliance History
The most recent site inspection was conducted on Oct. 11, 2019 and no violations were noted during that inspection. There have been no significant violations documented and no formal enforcement actions have been taken by DEQ for this site during this 10-year permit cycle.

DEQ's Recommendation Regarding the Permit Renewal
Based on a review of all issues and site visits, I recommend the draft permit be placed on public notice for comment.

State of Oregon Department of Environmental Quality

SOLID WASTE DISPOSAL SITE PERMIT:

Municipal Solid Waste Landfill

Oregon Department of Environmental Quality
165 E. Seventh Ave., Suite 100
Eugene, OR 97401-3049
541-687-7465

Issued as authorized by ORS 459.245 and in accordance with the provisions of Oregon Revised Statutes Chapter 459, 459A, Oregon Administrative Rules 340 Divisions 64, 90, 93, 95, 96 and 97 and subject to the Land Use Compatibility Statement referenced below.

ISSUED TO:

Valley Landfills, Inc.
28972 Coffin Butte Road
Corvallis, OR 97330

541-745-5792

FACILITY NAME AND LOCATION:

Coffin Butte Landfill
28972 Coffin Butte Road
Corvallis, OR 97330

Section 13&18, T10S, R5&4W, Benton County

OWNER:

Valley Landfills, Inc.
28972 Coffin Butte Road
Corvallis, OR 97330

541-745-5792

OPERATOR:

Coffin Butte Landfill
28972 Coffin Butte Road
Corvallis, OR 97330

541-230-5546

ISSUED IN RESPONSE TO:

- Solid waste permit renewal application received Dec 6, 2019
- Land Use Compatibility Statement from Benton County dated Dec. 20, 2000.

The determination to issue this permit is based on findings and technical information included in the permit record.

ISSUED BY THE OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY

Brian Fuller
Material Management Manager
Western Region

July 28, 2020
Date

Permitted Activities

Until this permit expires or is modified or revoked, the permittee is authorized to establish, operate, and maintain a solid waste land disposal site in conformance with the requirements, limitations, and conditions set forth in this document, including all attachments.

TABLE OF CONTENTS

INTRODUCTION

This document is a solid waste permit issued by the Oregon Department of Environmental Quality in accordance with Oregon Revised Statutes (ORS) 459 and Oregon Administrative Rules (OAR), Chapter 340.

PERMIT ADMINISTRATION

1.0 PERMIT ISSUANCE

1.1 Permittee

This permit is issued to Valley Landfills, Inc.

1.2 Permit number

This permit is DEQ Solid Waste Permit Number 306.

1.3 Permit term

The permit is issued on the date it is signed. The permit's expiration date is June 30, 2030.

1.4 Facility type

The facility is permitted as a municipal solid waste landfill.

1.5 Facility owner/ operator

The owner of this facility is:

Valley Landfills, Inc.
28972 Coffin Butte Road
Corvallis, OR 97330

The operator of this facility is:

Valley Landfills, Inc.
28972 Coffin Butte Road
Corvallis, OR 97330

1.6 Basis for permit issuance:

This permit is issued based upon the following documents submitted by the permittee:

- Solid waste permit application received Dec. 6, 2019
- Land Use Compatibility Statements from Benton County dated Dec. 20, 2000

1.7 Definitions

Unless otherwise specified, all terms are as defined in OAR 340-093-0030.

1.8 Legal control of property

The permittee shall at all times maintain legal control of the disposal site property; including maintaining a current permit, contract or agreement that allows the operation of the facility if the site is not owned by the permittee.

1.9 Submittal & notification address

Unless otherwise specified, all submittals and notifications to DEQ under this permit must be sent to:

Oregon Department of Environmental Quality
Manager, Materials Management Program
165 E Seventh Ave., Suite 100
Eugene, OR 97401-3049

Telephone: 541-687-7465

All submittals must include, at a minimum, one paper copy and one electronic copy in a format that is approved by the DEQ project manager. Note that some submittals may require more paper copies. Therefore, the permittee must confirm with the permit manager how many copies are necessary prior to submittal of a document.

Note: Whenever possible, the permittee should submit two-sided paper copies of all reports. DEQ may accept electronic submittals for portions of some reports, as approved in the Environmental Monitoring Plan or by DEQ.

2.0 DISCLAIMERS

2.1 Property rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights.

2.2 Department liability

DEQ, its officers, agents or employees do not sustain any liability on account of the issuance of this permit or on account of the construction, maintenance or operation of facilities pursuant to this permit.

3.0 AUTHORITY

3.1 Ten year permit

This permit is issued for a maximum of 10 years as authorized by Oregon Revised Statutes 459.245 (2).

3.2 Documents superseded

This document is the primary solid waste permit for the facility, superseding all of other solid waste permits issued for Coffin Butte Landfill by DEQ.

3.3 Permittee responsibility and liability

Conditions of this permit are binding upon the permittee. The permittee must conduct all facility activities in compliance with the provisions of the permit. The permittee is liable for all acts and omissions of the permittee's contractors and agents in carrying out the operations and other responsibilities pursuant to this permit.

3.4 Other compliance

This permit's issuance does not relieve the permittee from the responsibility to comply with all other applicable federal, state, or local laws or regulations, including the following solid waste requirements, and any future updates or additions to these requirements:

- Solid waste permit application received Dec. 6, 2019
- Oregon Revised Statutes, Chapters 459 and 459A
- Oregon Administrative Rules Chapter 340
- Any documents submitted by the permittee and approved by DEQ

3.5 DEQ access to disposal site

The permittee shall allow representatives of DEQ access to the disposal facility at all reasonable times for the purpose of making inspections, surveys, collecting samples, obtaining data and carrying out other necessary functions related to this permit.

Reference: OAR 340-093-0050(6).

3.6 Penalties

Violation of permit conditions will subject the permittee to civil penalties of up to $25,000 for each day of each violation.

Reference: ORS 459.995(1)(a)

4.0 PERMIT MODIFICATION

4.1 Five year review

In the permit's 4th to 6th year, DEQ will review the permit and amend it if necessary. DEQ will consider the following factors in making this determination:

- Compliance history of the facility
- Changes in volume, waste composition, or operations at the facility
- Changes in state or federal rules which should be incorporated into the permit

- A significant release of leachate or landfill gas to the environment from the facility
- Significant changes to a DEQ-approved site development plan, and/or conceptual design
- Other significant information or events

4.2 Permit modification

DEQ or the permittee may, at any time during the permit's term, propose to change the permit.

Once approved by DEQ, any permit-required plans become part of the permit by reference. DEQ may provide notice and opportunity for review of permit-required plans.

4.3 Modification and revocation by DEQ

DEQ may, at any time before the expiration date, modify, suspend or revoke this permit in whole or in part, in accordance with Oregon Revised Statutes 459.255, for reasons including but not limited to the following:

- Violation of any terms or conditions of this permit or any applicable statute, rule, standard or order of the Commission;
- Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts
- A significant change in the quantity or character of solid waste received or in the operation of the disposal site

4.4 Modification by permittee

The permittee must apply for a modification to this permit if there is a significant change in facility operations or a deviation from permitted activities.

4.5 Public participation

DEQ will issue a public notice to inform the public of any significant changes to the permit.

4.6 Changes in ownership or address

At least 10 days in advance, the permittee must report to DEQ any change in the facility's ownership or the permittee's or operator's name and/or address.

Reference: OAR 340-093-0070(6)(a)(A)

ALLOWABLE ACTIVITIES

5.0 AUTHORIZATIONS

5.1 Wastes authorized for receipt

This permit authorizes the facility to accept:

- Solid waste as defined in OAR 340-093-0030(91)
- The following waste, when special handling and management requirements for their disposal are included in a special waste management plan approved by DEQ:
    - Cleanup Materials Contaminated with Hazardous Substances as defined in OAR 340-093-0030(19), in accordance with OAR 340-093-0170
    - Waste requiring special management as defined in OAR 340-093-0190
    - Industrial solid wastes as defined in OAR 340-093-0030(53)

5.2 Authorization of other wastes

DEQ may authorize the permittee to accept other waste if:

- The permittee develops a Special Waste Management Plan and submits it to DEQ for review and approval;
- DEQ approves the Special Waste Management Plan
- The permittee can demonstrate that the materials are not hazardous waste, as defined by state and federal regulations or otherwise a threat to human health or waters of the state.

5.3 Tires for recycling

This permit authorizes the permittee to accept up to 100 whole tires at this facility for storage and removal.

This permit authorizes the permittee to accept up to 2,000 whole tires at this facility for storage and removal if the permittee maintains a continuous contract with a waste tire carrier to remove the tires from the site.

5.4 Salvaging and recycling

This permit authorizes the permittee to conduct salvaging and recycling in a controlled and orderly manner. The permittee must notify DEQ prior to changing salvaging and recycling operations. These operations must be described in the site Operations Plan.

6.0 PROHIBITIONS

6.1 Hazardous waste disposal

The permittee must not accept any regulated hazardous waste.

Reference: 40 CFR 258.20 (b).

In the event discovered waste is hazardous or suspected to be hazardous, the permittee must, within 24 hours, notify DEQ and initiate procedures to identify and remove the waste. Hazardous waste must be removed within 90 days, unless DEQ approves otherwise. The permittee's temporary storage and transportation practices must comply with DEQ rules.

6.2 Liquid waste disposal

The permittee must not accept liquid waste for disposal.

Definition: Liquid waste is waste that does not pass the paint filter test performed in accordance with EPA Method 9095B.

6.3 Vehicle disposal

The permittee must not accept discarded or abandoned motor vehicles, including trailers or mobile homes, for disposal.

6.4 Used oil disposal

The permittee must not accept used oil for disposal.

6.5 Battery disposal

The permittee must not accept lead-acid batteries for disposal.

6.6 Tire disposal

The permittee must not accept waste tires for disposal.

6.7 Recyclable material disposal

The permittee must not landfill or dispose of any source separated recyclable material brought to the disposal site.

Exception: If the source separated material is unusable or not recyclable it may be landfilled. DEQ must agree to such disposal and pre-approve the identified sources of unusable source separated material prior to its disposal.

6.8 Open burning

The permittee must not conduct any open burning at the site.

6.9 Electronic waste disposal

The permittee must not knowingly accept the following covered electronic devices for disposal:

- Computer monitors having a viewable area greater than four inches diagonally
- Televisions having a viewable area greater than four inches diagonally

- Desktop computers
- Portable computers

Reference: Oregon Revised Statutes 459.247 and 459A.300-365.

OPERATIONS AND DESIGN

7.0 OPERATIONS PLAN

7.1 Operations plan submittal

Within 270 days of the permit issue date, the permittee must review and submit any necessary updates to the site Operations Plan to DEQ for review and approval. The updated plan must be consistent with the conditions of this permit. A DEQ-approved plan becomes an integral part of the permit.

7.2 Plan content

The Operations Plan must describe facility operations, including the elements listed below, and demonstrate how the facility will comply with all regulatory and permit requirements:

General Topics	Describe plans or procedures for:
General operations	• Screening incoming waste to detect unauthorized or prohibited waste as required by 40 CFR 258.20(a) • Handling and removing unauthorized wastes discovered at the facility • Managing landfill gas • Managing landfill leachate in compliance with Subsection 9.15 • Recirculating landfill leachate & gas condensate in compliance with Subsections 5.5 and 9.15 • Monitoring landslide stability in compliance with Subsection 9.22 • Designing surface water and erosion control structures • Responding to non-compliance events or situations
Disposal operations	• Placing daily and interim cover • Detecting and preventing the disposal of regulated hazardous waste, and any other DEQ-prohibited waste • Disposing of putrescible waste • Disposal, handling and recordkeeping of cleanup materials contaminated with hazardous substances • Waste unloading and handling • Disposing of special waste • Using, stockpiling and tracking the receipt and use of waste approved for use as alternative daily cover • Reducing and controlling the risk of a landfill fire • Fill progression and phasing that is consistent with landslide stability recommendations, and takes into account other operational considerations
Special Waste Management Plan	• Identifying and characterizing special waste (i.e., waste which requires special management or waste streams not otherwise authorized by this permit) • Identifying the source of all special waste • Determining appropriate handling and disposal procedures • Documenting plan implementation, including waste characterization and location of waste disposition References: OAR 340-093-0190, OAR 340-094-0040[11][b][J]
Ancillary operations	• Waste unloading and handling • Solidifying liquid waste prior to disposal

General Topics	Describe plans or procedures for:
	• Handling and removal of waste tires • Placing and maintaining interim cover over inactive landfill areas • Managing transfer containers
Inspection and maintenance	• Washing equipment • Maintaining leachate and gas collection systems • Maintaining monitoring stations and devices • Periodically inspecting the continuity and integrity of primary leachate collection pipes • Maintaining surface water control structures
Operating record	• Establishing and maintaining the operating record
Contingency	• Backup methods for storing and/or disposing of leachate • Providing fire protection equipment, and arrangements made with local fire control agency • Notifying DEQ about emergencies and fires

7.3 Operations and maintenance manual

Within 60 days of the Operations Plan's approval the permittee must prepare and submit an updated Operations and Maintenance Manual which includes detailed inspection and maintenance procedures and an associated schedule for all facility components that require periodic inspection. The manual must include specific procedures for routine preventative maintenance and repairs and for response to emergency situations. The preventative inspection and maintenance program should address the following equipment and facilities: personnel safety equipment, operating equipment, support facilities, environmental control systems, environmental monitoring systems, and the transportation system. The permittee must keep a copy of the Operations and Maintenance Manual with the Operating Record, readily available for DEQ inspection and review.

7.4 Plan and manual updates

The permittee must update and revise both the Operations Plan and the Operations and Maintenance Manual as necessary to reflect current and future facility conditions and procedures.

The permittee must submit any associated revisions or updates to DEQ for review and approval.

7.5 Plan and manual compliance

The permittee must operate the facility in accordance with the approved Operations Plan and Operations and Maintenance Manual, and any amendments to these documents.

8.0 RECORDKEEPING AND REPORTING – OPERATIONS

8.1 Non-compliance reporting

The permittee must take immediate corrective action for any violations of permit conditions or DEQ rules and notify DEQ.

DEQ response: DEQ may investigate the nature and extent of the compliance problem and evaluate the adequacy of the permittee's corrective action plans.

8.2 Permit display

The permittee must display this permit where operating personnel can easily refer to it.

8.3 Access to records

DEQ must have access, when requested, to all records and reports related to the permitted facility.

8.4 Procedures

The permittee's recordkeeping and reporting procedures are as follows:

Step	Action
1	Keep the Operating Record at the facility or at another DEQ-approved location.
2	Place information required by 40 CFR 258.29 and this permit in the Operating Record.
3	During facility operations, record the daily amount of each waste type received and approved alternative daily cover - qualified waste used for daily cover. Record 0 if the waste is not received. *Identify the following waste types received and categorize them as either in- or out-of-state waste:* • Domestic solid waste and construction and demolition waste • Industrial solid waste • Asbestos • Contaminated cleanup materials (except materials counted as alternative daily cover qualified waste) • Approved alternative daily cover qualified waste received • Other (i.e., specify any waste type not included in the above list).
4	If applicable, every quarter, record the amount of each material recovered for recycling or other beneficial purpose.
5	Submit the information collected in Step 3 above on the Solid Waste Disposal Report/Fee Calculation form provided by DEQ. Pay solid waste fees as required by OAR 340-097. Date due: last day of the month following the end of the calendar quarter.
6	Submit the information collected in Steps 3 & 4 above to the Wasteshed Representative on DEQ provided or approved form. Date due: Jan. 25 of each year.
7	Retain copies of all records and reports for 10 years after their creation.
8	Update all records to reflect current conditions at the facility.

8.5 Submittal address

Send required submittals to:

Oregon Department of Environmental Quality
Materials Management Section
Environmental Solutions Division
700 NE Multnomah St., Suite 600
Portland OR 97232

503-229-5913

9.0 SPECIFIC OPERATING CONDITIONS

9.1 Discovery of prohibited waste

If the permittee discovers prohibited wastes, the permittee must notify DEQ within 24 hours and begin to isolate or remove the waste. In addition, the permittee must take digital photos of the prohibited waste to document its quantity, nature, identity and source.

Within 60 days following the discovery, the permittee must transport non-putrescible, non-hazardous prohibited waste to a disposal or recycling facility authorized to accept such waste, unless otherwise approved or restricted by DEQ. The permittee must obtain DEQ's written approval to store putrescible, non-hazardous, prohibited waste.

9.2 Spills notification

Oregon Revised Statue 466.635 and Oil and Hazardous Materials Emergency Response Requirements, Chapter 340, Division 142 require immediate notification to Oregon Emergency Response System (OERS) after taking any required emergency actions to protect human health and the environment when

oil or hazardous materials are spilled. The spill must be immediately reported to OERS at 1-800-452-0311 if the spill is of a reportable quantity. Reportable quantities include:

- *Any* amount of oil spilled to waters of the state
- Oil spills on land in excess of 42 gallons
- Two hundred pounds (25 gallons) or more of spilled pesticide residue
- Spills of hazardous materials that are equal to, or greater than, the quantity listed in the Code of Federal Regulations, 40 CFR Part 302 (List of Hazardous Substances and Reportable Quantities), and amendments adopted before July 1, 2002.

For a complete list of hazardous materials required to be reported, please refer to OAR 340-142-0050.

9.3 Access roads

The permittee must provide all-weather access roads from the landfill property line to the active operational area and the environmental monitoring stations, and maintain them in a manner that prevents traffic hazards, dust and mud.

The permittee must use appropriate means, including truck washing, as needed to prevent haul trucks from tracking mud on external roadways outside the landfill boundaries. Any truck washing activities must be conducted on a hard surface and any disposal of wastewater must be accomplished in a manner approved by DEQ.

9.4 Unloading area

The area(s) for unloading incoming waste must be clearly defined by signs, fences, barriers or other devices. The permittee must minimize width of the unloading area to the maximum extent practicable.

9.5 Daily cover

At the end of each working day the permittee must cover all solid waste with a six inch, or thicker, layer of compacted soil or with a DEQ-approved, alternative daily cover.

9.6 Interim cover

As specified in DEQ-approved design and operations plans, the permittee must place and maintain interim cover over fill areas that will not receive additional waste for an extended period of time [i.e., greater than 120 days] and actively revegetate, in a DEQ-approved manner, any interim cover that will remain exposed for more than two years.

9.7 Surface water structures

The permittee must maintain all stormwater drainage structures in good functional condition, report to DEQ any significant malfunctions or damage and complete repairs within 60 days of discovery the problem.

9.8 Stormwater pollution control plan

The permittee must update and implement the Storm Water Pollution Control Plan consistent with site conditions and the stormwater permit requirements. Refer to the National Pollutant Discharge Elimination System Stormwater Discharge Permit No. 1200-Z. In addition, the permittee must keep a current copy of the permit in the facility Operating Record.

9.9 Asbestos waste management

The permittee must offload and dispose of friable asbestos-containing solid waste as specified in DEQ-approved Operations Plan, Operations & Maintenance Manual, and in OAR 340-248.

9.10 Leachate management systems

The permittee must operate the disposal site in a manner that deters leachate production to the maximum extent practicable, and construct, operate and maintain in good functional condition all DEQ-approved leachate containment, collection, detection, removal, storage and treatment systems. The permittee must remove leachate continuously from all landfill leachate collection systems, to minimize fluid buildup on the bottom liner and prevent the hydraulic head (fluid depth) from exceeding one foot.

9.11 Leachate surface impoundments

The permittee must: 1) completely contain leachate stored within lined surface impoundments; 2) maintain a minimum dike freeboard of two (2) feet above the maximum leachate level in those impoundments unless otherwise approved by DEQ; 3) fence the impoundments to control public access; and 4) lock all gates when no attendant is on duty. In addition, the permittee must post clearly legible, visible signs that describe the surface impoundment's contents and display the words "no trespassing".

9.12 Litter control

The permittee must at all times minimize windblown litter and collect it quickly and effectively to prevent scattering, nuisance conditions and unsightliness.

9.13 Vector control

The permittee must minimize vectors in the active disposal area, including insects, rodents and birds.

9.14 Air emissions

The permittee must control air emissions, including dust, malodors, air toxics, etc. related to disposal site construction, operation and other activities, and comply with DEQ air quality standards.

9.15 Access control

The permittee must control public access to the landfill as necessary to prevent unauthorized entry and dumping.

9.16 Landfill entrance sign

A prominently displayed sign must indicate the following:

- The name of facility
- The emergency telephone number
- The days and hours of operation
- The authorized and prohibited waste
- The Solid Waste Permit number
- The operator's address
- The consequences to haulers if they attempt to dispose of prohibited materials
- Any other information critical to the safe and efficient operation of the facility.

9.17 Fire protection and reporting

The permittee must provide complete and sufficient protection equipment and facilities in accordance with DEQ-approved Operations Plan.

Arrangements must be made with the local fire control agency to immediately acquire their services when needed. The permittee must implement preventative measures to ensure adequate on-site fire control, as determined by the local fire control agency. Fires must be immediately and thoroughly extinguished.

Fires shall be reported to DEQ within 24 hours.

9.18 Water supply

The permittee must provide water in sufficient quantities for fire protection, dust suppression, establishment of vegetation, and other site operations requiring water.

9.19 Landfill gas management

The permittee must control landfill gas in accordance with the requirements of 40 CFR Parts 51, 52 and 60 and OAR 340-094-0060(4).

9.20 Landfill gas control system operation and maintenance

The permittee must operate and maintain the landfill gas control and monitoring systems in good working order as required to prevent nuisance odors, air emissions and landfill gas migration (see methane compliance limits in Section 18).

If critical landfill gas equipment is significantly damaged or compromised, the permittee must replace or repair that equipment, within 60 days of discovering the problem, and submit a written inspection report to DEQ.

10.0 SITE DEVELOPMENT AND DESIGN

10.1 Site development plan

Within 360 days of the permit issue date, the permittee must submit any necessary update to the long-term Site Development Plan to DEQ for review and approval. Once approved, the plan becomes an integral part of this permit.

Reference: The *Solid Waste Landfill Guidance, September 1996,* describes the basic elements of a Site Development Plan. Organizing the plan in accordance with the Guidance will expedite DEQ's review.

10.2 Baseline design criteria

New municipal landfill waste landfill disposal units must include the following engineering controls:

- A composite liner system, including a DEQ-approved geomembrane liner (at least 60 mils thick for high density polyethylene, and at least 30 mils thick for approved alternative geomembranes) and at least two feet of compacted soil with an in-place permeability of 1 X 10^{-7} cm/sec or less, or a DEQ-approved alternative liner pursuant to 40 CFR Part 258.40(a)(1);
- A primary leachate collection and removal system (LCRS) which fully covers the liner system and maintains a leachate depth of less than a one foot above the liner, per 40 CFR 258.40(a)(2). All leachate collection pipes must be serviceable by clean outs;
- A secondary leachate collection and removal system(s) designed to effectively monitor the overlying composite-liner system's performance and (1) detect and collect leachate at locations of maximum leak probability; and (2) prevent groundwater intrusion and related monitoring biases;
- A leachate collection sump(s) with a double composite liner system and a leak detection and removal system. Each composite liner must meet the minimum design criteria previously cited in this subsection;
- An operations layer that covers and protects the primary LCRS and liner system from physical damage; and
- A leachate surface impoundment (if applicable) with a double liner and leak detection and removal system. One liner must meet the minimum composite liner criteria described above.

10.3 Design plans

At least six months prior to the anticipated construction date for new disposal units, closure of existing units, or development of other ancillary facilities, the permittee must submit engineering design plans to DEQ for review and approval. The design plans must be prepared and stamped by a qualified Professional Engineer with current Oregon registration and specify and/or provide the following:

- All applicable performance criteria, construction material properties and characteristics, dimensions and slopes
- The design basis and all relevant engineering analyses and calculations

10.4 Construction requirements

The permittee must construct all improvements in accordance with:

- The approved plans and specifications
- Any DEQ imposed conditions of approval
- Any future DEQ approved amendments to the plans and specifications
- Construction work must begin within 18 months of plan approval

10.5 Construction documents

Prior to constructing any landfill engineering controls (e.g., final cover, new disposal unit, or other waste containment facilities or improvements), the permittee must submit complete construction documents and receive DEQ's written approval. The construction documents must:

- Define the construction project team
- Specify material and workmanship requirements to guide the constructor in executing work and furnishing products
- Include a Construction Quality Assurance Plan that describes how the project team will monitor the quality of materials and the constructor's work performance and assure compliance with project specifications and contract requirements.

Reference: Follow the current *Solid Waste Guidance* to expedite DEQ review of the construction documents.

10.6 Construction inspection

During construction of a new landfill disposal unit, final cover system, or any other landfill controls or engineered features, the permittee must provide DEQ with a summary and schedule of planned construction activities to facilitate DEQ's inspection and oversight.

10.7 Construction report submittal

Within 90 days of completing construction of a new landfill disposal unit, a final cover system, or other engineering controls, the permittee must submit to DEQ a Construction Certification Report prepared by a qualified independent party. The report must document and certify that the construction of all required components and structures complies with this permit and DEQ-approved design specifications.

10.8 Construction report content

The construction report must include:

- An executive summary describing the construction project and any major problems encountered
- A list of the governing construction documents
- A summary of all construction and construction quality assurance activities
- The manufacturer's written certifications that all geosynthetic materials conform with project specifications
- Test data documenting that soil materials conform with project specifications
- A summary of all construction quality assurance observations, including daily inspection records and test data sheets documenting that materials deployment and installation conform with project specifications
- A description of the problems encountered and the corrective measures implemented
- The designer's acceptance reports for errors and inconsistencies
- A list/description of any deviations from the design and material specifications, including justification for the deviations, copies of change orders and recorded field adjustments, and copies of DEQ's written approvals for deviations and change orders
- Signed certificates for subgrade acceptance prior to placement of soil liner and for acceptance of the soil liner prior to deployment of geomembrane liner
- Photographs and as-constructed drawings, including record surveys of the subgrade, soil liner, granular drainage layer and protective soil layer
- The certification statement(s) and signatures of the construction quality assurance consultant, designer, and facility owner. One of these representatives must be a professional engineer with current Oregon registration.

10.9 Approval to use new disposal units

The permittee must not dispose of solid waste in newly constructed disposal units until DEQ has accepted the Construction Certification. If DEQ does not respond to the Construction Certification Report within 30 days of its receipt, the permittee may place waste in the unit.

11.0 RECYCLING REQUIREMENTS

11.1 Materials

The permittee must provide a place for receiving the following recyclable materials:

☒	ferrous scrap metal	☒	mixed paper
☒	motor oil	☒	non-ferrous scrap metal (including aluminum)

☒	newspaper	☒	corrugated cardboard and kraft paper (brown paper bags)
☒	container glass	☒	tin cans

11.2 Receiving location

The place for receiving recyclable material must be located at the disposal site or at another location more convenient to the population served by the disposal site. The recycling center must be available to every person whose solid waste enters the disposal site.

11.3 Material use

All source separated recyclable materials must be reused or recycled.

11.4 Recycling information

The permittee must provide, to disposal site users, the following recycling information on printed handbills:

- The on-site or off-site location of the recycling center
- The recycling center's hours of operation
- A list of acceptable materials for recycling
- Instructions for preparing source separated recyclable material
- Reasons why people should recycle

11.5 Sign

A prominently displayed sign must indicate the following:

- The availability of recycling at the disposal site or another location

Note: The sign must indicate the recycling center location, if not at the disposal site

- The materials accepted at the recycling center
- The recycling center's hours of operation (if different than disposal site hours)

11.6 Storage

Unless DEQ approves otherwise, all recyclable materials, except car bodies, white goods and other bulky items must be stored in containers.

SITE CLOSURE

12.0 CLOSURE CONSTRUCTION AND MAINTENANCE

12.1 Worst-case closure plan development

Within 90 days of permit issuance, the permittee must develop a conceptual "worst-case" closure plan and a conceptual post-closure plan(s), obtain DEQ approval of the plan(s), and maintain up-to-date copies of these plan(s) in the facility file.

Reference: The plans must comply with 40 CFR, Part 258, Subpart F, and OAR 340-094-0110.

12.2 Notification

The permittee must notify DEQ and receive DEQ approval when the conceptual "worst-case" closure and conceptual post-closure care plans are updated and placed in the file.

12.3 Closure permit

In accordance with OAR 340-094-0100, the permittee must apply for a closure permit at least five years prior to the landfill's anticipated final closure.

12.4 Closure plan approval

At least six months prior to final closure of any portion of the landfill, the permittee must submit detailed engineering plans, specifications, and a closure schedule to DEQ for review and approval.

The design plans must be prepared and stamped by a qualified professional engineer with a current Oregon registration and specify and/or provide the following:

- All applicable performance criteria, construction material properties and characteristics, dimensions and slopes
- The design basis and all relevant engineering analyses and calculations

Reference: The *Solid Waste Landfill Guidance, September 1996,* describes Closure Plan preparation. Following that format will expedite DEQ review of the plan.

12.5 Closure schedule

The permittee must initiate and complete closure of each landfill disposal unit in accordance with 40 CFR 258.60(f)&(g), or an alternate schedule approved by DEQ.

12.6 Final cover

Unless DEQ approves otherwise, the final landfill cover must be:

- At least three feet thick {OAR 340-094-0120(2)(a)}
- Designed to minimize infiltration of precipitation as required by 40 CFR Part 258.60
- Graded to compensate for estimated differential settlement and maintain positive drainage. Final (post-settlement) slopes must range between two percent and 30 percent.

12.7 Vegetation

The permittee must establish and maintain a dense, healthy growth of native vegetation over the closed areas of the landfill consistent with the proposed final use.

12.8 Final cover maintenance.

The permittee must maintain the final surface contours of the landfill cover such that:

- Erosion is minimized and ponding of water is prevented
- The integrity of the cover system is preserved in accordance with the approved plans

The permittee must reconstruct the cover system with approved materials and grade and seed all areas that have settled or where water ponds, and all areas where the cover soil has been damaged or thinned by cracking or erosion. Areas where vegetation has not been fully established shall be fertilized, re-seeded and maintained. Any damage repair or other reconstruction of a geomembrane barrier component in the final cover system shall be conducted in accordance with a construction quality assurance plan approved by the DEQ.

12.9 Slope stability

The permittee must maintain the stability of the landfill slopes and the overall structural integrity of the landfill.

12.10 Deed record

Within 30 days after the disposal site's final closure, the permittee must record a notation on the deed to the facility property as required by 40 CFR 258.60(i) and OAR 340-094-0130(1)(a), and submit a copy of the notation on the deed to DEQ.

13.0 FINANCIAL ASSURANCE

13.1 Financial assurance plan

The permittee must submit an updated financial assurance plan to the DEQ for review and approval and provide financial assurance for the costs of site closure, post-closure care, and potential corrective action. In addition, the permittee must place the plan in the facility file.

Reference: The plan must be prepared in accordance with OAR 340-094-0140. Acceptable mechanisms are described in OAR 340-094-0145.

13.2 Financial assurance required.

The permittee must comply with applicable financial assurance criteria requirements prescribed by OAR 340-094-0140. The permittee must maintain an up-to-date Financial Assurance Plan in the facility Operating Record, and provide financial assurance for landfill closure, post-closure care and, if required, corrective action. The financial assurance provided must:

- Be in the amount required by OAR 340-094-0140(5)
- Be updated, annually, in accordance with OAR 340-094-0140(6)(e)
- Consist of a financial assurance mechanism complying with OAR 340-094-0145

13.3 Recertification of financial assurance.

The permittee must annually review and update their financial assurance in accordance with OAR 340-094-0140(6)(e).

By April 1 of each year, a notarized annual recertification of financial assurance must be submitted to DEQ demonstrating that this review has been completed. If a discount rate is used to estimate costs, the annual update must also include the certifications listed in OAR 340-094-0140(6)(d).

13.4 Use of financial assurance

The permittee must not use the financial assurance for any purpose other than to finance the permitted facility's approved closure, post-closure, and corrective action activities or to guarantee that those activities will be completed.

13.5 Continuous nature

The permittee must continuously maintain financial assurance for the facility until the permittee or other person owning or controlling the site is no longer required by DEQ to demonstrate financial responsibility for closure, post-closure care or corrective action.

ENVIRONMENTAL MONITORING

14.0 SITE CHARACTERIZATION

14.1 Workplan

At least 270 days prior to any new landfill construction or expansion beyond the currently characterized and approved footprint, the permittee must submit two (or more) copies of a detailed workplan to DEQ for review and approval. The workplan must summarize all site characterization completed to date, describe further site characterization that will be accomplished and include at least the following elements:

- A description of the landfill expansion
- A proposal for monitoring all relevant media within the expansion area
- An update to the Environmental Monitoring Plan that reflects all approved changes to the facility
- A detailed description of the planned investigation
- A detailed project schedule

14.2 Site characterization report

Within 180 days of DEQ's approval of the workplan, the permittee must submit at least two copies of the report to DEQ for review and approval. This report must be based on DEQ-approved workplan and any conditions of the approval. The report must be prepared and stamped an Oregon registered geologist or an Oregon registered engineering geologist. The permittee must submit the report and receive DEQ's approval before starting construction or operation of the new landfill area. Once approved, this report and any conditions of approval become an integral part of the permit.

Reference: The *Solid Waste Landfill Guidance, September 1996,* describes the applicable elements of a Site Characterization Report. Organizing the report in that manner will expedite DEQ's review of the plan.

15.0 ENVIRONMENTAL MONITORING PLAN

15.1 Environmental Monitoring Plan Submittal

Within 120 days when requested by DEQ, the permittee must submit an updated Environmental Monitoring Plan to DEQ for approval.

Major changes in updates to the original plan require that the entire plan be submitted as a stand-alone document; at a minimum, this must be done at least once every 10 years. The plan, or any updates to the plan, must be prepared and stamped by an Oregon registered geologist or an Oregon registered engineering geologist. Upon approval, this plan is incorporated into this permit by reference.

15.2 Environmental Monitoring Plan contents

The updated plan must include plans (other than monitoring that is already handled by an NPDES permit) implementing an environmental monitoring program that will characterize potential facility impacts, including leachate collection, containment, treatment and disposal. The updated plan may incorporate parts of the previous approved plan with any changes or additions since that time (i.e., approved permit-specific concentration limits, revised parameter lists, revised schedules and new wells).

The updated plan must include the following contents, as well as applicable elements from the reference document:

- Monitoring Network Design and Construction
- Sampling and Analysis Plan
- Field QA/QC Procedures
- Lab QA/QC Procedures
- Data Analysis and Evaluation
- Report Format and Executive Summary

Reference: The *Solid Waste Landfill Guidance, September 1996,* provides information on applicable elements of an Environmental Monitoring Plan. Following the organizational format provided in the Guidance will expedite DEQ review of the plan.

15.3 Environmental Monitoring Plan revisions and updates

The permittee must revise the current plan as necessary to reflect current and future environmental conditions, facility development and regulatory requirements. A geologist or certified engineering geologist, with current Oregon registration, must prepare and stamp the plan revisions and submit two copies (one printed and one electronic) to DEQ for review and approval.

15.4 Environmental Monitoring Plan public comment period

Plan changes may require a public comment period.

15.5 Long-term monitoring plan

After DEQ approves any Risk-Based Concentration Limits (RBCs), Permit-Specific Concentration Limits (PSCLs), Concentration Limit Variances (CLVs), Action Limits (ALs), or Site-Specific Limits (SSLs), the permittee must update the EMP to reflect the long-term monitoring program and submit the updated plan for DEQ review and approval.

Note: Also see this permit's requirements for establishing PSCLs, ALs, or SSLs and OAR 340-040-0030(4) for procedures to establish CLVs.

15.6 Leak Detection System

Any significant increase in flow rate in the leak detection system (or degradation of water quality) that have not been corrected (or significant progress made) within two years, also require an updated plan submittal. This plan update is required if a statistical analysis indicates that normal monitoring of detection and compliance sampling points have shown a degradation of water quality. The analysis should cover the period of time from before the changes to after the increased leakage (or degradation of water quality) occurred. The updated plan submittal must detail any proposed increases in frequency or parameter monitoring, as well as any additional monitoring points.

15.7 Additional monitoring points

The permittee must incorporate any new or replacement monitoring point or device into the Environmental Monitoring Plan and submit the updated plan to DEQ for review and approval.

15.8 Environmental Monitoring Plan Compliance

The permittee must conduct all environmental monitoring at the facility in accordance with the approved plan, including any conditions of approval, amendments and updates.

16.0 ENVIRONMENTAL SAMPLING REQUIREMENTS

16.1 Notification of sampling events

The permittee must notify DEQ, in writing, at least 10 working days prior to a scheduled sampling event.

16.2 Split sampling events

The permittee must split samples with DEQ at DEQ's request, and schedule split-sampling events with DEQ's laboratory at least 45 days ahead of time.

