Fact Sheet for State Waste Discharge Permit ST0008121
REC Solar Grade Silicon, Inc.

Purpose of this fact sheet

This fact sheet explains and documents the decisions the Department of Ecology (Ecology) made in drafting the proposed State Waste Discharge Permit for REC Solar Grade Silicon, Inc. (REC SGS) that will allow the discharge of process wastewater to the City of Moses Lake, Sand Dunes treatment plant; process wastewater to lined evaporation ponds; and non-contact cooling water to a 125 acre land treatment site.

State law requires any commercial or industrial facility to obtain a permit before discharging waste or chemicals to municipal sanitary sewer collection and treatment systems.

State law also requires public notice for applications for waste discharge permits relating to a new operation, or an operation previously under permit for which an increase in volume of wastes or change in character of effluent is requested over that previously authorized.

REC SGS's application for permit renewal did not include requests for increases in the volume of wastes discharged or a change in character of the effluents. Therefore, Ecology is not required and will not public notice the draft permit to invite review and comment. For more details, please see Appendix A - Public Involvement Information.

Ecology allowed REC SGS a 30-day review period for the draft permit and fact sheet. Ecology noted in the fact sheet where it made changes, or not, in response to REC SGS's comments in **Appendix E**.

Summary

REC SGS owns and operates a high purity polysilicon and silane plant in Moses Lake. The facility discharges low chloride wastewater to the City of Moses Lake, Sand Dunes Treatment Plant; high chloride and high sodium, high silicate wastewaters to a series of lined evaporation ponds; and non-contact cooling water to a 60 million gallon lined storage pond and 125 acre land application site.

This proposed State Waste Discharge permit retains the effluent limits for the discharge of low chloride process wastewater to the City of Moses Lake, Sand Dunes Treatment Plant. Due to uncertain groundwater conditions at the site, the proposed permit will require a scope of work for the installation of additional monitoring wells, preparation of a detailed leak detection monitoring plan for REC SGS's pond complex, and a requirement for the use of a double membrane liner system for any evaporation pond expansion or existing liner system replacement.

Table of Contents

I. Introduction

The legislature defined Ecology's authority and obligations for the wastewater discharge permit program in the Water Pollution Control law, chapter 90.48 RCW (Revised Code of Washington).

Ecology adopted rules describing how it exercises its authority:

- State waste discharge program (chapter 173-216 WAC)
- Submission of plans and reports for construction of wastewater facilities (chapter 173-240 WAC)

These rules require any industrial facility owner/operator to obtain a State Waste Discharge permit before discharging wastewater to state waters. This rule includes commercial or industrial discharges to sewerage systems operated by municipalities or public entities which discharge into public waters of the state. They also help define the basis for limits on each discharge and for other performance requirements imposed by the permit.

Under the State Waste Discharge Permit program and in response to a complete and accepted permit application, Ecology generally prepares a draft permit and accompanying fact sheet, and makes it available for public review before final issuance. If the volume of the discharge has not changed or if the characteristics of the discharge have not changed, Ecology may choose not to issue a public notice (as in the case with this permit renewal). When Ecology publishes an announcement (public notice); it tells people where they can read the draft permit, and where to send their comments, during a period of thirty days. (See **Appendix A - Public Involvement Information** for more detail about the public notice and comment procedures). After the public comment period ends, Ecology may make changes to the draft State Waste Discharge permit in response to comment(s). Ecology will summarize the responses to comments and any changes to the permit in **Appendix E**.

II. Background Information

Table 1: General Facility Information

Facility Information	
Applicant	REC Solar Grade Silicon, Inc.
Facility Name and Address	REC Solar Grade Silicon, Inc. 3322 Road “N” NE, Moses Lake, WA 98837
Contact at Facility	Mr. Paul Stenhouse 3322 Road “N” NE (509) 793-9165 paul.stenhouse@recsilicon.com
Responsible Official	Mr. Jeffrey S. Johnson Vice President of Moses Lake Operations, REC Silicon 3322 Road “N” NE, Moses Lake, WA 98837
Industrial User Type	Significant Industrial User
Industry Type	High purity polysilicon and silane plant

Facility Information	
Type of Treatment by Industry	Low chloride process wastewater (Outfall 001) – pH adjustment, chemical precipitation, filtration Non-Contact Cooling Water (Outfall 003) – Seasonal storage and land treatment High Sodium, High Silicate and High Chloride wastewaters (Outfall 004) – pH adjustment, chemical precipitation, filtration, discharge to lined evaporation ponds
SIC Codes	Silane Gas: 2819, Solar Grade Polysilicon: 3339
NAIC Codes	Silane Gas: 325180, Solar Grade Polysilicon: 331410
Facility Location (NAD83/WGS84 reference datum)	Latitude: 47.135794253916728 N Longitude: -119.19959077445471 W
Treatment Plant Receiving Discharge	City of Moses Lake, Dunes Treatment Plant
Discharge Location (NAD83/WGS84 reference datum)	Latitude: 47.1345031829971 N Longitude: -119.20109101733 W
Legal Description of Application Area	125 acres within the NW¼ of Section 17, Township 19 N., Range 29 E., Grant County Latitude: 47.1363259792127 N Longitude: -119.204894389713 W

Permit Status	
Renewal Date of Previous Permit	June 28, 2010
Application for Permit Renewal Submittal Date	June 23, 2014
Date of Ecology Acceptance of Application	May 8, 2015

Inspection Status	
Date of Last Non-sampling Inspection Date	June 14, 2014

Figure 1: Facility Location Map

A. Facility description

History

REC Solar Grade Silicon, Inc. (REC SGS) produces high purity polysilicon and silane gas at its facility in Moses Lake (see Figure 1). REC SGS sells polysilicon for use mainly in the photovoltaic industry while it uses silane gas as a raw material for polysilicon production. The processing plant has been at the location since the early 1980s. The Union Carbide Corporation first built and operated the facility. Advanced Silicon Materials, Inc. (ASiMI) acquired the operations in early 1990. In 2002, ASiMI entered into a joint venture with Renewable Energy Corporation (REC) for operation of the facility. In 2005, REC bought-out remaining shares of ASiMI and created REC SGS.

Plant 1.0 consisted of the original Moses Lake facility constructed in the 1980s. In 1996 through 1998, ASiMI constructed a silane gas and polysilicon plant in Butte, Montana (Plant 2.0). In 2006, REC SGS initiated a large scale expansion at Moses Lake (Plant 3.0) to increase silane production capacity. In 2010, REC SGS expanded again at Moses Lake (Plant 4.0) increasing silane production, load-out areas and polysilicon production vessels.

Industrial process(s)

High purity polysilicon is produced at the site by the thermal decomposition of silane (SiH4) gas. This decomposition occurs in both polysiemens reactors (Poly - Plant 1.0) and fluidized bed reactors (FBR - Plants 3.0 and 4.0). The Poly reactors consist of bell jar vessels in which silane and hydrogen gases crystallize onto a polysilicon seed crystal forming polysilicon rods. Silane and hydrogen gases feed into the FBRs for the crystallization of polysilicon beads. Both reactor systems produce hydrogen gas which REC SGS recycles in the plant.

The facility produces silane onsite by the reaction of metallurgical grade silicon with hydrogen and silicon tetrachloride in three separate plants (designated Silane Plants 1.0, 3.0 and 4.0). Process units heat and mix these materials which react to form intermediate chlorosilanes. The chlorosilanes then undergo distillation and further catalyzed reactions to form silane gas. The facility recycles unreacted chlorosilanes back to the start of the process.

Wastewater pretreatment

The facility segregates various process wastewaters streams for treatment. The following describes these wastestreams and treatment systems (CES 2014):

- Low Chloride. This systems consists of an equalization tank, clarifier, sludge thickener, and filter process. The low chloride system receives wastewater from the washing of the Poly and FBR vessels. Both reactors generate amorphous polysilicon dust as a byproduct. The wash water from these reactors flows to a powder slurry tank where REC SGS adds flocculent then uses a filter press to remove the polysilicon. The filtrate from the press goes to the low chloride treatment system.

  The powder slurry tank also receives wastewater from the Poly lab consisting of nitric and hydrofluoric acids, and hydrogen peroxide. The REC SGS neutralizes this wastewater prior to discharge to the powder slurry tank.

The low chloride system also receives wastewater from supply water treatment (sludge from the water softener system and reverse osmosis reject), excess lime slurry, flocculent, polymer, sulfuric acid and caustic.

- High Chloride. This system also consists of an equalization tank, clarifier, sludge thickener, and filter press. The High Chloride system receives discharge from lime based scrubbers, which include the process scrubber, maintenance scrubber, and emergency vent scrubbers. The High Chloride system also receives wastewater from the byproducts sump which encompasses the scrubber, influent water treatment systems, and the Low Chloride and High Chloride effluent treatment systems.

- High Sodium, High Silicate (HSHS) Wastestreams. The HSHS treatment system consists of an equalization tank, reactor, filter press, and sump. The HSHS system receives wastewater from caustic based scrubbers which include process finishing column, maintenance finishing column, Plant 3.0 and 4.0 metal chloride dryer scrubbers, and silane scrubber. These scrubbers remove chlorosilanes, hydrogen chlorides, and silane before venting to the atmosphere.

  Scrubber wastewater accumulates in the equalization tank before batch treatment in the reactor vessel. The reactor includes the addition of carbon dioxide to lower the pH and precipitate silicates. The filter press dewaters the silicate solids and produces a filter cake for disposal as a solid waste. The REC SGS removes treated waters from the HSHS sump by pump truck for discharge to the evaporation pond system.

