**APPLICATION FOR A PERMIT TO OPERATE A CLASS V LANDFILL**
**PROMONTORY POINT LANDFILL**

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# I. Facility General Information

## I.a Information Required for All Class I and V Landfills

### I.a.1 Completed Part I General Information Form

The General Information Form for the Promontory Point Landfill (PPL) is provided at the beginning of this submittal along with the report checklist.

### I.a.2 General description of the facility (Utah Administrative Code (UAC) R315-310-3(1)(b))

PPL is currently a 2,000-acre permitted Class I facility (1,000 acres for disposal bounded by 1,000 acres of buffer area) located on the west side of the southern tip of the Promontory Point Peninsula in Box Elder County, Utah. The Site is protected visually from the Wasatch Front by a ridgeline along the Promontory Peninsula. A drawing of the facility is provided on **Figure C-801**.

The permit history includes but is not limited to the following:

- A Class I Permit Application for the PPL was submitted by AQUA Engineering in 2003 and a permit was issued by the Utah Solid and Hazardous Waste Board in March 2004.
- The Site was issued a Solid Waste Permit Renewal by the Utah Solid and Hazardous Waste Control Board on September 1, 2011. The renewal included updated information that had changed since the 2003 permit approval.
- The Director of the Utah Division of Waste Management and Radiation Control (Director) approved a minor permit modification on July 16, 2015, which included changing the name from Utah Landfill & Ballast, LLC to Promontory Landfill.
- In May 2016, Tetra Tech submitted a Permit Modification and Design Report (PMDR) for Phase IA of the PPL. The PMDR provided engineering construction design drawings, stamped by a Professional Engineer registered in the State of Utah, for the Phase 1A development (**Appendix V**). The PMDR incorporated the construction plans, specifications, and other pertinent technical information including design calculations, a Geotechnical Design Report, and a Construction Quality Control and Construction Quality Assurance (CQC/CQA) Plan.
- December 13, 2016, Addendum 1 report was prepared by Tetra Tech that included updated hydrology and updated construction plan drawings and submitted to the Director to summarize changes to the location of the Phase IA PPL.
- On March 15, 2017, the Director approved a major permit modification changing the name of the owner and operator of PPL to Promontory Point Resources, LLC (PPR) and the landfill name to PPL (2017 Modification). The 2017 Modification also included approval of the 2016 landfill design modifications contained in the PMDR for the PPL

Phase 1A, 1B, and 1C cells, and construction and closure and post-closure cost estimates. Construction of the PPL Phase 1Acell was completed in the summer and fall of 2017.

- In February 2018, Tetra Tech submitted the Construction Quality Assurance Report (CQA Report) that summarized and documented construction quality assurance (CQA) observations and testing services performed by Tetra Tech during the construction of Phase 1A Cell Composite Liner System and Leachate Collection and Recovery System (LCRS)
- On July 10, 2019, the Director approved a major permit modification relocating the monitor well system to within 500 feet of the relocated PPL Phase IA cell and approval of the CQA Report (see **Appendix A**).

The PPL Phase 1A, 1B, and 1C cells are designed to meet all Class I and Class V requirements administered by the Director. No design changes are needed for the Class V designation. Further, he permitted waste types are to remain the same; however, with the Class V designation, the waste origin and contract restrictions in the PPL Class I permit will be removed. Regulation of the PPL operations and cells will continue under the Class V permit.

Detailed plans and drawings were submitted to the Director for approval for PPL Phase 1A cell and will be submitted for approval for each of Phase 1B and 1C.

The Director has approved this aspect of PPL. (See Letter dated 7/10/19 and Directors Approvals Timeline attached as **Appendix A**.)

### I.a.3 Legal description of property (R315-310-3(1)(c))

A parcel of land lying and situated in Sections 18, 19 and 30, Township 6 North, Range 5 West, Salt Lake Base and Meridian and Sections 13, 14, 23, 24 and 25, Township 6 North, Range 6 West, Salt Lake Base and Meridian. Comprising the 2,025.42 acres described in that certain Special Warranty Deed recorded as Entry 362739, in Book 1290, at Pages 848 through 853 of the Box Elder County Records. Basis of Bearing for subject Parcel being Geodetic North as determined by GPS. Subject parcel being more particularly described as follows:

Commencing at the Southeast Corner of Section 25, Township 6 North, Range 6 West, Salt Lake Base and Meridian, which is a number four rebar and cap with a plastic cap stamped "GREAT BASIN" set in a mound of stones, thence North 01°38'18" West 622.15 feet coincident with the east line of said Section 25 to a number five rebar and plastic cap stamped "PLS356548" monumentalizing a point on the northerly right of way line of a sixty-six foot wide Box Elder County Road and the TRUE POINT OF BEGINNING;

Thence the following twenty-four (24) courses coincident with the northerly and easterly right of way line of said County Road;

1. North 71°14’37” West 137.11 feet to a point of curvature and a number five rebar and cap stamped “PLS 356548”;
2. Westerly 356.24 feet along the arc of a 1416.00 foot radius curve to the left (center bears South 18°45’23” West) through a central angle of 14°24’52” to a point of tangency and a number five rebar and cap stamped “PLS 356548”;
3. North 85°39’29” West 535.18 feet to a point of curvature and a number five rebar and cap stamped “PLS 356548”;
4. Northwesterly 182.12 feet along the arc of a 434.00 foot radius curve to the right (center bears North 04°20’31” East) through a central angle of 24°02’33” to a point of tangency and a number five rebar and cap stamped “PLS 356548”;
5. North 61°36’56” West 359.46 feet to a point of curvature and a number five rebar and cap stamped “PLS 356548”;
6. Northwesterly 144.66 feet along the arc of a 1059.00 foot radius curve to the right (center bears North 28°23’04” East) through a central angle of 07°49’35” to a point of tangency and a number five rebar and cap stamped “PLS 356548”;
7. North 53°47’21” West 447.84 feet to a point of curvature and a number five rebar and cap stamped “PLS 356548”;
8. Northwesterly 197.60 feet along the arc of a 3459.00 foot radius curve to the right (center bears North 36°12’39” East) through a central angle of 03°16’23” to a point of tangency and a number five rebar and cap stamped “PLS 356548”;
9. North 50°30’58” West 434.87 feet to a point of curvature and a number five rebar and cap stamped “PLS 356548”;
10. Northwesterly 9.13 feet along the arc of a 934.00 foot radius curve to the right (center bears North 39°29’02” East) through a central angle of 00°33’37” to a point of tangency and a number five rebar and cap stamped “PLS 356548”;
11. North 49°57’21” West 76.98 feet to a point of curvature;
12. Northwesterly 122.11 feet along the arc of a 1316.00 foot radius curve to the left (center bears South 40°02’39” West) through a central angle of 05°18’59” to a point of tangency and a number five rebar and cap stamped “PLS 356548”;
13. North 55°16’20” West 7.82 feet to a point of curvature and a number five rebar and cap stamped “PLS 356548”;
14. Northwesterly 12.18 feet along the arc of a 434.00 foot radius curve to the right (center bears North 34°43’40” East) through a central angle of 01°36’28” to a point of tangency and a number five rebar and cap stamped “PLS 356548”;
15. North 53°39’52” West 1099.38 feet to a point of curvature and a number five rebar and cap stamped “PLS 356548”;
16. Northwesterly 435.25 feet along the arc of a 1384.00 foot radius curve to the right (center bears North 36°20’08” East) through a central angle of 18°01’07” to a point of tangency and a number five rebar and cap stamped “PLS 356548”;
17. North 35°38’45” West 823.97 feet to a point of curvature and a number five rebar and cap stamped “PLS 356548”;

18. Northerly 250.37 feet along the arc of a 11566.00 foot radius curve to the left (center bears South 54°21'15" West) through a central angle of 01°14'25" to a point of tangency and a number five rebar and cap stamped "PLS 356548";
19. North 36°53'10" West 641.50 feet to a point of curvature and a number five rebar and cap stamped "PLS 356548";
20. Northerly 149.95 feet along the arc of a 1934.00 foot radius curve to the right (center bears North 53°06'50" East) through a central angle of 04°26'32" to a point of tangency and a number five rebar and cap stamped "PLS 356548";
21. North 32°26'38" West 136.46 feet to a point of curvature and a number five rebar and cap stamped "PLS 356548";
22. Northerly 340.82 feet along the arc of a 1684.00 foot radius curve to the right (center bears North 57°33'22" East) through a central angle of 11°35'45" to a point of tangency and a number five rebar and cap stamped "PLS 356548";
23. North 20°50'53" West 242.98 feet to a point of curvature and a number five rebar and cap stamped "PLS 356548";
24. Northerly 253.93 feet along the arc of a 2091.00 foot radius curve to the left (center bears South 69°09'07" West) through a central angle of 06°57'29" to a point of tangency and a number five rebar and cap stamped "PLS 356548";
25. North 27°48'22" West 118.96 feet to a number five rebar and cap stamped "PLS 356548";

Thence leaving said right of way, North 00°41'58" East 32.10 feet coincident with the west line of the Northwest Quarter of said Section 25 to the Northwest Corner thereof which is a number four rebar set in a mound of stones;

Thence North 89°34'25" West 17.42 feet coincident with the south line of the Southeast Quarter of Section 23, Township 6 North, Range 6 West, Salt Lake Base and Meridian to a point on the easterly right of way line of said County Road and a number five rebar and cap stamped "PLS 356548";

Thence the following thirteen (13) courses coincident with said easterly right of way line;

1. Northerly 590.00 feet along the arc of a 5066.00 foot radius curve to the left (center bears South 62°00'00" West) through a central angle of 06°40'22" to a point of tangency and a number five rebar and cap stamped "PLS 356548";
2. North 34°40'22" West 317.77 feet to a point of curvature and a number five rebar and cap stamped "PLS 356548";
3. Northerly 14.03 feet along the arc of an 84.00 foot radius curve to the right (center bears North 55°19'38" East) through a central angle of 09°34'15" to a point of tangency and a number five rebar and cap stamped "PLS 356548";
4. North 25°06'07" West 304.86 feet to a point of curvature and a number five rebar and cap stamped "PLS 356548";

5. Northerly 222.99 feet along the arc of a 2766.00 foot radius curve to the left (center bears South 64°53’53” West) through a central angle of 04°37’09” to a point of tangency and a number five rebar and cap stamped “PLS 356548”;
6. North 29°43’16” West 237.17 feet to a point of curvature and a number five rebar and cap stamped “PLS 356548”;
7. Northerly 719.56 feet along the arc of a 1317.00 foot radius curve to the right (center bears North 60°16’44” East) through a central angle of 31°18’16” to a point of tangency and a number five rebar and cap stamped “PLS 356548”;
8. North 01°35’00” East 188.35 feet to a point of curvature and a number five rebar and cap stamped “PLS 356548”;
9. Northerly 357.01 feet along the arc of a 1783.00 foot radius curve to the left (center bears North 88°25’00” West) through a central angle of 11°28’20” to a point of tangency and a number five rebar and cap stamped “PLS 356548”;
10. North 09°53’20” West 103.89 feet to a point of curvature and a number five rebar and cap stamped “PLS 356548”;
11. Northerly 360.36 feet along the arc of a 2533.00 foot radius curve to the left (center bears South 80°06’40” West) through a central angle of 08°09’04” to a point of reverse curvature and a number five rebar and cap stamped “PLS 356548”;
12. Northerly 397.36 feet along the arc of a 2717.00 foot radius curve to the right (center bears North 71°57’36” East) through a central angle of 08°22’46” to a point of reverse curvature and a number five rebar and cap stamped “PLS 356548”;
13. Northerly 102.49 feet along the arc of a 1283.00 radius curve to the left (center bears South 80°20’22” West) through a central angle of 04°34’36” to a point on the west line of the Southeast Quarter of said Section 23 and a number five rebar and cap stamped “PLS 356548”;

Thence the following twenty-seven (27) courses coincident with aliquot subdivisional section lines;

1. North 00°41’45” East 321.05 feet to the NE 1/16th Corner of Section 23, Township 6 North, Range 6 West, which is a number 5 rebar and cap stamped “PLS 356548”;
2. North 00°41’45” East 677.79 feet to the C-N-NE 1/64th Corner of said Section 13, which is a number 5 rebar and cap stamped “PLS 356548”;
3. South 89°30’19” East 659.98 feet to the NE-NE 1/64th Corner of said Section 23, which is a number 5 rebar and cap stamped “PLS 356548”;
4. North 00°41’51” East 647.45 feet to the E-E 1/64th Corner of said Section 23, which is a number 5 rebar and cap stamped “PLS 356548”;
5. North 00°17’08” West 652.53 feet to the SE-SE- 1/64th Corner of Section 14, Township 6 North, Range 6 West, which is a number 5 rebar and cap stamped “PLS 356548”;
6. North 89°22’46” East 660.38 feet to the S-S 1/64th of said Section 14, which is a number 5 rebar and cap stamped “PLS 356548”;

7. North 00°15’58” West 653.48 feet to the S 1/16th Corner of Section 13, Township 6 North, Range 6 West, which is a number 5 rebar and cap stamped “PLS 356548”;
8. North 00°15’58” West 653.47 feet to the N-S 1/64th Corner of said Section 13, which is a number 5 rebar and cap stamped “PLS 356548”;
9. North 89°10’56” East 659.68 feet to the NW-SW 1/64th Corner of said Section 13, which is a number 5 rebar and cap stamped “PLS 356548”;
10. North 00°06’15” West 654.82 feet to the C-W-W 1/64th Corner of said Section 13, which is a number 5 rebar and cap stamped “PLS 356548”;
11. North 89°04’01” East 661.54 feet to the C-W 1/16th Corner of said Section 13, which is a number 5 rebar and cap stamped “PLS 356548”;
12. North 89°04’01” East 1323.07 to the C 1/4 Corner of said Section 13, which is a 1½” iron pipe;
13. North 89°54’49” East 2614.38 feet to the E 1/4 Corner of said Section 13, which is a number 5 rebar and cap stamped “PLS 356548” with a chiseled stone alongside;
14. South 89°46’59” East 1325.38 feet to the C-W 1/16th Corner of Section 18, Township 6 North, Range 5 West, which is a number 5 rebar and cap stamped “PLS 356548”;
15. South 89°46’59” East 662.69 feet to the C-E-W 1/64th Corner of said Section 18, which is a number 5 rebar and cap stamped “PLS 356548”;
16. South 00°20’22” West 667.77 feet to the NE-SE 1/64th Corner of said Section 18, which is a number 5 rebar and cap stamped “PLS 356548”;
17. South 89°40’56” East 661.42 feet to the C-N-S 1/64th Corner of said Section 18, which is a number 5 rebar and cap stamped “PLS 356548”;
18. South 00°26’49” West 668.94 feet to the C-S 1/16th Corner of said section 18, which is a number 5 rebar and cap stamped “PLS 356548”;
19. South 00°26’49” West 1337.88 feet to the N ¼ Corner of Section 19, Township 6 North, Range 5 West, which is a number 5 rebar and cap stamped “PLS 356548” with remains of stone mound alongside;
20. South 00°40’55” West 5285.67 feet to the N 1/4 Corner of Section 30, Township 6 North, Range 5 West, which is a stone monument with 1/4 chiseled on face and a rivet set on top.
21. South 89°57’56” West 649.34 feet to the E-W 1/64th Corner of said Section 30, which is a number 5 rebar and cap stamped “PLS 356548”;
22. South 02°03’04” East 672.21 feet to the NE-NW 1/64th Corner of Said Section 30, which is a number 5 rebar and cap stamped “PLS 356548”;
23. South 02°03’04” East 672.21 feet to the C-E-NW 1/64th Corner of said Section 30, which is a number 5 rebar and cap stamped “PLS 356548”;
24. North 89°40’33” West 652.70 feet to the NW 1/16th Corner of said Section 30, which is a number 5 rebar and cap stamped “PLS 356548”;
25. South 01°54’52” East 1340.22 feet to the C-W 1/16th Corner of said Section 30, which is a copper rivet set in limestone stone outcrop;

26. North 89°19’16” West 1312.18 feet to the E 1/4 Corner of Section 25, Township 6 North, Range 6 West, which is a number 5 rebar and cap stamped “PLS 356548”;
27. South 01°38’18” East 2041.54 feet to the point of beginning.

A parcel of land lying and situate in the Sections 25 and 26, Township 6 North, Range 6 West, Salt Lake Base and Meridian lying south of a four hundred foot wide Southern Pacific Railroad Right of Way; Comprising the 6.54 acres, more or less, being openly, notoriously and adversely possessed by GWSC Properties, LLC. Since November 16, 2006. Basis of Bearing for Subject parcel being South 01°38'18” East 5327.38 feet between the Northeast and Southeast Corners of said Section 25. Subject Parcel being more particularly described as follows:

Commencing at the Northeast Corner of Section 26, Township 6 North, Range 6 West, Salt Lake Base and Meridian, which is a number 4 rebar in a mound of stones with the original stone and "T" post alongside, thence South 01°38'18” West 92.59 feet to a point on the point of intersection with the southwesterly right of way line of a four hundred foot (400.00') wide Southern Pacific Railroad Right of Way and the TRUE POINT OF BEGINNING;

Thence continuing coincident with said east section line South 01°38'18" East 185.44 feet to a point on the Meander Line of the Great Salt Lake; Thence the following five (5) courses coincident with said Meander Line;

1. North 55°52'04" West 332.59 feet;
2. North 72°52'04" West 665.17 feet;
3. North 62°22'04" West 665.17 feet;
4. North 72°13'22" West 651.32 feet;
5. North 48°21'58" West 400.05 feet to the point of intersection with said Railroad Right of Way;

Thence easterly coincident with said southerly right of way line, approximated by the following seven (7) courses;

1. South 67°39'29" East 244.35 feet;
2. South 67°20'58" East 79.03 feet;
3. South 67°12'33" East 133.79 feet;
4. South 67°15'21" East 83.24 feet;
5. South 67°43'35" East 513.55 feet;
6. South 68°17'37" East 1142.96 feet;
7. South 68°56'20" East 399.54 feet to the point of beginning.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

I.a.4 Proof of ownership, lease agreement, or other mechanism (R315-310-3(1)(c))

Proof of ownership for the 2,000 acres where PPL is located is included in **Appendix B**.

The entrance to PPL is located at +40.826787°/-112.380254°.

The 2,000 acres of PPL are zoned SW – Solid Waste by Box Elder County. The surrounding properties do not have a zoning listing with the exception of parcels north of the adjacent property, which are zoned for mining (phone call with Scott Lyons, Box Elder County Community Development Director, 7/28/20). Land use and zoning maps can also be viewed on the Box Elder County Website - https://gis.boxeldercounty.org/webmap/.

I.a.5 Area served by the facility (R315-310-3(1)(d))

The area to be served by PPL is the state of Utah and beyond that make economic sense to haul waste via rail or truck to PPL. See NERA report **Appendix I-1**.

I.a.6 If the permit application is for a Class I landfill a demonstration that the landfill is not a commercial facility

Not applicable.

I.a.7 Waste type and anticipated daily volume (R315-310-3(1)(d))

As a Class V Landfill, the waste types will not change from the acceptable wastes approved by the Director for the current Class I permit and include:

- Municipal solid waste;
- Commercial waste;
- Industrial waste;
- Construction/demolition waste;
- Special waste as allowed by R315-315; and
- Conditionally exempt small quantity generator hazardous waste as specified in R315-303-4(7)(a)(i)(B) and PCB's as specified by R315-315-7(2).

The Director has approved this aspect of PPL. (See Letter of Approval from Director dated 8/31/11 and Director's Approvals Timeline attached as **Appendix A**.)

Daily and annual volume will be dependent upon contracted waste streams.