Oregon Department of Environmental Quality
Laboratory, Groundwater Monitoring Section
7202 NE Evergreen Parkway, Suite 150
Hillsboro, OR 97124
Phone: 503-693-5700 Fax: 503-693-4999

The permittee must conduct the following split sampling events with DEQ:

Fall or Spring 2024 (TBD)
Fall or Spring 2029 (TBD)
Other sampling events if requested by DEQ

16.3 Monitoring schedule

The permittee must refer to the approved EMP for environmental monitoring procedures. Quarterly monitoring benchmarks are defined below:

If sampling in the...	Schedule the sampling event	
	On, or after....	But on, or before...
Winter	Jan. 1	Feb. 28
Spring	April 1	May 31
Summer	July 1	Aug. 31
Fall	Oct. 1	Nov. 30

16.4 Monitoring after Environmental Monitoring Plan approval

The permittee must monitor the facility in accordance with: 1) the approved plan; 2) any conditions of DEQ's approval; and 3) any DEQ-approved amendments and updates.

16.5 Changes in sampling or split sampling

The permittee must submit a written request and obtain DEQ's written approval before changing the sampling program, including sampling frequency, parameters, or locations. Approved changes will become an integral part of the plan.

DEQ reserves the right to add to or delete from the list of scheduled sampling events, sampling locations, and sampling parameters, and to conduct unscheduled sampling or split sampling events.

If the split-sampling schedule changes, DEQ will try to notify the permittee at least 30 days prior to the next scheduled event.

17.0 ESTABLISHING PERMIT-SPECIFIC CONCENTRATION LIMITS (PSCLs), ACTION LIMITS (ALs), CONCENTRATION LIMIT VARIANCES (CLVs) AND SITE-SPECIFIC LIMITS (SSLs)

17.1 Gathering data

The permittee must monitor the designated background wells in accordance with the approved Environmental Monitoring Plan or propose an alternative intrawell approach. Site specific limits (SSLs) exist for several parameters at two wells and remedial action concentration limits exist for additional parameters at some other wells. Background monitoring shall continue until all necessary data sets have been collected, and may be used for creation of additional PSCLs, ALs and/or SSLs for parameters of concern. The permittee then must demonstrate to DEQ's satisfaction that the selected background-data set is valid and unaffected by facility releases.

17.2 Future disposal units or cells

Before using a new landfill unit or cell for waste disposal, the permittee must collect enough samples to determine background groundwater quality. Alternatively, the permittee may develop a program, to be approved by DEQ, for determining background groundwater quality with wells installed at the time of landfill cell construction.

17.3 Statistical analysis

To establish compliance concentration limits (PSCLs, ALs, and SSLs), the permittee must perform statistical evaluations of the monitoring results for each sampling event.

Use methods outlined in 40 CFR 258.53 or other DEQ accepted statistical methods.

References:

The permittee should use methods outlined in Environmental Protection Agency's "Statistical Analysis of Groundwater Monitoring at RCRA facilities" (March 2009) or other DEQ accepted statistical methods. DEQ's 2011 Guidance Document "Developing Concentration Limits at Permitted Solid Waste Facilities" provides some examples of acceptable methods.

17.4 Proposing PSCLs, ALs, and/or SSLs

The permittee must propose for DEQ's review and approval, a PSCL, AL or SSL pursuant to the guidelines specified in OAR 340-040. The proposal must address all required parameters. Once a statistically valid data set (at least nine acceptable data points) are established from the appropriate background well(s), the permittee may generate a PSCL, AL, or SSL for each designated, long-term monitoring parameter.

17.5 Changing PSCLs, ALs, and/or SSLs

If the permittee demonstrates to DEQ's satisfaction that background groundwater quality has significantly changed since the PSCL, AL or SSL was established, and if the change is unrelated to the permitted facility's influence, the permittee can propose to DEQ a revised level for the affected PSCL(s), AL(s) or SSL(s).

17.6 Establishing and changing CLVs

The permittee should refer to DEQ's Groundwater Quality Protection Rules [OAR 340-040-0030(4)] for guidance in establishing and changing Concentration Limit Variances (CLVs).

18.0 ENVIRONMENTAL MONITORING STANDARDS

18.1 Applicable regulatory standard

The permittee must not allow the release of any substance from the landfill into groundwater, surface water, or any other media which will result in a violation of any applicable federal or state air or water limit, drinking water rules, or regulations, beyond the solid waste boundary of the disposal site or an alternative boundary specified by DEQ. Refer to OAR 340-094-0080.

18.2 Compliance points

Compliance wells are defined in the most current site Environmental Monitoring Plan.

18.3 Review of results

The permittee must review the analytical results after each monitoring event according to the protocols established in the most currently approved site-specific Environmental Monitoring Plan.

18.4 Resampling results

Upon receipt of data from resampling, the permittee must review the analytical results according to the protocols established in the most currently approved site-specific Environmental Monitoring Plan.

18.5 Secondary leachate collection system (SLCS)

If the permittee observes liquids in the leak detection system, the permittee must respond in accordance with the approved plan procedures for sampling, analysis and reporting. If testing confirms landfill impacts

in the leak detection or secondary leachate collection system, and that system is compromised as a compliance point, DEQ may require the permittee to install additional detection or compliance wells and conduct further investigations.

The permittee must design each secondary leachate collection system-equipped landfill cell or sub-unit to allow for discrete sampling of the secondary leachate collection system without mixing, co-mingling or compositing of samples with other leachate sources.

18.6 Methane limits

The methane concentration must not exceed:

- Twenty-five percent of methane's Lower Explosive Limit in onsite structures (excluding gas control structures or gas recovery system components)
- Methane's Lower Explosive Limit at the facility property boundary

Note: Methane's Lower Explosive Limit is equal to a concentration of five percent by volume in air.

18.7 Methane exceedance

If methane levels exceed the specified limits, the permittee must:

1. Take immediate steps to protect human health and safety and notify DEQ within 24 hours
2. Within seven days of detection, confirm the measures taken to protect human health and safety (unless DEQ approves an alternative schedule), and describe the methane test results and response measures in the facility operating record
3. Within 60 days of the methane exceedance, develop and implement a remediation plan, incorporate the plan into the monitoring records, and submit a progress report to DEQ.

18.8 Certified environmental laboratory data

To assure the best possible data quality, DEQ requests that the permittee contract with environmental labs certified under the Oregon Environmental Laboratory Accredited Program (ORELAP) or the National Environmental Laboratory Accreditation Program (NELAP). The permittee should include a copy of the lab's certification with every data submittal. Use of an ORELAP or NELAP approved lab will facilitate DEQ's future review of Environmental Monitoring Plan updates, Annual Environmental Monitoring Reports, and RI/FS documents.

19.0 RECORDKEEPING AND REPORTING – ENVIRONMENTAL MONITORING

19.1 Annual Environmental Monitoring Report (AEMR)

Prior to March 31 of each year, the permittee must submit to DEQ two copies (one paper copy and one electronic copy) of an annual monitoring report for the previous calendar year's monitoring period. The report must conform to the format detailed in the approved plan and be prepared and stamped by a geologist or a certified engineering geologist, with current Oregon registration. Extensive ancillary information such as laboratory reports, and the historical analytical database, may be provided only in the electronic copy and not in the printed copy.

Note: The permittee should submit two-sided copies of all reports and may submit electronic submittals of reports.

19.2 Statement of compliance

The Annual Environmental Monitoring Report must include a brief (approximately one-page) cover letter that:

- Compares the analytical results with the relevant monitoring standards (RBCs, PSCLs, CLVs, ALs, or SSLs)
- Documents any exceedances of or federal or state standards for relevant media
- Documents any significant change in water quality, land quality, air quality or methane levels in monitored media

19.3 Annual Environmental Monitoring Report contents

The Annual Environmental Monitoring Report must reflect the facility's current conditions, present accurate data that correspond with the original field and lab data, and include the elements presented in the most recently approved plan.

19.4 Annual leachate treatment report

Prior to March 31 of each year, the permittee must submit an annual leachate monitoring report.

Reference: The report format should reflect DEQ's guidance: *Solid Waste Landfill Guidance*, September 1996, or the format presented in the most recently approved plan.

19.5 Annual leachate treatment report contents

This annual report must include the elements presented in the most recently approved plan.

Reference: The report format should reflect DEQ's guidance: *Solid Waste Landfill Guidance*, September 1996, or the format presented in the most recently approved plan.

19.6 Split sampling submittal

Within 90 days of any split sampling event, the permittee must submit the following information to DEQ's laboratory:

- A copy of all information pertinent to the sample collection handling, transport and storage, including field notes
- Copies of all laboratory analytical reports
- Copies of all laboratory Quality Assurance Quality Control reports
- A copy of the lab certification (ORLAP or NVLAP, see Certified Environmental Lab Data condition above)
- A hydrogeologic map of the site showing groundwater flow directions and water table contours
- Any other data or reports requested by DEQ

19.7 Lab address

Report all required split sampling information to:

Oregon Department of Environmental Quality
Laboratory, Groundwater Monitoring Section
7202 NE Evergreen Parkway, Suite 150
Hillsboro, OR 97124

Phone: 503-693-5700 Fax: 503-693-4999

19.8 DEQ response to split samples

If the permittee submits all required split sampling data and requests DEQ's results, DEQ's lab may provide, to the permittee, copies of the following information:

- DEQ's analysis of the split sample
- The QA/QC report
- The analytical report
- The field data sheets

20.0 ENVIRONMENTAL MONITORING NETWORK

20.1 Monitoring device installation

For future disposal units or cells, the permittee must install DEQ-approved background and detection and/or compliance wells at least 12 months before refuse disposal occurs in the new cells. A Site Characterization Report may also be required for any proposed new cell. DEQ may waive or modify this requirement if the permittee provides adequate justification for an alternative approach.

20.2 Monitoring stations and equipment

To assure that every sample is representative of the site's environmental conditions, the permittee must protect, operate, and maintain all environmental monitoring stations and equipment in accordance with DEQ's requirements.

20.3 Access to monitoring stations and equipment

To facilitate sample collection and/or inspection and maintenance activities, the permittee must maintain reasonable all-weather access to all monitoring stations and associated equipment.

20.4 Reporting equipment damage

Within 14 days of discovering any damaged monitoring equipment or station, the permittee must submit to DEQ a report describing the damage, the proposed repair or replacement measures, and the schedule to complete this work.

Example: a well's impaired function or altered position/location.

20.5 Monitoring well construction

The permittee must complete any monitoring well or gas monitoring probe abandonment (decommissioning), replacement, repair, or installation in a manner that complies with the Water Resources Rules, OAR 690-240, and with DEQ's *Guidelines for Groundwater Monitoring Well Drilling, Construction, and Decommissioning*, dated August 1992.

20.6 Reporting well construction and repairs

The permittee must document all monitoring well or gas probe repair and construction activities, including driller's logs, well location information, and construction information in a report prepared and stamped by a geologist or certified engineering geologist, with current Oregon registration. The permittee must submit the report to DEQ within 30 days of the action and include this documentation in the next Annual Environmental Monitoring Report.

20.7 Well decommissioning or replacement

The permittee must submit a written recommendation to DEQ prior to decommissioning or replacing any well or gas monitoring probe in the monitoring network. After receiving DEQ's approval, the permittee must decommission or replace any well or gas probe that meets the following criteria:

- The well or gas probe was installed in a borehole that hydraulically intersects two saturated stratas
- The permittee lacks supporting documentation demonstrating that the well or gas probe was properly installed and constructed
- The well or gas probe was damaged beyond repair or destroyed
- Other reasons as determined by either the permittee or DEQ

COMPLIANCE SCHEDULE

21.0 SUMMARY OF DUE DATES

21.1 Summary

The permittee must comply with the event-driven schedule shown below. This compliance schedule does not apply to many of the routine reporting requirements specified in other sections of the permit.

Due Date	Activity	See section...
120 days prior to new landfill construction or expansion	Submit updated Environmental Monitoring Plan	15.1 Environmental Monitoring Plan submittal
Within 90 days of permit issuance	Review and submit conceptual "worst-case" closure and post closure plan	12.1 Worst case closure plan development

April 1st of each year	Submit financial assurance plan and mechanism	13.3 Recertification of financial assurance
Within 360 days of permit issuance	Review and submit site development plan update	10.1 Site development plan
Within 270 days of permit issuance	Submit updated Operations Plan	7.1 Operations plan submittal
Within 60 days of Operations Plan approval	Submit updated Operations and Maintenance Manual	7.3 Operations and Maintenance Manual
By March 31 for each year	Submit an Annual Environmental Monitoring Report	19.1 Annual Environmental Monitoring Plan
By March 31 for each year	Submit an Annual Leachate Treatment Report	19.4 Annual leachate treatment report
SAMPLING:		
At least 10 working days prior to scheduled sampling event	Notify DEQ	16.1 Notification of sampling events
At least 45 days prior to split sampling event	Schedule split sampling event with DEQ laboratory	16.2 Split sampling events
Within 90 days of split sampling event	Submit required data/documents to DEQ laboratory	19.6 Split sampling submittal
EVENTS:		
Within 30 days of DEQ notification of need to install monitoring well or probe	Install groundwater monitoring well and/or probe	20.1 Monitoring device Installation
Within 30 days of any well construction	Submit well construction report	20.6 Reporting well construction and repairs
At least 6 months before any new disposal unit and/or closure construction	Submit engineering design plans and, if applicable, closure schedule	10.3 Design plans 12.4 Closure plan approval
At least 270 days prior to new construction or expansion	Submit a Site Characterization Report Workplan	14.1 Workplan
Within 180 days of DEQ approval of SCR workplan	Submit a Site Characterization Report	14.2 Site characterization report
Within 90 days after completion of any major construction	Submit Construction Certification Report	10.7 Construction report submittal
Within 18 months of plan approval	Begin construction	10.4 Construction requirements

ATTACHMENTS

22.0 ATTACHMENT

Attachments to the permit include:

Number	Description
1	Parameter Groups
2	Permit-specific concentration limits

22.1 Attachment 1: Parameter Groups

Overview

This attachment describes the environmental-monitoring parameter groups and associated requirements

Due to the duration of this permit, suggested analytical methods may change. If that is the case, use the most currently promulgated EPA method or DEQ-approved equivalent.

Note: Method means EPA SW 846 Method [suggested methods are in square brackets].

Group 1a: Field indicators

The field indicators parameter group includes the following parameters:

Elevation of water level
pH
Temperature
Specific Conductance
Dissolved Oxygen
Eh

With instruments calibrated to relevant standards, measure these parameters in the field when collecting samples. Acceptable methods include:

- Down-hole in situ
- In a flow-through well
- Immediately following sample recovery

Group 1b: Leachate indicators

The laboratory indicators parameter group includes the following parameters:

Total Dissolved Solids (TDS)
Total Suspended Solids (TSS)
Total Organic Carbon (TOC)
Chemical Oxygen Demand (COD)

Proper techniques for sample handling, preservation, and analysis are specific to each individual analyte: Follow appropriate EPA techniques or AWWA Standard Methods.

Group 2a: Common anions and cations

The common anions and cations parameter group includes the following parameters:

Calcium (Ca)
Sulfate (SO_4)
Total Ammonia (NH_3+NH_4)
Sodium (Na)
Nitrate (NO_3)
Silicon (Si)
Iron (Fe)
Manganese (Mn)
Magnesium (Mg)
Chloride (Cl)
Carbonate (CO_3)
Potassium (K)
Bicarbonate (HCO_3)

Dissolved concentrations must be measured. Field-filter and field-preserve samples according to standard DEQ and/or EPA guidelines and analyze by appropriate EPA or AWWA Standard Methods techniques. Report results in mg/L and meq/L.

Group 2b: Trace metals

The trace metals parameter group includes the following parameters:

Antimony (Sb)	Chromium (Cr)	Selenium (Se)
Arsenic (As)	Cobalt (Co)	Silver (Ag)
Barium (Ba)	Copper (Cu)	Thallium (Tl)
Beryllium (Be)	Lead (Pb)	Vanadium (V)
Cadmium (Cd)	Nickel (Ni)	Zinc (Zn)

If the Total Suspended Solids concentration is...	analyze for...
less than or equal to 100.0 mg/L in the sample	total concentrations (unfiltered)
Greater than 100.0 mg/L in the sample	both total (unfiltered) and dissolved (field-filtered)

Field-preserve samples according to standard DEQ and/or EPA guidelines and analyze by EPA Method 6010C or DEQ-approved equivalent.

Group 3: Volatile organic constituents

Analyze for all compounds detectable by EPA Method 8260B (C- other method 8/06) or EPA Method 524.2, include a library search to identify any unknown compounds present. The volatile-organic-compounds parameter group is equivalent to the EPA Method 8260B list.

DEQ must pre-approve alternative methods like EPA Method 8021B

Group 4: Assessment monitoring

The assessment monitoring parameter group includes the following parameters:

Semi-volatile Organic Constituents, including Phenols, EPA Method 8270D
Mercury, EPA Method 7470A
Cyanide, EPA Method 9010C (manual distillation) or 9012B (automated distillation)
Nitrite

All Method 8270D analyses must include a library search to identify any unknown compounds present.

Group 5: Surface water and leachate

The surface water parameter group includes the following parameters:

Total Kjeldahl Nitrogen (TKN)	Total Coliform Bacteria [EPA Method 9131]
Total Phosphorus (P)	Fecal Coliform Bacteria [EPA Method 9131]
Orthophosphate (PO_4)	E. Coli
Biological Oxygen Demand (BOD)	

22.2 Attachment 2: Remedial Action Concentration Limits and Permit Specific Concentration Limits

In accordance with OAR 340-040-0050(2) and as defined in the site Record of Decision (dated October 2004); Remedial Action Concentration Limits are established for the "west side" monitoring points specified in Section 18.2 of this permit as follows:

Compound	RACL	Basis	COPC
Volatile Organic Compounds (µg/L)			
1,4-Dichlorobenzene (1,4-DCB)	75	MCL/RL	Yes
Tetrachloroethene (PCE)	5	MCL	Yes
Trichloroethene (TCE)	5	MCL/RL	Yes
Vinyl chloride	2	MCL/RL	Yes
Trace Metals (µg/L)			
Antimony	6	MCL	No
Arsenic	10	MCL	Yes
Barium	1,000	RL	No
Beryllium	4	MCL	No
Cadmium	5	MCL	Yes
Chromium	50	RL	No
Lead	50	RL	No
Nickel	100	MCL	No
Selenium	10	RL	No
Silver	50	RL	No
Thallium	2	MCL	No
Dissolved Metals (µg/L)			
Iron	300	SMCL	Yes
Manganese	50	SMCL	Yes
Inorganic Compounds (mg/L)			
Chloride	250	SMCL	Yes
Total Dissolved Solids (TDS)	500	SMCL	Yes

RACL: Remedial Action Concentration Limit

Basis: The lower of either Federal primary Maximum Contaminant Level (MCL) or State Reference Level (OAR 340-040-0020, Tables 1 through 3).

SMCL: Secondary MCL

COPC: Chemical of Potential Concern

In accordance with Section 17 of this permit, Permit-Specific Concentration Limits are established for the "east side" monitoring points specified in Section 18.2 of this permit as follows:

Site Specific Limits for MW 26 and 27
Assumes 2 Compliance Wells, 7 or 8 COCs, Semiannual Sampling

Indicator Parameters (Date set: 2011-2018)	Statistical Distribution	Prediction Limits (mg/L)		Retesting
		MW-26	MW-27	
Bicarbonate	Normal	175[a]	495	1 of 2
Chloride	Normal	6.2	15.0	1 of 2
TDS	Normal	246[a]	499	1 of 2
Calcium	Normal	32.0[a]	100	1 of 2
Iron	NP/Normal	4.5	17.6	1 of 2
Magnesium	Normal	10.1	46.0	1 of 2
Manganese	Normal	0.74	8.9	1 of 2
Sodium	Normal	30.0	44.4	1 of 2

Note: [a] surrogate value calculated from MW-22.
Retesting scenario achieves annual site wide false positive rate of 10% per EPA Unified guidance.

TUPPAN CONSULTANTS LLC
Geology Hydrogeology Environmental Consulting

M E M O R A N D U M

TO: Seth Sadofsky; DEQ DATE: July 30, 2018

FROM: Eric Tuppan PROJECT: VLI-001-001

RE: Updated Statistical Summary for Compliance Wells MW-26 and MW-27: Coffin Butte Landfill

Over the past four years, since 2014, Valley Landfills, Inc. (VLI) has collected detection monitoring data at compliance wells MW-26 and MW-27, downgradient of the eastern margin of Cell 4 at its Coffin Butte Landfill. This memorandum summarizes that data and updates statistical prediction limits for the indicator parameters at those two wells. At the time that the site specific limits (SSLs) were established using prediction limits, it was realized that three of the parameters at MW-26 had minimal variance and normality-based statistics could not be used for a prediction limit. Therefore, surrogate values were calculated for those parameters at nearby well MW-22, which was a former compliance well that had been removed because of landfill expansion.

It was thought that several more years of data collection would produce the type of variance needed for normal statistical calculations. However, after nine additional semi-annual sampling events between 2014 and 2018, that has not occurred for those three parameters. We did take the opportunity to recalculate the prediction limits for the other parameters since the additional data provided a more representative statistical model of the water quality. This memorandum discusses the result of the updating the statistics with the additional sampling results and proposes new SSLs for well MW-26 and MW-27. The reader should reference the earlier memorandum on water quality statistics or the Environmental Monitoring Plan (EMP) which discusses the original statistical analysis and background hydrogeologic influences on the water quality at the site.

WATER QUALITY DATA SET

The full data set now includes quarterly sampling from fall 2011 through fall of 2013, a total of nine sampling events, and semiannual sampling from spring 2014 through spring 2018, a total of 9 more sampling events. Descriptive statistics are provided for the indicator parameters that include: bicarbonate, chloride, total dissolved solids (TDS), and five dissolved metals, calcium, iron, magnesium, manganese, and sodium.

Descriptive Statistics

The descriptive statistics were calculated for the data using standard Excel® statistical functions. Tables in Attachment A list the data by date, minimum, maximum, mean, median, standard deviation, interquartile range, skew, kurtosis, coefficient of variance, number of analyses, number of nondetect ("ND"), and percent nondetect. A second

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"edited" data set is also included. The only difference in these tables is that duplicates were averaged to eliminate weighting of results that fall on duplicate sampling dates.

Time Series Concentration Plots

The differences in water quality are illustrated over time on time-series concentration plots in Attachment B. These plots also provide a visual tool regarding the statistical distribution of data points between the wells. Observations from these plots relative to area water quality include the following:

- Generally, parameters in well MW-26 has relatively lower concentrations than MW-27.
- The variability of concentrations at MW-27 is significantly greater than at MW-26. For most parameters, MW-26 has very steady water quality over the past 7 years.
- There are no upward or downward trends in the data for MW-26 and MW-27 that would be suggestive of impacts.

STATISTICAL EVALUATION

In addition to the descriptive statistics and time-series concentration plots, each of the parameters was evaluated to approximate their distribution (normal or non-normal). Normality was tested by calculating the Shapiro Wilk statistic. Other statistical calculations were done using an Excel add-on called Analyse-it, which constructed box plots, histograms, and normality plots. Statistical calculations and plots are provided in Attachment C. The remainder of this section describes findings of the statistical calculations.

Normality Testing

For both wells, data distribution was tested using normality plots and the Shapiro-Wilk test. In addition to these, time concentration plots were examined for any trends and to distinguish overall variability of the parameter with time. The results of the normality tests (W statistic and critical values) are shown in Table 1. Normally distributed data have a W statistic that is greater than the critical value.

The primary purpose in identifying data distribution is to assist in selecting an appropriate statistical test for calculating the concentration limit using normality-based statistical tests. For parameters that were not distributed normally, outliers were removed from the data set and then again tested for normality. As shown in Table 1, removing outliers had mixed results. For MW-26, removing a high outlier for TDS still resulted in non-normal distribution, but removing an outlier from the calcium dataset resulted in normal distribution. Furthermore, the bicarbonate values for MW-26 were bimodal with no outliers, and the manganese, which had been normal with 9 events, became non-normal with the 18 sampling events. At MW-27, removing an outlier for TDS resulted in normal distribution, with all other indicators for that well normally-distributed.

Statistical Plots and Outlier Identification

Outlier box plots (also known as Box and Whisker plots) were plotted for each parameter by well (Attachment C). A box plot shows a summary of the data, including the minimum, first quartile, median, third quartile, and maximum. The box plot shows the median as a line, a box from the 1st to 3rd quartiles, and whiskers extending to the minimum and maximum. The outlier box plots shown in Attachment C are variations that extend the whiskers to the furthest observation within 1.5 x IQR from the quartiles. Possible near outliers (plus symbol) are identified as observations further than 1.5 x IQR from the quartiles, and possible far outliers (asterisk symbol) as observations further than 3.0 x IQR from the quartiles.

The outlier identification was used in attempting to resolve tests for normality as described above. However, it should be remembered that while removing the outliers may, at times, improve the data distribution, the primary disadvantage of this type of data adjustment is that it may in fact remove real expressions of the normal variability of the sample population, and ultimately increase the possibility of a false positive during routine sampling.

The statistical plots in Attachment C also include normality plots and histograms with a normal distribution curve plotted over the frequency distribution segments.

DISCUSSION AND PROPOSAL FOR REVISED CONCENTRATION LIMITS

Table 2 summarizes the prediction limit statistics. The prediction limits were calculated one of two ways, and are based on assumptions of normality and retesting schemes to meet an annual Site Wide False Positive Rate of 10 percent per year, consistent with Unified Guidance. Of the baseline data set, prediction limits were calculated using parametric assumptions of normality with the equation:

$$\text{Prediction Limit} = x + ks$$

Where x is the sample mean of the background, s is the background standard deviation, and k is a multiplier depending on several variables that include the number of compliance wells, number of background samples, number of constituents to be tested, sampling schedule, and retesting strategy. The k multiplier values are shown on the eighth column of Table 2 and assume variables taken from Unified Guidance Appendix D, Chapter 19 tables for intrawell estimates. These all include a retesting scheme of 1-of-2 future samples, 7 or 8 constituents (i.e., the number of indicator parameters), and number of background samples that depend on the data set ultimately used to calculate the prediction limit. For instance, where n is less than 18 background samples, it means that outliers have been removed.

Selected SSLs are shown in bold for each of the parameters under each well in which a normal distribution could be achieved. For several parameters in MW-26, the data were very consistent which resulted in either bimodal or trimodal distribution with little or no

variance. Data sets with no variance have no standard deviation and therefore, parametric statistical tests such as prediction limits are not valid (i.e., because there is no standard deviation). Nonparametric tests in these instances are also not practical where only two or three values are present. For these parameters (bicarbonate and TDS), prediction limits were calculated using the data set for nearby well MW-22 as a surrogate for MW-26. MW-22 was a past compliance well and approximately 300 feet west (upgradient) of MW-26. An MW-22 surrogate was also used for calcium at MW-26 because even though normality was achieved in the data set after removing an outlier, the calculated prediction limit was lower than the maximum and second maximum values detected and therefore would not represent a practical limit. In this case, the surrogate value of 32 mg/L calculated from MW-22 is considered a suitable prediction limit. The rationale for selecting SSLs is summarized as follows:

MW-26

- Chloride and magnesium: normal prediction limit.
- Sodium: normal prediction limit rounded up slightly to maximum detected value.
- Bicarbonate, TDS, and calcium: used MW-22 surrogates as explained above.
- Iron: maximum value consistent with methodology for nonparametric distribution.
- Manganese: currently non-parametric with 18 events; use 2014 value based on parametric prediction limit.

MW-27

- Bicarbonate, calcium, iron, magnesium, manganese, and sodium: normal prediction limit.
- Chloride: normal prediction limit rounded up slightly to maximum detected value.
- TDS: normal prediction limit based on adjusted data set (removed outlier).

The selected SSLs for indicator parameters are shown in Table 3. These values are indicated as horizontal lines in the time-series concentration plots in Attachment B. The proposed limits appear reasonable based on a visual examination of these plots.

Attachments: Tables 1 through 3
Attachment A: Descriptive Statistics
Attachment B: Time Series Concentration Plots
Attachment C: Normality Testing and Statistical Plots

Table 1
Indicator Parameters - Data Distribution
Coffin Butte Landfill
Corvallis, Oregon

MW-26	Data Set	W-calc	W (>)	Distribution	Removed outliers
Bicarbonate	All	0.457	0.897	N-P	Biomodal, with values of 140 mg/L and 150 mg/L, no variance
Chloride	All	0.965	0.897	Normal	
TDS	All	0.861	0.897	N-P	Mostly trimodal, with the majority of values at 190 mg/L.
TDS	Adjusted	0.831	0.892	N-P	Removed high outlier of 210, still non-normal.
Calcium	All	0.896	0.897	N-P	
Calcium	Adjusted	0.907	0.892	Normal	Removed outlier of 26 mg/L, becomes normal.
Iron	All	0.573	0.897	N-P	High variability.
Iron	Adjusted	0.702	0.892	N-P	Removed high outlier, still non-normal.
Magnesium	All	0.968	0.897	Normal	
Manganese	All	0.877	0.897	N-P/Norm.	Not normal with 18 events, had been normal with 9 events.
Sodium	All	0.949	0.897	Normal	
MW-27	Data Set	W-calc	W (>)	Distribution	Removed outliers
Bicarbonate	All	0.922	0.897	Normal	
Chloride	All	0.916	0.897	Normal	
TDS	All	0.842	0.897	N-P/Norm.	Not normal with 18 events, had been normal with 9 events.
TDS	Adjusted	0.938	0.892	Normal	Removed outlier of 310 mg/L, becomes normal.
Calcium	All	0.924	0.897	Normal	
Iron	All	0.899	0.897	Normal	
Magnesium	All	0.925	0.897	Normal	
Manganese	All	0.945	0.897	Normal	
Sodium	All	0.970	0.897	Normal	

Notes:
All = data set from 11/2011 through 4/2018.
Adjusted = data set adjusted to remove outliers.
W(>) = Shapiro-Wilk critical statistic at 0.05.
N-P = non parametric distribution

Table 2
Summary of Prediction Limit Statistics
Coffin Butte Landfill
Corvallis, Oregon

MW-26 (rev. 2018)	Units	Data Set	W-calc	W (>)	Distribution	n	k	Mean (x)	s	x + ks	Max	2nd Max	Selected PL
Bicarbonate	mg/L	All	0.457	0.897	N-P	18	1.796	148	3.83	155	150	150	*(MW-22)*
Chloride	mg/L	All	0.965	0.897	Normal	18	1.796	5.74	0.23	6.2	6.2	6.1	***6.2***
TDS	mg/L	All	0.861	0.897	N-P	18	1.796	189	8.45	204	210	200	*(MW-22)*
TDS (removed outlier)	mg/L	Adjusted	0.831	0.892	N-P	17	1.813	188	6.86	200	210	200	—
Calcium	mg/L	All	0.896	0.897	N-P	18	1.796	23.278	1.088	25.2	26.0	25.0	*(MW-22)*
Calcium (removed outlier)	mg/L	Adjusted	0.907	0.892	Normal	17	1.813	23.118	0.876	24.7	26.0	25.0	—
Iron	mg/L	All	0.573	0.897	N-P	18	1.796	0.607	0.647	1.8	4.5	1.4	***4.5***
Iron	mg/L	Adjusted	0.702	0.892	N-P	17	1.796	0.469	0.286	1.0	4.5	1.4	—
Magnesium	mg/L	All	0.968	0.897	Normal	18	1.796	8.967	0.618	10.1	10.0	9.90	***10.1***
Manganese	mg/L	All	0.877	0.897	N-P/Norm.	18	1.796	0.559	0.095	0.73	0.68	0.66	***0.74***
Sodium	mg/L	All	0.949	0.897	Normal	18	1.796	27.056	1.316	29.4	30.0	29.0	***30.0***
MW-27 (rev. 2018)													
Bicarbonate	mg/L	All	0.922	0.897	Normal	18	1.844	380	62.6	495	460	450	***495***
Chloride	mg/L	All	0.916	0.897	Normal	18	1.844	12.6	1.2	14.8	15.0	14.0	***15.0***
TDS	mg/L	All	0.842	0.897	N-P/Norm.	18	1.844	437	42.6	516	490	480	***—***
TDS (removed outlier)	mg/L	Adjusted	0.938	0.892	Normal	17	1.862	444	29.4	499	490	480	***499***
Calcium	mg/L	All	0.924	0.897	Normal	18	1.844	72.833	14.889	100	93.0	92.0	***100***
Iron	mg/L	All	0.899	0.897	Normal	18	1.844	8.072	5.144	17.6	16.0	15.0	***17.6***
Magnesium	mg/L	All	0.925	0.897	Normal	18	1.844	32.722	7.226	46.0	42.0	41.0	***46.0***
Manganese	mg/L	All	0.945	0.897	Normal	18	1.844	6.20	1.464	8.9	8.20	8.20	***8.9***
Sodium	mg/L	All	0.970	0.897	Normal	18	1.844	36.333	4.366	44.4	44.0	42.0	***44.4***
MW-22 (surrogate for MW-26)													
Bicarbonate	mg/L	1994-2000	0.930	0.887	Normal	16	1.83	169	3.1	175	150	150	***175***
TDS (removed >3 IQR)	mg/L	1994-2000	0.860	0.859	Normal	12	1.952	213	17	246	200	190	***246***
Calcium	mg/L	1994-2000	0.950	0.887	Normal	16	1.891	29.4	1.4	32	25.0	24.0	***32.0***

Notes:
N-P/Norm: not normal with 18 events; had been normal in 2014 with 9 events.
All = data set from 11/2011 through 4/2018.
Adjusted = data set adjusted to remove outliers.
W(>) = Shapiro-Wilk critical statistic at 0.05.
N-P = non parametric distribution
k values from Unified Guidance Appendix D, Table 19-10: wells(w)=2; number background samples(n)=variable; 7 or 8 Constituents (COCs), performed semiannually.

Table 3
Proposed Site Specific Limits
Assumes 2 Compliance Wells, 7 or 8 COCs, Semiannual Sampling
Coffin Butte Landfill
Corvallis, Oregon

Indicator Parameters SSLs	Units	Data Set	Statistical Distribution	Prediction Limit		Retesting
				MW-26	MW-27	
Bicarbonate	mg/L	2011-2018	Normal	175[a]	495	1-of-2
Chloride	mg/L	2011-2018	Normal	6.2	15.0	1-of-2
TDS	mg/L	2011-2018	Normal	246[a]	499	1-of-2
Calcium	mg/L	2011-2018	Normal	32.0[a]	100	1-of-2
Iron	mg/L	2011-2018	NP/Normal	4.5	17.6	1-of-2
Magnesium	mg/L	2011-2018	Normal	10.1	46.0	1-of-2
Manganese	mg/L	2011-2018	Normal	0.74	8.9	1-of-2
Sodium	mg/L	2011-2018	Normal	30.0	44.4	1-of-2

Notes:
[a] surrogate value calculated from MW-22.
Retesting scenario achieves annual site wide false positive rate of 10% per EPA Unified guidance.