- Sumps. The facility has numerous sumps that receive stormwater or maintenance wash water. With the exception of the HSHS, High Chloride/Low Chloride, Poly lab, and Poly reactor sumps, plant personnel either discharge the sump water to a lined stormwater pond or ship the water offsite for disposal.

- Stormwater. Facility stormwater flows into a perimeter ditch then to a lined pond for evaporation. Some parking lots and process equipment areas at the north and south portion of the plant site drain into diked infiltration areas.

- Noncontact Cooling Water. The REC SGS uses noncontact cooling water at various locations within the facility. These include blowdown from open-loop cooling towers and flows from a number of once-through processes. The facility discharges the non-contact cooling water through a series of two fire water ponds. If needed, it can withdraw water from the fire pond water for fire control with dedicated pumps and piping.

  Effluent from the fire water ponds gravity flows to a sump adjacent to a two celled, 60 million gallon lined storage pond. The pumps can direct the water to one or both of the two cells. Air Liquide also discharges about 25 gallons per minute of non-contact and reverse osmosis wastewater to the inlet sump.

- Evaporation Ponds. A series of six membrane lined evaporation ponds receive wastewater from the high chloride and HSHS treatment systems. Periodically, the REC SGS dewaters and removes solids from the ponds. Additionally, the REC SGS may also remove wastewater from evaporation pond #1 for sale as a calcium chloride road deicer. They may also use a separate mechanical vapor recompression system to concentrate calcium chloride concentrations in evaporation pond #1.

Land Treatment and Sprayfield Distribution System

The facility land treats the non-contact cooling water streams on a REC SGS owned, 125 acre, land treatment site. Irrigation occurs during the growing season, generally from April through October. During the winter months, the 60 million gallon storage pond stores the non-contact cooling water generated from the site. Irrigation occurs using a center pivot sprinkler system. The crops include alfalfa, with a periodic rotation with wheat. The facility uses fresh water from a deep water well to supplement irrigation on the site.

The site is relatively flat, with silty or sandy loam soils (loess). Loess consists of an accumulation of wind-blown silt with lesser and variable amounts of sand and clay particles. The soil depths range from 3 to 15 feet at the site, and in some areas included a silty sand to gravelly silty sand (loess mixed with caliche fragments). A hard caliche layer lies under the soil layer, ranging from 2 to 16 feet below ground surface (bgs).

Contaminants of concern for the land application system include total dissolved solids, conductivity, pH, and specific cations/anions. The wastewater contains relatively low amounts of nitrogen. The evaporative losses in the cooling system concentrate constituents present in the supply water. The City supply water quality varies with the well used (#17 or #18). Well #17 is relatively soft water (hardness less than 20 mg/L as CaCO3), with higher amounts of sodium, alkalinity, and silica. Well #18 water is hard (hardness of up to 180 mg/L as CaCO3) with moderate alkalinity (194 mg/L).

Irrigated wastewater has relative high levels of sodium (average of 157 mg/L) and lesser amounts of calcium (average of 10.2 mg/L) and magnesium (average of 3.78 mg/L). Elevated sodium in irrigation water may adversely affect soil structure and cause a reduction in water infiltration rates.

The sodium adsorption ratio (SAR) of the irrigation water averages 10.7. SAR measures the suitability of water for use in agricultural irrigation, as determined by the concentrations of calcium, magnesium, and sodium. When using a conductivity value of 1,032 umhos/cm (estimated at 2 times the average TDS concentration of 516 mg/L), the irrigated wastewater has a slight to moderate potential to cause loss of soil infiltration.

In the site soils, exchangeable sodium percentage (ESP) levels range up to 14%, near an upper acceptable level of 15% (CES, 2015). The 2015 irrigation and crop management plan recommended soil amendments of either sulfur or gypsum to mitigate the high sodium levels in the soil (CES, 2015).

Solid wastes

REC SGS submitted an update of their solid waste control plan with the 2014 permit renewal application. The facility generates a number of process derived solid wastes, including dried metal chloride solids, spent lime solids, filter press cake, and metallurgical grade silica. These wastes are characterized then disposed of at either hazardous waste facilities (Chemical Waste Management, Arlington, OR -- US Ecology, Grandview, ID) or local landfills (Grant County Landfill -- Greater Wenatchee Regional Landfill).

B. Discharge location of segregated wastewater

The following table summarizes the discharge outfalls and wastewater sources at the facility:

Table 2: Discharge Outfalls

Outfall #	Wastewater Source	Discharge Location
001	Low-Chloride Process Wastewater	City of Moses Lake
002	Plant Sanitary Wastewater	City of Moses Lake
003	Non-Contact Cooling Water	125 Acre Land Treatment Site
004	High Sodium, High Silicate (HSHS) Process Wastewater	Evaporation Pond System (Pond 6)
004	High Chloride Process Wastewater	Evaporation Pond System (Ponds 1, 2, 3, 4, and 5), MVR Evaporator
-	Stormwater Runoff	Two Separate Evaporation Ponds

C. Description of the groundwater

The site lies in the Quincy basin within the Columbia Plateau physiographic province. A series of flood basalts comprise the Columbia Plateau and cover most of Eastern Washington, northeastern Oregon, and western Idaho. The basalt flows of the region are generally fined-grained and dense. Geologists have sub-divided these flows into four formations, from oldest to youngest as Imnaha, Grande Ronde, Wanapum, and Saddle Mountains Basalt, respectively (CES, 2009).

Only the Grande Ronde and Wanapum Basalt are believed present near the site. The uppermost bedrock identified at the site is the Priest Rapids Member of the Wanapum Basalt formation. This bedrock slopes gently to the southwest (CES, 2009).

The Ringold Formation is the oldest unconsolidated sedimentary layer overlying the basalt bedrock. The Ringold Formation includes cemented silt and sand (caliche), with occasional conglomerate layers. Other unconsolidated Pliocene, Pleistocene, and Holocene sediments exist from the ground surface to the Ringold Formation and include extensive deposits of gravels, sands, and silt. These deposits presently occupy most the site along with the windblown silt (loess) (CES, 2009).

Irrigated agriculture of the last 50 years, predominately from the Columbia Basin Irrigation Project, dramatically changed the hydrogeology of the area. Previous to irrigation, groundwater primarily existed in the deep basalt formations. Since irrigation, groundwater levels in the uppermost aquifers have risen hundreds of feet due to leakage from both the canal system and irrigation return drains.

The Bureau of Reclamation typically operates the canal system from March 1st through October 31st. Local groundwater levels in the uppermost aquifers typically vary with operation of the canal system (CES, 2009).

Two groundwater systems for this site includes the deep, basalt aquifers and shallow, unconfined aquifers in the unconsolidated materials overlying the basalt bedrock (CES, 2009).

The uppermost aquifer of the site consists of approximately 15 to 45 feet of unconsolidated sediments which overlay basalt bedrock (CES, 2009). The sediments consist predominantly of silty sand from ground surface to 14 feet bgs followed by caliche from 2 to 31 feet bgs, and basalt from 15 to 45 feet bgs. Groundwater occurs in the unconsolidated sediment ranging from 21 to 32 feet bgs. Groundwater in the upper basalt is likely in contact with the upper alluvial aquifer. Areas with massive basalt and significant caliche may act as aquitards that restrict large volumes of downward leakage to deeper basalt aquifers.

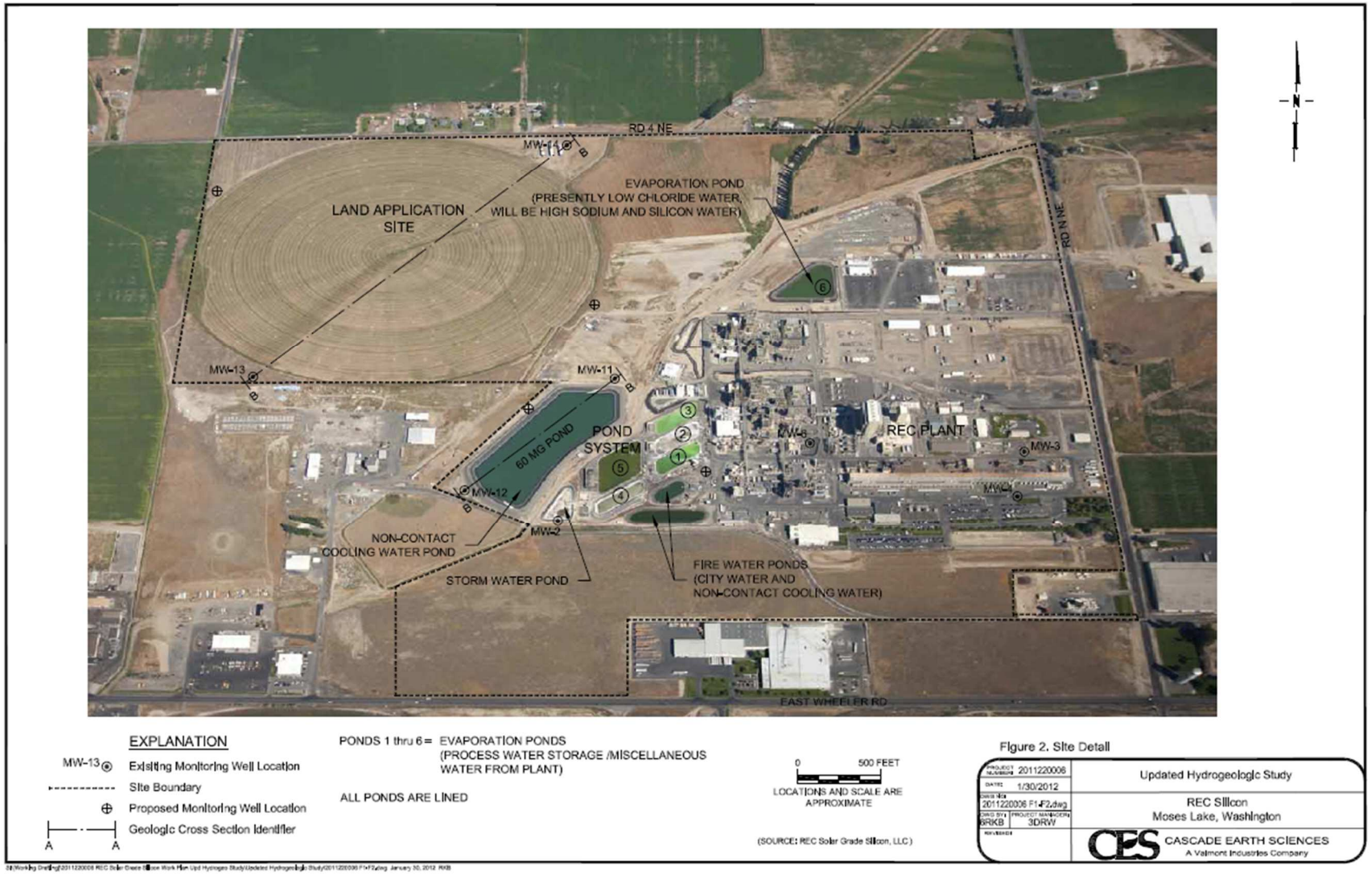
An irrigation supply canal (East Low Canal) lies about 1.5 miles to the east-northeast of the site at a higher elevation. The hydrogeologic study estimated that groundwater flows perpendicular away from the canal, generally to the west-southwest (CES, 2009). The report also expected groundwater to flow down the topographic gradient of the basalt bedrock surface at the site even when the canal goes dry.