## I.b Information Required for All New or Laterally Expanding Class I and V Landfills

I.b.1 Intended schedule of construction (R315-302-2(2)(a))

Construction of the Class I PPL Phase IA was completed in 2017, and the final CQA reports were submitted in 2018.

I.b.2 Name and address of all property owners within 1000 feet of the facility boundary (R315-310-3(2)(a)(i))

The following are the property owners within 1,000 feet of PPL:

**Property Owners**

| Property Owner Within 1,000 Feet | Property Address |
|---|---|
| Northshore Rail Services LLC | 1740 Combe Rd, Suite 1 South Ogden, UT 84403 |
| Young Resources LTD Partnership | 5010 UT-38, Brigham City, UT 84302 |
| Chournos Promontory LLC | 590 N 1600 E Tremonton, UT 84337 |
| Paul T Hales | 119 E 200 S, Pleasant Grove, UT 84062 |
| Peery Calvin Henry | 6015 Balfern Ave, Lakewood, CA 90713-1245 |
| PPR Rail Services, LLC | 298 24th Street, Suite 170, Ogden, UT 84401 |
| Southern Pacific Trans. Co | 1400 Douglas St, Ste 1640, Omaha, NE 68179 |

The Director has approved this aspect of PPL. (See Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.) Property owners have not changed since that approval.

I.b.3 Documentation that a notice of intent to apply for a permit was sent to all property owners listed above (R315-310-3(2)(ii))

A letter was sent to each of the surrounding property owners on October 30, 2020. Copies of the letters are provided in **Appendix C**.

I.b.4 Name of the local government with jurisdiction over the facility site (R315-310-3(2)(iii))

Box Elder County 81 North Main Brigham City, UT 84302.

The Director has approved this aspect of PPL. (See Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.) The local government has not changed since that approval.

## I.c Location Standards for All New or Laterally Expanding Class I and V Landfills (R315-302-1)

The only section below that applies to an existing facility per R315-302-1(1)(b) is R315-302-1(2)(f), which is addressed in section I.c.1. However, the information from previously approved applications has been included in these sections for completeness.

I.c.1 Documentation that PPL has met the historical survey requirement of R315- 302-1(2)(f)

Documentation from the State of Utah and a cultural reconnaissance are provided in **Appendix D**. As noted below a cave/rockshelter was noted in the buffer area. This area will not be disturbed by operations.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

I.c.2 Land use compatibility (R315-302-1(2)(a))

PPL conforms to the general location standards outlined in R315-302-1(2)(a):

- PPL is not located within 1,000 feet of a national, state or county park, monument, or recreational area, designated wilderness or wilderness study area, or wild or scenic river area.
- The active areas/operations are not within 1,000 feet of the Great Salt Lake. PPL is not within 1,000 feet of a reservoir. There are no streams within 1,000 feet of PPL.
- PPL is not located in an ecologically and scientifically significant natural area, including public wildlife management areas and habitat for threatened or endangered species as designated pursuant to the Endangered Species Act of 1982 (**Appendix F**).
- PPL is not in farmland classified or evaluated as "prime," "unique," or of "statewide importance" by the US Department of Agriculture Soil Conservation Service under the Prime Farmland Protection Act.
- PPL is not within a one-quarter mile of any existing permanent dwellings, residential areas, and other incompatible structures such as schools or churches. The nearest dwelling is several miles away.
- A cave/rockshelter is located on the property (**Appendix D**). The cave/rockshelter is within the buffer area to ensure its preservation.
- PPL is not within 10,000 feet of any airport runway used by turbojet aircraft or within 5,000 feet of any airport runway used by only piston-type aircraft. A private landing strip used by the brine shrimp operations is located approximately 8,000 feet southeast of PPL. The landing strip is used primarily only during the brine shrimp harvest season.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.) None of these items has changed since that approval.

I.c.3 Maps showing the existing land use, topography, residences, parks, monuments, recreation areas, or wilderness areas within 1000 feet of the site boundary

**Figure C-801** shows the existing land use, topography, and any residences, parks, monument, recreation areas, or wilderness areas within 1,000 feet of the PPL boundary.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.) This item has not changed since that approval.

I.c.4 Certifications that no ecologically or scientifically significant areas or endangered species are present in the site area

A wildlife survey was conducted in 2003 and updated in January 2017 (**Appendix E**). PPL is not located in an ecologically and scientifically significant natural area, including public wildlife management areas and habitat for threatened or endangered species as designated pursuant to the Endangered Species Act of 1982.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.). This item has not changed since that approval.

I.c.5 List of airports within five miles of facility and distance to each

There are no major airports within six miles of PPL.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.) This item has not changed since that approval.

I.c.6 Geology (R315-302-1(2)(b))

**General**

Surficial geologic units on the south end of Promontory Point are comprised of unconsolidated to weakly-consolidated alluvial and lacustrine deposits overlying older semi-consolidated fanglomerate deposits (Quaternary and possibly late Tertiary age), which in turn overlie Cambrian and Precambrian-age metamorphic bedrock. Previous subsurface investigations were completed at PPL to assess, among other characteristics, the geology, the thickness of the unconsolidated and semi-consolidated fanglomerate deposits, and the depths to and type of bedrock.

Applied Geotechnical Engineering Consultants, Inc. (AGEC, 2003) conducted a geotechnical assessment for the Phase I landfill cell. AGEC drilled borings and excavated test pits. AGEC installed the four 2-inch diameter existing monitor wells (MW-1, MW-2, MW-3, and MW-4) that are located along the southwest property fence line. During 2003 AGEC also completed one 4-inch diameter upgradient monitor well (MW-5) into bedrock. The borings for the 2-

inch diameter wells were drilled to depths of up to about 100 feet; monitor wells within these borings were completed at shallower depths. Completion details and survey information for the 2003 wells and test pits are presented in **Appendix F**.

Tetra Tech conducted two geotechnical investigations. The first Tetra Tech (2015) investigation included geologic reconnaissance and a seismic refraction survey, excavation of 11 test pits, and limited geologic mapping. A second Tetra Tech (2016) investigation included the drilling of seven exploratory borings to depths ranging from about 6.5 to 31.5 feet and the excavation of 13 test pits to depths ranging from about 9 to 15 feet below grade. Details are presented in **Appendices P-1, P-2, and S**.

During 2018, Loughlin Water installed four additional 2-inch diameter monitor wells (MW-6, MW-7, MW-8, and MW-9) around the PPL Phase IA cell. The borings for the 2-inch diameter wells were drilled to depths ranging from about 101 feet to 149 feet through semi-consolidated materials before construction of the wells. Loughlin took collectively 461 feet of core samples during drilling of the wells. Core samples and exposures of fanglomerate are shown in **Appendix W** photos. Completion details and other information for the 2018 wells and Site Hydrogeologic Study are presented in **Appendix J**.

### Unconsolidated Deposits

Unconsolidated sediments at PPL consist of Quaternary-age Lake Bonneville lacustrine deposits overlying older semi-consolidated fanglomerate deposits and bedrock. Lake Bonneville formed benches along the margins of the Promontory Mountains that can be seen on PPL. The unconsolidated sediments on PPL range between the highest level of Lake Bonneville to just below the lowest Lake Bonneville shoreline. The highest level of Lake Bonneville is known as the Bonneville shoreline, located just beyond the northeast property corner at an elevation of approximately 5,276 feet, and was formed about 18.6 to 17.7 kiloanni (ka, thousand years ago). This highest transgressive shoreline was mapped at PPL based on its pronounced geomorphic expression.

The Provo shoreline represents an open-basin stillstand that occurred at an estimated 17.7 to 15 ka (Nelson and Jewell, 2015). It was mapped at the toe of a pronounced bench in the central portion of PPL at an approximate elevation of 4,865 feet. The Stansbury shoreline represents the earliest transgressive stillstand of Lake Bonneville, estimated to have occurred between 26.2 and 24.1 ka (Currey, et. al., 1984; Nelson & Jewell, 2015). The Stansbury shoreline was mapped based on the expected isostatically- adjusted elevation range and geomorphic expression and is shown at an elevation of 4,619 feet. The regressive Gilbert shoreline is mapped at an elevation of 4,250 feet based on recent work by Oviatt (2014) and was formed as recently as 11.6 ka. Geomorphic expression for this feature was not readily recognized at PPL, and the shoreline is mapped on the basis of elevation alone.

In general, the unconsolidated deposits described by AGEC (2003) and Tetra Tech (2015, 2016) consist of silty sand, sand and silty sand with gravel, poorly-graded gravels, silty gravels, well-graded gravels, silty marls, cobbles or boulders and occasional carbonate-cemented zones within these unconsolidated materials. Tetra Tech (2016) described clasts

as being sub-rounded to sub-angular and consisting primarily of quartzite. None of the test pits excavated by Tetra Tech in the vicinity of the PPL Phase I Cell encountered bedrock.

Test pit excavations and monitor well drilling performed by AGEC (2003) and Tetra Tech (2015; 2016) were completed using a backhoe and auger rigs. Both investigations identified the presence of unconsolidated deposits overlying harder semi-consolidated deposits or what they thought was bedrock which resulted in auger refusal or very limited sample recovery. AGEC (2003) identified what it thought was bedrock in a number of test pit locations based on backhoe refusal, none of which were located near the Phase 1A cell. Graphic logs of test pits performed in 2015 and logs of test pits and boring logs are provided in **Appendix P**.

However, it is likely that a number of these test pits reached total depth in the boulders of the fanglomerate deposit identified by well drilling core samples taken by Loughlin and not within bedrock. Additionally, the boring for Well MW-1 completed by AGEC shows that AGEC thought that it incepted bedrock at a depth of 43 feet, but the drill rig was able to continue drilling and driving split spoon samples with little recovery to a depth of about 100 feet. Based on this evidence and the type of drilling equipment used, it is probable that the boring for Well MW-1 penetrated the fanglomerate deposit and not bedrock.

A seismic refraction survey was performed near the PPL Phase 1A cell by GEOvision (2015), for Tetra Tech. The purpose of the seismic refraction survey was to ascertain the subsurface velocity structure and rippability beneath six seismic lines. Each seismic line was 705 feet long and designated SL-1 through SL-6. The seismic survey results indicated that some of the earlier test pits completed by AGEC in the areas between seismic lines SL-2 and SL-5 did not reach total depth in bedrock.

Bedrock was not encountered in borings for the 2018 monitor wells that were installed around the PPL Phase 1A cell (Loughlin, 2018). The 2018 well borings indicated that Lake Bonneville deposits range in thickness from 20 to 30 feet and overlie an extensive semi-consolidated to consolidated fanglomerate deposit. The fanglomerate consists of silt, clay, and clasts of quartzitic materials that range from sand size to boulders. Geologic logs for the 2018 monitor well borings are presented in **Appendix J**. Photographs are contained in **Appendix W.**

### Bedrock

Much of the bedrock on PPL is concealed beneath Lake Bonneville sediments. Crittenden and others (1988) mapped outcrops of metasedimentary bedrock on the east and west portions of the property where bedrock is predominantly exposed; see **Appendix P-1. Plate A-1**. Two cross sections (A-A' and B-B') drawn through PPL by Tetra Tech (2016) illustrate the stratigraphic relationships between the bedrock units. These units include, in descending order (younger to older): the Middle and Lower Cambrian-age unnamed "limestone and shale" unit (Cls), the Lower Cambrian-age Geertsen Canyon Quartzite (Cgc), and the Late Proterozoic-age Browns Hole Formation (Zbh) and Mutual Formation (Zm).

The Promontory Point Production Well, located in the north-central part of PPL (see **Figure C-803**), penetrated the Geertsen Canyon Quartzite, Browns Hole Formation, and Mutual

Formation. Testing of the Promontory Well indicated that the (1) quartzite bedrock penetrated by the PPR Production Well is relatively unfractured, (2) fractures that are present have been filled by gypsum and clay, (3) quartzite bedrock is of extremely low permeability, and (4) the aquifer is under confined conditions. Additionally, testing of Well MW-5, also screened in bedrock, is of very low permeability.

The following description of PPL bedrock units is largely from Tetra Tech (2016). Tetra-Tech did not identify the presence of the fanglomerate deposit on the site but did identify the presence of alluvial deposits.[1]

Limestone and Shale - Middle and Lower Cambrian (Cls). The youngest metasedimentary bedrock unit at the site consists of an interbedded thin-bedded medium-gray limestone and olive shale. Carbonate rocks in the upper part of the unit include one or more beds from 3.3 to 9.6 feet thick of pale gray to nearly white laminated dolomite enclosed in limestone. Limestone intervals in the lower part of the unit consist of medium gray limestone marked by wavy tan silty wisps characteristic of the Cambrian. At its base is intensely-folded, dense, yellowish-gray cherty argillite and medium-gray to pinkish limestone, which is highly deformed as a result of shearing along the contact with the underlying quartzite unit (Crittenden, 1988). The "Limestone and Shale" unit crops out along the northerly and easterly portions of PPR's property where it is shown to be in fault contact with the Geertsen Canyon Quartzite (AGEC, 2003; Crittenden and others, 1988).

Geertsen Canyon Quartzite - Lower Cambrian (Cgc). The uppermost 330 feet consists of deep reddish-black hematitic quartzite. The main body consists of pale-gray, pinkish-gray or light-brown quartzite, commonly with pebble-sized clasts, dominantly of vein quartz. A zone of pebble- to cobble-conglomerate a few tens of meters thick is recognized about a third of the way up in the formation. The basal 165 to 330 feet is commonly coarse-grained and contains abundant angular fragments of salmon-colored microcline. Consequently, the basal zone is relatively non-resistant compared with the remainder of the formation and the underlying vitreous quartzite of the Browns Hole Formation (Crittenden and others, 1988). Outcrops of the Geertsen Canyon Quartzite occur in the easterly portion of PPR's property, where it is observed to occur as massive to pebbly, as well as laminated or cross-laminated with alternating creamy-white to dark reddish-brown laminations. At the surface, the formation is highly- to intensely-fractured/jointed and is cut by a series of northwest-trending high-angle faults. A zone of tight folding and brecciation was observed in an outcrop in the southeasterly portion of PPR's property, indicative of ductile shear. The upper contact with the overlying limestone and shale unit is covered by the lacustrine and alluvial deposits and is mapped as a fault contact in the easterly portion of the site (AGEC, 2003; Crittenden and others, 1988). The basal contact with the underlying Browns Hole Formation is similarly obscured by the overlying lacustrine and alluvial deposits.

Browns Hole Formation - Late Proterozoic (ƶbh). The Browns Hole Formation consists of pale-gray very-fine-grained vitreous quartzite. Both the grain size and color allow this unit to form a marked light-colored band that contrasts with the quartzites of the overlying and underlying units (Crittenden and others, 1988). Exposures on PPR's property exhibit intense ductile folding characteristics of a ductile shear zone. The upper contact with the

[1] Fanglomerate formation is located below PPL that AGEC and Tetra Tech mistook as bedrock. (See supra page 21.)

overlying Geertsen Canyon Quartzite is obscured beneath the Quaternary Lacustrine and Alluvial Deposits. The unit is observed at ground surface to be highly- to intensely-fractured/jointed.

Mutual Formation - Late Proterozoic (Ƶm). The Mutual Formation consists of thick-bedded coarse-grained quartzite with a few beds of siltstone and shale. The unit is well-exposed in the large quarry on the western margin of PPR's property, at the west end of Cross Section B-B' shown on Plate 4, Appendix S-3 of Tetra Tech (2016). Quartzite from this formation was purportedly used as rip-rap on the Southern Pacific Causeway across the western arm of the lake. The formation is cut by numerous dark-brown-weathered igneous dikes, some of which were previously exploited during prospecting in the early days. The Mutual Formation on PPR's property is highly- to intensely-fractured and jointed at ground surface (Crittenden and others, 1988).

## Geo-Hazard Potential

PPL is not located in a subsidence area, a dam failure flood area, above an underground mine, above a salt dome, above a salt bed, nor is PPL on or adjacent to known or suspected geologic features that will compromise the structural integrity of PPL. The overburden soil at PPL generally has low compressibility characteristics. The bedrock in the area consists predominantly of quartzite that has low solubility. The limestone that is present in the northeast portion of PPL shows no evidence of caverns or other solution features of significance. A reconnaissance of PPL found no evidence of depressions or other subsidence features. Subsidence due to dissolution of the limestone bedrock is not considered a potential hazard at PPL (AGEC, 2003).

## Holocene Faulting

There are no mapped active faults extending through PPL (Tetra Tech, 2015, Appendix P). The nearest mapped active fault is the Great Salt Lake Fault Zone, with (1) the Promontory Section located approximately 2.6 miles southwest of PPL (Dinter and Pechmann, 2014), (2) the Fremont Island Section located about 2.5 miles southwest of PPL, and (3) the Antelope Island Section located approximately 15 miles south of PPL. AGEC (2003) and Tetra Tech (2016) show a part of the Great Salt Lake Fault Zone to lie buried under lake sediments about 0.5 miles southwest of PPL; however, more recent studies by Dinter and Pechmann (2014) show that the fault occurs about 2.5 miles to the southwest, as shown in Appendix P-4. Also, AGEC and Tetra Tech maps show fault traces crossing the Pleistocene lacustrine deposits but those traces represent interpreted fault locations at the buried bedrock surface and the faults are not interpreted as Quaternary features. The Great Salt Lake Fault Zone (located about 2.5 miles to the southwest of PPL) is a major, generally north-trending, steeply west-dipping zone of Holocene normal faulting that was identified from seismic reflection profiling. Dinter and Pechmann (2014) determined a recurrence interval of about 2800 to 5600 years for the Great Salt Lake Fault.

The Wasatch Fault Zone is the most tectonically active structure in Utah with abundant evidence of movement during Holocene time (Black and others, 2004). The Wasatch fault zone (Brigham City section) is located about 25 miles northeast of PPL, and the Weber section is located approximately 27 miles east of PPL.

In conclusion, none of the observed and mapped faults at PPL are deemed to be Quaternary age.

**Seismic Impact Zones**

The regulations state that municipal landfills must be designed to withstand seismic accelerations if they are located in a seismic impact zone. A seismic impact zone is defined as an area with a 10% or greater probability that the maximum horizontal acceleration in lithified material would exceed 0.10 g in 250 years. According to Blake and others (2002), there is a 10% probability of ground acceleration exceeding 0.55 g in a 250-year period at PPL. PPL is therefore located in a seismic impact zone. However, the maximum design earthquake-induced permanent seismic displacement is estimated to be about 2.8 inches for the PPL Phase 1A cell, which is considered acceptable, and the design earthquake-induced permanent seismic displacement is estimated to be negligible. (Tetra Tech, 2016).

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11, 3/16/17, and 7/10/19 and Directors Approvals Timeline attached as **Appendix A**.)

### I.c.6.i Geologic maps showing significant geologic features, faults, and unstable areas

Significant geologic features, faults, and unstable areas are shown on Plate A-1 (in **Appendix P-2**).

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17, and 7/10/19 and Directors Approvals Timeline attached as **Appendix A**.)

### I.c.6.ii Maps showing site soils

PPL soils are shown on **Plate C-801** (in **Appendix S**).

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17, and 7/10/19 and Directors Approvals Timeline attached as **Appendix A**.)

## I.c.7 Surface water (R315-302-1(2)(c))

- PPL is not located on any public land that is being used by a public water system for watershed control for municipal drinking water purposes.
- PPL is not located in a 100-year floodplain.
- PPL is not located in any wetlands and will not contribute to any degradation of any wetland.
- PPL will not violate any applicable state water quality standard or Section 307 of the Clean Water Act.
- PPL will not jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of a critical habitat protected under the Endangered Species Act of 1973.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

### I.c.7.i Magnitude of 24-hour 25 year and 100-year storm events

Precipitation for the 25-year, 24-hour storm event is 2.25 inches and the 100-year, 24-hour event is 2.78 inches (National Oceanic and Atmospheric Administration (NOAA) precipitation frequency data server). All environmental controls were designed to be protected from the base design prescriptive precipitation event.