ATTACHMENT A

DESCRIPTIVE STATISTICS

Table A-1 - Coffin Butte Descriptive Statistics - Unedited Data Set
Inorganic Parameters

Location	Sample ID	Date	Type	Bicarbonate Alkalinity as CACO3		Chloride		Total Dissolved Solids		
				mg/L		mg/L		mg/L		
MW-26	VLF-111101-1	11/01/11	Primary Sample	150		5.6		190		Quarterly Sampling - Baseline Period
MW-26	VLF-111101-2	11/01/11	Field Duplicate	150		5.7		190		
MW-26	VLF-20120117-01	01/17/12	Primary Sample	150		5.5		170		
MW-26	VLF-20120117-02	01/17/12	Field Duplicate	150		5.6		190		
MW-26	VLF-120411-18	04/11/12	Primary Sample	150		6.0		190		
MW-26	VLF-120713-2	07/13/12	Primary Sample	150		5.9		190	J	
MW-26	VLF-120713-3	07/13/12	Field Duplicate	150		5.9		190	J	
MW-26	VLF-121016-1	10/16/12	Primary Sample	150		5.7		190		
MW-26	VLF-130124-2	01/24/13	Primary Sample	140		5.8		190		
MW-26	VLF-130124-3	01/24/13	Field Duplicate	140		5.6		190		
MW-26	VLF-130419-9	04/19/13	Primary Sample	150		5.8		200		
MW-26	VLF-130710-2	07/10/13	Primary Sample	150		5.6		190		
MW-26	VLF-130710-3	07/10/13	Field Duplicate	150		5.6		190		
MW-26	VLI-102813-25	10/28/13	Primary Sample	150		5.4		180		
MW-26	VLF-140415-1	04/15/14	Primary Sample	150		5.6		180		Semi-Annual Sampling - Detection Monitoring
MW-26	VLF-141021-12	10/21/14	Primary Sample	140		5.5		190		
MW-26	VLF-150425-2	04/25/15	Primary Sample	140		6.1		190		
MW-26	CBL-151017-7	10/17/15	Primary Sample	150		5.9		200		
MW-26	VLI-041616-6	04/16/16	Primary Sample	150		5.8		180		
MW-26	VLI-161022-4	10/22/16	Primary Sample	150		5.6	J	190		
MW-26	VLF-170421-3	04/21/17	Primary Sample	150		6.0		180		
MW-26	VLF-170421-4	04/21/17	Field Duplicate	150		5.9		170		
MW-26	VLF-171020-7	10/20/17	Primary Sample	150		5.4		210		
MW-26	VLF180428-2	04/28/18	Primary Sample	150		6.2		190		
			Minimum	***140***		***5.40***		***170***		
			Maximum	***150***		***6.20***		***210***		
			Mean	***148***		***5.74***		***188***		
			Median	***150***		***5.70***		***190***		
			Standard Deviation	***3.81***		***0.22***		***8.7***		
			Interquartile Range	***0.000***		***0.30***		***2.50***		
			Skew	***-1.91***		***0.37***		***-0.09***		
			Kurtosis	***1.79***		***-0.59***		***1.56***		
			Coefficient of Variance	***0.03***		***0.04***		***0.05***		
			Number of Analyses	***24***		***24***		***24***		
			Number of Nondetect	***0***		***0***		***0***		
			Percent Nondetect	***0.0%***		***0.0%***		***0.0%***		
MW-27	VLF-111102-8	11/02/11	Primary Sample	230		13		450		Quarterly Sampling - Baseline Period
MW-27	VLF-20120118-01	01/18/12	Primary Sample	350		12		400		
MW-27	VLF-120411-17	04/11/12	Primary Sample	330		12		370		
MW-27	VLF-120713-1	07/13/12	Primary Sample	410		12		450	J	
MW-27	VLF-121017-19	10/17/12	Primary Sample	320		9.6		430		
MW-27	VLF-130124-1	01/24/13	Primary Sample	310		13		460		
MW-27	VLF-130419-8	04/19/13	Primary Sample	390		13		450		
MW-27	VLF-130710-1	07/10/13	Primary Sample	390		12		430		
MW-27	VLI-102913-26	10/29/13	Primary Sample	430		13		460		
MW-27	VLF-140418-33	04/18/14	Primary Sample	400		11		420		Semi-Annual Sampling - Detection Monitoring
MW-27	VLF-141021-13	10/21/14	Primary Sample	400		12		460		
MW-27	VLF-150425-1	04/25/15	Primary Sample	430		13		470		
MW-27	CBL-151017-6	10/17/15	Primary Sample	460		13		490		
MW-27	VLI-041616-7	04/16/16	Primary Sample	450		13		480		
MW-27	VLI-161022-3	10/22/16	Primary Sample	410		12	J	440		
MW-27	VLF-170421-1	04/21/17	Primary Sample	290		15		310		
MW-27	VLF-171020-6	10/20/17	Primary Sample	390		14		430		
MW-27	VLF180428-1	04/28/18	Primary Sample	450		14		460		
			Minimum	***230***		***9.60***		***310***		
			Maximum	***460***		***15.0***		***490***		
			Mean	***380***		***12.6***		***437***		
			Median	***395***		***13.0***		***450***		
			Standard Deviation	***62.6***		***1.20***		***42.6***		
			Interquartile Range	***90.0***		***1.00***		***30.00***		
			Skew	***-0.89***		***-0.45***		***-1.76***		
			Kurtosis	***0.32***		***1.58***		***3.87***		
			Coefficient of Variance	***0.16***		***0.10***		***0.10***		
			Number of Analyses	***18***		***18***		***18***		
			Number of Nondetect	***0***		***0***		***0***		
			Percent Nondetect	***0.0%***		***0.0%***		***0.0%***		

Table A-2 - Coffin Butte - Descriptive Statistics - Unedited Data Set
Dissolved Metals - (Filtered)

Location	Sample ID	Date	Type	Calcium	Iron	Magnesium	Manganese	Sodium	
				µg/L	µg/L	µg/L	µg/L	µg/L	
MW-26	VLF-111101-1	11/01/11	Primary Sample	22,000	1,400	9,200	640	26,000	Quarterly Sampling - Baseline Period
MW-26	VLF-111101-2	11/01/11	Field Duplicate	23,000	4,500	9,800	680	27,000	
MW-26	VLF-20120117-01	01/17/12	Primary Sample	22,000	1,200	9,300	640	25,000	
MW-26	VLF-20120117-02	01/17/12	Field Duplicate	22,000	1,300	9,200	630	26,000	
MW-26	VLF-120411-18	04/11/12	Primary Sample	23,000	380	8,900	580	26,000	
MW-26	VLF-120713-2	07/13/12	Primary Sample	22,000	370	8,000	430	27,000	
MW-26	VLF-120713-3	07/13/12	Field Duplicate	22,000	400	7,900	420	27,000	
MW-26	VLF-121016-1	10/16/12	Primary Sample	22,000	430	8,700	610	27,000	
MW-26	VLF-130124-2	01/24/13	Primary Sample	23,000	400	8,600	630	27,000	
MW-26	VLF-130124-3	01/24/13	Field Duplicate	23,000	420	8,600	610	27,000	
MW-26	VLF-130419-9	04/19/13	Primary Sample	25,000	260	8,900	550	28,000	
MW-26	VLF-130710-2	07/10/13	Primary Sample	22,000	430	8,000	540	24,000	
MW-26	VLF-130710-3	07/10/13	Field Duplicate	24,000	450	8,400	540	26,000	
MW-26	VLI-102813-25	10/28/13	Primary Sample	22,000	440	8,900	640	28,000	
MW-26	VLF-140415-1	04/15/14	Primary Sample	23,000	350	8,300	460	28,000	Semi-Annual Sampling - Detection Monitoring
MW-26	VLF-141021-12	10/21/14	Primary Sample	24,000	510	9,800	640	29,000	
MW-26	VLF-150425-2	04/25/15	Primary Sample	23,000	290	9,300	450	28,000	
MW-26	CBL-151017-7	10/17/15	Primary Sample	26,000	1,100	9,900	660	30,000	
MW-26	VLI-041616-6	04/16/16	Primary Sample	24,000	190	9,100	530	27,000	
MW-26	VLI-161022-4	10/22/16	Primary Sample	24,000	530	9,400	650	26,000	
MW-26	VLF-170421-3	04/21/17	Primary Sample	24,000	360	8,600	410	27,000	
MW-26	VLF-170421-4	04/21/17	Field Duplicate	23,000	310	8,600	440	27,000	
MW-26	VLF-171020-7	10/20/17	Primary Sample	23,000	510	10,000	620	27,000	
MW-26	VLF180428-2	04/28/18	Primary Sample	24,000	170	8,100	370	25,000	
			Minimum	***22,000***	***170***	***7,900***	***370***	***24,000***	
			Maximum	***26,000***	***4,500***	***10,000***	***680***	***30,000***	
			Mean	***23,125***	***696***	***8,896***	***557***	***26,875***	
			Median	***23,000***	***425***	***8,900***	***595***	***27,000***	
			Standard Deviation	***1,076***	***881***	***622***	***96***	***1,296***	
			Interquartile Range	***2,000***	***158***	***750***	***183***	***1,250***	
			Skew	***0.87***	***3.82***	***0.16***	***-1.12***	***0.12***	
			Kurtosis	***0.65***	***16.3***	***-0.84***	***-1.13***	***0.93***	
			Coefficient of Variance	***0.05***	***1.27***	***0.07***	***0.17***	***0.05***	
			Number of Analyses	***24***	***24***	***24***	***24***	***24***	
			Number of Nondetect	***0***	***0***	***0***	***0***	***0***	
			Percent Nondetect	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	
MW-27	VLF-111102-8	11/02/11	Primary Sample	48,000	1,400	20,000	3,700	44,000	Quarterly Sampling - Baseline Period
MW-27	VLF-20120118-01	01/18/12	Primary Sample	71,000	12,000	36,000	6,400	39,000	
MW-27	VLF-120411-17	04/11/12	Primary Sample	61,000	3,600	27,000	5,000	33,000	
MW-27	VLF-120713-1	07/13/12	Primary Sample	62,000	5,100	26,000	5,300	34,000	
MW-27	VLF-121017-19	10/17/12	Primary Sample	61,000	6,100	28,000	5,100	32,000	
MW-27	VLF-130124-1	01/24/13	Primary Sample	86,000	15,000	37,000	6,900	38,000	
MW-27	VLF-130419-8	04/19/13	Primary Sample	93,000	15,000	40,000	7,400	40,000	
MW-27	VLF-130710-1	07/10/13	Primary Sample	68,000	9,100	29,000	5,400	30,000	
MW-27	VLI-102913-26	10/29/13	Primary Sample	66,000	3,200	30,000	5,800	35,000	
MW-27	VLF-140418-33	04/18/14	Primary Sample	88,000	16,000	41,000	8,100	40,000	Semi-Annual Sampling - Detection Monitoring
MW-27	VLF-141021-13	10/21/14	Primary Sample	87,000	13,000	39,000	6,800	40,000	
MW-27	VLF-150425-1	04/25/15	Primary Sample	86,000	13,000	42,000	8,200	40,000	
MW-27	CBL-151017-6	10/17/15	Primary Sample	92,000	13,000	41,000	8,200	42,000	
MW-27	VLI-041616-7	04/16/16	Primary Sample	86,000	5,300	40,000	7,200	37,000	
MW-27	VLI-161022-3	10/22/16	Primary Sample	79,000	4,900	34,000	6,800	35,000	
MW-27	VLF-170421-1	04/21/17	Primary Sample	45,000	490	19,000	3,100	28,000	
MW-27	VLF-171020-6	10/20/17	Primary Sample	61,000	4,000	29,000	5,400	32,000	
MW-27	VLF180428-1	04/28/18	Primary Sample	71,000	5,100	31,000	6,800	35,000	
			Minimum	***45,000***	***490***	***19,000***	***3,100***	***28,000***	
			Maximum	***93,000***	***16,000***	***42,000***	***8,200***	***44,000***	
			Mean	***72,833***	***8,072***	***32,722***	***6,200***	***36,333***	
			Median	***71,000***	***5,700***	***32,500***	***6,600***	***36,000***	
			Standard Deviation	***14,889***	***5,144***	***7,226***	***1,464***	***4,366***	
			Interquartile Range	***24,750***	***8,775***	***11,500***	***1,800***	***6,750***	
			Skew	***-0.30***	***0.23***	***-0.40***	***-0.50***	***-0.16***	
			Kurtosis	***-0.98***	***-1.53***	***-0.84***	***-0.23***	***-0.71***	
			Coefficient of Variance	***0.20***	***0.64***	***0.22***	***0.24***	***0.12***	
			Number of Analyses	***18***	***18***	***18***	***18***	***18***	
			Number of Nondetect	***0***	***0***	***0***	***0***	***0***	
			Percent Nondetect	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	

Table A-3 - Coffin Butte Descriptive Statistics - Edited Data Set
Inorganic Parameters

Location	Sample ID	Date	Type	Bicarbonate Alkalinity as CACO3		Chloride		Total Dissolved Solids		
				mg/L		mg/L		mg/L		
MW-26	VLF-111101-2	11/01/11	Average	150		5.65		190		Quarterly Sampling - Baseline Period
MW-26	VLF-20120117-02	01/17/12	Average	150		5.55		180		
MW-26	VLF-120411-18	04/11/12	Primary Sample	150		6		190		
MW-26	VLF-120713-3	07/13/12	Average	150		5.9		190	J	
MW-26	VLF-121016-1	10/16/12	Primary Sample	150		5.7		190		
MW-26	VLF-130124-3	01/24/13	Average	140		5.7		190		
MW-26	VLF-130419-9	04/19/13	Primary Sample	150		5.8		200		
MW-26	VLF-130710-3	07/10/13	Average	150		5.6		190		
MW-26	VLI-102813-25	10/28/13	Primary Sample	150		5.4		180		
MW-26	VLF-140415-1	04/15/14	Primary Sample	150		5.6		180		Semi-Annual Sampling - Detection Monitoring
MW-26	VLF-141021-12	10/21/14	Primary Sample	140		5.5		190		
MW-26	VLF-150425-2	04/25/15	Primary Sample	140		6.1		190		
MW-26	CBL-151017-7	10/17/15	Primary Sample	150		5.9		200		
MW-26	VLI-041616-6	04/16/16	Primary Sample	150		5.8		180		
MW-26	VLI-161022-4	10/22/16	Primary Sample	150		5.6		190		
MW-26	VLF-170421-3	04/21/17	Average	150		5.95		175		
MW-26	VLF-171020-7	10/20/17	Primary Sample	150		5.4		210		
MW-26	VLF180428-2	04/28/18	Primary Sample	150		6.2		190		
			Minimum	***140***		***5.40***		***175***		
			Maximum	***150***		***6.20***		***210***		
			Mean	***148***		***5.74***		***189***		
			Median	***150***		***5.70***		***190***		
			Standard Deviation	***3.83***		***0.23***		***8.4***		
			Interquartile Range	***0.000***		***0.30***		***7.50***		
			Skew	***-1.96***		***0.36***		***0.62***		
			Kurtosis	***2.04***		***-0.62***		***1.07***		
			Coefficient of Variance	***0.03***		***0.04***		***0.04***		
			Number of Analyses	***18***		***18***		***18***		
			Number of Nondetect	***0***		***0***		***0***		
			Percent Nondetect	***0.0%***		***0.0%***		***0.0%***		
MW-27	VLF-111102-8	11/02/11	Primary Sample	230		13		450		Quarterly Sampling - Baseline Period
MW-27	VLF-20120118-01	01/18/12	Primary Sample	350		12		400		
MW-27	VLF-120411-17	04/11/12	Primary Sample	330		12		370		
MW-27	VLF-120713-1	07/13/12	Primary Sample	410		12		450	J	
MW-27	VLF-121017-19	10/17/12	Primary Sample	320		9.6		430		
MW-27	VLF-130124-1	01/24/13	Primary Sample	310		13		460		
MW-27	VLF-130419-8	04/19/13	Primary Sample	390		13		450		
MW-27	VLF-130710-1	07/10/13	Primary Sample	390		12		430		
MW-27	VLI-102913-26	10/29/13	Primary Sample	430		13		460		
MW-27	VLF-140418-33	04/18/14	Primary Sample	400		11		420		Semi-Annual Sampling - Detection Monitoring
MW-27	VLF-141021-13	10/21/14	Primary Sample	400		12		460		
MW-27	VLF-150425-1	04/25/15	Primary Sample	430		13		470		
MW-27	CBL-151017-6	10/17/15	Primary Sample	460		13		490		
MW-27	VLI-041616-7	04/16/16	Primary Sample	450		13		480		
MW-27	VLI-161022-3	10/22/16	Primary Sample	410		12		440		
MW-27	VLF-170421-1	04/21/17	Primary Sample	290		15		310		
MW-27	VLF-171020-6	10/20/17	Primary Sample	390		14		430		
MW-27	VLF180428-1	04/28/18	Primary Sample	450		14		460		
			Minimum	***230***		***9.60***		***310***		
			Maximum	***460***		***15.0***		***490***		
			Mean	***380***		***12.6***		***437***		
			Median	***395***		***13.0***		***450***		
			Standard Deviation	***62.6***		***1.20***		***42.6***		
			Interquartile Range	***90.0***		***1.00***		***30.00***		
			Skew	***-0.89***		***-0.45***		***-1.76***		
			Kurtosis	***0.32***		***1.58***		***3.87***		
			Coefficient of Variance	***0.16***		***0.10***		***0.10***		
			Number of Analyses	***18***		***18***		***18***		
			Number of Nondetect	***0***		***0***		***0***		
			Percent Nondetect	***0.0%***		***0.0%***		***0.0%***		

Table A-3 - Coffin Butte Descriptive Statistics - Edited Data Set
Inorganic Parameters

Location	Sample ID	Date	Type	Bicarbonate Alkalinity as CACO3		Chloride		Total Dissolved Solids		
				mg/L		mg/L		mg/L		
MW-22	CB-081194-13	08/11/94	Primary Sample	170		4.6		206		
MW-22	CB-110394-04	11/03/94	Average	174		5.4		207		
MW-22	CB-020995-22	02/09/95	Primary Sample	164		5		206		
MW-22	CB-051195-4	05/11/95	Primary Sample	172		5.1		386		
MW-22	CB-080995-14	08/09/95	Average	173		4.9		181	J	
MW-22	CB-110795-5	11/08/95	Primary Sample	170		4.9		211		
MW-22	CB-021396-27	02/13/96	Primary Sample	170		5.1		207		
MW-22	CB-050896-11	05/08/96	Primary Sample	166		5.3		207		
MW-22	CB-080696-1	08/06/96	Primary Sample	167		5		222		
MW-22	CB-042197-1	04/21/97	Primary Sample	170		5.3		213		
MW-22	CB-102197-11	10/21/97	Primary Sample	170		4.9				
MW-22	CB-042198-5	04/21/98	Primary Sample	168		5.5		230		
MW-22	CB-102198-22	10/21/98	Primary Sample	170		5.4				
MW-22	CB-042399-31	04/23/99	Primary Sample	169		5.5		209		
MW-22	CB-101999-10	10/19/99	Primary Sample	162		5.8				
MW-22	CB-041900-7	04/19/00	Primary Sample	171		4.8		252		
MW-22	CB-101900-14	10/19/00	Primary Sample	176		5				
MW-22	VLF-042401-4	04/24/01	Primary Sample	170		5.5		199		
MW-22	VLF-011017-1	10/17/01	Primary Sample	166		4.7				
MW-22	VLF-042302-1	04/23/02	Primary Sample	173		6				
MW-22	VLF-101502-8	10/15/02	Primary Sample	168		5.2				
MW-22	VLF-042903-2	04/29/03	Primary Sample	171		5.2				
MW-22	VLF-101403-3	10/14/03	Primary Sample	172		5		246		
MW-22	VLF-042004-12	04/20/04	Primary Sample	172		4.9				
MW-22	VLF-101304-15	10/13/04	Primary Sample	169		5.3				
MW-22	VLF-041905-1	04/20/05	Primary Sample	176		4.9				
MW-22	VLF-111605-16	11/16/05	Primary Sample	171		4.8				
MW-22	VLF-060418-9	04/18/06	Primary Sample	170		4.8				
MW-22	VLF-061024-5	10/24/06	Primary Sample	168		5.1		254		
MW-22	VLF-070417-10	04/17/07	Primary Sample	174		5.1				
MW-22	VLF-071025-20	10/25/07	Primary Sample	170		5.9				
MW-22	VLF-080415-8	04/15/08	Primary Sample	170		5.6				
MW-22	VLF-081027-31	10/27/08	Primary Sample	160		6.2				
MW-22	VLF090414-15	04/14/09	Primary Sample	170		5.1				
MW-22	VLF-091015-26	10/15/09	Primary Sample	170		5.7		190		
MW-22	VLF-100406-13	04/06/10	Primary Sample	170		5.6				
MW-22	VLF-101013-9	10/13/10	Primary Sample	170		5.9				
MW-22	VLF-110412-4	04/12/11	Primary Sample	170		5.6				
			Minimum	***160***		***4.60***		***181***		
			Maximum	***176***		***6.20***		***386***		
			Mean	***170***		***5.25***		***225***		
			Mean (8/94-4/00)	***169***				***226***		
			Median	***170***		***5.15***		***209***		
			Standard Deviation	***3.25***		***0.39***		***46.2***		
			Standard Deviation (8/94-4/00)	***3.14***				***50.7***		
			Interquartile Range	***2.00***		***0.57***		***24.0***		
			Skew	***-0.85***		***0.57***		***2.91***		
			Kurtosis	***1.99***		***-0.41***		***9.96***		
			Coefficient of Variance	***0.02***		***0.07***		***0.21***		
			Number of Analyses	***38***		***38***		***17***		
			Number of Nondetect	***0***		***0***		***0***		
			Percent Nondetect	***0.0%***		***0.0%***		***0.0%***		

Table A-4 - Coffin Butte - Descriptive Statistics - Edited Data Set
Dissolved Metals - (Filtered)

Location	Sample ID	Date	Type	Calcium µg/L	Iron µg/L	Magnesium µg/L	Manganese µg/L	Sodium µg/L	
MW-26	VLF-111101-2	11/01/11	Average	22,500	2,950	9,500	660	26,500	Quarterly Sampling - Baseline Period
MW-26	VLF-20120117-02	01/17/12	Average	22,000	1,250	9,250	635	25,500	
MW-26	VLF-120411-18	04/11/12	Primary Sample	23,000	380	8,900	580	26,000	
MW-26	VLF-120713-3	07/13/12	Average	22,000	385	7,950	425	27,000	
MW-26	VLF-121016-1	10/16/12	Primary Sample	22,000	430	8,700	610	27,000	
MW-26	VLF-130124-3	01/24/13	Average	23,000	410	8,600	620	27,000	
MW-26	VLF-130419-9	04/19/13	Primary Sample	25,000	260	8,900	550	28,000	
MW-26	VLF-130710-3	07/10/13	Average	23,000	440	8,200	540	25,000	
MW-26	VLI-102813-25	10/28/13	Primary Sample	22,000	440	8,900	640	28,000	
MW-26	VLF-140415-1	04/15/14	Primary Sample	23,000	350	8,300	460	28,000	Semi-Annual Sampling - Detection Monitoring
MW-26	VLF-141021-12	10/21/14	Primary Sample	24,000	510	9,800	640	29,000	
MW-26	VLF-150425-2	04/25/15	Primary Sample	23,000	290	9,300	450	28,000	
MW-26	CBL-151017-7	10/17/15	Primary Sample	26,000	1,100	9,900	660	30,000	
MW-26	VLI-041616-6	04/16/16	Primary Sample	24,000	190	9,100	530	27,000	
MW-26	VLI-161022-4	10/22/16	Primary Sample	24,000	530	9,400	650	26,000	
MW-26	VLF-170421-3	04/21/17	Average	23,500	335	8,600	425	27,000	
MW-26	VLF-171020-7	10/20/17	Primary Sample	23,000	510	10,000	620	27,000	
MW-26	VLF180428-2	04/28/18	Primary Sample	24,000	170	8,100	370	25,000	
			Minimum	***22,000***	***170***	***7,950***	***370***	***25,000***	
			Maximum	***26,000***	***2,950***	***10,000***	***660***	***30,000***	
			Mean	***23,278***	***607***	***8,967***	***559***	***27,056***	
			Median	***23,000***	***420***	***8,900***	***595***	***27,000***	
			Standard Deviation	***1,088***	***647***	***618***	***95***	***1,316***	
			Interquartile Range	***1,375***	***171***	***775***	***161***	***1,875***	
			Skew	***0.92***	***3.15***	***0.06***	***-0.70***	***0.37***	
			Kurtosis	***0.93***	***10.93***	***-0.89***	***-0.91***	***0.21***	
			Coefficient of Variance	***0.05***	***1.07***	***0.07***	***0.17***	***0.05***	
			Number of Analyses	***18***	***18***	***18***	***18***	***18***	
			Number of Nondetect	***0***	***0***	***0***	***0***	***0***	
			Percent Nondetect	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	
MW-27	VLF-111102-8	11/02/11	Primary Sample	48,000	1,400	20,000	3,700	44,000	Quarterly Sampling - Baseline Period
MW-27	VLF-20120118-01	01/18/12	Primary Sample	71,000	12,000	36,000	6,400	39,000	
MW-27	VLF-120411-17	04/11/12	Primary Sample	61,000	3,600	27,000	5,000	33,000	
MW-27	VLF-120713-1	07/13/12	Primary Sample	62,000	5,100	26,000	5,300	34,000	
MW-27	VLF-121017-19	10/17/12	Primary Sample	61,000	6,100	28,000	5,100	32,000	
MW-27	VLF-130124-1	01/24/13	Primary Sample	86,000	15,000	37,000	6,900	38,000	
MW-27	VLF-130419-8	04/19/13	Primary Sample	93,000	15,000	40,000	7,400	40,000	
MW-27	VLF-130710-1	07/10/13	Primary Sample	68,000	9,100	29,000	5,400	30,000	
MW-27	VLI-102913-26	10/29/13	Primary Sample	66,000	3,200	30,000	5,800	35,000	
MW-27	VLF-140418-33	04/18/14	Primary Sample	88,000	16,000	41,000	8,100	40,000	Semi-Annual Sampling - Detection Monitoring
MW-27	VLF-141021-13	10/21/14	Primary Sample	87,000	13,000	39,000	6,800	40,000	
MW-27	VLF-150425-1	04/25/15	Primary Sample	86,000	13,000	42,000	8,200	40,000	
MW-27	CBL-151017-6	10/17/15	Primary Sample	92,000	13,000	41,000	8,200	42,000	
MW-27	VLI-041616-7	04/16/16	Primary Sample	86,000	5,300	40,000	7,200	37,000	
MW-27	VLI-161022-3	10/22/16	Primary Sample	79,000	4,900	34,000	6,800	35,000	
MW-27	VLF-170421-1	04/21/17	Primary Sample	45,000	490	19,000	3,100	28,000	
MW-27	VLF-171020-6	10/20/17	Primary Sample	61,000	4,000	29,000	5,400	32,000	
MW-27	VLF180428-1	04/28/18	Primary Sample	71,000	5,100	31,000	6,800	35,000	
			Minimum	***45,000***	***490***	***19,000***	***3,100***	***28,000***	
			Maximum	***93,000***	***16,000***	***42,000***	***8,200***	***44,000***	
			Mean	***72,833***	***8,072***	***32,722***	***6,200***	***36,333***	
			Median	***71,000***	***5,700***	***32,500***	***6,600***	***36,000***	
			Standard Deviation	***14,889***	***5,144***	***7,226***	***1,464***	***4,366***	
			Interquartile Range	***24,750***	***8,775***	***11,500***	***1,800***	***6,750***	
			Skew	***-0.30***	***0.23***	***-0.40***	***-0.50***	***-0.16***	
			Kurtosis	***-0.98***	***-1.53***	***-0.84***	***-0.23***	***-0.71***	
			Coefficient of Variance	***0.20***	***0.64***	***0.22***	***0.24***	***0.12***	
			Number of Analyses	***18***	***18***	***18***	***18***	***18***	
			Number of Nondetect	***0***	***0***	***0***	***0***	***0***	
			Percent Nondetect	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***	

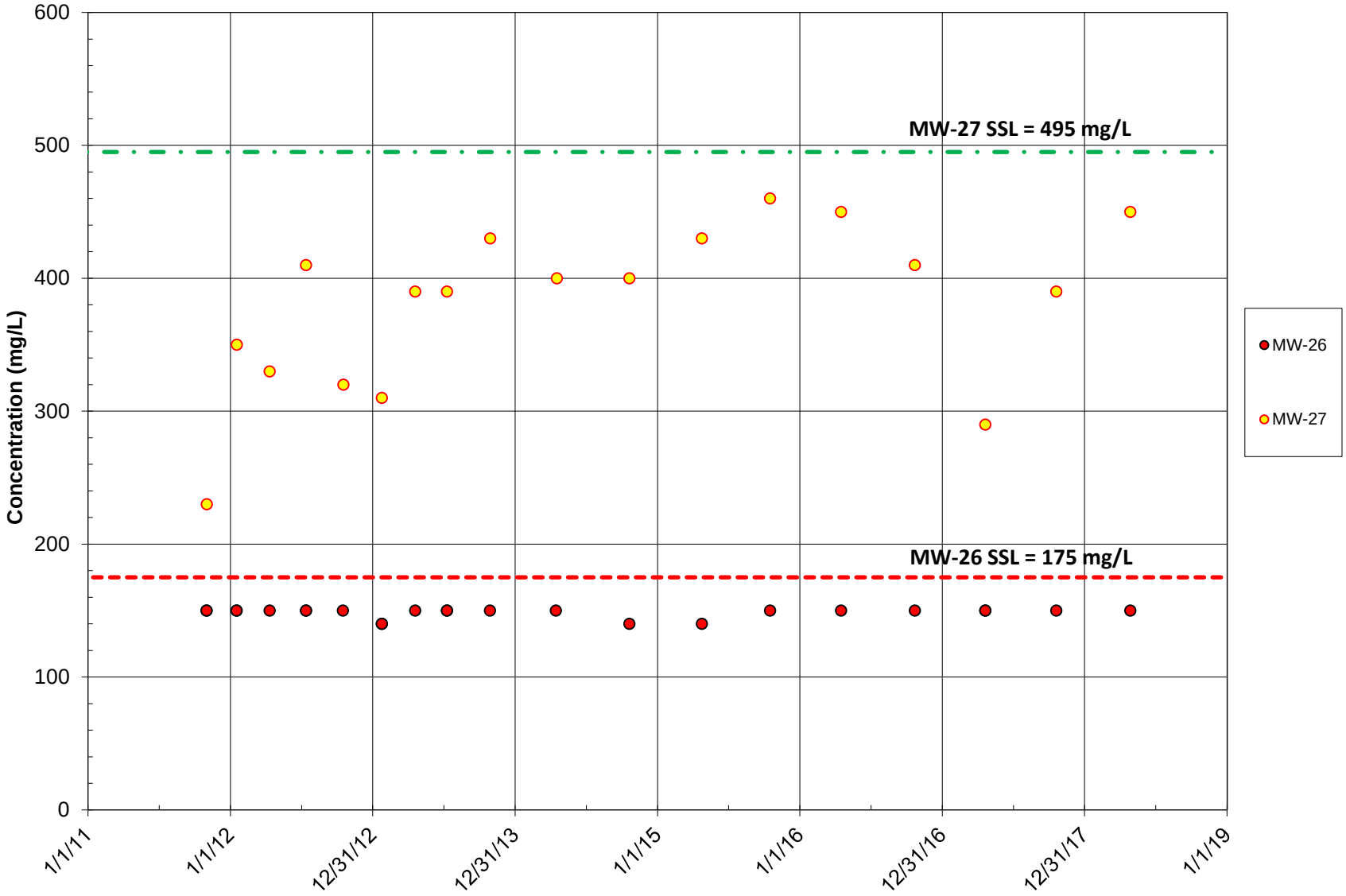
Table A-4 - Coffin Butte - Descriptive Statistics - Edited Data Set
Dissolved Metals - (Filtered)

Location	Sample ID	Date	Type	Calcium	Iron	Magnesium	Manganese	Sodium
				µg/L	µg/L	µg/L	µg/L	µg/L
MW-22	CB-081194-13	08/11/94	Primary Sample	29,400	370	12,300	689	25,200
MW-22	CB-110394-04	11/03/94	Average	28,000	388	11,900	584	23,200
MW-22	CB-020995-22	02/09/95	Primary Sample	31,800	718	13,000	680	22,200
MW-22	CB-051195-4	05/11/95	Primary Sample	28,900	783	12,200	599	23,600
MW-22	CB-080995-14	08/09/95	Average	29,200	770	12,150	613	23,500
MW-22	CB-110795-5	11/08/95	Primary Sample	30,000	847	12,500	662	24,400
MW-22	CB-021396-27	02/13/96	Primary Sample	28,900	931	11,900	652	22,300
MW-22	CB-050896-11	05/08/96	Primary Sample	30,100	1,140	12,500	654	23,800
MW-22	CB-080696-1	08/06/96	Primary Sample	29,200	1,160	12,200	627	24,100
MW-22	CB-042197-1	04/21/97	Primary Sample	32,400	1,140	13,600	657	26,000
MW-22	CB-102197-11	10/21/97	Primary Sample	28,500	1,050	11,900	589	23,400
MW-22	CB-042198-5	04/21/98	Primary Sample	26,700	902	11,200	530	23,700
MW-22	CB-102198-22	10/21/98	Primary Sample	30,300	960	12,500	588	24,100
MW-22	CB-042399-31	04/23/99	Primary Sample	29,300	949	12,100	558	23,000
MW-22	CB-101999-10	10/19/99	Primary Sample	28,100	1,020	11,600	542	22,100
MW-22	CB-041900-7	04/19/00	Primary Sample	29,300	973	11,900	561	25,000
MW-22	CB-101900-14	10/19/00	Primary Sample	29,000	952	12,400	541	21,800
MW-22	VLF-042401-4	04/24/01	Primary Sample	29,900	942	11,200	578	23,200
MW-22	VLF-011017-1	10/17/01	Primary Sample	28,700	968	12,300	582	24,900
MW-22	VLF-042302-1	04/23/02	Primary Sample	28,900	1,090	12,400	585	23,600
MW-22	VLF-101502-8	10/15/02	Primary Sample	29,100	978	12,200	600	24,700
MW-22	VLF-042903-2	04/29/03	Primary Sample	29,000	1,040	12,000	575	24,600
MW-22	VLF-101403-3	10/14/03	Primary Sample	29,200	915	12,200	589	23,500
MW-22	VLF-042004-12	04/20/04	Primary Sample	29,200	819	12,100	569	25,500
MW-22	VLF-101304-15	10/13/04	Primary Sample	27,200	849	11,300	545	25,000
MW-22	VLF-041905-1	04/20/05	Primary Sample	28,800	943	11,800	585	23,000
MW-22	VLF-111605-16	11/16/05	Primary Sample	28,200	416	11,300	477	26,800
MW-22	VLF-060418-9	04/18/06	Primary Sample	29,700	1,040	12,200	591	24,800
MW-22	VLF-061024-5	10/24/06	Primary Sample	27,000	866	11,300	538	24,000
MW-22	VLF-070417-10	04/17/07	Primary Sample	29,000	682	12,100	563	23,600
MW-22	VLF-071025-20	10/25/07	Primary Sample	29,000	730	12,000	500	27,000
MW-22	VLF-080415-8	04/15/08	Primary Sample	28,000	910	12,000	520	26,000
MW-22	VLF-081027-31	10/27/08	Primary Sample	27,000	430	11,000	470	27,000
MW-22	VLF090414-15	04/14/09	Primary Sample	28,000	820	12,000	560	25,000
MW-22	VLF-091015-26	10/15/09	Primary Sample	29,000	960	13,000	550	25,000
MW-22	VLF-100406-13	04/06/10	Primary Sample	26,000	940	11,000	570	25,000
MW-22	VLF-101013-9	10/13/10	Primary Sample	28,000	830	12,000	550	25,000
MW-22	VLF-110412-4	04/12/11	Primary Sample	26,000	940	11,000	560	25,000
			Minimum	***26,000***	***370***	***11,000***	***470***	***21,800***
			Maximum	***32,400***	***1,160***	***13,600***	***689***	***27,000***
			Mean	***28,789***	***873***	***12,007***	***578***	***24,305***
			Mean (8/94-4/00)	***29,381***	***881***	***12,216***	***612***	***23,725***
			Median	***29,000***	***936***	***12,050***	***577***	***24,250***
			Standard Deviation	***1,313***	***199***	***571***	***50.6***	***1,303***
			Standard Deviation (8/94-4/00)	***1,385***	***236***	***554***	***50.3***	***1,086***
			Interquartile Range	***1,250***	***153***	***450***	***47.0***	***1,500***
			Skew	***0.18***	***-1.23***	***0.20***	***0.24***	***0.20***
			Kurtosis	***1.38***	***1.32***	***0.74***	***0.24***	***-0.22***
			Coefficient of Variance	***0.05***	***0.23***	***0.05***	***0.09***	***0.05***
			Number of Analyses	***38***	***38***	***38***	***38***	***38***
			Number of Nondetect	***0***	***0***	***0***	***0***	***0***
			Percent Nondetect	***0.0%***	***0.0%***	***0.0%***	***0.0%***	***0.0%***

ATTACHMENT B

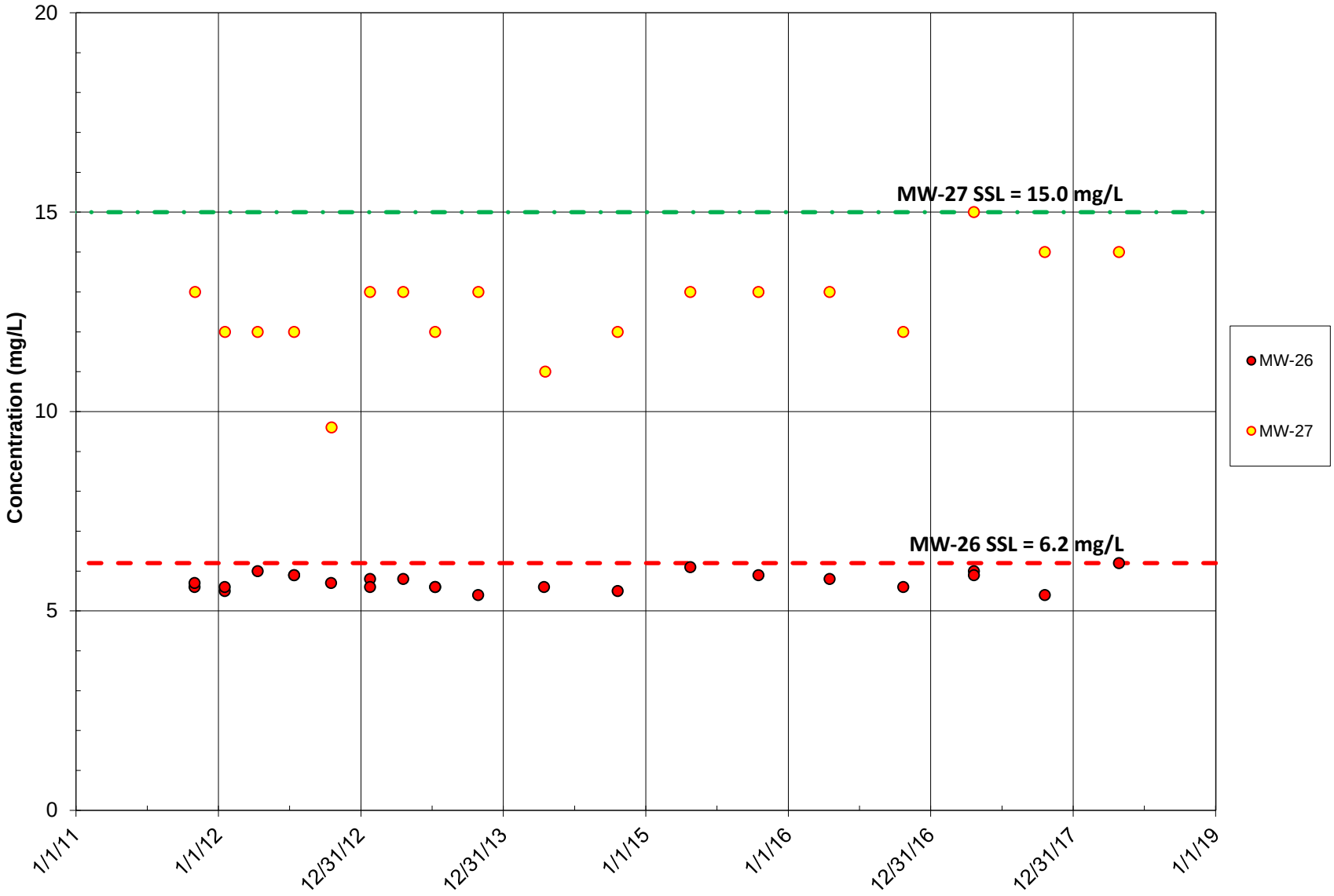
TIME-SERIES CONCENTRATION PLOTS

Coffin Butte Landfill
East-Side Wells: Bicarbonate Alkalinity



inorg_MW-26-27-plots/HCO3 (SSL)