A monitoring well network exists for the site consisting of eight monitoring wells (Figure 2) constructed at the land treatment site, pond complex, and the main manufacturing facility:

Table 3: Monitoring Wells (CES, 2012)

Well	Purpose of Monitoring Location
MW2, MW3, MW4, MW6	Monitors groundwater upgradient of the pond complex
MW11	Monitors groundwater Upgradient/Cross-gradient of Pond Complex
MW12	Monitors groundwater Downgradient/Cross-gradient of Pond Complex
MW13	Monitors groundwater Downgradient of Land Treatment Site and Pond Complex
MW14	Monitors groundwater Upgradient of Land Treatment Site

Figure 2: Groundwater Monitoring Wells



Four wells, constructed in 1990, lie within the manufacturing facility (MW2, MW3, MW4, and MW6). The remaining four, constructed in October 2009, lie in the vicinity of the land treatment site and pond complex (MW11, MW12, MW13, and MW14). REC SGS deepened monitoring wells MW13 and MW14 in April 2011 due to insufficient ground water to sample (CES 2012).

An updated hydrogeologic evaluation was prepared based on data collected from the monitoring well network from July 2010 and November 2011 (CES, 2012). From this evaluation, depth to groundwater at the land treatment site ranged from 32.3 feet bgs at MW13 to 53.9 feet bgs at MW14. At the pond complex, depth to groundwater ranges from 14.6 bgs at MW12 to 25.5 feet bgs at MW11 while depth to groundwater beneath the manufacturing facility ranges from 19.2 feet bgs at MW4 to 26.6 feet bgs at MW3. The 2012 hydrogeologic study also recommended the installation of four additional monitoring wells to better characterize groundwater conditions at the site (see Figure 2).

Between July 2010 and the early months of 2011, groundwater flows generally to the west-northwest. From April through November, when groundwater elevations were their highest, groundwater showed a southwesterly flow with additional influence from recharge to the north of the site (CES, 2012). The recharge originates mostly from leakage of unlined canals carrying irrigation return flows to the north of the site, and to a lesser extent from irrigation and precipitation.

Groundwater data from August 2010 through September 2015 show exceedances of groundwater quality criteria for all wells for the upper pH limit (8.5 su), iron (0.3 mg/L), and manganese (0.05 mg/L). At the downgradient well MW13, TDS consistently exceeded the groundwater TDS criteria of 500 mg/L throughout the monitoring period, and exceeded the chloride criteria 250 mg/L from August 2010 through January 2013.

Well MW13 had higher concentrations of calcium, chloride, conductivity, magnesium, sulfate, and TDS compared with all other site wells. Chloride concentrations and conductivity in MW13 showed a strong seasonal variation with peak levels measured during 2011 and 2012. Since that time, levels of chloride, conductivity, TDS, and other ions have decreased in MW13. **Appendix D** provides a summary of groundwater data.

D. Wastewater characterization

REC SGS reported the concentration of pollutants in the permit application and in discharge monitoring reports. The tabulated data represents the quality of the effluent discharged from Outfall 001 to the POTW from August 2012 through August 2015 as follows:

Table 4: Discharges to the POTW (Outfall 001) Wastewater Characterization

Parameter	Units	Average Value	Maximum Value
Flow	gpd	38,690	134,290
Biochemical Oxygen Demand (BOD_5)	mg/L	23.43	116
Chloride	mg/L	30.04	105.7

Parameter	Units	Average Value	Maximum Value
	lbs/day	9.984	45.3
Fluoride	mg/L	6.306	25.1
	lbs/day	2.012	8.9
Sodium	mg/L	138.9	546.4
	lbs/day	52.86	495.5
Nitrate (as Nitrogen)	mg/L	48.69	268
Oil and Grease	mg/L	2.718	14
Sulfate	mg/L	282.2	3,867
	lbs/day	106.1	840.3
Totals Dissolved Solids (TDS)	mg/L	925.9	3,146
	lbs/day	331.3	1,855
Temperature	°F	76.19	110
Total Suspended Solids (TSS)	mg/L	49.22	914.4
Total Alkalinity	mg/L	111.2	210
Arsenic	ug/L	2.92	9
Calcium	mg/L	86.26	216
Cadmium	ug/L	0.3	0.3
Copper	ug/L	4.39	8.3
Conductivity	umhos/cm	2,244	4,384
Mercury	ug/L	0.2	0.2
Potassium	mg/L	8.129	10.2
Magnesium	mg/L	15.69	72
Manganese	mg/L	16.55	86.5
Molybdenum	ug/L	21.08	35
Ammonia (as Nitrogen)	mg/L	2.293	33
Nickel	ug/L	6.063	9.25
Lead	ug/L	1.65	5
Selenium	ug/L	2	2
Total Phosphorus (as P)	mg/L	0.375	1.9
Zinc	ug/L	22.2	73.5

Parameter	Units	Minimum Value	Maximum Value
pH	s.u.	6	10.6

For non-contact cooling water applied to the land treatment site, the tabulated data represents the quality of the effluent discharged from the 2012 through 2014 irrigation seasons. The REC SGS did not land treat wastewater in 2015.

Table 5: Discharge to the land treatment system (Outfall 003) Wastewater Characterization

Parameter	Units	Average Value	Maximum Value
Flow	gpd	350,900	1,038,800
Total Alkalinity	mg/L	169	209
Calcium	mg/L	10.2	17.2
Chloride	mg/L	40.19	66.76
Fluoride	mg/L	4.257	7.3
Potassium	mg/L	14.19	19.7
Magnesium	mg/L	3.778	6.35
Manganese	mg/L	24.14	188
Sodium	mg/L	157	218
Ammonia	mg/L	0.4389	2.3
Nitrate	mg/L	0.1975	0.64
Sulfate	mg/L	150.6	237
Total Dissolved Solids	mg/L	516.3	786
Total Phosphorus	mg/L	1.239	1.8
Sodium Adsorption Ratio (calculated)	-	10.7	11.4

Parameter	Units	Minimum Value	Maximum Value
pH	s.u.	8.0	9.7

E. Summary of compliance with previous permit issued

The previous permit placed effluent limits on Outfall 001 (Low-Chloride Process Wastewater), Outfall 003 (Non-Contact Cooling Water) and conditions on the High Sodium, High Silicate (HSHS) Process Wastewater and High Chloride Process Wastewater.

REC SGS has complied with the effluent limits and permit conditions throughout the duration of the permit effective on July 1, 2010 with the following exceptions:

- An exceedance of the daily maximum chloride limit at Outfall 001 on August 8 and 9, 2011. The REC SGS immediately determined the cause and corrected the problem.
- Missing monitoring data that occurred on an infrequent basis, the majority resulting from equipment malfunctions.

- Infrequent submittal of late discharge monitoring reports. Ecology does not routinely take enforcement actions for submitting DMRs up to five days late.

Ecology assessed compliance based on its review of the facility's information in the Ecology Permitting and Reporting Information System (PARIS), discharge monitoring reports (DMRs) and on inspections conducted by Ecology.

The REC SGS complied with report submittal requirements over the permit term.

F. State environmental policy act (SEPA) compliance

State law exempts the issuance, reissuance or modification of any wastewater discharge permit from the SEPA process as long as the permit contains conditions that are no less stringent than federal and state rules and regulations (RCW 43.21C.0383). The exemption applies only to existing discharges, not to new discharges.