PPL is not located in a 100-year flood plain.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

### I.c.7.ii Average annual rainfall

Average annual rainfall measured at the nearest station in Ogden, UT is 19.15 inches.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

### I.c.7.iii Maximum elevation of flood waters proximate to the facility

According to the Federal Emergency Management Agency (FEMA) website, the PPL Site is located within zone D areas in which flood hazards are undetermined, but possible. No Flood Insurance Rate (FIRM) map is printed for the location. The nearest FIRM map is located north of PPL on the Promontory Peninsula. The FEMA flood map number 49003C2200D show the 100-year flood located within the shores of the Great Salt Lake as Zone A with no base flood elevations determined. The historic average elevation of the Great Salt Lake is 4,200 feet. The lowest elevation on PPL property is approximately 4,228'. From 1982 to 1986 the precipitation in the Great Salt Lake drainage basin averaged 134 percent of normal and resulted in a historic record high level of 4,211.85 ft. When taking into account the NAVD 88 vertical datum correction, the elevation of the historic flood level was 4,214.93 ft. The lowest point along the southern boundary of PPL is approximately 4,228 ft. The elevation of PPL Phase 1A cell is approximately 4300 ft on the berm, south corner and approximately 4280 ft at the buildings. PPL is not at risk of inundation of the 100-year flood.

### I.c.7.iv Maximum elevation of flood water from 100-year flood for waters proximate to the facility

PPL is not at risk of inundation of a 100-year flood.

The Director has approved this aspect of the PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

I.c.8 Wetlands (R315-302-1(2)(d))

Wetlands are not present at PPL, and PPL activities will not contribute to significant degradation of wetlands.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

I.c.9 Groundwater (R315-302-1(2)(e))

The historic depth to groundwater from existing topography underneath PPL ranges from approximately 90 feet near the southern limit to approximately 525 feet in the Promontory Point (Production) Well near the northern property boundary (see **Figure C-803**). The borehole for the Promontory Point Production Well was dry to 750 feet, indicating the groundwater in the bedrock is confined (see **Appendix J**). The approved depth of landfill excavation ranges from approximately 40 feet near the southern limit to approximately 315 feet near the northern limit (see **Figure C-806**). The liner design leaves a minimum of 50 feet of separation from groundwater, which exceeds the required minimum 5 feet of separation between groundwater and liner.

PPL is not located over a sole source aquifer. PPL is not located over groundwater classified as IB under Section R317-6-3.3. PPL is not located in a designated drinking water source protection area.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11, 3/6/17, and 7/10/19 and Directors Approvals Timeline attached as **Appendix A**.)

## I.d Plan of Operations Requirements for All Class I and V Landfills (R315-310-3(1)(e) and R315-302-2(2))

I.d.1 Forms and other information as required in R315-302-2(3) including a description of on-site waste handling procedures and an example of the form that will be used to record the weights or volumes of waste received (R315-302-2(2)(b) and R315-310-3(1)(f))

Daily operation of the Class V PPL will be under the direction of the Landfill Manager. In the event of the Landfill Manager's absence, a Senior Operator will be the designee in charge of PPL.

A landfill entrance sign will be constructed and will provide PPL's name, hours of operation, list of materials not accepted by PPL, and emergency contact information.
At the beginning of each working day, the Landfill Manager will be responsible for informing operators of any special off-loading conditions and where to direct all solid waste for disposal. PPL personnel will be responsible for directing each transport vehicle to the proper location for disposal of the waste. This could alternatively be accomplished through the placement of directional signs or a combination thereof. The Landfill Manager or his

designee will be at PPL during all operating hours to provide supervision and oversight of the operations.

The Landfill Manager will maintain the following operating records for PPL:

- Records of maintenance;
- Records of training and notification procedures;
- Records of groundwater monitoring;
- Records of landfill gas monitoring;
- Records of weights or volumes, number of vehicles, and if available, wastes received
- Deviations from the plan of operation;
- Records of placement or recirculation of leachate;
- Records of any gas condensate;
- Prepare an annual report and place the report in PPL's operating record; and
- Inspection log or summary.

Sample forms are provided in **Appendix G**.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

I.d.2 Schedule for conducting inspections and monitoring, and examples of the forms that will be used to record the results of the inspections and monitoring (R315-302- 2(2)(c), R315-302-2(5)(a), and R315-310-3(1)(g))

The Landfill foreman or his designee is responsible for conducting and recording routine inspections of PPL in order to prevent malfunctions and deterioration, operator errors, and discharges which may cause or lead to the release of wastes to the environment or to a threat to human health. These inspections will be conducted at least quarterly or with sufficient frequency to identify problems in time to correct them before they harm human health or the environment. An example of forms that may be used for recording routine inspections is presented in **Appendix G**. The forms include the date and time of inspection, the printed name and handwritten signature of the inspector, a notation of observations made, and the date and nature of any repairs or corrective action. The log or summary will be kept at PPL or other convenient location if permanent office facilities are not on-site, for at least three years from the date of inspection. Inspection records shall be available to the Director or his authorized representative upon request. The Landfill Manager is responsible for verifying the completeness of the inspection records on a quarterly basis.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

I.d.3 Contingency plans in the event of a fire or explosion (R315-302-2(2)(d))

**Fire Protection (R315-302-2(2)(d)) and R315-303-3(7)(e))**

A fire suppression area shall be designated as the location for any burning materials to be moved to or to be consolidated on for fire suppression activities. These areas shall not be located within 150 feet of any exposed HDPE liner or gas collection system piping or within 5 vertical feet of any existing liner. This area may move from time to time to be in close proximity of the working area of PPL operations.

Vehicle Fires

In the event that a disposal vehicle carrying a burning or smoldering load of waste enters PPL, the following procedures will be instituted:

1. The vehicle should be directed to the designated fire suppression area as previously outlined above.
2. Once burning waste is removed from the vehicle, the application of cover material by landfill equipment or the application of water by the on-site water truck will be used to extinguish the fire. Smothering with soil will be the primary method used to extinguish a fire.
3. Vehicles and any equipment in the "fire zone" will be inspected and sprayed with water, as needed, while working to quench the fire.
4. Precautions should be taken throughout the entire fire-fighting operation including using a hot-spot observer.
5. If, at any time, additional assistance is required, local fire-fighting units will be contacted per pre-arranged agreement.

Ground Fire/Below Cover Fire

In the event that waste placed on the ground or waste that was previously covered erupts into fire, the following procedures will be instituted:

1. It will be isolated from previously deposited waste immediately. This will be done by either moving burning waste to the designated fire suppression area or by concentrating the burning waste in one spot using landfill equipment.
2. Once burning waste is separated from other exposed waste, the fire will be extinguished by the application of cover material by landfill earth moving equipment or the application of water by the on-site water truck. Smothering with soil will be the primary method used to extinguish fire.
3. Vehicles and any equipment in the "fire zone" will be inspected and sprayed with water, as needed, while working to quench the fire.
4. Precautions should be taken throughout the fire-fighting operation, including using a hot-spot observer.
5. If, at any time, additional assistance is required, local fire-fighting units will be contacted.

Explosion

In the event that an explosion should occur at PPL or in any structure associated with PPL, the following will be done:

1. All personnel and equipment in the area, including those in surrounding buildings will be evacuated immediately to the emergency staging area.
2. All PPL personnel will be accounted for.
3. Local emergency personnel will be contacted by dialing 911.
4. The Landfill Manager will be informed of the situation if he/she is not already at PPL.
5. The explosion area will be restricted to all personnel until cleared for reentry by local emergency personnel.
6. Precautions should be taken throughout the entire emergency response operations.
7. The President of Promontory Point Resources, LLC or his/her designee will be the only person authorized to make statements to the media.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

I.d.4 Corrective action programs to be initiated if groundwater is contaminated (R315-302-2(2)(e))

The facility operator will perform a statistical analysis of the groundwater sample analytical results in order to determine whether a statistically significant change has occurred as compared to the established background water quality conditions for parameters in Section R315-308-4. If the facility operator determines that there is a statistically significant increase over background in any R315-308-4 listed parameter at any compliance point monitoring well, the owner or operator will implement corrective action as specified in R315-308-3.

The Director has approved this aspect of PPL. (*See* Letter dated 3/8/04 and Directors Approvals Timeline attached as **Appendix A**.)

I.d.5 Contingency plans for other releases, e.g. explosive gases or failure of run-off collection system (R315-302-2(2)(f))

**Explosive Gas Emissions (R315-302-2(2)(f) and R315-303-2(2))**

Methane gas releases would be detected using a methane detection meter capable of measuring methane levels below the 25% lower explosive limit (LEL) (1.25% methane by volume in air). Gas monitoring will be conducted in perimeter probes around the disposal area and in PPL structures on a quarterly basis. Upon detection of explosive gases equal to or above the LEL in perimeter probes (5% methane by volume in air) or 25% of the LEL inside structures, the Owner or Operator would take the following steps:

1. Immediately upon detection, steps would be taken to protect human health. These steps would include, as applicable, accounting for all PPL personnel providing adequate ventilation, moving all equipment and personnel away from the release area, shutdown of any electrical devices that could cause ignition, monitoring the release area and surrounding areas with a combustible gas indicator and document reading for

placement into the operating record, determination of the cause of explosive gas levels, and keep the area off-limits until corrective actions are taken.

2. Within 24 hours the Director would be notified.
3. Within seven days of detection, the explosive gas levels would be recorded in the operating record along with a description of the steps taken to protect human health.
4. Within 60 days of detection, a remediation plan that had been approved by the Director would be implemented, and a copy of the plan placed in the operating record. Upon implementation, the Director would be notified.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

### Surface Waters (R315-302-2(2)(f))

If the surface water run-off collection system were to fail, the following actions would be taken:

1. As necessary, construct berms and ditches or take other appropriate actions to divert water around the collection system failure area using PPL soils or readily available materials and equipment.
2. Analyze and evaluate the extent of damage to the run-off collection system.
3. Identify the mechanism of failure.
4. If warranted, call a qualified professional to discuss possible solutions.
5. Develop and implement corrective actions.

I.d.6 Plan to control fugitive dust generated from roads, construction, general operations, and covering the waste (R315-302-2(2)(g))

The predominant winds are from the southwest. Wind erosion at this location would primarily come from dust from earthwork operations and traffic. Each of these issues has been addressed to minimize man-made causes of wind erosion.

Blowing dust and dirt would be minimized by prevention and response to areas where the problem occurs. Dust would be mitigated on an as-needed basis using dust suppressants and road surface treatments. Leachate may be used as a suppressant on areas of the landfill that are overlain by an approved liner. Stockpiles of dirt would also need to be monitored.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

I.d.7 Plan for litter control and collection (R315-302-2(2)(h))

PPL will minimize fugitive waste using management, engineering, process, and personnel controls. Among these are covered containers, fencing, wind monitoring, and periodic cleaning.

The methods to reduce litter in and near PPL include the following:

- PPL requires that all waste loads entering PPL must be covered. Waste will remain covered until unloaded at the working face.
- Operators will minimize the working face. This will reduce the waste surface area that is exposed to wind and reduce the potential for winds to transport out of the active cell.
- Operators will place a daily cover or approved alternate daily cover as soon as practical.
- Litter control fencing will be placed near the working face to capture as much wind-blown litter as possible. A temporary fence will be available to move around PPL as needed. A litter fence will be constructed on the south-southeast side of the working face of the landfill cells.
- Active cleanup of wind-blown litter will be conducted within the property boundary as part of routine operation. Periodically, PPL operators will inspect adjacent properties for litter that has migrated offsite.
- PPL will maintain the perimeter fencing in good repair and pick up trash that has been collected on the fence. Fencing would be inspected weekly and waste cleanup and repair of the fence would occur as necessary.

The fugitive waste plan is included in **Appendix H**.

I.d.8 Description of maintenance of installed equipment (R315-302-2(2)(i))

The operator shall perform inspection and maintenance activities to assure the structural integrity and effectiveness of all installed equipment (i.e., leachate and gas collection systems, and groundwater monitoring systems).

### Leachate Collection and Recovery System (LCRS)

The operator shall ensure that leachate collection and control is managed to prevent public contact and control vectors, and odor-related nuisances. LCRS side-slope risers and sump pumps will be inspected, operated, and maintained. Based on the results of the inspection activities, repairs and/or replacement of components of the LCRS will be made as necessary. Identified worn or malfunctioning elements of the LCRS will be repaired or replaced, as appropriate.

### Groundwater Monitoring Network

The groundwater monitoring network will be inspected each time groundwater samples are collected from the wells. During each monitoring event, the wells will be inspected for damage to the well surface completion, well casing, protective cover, lock, well cap, and concrete pad. In addition, the ground surface around the well pads will be inspected for erosion. If any problems to the wells or equipment are discovered they will be repaired or

replaced as soon as practicable. Other repairs, including possible well abandonment and re-drilling, will be conducted in accordance with regulatory standards.

### Landfill Gas Collection System

Upon installation, the landfill gas management system will be inspected with a focus on well head assemblies, pipeline couplings, connections, pipeline leaks (which may be indicated by a gas odor, hissing sounds, elevated gas concentrations in surface air samples or elevated oxygen readings in the collection system), pipeline breakage, cracking, abnormalities, or deformations. Regular inspections of the blower/flare station mechanical and electrical system will also be conducted.

Routine inspection and maintenance of the landfill gas extraction system will include adjustment of valves, testing of well pressures, temperature and oxygen levels, checking for gas leakage at the well head, and checking the integrity of well penetrations through the final cover. Cracked, broken, or malfunctioning portions of the landfill gas collection system will be repaired upon detection in accordance with industry standards. Landfill gas well repairs are dependent on the nature and extent of damages to the landfill gas collection system and may include removal and replacement of solid-wall sections of polyethylene (PE) pipe, soil backfill, bentonite grout, and/or geomembrane boots. If it is determined that landfill gas wells are damaged beyond repair, they will be abandoned and/or re-drilled. Repairs to the LFG headers may include removal and replacement of damaged header pipe.

I.d.9 Procedures for excluding the receipt of prohibited hazardous or PCB containing wastes (R315-302-2(2)(j))

A "Prohibited Waste" control program designed to detect and deter attempts to dispose of hazardous and other unacceptable waste will be implemented at PPL. The program is designed to protect the health and safety of employees, customers, and the general public, as well as, protect against contamination of the environment. The Landfill Manager will be in charge of waste inspection activities, including delegating those responsibilities to other employees. The waste disposed at PPL will be visually inspected prior to final placement. The waste may be inspected at off-site transfer stations. Further information about each of these potential inspection locations is listed below.

Waste from transfer stations generally has a waste inspection plan that visually inspects waste for hazardous materials before loading for transit.

On-site inspection will be conducted at the working face. PPL operators will be trained in the recognition of prohibited waste. A random visual inspection program will be conducted of waste that has not already been inspected at transfer stations. All waste will be visually inspected as it is being placed, spread, and compacted in the cell. Upon finding any unacceptable waste the following steps will be taken:

1. Using landfill equipment such as an excavator or a loader, separate the questionable waste from the other waste in the load. Move the questionable waste away from the operating area of the tipping floor or tipping face so that operations can continue.

2. Notify the Landfill Supervisor or his/her designee immediately of the situation and the Generator of the waste and wait for direction.
3. Keep all other landfill personnel and equipment away from the questionable wastes until notified by the Landfill Supervisor or his/her designee to do otherwise.
4. The Landfill Supervisor shall notify the generator of the problem and allow the Generator 24 hours to remove the material from the premises.
5. If the Generator does not respond in a timely fashion, remove the waste from the landfill and dispose of it in a facility appropriate for the type of waste.
6. Note the details of all actions in the Operating Record.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

I.d.10 Procedures for controlling disease vectors (R315-302-2(2)(k))

Various procedures will be incorporated into the operation of PPL to control vectors. The use of daily cover is necessary to control vectors and the subsequent spread of disease. PPL personnel, to the extent possible, will inspect PPL for signs and indications of vectors. If observed, the Landfill Manager would be contacted immediately and appropriate steps would be taken depending on the specifics of the situation.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

I.d.11 A plan for alternative waste handling (R315-302-2(2)(l))

In the event of a major equipment failure, solid waste would be loaded and shipped to an alternative waste disposal facility such as Box Elder County or other available landfills in the area. A contract will be negotiated for an alternative disposal location prior to PPL operating.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

I.d.12 A general training plan for site operations (R315-302-2(2)(o))

Each employee at PPL will be trained to have a working knowledge of the maintenance and operational techniques necessary to operate and maintain PPL in a manner to preserve human health, safety, and the environment. Training will be accomplished through on-the-job training (OJT) and classroom training sessions. The Landfill Manager, or a designated trainer, will be in charge of directing the training programs. Initial training will be completed within three months of employment followed by an annual review.

The Landfill Manager will be required to pass the SWANA Manager of Landfill Operations (MOLO) course or equivalent experience. In addition, operators are required to take one or

both of the following SWANA training courses; Landfill Operator Training, and Waste Screening or equivalent. Continuing education efforts include the following:

### Introductory Training

Synopsis of solid waste regulations, record keeping, and transporter requirements:

- Requirement All Personnel
- Method On-The-Job Training
- Review Quarterly

### Policies and Procedures

Security, inspections and emergency response:

- Requirement All Personnel
- Method Lecture/Video Course, On-The-Job Training
- Review Quarterly

### Safety

Personal protection, hazardous waste recognition, hazardous material handling, emergency response, and first aid:

- Requirement All Personnel
- Method Classroom/Video Course
- Review Annual

Training documents will be kept in the operating record. A Safety Training meeting is generally held once a week taking a minimum of 15 minutes. Training documents will be kept with the Plan of Operation for a rolling five-year period.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

I.d.13 Any recycling programs planned at the facility (R315-303-4(6))

Recycling is not planned for PPL at this time.

I.d.14 Closure and post-closure care Plan (R315-302-2(2)(m))

Closure activities would be implemented as each module within the disposal cell is completed. These closure activities would minimize the need for further maintenance, and minimize or eliminate the threat to human health and the environment from post-closure escape of solid waste constituents, leachate, contaminated run-off or waste decomposition products to the ground, groundwater, surface water or the atmosphere. A monitoring plan

has been developed to prevent problems through careful monitoring and inspection. PPR will provide closure and post-closure activities for continued facility maintenance and monitoring of gases, land, and water for 30 years or as long as the Director determines is necessary for the facility or unit to become stabilized and to protect human health and the environment. Post-closure activities will commence after closure activities have been completed. The Director may direct that post-closure activities cease until PPL receives a notice from the Director to proceed with post-closure activities.

Maintenance of the facility, the facility structures that remain after closure, and monitoring systems for their intended use will be performed as part of post-closure. The table below provides a schedule for conducting inspections and maintenance. The owner/operator will be responsible for conducting inspections, scheduling maintenance and recording these activities.

**Frequency of Inspection and Maintenance of Facilities during the Post-Closure Care Period**

| Landfill Facility | Inspection | Frequency |
|---|---|---|
| Landfill Cell | Final cover integrity | Quarterly |
| | Settlement | Quarterly |
| | Vegetation | Quarterly |
| | Perimeter fence integrity | Quarterly |
| Stormwater | Run-on/run-off control system integrity | Quarterly |
| Leachate Collection System | Leachate evaporation pond integrity | Quarterly |
| Groundwater Monitoring System | Groundwater well integrity | Semi-Annually |
| Landfill Gas Collection/Monitoring System | Landfill gas collection well and line integrity | Quarterly |
| | Landfill gas monitoring system integrity | Quarterly |
| Other Appurtenances | Entrance/main gate integrity | Quarterly |
| | Facility roads | Quarterly |
| | Equipment maintenance | As-needed |

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

I.d.15 Procedures for the handling of special wastes (R315-315)

Special wastes will be handled and disposed of in a manner that will minimize exposure and in accordance with R315-315. All special wastes will be disposed only on areas designated and assigned to receive special wastes and will only be disposed of by those properly trained to handle the special wastes.