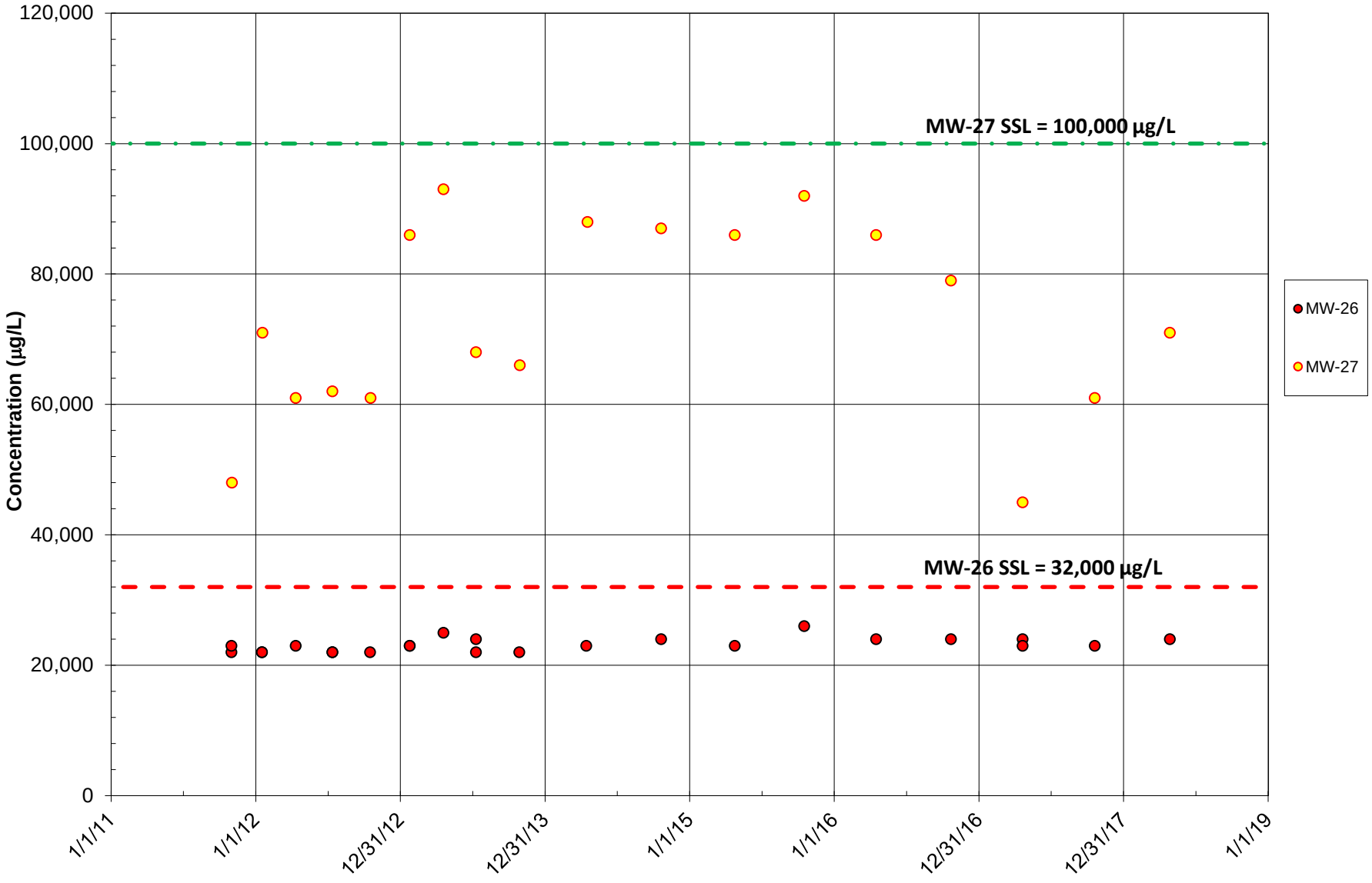
Coffin Butte Landfill
East-Side Wells: Chloride



inorg_MW-26-27-plots/CL (SSL)

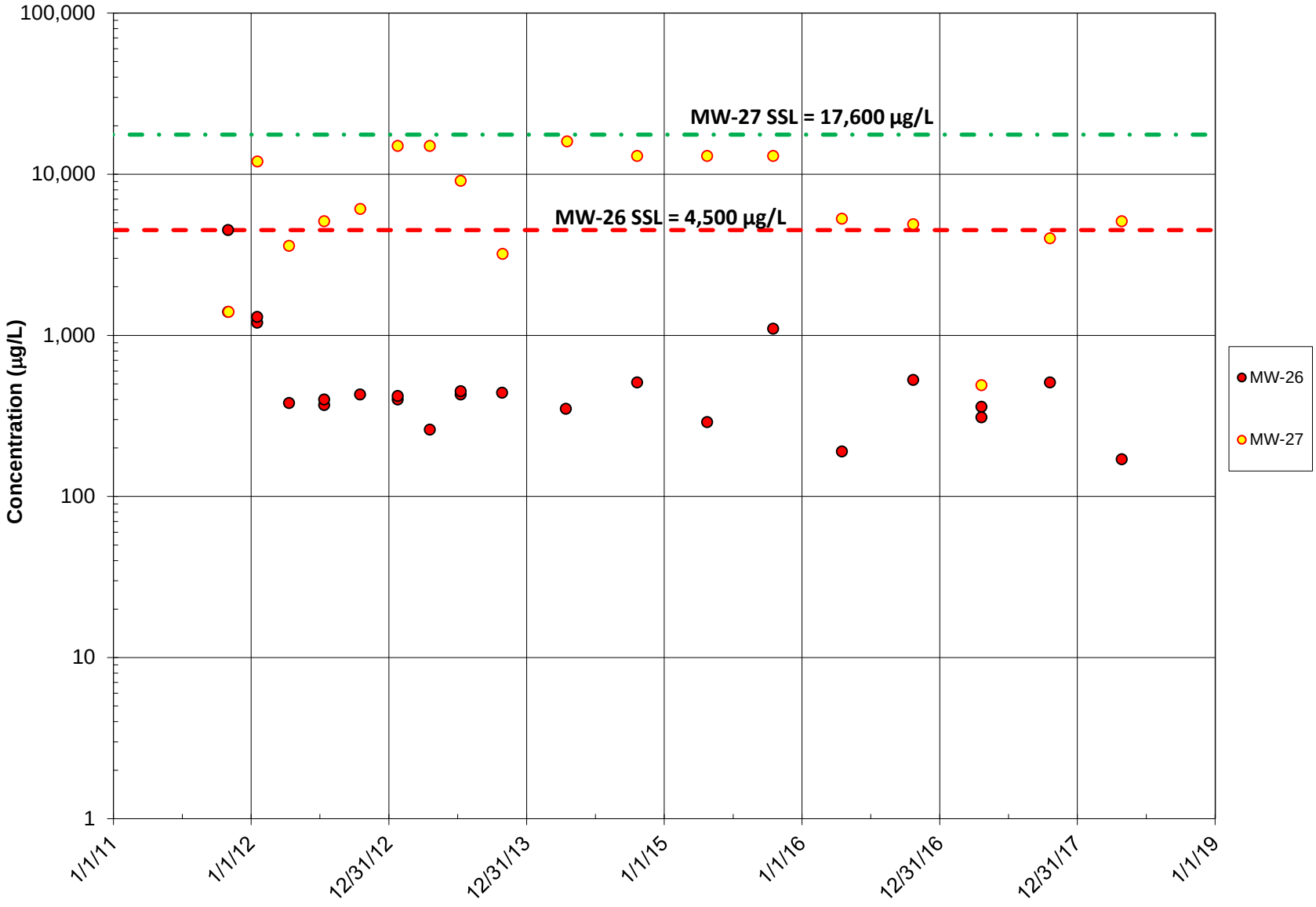
inorg_MW-26-27-plots/TDS (SSL) (2)

Coffin Butte Landfill
East-Side Wells: Calcium



dmet_MW-26-27-plots/Ca (SSL)

Coffin Butte Landfill
East-Side Wells: Iron

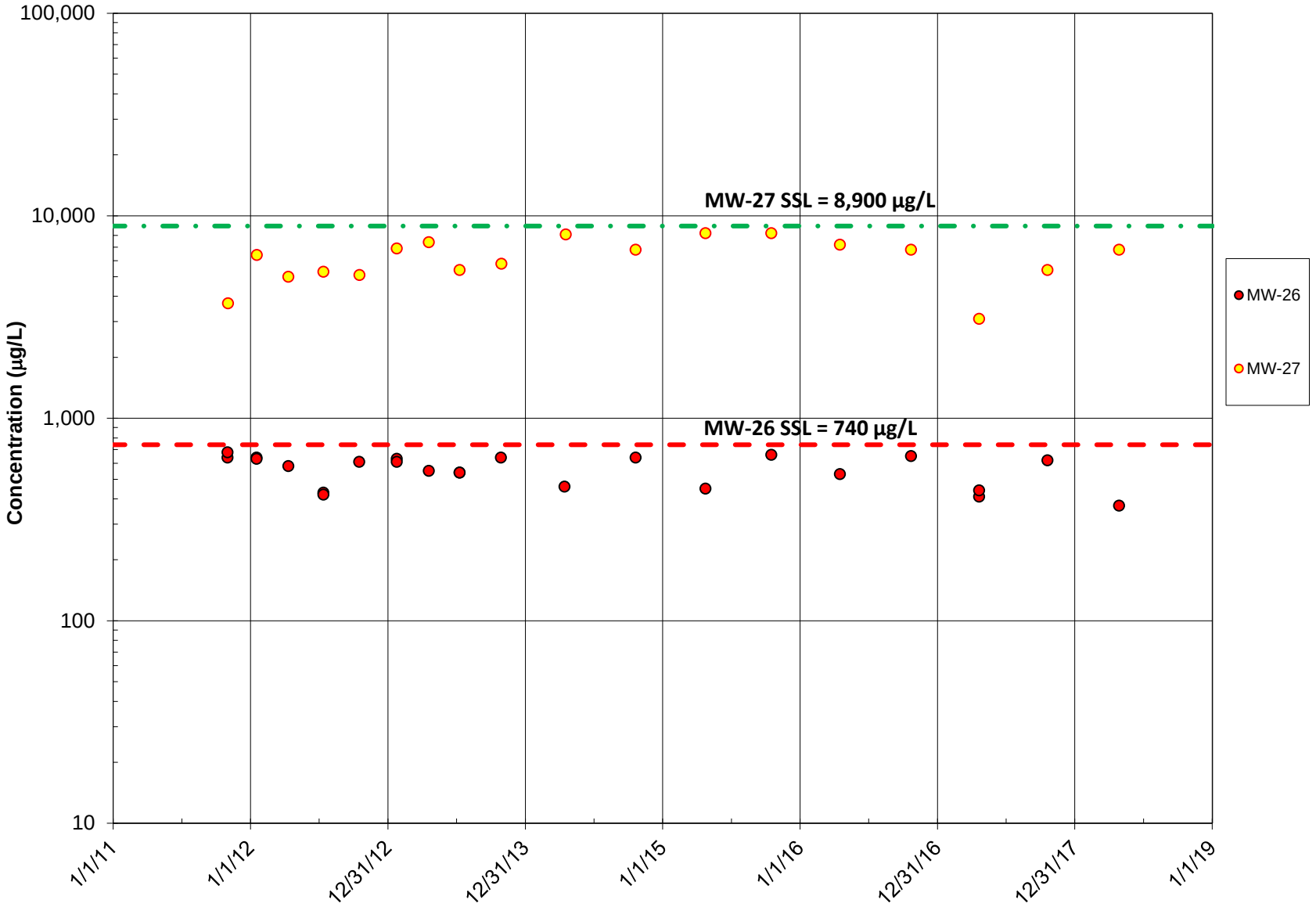


dmet_MW-26-27-plots/Fe (SSL)

Coffin Butte Landfill
East-Side Wells: Magnesium

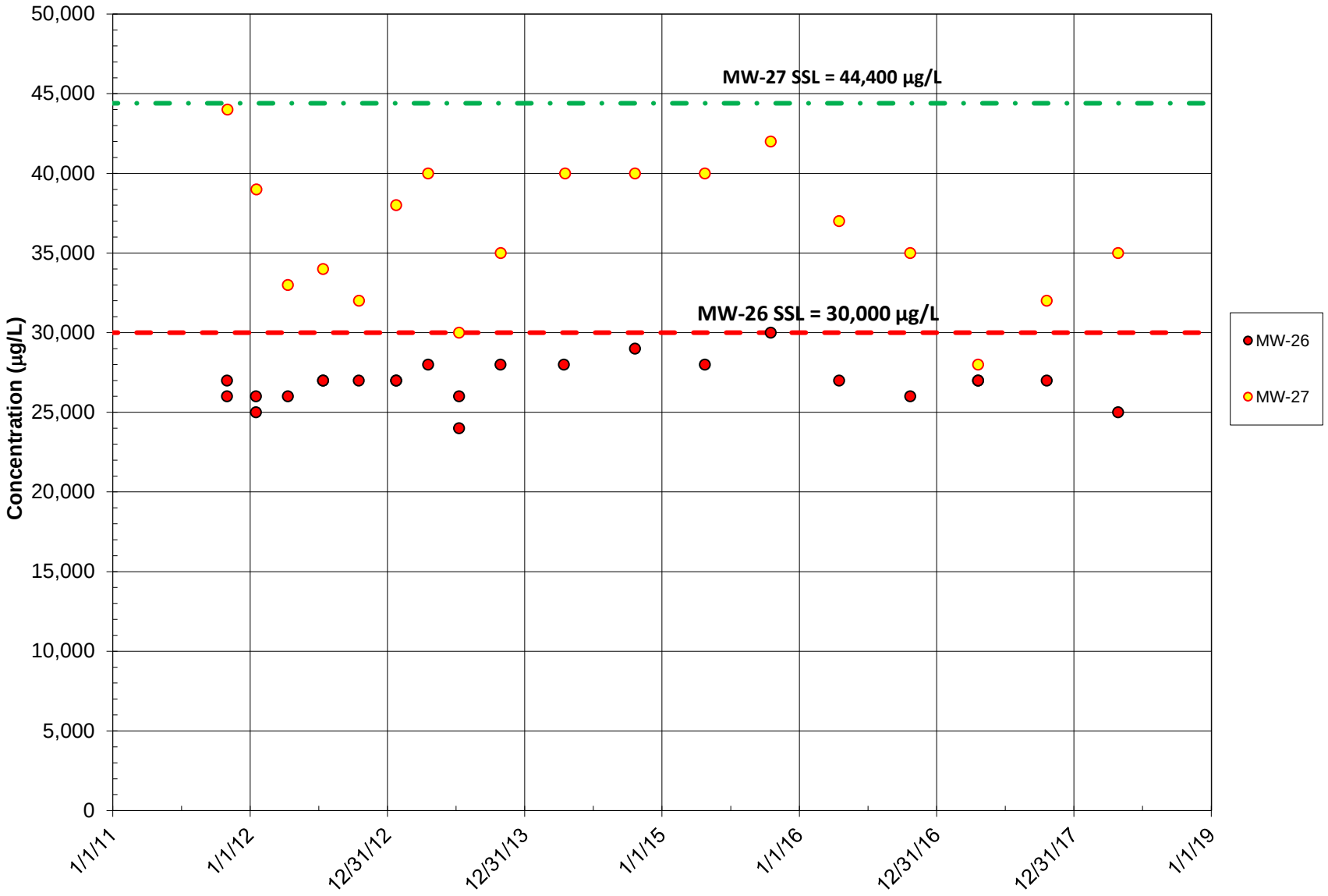
dmet_MW-26-27-plots/Mg(SSL)

Coffin Butte Landfill
East-Side Wells: Manganese



dmet_MW-26-27-plots/Mn (SSL)

Coffin Butte Landfill
East-Side Wells: Sodium



dmet_MW-26-27-plots/Na (SSL)

ATTACHMENT E

NORMALITY TESTING AND STATISTICAL PLOTS

Calcium MW-26

n=18	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i	
22500	22000	26000	4000	0.4886	1954.4	
22000	22000	25000	3000	0.3253	975.9	
23000	22000	24000	2000	0.2553	510.6	
22000	22000	24000	2000	0.2027	405.4	
22000	22500	24000	1500	0.1587	238.05	
23000	23000	24000	1000	0.1197	119.7	
25000	23000	23500	500	0.0837	41.85	
23000	23000	23000	0	0.0496	0.000	
22000	23000	23000	0	0.0163	0.000	
23000	23000	23000	0			
24000	23000	23000	0			
23000	23500	23000	-500			
26000	24000	23000	-1000			
24000	24000	22500	-1500		4245.9	= b
24000	24000	22000	-2000		1087.66	= SD
23500	24000	22000	-2000		**W =**	**0.896** **NOT NORMAL**
23000	25000	22000	-3000		$W_{.05,18}$=	0.897
24000	26000	22000	-4000		***If W is less than Wcoefficient, then not normal***	

Calcium MW-26 (REMOVE 26000 OUTLIER)

n=17	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i	
22500	22000	25000	3000	0.4968	1490.4	
22000	22000	24000	2000	0.3273	654.6	
23000	22000	24000	2000	0.2540	508	
22000	22000	24000	2000	0.1988	397.6	
22000	22500	24000	1500	0.1524	228.6	
23000	23000	23500	500	0.1109	55.45	
25000	23000	23000	0	0.0725	0	
23000	23000	23000	0	0.0359	0.000	
22000	23000	23000	0	0.0000	0.000	
23000	23000	23000	0			
24000	23000	23000	0			
23000	23500	23000	-500			
24000	24000	22500	-1500		23118	=x
24000	24000	22000	-2000		3334.7	= b
23500	24000	22000	-2000		875.53	= SD
23000	24000	22000	-2000		**W =**	**0.907** **NORMAL**
24000	25000	22000	-3000		$W_{.05,17}$=	0.892
					If W is less than Wcoefficient, then not normal	

Iron MW-26

n=18	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i	
2950	170	2950	2780	0.4886	1358.308	
1250	190	1250	1060	0.3253	344.818	
380	260	1100	840	0.2553	214.452	
385	290	530	240	0.2027	48.648	
430	335	510	175	0.1587	27.773	
410	350	510	160	0.1197	19.152	
260	380	440	60	0.0837	5.022	
440	385	440	55	0.0496	2.728	
440	410	430	20	0.0163	0.326	
350	430	410	-20			
510	440	385	-55			
290	440	380	-60			
1100	510	350	-160			
190	510	335	-175		2021.2	= b
530	530	290	-240		647.32	= SD
335	1100	260	-840		**W =**	**0.574** ***NOT NORMAL***
510	1250	190	-1060		$W_{.05,18}$=	0.897
170	2950	170	-2780		***If W is less than Wcoefficient, then not normal***	

Iron ***MW-26*** (remove high outlier)

n=17	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i		
1250	170	1250	1080	0.4968	536.544		
380	190	1100	910	0.3273	297.843		
385	260	530	270	0.2540	68.580		
430	290	510	220	0.1988	43.736		
410	335	510	175	0.1524	26.670		
260	350	440	90	0.1109	9.981		
440	380	440	60	0.0725	4.350		
440	385	430	45	0.0359	1.616		
350	410	410	0	0.0000	0.000		
510	430	385	-45				
290	440	380	-60				
1100	440	350	-90				
190	510	335	-175				
530	510	290	-220		989.3	= b	
335	530	260	-270		286.35	= SD	
510	1100	190	-910		**W =**	**0.702**	***NOT NORMAL***
170	1250	170	-1080		$W_{.05,17}$=	0.892	

If W is less than Wcoefficient, then not normal

Magnesium ***MW-26***

n=18	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i		
9500	7950	10000	2050	0.4886	1001.63		
9250	8100	9900	1800	0.3253	585.54		
8900	8200	9800	1600	0.2553	408.48		
7950	8300	9500	1200	0.2027	243.24		
8700	8600	9400	800	0.1587	126.96		
8600	8600	9300	700	0.1197	83.79		
8900	8700	9250	550	0.0837	46.035		
8200	8900	9100	200	0.0496	9.920		
8900	8900	8900	0	0.0163	0.000		
8300	8900	8900	0				
9800	9100	8900	-200				
9300	9250	8700	-550				
9900	9300	8600	-700				
9100	9400	8600	-800		2505.6	= b	
9400	9500	8300	-1200		617.63	= SD	
8600	9800	8200	-1600		**W =**	**0.968**	***NORMAL***
10000	9900	8100	-1800		$W_{.05,18}$=	0.897	
8100	10000	7950	-2050				

If W is less than Wcoefficient, then not normal

Manganese ***MW-26***

n=18	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i		
660	370	660	290	0.4886	141.694		
635	425	660	235	0.3253	76.4455		
580	425	650	225	0.2553	57.4425		
425	450	640	190	0.2027	38.513		
610	460	640	180	0.1587	28.566		
620	530	635	105	0.1197	12.5685		
550	540	620	80	0.0837	6.696		
540	550	620	70	0.0496	3.4720000		
640	580	610	30	0.0163	0.4890000		
460	610	580	-30				
640	620	550	-70				
450	620	540	-80				
660	635	530	-105				
530	640	460	-180		365.9	= b	
650	640	450	-190		94.76	= SD	
425	650	425	-225		**W =**	**0.877**	***NOT NORMAL***
620	660	425	-235		$W_{.05,18}$=	0.897	
370	660	370	-290				

If W is less than Wcoefficient, then not normal

Sodium ***MW-26***

n=18	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i		
26500	25000	30000	5000	0.4886	2443		
25500	25000	29000	4000	0.3253	1301.2		
26000	25500	28000	2500	0.2553	638.25		
27000	26000	28000	2000	0.2027	405.4		
27000	26000	28000	2000	0.1587	317.4		
27000	26500	28000	1500	0.1197	179.55		
28000	27000	27000	0	0.0837	0.00		
25000	27000	27000	0	0.0496	0.00		
28000	27000	27000	0	0.0163	0.00		
28000	27000	27000	0				
29000	27000	27000	0				
28000	27000	27000	0				
30000	28000	26500	-1500				
27000	28000	26000	-2000		5284.8	= b	
26000	28000	26000	-2000		1316.06	= SD	
27000	28000	25500	-2500		**W =**	**0.949**	***NORMAL***
27000	29000	25000	-4000		$W_{.05,18}$=	0.897	
25000	30000	25000	-5000		***If W is less than Wcoefficient, then not normal***		

Bicarbonate ***MW-26***

n=18	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i		
150	140	150	10	0.4886	4.886		
150	140	150	10	0.3253	3.253		
150	140	150	10	0.2553	2.553		
150	150	150	0	0.2027	0.000		
150	150	150	0	0.1587	0.000		
140	150	150	0	0.1197	0.000		
150	150	150	0	0.0837	0.000		
150	150	150	0	0.0496	0.000		
150	150	150	0	0.0163	0.000		
150	150	150	0				
140	150	150	0				
140	150	150	0				
150	150	150	0				
150	150	150	0		10.7	= b	
150	150	150	0		3.83	= SD	
150	150	140	-10		**W =**	**0.457**	***NOT NORMAL***
150	150	140	-10		$W_{.05,18}$=	0.897	***Bimodal***
150	150	140	-10		***If W is less than Wcoefficient, then not normal***		

Chloride ***MW-26***

n=18	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i		
5.65	5.40	6.20	0.8	0.4886	0.39088		
5.55	5.40	6.10	0.7	0.3253	0.22771		
6.00	5.50	6.00	0.5	0.2553	0.12765		
5.90	5.55	5.95	0.4	0.2027	0.08108		
5.70	5.60	5.90	0.3	0.1587	0.04761		
5.70	5.60	5.90	0.3	0.1197	0.03591		
5.80	5.60	5.80	0.2	0.0837	0.01674		
5.60	5.65	5.80	0.15	0.0496	0.0074400		
5.40	5.70	5.70	0	0.0163	0.0000000		
5.60	5.70	5.70	0				
5.50	5.80	5.65	-0.15				
6.10	5.80	5.60	-0.2				
5.90	5.90	5.60	-0.3				
5.80	5.90	5.60	-0.3		0.94	= b	
5.60	5.95	5.55	-0.4		0.23	= SD	
5.95	6.00	5.50	-0.5		**W =**	**0.965**	***NORMAL***
5.40	6.10	5.40	-0.7		$W_{.05,18}$=	0.897	
6.20	6.20	5.40	-0.8		***If W is less than Wcoefficient, then not normal***		

TDS ***MW-26***

n=18	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i		
190	175	210	35	0.4886	17.101		
180	180	200	20	0.3253	6.506		
190	180	200	20	0.2553	5.106		
190	180	190	10	0.2027	2.027		
190	180	190	10	0.1587	1.587		
190	190	190	0	0.1197	0		
200	190	190	0	0.0837	0		
190	190	190	0	0.0496	0.0000000		
180	190	190	0	0.0163	0.0000000		
180	190	190	0				
190	190	190	0				
190	190	190	0				
200	190	190	0				
180	190	180	-10		32.3	= b	
190	190	180	-10		8.45	= SD	
175	200	180	-20		**W =**	**0.862**	***NOT NORMAL***
210	200	180	-20		$W_{.05,18}$=	0.897	
190	210	175	-35		***If W is less than Wcoefficient, then not normal***		

TDS ***MW-26 (remove high outlier '210')***

n=17	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i		
190	175	200	25	0.4968	12.42		
180	180	200	20	0.3273	6.546		
190	180	190	10	0.2540	2.54		
190	180	190	10	0.1988	1.988		
190	180	190	10	0.1524	1.524		
190	190	190	0	0.1109	0		
200	190	190	0	0.0725	0		
190	190	190	0	0.0359	0.0000000		
180	190	190	0	0.0000	0.0000000		
180	190	190	0				
190	190	190	0				
190	190	190	0				
200	190	180	-10				
180	190	180	-10		25.0	= b	
190	190	180	-10		6.86	= SD	
175	200	180	-20		**W =**	**0.831**	***NOT NORMAL***
190	200	175	-25		$W_{.05,17}$=	0.892	
					If W is less than Wcoefficient, then not normal		

Calcium ***MW-27***

n=18	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i		
48000	45000	93000	48000	0.4886	23452.8		
71000	48000	92000	44000	0.3253	14313.2		
61000	61000	88000	27000	0.2553	6893.1		
62000	61000	87000	26000	0.2027	5270.2		
61000	61000	86000	25000	0.1587	3967.5		
86000	62000	86000	24000	0.1197	2872.8		
93000	66000	86000	20000	0.0837	1674		
68000	68000	79000	11000	0.0496	545.600		
66000	71000	71000	0	0.0163	0.000		
88000	71000	71000	0				
87000	79000	68000	-11000				
86000	86000	66000	-20000				
92000	86000	62000	-24000				
86000	86000	61000	-25000		58989.2	= b	
79000	87000	61000	-26000		14888.80	= SD	
45000	88000	61000	-27000		**W =**	**0.923**	**NORMAL**
61000	92000	48000	-44000		$W_{.05,18}$=	0.897	
71000	93000	45000	-48000		***If W is less than Wcrit. value, then not normal***		

Iron ***MW-27***

n=18	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i		
1400	490	16000	15510	0.4886	7578.186		
12000	1400	15000	13600	0.3253	4424.080		
3600	3200	15000	11800	0.2553	3012.540		
5100	3600	13000	9400	0.2027	1905.380		
6100	4000	13000	9000	0.1587	1428.300		
15000	4900	13000	8100	0.1197	969.570		
15000	5100	12000	6900	0.0837	577.530		
9100	5100	9100	4000	0.0496	198.400		
3200	5300	6100	800	0.0163	13.040		
16000	6100	5300	-800				
13000	9100	5100	-4000				
13000	12000	5100	-6900				
13000	13000	4900	-8100				
5300	13000	4000	-9000		20107.0	= b	
4900	13000	3600	-9400		5143.86	= SD	
490	15000	3200	-11800		**W =**	**0.899**	***NORMAL***
4000	15000	1400	-13600		$W_{.05,18}$=	0.897	
5100	16000	490	-15510		***If W is less than Wcrit. value, then not normal***		

Magnesium ***MW-27***

n=18	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i		
20000	19000	42000	23000	0.4886	11237.8		
36000	20000	41000	21000	0.3253	6831.3		
27000	26000	41000	15000	0.2553	3829.5		
26000	27000	40000	13000	0.2027	2635.1		
28000	28000	40000	12000	0.1587	1904.4		
37000	29000	39000	10000	0.1197	1197		
40000	29000	37000	8000	0.0837	669.6		
29000	30000	36000	6000	0.0496	297.600		
30000	31000	34000	3000	0.0163	48.900		
41000	34000	31000	-3000				
39000	36000	30000	-6000				
42000	37000	29000	-8000				
41000	39000	29000	-10000				
40000	40000	28000	-12000		28651.2	= b	
34000	40000	27000	-13000		7225.82	= SD	
19000	41000	26000	-15000		**W =**	**0.925**	***NORMAL***
29000	41000	20000	-21000		$W_{.05,18}$=	0.897	
31000	42000	19000	-23000		***If W is less than Wcrit. value, then not normal***		

Manganese ***MW-27***

n=18	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i		
3700	3100	8200	5100	0.4886	2491.86		
6400	3700	8200	4500	0.3253	1463.85		
5000	5000	8100	3100	0.2553	791.43		
5300	5100	7400	2300	0.2027	466.21		
5100	5300	7200	1900	0.1587	301.53		
6900	5400	6900	1500	0.1197	179.55		
7400	5400	6800	1400	0.0837	117.18		
5400	5800	6800	1000	0.0496	49.6000000		
5800	6400	6800	400	0.0163	6.5200000		
8100	6800	6400	-400				
6800	6800	5800	-1000				
8200	6800	5400	-1400				
8200	6900	5400	-1500				
7200	7200	5300	-1900		5867.7	= b	
6800	7400	5100	-2300		1463.68	= SD	
3100	8100	5000	-3100		**W =**	**0.945**	***NORMAL***
5400	8200	3700	-4500		$W_{.05,18}$=	0.897	
6800	8200	3100	-5100		***If W is less than Wcrit. value, then not normal***		

Sodium ***MW-27***

n=18	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i		
44000	28000	44000	16000	0.4886	7817.6		
39000	30000	42000	12000	0.3253	3903.6		
33000	32000	40000	8000	0.2553	2042.4		
34000	32000	40000	8000	0.2027	1621.6		
32000	33000	40000	7000	0.1587	1110.9		
38000	34000	40000	6000	0.1197	718.2		
40000	35000	39000	4000	0.0837	334.80		
30000	35000	38000	3000	0.0496	148.80		
35000	35000	37000	2000	0.0163	32.60		
40000	37000	35000	-2000				
40000	38000	35000	-3000				
40000	39000	35000	-4000				
42000	40000	34000	-6000				
37000	40000	33000	-7000		17730.5	= b	
35000	40000	32000	-8000		4365.64	= SD	
28000	40000	32000	-8000		**W =**	**0.970**	***NORMAL***
32000	42000	30000	-12000		$W_{.05,18}$=	0.897	
35000	44000	28000	-16000		***If W is less than Wcrit. value, then not normal***		

Bicarbonate ***MW-27***

n=18	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i		
230	230	460	230	0.4886	112.378		
350	290	450	160	0.3253	52.048		
330	310	450	140	0.2553	35.742		
410	320	430	110	0.2027	22.297		
320	330	430	100	0.1587	15.870		
310	350	410	60	0.1197	7.182		
390	390	410	20	0.0837	1.674		
390	390	400	10	0.0496	0.496		
430	390	400	10	0.0163	0.163		
400	400	390	-10				
400	400	390	-10				
430	410	390	-20				
460	410	350	-60				
450	430	330	-100		247.9	= b	
410	430	320	-110		62.59	= SD	
290	450	310	-140		**W =**	**0.922**	***NORMAL***
390	450	290	-160		$W_{.05,18}$=	0.897	
450	460	230	-230		***If W is less than Wcrit. value, then not normal***		

Chloride ***MW-27***

n=18	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i		
13.00	9.60	15.00	5.4	0.4886	2.63844		
12.00	11.00	14.00	3	0.3253	0.9759		
12.00	12.00	14.00	2	0.2553	0.5106		
12.00	12.00	13.00	1	0.2027	0.2027		
9.60	12.00	13.00	1	0.1587	0.1587		
13.00	12.00	13.00	1	0.1197	0.1197		
13.00	12.00	13.00	1	0.0837	0.0837		
12.00	12.00	13.00	1	0.0496	0.0496000		
13.00	13.00	13.00	0	0.0163	0.0000000		
11.00	13.00	13.00	0				
12.00	13.00	12.00	-1				
13.00	13.00	12.00	-1				
13.00	13.00	12.00	-1				
13.00	13.00	12.00	-1		4.74	= b	
12.00	13.00	12.00	-1		1.20	= SD	
15.00	14.00	12.00	-2		**W =**	**0.916**	***NORMAL***
14.00	14.00	11.00	-3		$W_{.05,18}$=	0.897	
14.00	15.00	9.60	-5.4		***If W is less than Wcrit. value, then not normal***		

TDS ***MW-27***

n=18	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i		
450	310	490	180	0.4886	87.948		
400	370	480	110	0.3253	35.783		
370	400	470	70	0.2553	17.871		
450	420	460	40	0.2027	8.108		
430	430	460	30	0.1587	4.761		
460	430	460	30	0.1197	3.591		
450	430	460	30	0.0837	2.511		
430	440	450	10	0.0496	0.4960000		
460	450	450	0	0.0163	0.0000000		
420	450	450	0				
460	450	440	-10				
470	460	430	-30				
490	460	430	-30				
480	460	430	-30		161.1	= b	
440	460	420	-40		42.56	= SD	
310	470	400	-70		**W =**	**0.842**	***NOT NORMAL***
430	480	370	-110		$W_{.05,18}$=	0.897	
460	490	310	-180		***If W is less than Wcrit. value, then not normal***		