III. Proposed Permit Limits

State regulations require that Ecology base limits in a State Waste Discharge permit on the:

- Technology and treatment methods available to treat specific pollutants (technology-based). Technology-based limits are set by the EPA and published as a regulation
(40 CFR 400 - 471), or Ecology develops limits on a case-by-case basis
(40 CFR 125.3, and RCW 90.48). Dischargers must treat wastewater using all known, available, reasonable methods of prevention, control, and treatment (AKART).
- Effects of the pollutants on the publicly-owned treatment works (POTW). Wastewater must not interfere with the operation of the POTW. Ecology considers local limits in developing permit limits.
- Applicable requirements of other local, state and federal laws.

Ecology applies the most stringent of these limits to each parameter of concern and further describes the proposed limits below.

The limits in this permit reflect information received in the application and from supporting reports (engineering, hydrogeology, monitoring, etc.). Ecology evaluated the permit application and determined the limits needed to comply with the rules adopted by the state of Washington. Ecology does not develop effluent limits for all reported pollutants. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, and are not listed in regulation.

Ecology does not usually develop permit limits for pollutants not reported in the permit application but may be present in the discharge. The permit does not authorize the discharge of the non-reported pollutants. During the five-year permit term, the facility's effluent discharge conditions may change from those conditions reported in the permit application. The facility must notify Ecology if significant changes occur in any constituent. Until Ecology modifies the permit to reflect additional discharge of pollutants, a permitted facility could be violating its permit.

A. Technology-based effluent limits – Outfall 001, discharge to Moses Lake POTW

Waste discharge permits issued by Ecology specify conditions requiring all available and reasonable methods of prevention, control, and treatment (AKART) of discharges to waters of the state (RCW 90.48).

This facility has no applicable federal categorical limits under 40 CFR Parts 405-471.

The state waste discharge permit regulations include restrictions and prohibitions to protect publicly-owned sewerage systems. A facility may not discharge any wastewater having a pH less than 5.0 or greater than 11.0 or having any other corrosive property capable of causing damage or hazard to structures, equipment, or personnel unless the:

- System is specifically designed to accommodate such discharge.
- Discharge is authorized by a permit (WAC 173-216-060).

Federal regulations (40 CFR 403.5b) also prohibits the discharge of pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0, unless the collection and treatment system is designed to accommodate such discharges.

Ecology approved the engineering report for the increased discharge from the Plant 4.0 expansion to the Moses Lake POTW, prepared by REC SGS (REC, 2009). Ecology determined the facility meets the minimum requirements demonstrating compliance with the AKART standard if the REC operates the treatment and disposal system as described in the approved engineering report and any subsequent Ecology approved reports.

The Sand Dunes treatment plant discharges its treated municipal wastewater to groundwater via rapid infiltration. The disposal method poses a risk to receiving groundwater quality. The POTW treatment process does not remove total dissolved solids (TDS) contained in the wastewater. These dissolved solids may pass through, and impact downgradient groundwater quality. Presently, the City of Moses Lake has a daily maximum effluent limit for TDS of 1,000 mg/L at the Dunes Treatment plant. However, Ecology plans to reevaluate this limit in the renewal of the City's State Waste Discharge Permit. A change in the City's TDS limit may result in Ecology reevaluating TDS limits for the all industrial discharges to the Dunes treatment plant.

The facility previously evaluated alternatives to reduce TDS loading to the City of Moses Lake sewer system. REC SGS installed a new source water supply treatment system, switching from ion exchange to reverse osmosis/electro deionization. This installation occurred concurrent with the Plant 3.0 expansion.

Appendix D lists TDS data from REC SGS and the Sand Dunes treatment plant from July 2010 through August 2015. After January 2013, TDS levels discharged from REC SGS dropped, due to the stoppage of production of high purity silicon from the Poly reactors (plant 1.0).

From July 2010 through December 2012, TDS at the Dunes treatment plant averaged 9,360 lbs/day (518 mg/L). During this time-period, REC SGS contributed about 8.7% of the average TDS loading to the treatment plant with the discharge averaging 818 lbs/day (1,319 mg/L).

From January 2013 through August 2015, TDS at the Dunes treatment plant averaged 8,737 lbs/day (501 mg/L). During this time-period, REC SGS contributed about 2.9% of the average TDS loading to the treatment plant with the discharge averaging 255 lbs/day (885 mg/L).

In the previous permit issued on July 2010, Ecology developed proposed performance based limits for TDS, chloride, and sodium. From effluent data from June, 2009 to October, 2009, Ecology calculated the pounds of pollutant(s) discharged per 10,000 gallons of wastewater. Ecology then used this ratio to determine pollutant limits at the expected discharge quantities of 210,000 gpd monthly average and 300,000 gpd daily maximum. Ecology increased the existing limits by 15% to accommodate the additional Plant 4.0 loadings. **Appendix D** includes these calculations from the previous permit.

Ecology reevaluated the performance based limits for TDS, sodium, and chloride using the same procedure as used in the previous permit issued in July 2010. This evaluation resulted in similar discharge limits. Therefore, the proposed permit will include technology based limits as in the previous permit as shown below:

Table 6: Outfall 001 – Technology-based Effluent Limits

Effluent Limits		
Parameter	**Average Monthly**	**Maximum Daily**
Flow, gpd	210,000	300,000
TDS, lbs/day	3,240	4,560
Chloride, lbs/day	63	90
Sodium, lbs/day	558	796
Fluoride, lbs/day	28	46

B. Effluent limits based on local limits – Outfall 001, discharge to Moses Lake POTW

To protect the City of Moses Lake, Dunes Treatment Plant from pass-through, interference, concentrations of toxic chemicals that would impair beneficial or designated uses of sludge, or potentially hazardous exposure levels, Ecology believes it necessary to impose limits for certain parameters. Ecology based these limits on local limits established by the Moses Lake POTW and codified in ordinance.

Ecology's pretreatment program delegation agreement with EPA includes language in which Ecology agreed to enforce limits adopted by non-delegated programs (local limits). Applicable limits for this discharge include the following:

Table 7: Outfall 001 – Limits Based on Local Limits

Effluent Limits		
Parameter	**Average Monthly**	**Maximum Daily**
Temperature, °F	-	104
Oil and Grease (HEM), mg/L	-	100
BOD_5, mg/L	-	300
TSS, mg/L	-	350
Color, color units	-	15

Parameter	Daily Minimum	Daily Maximum
pH	6.0 standard units	11.0 standard units

C. Technology-based effluent limits – Outfall 003

Waste discharge permits issued by Ecology specify conditions requiring the facility to use AKART before discharging to waters of the state (RCW 90.48).

Ecology approved the engineering report for the land application system (CH2M Hill, 2010).

Ecology evaluated the report using the:

- *Guidelines for the Preparation of Engineering Reports for Industrial Wastewater Land Application Systems*, Ecology, May 1993.

Ecology determined that the facility meets the minimum requirements demonstrating compliance with the AKART standard if REC SGS operates the irrigation system as described in the approved engineering report and any subsequent Ecology approved reports.

Ecology also evaluated the report for water quality based requirements which is described in the next section of the fact sheet.

Land Treatment Requirements

REC SGS must meet the following permit limits to satisfy the requirement for AKART:

- Apply of wastewater via spray irrigation must not exceed agronomic rates (as defined in Ecology's groundwater implementation guidance) for total nitrogen and water. Wastewater application rates for other wastewater constituents must protect the background groundwater quality.
- Apply total nitrogen and water to the sprayfields as determined by an Ecology approved and current irrigation and crop plan.
- Operate the system to protect the existing and future beneficial uses of the groundwater and not cause a violation of the groundwater standards.

D. Groundwater quality-based effluent limits

In order to protect existing water quality and preserve the designated beneficial uses of Washington's groundwaters including the protection of human health, WAC 173-200-100 requires Ecology to condition discharge permits in such a manner as to authorize only activities that will not cause violations of the groundwater quality standards. The goal of the groundwater quality standards is to maintain the highest quality of the State's groundwaters and to protect existing and future beneficial uses of the groundwater through the reduction or elimination of the discharge of contaminants to groundwater [WAC 173-200-010(4)]. Ecology achieves this goal by:

- Applying all known available and reasonable methods of prevention, control and treatment (AKART) to any discharge.
- Applying the antidegradation policy of the groundwater standards.
- Establishing numeric and narrative criteria for the protection of human health and the environment in the groundwater quality standards.

Ecology approved the engineering report as noted above in the technology based limits section. In addition, Ecology evaluated the report to ensure compliance with groundwater standards using the:

- *Guidance on Land Treatment of Nutrients in Wastewater, with Emphasis on Nitrogen, Ecology*, November 2004 (https://fortress.wa.gov/ecy/publications/SummaryPages/0410081.html)

Antidegradation Policy

The state of Washington's ground water quality standards (GWQS) require preservation of existing and future beneficial uses of groundwater through the antidegradation policy, which includes the two concepts of antidegradation and non-degradation. Antidegradation is not the same as non-degradation (see below).

Antidegradation

Antidegradation applies to calculation of permit limits in groundwater when background (see below) contaminant concentrations are less than criteria in the GWQS. Ecology has discretion to allow the concentrations of contaminants at the point of compliance to exceed background concentrations but not exceed criteria in the GWQS. Ecology grants discretion through an approved AKART engineering analysis of treatment alternatives. If the preferred treatment alternative predicts that discharges to groundwater will result in contaminant concentrations that fall between background concentrations and the criteria, then the preferred treatment alternative should protect beneficial uses and meet the antidegradation policy. In this case, the predicted concentrations become the permit limits. If the preferred alternative will meet background contaminant concentrations, background concentrations become the permit limits. Permit limits must protect groundwater quality by preventing degradation beyond the GWQS criteria. If discharges will result in exceedance of the criteria, facilities must apply additional treatment before Ecology can permit the discharge.