I.d.16 Plans and operation procedures to minimize liquids (R315-303-3(1))

Liquid waste is a solid waste material that contains "free liquids" as defined by EPA Method 9095 (Paint Filter Liquids Test), as described in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Method" (EPA Publication No. SW846, latest edition). PPL will minimize liquids admitted to the active fill areas of PPL, as follows:

- At the close of each day of operation, PPL will completely cover the waste with at least six (6) inches of soil or an alternative daily cover as allowed in Subsections R315-303-4(4)(b) through (e).
- PPL will prohibit the disposal of containerized liquids larger than household size, non-containerized liquids, sludge containing free liquids, or any waste containing free liquids in containers larger than household size.

PPL has been designed to prevent run-on and control, collect, and treat runoff from a 25-year storm as discussed in Section II.c.8 and in **Appendix S**.

The Director has approved this aspect of PPL. (*See* Letter dated 3/9/04 and 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

I.d.17 Plans and procedures to address the requirements of R315-303-3(7)(c) through (i) and R315-303-4

### Weighing or Estimating Tonnage of Incoming Waste (R315-303-3(7)(c))

The operator will operate scales for waste entering PPL. All loads will be weighed prior to traveling to the tipping face. All weighed transactions will be recorded. An example of the weight tickets and tonnage reports is provided in **Appendix G**.

### Entrance Sign R315-303-3(7)(d)

A sign will be placed at PPL entrance which identifies the name of PPL, the hours during which PPL is open for public use, unacceptable materials, and emergency contact information.

### Fire Protection (R315-302-2(2)(d)) and R315-303-3(7)(e))

A fire suppression area shall be designated as the location for any burning materials to be moved to or to be consolidated on for fire suppression activities. These areas shall not be located within 150 feet of any exposed HDPE liner or gas collection system piping or within 5 vertical feet of any existing liner. This area may be moved from time to time to be in close proximity of the working area of PPL operations.

Additionally, above-ground storage tanks maintain water at all times for fire suppression.

### Vehicle Fires

In the event that a disposal vehicle carrying a burning or smoldering load of waste enters PPL, the following procedures will be instituted:

1. The vehicle should be directed to the designated fire suppression area as previously outlined above.
2. Once burning waste is removed from the vehicle, the application of cover material by PPL equipment or the application of water by the on-site water truck will be used to extinguish the fire. Smothering with soil will be the primary method used to extinguish a fire.
3. Vehicles and any equipment in the "fire zone" will be inspected and sprayed with water, as needed, while working to quench the fire.
4. Precautions should be taken throughout the entire fire-fighting operation including using a hot-spot observer.
5. If, at any time, additional assistance is required, local fire-fighting units will be contacted per pre-arranged agreement.

### Ground Fire/Below Cover Fire

In the event that waste placed on the ground or waste that was previously covered erupts into fire, the following procedures will be instituted:

1. It will be isolated from previously deposited waste immediately. This will be done by either moving burning waste to the designated fire suppression area or by concentrating the burning waste in one spot using PPL equipment.
2. Once burning waste is separated from other exposed waste, the fire will be extinguished by the application of cover material by PPL earth moving equipment or the application of water by the on-site water truck. Smothering with soil will be the primary method used to extinguish fire.
3. Vehicles and any equipment in the "fire zone" would be inspected and sprayed with water, as needed, while working to quench the fire.
4. Precautions should be taken throughout the fire-fighting operation, including using a hot-spot observer.
5. If, at any time, additional assistance is required, local fire-fighting units will be contacted.

### Explosion

In the event that an explosion should occur at PPL or in any structure associated with PPL, the following will be done:

1. All personnel and equipment in the area, including those in surrounding buildings will be evacuated immediately to the emergency staging area.
2. All PPL personnel will be accounted for.
3. Local emergency personnel will be contacted. The Landfill Manager will be informed of the situation if he/she is not already at PPL.
4. The explosion area will be restricted to all personnel until cleared for reentry by local emergency personnel.
5. Precautions should be taken throughout the entire emergency response operations.

6. The CEO of Promontory Point Resources, LLC or his/her designee will be the only person authorized to make statements to the media.

### Preventing Harborage of Rats and Other Vectors (R315-303-3(7)(f))

The use of daily cover is necessary to control vectors and the subsequent spread of disease. PPL personnel, to the extent possible, will inspect PPL for signs and indications of vectors. If observed, the Landfill Manager would be contacted immediately and appropriate steps would be taken depending on the specifics of the situation. If vectors were to become a problem, pest control specialists would be contracted to address the issue.

If the primary methods do not produce satisfactory results, other methods will be explored and implemented.

### Unloading Area/Working Face Size (R315-303-3(7)(g))

Equipment operators will maintain the working face so that it is as small as practical but will still allow for efficient and safe unloading of waste.

### Traffic Control (R315-303-3(7)(h))

An all-weather access road will be constructed from the entrance to the area of the first landfill cell. Temporary internal access roads will be constructed to access the bottom of the Cell, initially; and the roads rerouted as waste is placed in PPL and waste fill grades change. Drivers will be directed to the working face where the driver will be instructed to discharge the load.

### Communication (R315-303-3(7)(l))

All communication on and off PPL will be by cell phone, radio, or off-grid communication device.

### Control of Fugitive Dust (R315-303-4(2)(a))

Wind erosion at this location would primarily come from dust from earthwork operations and traffic. Each of these issues has been addressed to minimize man-made causes of wind erosion.

Blowing dust and dirt would be minimized by prevention and response to areas where the problem occurs. Dust would be mitigated on an as-needed basis using dust suppressants and road surface treatments. Leachate may only be used as a suppressant on areas of PPL that are overlain by an approved liner. Stockpiles of dirt would also need to be monitored.

### Litter Control (R315-303-4(2)(c))

Operations at the working face will not take place without fencing to control fugitive waste. Tipping operations at the open face will be limited to one area at a time to control the amount of exposed waste. Appendix H contains the fugitive waste plan.

### Daily and Intermediate Cover (R315-303-4(4))

Daily and intermediate cover will be generated from borrow areas within the buffer zone or from processing operations. Cover material will be available in stockpiles or accessible from borrow areas at all times. This adequately covers the anticipated maximum size working face by a factor of two which leaves excess material available for contingencies. Alternative daily cover material may also be utilized as allowed in R315-303-4(4)(b) through (e). The following are approved for use as alternative daily covers:
Non-hazardous contaminated soil;

- Tarps;
- Plastic sheets, when designed for landfill cover use;
- Foam products, when designed for landfill cover use;
- Products created from cement kiln dust, when designed for landfill cover use;
- Incinerator ash (when its use does not create a human health or environmental hazard);
- Non-hazardous auto shredder residue not otherwise regulated by 40 CFR Part 761;
- Chipped waste tires; and
- Spray-on materials, when designed for landfill cover use.

Prior to use of any of the alternative daily covers (except non-hazardous contaminated soil) the owner/operator will establish a schedule for use of the approved alternative cover based on the alternative cover's performance in controlling vectors, fires, odors, blown litter, and scavenging. The schedule shall include the following requirements:

- Any schedule established by PPL owner or operator must provide for the placing of six inches of soil cover at least once per week;
- No approved alternative daily cover may be used on the day preceding a day the landfill will be closed;
- No alternative daily cover may be used on an area of the landfill that will not be covered with waste or an intermediate cover, as required in Subsection R315-303-4(4)(g), within two days; and
- The Director may require the use of six inches of soil cover upon finding that use of an alternative cover is not controlling vectors, fires, odors, blowing litter or scavenging.
- The PPL operating record will document the days when an alternative cover was used and the days when soil cover was used.

If an area of the working face of the landfill will not receive municipal waste for a period longer than 30 days, the owner/operator shall cover the area with a minimum of 12 inches of soil as an intermediate cover or an alternative intermediate cover as approved by the Director.

### General Standards for Maintenance and Operation (R315-303-4(2)(b), (d) through (f) and R315-303-4(3))

As required in R315-303-4(2)(b) and (d), the following is prohibited:

- Open burning

- Scavenging

At least two PPL personnel trained in landfill operations will be present at PPL (one at the active face) when PPL is open. Boundary posts will clearly mark the active area boundaries authorized in the permit by placement of permanent posts or by using an equivalent method clearly visible for inspection purposes. Borrow area reclamation will be performed in an orderly manner and in a way that does not interfere with PPL operation.

I.d.18 Any other site-specific information pertaining to the plan of operation required by the Director (R315-302-2(2)(p))

No specific information is required at this time.

## I.e Special Requirements for New or Laterally Expanding Class V Landfill (R315-310-3(3))

1.e.1 Submit information required by the Utah Solid and Hazardous Waste Act Subsections 19-6-108(9) and 19-6-108(10) (R315-310-3(2)(a))

### Roads

A letter from DOT indicating that PPL does not impact the safety, operation or conditions of the roads is provided in **Appendix I-2** along with a traffic impact study (**Appendix I-3**). Additionally, PPR is working with the county on public access requirements through the county approval process.

### Needs

The needs study showing the need for PPL is presented in **Appendix I-1**.

### Compliance History

PPR's parent company, Allos Environmental, Inc., owns and operates the Chicago Grade Landfill (CGL) and the Santa Maria Transfer Station (SMTS) in the state of California. These two facilities have been and are operated by experienced personnel under the direct supervision of the Allos Environmental management team. A copy of the last two years of compliance history for the CGL and SMTS are provided in **Appendix I-4**.

# II. Facility Technical Information

## II.a Maps for All Class I and V Landfills

II.a.1 Topographic map drawn to the required scale with contours showing the boundaries of the landfill unit, groundwater monitoring well locations, gas monitoring points, and the borrow and fill areas (R315-310-4(2)(a)(i))

Figure C-803 is a map showing the boundaries of the landfill unit, groundwater monitoring well locations, gas monitoring points, location of the production well, and the borrow and fill areas.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as Appendix A.)

II.a.2 Most recent U.S. Geological Survey topographic map, 7-1/2 minute series, showing the waste facility boundary; the property boundary; surface drainage channels; any existing utilities and structures within one-fourth mile of PPL; and the direction of the prevailing winds (R315-310- 4(2)(a)(ii))

Figure C-802 is a map showing the waste facility boundary, the property boundary, surface drainage channels, existing utilities and structures within one-fourth mile of PPL, and the direction of the prevailing winds shown on the most recent USGS map.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as Appendix A.)

## II.b Geohydrological Assessment for All Class I and V Landfills (R315-310-4(2)(b))

II.b.1 Local and regional geology and hydrology including faults, unstable slopes and subsidence areas on site (R315-310-4(2)(b)(i))

PPL is situated at the southerly end of Promontory Point, which is a peninsula extending southward from the northerly shore of the Great Salt Lake. The Promontory Mountains occupy this peninsula, forming one of the mountain blocks of the Basin and Range geomorphic province. Much of PPL is occupied by a broad valley containing Pleistocene lacustrine deposits of the ancient Lake Bonneville overlying older fanglomerate deposits derived from the Promontory Mountains to the north and flanked by Late Proterozoic and Early Paleozoic metasedimentary outcrops. The axis of the valley drains from northeast to southwest at an approximate grade of eight percent. Some of the surrounding outcrops (which were once submerged by Lake Bonneville) show evidence of reworking and erosional effects by the Pleistocene-Age lake and partially-eroded coatings of tufa. The tufa is as much as one foot thick.

Significant geologic features, faults, and unstable areas are shown on Plates A-1 in **Appendix P-2**. Generalized geologic cross sections (Cross Section numbers A-A' and B-B') were constructed across the project area in generally north-south and east-west directions, respectively, prior to well drilling and construction and are shown on Plate A-1 (in **Appendix P-2**). It should be noted that the location of the East Great Salt Lake Fault Zone shown on Plate A-1 is superseded by the work of Dinter and Pechmann (2014) which is shown in **Appendix P-4**. Cross Section A-A' shown on Plate A-1 extends roughly down the central axis of the broad valley comprising the PPL 1,000-acre disposal area. Cross Section B-B' extends from the westerly quarry, across the valley at roughly elevation 4,440 feet, and terminates in the metamorphic outcrops to the southeast. Tetra Tech completed shallow borings and shallow test pits but did not drill any wells. Therefore, the cross sections on Plate A-1 do not show the location of the fanglomerate that underlies the Lake Bonneville deposits and the PPL landfill cell. Figure 2 (**Appendix J**) shows the locations of the PPL monitor wells and the location of Cross Section C-C'. Figure 11 (**Appendix J**) is a cross section (C-C') that was constructed based on geologic and hydrogeologic data collected in 2018 from the new monitor wells. **Appendix W** photos show well drilling operations, geologic contacts, and drill cores and outcrops of fanglomerate formation.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17, 7/10/19 and Directors Approvals Timeline attached as **Appendix A**.)

II.b.2 Evaluation of bedrock and soil types and properties including permeability rates (R315-310-4(2)(b)(ii))

Seven geologic units were identified at PPL and are described from youngest to oldest in the following sections.

1. Fill – Historical (Qaf): A fill platform comprised of quarried or mined bedrock, primarily quartzite, ranging in size to large angular boulders is located in the westerly portion of PPR's property on the east flank of a metasedimentary bedrock outcrop. The fill platform extends some 150 feet wide by 400 feet long and is located approximately 800 feet west of Test Pit Number PT-05.

2. Lacustrine and Alluvial Deposits (undivided) – Quaternary (Qla): This unit includes mixed alluvial and lacustrine deposits of marl, silt, sand and gravel. It also includes topsoil and pre-Bonneville alluvial deposits. This is the primary unit explored within the depths of the test pit excavations and forms the surface across which the seismic refraction profiles were performed.

   Holocene alluvium deposits are likely thin and discontinuous, occurring within the incised ephemeral stream channels that drain generally southwesterly across PPL. Such deposits were not observed in sufficient quantity to substantiate a separate mapped interval.

   Pleistocene lacustrine deposits of Lake Bonneville were the primary unit encountered by the test pit excavations during the field exploration. A Log of Test Pits is provided in

**Appendix F**, and **Appendix P-2**, which provides summary descriptions and depth distribution of various soil types encountered in the excavations, as well as a graphic depiction of the sampled intervals. The maximum depth of test pit penetration into these deposits was 12 feet, limited by the reach of the backhoe.

Two boreholes advanced by AGEC (2003) for use as monitoring wells were interpreted as quartzite or dolomite bedrock at depths of 42 to 43 feet. One of the wells was completed in quartzite while the other was interpreted to be fanglomerate.[2] Three additional borings were advanced to a maximum depth of 98 feet without encountering bedrock.

In general, the lacustrine and alluvial deposits were observed to consist of the following.

Silty SAND and Silty SAND with GRAVEL - Brown to yellowish brown, generally fine to coarse, loose to medium dense, generally dry, with scattered to abundant GRAVEL, cobbles or boulders, occasional carbonate-cemented zones. Where encountered, clasts were observed to be subrounded to subangular and consisted primarily of quartzite. According to Freeze and Cherry (1979), these types of materials have a hydraulic conductivity range between approximately $10^{-5}$ and $10^{-1}$ centimeters per second (cm/sec).

Poorly-graded SAND and poorly-graded SAND with GRAVEL – Very pale brown to light gray, fine to coarse, loose to medium dense, generally dry and commonly occurring with cemented zones or lenses. According to Freeze and Cherry (1979), these types of materials have a hydraulic conductivity range between approximately $10^{-4}$ and 10 cm/sec.

Sandy SILT with GRAVEL – Yellowish brown with fine SAND, dense, dry, with scattered GRAVEL to 2-inch diameter, partially cemented with secondary clay films. According to Freeze and Cherry (1979), these types of materials have a hydraulic conductivity range between approximately $10^{-5}$ and $10^{-1}$ cm/sec.

Silty Marl – Cemented sandy SILT, moderate orange-pink to grayish orange-pink, well-cemented with calcite or aragonite, slightly clayey. Although not encountered in the test pits, this unit was observed in two of the smaller quarries along the southwesterly margin of PPL as an approximately 2 to 7 feet thick interval. The marl was observed to be overlain unconformably by a variable thickness of cemented lacustrine gravel. The depth below PPL grade at the top of the quarry to the top of the silty marl is estimated to range between 12 and 17 feet near the quarry margin. This material was sampled at an outcrop as PM047 G-01.

Silty GRAVEL – Clasts are predominantly composed of quartzite, generally subrounded to subangular, generally fine to coarse gravel, with cobbles and boulders as noted in the log. Clasts occur in a loose to medium dense silty matrix with accessory SAND or CLAY. This unit was portions of PT-02, PT-03, and PT-04, was generally dry and uncemented.

[2] Fanglomerate formation is located below PPL that AGEC and Tetra Tech mistook as bedrock. (See supra page 21.)

According to Freeze and Cherry (1979), these types of materials have a hydraulic conductivity range between approximately $10^{-1}$ and 10 cm/sec.

Poorly-graded GRAVEL - Clasts are predominantly composed of quartzite, generally subrounded to subangular, fine to coarse, with cobbles or boulders as noted in the log. The matrix is poorly-graded SAND or silty SAND, medium dense to dense, dry, commonly occurring with zones of carbonate cementation. Where observed near the westerly quarries this unit is clast-supported, cemented and is inclined toward the south at approximately 10 to 15 degrees. According to Freeze and Cherry (1979), these types of materials have a hydraulic conductivity range between approximately $10^{-1}$ and 100 cm/sec.

Well-graded GRAVEL – With cobbles and boulders composed primarily of quartzite, generally subangular with a matrix of poorly graded SAND (where present), generally uncemented where encountered in PT-05 and PT-06.

Pre-Bonneville deposits were encountered in a test pit excavation at PT-02 beneath a zone of cobbles and boulders at a depth of 4 feet. The deposit encountered at that location consists of well- graded GRAVEL and is interpreted to be an ancient talus slope, based on the angularity and uniformity of the quartzite clasts. The unit was observed to be strongly cemented within the upper 2 to 3 feet, grading to a weakly-cemented condition near the bottom of the excavation at a depth 11.5 feet. According to Freeze and Cherry (1979), these types of materials have a hydraulic conductivity range between approximately 1 and 100 cm/sec.

3. Fanglomerate Deposit – Promontory established four new monitoring well locations during 2018 (see **Appendix J**). These wells were drilled and completed to depths of 101 to 148 feet below grade. The wells were completed in a fanglomerate deposit that was locally exposed in the Phase IA landfill cell excavation. This fanglomerate deposit was derived from the Cambrian-age Geertsen Canyon Quartzite, and the Proterozoic-age Browns Hole and the Mutual formations. Younger Quaternary-age Lake Bonneville deposits conceal (cover) the fanglomerate deposit and bedrock at PPL. The fanglomerate consists of silt, clay, and clasts of quartzitic materials that range from sand size to boulders. **Appendix W** photos show well drilling operations, geologic contacts, and drill cores and outcrops of fanglomerate formation. The fanglomerate overlies Cambrian and Proteozoic formations (Loughlin, 2018). Hydraulic conductivity of the fanglomerate, as estimated through slug testing, ranges from about 1 to 7 feet per day (approximately 3.5 X $10^{-4}$ and 2.5 X $10^{-3}$ cm/sec).