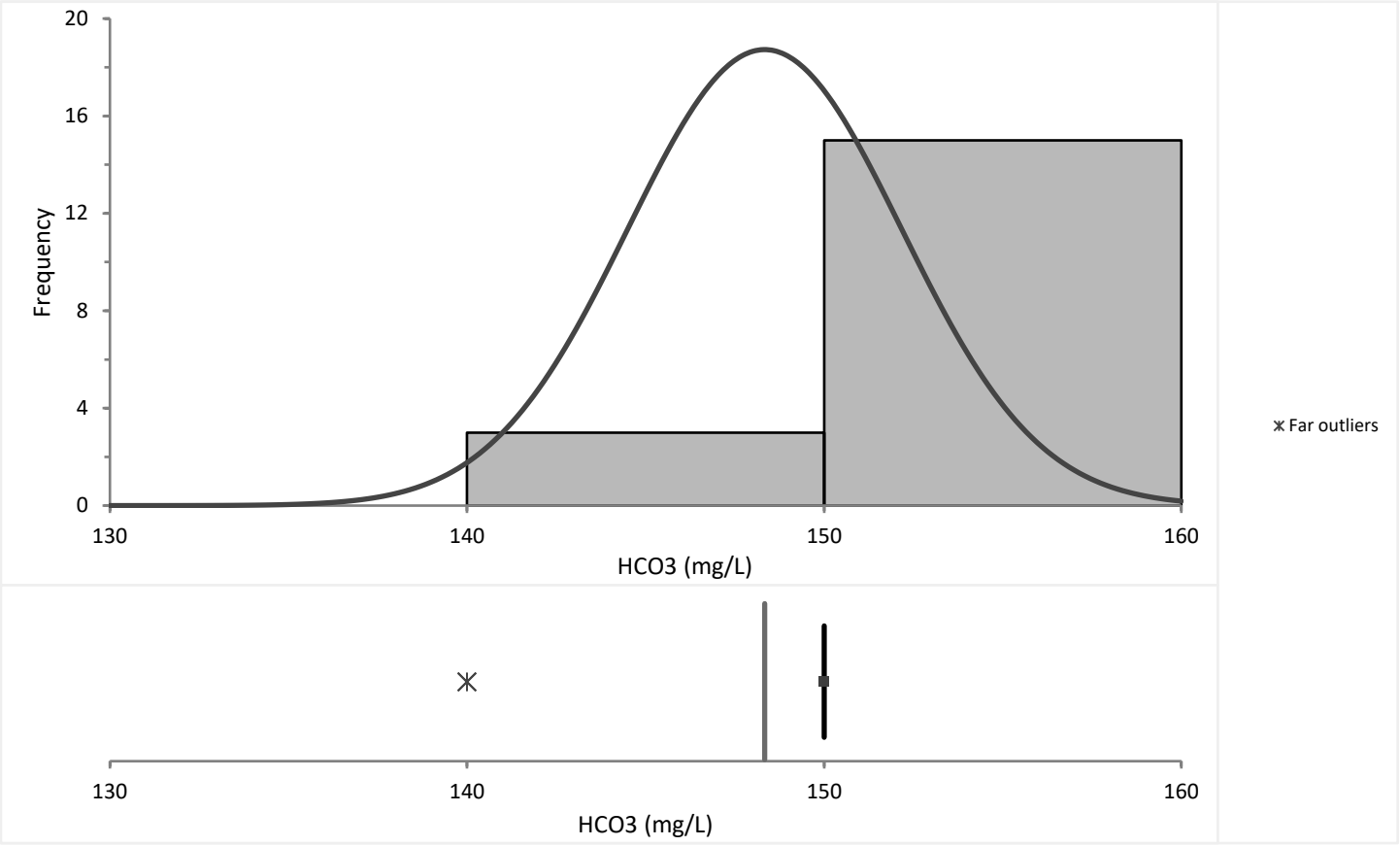
TDS ***MW-27 (remove low outlier '310')***

n=17	$x_{(i)}$	$x_{(n-i+1)}$	$x_{(n-i+1)} - x_{(i)}$	$a_{(n-i+1)}$	b_i		
450	370	490	120	0.4968	59.616		
400	400	480	80	0.3273	26.184		
370	420	470	50	0.2540	12.7		
450	430	460	30	0.1988	5.964		
430	430	460	30	0.1524	4.572		
460	430	460	30	0.1109	3.327		
450	440	460	20	0.0725	1.45		
430	450	450	0	0.0359	0.0000000		
460	450	450	0	0.0000			
420	450	450	0				
460	460	440	-20				
470	460	430	-30				
490	460	430	-30				
480	460	430	-30		113.8	= b	
440	470	420	-50		29.38	= SD	
430	480	400	-80		**W =**	**0.938**	***NORMAL***
460	490	370	-120		$W_{.05,17}$=	0.892	
					If W is less than Wcrit. value, then not normal		

Coffin Butte Landfill
Edited Data Set for Statistical Plots
Inorganic Parameters

Location	HCO3	Chloride	TDS		Sample ID	Date	Type
MW-26	150	5.65	190		VLF-111101-2	11/01/11	Average
MW-26	150	5.55	180		VLF-20120117-02	01/17/12	Average
MW-26	150	6	190		VLF-120411-18	04/11/12	Primary Sample
MW-26	150	5.9	190		VLF-120713-3	07/13/12	Average
MW-26	150	5.7	190		VLF-121016-1	10/16/12	Primary Sample
MW-26	140	5.7	190		VLF-130124-3	01/24/13	Average
MW-26	150	5.8	200		VLF-130419-9	04/19/13	Primary Sample
MW-26	150	5.6	190		VLF-130710-3	07/10/13	Average
MW-26	150	5.4	180		VLI-102813-25	10/28/13	Primary Sample
MW-26	150	5.6	180		VLF-140415-1	04/15/14	Primary Sample
MW-26	140	5.5	190		VLF-141021-12	10/21/14	Primary Sample
MW-26	140	6.1	190		VLF-150425-2	04/25/15	Primary Sample
MW-26	150	5.9	200		CBL-151017-7	10/17/15	Primary Sample
MW-26	150	5.8	180		VLI-041616-6	04/16/16	Primary Sample
MW-26	150	5.6	190		VLI-161022-4	10/22/16	Primary Sample
MW-26	150	5.95	175		VLF-170421-3	04/21/17	Average
MW-26	150	5.4	210		VLF-171020-7	10/20/17	Primary Sample
MW-26	150	6.2	190		VLF180428-2	04/28/18	Primary Sample
Well	Bicarbonate Alkalinity as CACO3	Chloride	Total Dissolved Solids		Sample ID	Date	Type
MW-27	230	13	450		VLF-111102-8	11/02/11	Primary Sample
MW-27	350	12	400		VLF-20120118-01	01/18/12	Primary Sample
MW-27	330	12	370		VLF-120411-17	04/11/12	Primary Sample
MW-27	410	12	450		VLF-120713-1	07/13/12	Primary Sample
MW-27	320	9.6	430		VLF-121017-19	10/17/12	Primary Sample
MW-27	310	13	460		VLF-130124-1	01/24/13	Primary Sample
MW-27	390	13	450		VLF-130419-8	04/19/13	Primary Sample
MW-27	390	12	430		VLF-130710-1	07/10/13	Primary Sample
MW-27	430	13	460		VLI-102913-26	10/29/13	Primary Sample
MW-27	400	11	420		VLF-140418-33	04/18/14	Primary Sample
MW-27	400	12	460		VLF-141021-13	10/21/14	Primary Sample
MW-27	430	13	470		VLF-150425-1	04/25/15	Primary Sample
MW-27	460	13	490		CBL-151017-6	10/17/15	Primary Sample
MW-27	450	13	480		VLI-041616-7	04/16/16	Primary Sample
MW-27	410	12	440		VLI-161022-3	10/22/16	Primary Sample
MW-27	290	15	310		VLF-170421-1	04/21/17	Primary Sample
MW-27	390	14	430		VLF-171020-6	10/20/17	Primary Sample
MW-27	450	14	460		VLF180428-1	04/28/18	Primary Sample

Descriptives



N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
HCO3	148.3	0.90	3.8	-2.0	2.04

	Minimum	1st quartile	Median	3rd quartile	Maximum	IQR
HCO3	140	150.0	150.0	150.0	150	0.0

Frequency Distribution

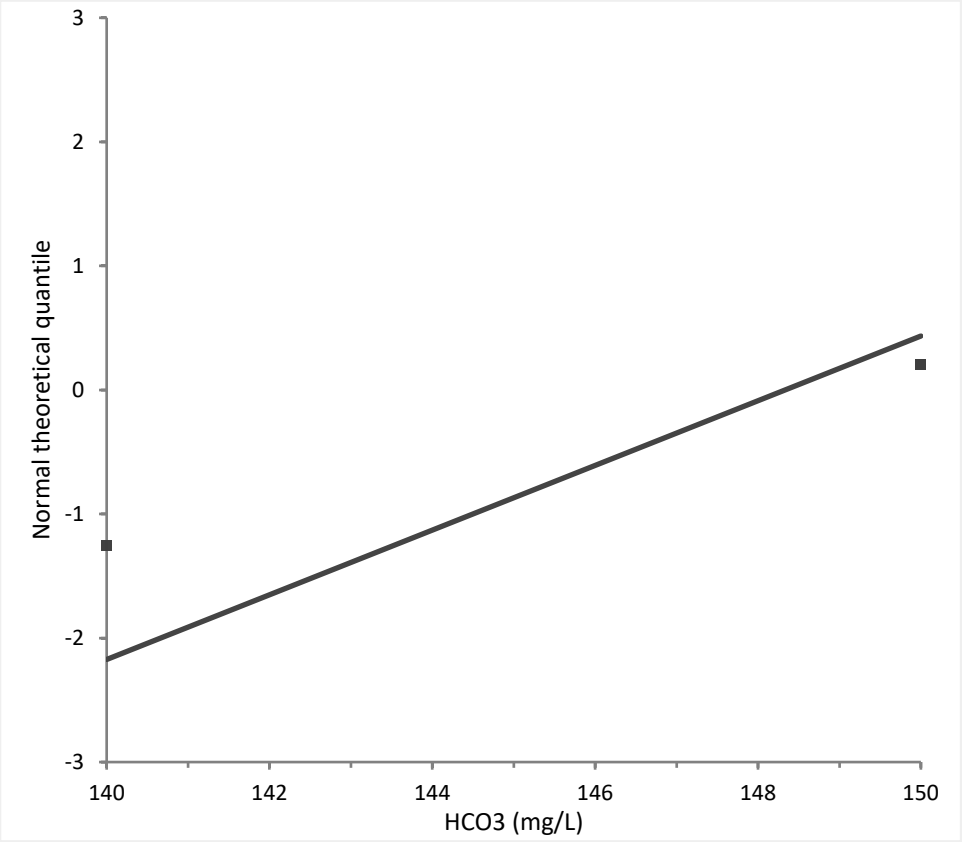
Class	Frequency	Relative frequency	Density	Cumulative frequency	Cumulative relative frequency
≥140 to <150	3	0.167	0.0167	3	0.167
≥150 to <160	15	0.833	0.0833	18	1.000

Descriptives

N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
HCO3	148.3	0.90	3.8	-2.0	2.04

Normality

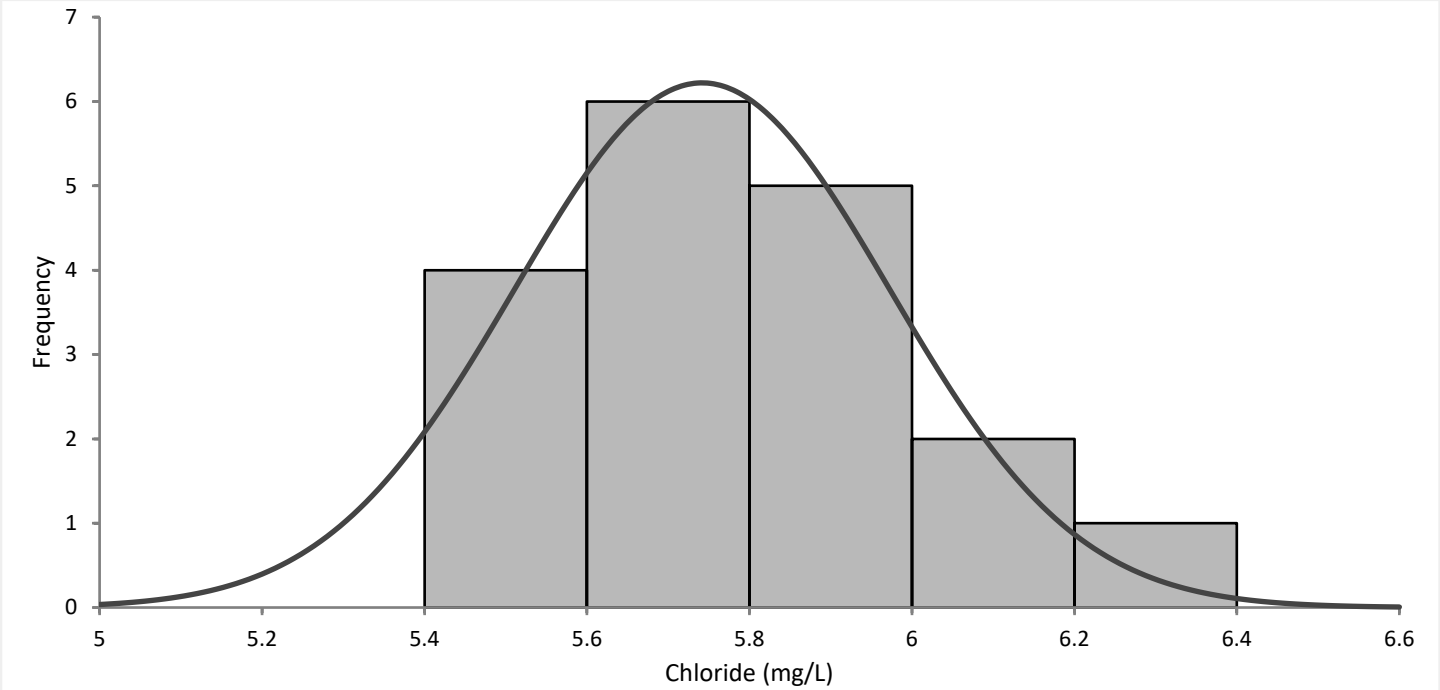


Shapiro-Wilk test

W statistic	0.457
p-value	<0.0001[1]

H0: F(Y) = N(μ, σ)
The distribution of the population is normal with unspecified mean and standard deviation.
H1: F(Y) ≠ N(μ, σ)
The distribution of the population is not normal.
[1] Reject the null hypothesis in favour of the alternative hypothesis at the 10% significance level.

Descriptives



N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Chloride	5.742	0.0544	0.231	0.4	-0.62

	Minimum	1st quartile	Median	3rd quartile	Maximum	IQR
Chloride	5.40	5.596	5.700	5.904	6.20	0.308

Frequency Distribution

Class	Frequency	Relative frequency	Density	Cumulative frequency	Cumulative relative frequency
≥5.4 to <5.6	4	0.222	1.1111	4	0.222
≥5.6 to <5.8	6	0.333	1.6667	10	0.556
≥5.8 to <6	5	0.278	1.3889	15	0.833
≥6 to <6.2	2	0.111	0.5556	17	0.944
≥6.2 to <6.4	1	0.056	0.2778	18	1.000

Chloride

MW-26

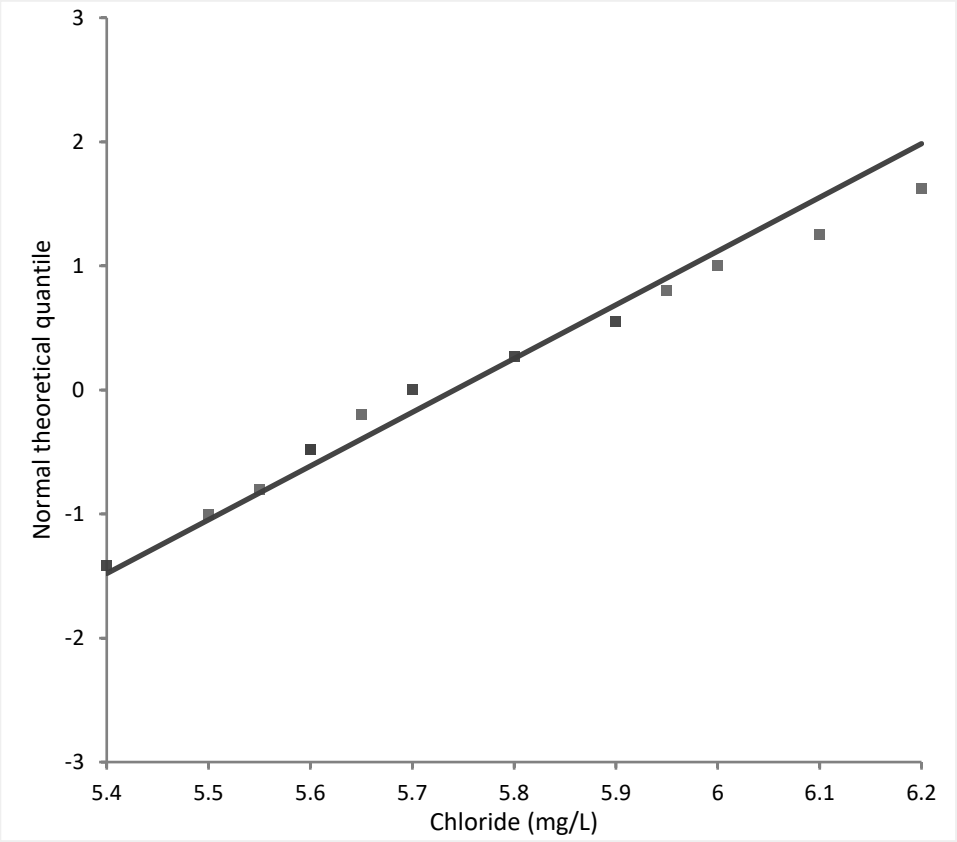
Last updated 5 July 2018 at 14:14 by TupLLC

Descriptives

N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Chloride	5.742	0.0544	0.231	0.4	-0.62

Normality

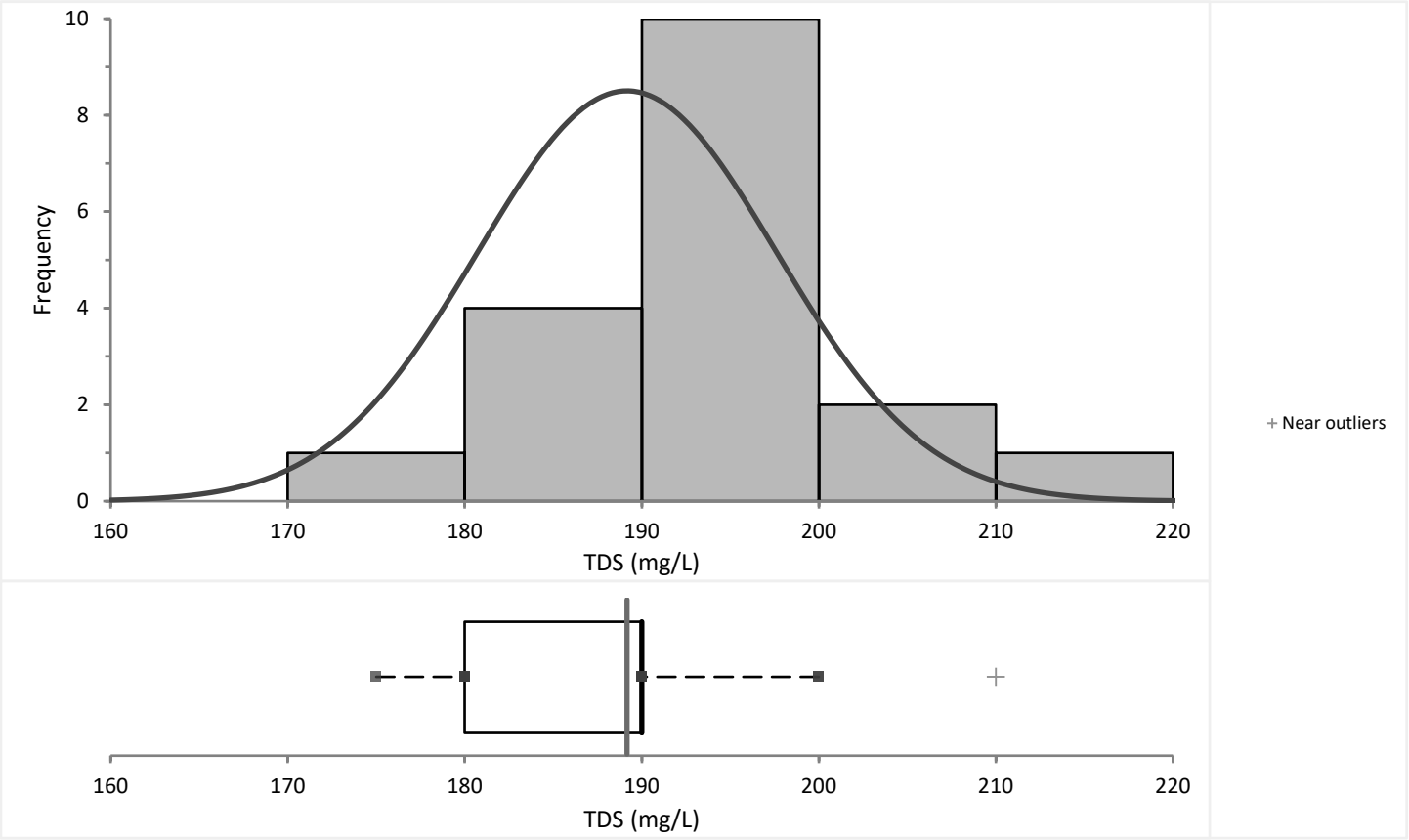


Shapiro-Wilk test

W statistic	0.965
p-value	0.6943[1]

H0: F(Y) = N(μ, σ)
The distribution of the population is normal with unspecified mean and standard deviation.
H1: F(Y) ≠ N(μ, σ)
The distribution of the population is not normal.
[1] Do not reject the null hypothesis at the 10% significance level.

Descriptives



	N
	18

	Mean	Mean SE	SD	Skewness	Kurtosis
TDS	189.2	1.99	8.4	0.6	1.07

	Minimum	1st quartile	Median	3rd quartile	Maximum	IQR
TDS	175	180.0	190.0	190.0	210	10.0

Frequency Distribution

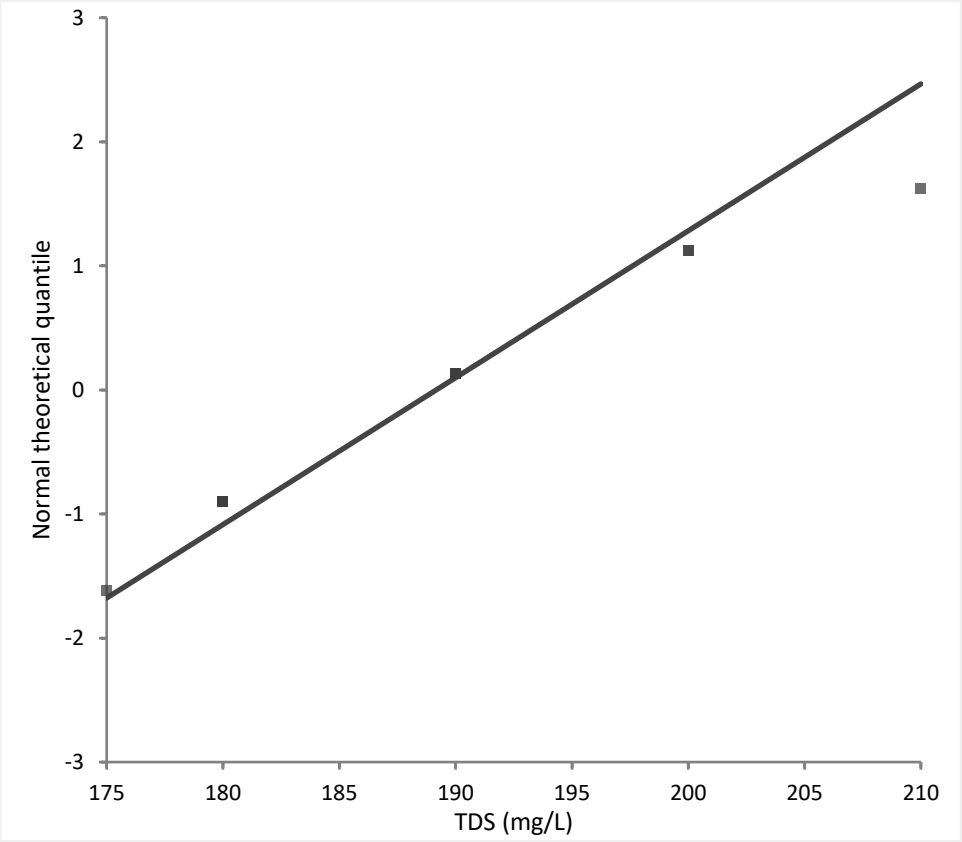
Class	Frequency	Relative frequency	Density	Cumulative frequency	Cumulative relative frequency
≥170 to <180	1	0.056	0.0056	1	0.056
≥180 to <190	4	0.222	0.0222	5	0.278
≥190 to <200	10	0.556	0.0556	15	0.833
≥200 to <210	2	0.111	0.0111	17	0.944
≥210 to <220	1	0.056	0.0056	18	1.000

Descriptives

N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
TDS	189.2	1.99	8.4	0.6	1.07

Normality

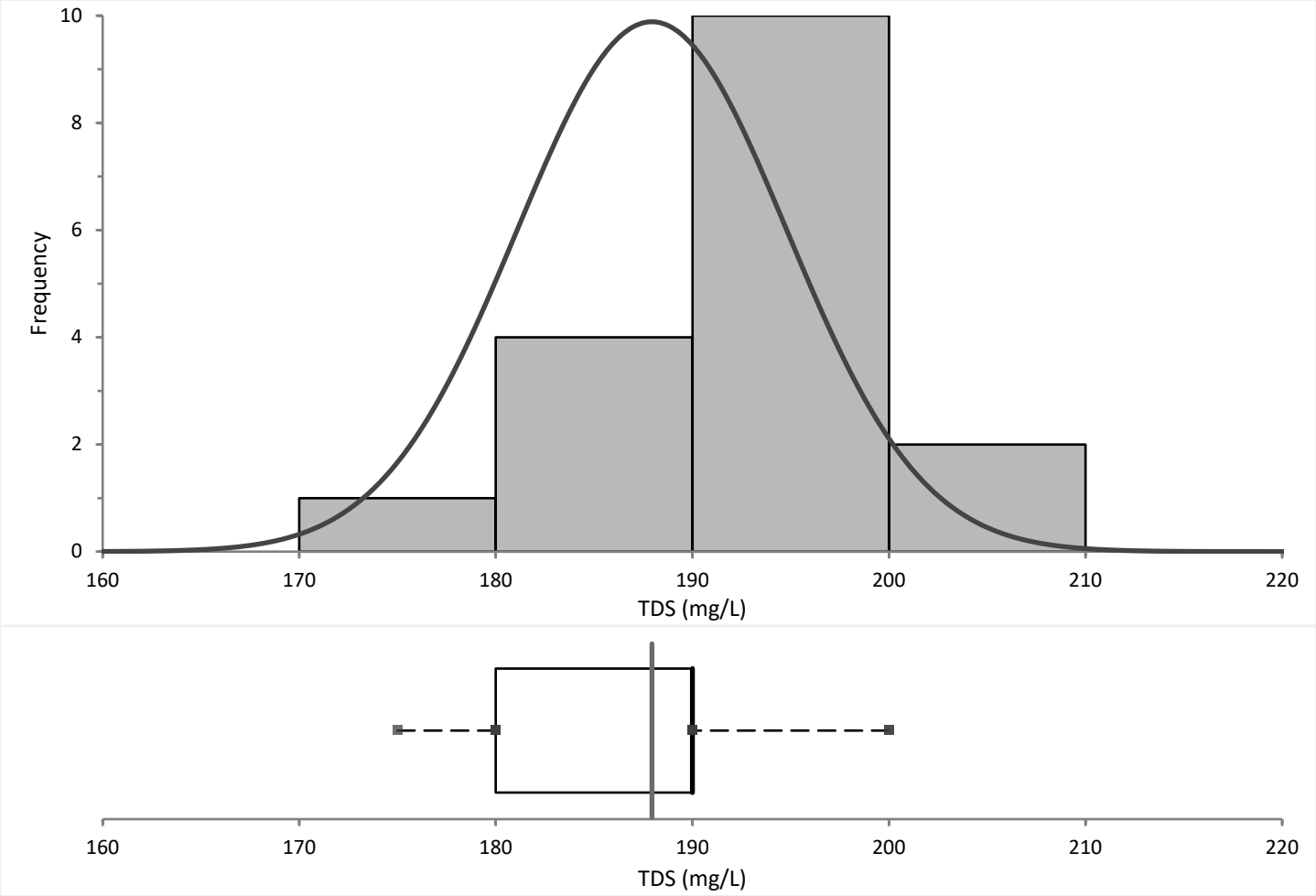


Shapiro-Wilk test

W statistic	0.861
p-value	0.0129[1]

H0: F(Y) = N(μ, σ)
The distribution of the population is normal with unspecified mean and standard deviation.
H1: F(Y) ≠ N(μ, σ)
The distribution of the population is not normal.
[1] Reject the null hypothesis in favour of the alternative hypothesis at the 10% significance level.

Descriptives



	N
	17

	Mean	Mean SE	SD	Skewness	Kurtosis
TDS	187.9	1.66	6.9	-0.1	-0.10

	Minimum	1st quartile	Median	3rd quartile	Maximum	IQR
TDS	175	180.0	190.0	190.0	200	10.0

Frequency Distribution

Class	Frequency	Relative frequency	Density	Cumulative frequency	Cumulative relative frequency
≥170 to <180	1	0.059	0.0059	1	0.059
≥180 to <190	4	0.235	0.0235	5	0.294
≥190 to <200	10	0.588	0.0588	15	0.882
≥200 to <210	2	0.118	0.0118	17	1.000
≥210 to <220	0	0.000	0.0000	17	1.000

TDS

MW-26 (exclude '210' outlier)

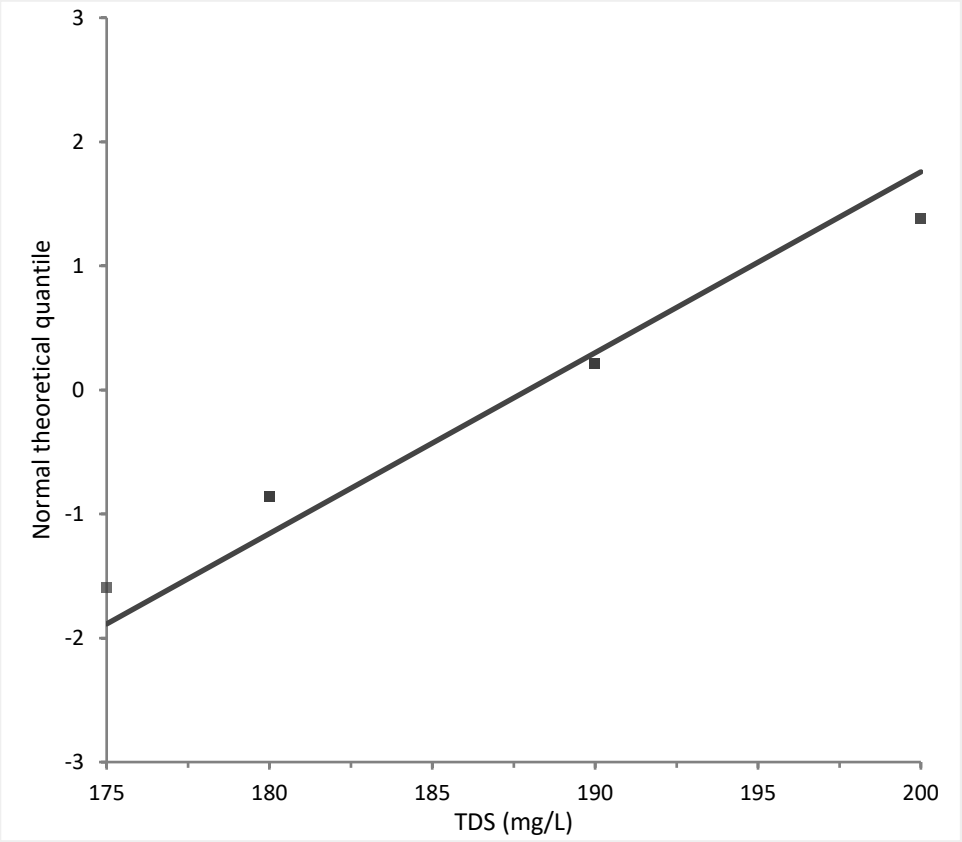
Last updated 5 July 2018 at 14:19 by TupLLC

Descriptives

N	17

	Mean	Mean SE	SD	Skewness	Kurtosis
TDS	187.9	1.66	6.9	-0.1	-0.10

Normality



Shapiro-Wilk test

W statistic	0.831
p-value	0.0056[1]

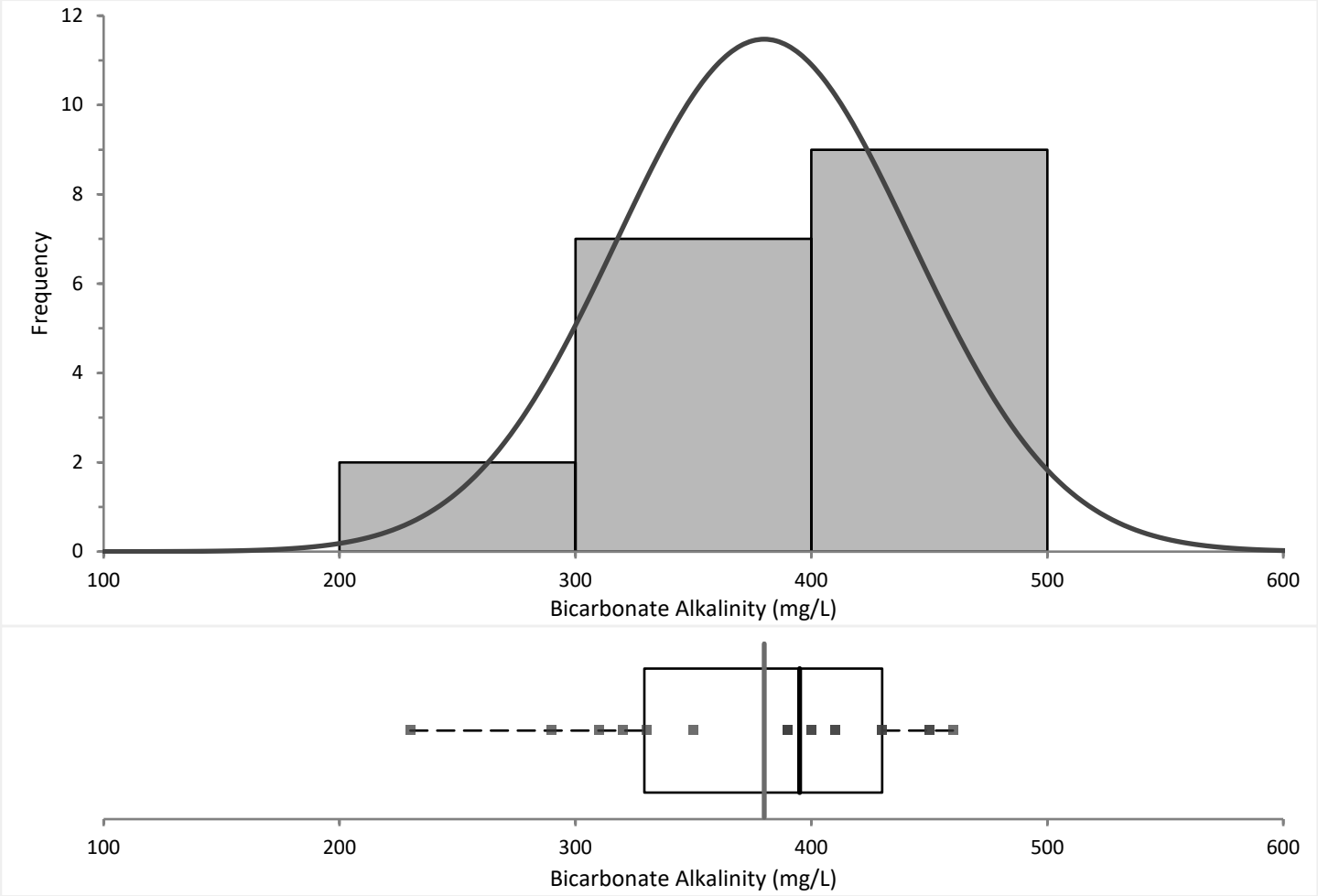
H0: F(Y) = N(μ, σ)
The distribution of the population is normal with unspecified mean and standard deviation.
H1: F(Y) ≠ N(μ, σ)
The distribution of the population is not normal.
[1] Reject the null hypothesis in favour of the alternative hypothesis at the 10% significance level.