Non-degradation

Non-degradation applies to permit limits in groundwater when background contaminant concentrations exceed criteria in the GWQS. Non-degradation means that discharges to groundwater must not further degrade existing water quality. In this case, Ecology considers the background concentrations as the water quality criteria and imposes the criteria as permit limits. To meet the antidegradation policy, the facility must prepare an AKART engineering analysis that demonstrates that discharges to groundwater will not result in increasing background concentrations. Ecology must review and approve the AKART engineering analysis.

You can obtain more information on antidegradation and non-degradation by referring to the *Implementation Guidance for the Ground Water Quality Standards (Implementation Guidance)*, Ecology Publication #96-02 (available at https://fortress.wa.gov/ecy/publications/SummaryPages/9602.html).

Background Water Quality

Background water quality is determined by a statistical calculation of contaminant concentrations without the impacts of the proposed activity. The calculation requires an adequate amount of groundwater quality data and determining the mean and standard deviation of the data, as described in the *Implementation Guidance*. Following the procedure in the *Implementation Guidance*, Ecology then defines background water quality for most contaminants as the 95 percent upper tolerance limit. This means that Ecology is 95 percent confident that 95 percent of future measurements will be less than the upper tolerance limit. There are a few exceptions to the use of the upper tolerance limit. For pH, Ecology will calculate both an upper and a lower tolerance limit resulting in an upper and lower bound to the background water quality. If dissolved oxygen is of interest, Ecology will calculate a lower tolerance limit without an upper tolerance limit.

Two features at the site may impact groundwater quality, the pond complex and the 125 acre land treatment site. According to the 2012 Hydrogeologic Study (CES 2012), MW-11 monitors cross-gradient to upgradient groundwater conditions for the 60 million gallon storage pond while MW-14 monitoring upgradient groundwater conditions for the land treatment site. Well MW13 monitors groundwater downgradient from both features.

Ecology has reviewed the groundwater quality data for the monitoring wells MW11 and MW14 and determined background groundwater quality as defined in chapter 173-200 WAC and described in the Implementation Guidance for the Ground Water Quality Standards; Ecology, Revised October 2005. **Appendix D** includes a summary of Ecology's calculations of background values.

Applicable groundwater criteria as defined in chapter 173-200 WAC and in RCW 90.48.520 for this facility and background groundwater quality include those in the following table:

Table 8: Groundwater Quality Criteria

Parameter	Units	Groundwater Criteria	Background Value
Total Dissolved Solids [a]	mg/L	500	350 (MW11) 320 (MW14)
Chloride	mg/L	250	40.6 (MW11) 11.9 (MW14)
Sulfate [b]	mg/L	250	28.5 (MW11) 21.4 (MW14)
Nitrate (as nitrogen)	mg/L	10	9.1 (MW11) 2.6 (MW14)
pH (Minimum / Maximum) [c]	standard units	6.5 to 8.5	7.7/8.8 (MW11) 7.9/8.8 (MW14)
Manganese [d]	mg/L	0.05	1.02 (MW11) 0.48 (MW14)
Total Iron [e]	mg/L	0.3	58.9 (MW11) 17.5 (MW14)

a	Outlier of 78 mg/L collected in April 2013 removed from MW14 dataset; Outliers of 534 mg/L (October 2010), 94 mg/L (January 2011), 152 mg/L (December 2011), and 94 mg/L (November 2011) removed from MW11 dataset.
b	Outlier of 124.39 mg/L (October 2010) removed from MW11 dataset.
c	Outlier of 7.5 su (December 2011) removed from MW14 dataset.
d	Outliers of 565 mg/L (August 2010), 1,740 mg/L (November 2010), and 38,000 mg/L (February 2011 removed from MW11 dataset.
e	Outliers of 25,500 mg/L (August 2010), 11,000 mg/L (December 2010), and 1,160 mg/L (February 2011) removed from MW11 dataset.

As noted above, the constituent levels in the downgradient groundwater monitoring well MW13 show elevated constituent concentrations compared with the background values above.

Ecology will establish groundwater enforcement limits in the next permit cycle to protect the quality of the groundwater based on these background values in groundwater. As noted above, the pond complex and the 125 acre land treatment site are impacting groundwater quality at the site. Based on the chloride concentrations in MW13, it appears that site activities impact downgradient groundwater quality.

The proposed permit requires REC-SGS to install the recommended monitoring wells identified in the CES 2012 Hydrogeologic evaluation. Ecology will use the data provided by the additional upgradient wells to set groundwater enforcement limits in the next permit.

- The proposed permit also requires REC-SGS to: Prepare a leak detection monitoring plan for the pond complex and offsite evaporation ponds. This plan must describe how REC SGS will monitor, test, and report the structural integrity of all wastewater impoundments on a routine basis.
- Evaluate that they are applying all known available and reasonable methods of prevention, control and treatment (AKART) for any expansion or liner system replacement to the High Chloride/High Sodium High Silicate evaporation pond system. Ecology considers use of a double membrane liner system with a leak detection and recovery for any expansion or liner system replacement for the pond complex as AKART for all lagoons.

If, after implementing the above actions, Ecology determines that the operations continue to impact groundwater quality, Ecology may reopen the permit sooner to establish groundwater enforcement limits and other specific measures to protect background groundwater quality.

E. Comparison of effluent limits with the previous permit issued on June 28, 2010

The proposed effluent limits for Outfall 001 are identical to the previous permit, except for the limit for TSS (applied as a daily maximum instead of average monthly) and the addition of color. These changes make these limits consistent with the City of Moses Lake local limits.

Table 9: Comparison of Effluent Limits Outfall 001

		Previous Effluent Limits: Outfall # 001		Proposed Effluent Limits: Outfall # 001	
Parameter	**Basis of Limit**	**Average Monthly**	**Maximum Daily**	**Average Monthly**	**Maximum Daily**
Flow, gpd	Technology	210,000	300,000	210,000	300,000
TDS, lbs/day	Technology	3,240	4,560	3,240	4,560
Chloride, lbs/day	Technology	63	90	63	90
Sodium, lbs/day	Technology	558	796	558	796
Fluoride, lbs/day	Technology	28	46	28	46

		Previous Effluent Limits: Outfall # 001		Proposed Effluent Limits: Outfall # 001	
Temperature, °F	Technology	-	104	-	104
Oil and Grease (HEM), mg/L	Local	-	100	-	100
BOD_5, mg/L	Local	-	300	-	300
TSS, mg/L	Local	350	-	-	350
Color, color units	Local	-	-	-	15

Parameter	Basis of Limit	Daily Minimum	Daily Maximum
pH	Local	6.0	11.0

The proposed limits for Outfall 003 do not include the previous permit limit for total dissolved solids (TDS). Instead, the application rates of TDS to the sprayfield must protect the existing and future beneficial uses of both groundwater and surface water; and not cause a violation of the groundwater standards (Permit Condition S1.B).

IV. Monitoring Requirements

Ecology requires monitoring, recording, and reporting (WAC 173-216-110) to verify that the treatment process functions correctly and that the discharge complies with the permit's effluent limits.

If a facility uses a contract laboratory to monitor wastewater, it must ensure that the laboratory uses the methods and meets or exceeds the method detection levels required by the permit. The permit describes when facilities may use alternative methods. It also describes what to do in certain situations when the laboratory encounters matrix effects. When a facility uses an alternative method as allowed by the permit, it must report the test method, detection level (DL), and quantitation level (QL) on the discharge monitoring report or in the required report.

A. Lab accreditation

Ecology requires that facilities must use a laboratory registered or accredited under the provisions of chapter 173-50 WAC, Accreditation of Environmental Laboratories, to prepare all monitoring data (with the exception of certain parameters). Ecology accredited the laboratory at this facility for:

Table 10: Accredited Parameters

Parameter Name	Category	Method Name	Matrix Description
Specific Conductance	General Chemistry	SM 2510 B-97	Non-Potable Water
Solids, Total Dissolved	General Chemistry	SM 2540 C-97	Non-Potable Water
Solids, Total Suspended	General Chemistry	SM 2540 D-97	Non-Potable Water
Chloride	General Chemistry	SM 4110 B-00	Non-Potable Water

Parameter Name	Category	Method Name	Matrix Description
Fluoride	General Chemistry	SM 4110 B-00	Non-Potable Water
Sulfate	General Chemistry	SM 4110 B-00	Non-Potable Water
Chlorine (Residual), Total	General Chemistry	SM 4500-Cl G-00	Non-Potable Water
pH	General Chemistry	SM 4500-H+ B-00	Non-Potable Water
Calcium	Metals	SM 3120 B-99	Non-Potable Water
Sodium	Metals	SM 3120 B-99	Non-Potable Water

B. Wastewater monitoring

Ecology details the proposed monitoring schedule under Special Condition S2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

The proposed permit requires additional priority pollutant monitoring to further characterize the facility's wastewater. These pollutant(s) could have a significant impact on the receiving POTW.

C. Irrigated Wastewater Monitoring

Ecology details the proposed monitoring schedule under Special Condition S2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

D. Crop monitoring

Ecology details the proposed monitoring schedule under Special Condition S2. The facility and Ecology use the crop monitoring data to develop the nutrient and salt balances that are necessary to demonstrate compliance with the agronomic rate limit in Special Condition S1.

E. Soil monitoring

Ecology details the proposed monitoring schedule under Special Condition S2. The facility and Ecology use the soil monitoring data to monitor and evaluate wastewater application rates and to determine if salts and nutrients are flushing through the root zone and leaching to the groundwater. The presence and concentration of certain wastewater related parameters in the soils (e.g., nitrogen and salts) can indicate over application of wastewater. The facility must follow the analytical methods provided in Soil, Plant and Water Reference Methods for the Western Region (2003).