4. Limestone and Shale - Middle and Lower Cambrian (Ꞓls): The youngest metasedimentary bedrock unit at PPL consists of an interbedded thin-bedded medium-gray limestone and olive shale. Carbonate rocks in the upper part of the unit include one or more beds from about 3.3 to 9.6 feet thick of pale gray to nearly white laminated dolomite enclosed in limestone. Limestone intervals in the lower part of the unit consist of medium gray limestone marked by wavy tan silty wisps characteristic of the Cambrian. Shale intervals correlated with the Wheeler Shale and Spence Shale occur within the

limestone and shale unit. At its base is intensely-folded, dense, yellowish-gray cherty argillite and medium-gray to pinkish limestone, which is highly deformed as a result of shearing along the contact with the underlying quartzite unit (Crittenden, 1988).

The "Limestone and Shale" unit occurs in outcrop along the northerly and easterly portions of PPR's property where it is shown to be in fault contact with the Geertsen Canyon Quartzite (AGEC, 2003; Crittenden, 1988). Dolomite was reported to have been encountered in the bottom of 3 of AGEC's test pits, including TP-6 in the northeasterly portion of PPL, in TP-16 near a smaller quarry on the southwesterly perimeter, and in TP-21 in the southerly portion of PPR's property. According to Freeze and Cherry (1979), these types of formations have hydraulic conductivities that range between approximately $10^{-7}$ and $10^{-3}$ cm/sec.

5. Geertsen Canyon Quartzite - Lower Cambrian (Ꞓgc): The uppermost 100 m (330 feet) consists of deep reddish-black hematitic quartzite. The main body consists of pale-gray, pinkish- gray or light-brown quartzite, commonly with pebble-sized clasts, dominantly of vein quartz. A zone of pebble- to cobble-conglomerate a few tens of meters thick is recognized about a third of the way up in the formation. The basal 50 to 100 m (165 to 330 feet) is commonly coarse-grained and contains abundant angular fragments of salmon-colored microcline. Consequently, the basal zone is relatively non-resistant compared with the remainder of the formation and the underlying vitreous quartzite of the Browns Hole Formation (Crittenden, 1988).

   Outcrops of the Geertsen Canyon Quartzite occur in the easterly portion of PPR's property, where it is observed to occur as massive to pebbly, and laminated or cross-laminated with alternating creamy-white to dark reddish-brown laminations. The formation is highly- to intensely-fractured/jointed at the ground surface and is cut by a series of northwest-trending high-angle faults. A zone of tight folding and brecciation was observed in an outcrop in the southeasterly portion of PPR's property, indicative of ductile shear. The upper contact with the overlying limestone and shale unit is covered at PPR's property by the lacustrine and alluvial deposits, and is mapped as a fault contact in the easterly portion of PPR's property (AGEC, 2003; Crittenden, 1988). The basal contact with the underlying Browns Hole Formation is similarly obscured by the overlying lacustrine and alluvial deposits. Quartzite was thought to have been encountered in the bottom of Test Pit numbers PT-04 and PT-05, in most of the AGEC test pits that described bedrock and possibly in two of the AGEC drill holes, but the specific formation was not identified.[3] Well MW-5 may also be completed in the Geertsen Canyon Quartzite. Well testing indicates that this formation has a hydraulic conductivity of about 3.5 X $10^{-4}$ cm/sec.

6. Browns Hole Formation - Late Proterozoic (ƶbh): The Browns Hole Formation consists of pale-gray very-fine-grained vitreous quartzite. Both the grain size and color allow this unit to form a marked light-colored band that contrasts with the quartzites of the overlying and underlying units. Exposures at PPR's property exhibit intense ductile folding

[3] Fanglomerate formation is located below PPL that AGEC and Tetra Tech mistook as bedrock. (See supra page 21.)

characteristic of a ductile shear zone. The upper contact with the overlying Geertsen Canyon Quartzite is obscured beneath the fanglomerate and Quaternary Lacustrine and Alluvial Deposits. The unit is observed to be highly- to intensely- fractured/jointed at the ground surface. Quartzite was thought to have been encountered in the bottom of Test Pit numbers PT-04 and PT-05, and in most of the AGEC test pits that described bedrock.[4]

7. Mutual Formation - Late Proterozoic (Ƶm): The mutual formation consists of thick-bedded coarse-grained quartzite with a few beds of siltstone and shale. The unit is well-exposed in the large quarry on the westerly property margin, at the west end of Cross Section B-B' (**Appendix P-2**). Quartzite from this formation was purportedly used as rip-rap on the Southern Pacific Causeway across the western arm of the lake. The formation is cut by numerous dark-brown-weathered igneous dikes, some of which were previously exploited during prospecting in the early days. The Mutual Formation on PPR's property is highly- to intensely-fractured/jointed at the surface.

   Several steeply-dipping open fractures were observed in the Mutual Formation quartzite within 20 to 40 feet of the top of the quarried face (Photo DSCN2074, **Appendix F** of **Appendix P-2**). These fractures are likely a result of blasting during one of the large (~1-million ton) quarry blasts in the late 1950's (Morrison- Knudsen, 1959).

   The Promontory Production well is screened predominantly in the Mutual Formation with some of the well screened interval in the Browns Hole Formation. Well testing indicates that this formation is confined has an upward gradient and a hydraulic conductivity of about 1.06 X $10^{-5}$ cm/sec, based on a 72-hour pumping test.

The Director has approved this aspect of PPL. (*See* Letter dated 7/10/19 and Directors Approvals Timeline attached as **Appendix A**.)

II.b.3 Depth to groundwater (R315-310-4(2)(b)(iii))

The measured depth to groundwater at PPL ranges from about 20 feet near the south end of the PPR property, about 85 feet immediately south of the Phase IA landfill cell, and about 128 feet on the north side of the Phase IA cell. The depth to water measured in the Promontory Point Production Well near the northern end of PPL was 526 feet in September 2017. Depth of groundwater throughout PPL was measured in historic pre-existing wells (8-inch and 12-inch wells), the Promontory Point Production Well installed in 2017, the monitoring wells that were installed by AGEC during the 2003 Site investigation, and the monitoring wells installed at the Phase IA cell in 2018. The Loughlin Hydrogeologic Study Report is presented in **Appendix J**.

The Director has approved this aspect of PPL. (*See* Letter dated 7/10/19 and Directors Approvals Timeline attached as **Appendix A**.)

[4] Fanglomerate formation is located below PPL that AGEC and Tetra Tech mistook as bedrock. (See supra page 21.)

II.b.4 Direction and estimated flow rate of groundwater (R315-310-4(2)(b)(iv))

Groundwater on the PPR property flows from north to south, generally in the direction of the topographic surface. **Appendix J** contains the October 30, 2018 site potentiometric maps that show the general direction of groundwater movement, which is perpendicular to the water level contours. Groundwater flows from higher elevations in the bedrock into the semi-consolidated fanglomerate and unconsolidated Lake Bonneville deposits towards the GSL. Groundwater exits the bedrock and enters the fanglomerate at some point between upgradient Well MW-5 and upgradient Well MW-9. Groundwater exits the fanglomerate and enters the Lake Bonneville deposits between Promontory Point Road and the causeway.

Only small magnitude water level changes (about 1 to 2 feet) are noted in the wells on an annual basis. Groundwater elevations range from about 4221 feet in Well MW-5 to about 4204 feet in Well MW-4. Groundwater flow direction beneath the PPL Phase IA cell is to the west-southwest. The hydraulic gradient beneath between Well MW-5 and Well MW-9 north of the PPL landfill cell is about 0.005 feet per foot (ft/ft). The hydraulic gradient between upgradient Well MW-9 and downgradient Well MW-7 south of the Phase IA landfill cell is about 0.004 ft/ft.

Hydraulic conductivity and transmissivity values were estimated for the area around the Phase IA landfill cell and directly downgradient of the landfill cell by conducting (1) slug tests of the 2018 monitor wells (MW-6 through MW-9), (2) slug tests in five 2003 monitor wells (MW-1 through MW-5) and (3) a three-day pumping test of the PPR Production Well. The results are shown in **Appendix J**. Hydraulic conductivities estimated from well testing differ by three orders of magnitude. The downgradient monitor wells MW-1 through MW-4 have the largest estimated values, with smaller values estimated in the 2018 monitor wells and the bedrock wells. The estimated hydraulic conductivities range from (1) about 0.003 to 0.044 cm/sec in the unconsolidated deposits monitored by MW-1 through MW-4, (2) about $3.5 \times 10^{-4}$ to $2.5 \times 10^{-3}$ cm/sec in the fanglomerate deposits monitored by wells MW-6 through MW-9, and (3) from $1.06 \times 10^{-5}$ to $1.4 \times 10^{-3}$ cm/sec in the bedrock. Although bedrock is intensely fractured where exposed at the ground surface, bedrock in the PPR Production Well was dense and hard and relatively unfractured. Where fractures were encountered in the PPR Production Well, they appeared to be filled with clay or mineralization.

Groundwater velocities (average velocity of a water molecule) can be estimated using a modified version of Darcy's Law which is an equation that describes groundwater flow. The equation for estimating groundwater velocity is:

$V = Ki/n$, where:

V is groundwater particle velocity,
K is horizontal hydraulic conductivity,
i is horizontal hydraulic gradient, and
n is effective porosity.

Groundwater velocities of the groundwater range from about 0.01 ft/day to 9 ft/day for the unconsolidated and semi-consolidated deposits.

The Director has approved this aspect of PPL. (*See* Letter dated 7/10/19 and Directors Approvals Timeline attached as **Appendix A**.)

II.b.5 Quantity, location, and construction of any private or public wells on-site or within 2,000 feet of the facility boundary (R315-310-4(2)(b)(v))

There are 12 water wells located on PPL (one water supply well and 11 monitoring wells). There is one private well within 2,000 feet of the PPL boundary (WIN 20954), which is dry. The water well logs and a map showing the locations of the wells that are registered with the Utah Division of Water Rights are provided in **Appendix K**.

II.b.6 Tabulation of all water rights for groundwater and surface water on-site and within 2,000 feet of the facility boundary (R315-310-4(2)(b)(vi))

A water right search of the area surrounding PPL using the Utah Division of Water Rights database was initiated to identify proximate water right applications on file in the State Engineer's office. Six water rights were identified within 2,000 feet of the PPL boundary.

These water sources, location map and water right information are provided in **Appendix L**.

**Summary of Area Water Rights**

| Water Right No. | Name of Water Right Owner | Type of POD | Amount of Water Right (cfs) | Amount of Water Right (ac-ft) |
|---|---|---|---|---|
| 13-3679 | Young Resources Ltd. Partnership | Springs[a] | 0.027b | 10.91b |
| 13-2072 | Young Resources Limited Partnership | Well | 0.015 | 22.68c |
| 13-1947 | Young Resources Limited Partnership | Well | 0.015 | |
| 13-2774 | Lake Crystal Salt Co. | Well | 0.011 | 4.8d |
| 13-3989 | Promontory Point Resources, LLC | Well | NA | 56 |
| 13-3872 | UT Division of Forestry, Fire, State Lands | Spring | NA | 4.2 |

cfs means cubic feet per second; 1 cfs equals about 448.8 gpm.

[a] Includes 8 springs, 4 of which are located in Little Valley on the north side of Lead Mountain, more than 2 miles to the north of PPL.

[b] Certificate of Beneficial Use for 13-3679 indicates a total allowed use for stockwatering of 1,949 Equivalent Livestock Units (ELUs), and documents filed by water right owner indicate that stockwatering is for sheep, which according to the DWRi have a usage of 0.0056 ac-ft per ELU.

[c] As reported in Proposed Determination of Water Rights in Box Elder County on file with the DWRi for this water right; total includes 13-2072 and 13-1947.

[d] Lake Crystal Well. This well was not located in the field.

II.b.7 Identification and description of all surface waters on-site and within one mile of the facility boundary (R315-310-4(2)(b)(vii))

There are no perennial streams located on or near PPL. Intermittent flows occur on PPL and surrounding areas during times of rainfall or snowmelt. Most of storm runoff at PPL is received from the hills to the north and northeast. The nearest perennial stream is Blue Creek, located approximately 20 miles to the northeast, which flows most of the year and is fed by large springs discharging an estimated peak flow of 3 cubic feet per second.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

**Summary of Springs**

| Spring | Approximate Elevation of Spring[a] (feet) | Approximate Distance to Property Boundary (feet) | Reported Flow[b] (cfs-gpm) | Date[b] of Flow Measurement |
|---|---|---|---|---|
| Pasture Pond Spring | 4250 | 600 | 0.0018 - 0.8[c] | 6/14/2009 |
| New Pasture Pond Spring | 4250 | 5000 | 0.0099 - 4.4 | 6/14/2009 |
| Rocoso Spring | 4670 | 3000 | 0.0056 - 2.5 | 4/29/2009 |
| Sing Sing Spring | 4360 | 5500 | 0.0025 - 1.1 | 4/29/2009 |
| Unnamed Spring (DNR) | 4199 | 5000 | NA | NA |

[a] Estimated from topographic map;
[b] According to Proof of Beneficial Use (Proof) filed on April 29, 2009 by Linda D. Day, P.E. for Water Right 13-3679.
[c] We observed a pond, but no surface flow from Pasture Pond Spring on March 14, 2017.

II.b.8 Background groundwater and surface water quality assessment and, for an existing facility, identification of impacts upon the groundwater and surface water from leachate discharges (R315-310-4(2)(b)(viii))

There is no surface water at PPL. Groundwater in the vicinity of the landfill cell is saline. According to R317-6-3, this water would be classified as a Class III or Class IV water, either Limited Use Ground Water or Saline Ground Water, heavily impacted by activities related to the GSL. The background groundwater quality naturally has elevated concentrations of arsenic, calcium, chloride, magnesium, nitrate, potassium, selenium, sodium, sulfate and TDS. Chloride, nitrate, sulfate and total dissolved solids (TDS) exceed drinking water standards. R315-308-2.5.a requires a minimum of eight independent samples from the upgradient well MW-9 and four independent samples from each downgradient well (MW-6,

MW-7 and MW-8) for all parameters listed in Section R315-308-4 to establish background concentrations. A background groundwater quality report of eight background sampling events was submitted on July 1, 2020, to the DWMRC and currently under review.

II.b.9 Groundwater Monitoring (R315-303-3(7)(b) and R315-308)

**Groundwater Monitoring Network**

The PPL groundwater monitoring system consists of four 2-inch diameter monitoring wells. Locations of the four wells are shown on Figure C-803. The groundwater monitoring system consists of one upgradient well (MW-9), and three downgradient compliance wells (MW-6, MW-7, and MW-8). All four wells are completed in and monitor the uppermost aquifer and all four wells are screened in a semi-consolidated fanglomerate. The monitor wells will be used to monitor groundwater quality, evaluate aquifer characteristics, and monitor potentiometric groundwater levels in accordance with R315-308-2.2, R315-308-2.3, and the requirements of Landfill Permit 0202R1.

There are also five older monitoring wells (one upgradient (MW-5) well that is north of the cell and four downgradient wells (MW-1, MW-2, MW-3 and MW-4) located adjacent to the fence line near the Promontory County road. These five wells will not be utilized for routine groundwater sampling and analyses, but will be routinely monitored for groundwater levels. Two other wells, the 8-inch well and the 12-inch well will also be monitored for water levels. Monitoring well locations are shown on **Figure** C-803. Well construction logs are provided in **Appendix F** and **Appendix J**. The following table summarizes the well construction details.

**Groundwater Monitoring Wells**

| Well I.D. | Casing Material | Top of Casing Elevation (ft. AMSL) | Screen Interval (ft. BGS) |
|---|---|---|---|
| MW-1 | 2-inch, Sch.40 PVC | 4,240.66 | 21 – 41 |
| MW-2 | 2-inch, Sch.40 PVC | 4,240.83 | 28 – 68 |
| MW-3 | 2-inch, Sch.40 PVC | 4,239.85 | 24 – 64 |
| MW-4 | 2-inch, Sch.40 PVC | 4,243.73 | 26 – 66 |
| MW-5 | 4-inch, Sch.40 PVC | 4,444.05 | 200 - 240 |
| MW-6 | 2-inch, Sch.40 PVC | 4298.95 | 98.5 to 108.5 |
| MW-7 | 2-inch, Sch.40 PVC | 4291.10 | 90.5 to 100.5 |
| MW-8 | 2-inch, Sch.40 PVC | 4298.08 | 91.5 to 101.5 |
| MW-9 | 2-inch, Sch.40 PVC | 4340.83 | 138.5 to 148.5 |

Notes: Above mean sea level (AMSL), below ground surface (BGS)

Prior to any sampling activities, each of the wells will be inspected to verify its condition. This will include inspection of the wellhead for damage or vandalism and measuring the depth to water. Groundwater flow directions and the gradient will be determined for each sampling event in accordance with R315-308-2(7) and a potentiometric map will be constructed to assess groundwater levels, gradient and flow direction each time that

sampling occurs. The potentiometric map will be submitted to DWMRC with the semiannual detection monitoring report.

### Groundwater Sampling Plan

The Groundwater Monitoring Plan (GMP) addresses the requirements of Utah Administrative Code R315-308 (Groundwater Monitoring Requirements) for the facility operation and was prepared following guidelines presented in the (1) Ground Water Monitoring Plan Guidance (Utah Division of Solid and Hazardous Waste, September 2006), and (2) the Sampling and Analysis Plan Guidance and Template, Version 4, (EPA, 2014). Furthermore, the GMP contains the laboratory Quality Assurance Project Plan (QAPP) and a list of standard operating procedures (SOPs) for each aspect of site sampling. SOPs developed PPL include:

- Dedicated Equipment Low-Flow Groundwater Sampling, Sample Collection and Preservation
- Non-Dedicated Well Purging and Sampling, Sample Collection and Preservation;
- Equipment Decontamination;
- Field Documentation;
- Sample Handling and Shipping; and
- Equipment Repairs and Equipment Replacement.

Additionally, PPL developed a QAPP for management of the monitoring program. The purpose of the QAPP is to ensure compliance and environmental protection of the groundwater and to provide a protocol among those individuals and organizations that (1) collect the data, (2) analyze the data, (3) evaluate and interpret the data, and (4) provide regulatory oversight.

A minimum of eight (8) independent samples were collected and analyzed for the Constituents of Detection Monitoring listed in R315-308-4 to establish background concentrations, as required by R315-308-2(4)(a). Additional monitoring wells will be installed as additional landfill cells are developed. Background data for the detection monitoring constituents will be established for all monitoring wells as they are constructed as specified in R315-308-2(4) and Subtitle D (40 CFR 258.53) regulations. Background data will be generated by sampling the monitoring wells on an approximately monthly basis after the construction of any new well. To provide an acceptable level of confidence in the data, a minimum of eight samples will be collected from the four new monitor wells to establish background concentrations.

During each monitoring event, the wells will be inspected for damage to the well surface completion, well casing, protective cover, lock, well cap, and concrete pad. In addition, the ground surface around the well pads will be inspected for erosion. If any problems with the wells or equipment are discovered they will be repaired or replaced as soon as practicable. Static groundwater levels will be measured on the same day during each monitoring event prior to well evacuation. Groundwater level measurements will be made on the same day prior to sampling, and immediately before any purging of the wells. Depth to water will be collected using an electronic water-level meter (sounder) marked in 0.01-foot increments.

The groundwater levels will be measured and recorded to the nearest 0.01 foot from the top of the monitor well casing measuring point. Water level measurements will always be referenced to the measuring point mark on the well casing. When a water level is measured, each measurement will be reproduced several times to ensure that the correct measurement is made. Water level measurements for each monitoring event will be converted to elevations (nearest 0.01-foot) and submitted with the groundwater sampling report. The survey data for each monitor well will be referenced to the top of casing benchmark established by the survey.

Prior to well purging, the field water quality meter(s) will be calibrated in accordance with the manufacturer's instructions using fresh calibration solutions. Calibration shall be at a minimum, daily, or more frequently as conditions change. Calibration time and calibration values shall be recorded on the field sampling sheets.