Bicarbonate Alkalinity

MW-27

Last updated 5 July 2018 at 14:33 by TupLLC

Descriptives



N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Bicarbonate Alkalinity as CACO3	380.0	14.75	62.6	-0.9	0.32

	Minimum	1st quartile	Median	3rd quartile	Maximum	IQR
Bicarbonate Alkalinity as CACO3	230	329.2	395.0	430.0	460	100.8

Frequency Distribution

Class	Frequency	Relative frequency	Density	Cumulative frequency	Cumulative relative frequency
≥200 to <300	2	0.111	0.0011	2	0.111
≥300 to <400	7	0.389	0.0039	9	0.500
≥400 to <500	9	0.500	0.0050	18	1.000

Bicarbonate Alkalinity

MW-27

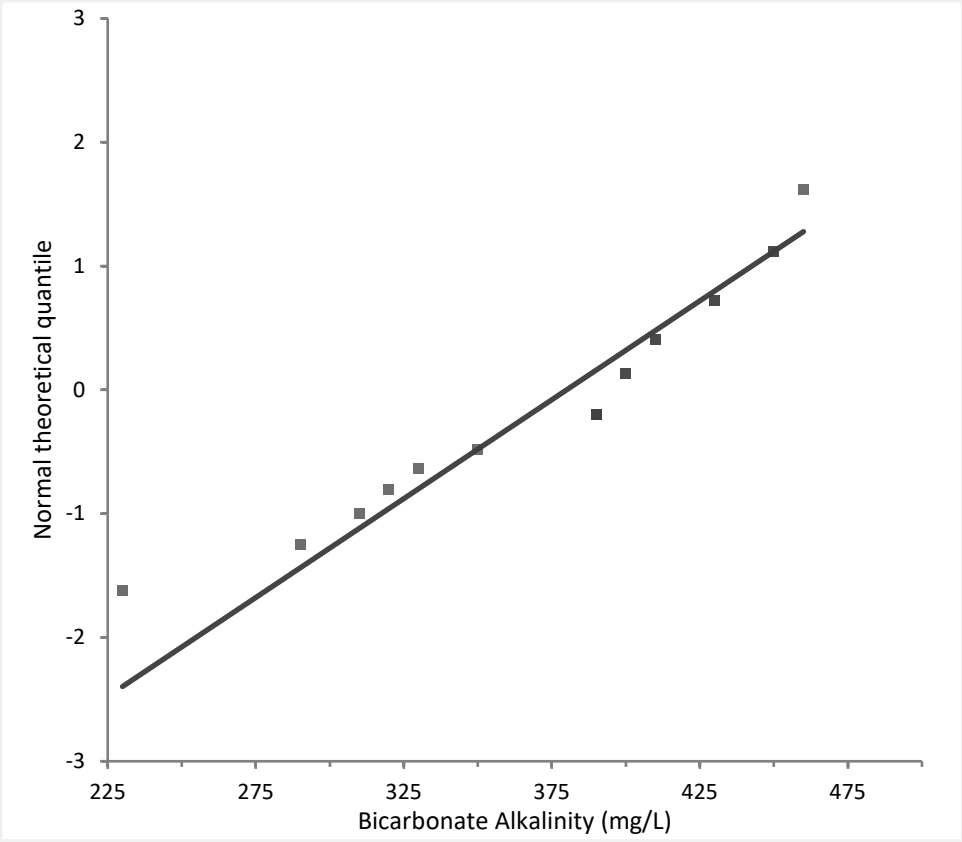
Last updated 5 July 2018 at 14:34 by TupLLC

Descriptives

N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Bicarbonate Alkalinity as CACO3	380.0	14.75	62.6	-0.9	0.32

Normality

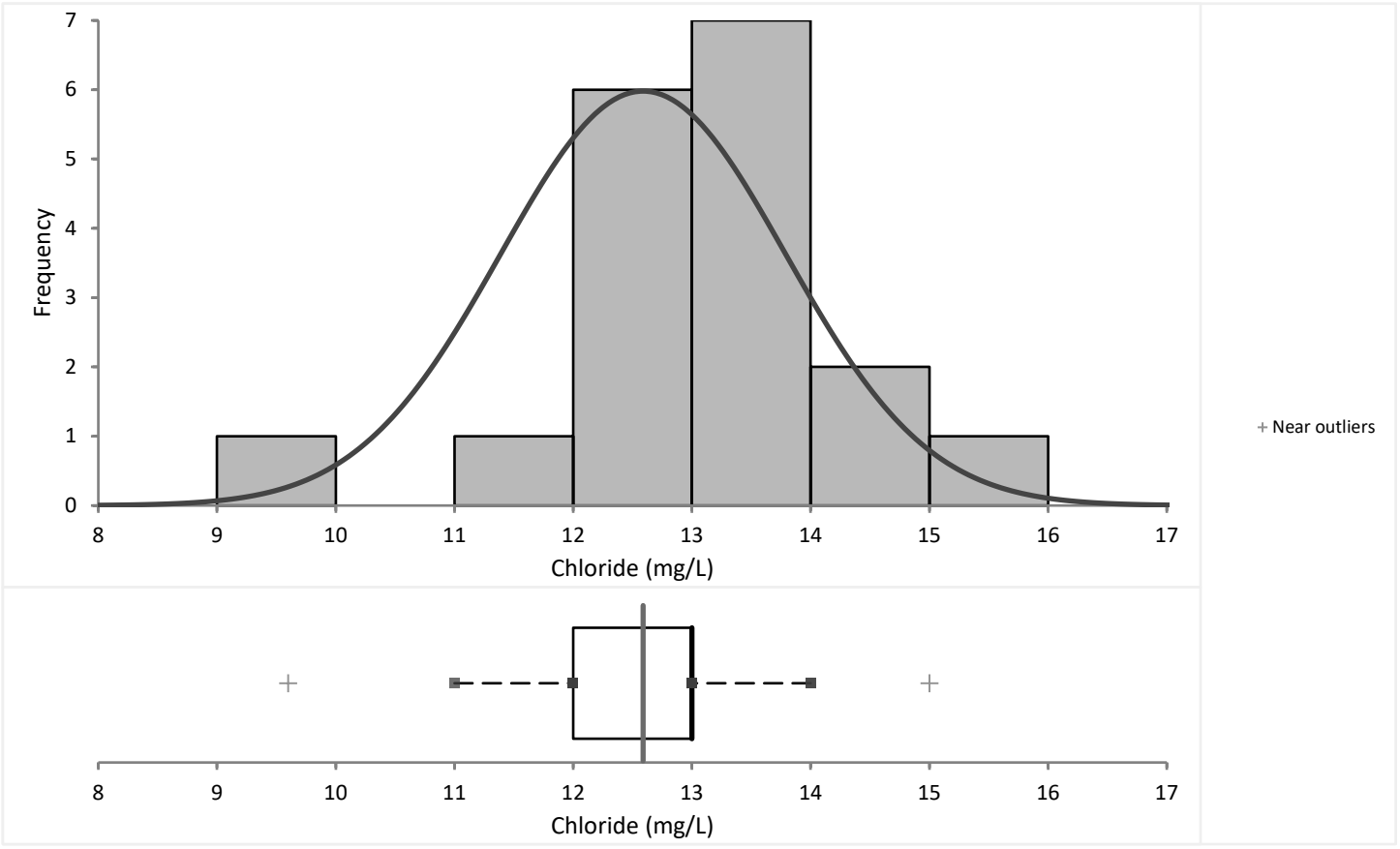


Shapiro-Wilk test

W statistic	0.922
p-value	0.1412[1]

H0: F(Y) = N(μ, σ)
The distribution of the population is normal with unspecified mean and standard deviation.
H1: F(Y) ≠ N(μ, σ)
The distribution of the population is not normal.
[1] Do not reject the null hypothesis at the 10% significance level.

Descriptives



N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Chloride	12.59	0.283	1.20	-0.5	1.58

	Minimum	1st quartile	Median	3rd quartile	Maximum	IQR
Chloride	9.6	12.00	13.00	13.00	15.0	1.00

Frequency Distribution

Class	Frequency	Relative frequency	Density	Cumulative frequency	Cumulative relative frequency
≥9 to <10	1	0.056	0.0556	1	0.056
≥10 to <11	0	0.000	0.0000	1	0.056
≥11 to <12	1	0.056	0.0556	2	0.111
≥12 to <13	6	0.333	0.3333	8	0.444
≥13 to <14	7	0.389	0.3889	15	0.833
≥14 to <15	2	0.111	0.1111	17	0.944
≥15 to <16	1	0.056	0.0556	18	1.000

Chloride

MW-27

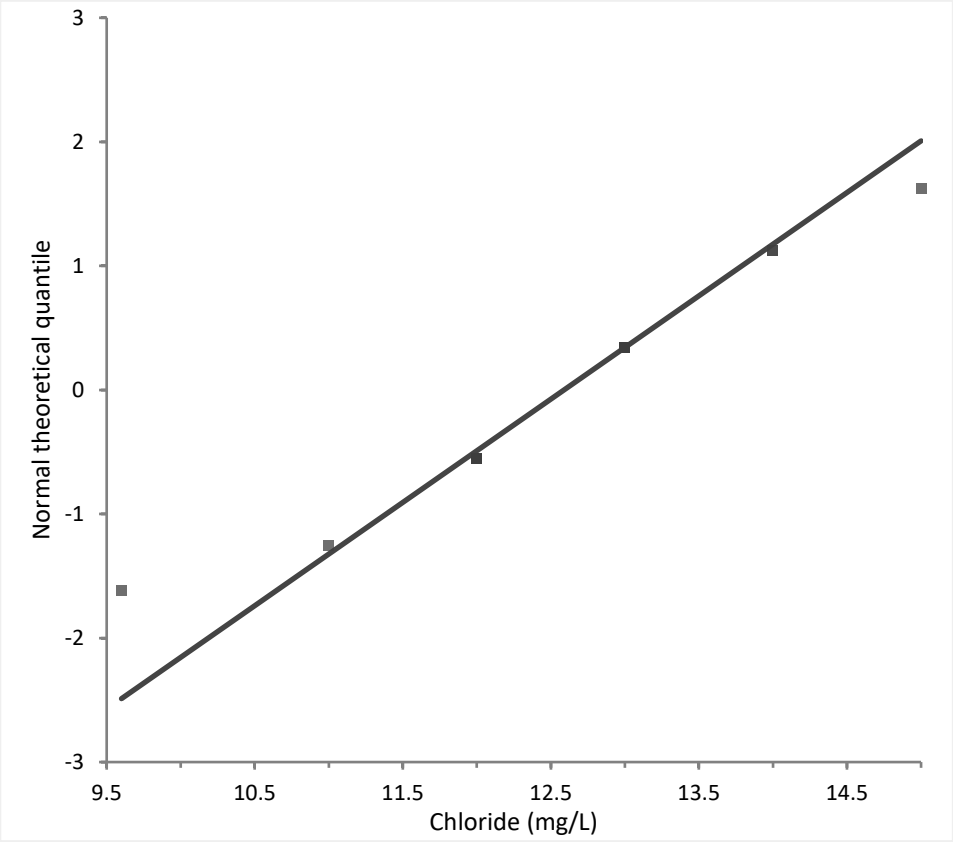
Last updated 5 July 2018 at 14:37 by TupLLC

Descriptives

N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Chloride	12.59	0.283	1.20	-0.5	1.58

Normality



Shapiro-Wilk test

W statistic	0.916
p-value	0.1104[1]

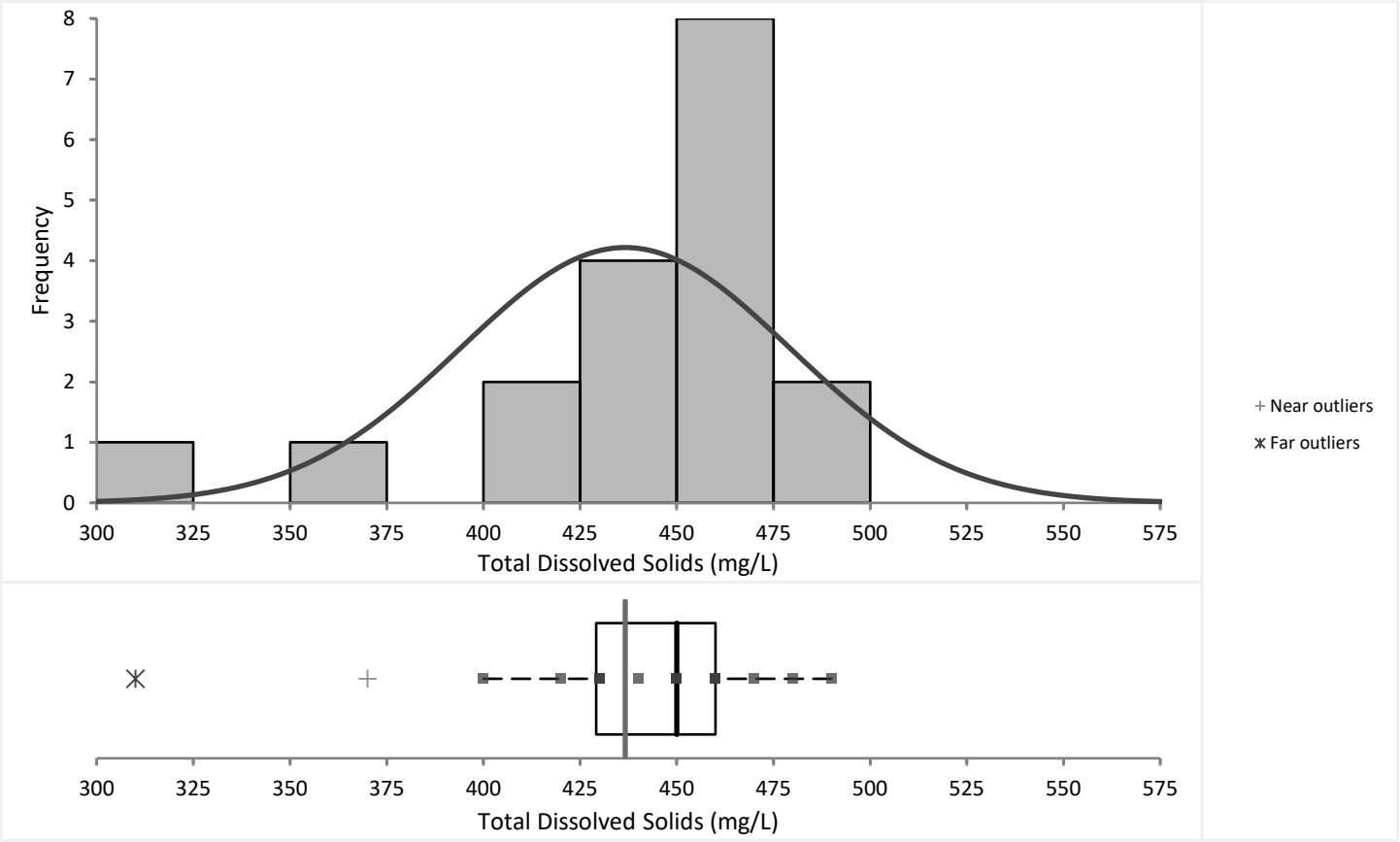
H0: F(Y) = N(μ, σ)
The distribution of the population is normal with unspecified mean and standard deviation.
H1: F(Y) ≠ N(μ, σ)
The distribution of the population is not normal.
[1] Do not reject the null hypothesis at the 10% significance level.

Total Dissolved Solids

MW-27

Last updated 5 July 2018 at 14:40 by TupLLC

Descriptives



	N
	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Total Dissolved Solids	436.7	10.03	42.6	-1.8	3.87

	Minimum	1st quartile	Median	3rd quartile	Maximum	IQR
Total Dissolved Solids	310	429.2	450.0	460.0	490	30.8

Frequency Distribution

Class	Frequency	Relative frequency	Density	Cumulative frequency	Cumulative relative frequency
≥300 to <325	1	0.056	0.0022	1	0.056
≥325 to <350	0	0.000	0.0000	1	0.056
≥350 to <375	1	0.056	0.0022	2	0.111
≥375 to <400	0	0.000	0.0000	2	0.111
≥400 to <425	2	0.111	0.0044	4	0.222
≥425 to <450	4	0.222	0.0089	8	0.444
≥450 to <475	8	0.444	0.0178	16	0.889
≥475 to <500	2	0.111	0.0044	18	1.000

Total Dissolved Solids

Analyse-it v4.96.2

MW-27

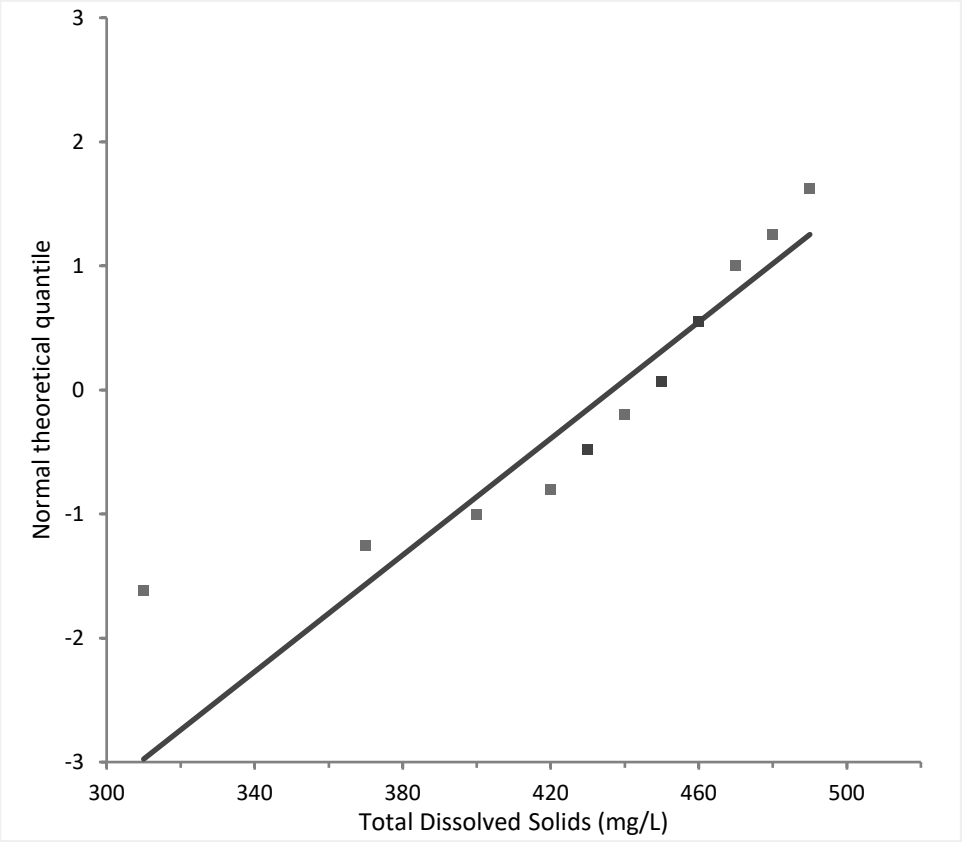
Last updated 5 July 2018 at 14:41 by TupLLC

Descriptives

N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Total Dissolved Solids	436.7	10.03	42.6	-1.8	3.87

Normality



Shapiro-Wilk test

W statistic	0.842
p-value	0.0064[1]

H0: F(Y) = N(μ, σ)
The distribution of the population is normal with unspecified mean and standard deviation.
H1: F(Y) ≠ N(μ, σ)
The distribution of the population is not normal.
[1] Reject the null hypothesis in favour of the alternative hypothesis at the 10% significance level.

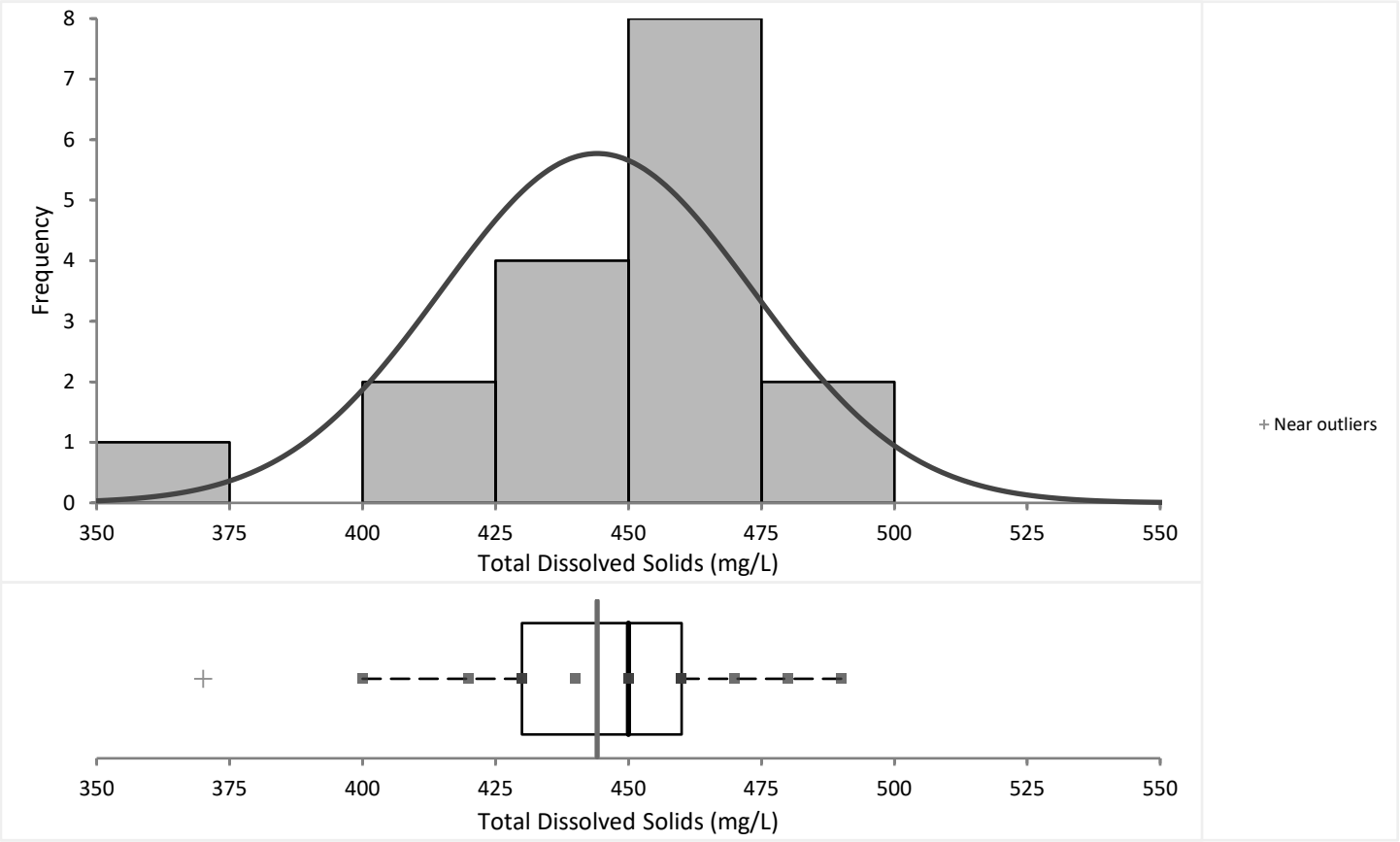
Total Dissolved Solids

Analyse-it v4.96.2

MW-27 (exclude '310' outlier)

Last updated 5 July 2018 at 14:44 by TupLLC

Descriptives



N	17

	Mean	Mean SE	SD	Skewness	Kurtosis
Total Dissolved Solids	444.1	7.13	29.4	-0.9	1.38

	Minimum	1st quartile	Median	3rd quartile	Maximum	IQR
Total Dissolved Solids	370	430.0	450.0	460.0	490	30.0

Frequency Distribution

Class	Frequency	Relative frequency	Density	Cumulative frequency	Cumulative relative frequency
≥350 to <375	1	0.059	0.0024	1	0.059
≥375 to <400	0	0.000	0.0000	1	0.059
≥400 to <425	2	0.118	0.0047	3	0.176
≥425 to <450	4	0.235	0.0094	7	0.412
≥450 to <475	8	0.471	0.0188	15	0.882
≥475 to <500	2	0.118	0.0047	17	1.000

Total Dissolved Solids

Analyse-it v4.96.2

MW-27 (exclude '310' outlier)

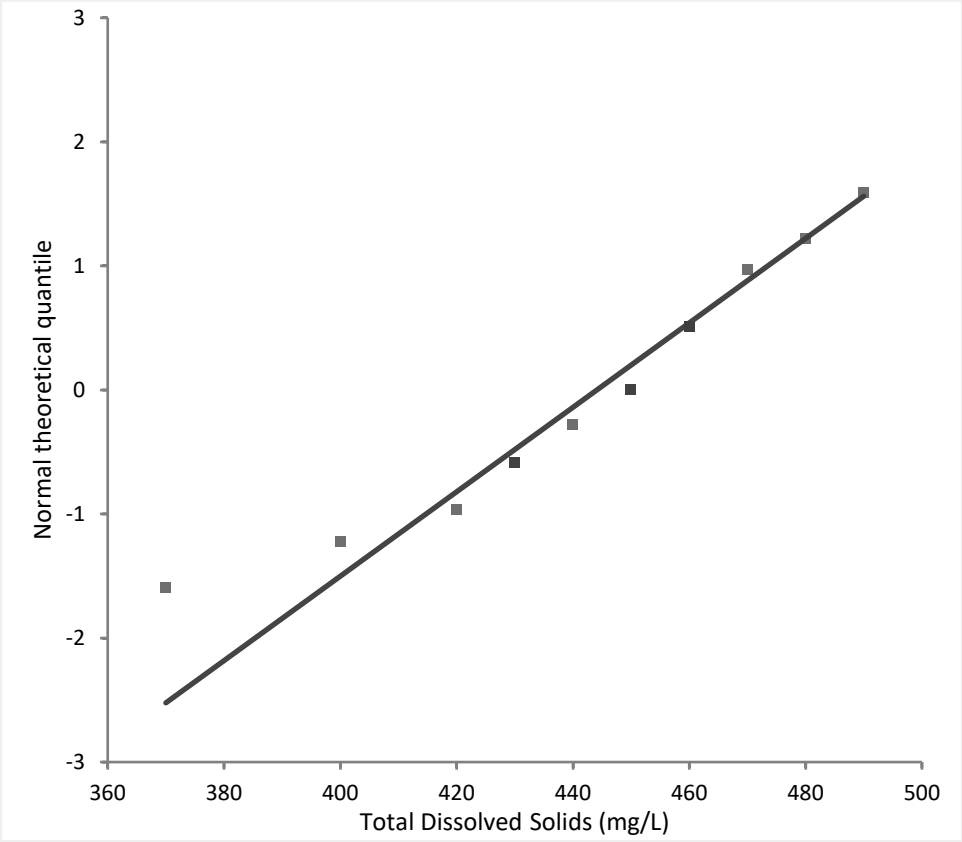
Last updated 5 July 2018 at 14:42 by TupLLC

Descriptives

N	17

	Mean	Mean SE	SD	Skewness	Kurtosis
Total Dissolved Solids	444.1	7.13	29.4	-0.9	1.38

Normality



Shapiro-Wilk test

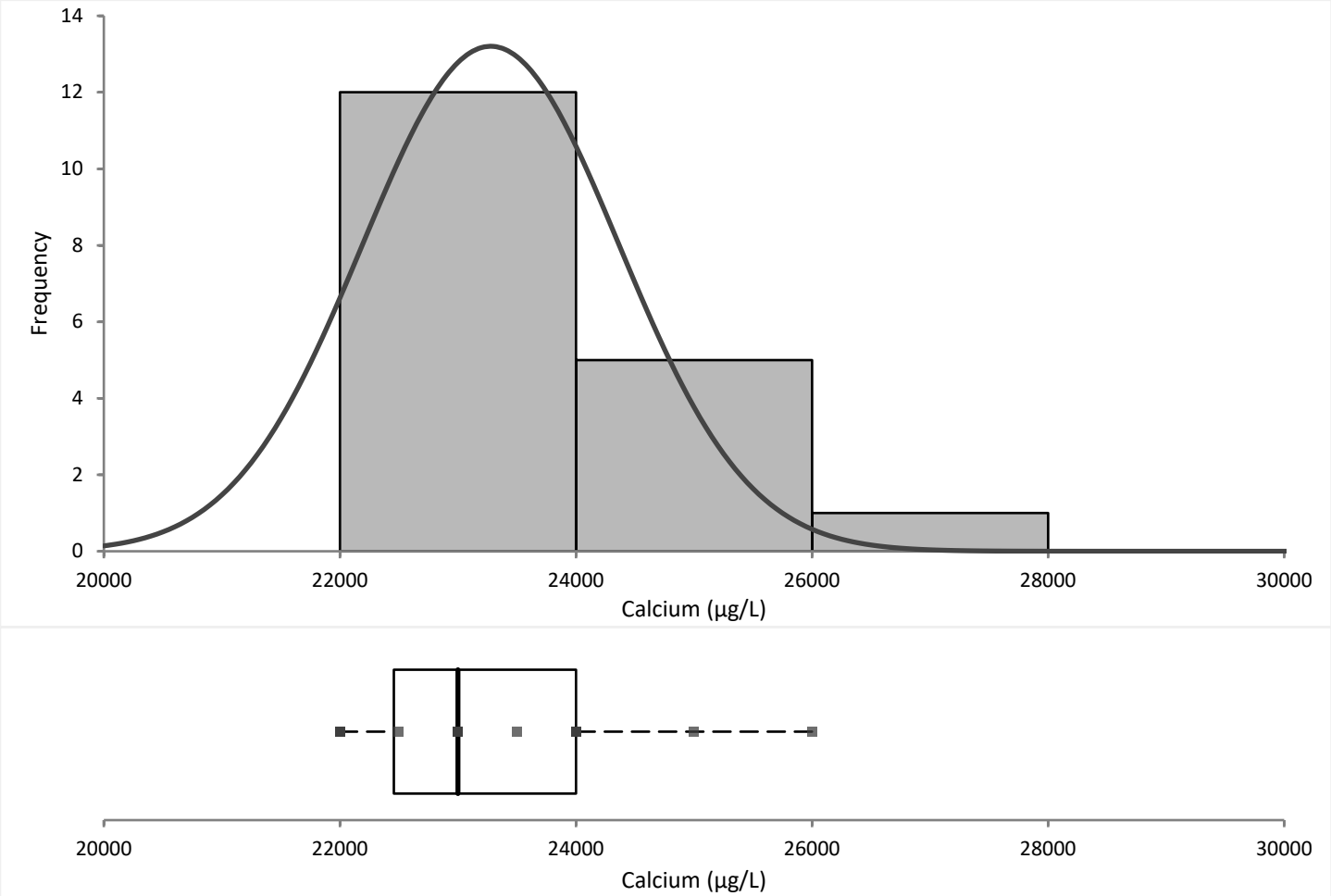
W statistic	0.938
p-value	0.2947[1]

H0: F(Y) = N(μ, σ)
The distribution of the population is normal with unspecified mean and standard deviation.
H1: F(Y) ≠ N(μ, σ)
The distribution of the population is not normal.
[1] Do not reject the null hypothesis at the 10% significance level.

Coffin Butte Landfill
Edited Data Set for Statistical Plots
Dissolved Metals - (Filtered)

Location	Calcium	Iron	Magnesium	Manganese	Sodium		Sample ID	Date	Type
MW-26	22,500	2,950	9,500	660	26,500		VLF-111101-2	11/01/11	Average
MW-26	22,000	1,250	9,250	635	25,500		VLF-20120117-02	01/17/12	Average
MW-26	23,000	380	8,900	580	26,000		VLF-120411-18	04/11/12	Primary Sample
MW-26	22,000	385	7,950	425	27,000		VLF-120713-3	07/13/12	Average
MW-26	22,000	430	8,700	610	27,000		VLF-121016-1	10/16/12	Primary Sample
MW-26	23,000	410	8,600	620	27,000		VLF-130124-3	01/24/13	Average
MW-26	25,000	260	8,900	550	28,000		VLF-130419-9	04/19/13	Primary Sample
MW-26	23,000	440	8,200	540	25,000		VLF-130710-3	07/10/13	Average
MW-26	22,000	440	8,900	640	28,000		VLI-102813-25	10/28/13	Primary Sample
MW-26	23,000	350	8,300	460	28,000		VLF-140415-1	04/15/14	Primary Sample
MW-26	24,000	510	9,800	640	29,000		VLF-141021-12	10/21/14	Primary Sample
MW-26	23,000	290	9,300	450	28,000		VLF-150425-2	04/25/15	Primary Sample
MW-26	26,000	1,100	9,900	660	30,000		CBL-151017-7	10/17/15	Primary Sample
MW-26	24,000	190	9,100	530	27,000		VLI-041616-6	04/16/16	Primary Sample
MW-26	24,000	530	9,400	650	26,000		VLI-161022-4	10/22/16	Primary Sample
MW-26	23,500	335	8,600	425	27,000		VLF-170421-3	04/21/17	Average
MW-26	23,000	510	10,000	620	27,000		VLF-171020-7	10/20/17	Primary Sample
MW-26	24,000	170	8,100	370	25,000		VLF180428-2	04/28/18	Primary Sample
Location	Calcium	Iron	Magnesium	Manganese	Sodium		Sample ID	Date	Type
MW-27	48,000	1,400	20,000	3,700	44,000		VLF-111102-8	11/02/11	Primary Sample
MW-27	71,000	12,000	36,000	6,400	39,000		VLF-20120118-01	01/18/12	Primary Sample
MW-27	61,000	3,600	27,000	5,000	33,000		VLF-120411-17	04/11/12	Primary Sample
MW-27	62,000	5,100	26,000	5,300	34,000		VLF-120713-1	07/13/12	Primary Sample
MW-27	61,000	6,100	28,000	5,100	32,000		VLF-121017-19	10/17/12	Primary Sample
MW-27	86,000	15,000	37,000	6,900	38,000		VLF-130124-1	01/24/13	Primary Sample
MW-27	93,000	15,000	40,000	7,400	40,000		VLF-130419-8	04/19/13	Primary Sample
MW-27	68,000	9,100	29,000	5,400	30,000		VLF-130710-1	07/10/13	Primary Sample
MW-27	66,000	3,200	30,000	5,800	35,000		VLI-102913-26	10/29/13	Primary Sample
MW-27	88,000	16,000	41,000	8,100	40,000		VLF-140418-33	04/18/14	Primary Sample
MW-27	87,000	13,000	39,000	6,800	40,000		VLF-141021-13	10/21/14	Primary Sample
MW-27	86,000	13,000	42,000	8,200	40,000		VLF-150425-1	04/25/15	Primary Sample
MW-27	92,000	13,000	41,000	8,200	42,000		CBL-151017-6	10/17/15	Primary Sample
MW-27	86,000	5,300	40,000	7,200	37,000		VLI-041616-7	04/16/16	Primary Sample
MW-27	79,000	4,900	34,000	6,800	35,000		VLI-161022-3	10/22/16	Primary Sample
MW-27	45,000	490	19,000	3,100	28,000		VLF-170421-1	04/21/17	Primary Sample
MW-27	61,000	4,000	29,000	5,400	32,000		VLF-171020-6	10/20/17	Primary Sample
MW-27	71,000	5,100	31,000	6,800	35,000		VLF180428-1	04/28/18	Primary Sample

Descriptives



N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Calcium	23277.8	256.36	1087.7	0.9	0.93

	Minimum	1st quartile	Median	3rd quartile	Maximum	IQR
Calcium	22000	22458.3	23000.0	24000.0	26000	1541.7

Quantile	Calcium
0.250	22458.3
0.500	23000.0
0.750	24000.0

Calcium

MW-26

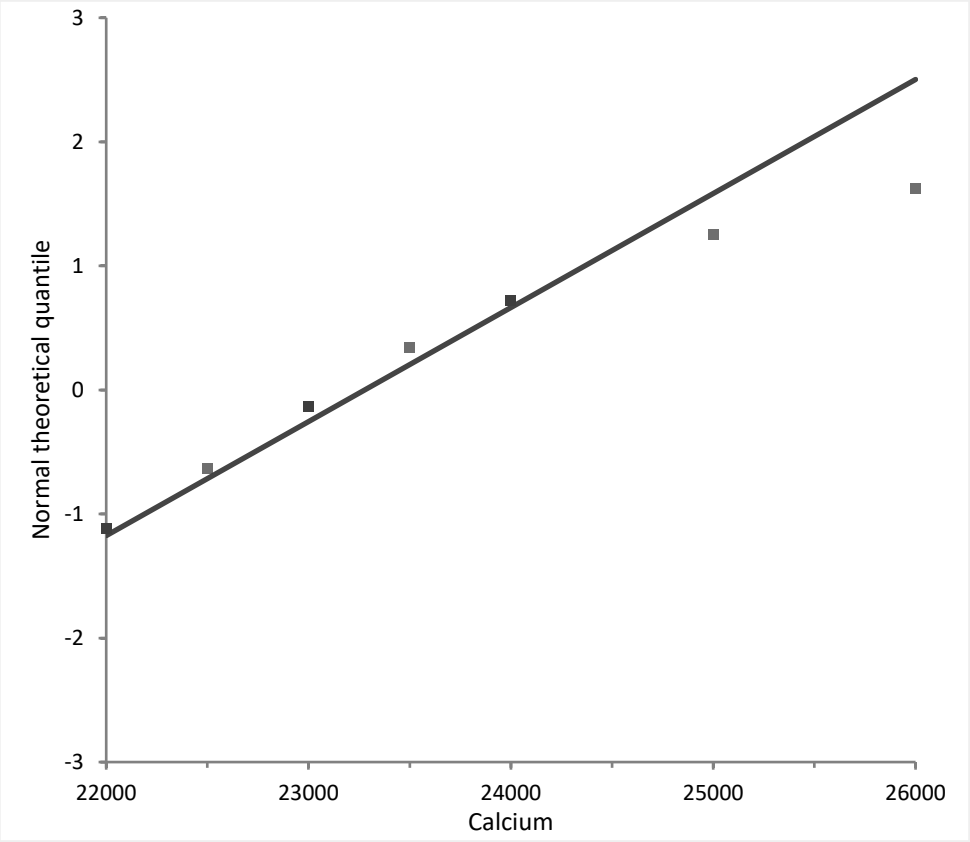
Last updated 5 July 2018 at 16:35 by TupLLC

Descriptives

N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Calcium	23277.8	256.36	1087.7	0.9	0.93

Normality



Shapiro-Wilk test

W statistic	0.896
p-value	0.0497[1]

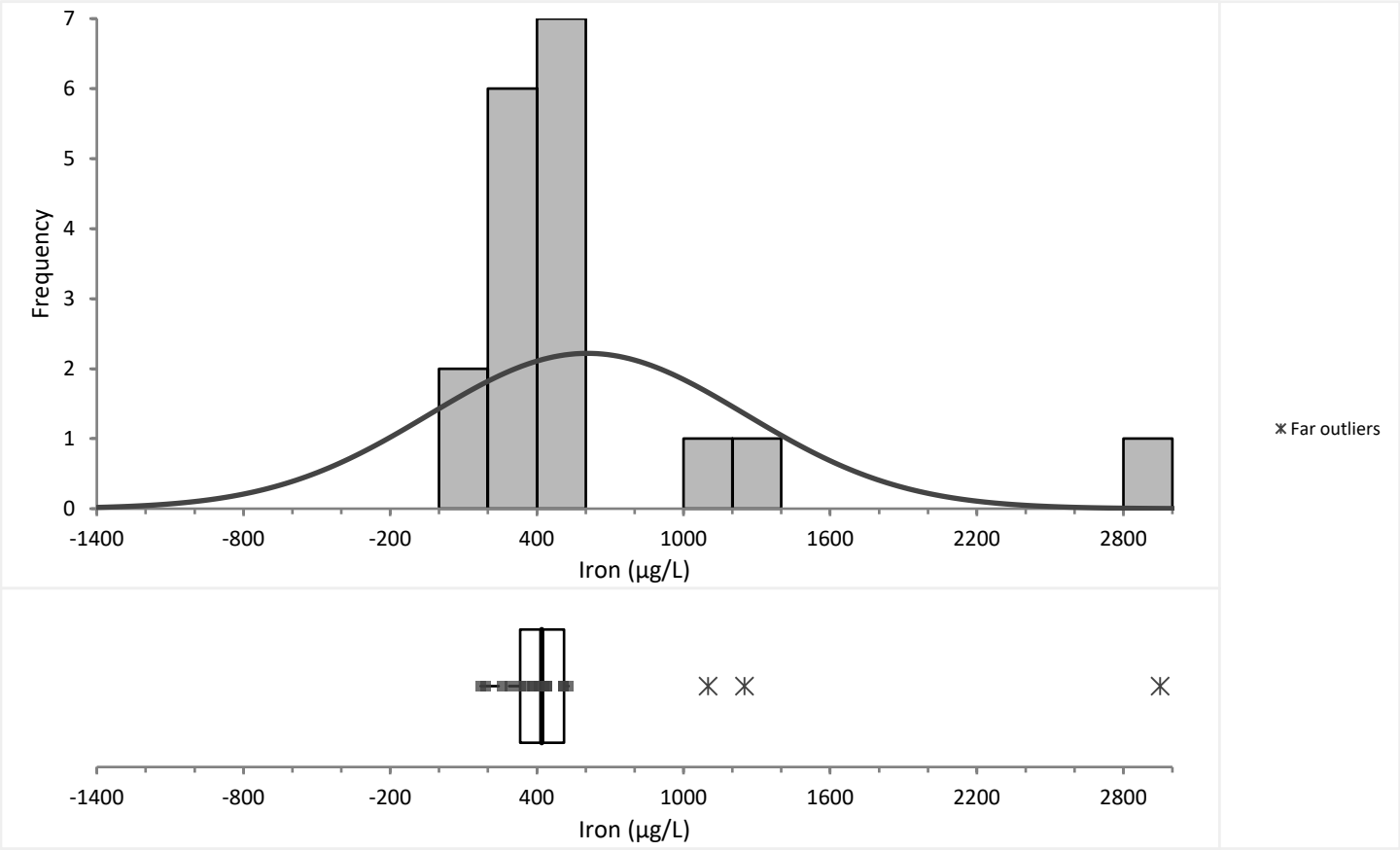
H0: F(Y) = N(μ, σ)
The distribution of the population is normal with unspecified mean and standard deviation.
H1: F(Y) ≠ N(μ, σ)
The distribution of the population is not normal.
[1] Reject the null hypothesis in favour of the alternative hypothesis at the 10% significance level.