F. Groundwater monitoring

Ecology requires groundwater monitoring at the site in accordance with the Ground Water Quality Standards, chapter 173-200 WAC. Ecology has determined that this discharge has a potential to pollute the groundwater. Therefore, the Facility must evaluate the impacts on groundwater quality.

Ecology considers monitoring of the groundwater at the site boundaries and within the site an integral component of such an evaluation.

V. Other Permit Conditions

A. Reporting and recordkeeping

Ecology based Special Condition S3 on its authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges [WAC 173-216-110 and CFR 403.12 (e), (g), and (h)].

B. Operations and maintenance

Ecology requires dischargers to take all reasonable steps to properly operate and maintain their wastewater treatment system in accordance with state regulations (WAC 173-240-080 and WAC 173-216-110). The facility has prepared and must maintain an operation and maintenance (O&M) manual as required by state regulation for the construction of wastewater treatment facilities (WAC 173-240-150). Implementation of the procedures in the operation and maintenance manual ensures the facility's compliance with the terms and limits in the permit. The proposed permit requires submission of an updated O&M manual for the entire wastewater system.

C. Prohibited discharges

Ecology prohibits certain pollutants from being discharged to the POTW. These include substances which cause pass-through or interference, pollutants which may cause damage to the POTW or harm to the POTW workers (chapter 173-216 WAC) and the discharge of designated dangerous wastes not authorized by this permit (chapter 173-303 WAC).

D. Dilution prohibited

Ecology prohibits the facility from diluting its effluent as a partial or complete substitute for adequate treatment to achieve compliance with permit limits.

E. Solid waste control plan

REC SGS could cause pollution of the waters of the state through inappropriate disposal of solid waste or through the release of leachate from solid waste.

This proposed permit requires this facility to update the approved solid waste control plan designed to prevent solid waste from causing pollution of waters of the state (RCW 90.48.080). REC SGS must submit the updated plan to Ecology for review.

F. Non routine and unanticipated wastewater

Occasionally, this facility may generate wastewater not characterized in the permit application because it is not a routine discharge and the facility did not anticipate it at the time of application. These wastes typically consist of waters used to pressure-test storage tanks or fire water systems or of leaks from drinking water systems.

The permit authorizes the discharge of non-routine and unanticipated wastewater under certain conditions. The facility must characterize these waste waters for pollutants and examine the opportunities for reuse. Depending on the nature and extent of pollutants in this wastewater and on any opportunities for reuse, Ecology may:

- Authorize the facility to discharge the water.
- Require the facility to treat the wastewater.
- Require the facility to reuse the wastewater.

G. Spill plan

This facility stores a quantity of chemicals on-site that have the potential to cause water pollution and/or interference or pass through at the receiving POTW if accidentally released. Ecology can require a facility to develop best management plans to prevent this accidental release [Section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080].

REC SGS developed a plan for preventing the accidental release of pollutants to state waters, to the receiving treatment plant, and for minimizing damages if such a spill occurs. The proposed permit requires the facility to update this plan and submit it to Ecology.

H. Slug discharge plan

Ecology determined that REC SGS has the potential for a batch discharge or a spill that could adversely affect the treatment plant, therefore the proposed permit requires a slug discharge control plan [(40 CFR 403.8 (f)(l) (iii)(B)(6) and (f) (2)(vi)].

I. Irrigation and crop management plans

Ecology requires the irrigation and crop management plan to support the engineering report(s) and operations and maintenance manual. This plan must include a consideration of wastewater application at agronomic rates as required by Special Condition S1 and should describe and evaluate various irrigation controls.

Plans must comply with the requirements for an irrigation and crop management plan given in Ecology's guidance, *Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems.* (1993).

J. Leak detection plan

As discussed above, the proposed permit requires REC SGS to submit a **Leak Detection Plan** for Ecology review **by October 1, 2017.** This plan must describe how the REC SGS will monitor, test, and report the structural integrity of all wastewater impoundments on a routine basis.

K. Scope of work for installation of additional groundwater monitoring wells

In accordance with WAC 173-200-080, the proposed permit requires the facility to submit a **scope of work** for the installation of additional groundwater monitoring wells according to recommendations of the 2012 hydrogeologic study. The permit requires the scope of work within within six months after the issuance date of the permit and the installation of the new wells within one year after the issuance date of the permit.

L. General conditions

Ecology bases the standardized general conditions on state law and regulations. They are included in all state waste discharge permits issued by Ecology.

VI. Public Notification of Noncompliance

Ecology may annually publish a list of all industrial users in significant noncompliance with Pretreatment Standards or Requirements during any of the previous four quarters in a local newspaper. Accordingly, this permit Special Condition informs the Facility that noncompliance with this permit may result in publication of the noncompliance.

VII. Permit Issuance Procedures

A. Permit modifications

Ecology may modify this permit to impose or change the numerical limits, if necessary to comply with changes in the pretreatment requirements, conditions in local sewer ordinances, or based on new information from sources such as inspections and effluent monitoring. It may also modify this permit to comply with new or amended state or federal regulations.

B. Proposed permit issuance

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limits and conditions believed necessary to control toxics. Ecology proposes that the permit be issued for 5 years.

VIII. References for Text and Appendices

Gavlak, R., D. Horneck , R.O. Miller, and J. Kotuby-Amacher.

3rd edition 2005. *Soil, Plant and Water Reference Methods for the Western Region* https://community.ipni.net/site/wera.nsf/home.xsp

Cascade Earth Sciences

August 2009. *Hydrogeologic Study, REC Solar Grade Silicon, LLC, Moses Lake, WA.*

February 2012. *Hydrogeologic Study, REC Solar Grade Silicon, LLC, Moses Lake, WA.*

June 2014. *Operations and Maintenance Manual, REC Solar Grade Silicon, Moses Lake, WA.*

March 2015. *2015 Irrigation and Crop Management Plan, REC Solar Grade Silicon, LLC, Moses Lake, WA.*

CH2M Hill

March 2010. *Non-Contact Cooling Water Land Application System, prepared for REC Solar Grade Silicon, LLC, Moses Lake, WA.*

REC Solar Grade Silicon

April 10, 2009. *Industrial Wastewater Facilities Engineering Report (Rev 2).*

Washington State Department of Ecology.

Laws and Regulations http://www.ecy.wa.gov/laws-rules/index.html

Permit and Wastewater Related Information
http://www.ecy.wa.gov/programs/wq/permits/guidance.html

December 2011. *Permit Writer's Manual*, Publication Number 92-109
https://fortress.wa.gov/ecy/publications/SummaryPages/92109.html

February 2007. *Focus Sheet on Solid Waste Control Plan, Developing a Solid Waste Control Plan for Industrial Wastewater Discharge Permittees*, Publication Number 07-10-024.
http://www.ecy.wa.gov/pubs/0710024.pdf

Appendix A - Public Involvement Information

Ecology proposes to reissue a permit to REC Solar Grade Silicon, Inc. (REC SGS). The permit includes wastewater discharge limits and other conditions. This fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

In their permit renewal application, REC SGS did not request an increase in volume of wastes or change in character of effluent over that previously authorized. In accordance with Chapter 90.48.170 RCW, Ecology does not need to Public Notice the Application or the Draft Permit.

You may obtain further information from Ecology by telephone at (509) 329-3500 or by writing to the address listed below.

Water Quality Program
Department of Ecology
Eastern Regional Office
4601 North Monroe Street
Spokane, WA 99205-1295

Appendix B - Your Right to Appeal

You have a right to appeal this permit to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of the final permit. The appeal process is governed by chapter 43.21B RCW and chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2) (see glossary).

To appeal you must do the following within 30 days of the date of receipt of this permit:

- File your appeal and a copy of this permit with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this permit on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in chapter 43.21B RCW and chapter 371-08 WAC.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608
Pollution Control Hearings Board 1111 Israel RD SW STE 301 Tumwater, WA 98501	**Pollution Control Hearings Board** PO Box 40903 Olympia, WA 98504-0903

Appendix C - Glossary

1-DMax or 1-day maximum temperature -- The highest water temperature reached on any given day. This measure can be obtained using calibrated maximum/minimum thermometers or continuous monitoring probes having sampling intervals of thirty minutes or less.

7-DADMax or 7-day average of the daily maximum temperatures -- The arithmetic average of seven consecutive measures of daily maximum temperatures. The 7-DADMax for any individual day is calculated by averaging that day's daily maximum temperature with the daily maximum temperatures of the three days prior and the three days after that date.

Acute toxicity --The lethal effect of a compound on an organism that occurs in a short time period, usually 48 to 96 hours.

AKART -- The acronym for "all known, available, and reasonable methods of prevention, control and treatment." AKART is a technology-based approach to limiting pollutants from wastewater discharges, which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and 520, WAC 173-200-030(2)(c)(ii), and WAC 173-216-110(1)(a).

Alternate point of compliance -- An alternative location in the groundwater from the point of compliance where compliance with the groundwater standards is measured. It may be established in the groundwater at locations some distance from the discharge source, up to, but not exceeding the property boundary and is determined on a site specific basis following an AKART analysis. An "early warning value" must be used when an alternate point is established. An alternate point of compliance must be determined and approved in accordance with WAC 173-200-060(2).

Ambient water quality -- The existing environmental condition of the water in a receiving water body.

Ammonia -- Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Annual average design flow (AADF) -- average of the daily flow volumes anticipated to occur over a calendar year.