The monitor wells will be purged using dedicated PVC bladder pumps. Dedicated pumps will reduce the possibility of cross-contamination between wells and provide consistent, accurate, reliable groundwater samples ensuring no air/water contact during operation, minimizing the potential for sample volatilization. PVC pumps were selected based on the relatively large background groundwater chloride concentrations. These pumps will remain dedicated to each respective well throughout monitoring unless a replacement is necessary due to damage or wear, in which case repairs will be completed or a new pump will be dedicated. Pump intakes will be located close to the middle of the screened interval in each well. Tubing and other dedicated monitoring and pumping equipment should be appropriate for low flow monitoring within high TDS water environments.

Well purging will be conducted at a rate of about 100 milliliters per minute, or at a rate that maintains a maximum drawdown of 0.3 feet below the static level in each well until (1) a minimum of two pump and tubing volumes have been removed and (2) stabilization of field parameters is achieved.

Field parameters include temperature, specific conductivity, pH, and turbidity. Parameter stabilization is defined as:

- Temperature = ± 10% for three (3) consecutive measurements;
- pH = ± 0.1 standard pH units for three (3) consecutive measurements;
- Specific Conductance = ± 10% for three (3) consecutive measurements; and
- Turbidity = ± 10% for values greater than 5 NTU; (if three turbidity values are less than 5 NTU, consider the values as stabilized).

Measurements of temperature, pH, conductivity, and turbidity will be recorded at intervals of approximately three (3) to five (5) minutes on a Field Data Sheet during purging.

Sampling may begin once purging is considered complete. Samples will be collected directly from the dedicated discharge tubing into the appropriate sample containers. The sample flow rate will remain at the established purge flow rate or lowered as needed to minimize aeration, bubble formation, or turbulent filling of sample containers. Groundwater samples are to be collected in-line from the sampling pump from a point prior to the flow-through cell. In accordance with R315-308, no samples will be filtered, initially. However, should

metals data indicate that the filtering of samples would provide a more accurate representation of the groundwater conditions at the, a request may be made to the Director to modify the program.

In addition to the samples collected from the wells, QA/QC samples will also be collected and will consist of:

- Duplicate Samples - A minimum of one duplicate sample will be collected for each monitoring event where multiple wells are sampled. To assess variability of the laboratory measurement process, the location where the duplicate was collected will be noted on the sampling log, and a made-up sample time and sample label identifying the location will be labeled on the duplicate sample and chain-of-custody entry. Duplicate samples will be analyzed for the same analytes as the primary sample.
- Trip Blanks - One laboratory-supplied trip blank will accompany each sample shipment. The trip blank(s) is used to evaluate whether VOC contamination occurred during sample transport or storage. Trip blanks will be analyzed for VOCs.
- Equipment Blanks - If non-dedicated or non-disposable sampling equipment is used, one field equipment blank will be collected per sampling event after the equipment has been thoroughly decontaminated. If decontamination procedures are effective, there should be no contamination in the field blanks. Equipment blanks are not required if dedicated sampling equipment or disposable sampling equipment is used. The field blank samples will be prepared by pouring reagent grade water supplied by the laboratory and used in the final rinse step of the equipment decontamination procedure. The field blank water through the equipment will be handled and analyzed the in the same procedure as water samples.

Details of sample collection at each sampling point will be recorded on the corresponding Low-Flow Water Sample Field Data Sheet.

Samples will be collected in laboratory-supplied containers appropriate for the requested analyses. Samples will be labeled with their well identification number, sealed in plastic bags, stored on ice and transported to the selected state- certified laboratory in a cooler.

Analyte-specific hold times will be reviewed to ensure that samples will be received by the laboratory within the appropriate time-frame.

Once the samples have been properly sealed and labeled, the relevant information for each sample will be recorded on a Chain-of-Custody (COC) form, signed and dated by the sampling technician. Proper chain of custody records are required to ensure the integrity of the samples and the conditions of the samples upon receipt at the laboratory, including the temperature of the samples at the time of log in. The sample collector shall fill in all applicable sections and forward the original, with the respective sample(s), to the laboratory performing the analysis. The lab will be notified in advance when sample delivery is anticipated. If there is a discrepancy with the samples, the person who collected the samples will be notified, and the problem will be resolved before the analyses are performed.

All collected samples will be analyzed for the constituents listed in Section R315-308-4. Results of analytical testing will be evaluated using the statistical methodology established following the first year of monitoring. Should that evaluation, indicate evidence of impacts attributable to PPL as per R315-308-2(11), notifications will be made and further assessments will be initiated in accordance with R315-308-2(11) and R315-308-2(12).

For each monitoring event following information shall be placed in PPL's operating record and a copy submitted to the Director. Groundwater monitoring results will be included in PPL annual report required and will, at a minimum include:

- A description of the monitoring and sampling procedures utilized;
- Results of quality control/quality assurance sample analyses (blanks and duplicates);
- Field measurements recorded during monitoring activities;
- Field forms, including completed Chain of Custody forms;
- Laboratory data reports including laboratory QA/QC data;
- Tabulated analytical results;
- Tabulated water level data;
- Groundwater flow directions and rates; and
- Statistical analysis of the results of groundwater monitoring.

The Director has approved this aspect of PPL. (*See* Letter dated 7/10/19 and Directors Approvals Timeline attached as **Appendix A**.)

II.b.10 Statistical method to be used (R315-308-2(8))

Statistical comparisons will be completed using Sanitas software, a commercial software program developed by Sanitas Technologies. Background data will be analyzed to determine the variability of groundwater chemistry and to establish the appropriate statistical method(s) to be used during future semiannual detection monitoring. Estimated, or "J-qualified," values will be entered as the highest reporting or detection limit from the data set to establish background data or in statistical analysis during detection monitoring. Because statistics require a numerical concentration level to be available for all samples, the following approach will be used to handling censored data:

- If less than 15% of the background data are non-detects, then the numerical result value used on the non-detect samples is 1/2 the detection limit.
- If the number of samples that are non-detects is between 15% and 50% on the data, then the sample mean and standard deviation are adjusted according to Cohen's method (a statistical method for adjustment to the mean and standard deviation of a single-censored sample population).
- If the number of samples that are non-detects are over 50%, a non-parametric prediction limit will be calculated.

Two basic approaches to statistical analyses include intra-well comparisons and inter-well comparisons. Intra-well comparisons compare chemical concentrations in a particular monitoring well to the background concentrations found in that same well; whereas, inter-

well comparisons compare sample results in a compliance (downgradient) well to concentrations in upgradient well(s).

Once the background data are established from the collected background data set and the appropriate statistical method(s) (inter-well versus intra-well) is defined, semiannual groundwater monitoring data will be evaluated to determine whether statistically significant changes from background values exist for each constituent listed in R315-308-4. The statistical analyses will be performed in accordance with R315-308-2(8).

The Director has approved this aspect of PPL. (*See* Letter dated 7/10/19 and Directors Approvals Timeline attached as **Appendix A**.)

II.b.11 Calculation of site water balance (R315-310-4(2)(b)(ix))

Modeling of potential leachate was performed using the United States Environmental Protection Agency (EPA) Hydrologic Evaluation of Landfill Performance (HELP) version 3.07. A copy of the HELP modeling is included in **Appendix M**.

The HELP Model was developed to provide landfill designers and regulators with a tool for rapid, economical screening of alternative designs. The computer program uses climatologic, soil, and design data to produce daily estimates of water movement across, into, through, and out of the landfill. To accomplish this daily precipitation, runoff, infiltration, surface evaporation, subsurface evapotranspiration, stored soil moisture, percolation, and subsurface lateral drainage are modeled to maintain a water balance. The model utilizes daily climatic data to develop a daily water balance for up to thirty years.

The HELP Model was used to evaluate the total head on the liner for two proposed base liner sections. The selection of the liner section is dependent on material availability, and therefore both sections were analyzed. The landfill was constructed using Option 2. For completeness, the evaluation of both options is presented below. Two options consist of the following layers from bottom-to-top:

**Option 1 (see Detail 2 on Sheet C-501 – Appendix V):**

- Prepared subgrade;
- Geosynthetic Clay Liner (GCL);
- 60 mil HDPE geomembrane (textured both sides); and
- 18 inches of coarse sand.

**Option 2 (see Detail 3 on Sheet C-501 – Appendix V):**

- Prepared subgrade;
- Geosynthetic Clay Liner (GCL);
- 60 mil HDPE geomembrane (textured both sides);
- Cushion geotextile;
- 9 inches of LCRS gravel;
- Filter geotextile; and

- 18 inches of Protective Cover Soil (PCS).

The refuse thickness varies depending on the area of the landfill analyzed, the edges of the landfill are relatively shallow while the total thickness in the middle is designed to be approximately 970 feet thick. The refuse thickness also varies over time as the landfill is developed, waste is placed in approximately 20-foot lifts. Leachate generation is highest during the initial lift, simply because the leachate has less vertical distance to travel. In order to analyze the worst-case scenario, the model was run with only one 20-foot lift of refuse, referred to as the initial condition, to show how leachate generation slows as refuse placement advances. An interim condition was also modeled with 200 feet of refuse.

A review of historic climatic records from nearby weather stations revealed that the largest amount of rain in one year was 33.93 inches recorded at Brigham City waste plant in 1983. The Brigham City waste plant is approximately 24 miles northeast of PPL. The 33.93-inch annual rainfall was used and HELP synthetically generated precipitation for a five-year period for the initial condition to determine the worst-case scenario, or highest leachate generation rate to be expected. For the intermediate condition the default weather data from Salt Lake City was used, and modeled for a 30-year period to determine the range of leachate generation to be expected.

The input design and weather parameters used in the HELP to model the proposed liner design profiles are listed on the first couple pages of each HELP Model output file. The input listing shows layer type, thickness, and soil characteristics. The soil characteristics are default values suggested by the HELP Model to simulate the soils to be used in the proposed design. The drainage layer was modeled with a three percent slope and drainage length of 200 feet. The HDPE layer was assumed to have a pinhole density of three (3) per acre and installation defect of three (3) per acre, and a placement quality of "3" or "good".

The following table summarizes the main input values and results for the various scenarios.

**HELP Results**

| Liner Section | Condition | Refuse Thickness (feet) | Duration (years) | Peak Head Over Liner (inches) |
|---|---|---|---|---|
| Base Option 1 | Initial | 20 | 5 | 2.29 |
| Base Option 2 | Initial | 20 | 5 | 1.04 |
| Base Option 1 | Intermediate | 200 | 30 | 1.56 |
| Base Option 2 | Intermediate | 200 | 30 | 0.43 |

As shown in the table above the maximum peak head of leachate over liner is 2.29 inches which is well below the regulatory maximum of one foot.

The main components of the leachate collection system are the drainage layer and the LCRS collection pipes, as shown in Detail 4 and 5 on Sheet C-502 (see **Appendix V**). The leachate will percolate vertically through the refuse mass, be conveyed laterally through the coarse sand or gravel drainage layer towards the LCRS collection pipes. The LCRS pipes are laid out in a dendritic network, with the main line running centrally below the waste mass and

the laterals branching outwards. As modeled in the HELP analysis the maximum spacing for the laterals will be 200 feet. The mainline gravity drains to the gravel sump as shown in Detail 6 on Sheet C-501 (see **Appendix V**), and is then pumped into tanks as shown in Detail 1 on Sheet C-506 (see **Appendix V**).

There is no proposed leachate treatment system, the leachate will be used in one of the following methods:

- Dust control within lined cells;
- Recirculated into the landfill via injection wells;
- Destroyed in the LFG flare; and
- Evaporated in lined basins.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

## II.c Engineering Report - Plans, Specifications, and Calculations for All Class I and V Landfills

II.c.1 Documentation that the facility will meet all of the performance standards of R315-303-2

### Groundwater (R315-303-2((1)

The PPL disposal cell is designed and constructed to protect the waters of the state from degradation by pollutants or contaminants by minimizing percolation of water through the landfill and providing a containment system and leachate control and removal system. The PPL disposal cell is divided into Phase IA, IB, and IC. The PPL Phase IA cell is built.

PPL is using the area fill method in constructing and operating the landfill cell. This method involves excavation of a defined area, installation of a liner, leachate collection system, select waste layer, and placement of refuse in conjunction with the installation of a gas collection system. Select waste will exclude any items that may compromise the liner system. Select waste is typically obtained from residential MSW collection. Refuse will be placed in layers and compacted to minimize the potential for settlement. A drainage berm will be constructed around the module to help divert run-on away from the refuse.

The refuse will be covered daily with interim cover soil or with a Director approved alternative daily cover. Soil will be the primary means for daily cover and will be obtained from either excavated soil from future modules or imported soils from the borrow areas or other nearby sites. Gravel for the leachate piping and possible import fill could be obtained at or near PPL in the surrounding gravel pits. An intermediate cover consisting of 12 inches of soil or an approved alternative will be applied to any working face not receiving waste for a period exceeding 30 days.

PPL is equipped with a leachate monitoring and collection system. The system is comprised of a network of drains which gravity flow to centrally located sumps positioned at the lowest

points of the landfill cell. Risers are placed along critical areas of the main leachate trunk line for monitoring and maintenance. The collection system is constructed with perforated drainpipe encased within a 24-inch gravel layer overlain by a geotextile mat for separation between the MSW and leachate collection system. The collection system piping will be designed to handle the specific Site loading conditions. To help protect the collection system, the gravel protection layer will be thickened near the sumps. Leachate will be pumped on an as-needed basis to maintain a head level of less than one (1) foot of leachate over the liner system. Sump areas will be constructed and may have more than one (1) foot of head within that area to enhance leachate extraction with pumps. The removed leachate will either be use as a suppressant for fugitive dust and compaction water on areas of the landfill that are overlaid by an approved liner system or pumped to tanks. Cleaning of the leachate collection system will be conducted on an as needed basis.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

### Air Quality (R315-303-2(2))

Rule R315-303 Landfilling Standards require landfill gases to be monitored to protect air quality and limit explosive gas emissions. A hand-held field explosive gas meter would be used for recording at PPL. The meter would be calibrated as recommended by the manufacturer by using a methane standard. Concentrations would not be allowed to exceed 25% of the lower limit in facility structures and 100% of the lower limit around the disposal area boundary. Quarterly monitoring would be performed at the landfill area and within all facility structures. Readings would be taken at the ground level.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

### Explosive Gas Emissions (R315-302-2(2)(f) and R315-303-2(2))

Methane gas releases would be detected using a methane detection meter capable of measuring methane levels below the 25% lower explosive limit (LEL) (1.25% methane by volume in air). Gas monitoring will be conducted around the disposal area and in any facility structures. Upon detection of explosive gases equal to or above the LEL, the Owner or Operator would take the following steps:

1. Immediately upon detection, steps would be taken to protect human health. These steps would include, as applicable, accounting for all PPL personnel providing adequate ventilation, moving all equipment and personnel away from the release area, shutdown of any electrical devices that could cause ignition, monitoring the release area and surrounding areas with a combustible gas indicator and document reading for placement into the operating record, determination of the cause of explosive gas levels, and keep the area off-limits until corrective actions are taken.
2. Within 24 hours the Director would be notified.
3. Within seven days of detection, the explosive gas levels would be recorded in the operating record along with a description of the steps taken to protect human health.

4. Within 60 days of detection, a remediation plan that had been approved by the Director would be implemented and a copy of the plan placed in the operating record. Upon implementation, the Director would be notified.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

### Surface Waters (R315-302-2(2)(f))

If the surface water run-off collection system were to fail, the following actions would be taken:

1. As necessary, construct berms and ditches or take other appropriate actions to divert water around the collection system failure area using PPL soils or readily available materials and equipment;
2. Analyze and evaluate the extent of damage to the run-off collection system.
3. Identify the mechanism of failure;
4. If warranted, call a qualified professional to discuss possible solutions; and
5. Develop and implement corrective actions.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

### Surface Water Discharge Requirements (R315-303-2(3))

The construction stormwater pollution prevention plan (SWPPP) was prepared for the Phase 1 landfill cell in accordance with Utah Administrative Code R317-8-3.9. The Utah Pollutant Discharge Elimination System (UPDES) requires construction stormwater permits for construction activities that disturb one acre or more. The permit requires submission of a Notice of Intent (NOI) by creating an account on the Utah.gov website. The construction general permit must be renewed annually and the online account can be used to renew the permits. An owner or operator may submit a Notice of Termination (NOT) form at the end of the construction activity. The construction SWPPP is included in **Appendix N**. The construction SWPPP may be modified by the contractor in order to comply with the DEQ stormwater regulations.

Operators of facilities that have industrial stormwater discharges are covered by the General Multi-Sector Industrial Stormwater Permit. Coverage is based on the PPL's Standard Industrial Classification (SIC) code which is 4953 for Refuse Systems. The permit requires submission of a Notice of Intent (NOI) by creating an account on the Utah.gov website. The general permit cycle is for 5 years and the online account can be used to renew the permits. A draft industrial SWPPP is included in **Appendix O**. The draft industrial SWPPP may be modified by the contractor in order to comply with the DEQ stormwater regulations.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11, 3/6/17, 7/10/19 and Directors Approvals Timeline attached as **Appendix A**.)

II.c.2 Engineering reports required to meet the location standards of R315-302-1 including documentation of any demonstration or exemption made for any location standard (R315-310-4(2)(c)(i))

The Rules require that Class V Landfills comply with certain location standards. These standards are intended to minimize potential impacts to surrounding lands, the environment, surface and groundwater resources, cultural and social resources, and human health. Environmental and cultural resource studies are included in **Appendices D and E**.

### Land Use Compatibility

PPL conforms to the general location standards outlined in R315-302-2. Figures included within this Permit Application show the approximate boundary of the disposal cell. Some of the location standards have been identified below:

1. PPL is not located within 1,000 feet of a national, state or county park, monument, or recreational area, designated wilderness or wilderness study area, or wild or scenic river area.
2. PPL is not located in an ecologically and scientifically significant natural area, including public wildlife management areas and habitat for threatened or endangered species as designated pursuant to the Endangered Species Act of 1982.
3. PPL is not in farmland classified or evaluated as "prime," "unique," or of "statewide importance" by the U S Department of Agriculture Soil Conservation Service under the Prime Farmland Protection Act.
4. PPL is not within a quarter mile of any existing permanent dwellings, residential areas, and other incompatible structures such as schools or churches. The nearest dwelling is several miles away.
5. A cave/rockshelter was located near the cell development area. PPL has selected to include the cave/rockshelter within the buffer area to ensure its preservation. PPL will not be conducting mining of soils near the cave/rockshelter and will try to protect it from vandals by close observations. See **Figure C-801** for general location.
6. PPL is not within 10,000 feet of any airport runway used by turbojet aircraft or within 5,000 feet of any airport runway used by only piston-type aircraft. A landing strip used by the brine shrimp operations is located approximately 8,000 feet southeast of the Site. The landing strip is utilized by piston-type aircraft and primarily only during the brine shrimp harvest season.
7. PPL is not within 1,000 feet of any public highway. The nearest state highway is almost 16 miles from the Site.
8. PPL is not located on any public land that is being used by a public water system for municipal drinking water purposes. The Site is not located within a watershed used by a water system.
9. PPL is not located in a 100-year floodplain.

10. PPL will not violate any applicable state water quality standard or section 307 of the Clean Water Act
11. PPL is not located in any wetlands and thus will not contribute to significant degradation of wetlands.

## Geology

A site hydrogeologic study was completed by Loughlin Water (2018) and is presented in **Appendix J**. An earlier Geotechnical and Geologic Study was performed for the Site by Applied Geotechnical Engineering Consultants, Inc. in July 2003 (see **Appendix P-1**). The following were reviewed in regards to location standards:

Dam Failure Flooding: There are no dams upgradient of the Site. Thus, dam failure flooding is not considered a hazard.