Iron

MW-26

Last updated 3 July 2018 at 12:52 by TupLLC

Descriptives

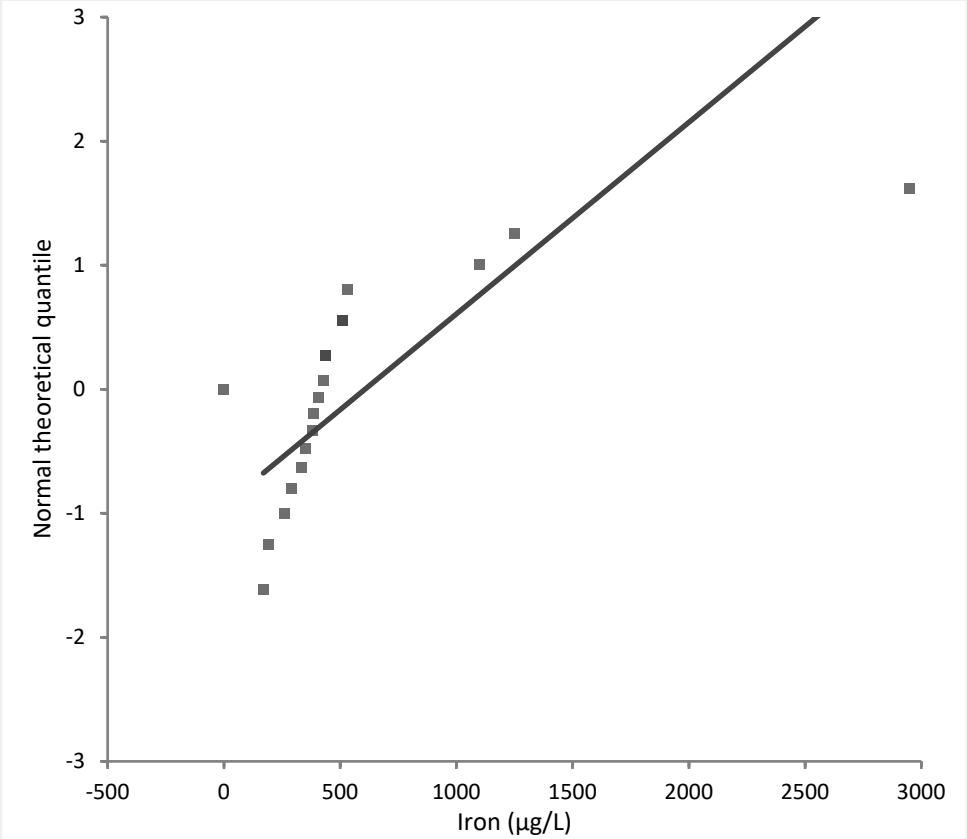


N	18

	Minimum	1st quartile	Median	3rd quartile	Maximum	IQR
Iron	170	331.3	420.0	511.7	2950	180.4

Quantile	Iron
0.100	201.7
0.200	290.0
0.300	347.5
0.400	383.3
0.500	420.0
0.600	440.0
0.700	510.0
0.800	530.0
0.900	1225.0

Normality



Shapiro-Wilk test

W statistic	0.573
p-value	<0.0001[1]

H0: F(Y) = N(µ, σ)

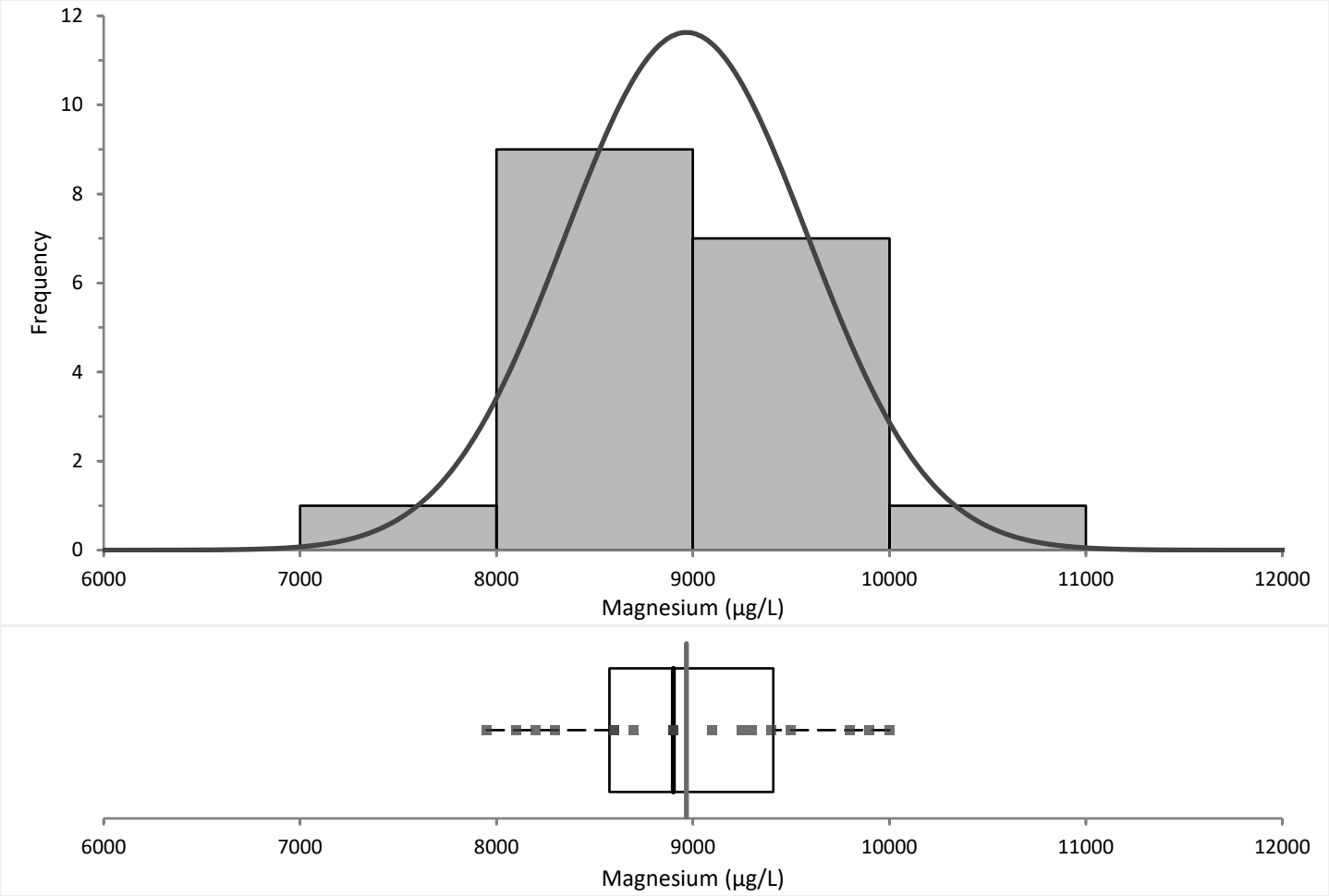
The distribution of the population is normal with unspecified mean and standard deviation.

H1: F(Y) ≠ N(µ, σ)

The distribution of the population is not normal.

[1] Reject the null hypothesis in favour of the alternative hypothesis at the 10% significance level.

Descriptives



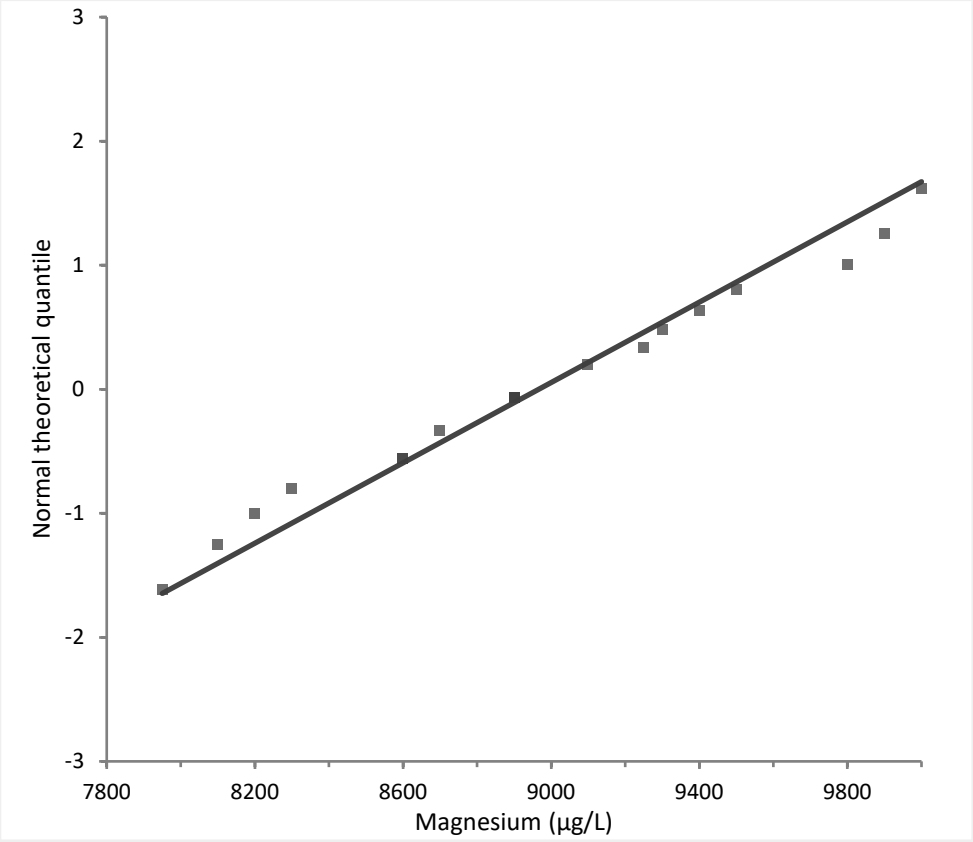
N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Magnesium	8966.7	145.58	617.6	0.1	-0.89

	Minimum	1st quartile	Median	3rd quartile	Maximum
Magnesium	7950	8575.0	8900.0	9408.3	10000

Quantile	Magnesium
0.100	8116.7
0.200	8300.0
0.300	8600.0
0.400	8833.3
0.500	8900.0
0.600	9150.0
0.700	9316.7
0.800	9500.0
0.900	9883.3

Normality



Shapiro-Wilk test

W statistic	0.968
p-value	0.7565[1]

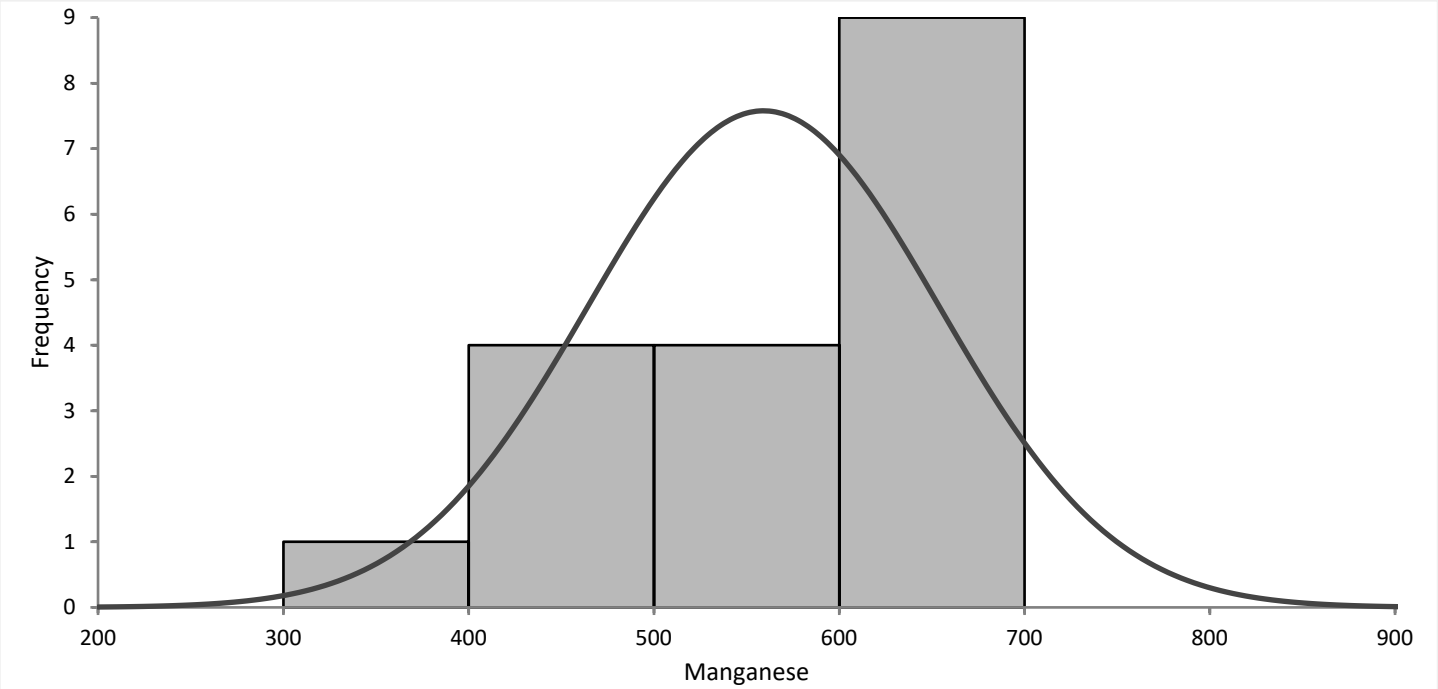
H0: F(Y) = N(μ, σ)
The distribution of the population is normal with unspecified mean and standard deviation.
H1: F(Y) ≠ N(μ, σ)
The distribution of the population is not normal.
[1] Do not reject the null hypothesis at the 10% significance level.

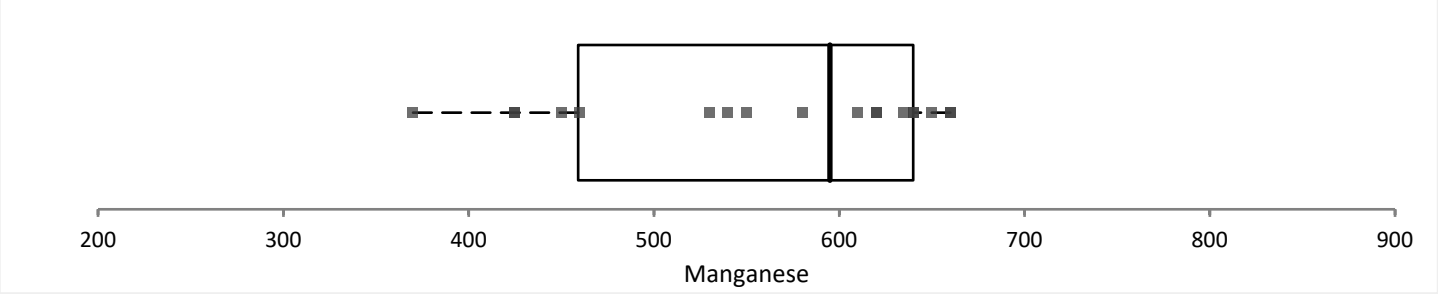
Manganese

MW-26

Last updated 5 July 2018 at 16:40 by TupLLC

Descriptives





N	18

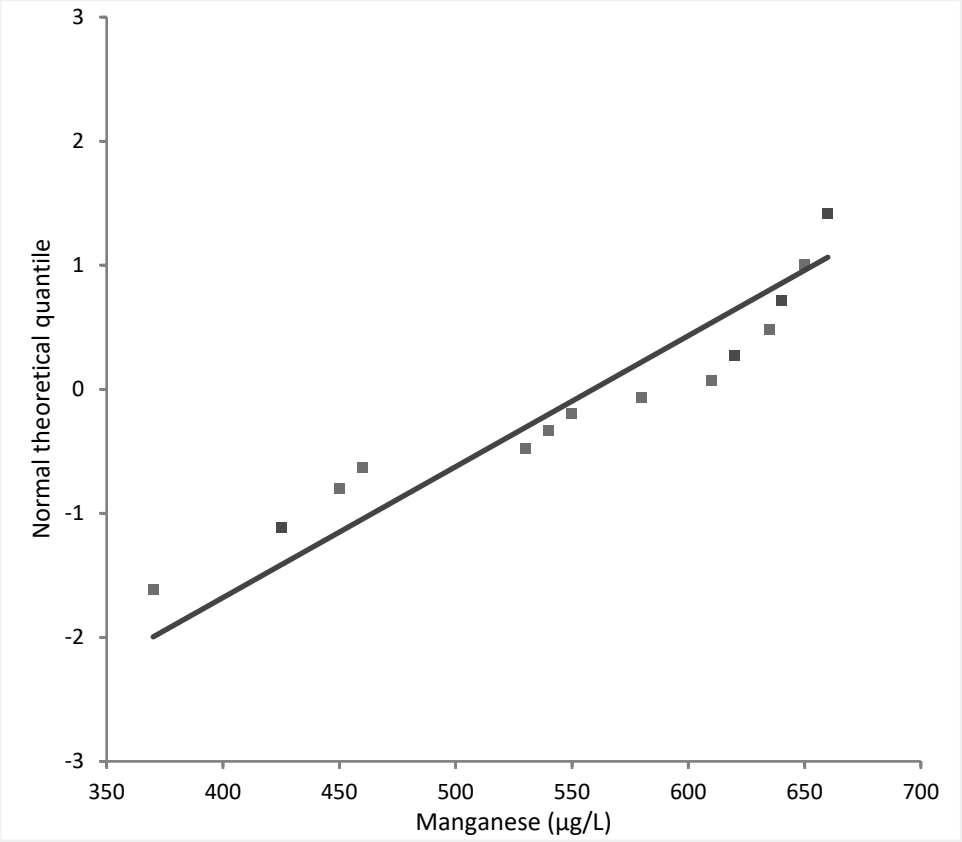
	Mean	Mean SE	SD	Skewness	Kurtosis
Manganese	559.2	22.34	94.8	-0.7	-0.91

	Minimum	1st quartile	Median	3rd quartile	Maximum	IQR
Manganese	370	459.2	595.0	640.0	660	180.8

Frequency Distribution

Class	Frequency	Relative frequency	Density	Cumulative frequency	Cumulative relative frequency
≥300 to <400	1	0.056	0.0006	1	0.056
≥400 to <500	4	0.222	0.0022	5	0.278
≥500 to <600	4	0.222	0.0022	9	0.500
≥600 to <700	9	0.500	0.0050	18	1.000

Normality

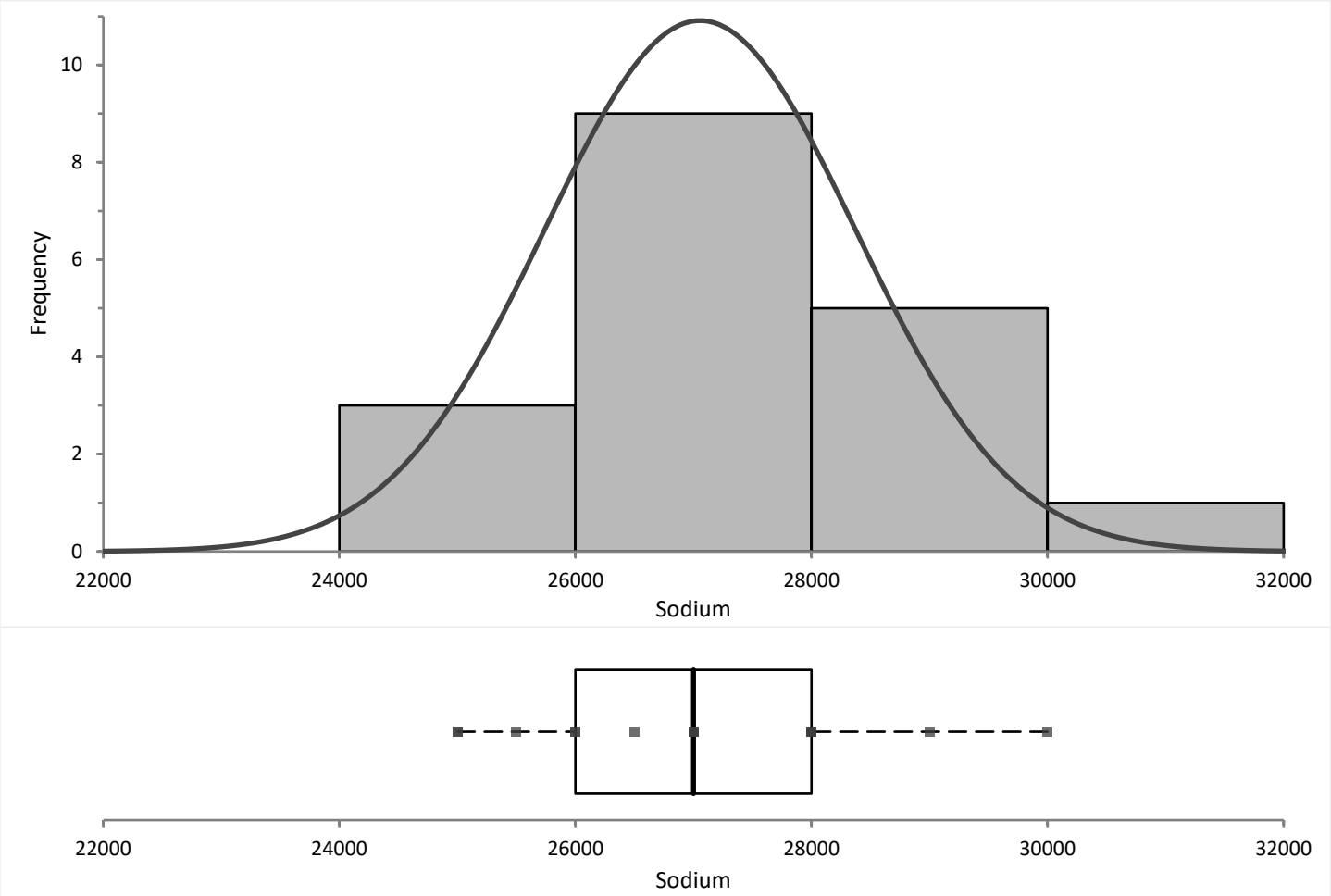


Shapiro-Wilk test

W statistic	0.877
p-value	0.0230[1]

H0: F(Y) = N(µ, σ)
The distribution of the population is normal with unspecified mean and standard deviation.
H1: F(Y) ≠ N(µ, σ)
The distribution of the population is not normal.
[1] Reject the null hypothesis in favour of the alternative hypothesis at the 10% significance level.

Descriptives



	N
	18

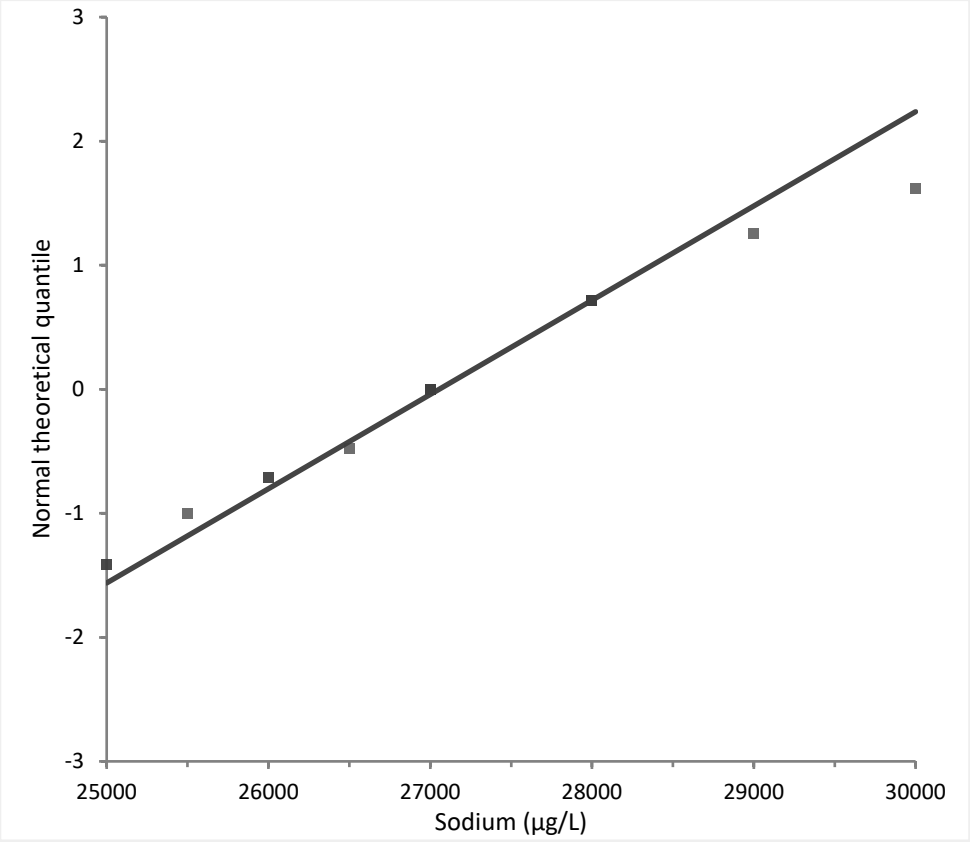
	Mean	Mean SE	SD	Skewness	Kurtosis
Sodium	27055.6	310.20	1316.1	0.4	0.21

	Minimum	1st quartile	Median	3rd quartile	Maximum	IQR
Sodium	25000	26000.0	27000.0	28000.0	30000	2000.0

Frequency Distribution

Class	Frequency	Relative frequency	Density	Cumulative frequency	Cumulative relative frequency
≥24000 to <26000	3	0.167	0.0001	3	0.167
≥26000 to <28000	9	0.500	0.0003	12	0.667
≥28000 to <30000	5	0.278	0.0001	17	0.944
≥30000 to <32000	1	0.056	0.0000	18	1.000

Normality

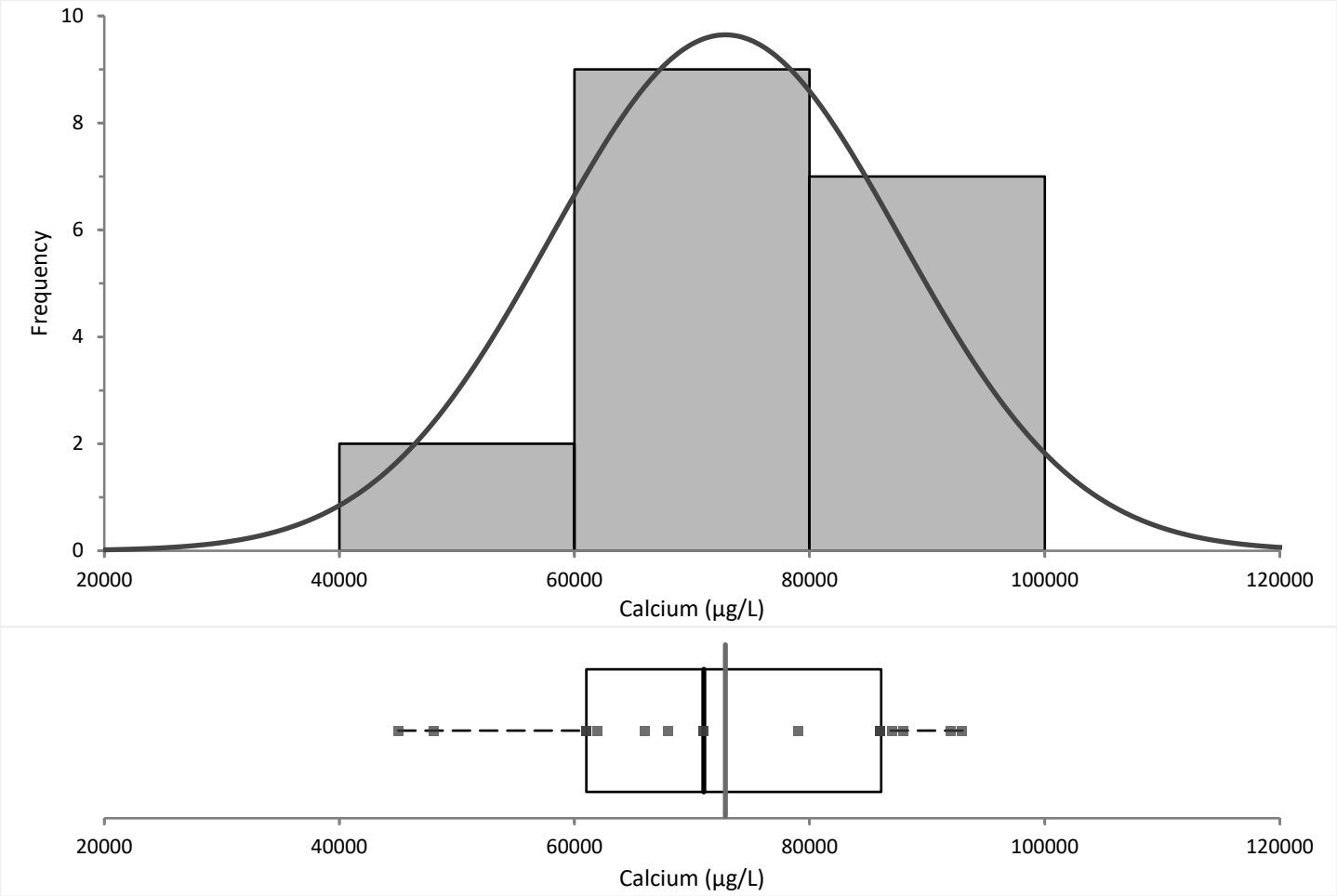


Shapiro-Wilk test

W statistic	0.949
p-value	0.4029[1]

H0: F(Y) = N(µ, σ)
The distribution of the population is normal with unspecified mean and standard deviation.
H1: F(Y) ≠ N(µ, σ)
The distribution of the population is not normal.
[1] Do not reject the null hypothesis at the 10% significance level.