Average monthly (intermittent) discharge limit-- The average of the measured values obtained over a calendar month's time taking into account zero discharge days.

Average monthly discharge limit -- The average of the measured values obtained over a calendar month's time.

Background water quality -- The concentrations of chemical, physical, biological or radiological constituents or other characteristics in or of groundwater at a particular point in time upgradient of an activity that has not been affected by that activity, [WAC 173-200-020(3)]. Background water quality for any parameter is statistically defined as the 95% upper tolerance interval with a 95% confidence based on at least eight hydraulically upgradient water quality samples. The eight samples are collected over a period of at least one year, with no more than one sample collected during any month in a single calendar year.

Best management practices (BMPs) -- Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD5 -- Determining the five-day Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD5 is used in modeling to measure the reduction of dissolved oxygen in receiving waters after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD_5 is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass -- The intentional diversion of waste streams from any portion of a treatment facility.

Categorical pretreatment standards -- National pretreatment standards specifying quantities or concentrations of pollutants or pollutant properties, which may be discharged to a POTW by existing or new industrial users in specific industrial subcategories.

Chlorine -- A chemical used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic toxicity -- The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean water act (CWA) -- The federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance inspection-without sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance inspection-with sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations. In addition it includes as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Ecology may conduct additional sampling.

Composite sample -- A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction activity -- Clearing, grading, excavation, and any other activity, which disturbs the surface of the land. Such activities may include road building; construction of residential houses, office buildings, or industrial buildings; and demolition activity.

Continuous monitoring -- Uninterrupted, unless otherwise noted in the permit.

Critical condition -- The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Date of receipt – This is defined in RCW 43.21B.001(2) as five business days after the date of mailing; or the date of actual receipt, when the actual receipt date can be proven by a preponderance of the evidence. The recipient's sworn affidavit or declaration indicating the date of receipt, which is unchallenged by the agency, constitutes sufficient evidence of actual receipt. The date of actual receipt, however, may not exceed forty-five days from the date of mailing.

Detection limit -- The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the pollutant concentration is above zero and is determined from analysis of a sample in a given matrix containing the pollutant.

Dilution factor (DF) -- A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction, for example, a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Distribution uniformity -- The uniformity of infiltration (or application in the case of sprinkle or trickle irrigation) throughout the field expressed as a percent relating to the average depth infiltrated in the lowest one-quarter of the area to the average depth of water infiltrated.

Early warning value -- The concentration of a pollutant set in accordance with WAC 173-200-070 that is a percentage of an enforcement limit. It may be established in the effluent, groundwater, surface water, the vadose zone or within the treatment process. This value acts as a trigger to detect and respond to increasing contaminant concentrations prior to the degradation of a beneficial use.

Enforcement limit -- The concentration assigned to a contaminant in the groundwater at the point of compliance for the purpose of regulation, [WAC 173-200-020(11)]. This limit assures that a groundwater criterion will not be exceeded and that background water quality will be protected.

Engineering report -- A document that thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report must contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal coliform bacteria -- Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab sample -- A single sample or measurement taken at a specific time or over as short a period of time as is feasible.

Groundwater -- Water in a saturated zone or stratum beneath the surface of land or below a surface water body.

Industrial user -- A discharger of wastewater to the sanitary sewer that is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

Industrial wastewater -- Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business; from the development of any natural resource; or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated stormwater and, also, leachate from solid waste facilities.

Interference -- A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

- Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and
- Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Local limits -- Specific prohibitions or limits on pollutants or pollutant parameters developed by a POTW.

Major facility -- A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum daily discharge limit -- The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Maximum day design flow (MDDF) -- The largest volume of flow anticipated to occur during a one-day period, expressed as a daily average.

Maximum month design flow (MMDF) -- The largest volume of flow anticipated to occur during a continuous 30-day period, expressed as a daily average.

Maximum week design flow (MWDF) -- The largest volume of flow anticipated to occur during a continuous 7-day period, expressed as a daily average.

Method detection level (MDL) -- See Detection Limit.

Minor facility -- A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing zone -- An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The permit specifies the area of the authorized mixing zone that Ecology defines following procedures outlined in state regulations (chapter 173-201A WAC).

National pollutant discharge elimination system (NPDES) -- The NPDES (Section 402 of the Clean Water Act) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both state and federal laws.

pH -- The pH of a liquid measures its acidity or alkalinity. It is the negative logarithm of the hydrogen ion concentration. A pH of 7 is defined as neutral and large variations above or below this value are considered harmful to most aquatic life.

Pass-through -- A discharge which exits the POTW into waters of the State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of State water quality standards.

Peak hour design flow (PHDF) -- The largest volume of flow anticipated to occur during a one-hour period, expressed as a daily or hourly average.

Peak instantaneous design flow (PIDF) -- The maximum anticipated instantaneous flow.

Point of compliance -- The location in the groundwater where the enforcement limit must not be exceeded and a facility must comply with the Ground Water Quality Standards. Ecology determines this limit on a site-specific basis. Ecology locates the point of compliance in the groundwater as near and directly downgradient from the pollutant source as technically, hydrogeologically, and geographically feasible, unless it approves an alternative point of compliance.

Potential significant industrial user (PSIU) --A potential significant industrial user is defined as an Industrial User that does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day or;

b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).
Ecology may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

Quantitation level (QL) -- Also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to (1,2,or 5) x 10^n, where n is an integer. (64 FR 30417).

ALSO GIVEN AS:
The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency December 2007).

Reasonable potential -- A reasonable potential to cause a water quality violation, or loss of sensitive and/or important habitat.

Responsible corporate officer -- A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or have gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Sample Maximum -- No sample may exceed this value.

Significant industrial user (SIU) --

1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N and;

2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement [in accordance with 40 CFR 403.8(f)(6)].

Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

*The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

Slug discharge -- Any discharge of a non-routine, episodic nature, including but not limited to an accidental spill or a non-customary batch discharge to the POTW. This may include any pollutant released at a flow rate that may cause interference or pass through with the POTW or in any way violate the permit conditions or the POTW’s regulations and local limits.

Soil scientist -- An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting Scientists or who has the credentials for membership.

Minimum requirements for eligibility are: possession of a baccalaureate, masters, or doctorate degree from a U.S. or Canadian institution with a minimum of 30 semester hours or 45 quarter hours professional core courses in agronomy, crops or soils, and have 5,3,or 1 years, respectively, of professional experience working in the area of agronomy, crops, or soils.

Solid waste -- All putrescible and non-putrescible solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes, abandoned vehicles or parts thereof, contaminated soils and contaminated dredged material, and recyclable materials.

Soluble BOD_5 -- Determining the soluble fraction of Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of soluble organic material present in an effluent that is utilized by bacteria. Although the soluble BOD_5 test is not specifically described in Standard Methods, filtering the raw sample through at least a 1.2 um filter prior to running the standard BOD_5 test is sufficient to remove the particulate organic fraction.

State waters -- Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a stormwater drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based effluent limit -- A permit limit based on the ability of a treatment method to reduce the pollutant.

Total coliform bacteria -- A microbiological test, which detects and enumerates the total coliform group of bacteria in water samples.

Total dissolved solids -- That portion of total solids in water or wastewater that passes through a specific filter.

Total maximum daily load (TMDL) -- A determination of the amount of pollutant that a water body can receive and still meet water quality standards.

Total suspended solids (TSS) -- Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset -- An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the REC SGS. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water quality-based effluent limit -- A limit imposed on the concentration of an effluent parameter to prevent the concentration of that parameter from exceeding its water quality criterion after discharge into receiving waters.

Appendix D - Technical Calculations/Water Quality Data

Attachment to Appendix D contains the technical calculations and water quality data for effluents and groundwater.

Appendix E – Response to Comments

As described in Appendix A – Public Involvement Information, REC SGS did not request an increase in volume of wastes or change in character of effluent over that previously authorized. In accordance with Chapter 90.48.170 RCW, Ecology did not need to Public Notice the Application or the Draft Permit.

Ecology allowed REC SGS a review period for the draft permit and fact sheet. Ecology received the following review comments from REC SGS by e-mails dated May 23, 2016 and October 25, 2016. Below are these comments and Ecology's responses. Ecology considered these comments and made changes to the final permit as determined appropriate.