Mining Activity: The Promontory Mountains have been mined for lead in the past. There are mine prospects northeast of the Site at and around Lead Mountain. Gravel and riprap for construction for the railroad causeway have been mined in the northwest portion of the property. There are some mine prospects in igneous dikes which cut through the Mutual Formation in the northwest portion of the Site. Most mine prospects in the area appear to be shallow explorations with no evidence of significant underground mining due to the lack of mine spoil piles of significance. Two mine shafts were identified by the Utah Division of Oil, Gas and Mining in 1986 just east of the gravel quarries in the northwest portion of the Site. These shafts were approximately 42 feet and 102 feet deep, respectively. Both shafts were filled in 1986. Mine related hazards are not considered a concern for the proposed development.

Salt Domes and Beds: Based on a reconnaissance of the Site and subsurface exploration, there is no evidence for significant salt deposits on the property. Salt deposits are not present in the type of bedrock encountered at the Site.

Seismic Impact Zone: The regulations state that municipal landfills must be designed to withstand seismic accelerations if they are located in a seismic impact zone. A seismic impact zone is defined as an area with a 10% or greater probability that the maximum horizontal acceleration in lithified material would exceed 0-10 g in 250 years. According to Blake, T F, et al (2002), there is a 10% probability of ground acceleration exceeding 0.55 g in a 250-year period at the Site. The Site is therefore located in a seismic impact zone. The proposed cell has been designed to remain stable while undergoing the predicted maximum earthquake accelerations. The results from Tetra Tech "Phase 1 Slope Stability Evaluation" (see **Appendix Q**) indicate the following:

- The static factors of safety for the proposed Phase 1-Subphases 1A through 1C landfill configurations are above the minimum required of 1.5 using the lowest large displacement shear strength for the slope liner components and the lowest peak shear strength for the base liner.

- The static factors of safety for the proposed Phase 1-Subphases 1A through 1C landfill configurations are above the minimum required of 1.0 using the lowest large displacement shear strength parameters for both the slope and base liner components.
- The static factor of safety for the assumed final configuration of the landfill is above the minimum required of 1.5 using the lowest large displacement shear strength for the slope liner and the lowest peak shear strength parameters for the base liner.
- The maximum design earthquake-induced permanent seismic displacement for the proposed landfill Phase 1 is estimated to be about 2.8 inches for the Subphase 1A configuration, which is considered acceptable.
- The design earthquake-induced permanent seismic displacement is estimated to be negligible for the assumed final landfill configuration of the whole landfill.

### Surface Water

The Site is not located on any public land that is being used by a public water system for watershed control for municipal drinking water purposes. The Site is not located in a 100-year floodplain.

### Wetlands

No wetland habitats, stream channels, or other jurisdictional waterways were identified within the boundary of the Site.

### Groundwater

Groundwater in the Promontory Point area is not considered a discrete hydrologic unit. The aquifer is not considered as a sole source aquifer and the groundwater is not classified as a Class IB under Section R317-6-3 3. Groundwater in the vicinity of the Phase landfill cell is saline. According to R317-6-3, this water would be classified as a Class III or Class IV water, either Limited Use Ground Water or Saline Ground Water, heavily impacted by activities related to the GSL.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

II.c.3 Anticipated facility life and the basis for calculating the facility's life (R315-310-4(2)(c)(ii))

Estimates of landfill airspace capacity were made by Tetra Tech using AutoDesk Civil 3D software. Quantity take-off comparisons were made between: (1) proposed base grading plan presented on **Figure** C-806 and (2) the proposed final grading plan presented on **Figure** C-807. Projected municipal solid waste and special waste tonnage provided by Promontory Point Resources, LLC were used to estimate the rate of airspace consumption. Taking into account airspace to be consumed by base liner, slope liner, and the final cover system, it is estimated that approximately 775 million cubic yards (656 million tons) of airspace is available at the Site under the Site development plans presented herein. Based on this Site

airspace capacity and other variables discussed below, the landfill Site life is expected to be exhausted in approximately 125 years.

The Site life is based on an assumed in-place density of 2,000 pounds per cubic yard for municipal solid waste and 1,350 pounds per cubic yard for special waste with an assumed waste-to-cover ratio of 7:1. Projecting the Site life is an estimate and is affected by many factors including population and demographic changes, local and regional economic activity affecting waste generation, advances in waste handling and disposal technology, recycling efforts, compaction efforts, settlement, soil cover and alternate daily cover (ADC) use, contractual arrangements for waste deliveries, and future revisions to permit conditions. Refer to **Appendix R** for all assumptions and further details.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

II.c.4 Cell design to include liner design, cover design, fill methods, elevation of final cover including plans and drawings signed and sealed by a professional engineer registered in the State of Utah (R315-303-3(3), R315-303-3(6) and (7)(a), R315- 310-3(1)(b) and R315-310-4(2)(c)(iii))

See **Figures** C-806 and C-807, as well as Phase 1 Plans (**Appendix V**) and the following discussion in Section II.c.5.

To minimize the potential for damage to the liner system resulting from initial waste disposal operations, initial waste fill operations will include a uniform 10 to 20-foot initial lift of select waste. This lift of waste will be placed to protect the operations layer. In addition, the first lift of waste and associated daily cover will be graded to direct clean stormwater and surface water run-off away from the waste and to minimize stormwater infiltration into the refuse prism. Filling operations will then proceed with typical lifts of approximately 20 feet, thereafter.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

II.c.5 Leachate collection system design and calculations showing system meets the requirements of R315-303-3(2)

Modeling of potential leachate was performed using the United States Environmental Protection Agency (EPA) Hydrologic Evaluation of Landfill Performance (HELP) version 3.07. HELP modeling runs performed for the engineered landfill design are included in **Appendix M**.

The HELP Model uses climatologic, soil, and design data to produce daily estimates of water movement across, into, through and out of the landfill. To accomplish this; daily precipitation, run-off, infiltration, surface evaporation, subsurface evapotranspiration, stored soil moisture, percolation, and subsurface lateral drainage are modeled to maintain

a water balance. The model utilizes daily climatic data to develop a daily water balance for up to thirty years.

The HELP Model was used to evaluate the total head on the liner and to size the leachate collection system. Two base liner sections were evaluated. The selection of the liner section was dependent on material availability, and therefore both configurations were analyzed. The landfill was constructed using Option 2. For completeness, the two options are shown below and consist of the following layers from bottom-to-top:

**Option 1 (see Detail 2 on Sheet C-501 – Appendix V):**

- Prepared subgrade;
- Geosynthetic Clay Liner (GCL);
- 60 mil HDPE geomembrane (textured both sides); and
- 18 inches of coarse sand.

**Option 2 (see Detail 3 on Sheet C-501 – Appendix V):**

- Prepared subgrade;
- Geosynthetic Clay Liner (GCL);
- 60 mil HDPE geomembrane (textured both sides);
- Cushion geotextile;
- 9 inches of LCRS gravel;
- Filter geotextile; and
- 18 inches of Protective Cover Soil (PCS).

The HELP Model was used to evaluate and design of both base liner section options and the slope liner for conformance with regulatory requirements. Specifically, the HELP Model was used to evaluate the total head on the liner and to determine leachate generation rates for use in designing and sizing the leachate pipes and storage tanks. Option 2 was chosen for the landfill construction.

The LCRS drainage layer is critical for maintaining low levels of head over the liner by quickly removing leachate. The base liner will have either a gravel drainage layer with a filter geotextile and two feet of protective cover soil above it (Alternative 1) or a coarse sand drainage layer (Alternative 2). The protective cover soil and filter geotextile will help filter the leachate before it enters the gravel drainage layer therefore clogging is expected to be minimal, however there is no filtering of leachate before it gets to the drainage layer in the Alternative 2 base liner configuration; therefore, clogging must be analyzed. A sensitivity analysis was performed using the HELP model and varying the hydraulic conductivity of the coarse sand layer and keeping all other inputs constant to determine the lowest hydraulic conductivity of the coarse sand layer that would still provide adequate drainage and keep the leachate head over the liner below 12 inches. A hydraulic conductivity of $1.0 \times 10^{-3}$ cm/sec resulted in a head over the liner of approximately 11.95 inches, therefore it was determined that the lowest allowable hydraulic conductivity should be $1.0 \times 10^{-3}$ cm/sec. The specified hydraulic conductivity for the coarse sand layer is $1.0 \times 10^{-1}$ cm/sec which results

in a factor of safety of approximately 100 when compared to the lowest allowable hydraulic conductivity.

The main components of the leachate collection system are the drainage layer and the LCRS collection pipes, as shown in Detail 4 and 5 on Sheet C-502 (see **Appendix V**). The leachate will percolate vertically through the refuse mass, be conveyed laterally through the coarse sand or gravel drainage layer towards the LCRS collection pipes. The LCRS pipes are laid out in a dendritic network, with the main line running centrally below the waste mass and the laterals branching outwards. As modeled in the HELP analysis, the maximum spacing for the laterals will be 200 feet. The mainline gravity drains to the gravel sump as shown in Detail 6 on Sheet C-501 (see **Appendix V**), and is then pumped into tanks as shown in Detail 1 on Sheet C-506 (see **Appendix V**). The drainage layer on the floor will be drained by four-inch diameter slotted HDPE lateral collectors spaced at maximum 200-foot intervals which connect to a six-inch diameter LCRS mainline pipe. The LCRS mainline pipe connects directly to the leachate sump.

Access for cleaning of the six-inch mainline shall be provided by extending the LCRS line above the liner limit. The LCRS collection system is equipped with sampling ports located prior to discharge of liquids into an outfall containment tank. The leachate will gravity drain to the sump, where it will be pumped to the outfall containment tanks. There will be two outfall containment tanks for the LCRS installed as part of Phase 1A and the tank pad will have room for an additional tank to be added later as the landfill is developed.

The HELP model results were used to size the leachate tanks for the initial phase of landfill development. HELP model results are presented in **Appendix M**. The Phase 1 cell has approximately 15 acres of base liner and 4 acres of slope liner. Using the average leachate generation rates listed in the table below results in a total leachate flow of approximately 1,860 gallons per day. Details of the leakage collection system are shown in **Appendix V**, Sheets C-501 through C-506. Calculations showing that the system meets the requirements of R315-303-3(2) are presented in **Appendix M**.

**HELP Modeling Results**

| Liner Section | Refuse Thickness (feet) | Duration (years) | Max Head Over Liner (inches) | Peak Leachate Generation (cf/ac) | Average Annual Leachate Total (cf/ac/year) |
|---|---|---|---|---|---|
| Interim Condition | | | | | |
| Base Alt. 1 | 20 | 5 | 1.04 | 503.66 | 4,698.91 |
| Base Alt. 2 | 20 | 5 | 2.29 | 386.3 | 4,663.92 |
| Slope | 10 | 5 | 3.91 | 286.74 | 4,759.77 |
| Final Condition | | | | | |
| Base Alt. 1 | 200 | 30 | 0.43 | 203.64 | 933.43 |
| Base Alt. 2 | 200 | 30 | 1.56 | 258.32 | 933.43 |
| Slope | 100 | 30 | 8.73 | 135.9 | 3,591.77 |

cf means cubic feet; ac means acre

Two tanks were installed during Phase 1 construction (see Sheet C-506, **Appendix V**) for a total capacity of 17,400 gallons; therefore, the tanks will have to be emptied every 9 days on average. The leachate tanks have a capacity of 8,700 gallons each. However, the yield values in the HELP analysis are conservative as they do not account for phasing over time and closure of certain areas. Therefore, the tank capacity is sufficient for peak leachate generation and should not require evacuation on a frequent basis.

Design calculations were performed by Tetra Tech for various elements of the liner system.

The following calculations are included in **Appendix M**:

- Liner and LCRS Pipe Calculations;
- Geotextile cushion;
- LCRS pipe strength;
- LCRS pipe capacity;
- LCRS pipe spacing;
- Hydrologic and hydraulic calculations for stormwater drainage systems; and
- Leachate Generation - HELP Modeling.

There is no proposed leachate treatment system, the leachate will be used in one of the following methods:

- Dust control within lined cells;
- Recirculated into the landfill via injection wells;
- Destroyed in the LFG flare; and
- Evaporated in lined basins.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.) Phase I landfill cell was constructed using Option 2.

### II.c.6 Equipment requirements and availability (R315-310-4(2)(c)(iii))

PPL will maintain the necessary equipment to off-load, spread and compact waste, control dust, and perform other facility operations. The following table shows a preliminary list of anticipated equipment for landfill operations.

**Landfill Equipment**

| Type of Equipment | Model |
|---|---|
| Dozer | CAT 8 |
| Articulating Truck | CAT 740 |
| Self Loading Scraper | CAT 623 |
| Vacuum Truck | TBD* |
| Compactor | CAT 836 |
| Excavator | CAT 375 |
| Loader | CAT980 |
| Water Truck | TBD |
| Motor Grader | TBD |
| Backhoe | TBD |
| Skid Steer | TBD |
| 4-Wheel Pick Up Truck | TBD |

*TBD - To be determined.

The Director has approved this aspect of PPL. (*See* Letter dated 8/31/11 and Directors Approvals Timeline attached as **Appendix A**.)

II.c.7 Identification of borrow sources for daily and final cover and for soil liners (R315-310-4(2)(c)(iv))

Daily and intermediate cover will be generated from either excavated soil from future phases or from approved daily cover material. The final cover will be acquired from on-site cell excavation soil material, see **Figure** C-808.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

II.c.8 Run-On and run-off diversion designs (R315-303-3(1)(c), (d) and (e))

Run-on and run-off of stormwater will be controlled during both the open and closed phases of the disposal cells. Drainage swales will be used to divert water around the modules to an interim perimeter drainage system. Final cover run-off will be routed to the perimeter drainage swales and discharged to the desilting basins on the property in such a manner to minimize erosion and capture sediment prior to discharge. Run-off along the access roads

will be controlled by sloping the road to one side. If required, culverts will be strategically placed along the access road. See the Phase 1 Plans in **Appendix V**.

All stormwater that comes in contact with waste must remain within the boundaries of the landfill liner system and be managed as leachate. All stormwater that does not come in contact with waste is not considered leachate and will be diverted so as to not allow it to enter the landfill. During initial filling of cells leachate collection system piping to collect any precipitation that fell directly onto the cell.

For permitting purposes, a drainage analysis was completed for the entire site. Areas within the Site that do not contribute run-on to the landfill cell or environmental controls were not analyzed. The area contributing run-on flow to the Site is shown on **Figure** C-804 and **Figure** C-805.

The quantity of flow expected for developed conditions was determined by using precipitation depth in a 25-year, 24-hour storm event of 2.25 inches from the National Oceanic and Atmospheric Administration (NOAA) precipitation frequency data server. The hydrologic soil types and boundaries were determined from United States Department of Agriculture (USDA) web soil survey data. The peak flow generated was determined by applying the U.S. Soil Conservation Service Technical Release Number 55 (SCS TR 55) method.

Details of the input parameters and the model output are included in **Appendix S**. As the cells are developed, the Site drainage paths are lengthened reducing the peak discharge rate from its original condition.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

II.c.9 Leachate collection, treatment, and disposal and documentation to show that any treatment system is being or has been reviewed by the Division of Water Quality (R315-310-4(2)(c)(v) and R315-310-3(1)(i))

There is no proposed leachate treatment system, the leachate will be used in one of the following methods:

- Dust control within lined cells;
- Recirculated into the landfill via injection wells;
- Destroyed in the LFG flare; and
- Evaporated in lined basins.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

II.c.10 Groundwater monitoring plan that meets the requirements of Rule R315-308 including well locations, design, and construction (R315-310-4(2)(b)(x) and R315- 310-4(2)(c)(vi))

**Groundwater Monitoring Network**

The PPR groundwater monitoring system consists of four 2-inch diameter monitoring wells. Locations of the four wells are shown on **Figure** C-803. The groundwater monitoring system consists of one upgradient well (MW-9), and three downgradient compliance wells (MW-6, MW-7, and MW-8). All four wells are completed in and monitor the uppermost aquifer and all four wells are screened in a semi-consolidated fanglomerate. The monitor wells will be used to monitor groundwater quality, evaluate aquifer characteristics and monitor potentiometric groundwater levels in accordance with R315-308-2.2, R315-308-2.3, and the requirements of Landfill Permit 0202R1. Well construction logs are provided in **Appendix J**.

There are older monitoring wells, one upgradient (MW-5) that is north of the cell and four downgradient (MW-1, MW-2, MW-3 and MW-4) located adjacent to the fence line near the Promontory County road. These wells will not be utilized for routine groundwater sampling and analyses but will be used to measure water levels. Monitoring well locations are shown on **Figure** C-803. Well construction logs are provided in **Appendix F**. The following table summarizes the well construction details.

**Groundwater Monitoring Wells**

| Well I.D. | Casing Material | Top of Casing Elevation (ft. AMSL) | Screen Interval (ft. BGS) |
|---|---|---|---|
| MW-1 | 2-inch, Sch.40 PVC | 4,240.66 | 21 – 41 |
| MW-2 | 2-inch, Sch.40 PVC | 4,240.83 | 28 – 68 |
| MW-3 | 2-inch, Sch.40 PVC | 4,239.85 | 24 – 64 |
| MW-4 | 2-inch, Sch.40 PVC | 4,243.73 | 26 – 66 |
| MW-5 | 4-inch, Sch.40 PVC | 4,444.05 | 200 - 240 |
| MW-6 | 2-inch, Sch.40 PVC | 4298.95 | 98.5 to 108.5 |
| MW-7 | 2-inch, Sch.40 PVC | 4291.10 | 90.5 to 100.5 |
| MW-8 | 2-inch, Sch.40 PVC | 4298.08 | 91.5 to 101.5 |
| MW-9 | 2-inch, Sch.40 PVC | 4340.83 | 138.5 to 148.5 |

Notes: Above mean sea level (AMSL), below ground surface (BGS)

Prior to any sampling activities, each of the wells will be inspected to verify its condition. This will include inspection of the wellhead for damage or vandalism and measuring the depth to water. Groundwater flow directions and the gradient will be determined for each sampling event in accordance with R315-308-2(7) and a potentiometric map will be

constructed. The potentiometric map will be submitted to DWMRC with the semiannual detection monitoring report. to assess groundwater levels, gradient and flow direction each time that sampling occurs.

### Groundwater Sampling Plan

The GMP addresses the requirements of R315-308 (Groundwater Monitoring Requirements) for the facility operation and was prepared following guidelines presented in the (1) Ground Water Monitoring Plan Guidance (Utah Division of Solid and Hazardous Waste (September 2006) and the Sampling and Analysis Plan Guidance and Template, Version 4, (EPA, 2014). Furthermore, the GMP contains the laboratory Quality Assurance Project Plan (QAPP) and a list of standard operating procedures (SOPs) for each aspect of site sampling. SOPs developed for the PPL include:

- Dedicated Equipment Low-Flow Groundwater Sampling, Sample Collection and Preservation;
- Non-Dedicated Well Purging and Sampling, Sample Collection and Preservation;
- Equipment Decontamination;
- Field Documentation;
- Sample Handling and Shipping; and
- Equipment Repairs and Equipment Replacement.

Additionally, PPL developed a QAPP for management of the monitoring program. The purpose of the QAPP is to ensure compliance and environmental protection of the groundwater and to provide a protocol among those individuals and organizations that (1) collect the data, (2) analyze the data, (3) evaluate and interpret the data and (4) provide regulatory oversight.

A minimum of eight (8) independent samples will be collected and analyzed for the Constituents of Detection Monitoring listed in R315-308-4 to establish background concentrations, as required by R315-308-2(4)(a). Additional monitoring wells will be installed as additional landfill cells are developed. Background data for the detection monitoring constituents will be established on all monitoring wells as they are constructed as specified in R315-308-2(4) and Subtitle D (40 CFR 258.53) regulations. Background data will be generated by sampling the monitoring wells on an approximately monthly basis after the construction of any new well. To provide an acceptable level of confidence in the data, a minimum of eight samples will be collected from new wells to establish background concentrations.