Descriptives



	N
	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Calcium	72833.3	3509.32	14888.8	-0.3	-0.98

	Minimum	1st quartile	Median	3rd quartile	Maximum	IQR
Calcium	45000	61000.0	71000.0	86083.3	93000	25083.3

Frequency Distribution

Class	Frequency	Relative frequency	Density	Cumulative frequency	Cumulative relative frequency
≥40000 to <60000	2	0.111	0.0000	2	0.111
≥60000 to <80000	9	0.500	0.0000	11	0.611
≥80000 to <100000	7	0.389	0.0000	18	1.000

Calcium

MW-27

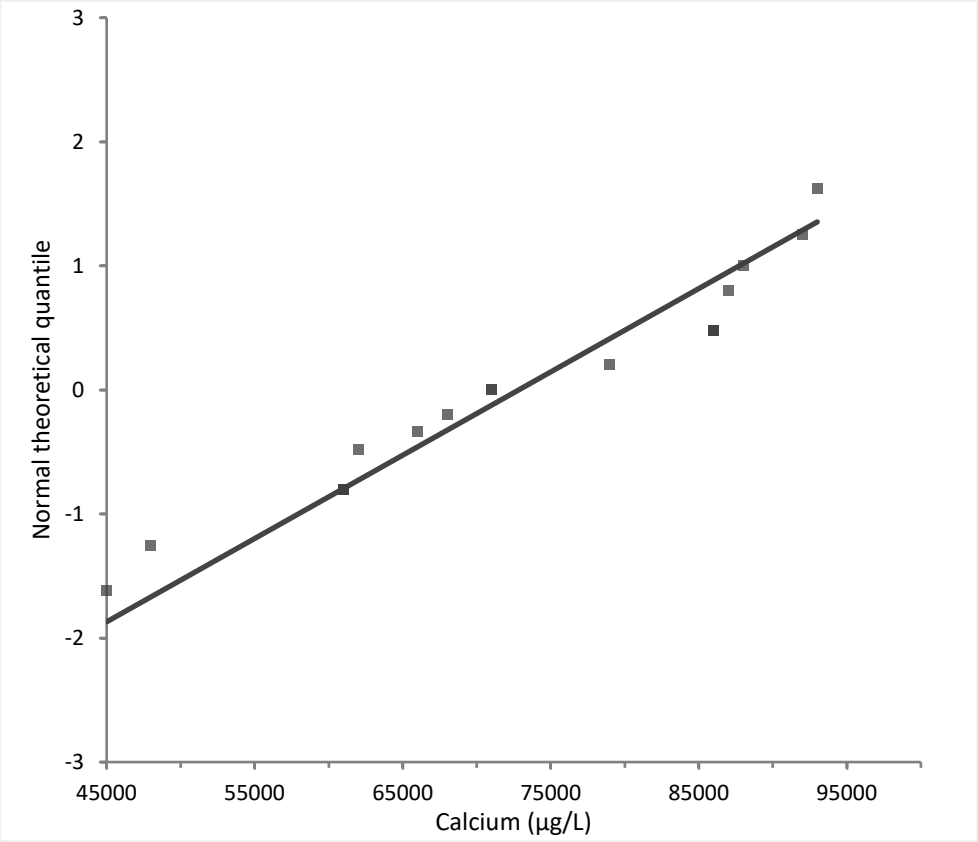
Last updated 3 July 2018 at 13:37 by TupLLC

Descriptives

N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Calcium	72833.3	3509.32	14888.8	-0.3	-0.98

Normality

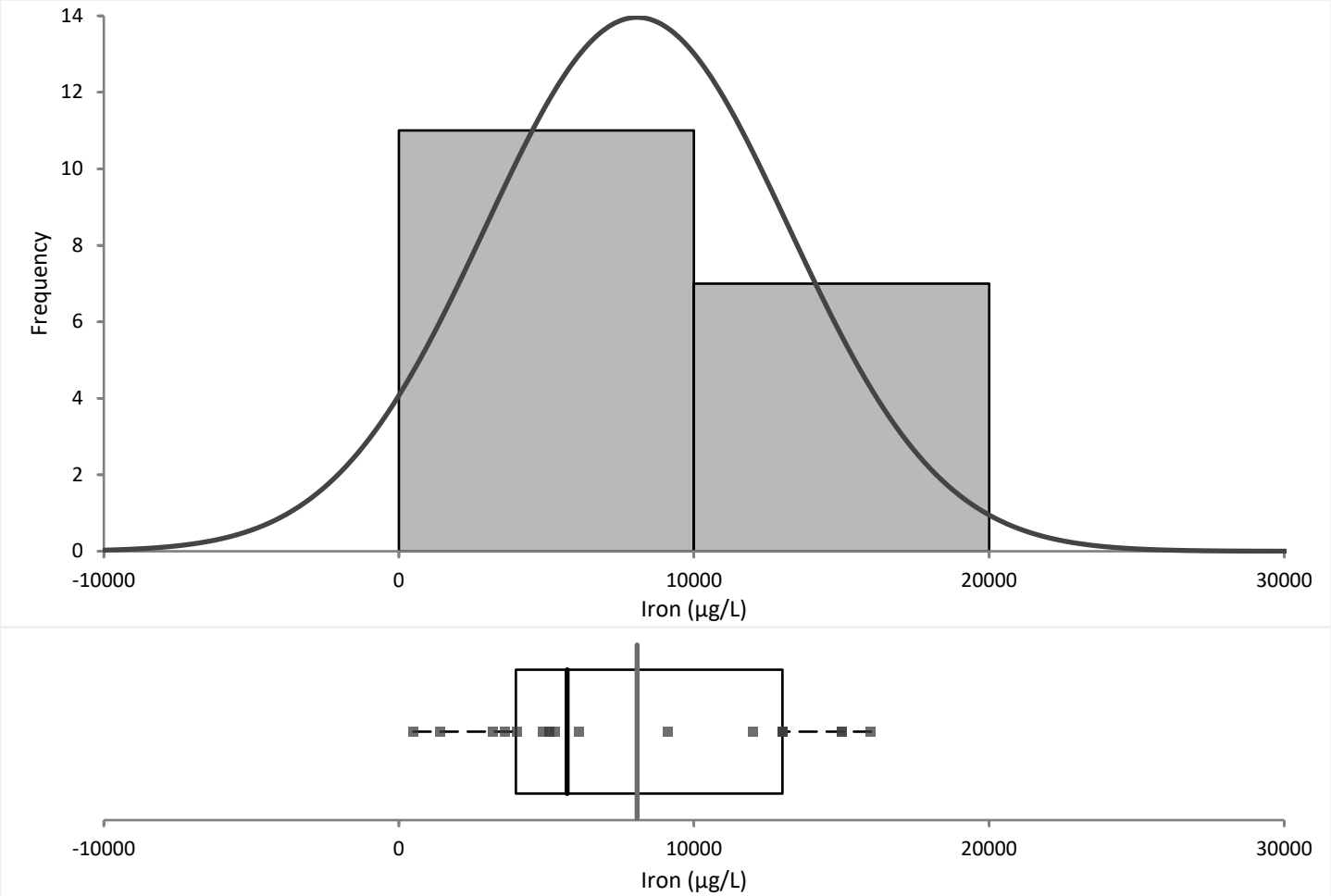


Shapiro-Wilk test

W statistic	0.924
p-value	0.1497[1]

H0: F(Y) = N(μ, σ)
The distribution of the population is normal with unspecified mean and standard deviation.
H1: F(Y) ≠ N(μ, σ)
The distribution of the population is not normal.
[1] Do not reject the null hypothesis at the 10% significance level.

Descriptives



N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Iron	8071.7	1212.42	5143.9	0.2	-1.53

	Minimum	1st quartile	Median	3rd quartile	Maximum	IQR
Iron	490	3966.7	5700.0	13000.0	16000	9033.3

Frequency Distribution

Class	Frequency	Relative frequency	Density	Cumulative frequency	Cumulative relative frequency
≥0 to <10000	11	0.611	0.0001	11	0.611
≥10000 to <20000	7	0.389	0.0000	18	1.000

Iron

MW-27

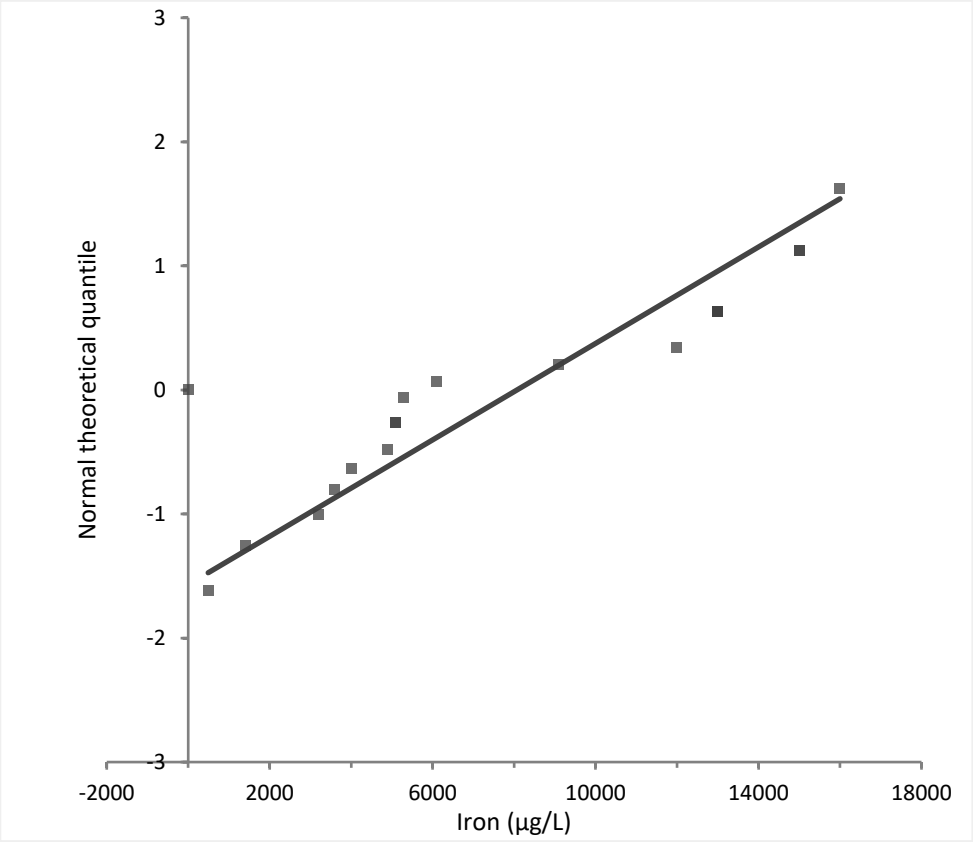
Last updated 3 July 2018 at 13:40 by TupLLC

Descriptives

N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Iron	8071.7	1212.42	5143.9	0.2	-1.53

Normality

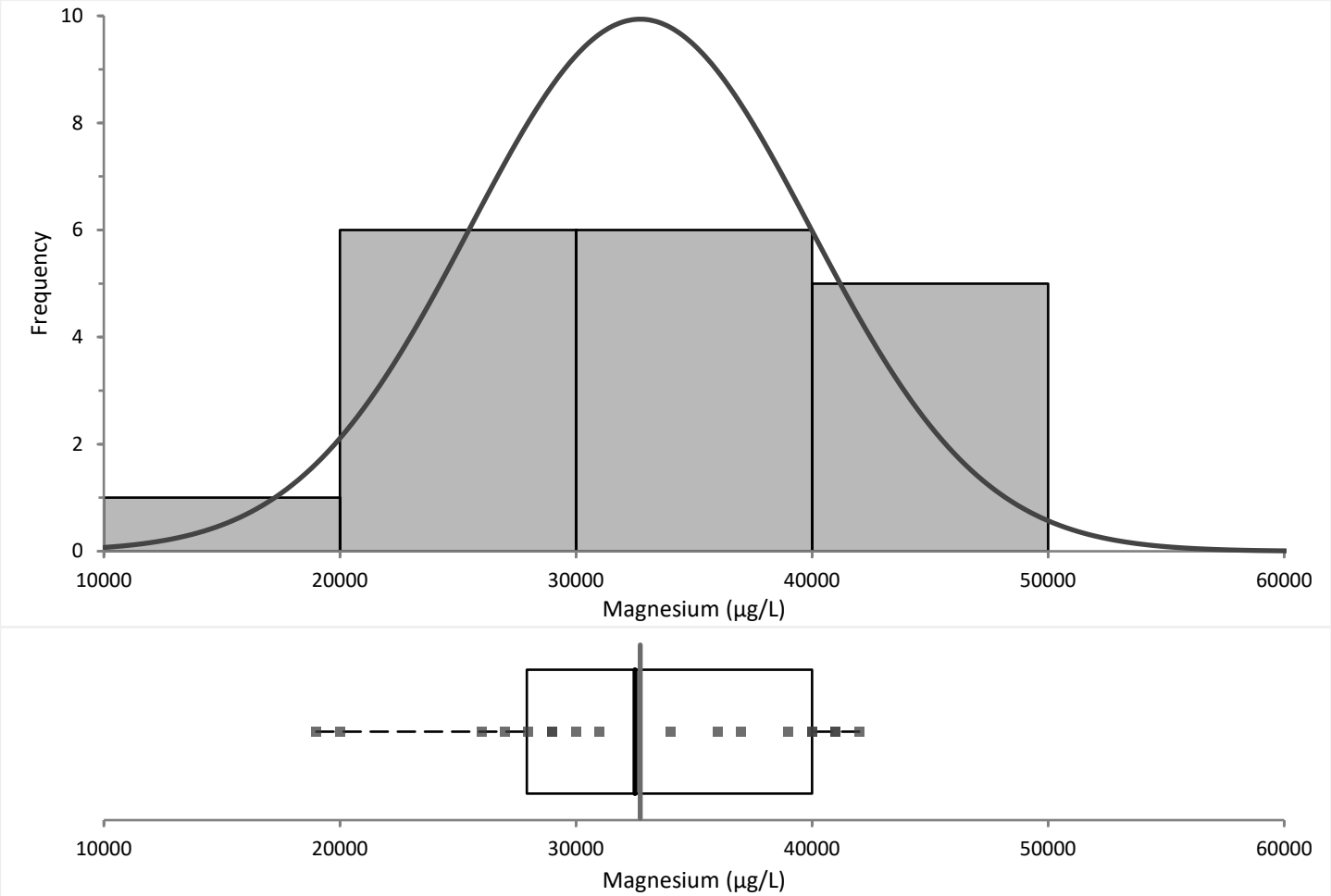


Shapiro-Wilk test

W statistic	0.899
p-value	0.0547[1]

H0: F(Y) = N(μ, σ)
The distribution of the population is normal with unspecified mean and standard deviation.
H1: F(Y) ≠ N(μ, σ)
The distribution of the population is not normal.
[1] Reject the null hypothesis in favour of the alternative hypothesis at the 10% significance level.

Descriptives



	N
	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Magnesium	32722.2	1703.14	7225.8	-0.4	-0.84

	Minimum	1st quartile	Median	3rd quartile	Maximum	IQR
Magnesium	19000	27916.7	32500.0	40000.0	42000	12083.3

Frequency Distribution

Class	Frequency	Relative frequency	Density	Cumulative frequency	Cumulative relative frequency
≥10000 to <20000	1	0.056	0.0000	1	0.056
≥20000 to <30000	6	0.333	0.0000	7	0.389
≥30000 to <40000	6	0.333	0.0000	13	0.722
≥40000 to <50000	5	0.278	0.0000	18	1.000
≥50000 to <60000	0	0.000	0.0000	18	1.000

Magnesium

MW-27

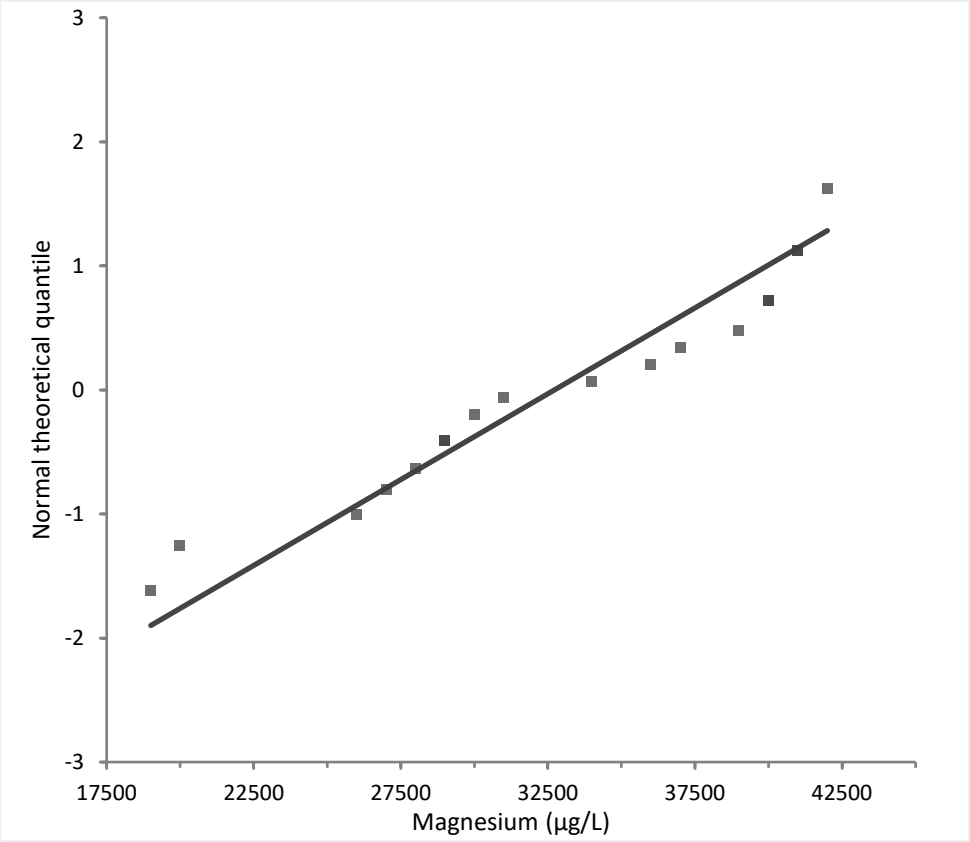
Last updated 3 July 2018 at 13:46 by TupLLC

Descriptives

N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Magnesium	32722.2	1703.14	7225.8	-0.4	-0.84

Normality



Shapiro-Wilk test

W statistic	0.925
p-value	0.1580[1]

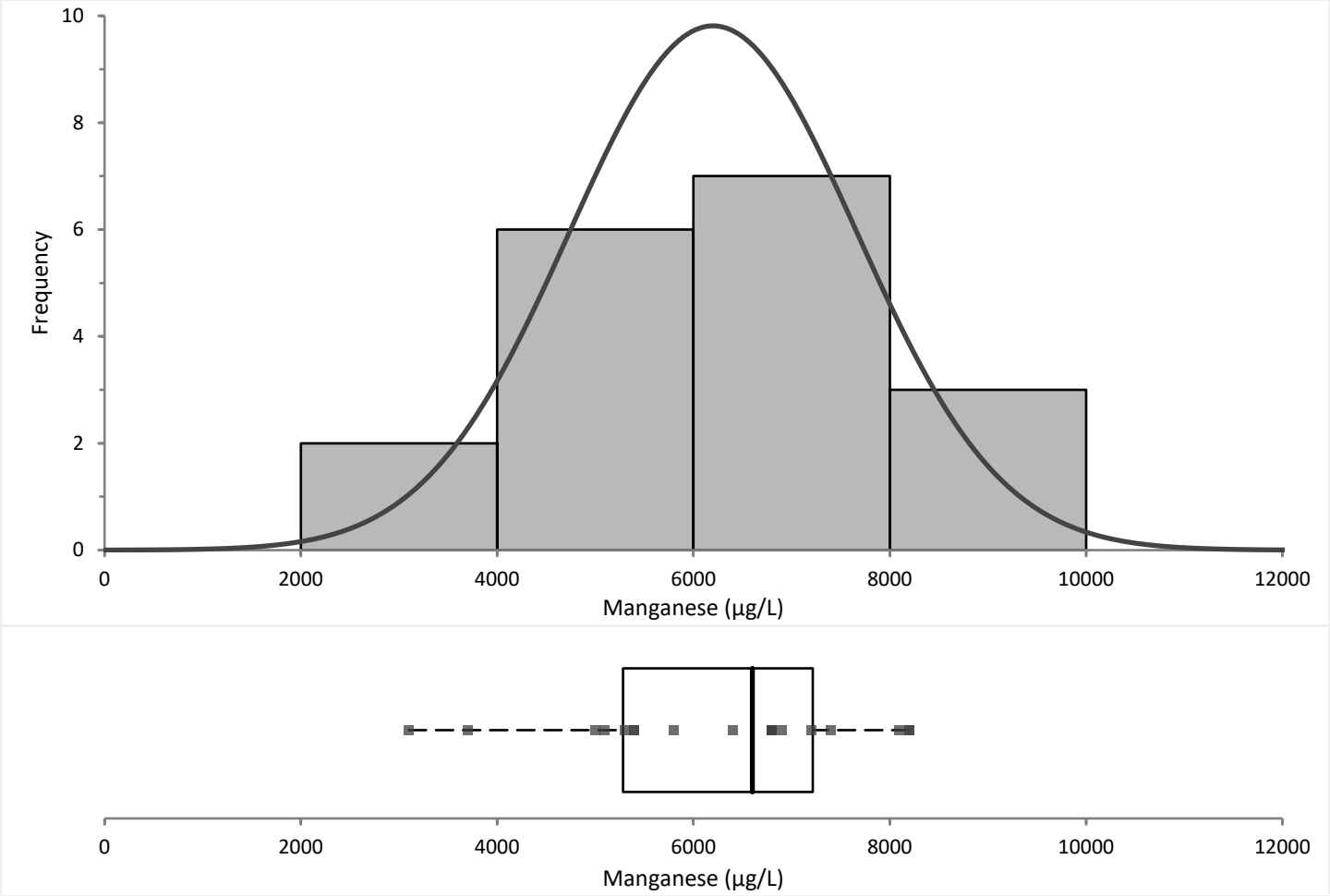
H0: F(Y) = N(µ, σ)
The distribution of the population is normal with unspecified mean and standard deviation.
H1: F(Y) ≠ N(µ, σ)
The distribution of the population is not normal.
[1] Do not reject the null hypothesis at the 10% significance level.

Manganese

MW-27

Last updated 3 July 2018 at 13:45 by TupLLC

Descriptives



	N
	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Manganese	6200.0	344.99	1463.7	-0.5	-0.23

	Minimum	1st quartile	Median	3rd quartile	Maximum	IQR
Manganese	3100	5283.3	6600.0	7216.7	8200	1933.3

Frequency Distribution

Class	Frequency	Relative frequency	Density	Cumulative frequency	Cumulative relative frequency
≥2000 to <4000	2	0.111	0.0001	2	0.111
≥4000 to <6000	6	0.333	0.0002	8	0.444
≥6000 to <8000	7	0.389	0.0002	15	0.833
≥8000 to <10000	3	0.167	0.0001	18	1.000

Manganese

MW-27

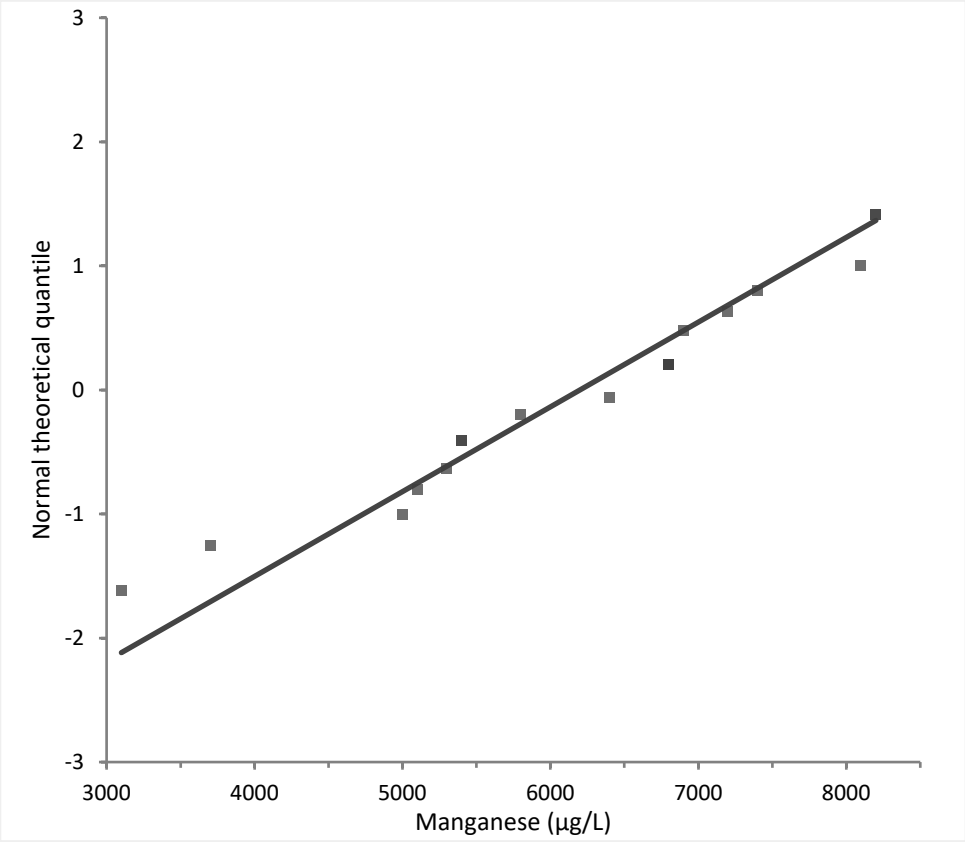
Last updated 3 July 2018 at 13:47 by TupLLC

Descriptives

N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Manganese	6200.0	344.99	1463.7	-0.5	-0.23

Normality

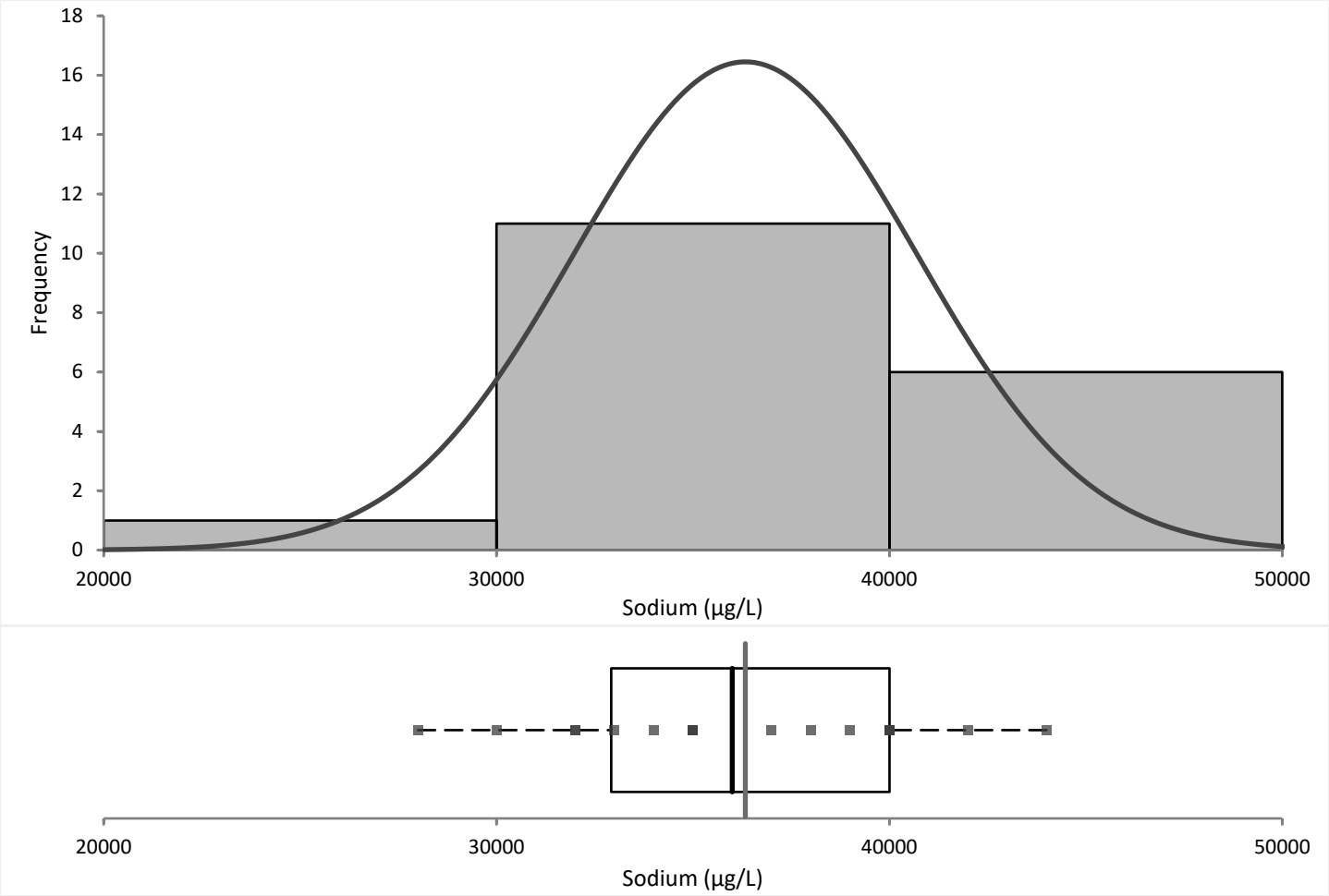


Shapiro-Wilk test

W statistic	0.945
p-value	0.3576[1]

H0: F(Y) = N(µ, σ)
The distribution of the population is normal with unspecified mean and standard deviation.
H1: F(Y) ≠ N(µ, σ)
The distribution of the population is not normal.
[1] Do not reject the null hypothesis at the 10% significance level.

Descriptives



N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Sodium	36333.3	1028.99	4365.6	-0.2	-0.71

	Minimum	1st quartile	Median	3rd quartile	Maximum	IQR
Sodium	28000	32916.7	36000.0	40000.0	44000	7083.3

Frequency Distribution

Class	Frequency	Relative frequency	Density	Cumulative frequency	Cumulative relative frequency
≥20000 to <30000	1	0.056	0.0000	1	0.056
≥30000 to <40000	11	0.611	0.0001	12	0.667
≥40000 to <50000	6	0.333	0.0000	18	1.000

Sodium

MW-27

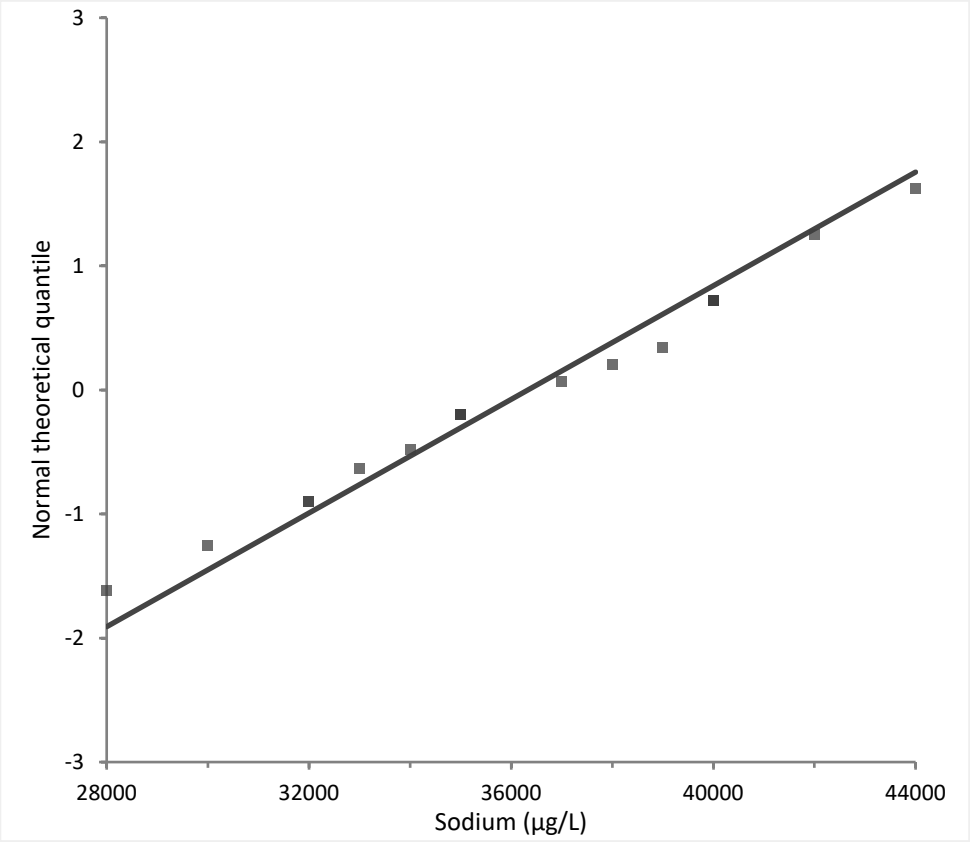
Last updated 3 July 2018 at 13:51 by TupLLC

Descriptives

N	18

	Mean	Mean SE	SD	Skewness	Kurtosis
Sodium	36333.3	1028.99	4365.6	-0.2	-0.71

Normality



Shapiro-Wilk test

W statistic	0.970
p-value	0.8050[1]

H0: F(Y) = N(μ, σ)
The distribution of the population is normal with unspecified mean and standard deviation.
H1: F(Y) ≠ N(μ, σ)
The distribution of the population is not normal.
[1] Do not reject the null hypothesis at the 10% significance level.

Oregon
John A. Kitzhaber, MD, Governor

Department of Environmental Quality
Western Region Eugene Office
165 East 7th Avenue, Suite 100
Eugene, OR 97401
(541) 686-7838
FAX (541) 686-7551
TTY 711

March 20, 2015

Ian Macnab
Valley Landfills, Inc.
28972 Coffin Butte Rd
Corvallis, OR 97330-9592

Re: Compliance Inspection at Coffin Butte Landfill
1200-Z Stormwater Discharge Permit
File Number 104176
Benton County

Dear Ian:

Thank you for taking the time to meet with me during the compliance inspection of the Coffin Butte Landfill on March 5, 2015. The inspection worksheet is enclosed.

If you have any questions regarding the document, please do not hesitate to contact me at *riedel.mark@deq.state.or.us* or (541) 687-7343.

Also, please remember a variety of information, including guidance documents, frequently asked questions, and the DEQ's Stormwater Newsletter subscription, can be found on DEQ's website: http://www.deq.state.or.us/wq/stormwater/industrial.htm

Sincerely,

Mark Riedel-Bash
Stormwater Specialist

Att: Inspection Report

cc: Source File, DEQ
Randy Bringle, Valley Landfills, Inc., 28972 Coffin Butte Rd, Corvallis, OR 97330

State of Oregon Department of Environmental Quality

NPDES Industrial Stormwater Inspection Worksheet

General Information			
Inspection Type	1200-Z	DEQ Inspector Name	Mark Riedel
DEQ Permit No.	104176	Entry Time	9:30 AM
Inspection Date	3/5/15	Exit Time	12: 30 PM
Weather Conditions	sunny	DEQ Inspector Initials	MRB

Facility Information	
Name of Facility	Coffin Butte Landfill
Address of Location	28972 Coffin Butte Rd
	Corvallis, Benton County
Receiving Waterbody	Soap Creek

Contact Information/Inspection Personnel		
Permittee	Valley Landfills, Inc.	
Operator	Coffin Butte Landfill	
Facility Contact(s)	Ian Macnab Environmental Manager	541-745-5792 Ext. 17
Facility Personnel	Jake Paetsch	
Other(s)	Aaron Vance	

Site Information	
Industrial Activity	Operation of a solid waste landfill
SIC Code	4653
Secondary SIC Code	N/A
Facility Description	Coffin Butte Landfill operates a municipal solid waste landfill.

Basic Permit/SWPCP Information			
Permit Coverage	12/14/92, 5/28/13	DMR Review	In process
Permit Type	1200-Z, Sector L	DMR Issues	No, pending info request
Year Permit Renewed	May 28, 2013	Inspection Records	Not Reviewed
SWPCP onsite	Yes	Employee Education	Not Reviewed
SWPCP Satisfactory	Yes	Maintenance Records	Not Reviewed
SWPCP Implemented	Yes	Tier I Reports	Yes
Notes	This inspection was scheduled to discuss the following issues: • The updated sampling monitoring table • Confirm the ELG sampling and where they apply, • To confirm the sampling locations, and • To discuss BMPs.		

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NPDES Industrial Stormwater Inspection Worksheet

Recommendations
Much of the office discussion centered on the ELG and sector specific sampling listed in Sector L of the permit. If Coffin Butte Landfill discharges contaminated stormwater (as defined by the permit on page 58), the limits would apply to all stormwater discharge. If Coffin Butte Landfill has determined that no contaminated stormwater is discharged to an outfall, then Coffin Butte Landfill should sample for total iron (see page 60 of the permit). Coffin Butte Landfill, as of this time, has not applied for a monitoring waiver. Coffin Butte Landfill could apply for a monitoring waiver that would allow them to not monitor for approved pollutants for the remainder of the permit term. Additional information regarding monitoring waives can be found on page 22 of the permit. The active quarry was also discussed. It is DEQ's understanding that Knife River is operating under a 1200-A permit (overseen by DOGAMI). DEQ requested that this relationship be document in their SWPCP so that stormwater discharge from this portion of the site is more clearly described.

Violations/Non-Compliance
No violations noted.

Corrective Actions and/or SWPCP Modification
See Recommendations above.

NPDES Industrial Stormwater Inspection Worksheet documents the site at the time of the inspection and does not guarantee permit compliance. Observation, notes and photographs document the site at one specific time and may be referred to in the future on an as needed basis. The Inspection Worksheet will be place in the facility's DEQ file and become part of the public record.

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TBEL	In Compliance	Technology Based Effluent Limits (Evaluation)
Minimize Exposure	Yes ☒ No ☐ N/A ☐	
Oil and Grease Management	Yes ☒ No ☐ N/A ☐	
Waste Chemical and Material Disposal	Yes ☒ No ☐ N/A ☐	
Erosion and Sediment Control	Yes ☒ No ☐ N/A ☐	During the inspection several Riverbend Landfill employees were actively installing erosion and sediment control measures on the covered landfill cap.
Debris Control	Yes ☒ No ☐ N/A ☐	Debris control was adequate at the time.
Dust Generation & Vehicle Tracking	Yes ☒ No ☐ N/A ☐	There was minimal track out observed on Coffin Butte Road, track out was discussed during the site inspection.
Housekeeping	Yes ☒ No ☐ N/A ☐	While the housekeeping activities appeared adequate.
Spill Prevention and Response	Yes ☒ No ☐ N/A ☐	Spill kits were in place and the requirement for an SPCC was also discussed.
Preventive Maintenance	Yes ☒ No ☐ N/A ☐	
Employee Education	Yes ☒ No ☐ N/A ☐	
Non-Stormwater Discharges	Yes ☒ No ☐ N/A ☐	☐ Authorized: ☐ Non-authorized

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Stormwater Runoff		
Was stormwater discharging from the site?	Yes ☐ No ☒ N/A ☐	
Do the stormwater outfalls on site correspond with those listed in the SWPCP	Yes ☒ No ☐ N/A ☐	

Stormwater Controls	
Common Control Measures (BMPs)	☐ Catch basin or other inlet treatment/filter system ☐ Oil/water separator ☒ On-site grassy bio-swale ☒ Constructed wetlands ☐ Roof downspout (gutter) treatment/filter system ☒ Dumpster and equipment cover ☐ Drum and container containment ☒ Sweeping (manual or mechanical) ☒ Stormwater diversion ☒ Vegetated buffer zone ☐ Storm treatment system ☐ Multi-chambered treatment train
Other structural and nonstructural controls employed by the facility	None
Are the controls reasonable and appropriate for the facility?	Yes
Are the controls installed and maintained correctly?	Yes
Documents left on site:	• An updated monitoring table • Sector L of the 1200-Z permit • Sector L of the 2013 MSGP • EPA Fact Sheet, Sector L: Landfills, Land Application Sites, and Open Dumps • DEQ stormwater Natural Background Fact Sheet • Current DMR • Tier I Report Form

DEQ Inspection Photo Log				Inspection Date	3/5/15
Facility Name	Coffin Butte Landfill	ID#	104176	Photographer	MRB

Photo # 1
Description, location, comments: outfall 2.

Photo # 2
Description, location, comments: inlet to bioswale with oyster shells in foreground.

Photo # 3
Description, location, comments: outfall 6.

Photo # 4
Description, location, comments: bioslwale in midground.