During each monitoring event, the wells will be inspected for damage to the well surface completion, well casing, protective cover, lock, well cap, and concrete pad. In addition, the ground surface around the well pads will be inspected for erosion. If any problems to the wells or equipment are discovered they will be repaired or replaced as soon as practicable. Static groundwater level measurements will be collected on the same day during each monitoring event prior to well evacuation. Groundwater levels will be measured on the same day prior to sampling, and immediately before any purging of the wells. Depth to water will

be measured using an electronic water-level meter (sounder) marked in 0.01-foot increments.

The groundwater levels will be measured and recorded to the nearest 0.01-feet from the top of the monitor well casing measuring point. Water level measurements will always be referenced to the measuring point mark on the well casing. The water level measurement will be reproduced several times to ensure that the correct measurement is made. Water level measurements for each monitoring event will be converted to elevations (nearest 0.01-foot) and submitted with the groundwater sampling report. The survey data for each monitoring well will be referenced to the top of casing benchmark established by the survey.

Prior to well purging, the field water quality meter(s) will be calibrated in accordance with the manufacturer's instructions using fresh calibration solutions. Calibration shall be at a minimum, daily, or more frequently as conditions change. Calibration time and calibration values shall be recorded on the field sampling sheets.

The monitor wells will be purged using dedicated PVC bladder pumps. Dedicated pumps will reduce the possibility of cross-contamination between wells and provide consistent, accurate, reliable groundwater samples ensuring no air/water contact during operation, minimizing the potential for sample volatilization. PVC pumps were selected based on the relatively large background groundwater chloride concentrations. These pumps will remain dedicated to each respective well throughout monitoring unless a replacement is necessary due to damage or wear, in which case repairs will be completed or a new pump will be dedicated. Pump intakes will be located close to the middle of the screened interval in each well. Tubing and other dedicated monitoring and pumping equipment should be appropriate for low flow monitoring within high TDS water environments.

Well purging will be conducted at a rate of about 100 milliliters per minute, or at a rate that maintains a maximum drawdown of 0.3 feet below the static level in each well until (1) a minimum of two pump and tubing volumes have been removed and (2) stabilization of field parameters is achieved.

Field parameters include temperature, specific conductivity, pH, and turbidity. Parameter stabilization is defined as:

- Temperature = ± 10% for three (3) consecutive measurements;
- pH = ± 0.1 standard pH units for three (3) consecutive measurements;
- Specific Conductance = ± 10% for three (3) consecutive measurements; and
- Turbidity = ± 10% for values greater than 5 NTU; (if three turbidity values are less than 5 NTU, consider the values as stabilized).

Measurements of temperature, pH, conductivity, and turbidity will be recorded at intervals of approximately three (3) to five (5) minutes on a Field Data Sheet during purging.

Sampling may begin once purging is considered complete. Samples will be collected directly from the dedicated discharge tubing into the appropriate sample containers. The sample flow rate will remain at the established purge flow rate or lowered as needed to minimize

aeration, bubble formation, or turbulent filling of sample containers. Groundwater samples are to be collected in-line from the sampling pump from a point prior to the flow-through cell. In accordance with R315-308, no filtering of samples will be conducted, initially. However, should metals data indicate that filtering of samples would provide a more accurate representation of the groundwater conditions at the, a request may be made to the Director to modify the program.

In addition to the samples collected from the wells, QA/QC samples will also be collected and will consist of:

- Duplicate Samples - A minimum of one duplicate sample will be collected for each monitoring event where multiple wells are sampled. To assess variability of the laboratory measurement process, the location where the duplicate was collected will be noted on the sampling log, and a made-up sample time and sample label identifying the location will be labeled on the duplicate sample and chain-of-custody entry. Duplicate samples will be analyzed for the same analytes as the primary sample.
- Trip Blanks - One laboratory-supplied trip blank will accompany each sample shipment. The trip blank(s) is used to evaluate whether VOC contamination occurred during sample transport or storage. Trip blanks will be analyzed for VOCs.
- Equipment Blanks - If non-dedicated non-disposable sampling equipment is used, one field equipment blank will be collected per sampling event after the equipment has been thoroughly decontaminated. If decontamination procedures are effective, there should be no contamination in the field blanks. Equipment blanks are not required if dedicated sampling equipment or disposable sampling equipment is used. The field blank samples will be prepared by pouring reagent grade water supplied by the laboratory and used in the final rinse step of the equipment decontamination procedure. The field blank water through the equipment will be handled and analyzed the in the same procedure as water samples.

Details of sample collection at each sampling point will be recorded on the corresponding Low-Flow Water Sample Field Data Sheet.

Samples will be collected in laboratory-supplied containers appropriate for the requested analyses. Samples will be labeled with their well identification number, sealed in plastic bags, stored on ice and transported to the selected state- certified laboratory in a cooler.

Analyte-specific hold times will be reviewed to ensure that samples will be received by the laboratory within the appropriate time-frame.

Once the samples have been properly sealed and labeled, the relevant information for each sample will be recorded on a Chain-of-Custody (COC) form, signed and dated by the sampling technician. Proper chain of custody records are required to ensure the integrity of the samples and the conditions of the samples upon receipt at the laboratory, including the temperature of the samples at the time of log in. The sample collector shall fill in all applicable sections and forward the original, with the respective sample(s), to the laboratory performing the analysis. The lab will be notified in advance when sample delivery is anticipated. If there is a discrepancy with the samples, the person who collected the

samples will be notified, and the problem will be resolved before the analyses are performed.

All collected samples will be analyzed for the constituents listed in R315-308-4. Results of analytical testing will be evaluated using the statistical methodology established following the first year of monitoring. Should that evaluation, indicate evidence of impacts attributable to the landfill as per R315-308-2(11), notifications will be made and further assessments will be initiated in accordance with R315-308-2(11) and R315-308-2(12).

For each monitoring event following information shall be placed in the Site's operating record and a copy submitted to the Director. Groundwater monitoring results will be included in the Site annual report required and will, at a minimum include:

- A description of the monitoring and sampling procedures utilized;
- Results of quality control/quality assurance sample analyses (blanks and duplicates);
- Field measurements recorded during monitoring activities;
- Field forms, including completed Chain of Custody forms;
- Laboratory data reports including laboratory QA/QC data;
- Tabulated analytical results;
- Tabulated water level data;
- Groundwater flow directions and rates; and
- Statistical analysis of the results of the groundwater monitoring.

The Director has approved this aspect of PPL. (*See* Letter dated 7/10/19 and Directors Approvals Timeline attached as **Appendix A**.)

II.c.11 Landfill gas monitoring and control plan that meets the requirements of Subsection R315-303-3(5) (R315-310-4(2)(c)(vii))

Gas monitoring will be conducted around the disposal area and in any of the Site structures on a quarterly basis.

Upon detection of explosive gases equal to or above the lower explosion limit, PPR would take the following steps:

1. Immediately upon detection, steps would be taken to protect human health. These steps would include accounting for all landfill personnel and moving all equipment and personnel away from the release area, shutdown of any electrical devices that could cause ignition, notify emergency personnel (fire, police) and advise them of the situation, monitor the release area and surrounding areas with a combustible gas indicator and document reading for placement into the operating record, determination of the cause of explosive gas, and keep the area closed until corrective actions are taken.
2. Within 24 hours the Director would be notified.
3. Within seven days of detection, the explosive gas levels would be recorded in the operating record along with a description of the steps taken to protect human health.

4. Within 60 days of detection, a remediation plan that had been approved by the Director would be implemented and a copy of the plan placed in the operating record. Upon implementation, the Director would be notified.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

II.c.12 Slope stability analysis for static and under the anticipated seismic event for the facility (R315-310-4(2)(b)(i) and R315-302-1(2)(b)(ii))

A slope stability analysis, which was based on site-specific geotechnical field investigations, liner materials and calculations for static and pseudo static slope stability, was prepared for the Phase 1 design. The methods and results of this work are documented in a report titled Slope Stability Evaluation, Promontory Point Landfill Cell 1, Phase 1A, Ogden Utah (see **Appendix Q**). Static and pseud ostatic slope stability calculations were completed for subgrade, liner, interim fill, and final fill slope geometries for Phase 1.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

II.c.13 Design and location of run-on and run-off control systems (R315-310-4(2)(c)(viii))

Run-on and run-off of stormwater will be controlled during both the open and closed phases of the disposal cells. Drainage swales will be used to divert water around the modules to an interim perimeter drainage system. Final cover run-off will be routed to the perimeter drainage swales and discharged to the desilting basins on the property in such a manner to minimize erosion and capture sediment prior to discharge. Run-off along the access roads will be controlled by sloping the road to one side. If required, culverts will be strategically placed along the access road, as detailed in the Phase 1 Plans in **Appendix Y**.

All stormwater that comes in contact with waste will remain within the boundaries of the landfill liner system and be managed as leachate. All stormwater that does not come in contact with waste is not considered leachate and will be diverted so as to not allow it to enter the landfill.

For permitting purposes, a drainage analysis was completed for the entire site. Areas within the Site that do not contribute run-on to the landfill cell or environmental controls were not analyzed were excluded. The area contributing run-on flow to the 1,000-acre Site is shown on **Figure** C-804 and **Figure** C-805. The entire drainage area was evaluated in both pre-developed and developed conditions.

The quantity of flow expected for pre-developed and developed conditions was determined by using precipitation depth in the 25-year, 24-hour storm event of 2.25 inches from the (National Oceanic and Atmospheric Administration (NOAA) precipitation frequency data server). The hydrologic soil types and boundaries were determined from United States Department of Agriculture (USDA) web soil survey data. The peak flow generated was determined by applying the U.S. Soil Conservation Service Technical Release Number 55

(SCS TR 55) method. Details of the input parameters and the model output are included in **Appendix S**.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

## II.d Closure Plan for All Class I and V Landfills (R315-310-3(1)(h))

II.d.1 Closure Plan (R315-302-3(2) and (3))

The Site will be constructed over time and will be composed of several landfill cells. Portions of the landfill will be closed over time as areas of the fill reach maximum capacity. Soil from newly excavated landfill cells will be stockpiled onsite and used for cover materials as areas are closed. PPR will notify the Director of the intent to implement the closure plan in whole or part, 60 days prior to the projected final receipt of waste. Final closure of each area will begin 30 days of the last receipt of waste. Final closure will be completed within 180 days after closure activities begin. These closure activities will minimize the need for further maintenance, and minimize or eliminate the threat to human health and the environment from post-closure escape of solid waste constituents, leachate, contaminated run-off or waste decomposition products to the ground, groundwater, surface water or the atmosphere.

Grading plans, including final grades, can be seen on conceptual engineering plans (**Figure** C-807). In general, the final cover will be graded so that the deck slopes at least 2% to provide positive drainage and the side slopes will not be greater than 3 to 1 gross slope (horizontal to vertical).

Drainage channels will be constructed around the cell as indicated by the drawings to help prevent erosion and divert any run-on and convey run-off in a controlled manner. Berms will be placed and used as needed to direct surface flows.

Revegetating the cover will consist of using an appropriate seed mix. The cover will be prepared to a clean, firm, and consistent seedbed. The seeds will be drilled 1/2- to 1/4-inch deep or broadcasted in areas where drilling is found to be impractical.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

II.d.2 Closure schedule (R315-310-4(2)(d)(i))

Phased closure of the Site will be completed within two years of the final receipt of waste.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

II.d.3 Design of final cover (R315-303-3(4) and R315-310-4(2)(c)(iii))

The closure and post-closure care plan will be updated to account for changing conditions of the landfill. The status of closure and post-closure care funding will be reported to the Utah Department of Environmental Quality (UDEQ) with the landfill's annual reports.
An alternative to the prescriptive final cover is proposed as allowed in R315- 303-3(4)(c) which allows the director to approve an alternative cover design if it can be documented that the alternative cover achieves an equivalent reduction in infiltration as achieved by the standard design and the alternative final cover provides equivalent protection from wind and water erosion as achieved by the standard design. The proposed alternative design will consist of a monolithic soil evapotranspiration cover for placement on final fill slopes which will be designed to a depth and soil type which will perform equivalently to the prescriptive standard in R315-303-3(4). Detailed design and support calculations will be presented prior to closure when final cover materials have been selected and modeled. The deck final cover will be either the prescriptive final cover as prescribed in R315-303-3(4) or the proposed alternative monolithic soil evapotranspiration cover.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

II.d.4 Capacity of site in volume and tonnage (R315-310-4(2)(d)(ii))

Estimates of landfill airspace capacity were made using AutoDesk Civil 3D software. Quantity take-off comparisons were made between: (1) proposed base grading plan presented herein and (2) the proposed final grading plan presented herein. Projected tonnage provided by Promontory Point Resources, LLC was used to estimate the rate of airspace consumption. Taking into account airspace to be consumed by base liner, slope liner, and the final cover system, it is estimated that approximately 775 million cubic yards (656 million tons) of airspace is available at the Site under the Site development plans presented herein. Based on this Site airspace capacity and other variables discussed below, the landfill site life is expected to be exhausted in approximately 125 years.

The Site life is based on an assumed in-place density of 2,000 pounds per cubic yard for municipal solid waste and 1,350 pounds per cubic yard for special waste with an assumed waste-to-cover ratio of 7:1 (the densities of designated widely vary and these are only assumed weights). Projecting the Site life is an estimate and is affected by many factors including population and demographic changes, local and regional economic activity affecting waste generation, advances in waste handling and disposal technology, recycling efforts, compaction efforts, settlement, soil cover and alternate daily cover (ADC) use, contractual arrangements for waste deliveries, and future revisions to permit conditions. Refer to **Appendix R** for assumptions and further details used to estimate the cumulative volumes and remaining capacities.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

II.d.5 Final inspection by regulatory agencies (R315-310-4(2)(d)(iii))

PPR will notify the Director of the intent to implement the closure plan in whole or part, 60 days prior to the projected final receipt of waste. Final closure of each cell will begin within 30 days of the last receipt of waste. Final closure will be completed within 180 days after closure activities begin.

When closure construction is completed, PPR will submit to the Director, within 90 days or as required by the Director, the following:

- Facility or unit closure plans, signed by a professional engineer registered in the state of Utah, and modified as necessary to represent as-built changes to final closure construction as approved in the closure plan; and
- Certification by the owner or operator, and, a professional engineer registered in the state of Utah, that the Site or unit has been closed in accordance with the approved closure plan.

Inspection will include cell cover design, run-on and run-off control, proper final grading to promote run-off, and restriction of access to the Site by fencing. Not later than 60 days after certification of closure, PPR will submit plats and a statement of fact concerning the location of all disposal areas will be given to the county recorder to be recorded as part of the record of title. Proof of record of title then will be submitted to the Director.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as Appendix A.)

## II.e. Post-Closure Plan for All Class I and V Landfills (R315-310-3(1)(h))

II.e.1 Post-Closure Plan (R315-302-3(5) and (6))

The owner/operator shall provide post-closure activities for continued facility maintenance and monitoring of gases, land, and water for 30 years or as long as the Director determines is necessary for the facility or unit to become stabilized and to protect human health and the environment. Post-closure activities will commence after closure activities have been completed. The Director may direct that post-closure activities cease until the owner or operator receives a notice from the Director to proceed with post-closure activities.

The post-closure land use of the Site will be open space. When post-closure activities are complete, as determined by the Director, the owner or operator shall submit a certification to the Director, signed by the owner or operator, and a professional engineer registered in the state of Utah stating why post-closure activities are no longer necessary (i.e., little or no settlement, gas production, or leachate generation). If the Director finds that post-closure monitoring has established that the facility or unit is stabilized, the Director may authorize the owner or operator to discontinue any portion or all of the post-closure maintenance and monitoring activities.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

II.e.2 Site monitoring of landfill gases, groundwater, and surface water, if required (R315-310-4(2)(e)(i))

### Landfill Gas Monitoring

Landfill gas will be monitored on a quarterly basis.

### Groundwater Monitoring

Groundwater will be monitored on a semiannual basis, or another schedule as determined by the Director.

### Surface Water Monitoring

Surface water, if required, will be monitored on the schedule specified by the Director.
The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

II.e.3 Changes to record of title, land use, and zoning restrictions (R315-310-4(2)(e)(v))

Appropriate documentation will be submitted no more than 60 days after certification of closure.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

II.e.4 Maintenance activities to maintain cover and run-on/run-off control systems (R315-310-4(2)(e)(iii))

The final cover will be inspected for erosion or other maintenance problems. Any problems detected during routine Site inspections will be corrected as soon as practicable. All eroded areas will be re-covered with suitable soil to establish erosion- control and infiltration layers and to provide positive drainage that will maintain the integrity of the final cover. All bare areas in the final cover will be revegetated as necessary.

Periodic inspections will determine whether the final cover system needs to be repaired due to differential settlement or subsidence by evaluating whether the final cover in the affected area has been impaired. Any areas where the integrity of the final cover has been compromised will be repaired as necessary.

Eroded areas in drainage ditches will be repaired and re-graded. Sediment accumulation will be removed from areas where flow is restricted. Temporary stormwater control structures will be constructed and maintained as needed.

The Director has approved this aspect of PPL. (*See* Letter dated 3/16/17 and Directors Approvals Timeline attached as **Appendix A**.)

II.e.5 List the name, address, and telephone number of the person or office to contact about the facility during the post-closure care period (R315-310-4(2)(e)(vi))

Promontory Point Resources, LLC
298 24th Street
Suite 170
Ogden, Ut 84401
435.414.9880

## II.f Financial Assurance for All Class I and V Landfills (R315-310- 3(1)(j))

II.f.1 Identification of closure costs including cost calculations (R315-310-4(2)(d)(iv)) and (R315-302-2(2)(n))

The closure cost estimate has been prepared as of 2019 rates and reflects the costs of placement of the proposed alternative final cover on the final fill slopes and the prescriptive cover on the deck areas.

The cost estimate assumes that closure activities will be implemented as each phase within the Site is completed. These closure activities will minimize the need for further maintenance, and minimize or eliminate the threat to human health and the environment from post-closure escape of solid waste constituents, leachate, contaminated run-off or waste decomposition products to the ground, groundwater, surface water or the atmosphere.

This cost estimate assumes the initial closure phase (Phase 1A) will consist of approximately 16 acres; therefore, the cost estimate is based on closure of the first 16 acres of the Site. Table A provided in **Appendix T** presents the cost and supporting documentation. The closure cost has been prepared as required by R315-309-2 and in accordance with R315-309-2(3)(a).

II.f.2 Identification of post-closure care costs including cost calculations (R315-310-4(2)(e)(iv))

The post-closure cost estimate has been prepared as of 2019 rates and reflects the appropriate maintenance costs for each final cover type (i.e., alternative and prescriptive).

The cost estimate assumes that post-closure activities will be implemented as each phase within the Site is completed. These closure activities will minimize the need for further maintenance, and minimize or eliminate the threat to human health and the environment from post-closure escape of solid waste constituents, leachate, contaminated run-off or waste decomposition products to the ground, groundwater, surface water or the atmosphere. Table B provided in **Appendix T** presents the cost and supporting

documentation. The post-closure cost has been prepared as required by R315-309-2 and in accordance with R315-309-2(3)(b).

II.f.3 Identification of the financial assurance mechanism that meets the requirements of Rule R315-309 and the date that the mechanism will become effective (R315-309- 1(1))

The financial assurance mechanism, a Standby Trust Agreement, that was approved for the Class I permit will be the mechanism used for this permit application. A copy of the agreement is in **Appendix U**.

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