Comments from May 23, 2016 email:

	Comments	Ecology's Responses
1	General comment: REC recognizes the Moses Lake municipal ordinances were updated in 2012 to reflect new requirements to discharges to the Sand Dunes publicly owned treatment works (POTW). As such, the measurement and any necessary accreditation required to perform these tests will require additional resources and time to establish. There is also an associated increase in cost with meeting these new permit requirements.	*Comment noted. The City of Moses Lake has recently updated their municipal code ordinance in May of 2016 (Chapter 13.05 – Wastewater Regulations). The final permit includes local limits consistent with the updated ordinance with the exception of TSS (see Response to Comment #5). The effluent color limitation for Outfall 001 has changed from 15 to 100 color units based on the 2016 revised City of Moses Lake local limit.*
2	S1. Discharge Limits A. Outfall 001 effluent limits: Oil and grease and BOD5 are currently measured weekly. Results from the analytical laboratory take ~10 days to receive results. As such, REC does not have the capacity to hold water during this time before discharge to the POTW is required. Accordingly, REC respectfully requests acknowledgement that the timing and duration of these tests occur by collecting one sample on a greater-than-daily interval (and consistent with S2. Monitoring requirements), with results measured by a third party laboratory.	*The draft permit incorrectly listed the sample type for TSS, TDS, Sodium, Chloride, Fluoride, Sulfate, and BOD_5 as 'meter' rather than '24-hour composite.' For these parameters, the final permit specifies the sample type as a 24-hour composite sample, consistent with the previous permit's monitoring requirements.* *The final permit includes monitoring frequency of BOD_5 and oil and grease as once per week using a 24-hour composite sample and grab sample, respectively.*
3	S1. Discharge Limits A. Outfall 001 effluent limits: Color units is a new measurement—accordingly, REC will either investigate conducting this test in-house, or be required to use a third party laboratory with a less-than-daily water sampling schedule.	*Comment noted. Also, see Response to Comment #1.*
4	S1. Discharge Limits A. Outfall 001 effluent limits: The maximum pH reflected in this table is inconsistent with the City of Moses Lake municipal ordinance 13.05.070 (F). Please amend the maximum pH to be consistent with the municipal ordinance which allows a maximum pH of 11.0.	*The final permit includes a pH of 6.0 to 11.0 su, consistent with the City of Moses Lake's wastewater regulations.*
5	S1. Discharge Limits A. Outfall 001 effluent limits: The change in TSS from an average monthly to a maximum daily limit is a departure from the past allowance to TSS limits. Previously, REC	*The final permit includes a monthly average TSS limit of 350 mg/L, consistent with the decision of the City Council's decision on September 14, 2010.*

	Comments	Ecology's Responses
	received permission from the Moses Lake City Council to maintain a TSS limit of 350 mg/L average monthly during a September 14, 2010 city council meeting (the documentation is attached). REC respectfully requests this approval be reflected in this and future water permit renewals.	
6	S1. C. Outfall 004 – Process Wastewater Evaporation Ponds, 4th line: please make pond plural as there are two 21 million gallon evaporation ponds.	*Ecology corrected this sentence in the final permit.*
7	S1. D. Stormwater: REC respectfully requests written permission to route stormwater/service water that enters any process sump that has conductivity < 500 µS/cm. Service water recently measured from a tap in the water lab contained conductivity of 415 µS/cm. This service water is also used in our deluge testing on a periodic basis. As such, REC respectfully requests the flexibility to manage stormwater/service water by routing the same to our stormwater evaporation ponds. Water containing any other materials (discolored, oil sheen) would not be considered in this permission.	*Ecology has added a condition to the final permit in Section S1 that allows REC to transfer stormwater/service water with a conductivity of <500 µmhos/cm to the stormwater evaporation ponds. The final permit also includes monitoring and reporting requirements for the stormwater service water discharges in Section S2.*
8	REC acknowledges the removal of the S1. E. section on high chloride water usage for dust control.	*Comment noted.*
9	S2.A. Outfall 001 monitoring requirements table; the draft permit changes the sample type for these analytes to a meter-based sample type. REC's current permit lists 24 hour composite samples for TSS, TDS, sodium, chloride, fluoride, sulfate, and BOD5. REC's current methods and sampling equipment are set for 24 hour composite samples for these parameters. As such, REC respectfully requests to retain these analytes and the specified sample type listed in REC's current permit as a 24 hour composite. In section (2) permit renewal, REC requests clarification if these samples are collected for any future permit renewal only (i.e., in the next five year renewal cycle). Please also amend the units for TSS in this table. The priority pollutants and total metals require a large sample volume due to the extensive list of analytes. As such, REC respectfully requests a grab sample type consistent with the existing discharge permit and collection method.	*The draft permit contained errors in the sampling types for these parameters. See response to Comment #2.* *The TSS units have been amended in the final permit.* *Due to the potential daily variability of the wastewater at Outfall 001, the sample type for priority pollutants remains as a 24-hour composite sample.*
10	S2.B. Outfall 003 table; FDS is currently not measured by REC, nor required in the current permit. Additionally, WAC 173-200 lists TDS, not FDS. REC respectfully requests the addition of	*The final permit will require the testing of FDS for wastewater and irrigation water samples. After testing demonstrates the relationship between TDS and FDS, Ecology will consider removing either TDS or FDS from the sampling requirements.*

	Comments	Ecology's Responses
	FDS measurements be removed from all aspects of the permit.	
11	Page 11, S2.C: Outfall 004. The HSHS treatment system does not have a clarifier. Flow at HSHS is measured at the outlet of the equalization tank.	*Comment noted. This language has been changed in the final permit.*
12	Page 11, footnotes c—e; please clarify whether these items are to be reported on the monthly DMR or can be reported annually through the ICMP.	*The final permit includes clarification that REC report these values on the monthly DMR.*
13	Page 11, Table (004B): Please amend High Sodium-High Silicate (HSHS) – Offsite HSHS Evaporation Ponds to read, High Chloride (HC) – Offsite HC Evaporation Ponds	*Ecology has corrected this table in the final permit.*
14	S2.D. Supplemental Irrigation Water Monitoring; REC respectfully requests this table be removed from the permit because monthly groundwater sampling is currently being conducted for the same analytical suite listed in this table. The farmer uses the supplemental irrigation well for standard farming practices, including any supplemental chemical and fertilizer application.	*Ecology required monitoring of supplemental irrigation water for the evaluation of the TDS loading at the land treatment site; not necessarily for groundwater quality monitoring purposes.* *This monitoring remains in the final permit.*
15	S2.E. Groundwater Monitoring and S16. Groundwater Monitoring Wells; REC respectfully requests the ability to first sample the existing monitoring well network listed in the S2.E. and do so on a monthly basis for a continual period for all parameters shown in that same table in lieu of new well installation. Additionally, REC is proposing to continue sampling on a monthly basis for continuity until such time as the 1 year intensive sampling begins. The intensive sampling period would occur from December 2016 to December 2017 (inclusive) and present a 1 year complete summary of the groundwater quality across the entire plant site. Additionally, REC will survey existing surface water features that enter/exit the plant boundary and include these locations as samples. REC and Ecology have previously discussed the need to have a clearer understanding of the groundwater quality at the site. REC believes that the existing groundwater monitoring wells can fulfill this needs, and take a lower cost/quicker approach to filing any data gap before more monitoring wells are installed. REC has experienced low water/turbid water at times in certain wells that might otherwise show different results when redeveloped/pumped clean and resampled (MW-11, MW-12, MW-13). Within 6 months of the permit issuance, REC will submit a plan to Ecology for approval to re-develop and test groundwater and any surface water quality for this 13 month cycle. Footnote b indicates the	*Based on a review of groundwater monitoring data and past hydrogeologic studies, Ecology has removed the requirement to install additional monitoring wells from the final permit. Instead, the final permit will require REC to monitor a complete set of parameters for monitoring wells MW-2, MW-3, MW-4, and MW-6.* *Because past groundwater data for temperature, specific conductance, calcium, and potassium have not provided unique or additional information, the final permit will not require monitoring for these parameters in groundwater.* *The final permit also includes a requirement to prepare a surface water monitoring plan for the purpose of characterizing surface water quality at locations within the plan boundary.*

	Comments	Ecology's Responses
	reporting for MW-11—MW-14 will be quarterly. REC is requesting to continue monthly sampling for all wells as is the current practice and throughout the extensive sampling campaign (through December 2017). At which time, REC would revert back to monthly/quarterly sampling as per the schedule in S2.E in January 2018.	
16	S2.F. Soil Monitoring; please clarify the 6th requirement by adding the following language…(e.g., the 1st composite consists of all samples collected at the 0—12 inch interval, the 2nd composite consists of all samples collected at the 12—24 inch interval, and so on. A maximum of six composites representing the appropriate depth interval are possible.)	*Ecology has changed this sentence to read:* *Depth (inches) vs. Depth increment (ft.) for composite samples:* *0 -12" (1ft); 12-24" (2ft); 24-36" (3ft); 36-48" (4ft); 48-60" (5ft); 60-72" (6ft)* *The 1st composite would consist of all core samples collected at the 0 -12" (1ft) depth, the 2nd composite would consist of all core samples collected at the 12-24" (2ft) depth, etc.*
17	S2.I. Item #2; please replace wastestream with medium as not all sampled items required by this permit are waste.	*This has been changed in the final permit.*
18	S2.I. Item #3: REC respectfully requests that calibration frequency be aligned with the current permit which allows for calibration at the manufacturer's recommended frequency (please see section H, page 13 of REC's current permit). 3b; REC conducts calibration according to various PM schedules or by the manufacturer's recommended interval. Please clarify the language of these two items as they seem appear to require a grab sample to calibrate. pH meters are calibrated using buffer solutions whereas a grab sample can be used to verify the meter returns an appropriate value. REC understands this requirement to apply to pH probes used in the waste water treatment systems at the plant. Please remove 3a and 3c; REC does not monitor these parameters.	*This wording has been changed in the final permit. The language regarding calibration checks for pH continuous monitoring has been modified to read:* *Calibrate continuous pH monitoring instruments weekly unless it can demonstrate a longer period is sufficient based on monitoring records/calibration checks*
19	S2.J. Laboratory accreditation; REC respectfully requests to retain the language of this entire paragraph from the current permit that allows for crop and soil data to be measured by laboratories that participate in nationally recognized proficiency testing programs. Soiltest in Moses Lake is REC's consultant who collects and analyzes samples up to 6 times per year and is closely located to the facility for ease of logistics and sampling. REC is unaware of any other local laboratory that meets the requirements of the existing crop and soil monitoring. Soiltest participates in a nationally recognized proficiency testing program but does not maintain	*The final permit includes the following standard language for soils and crop monitoring data:* *Crops and soils data are process control parameters, which do not require preparation by an accredited laboratory. However, the Permittee must obtain this data from a reputable agricultural test lab that is an active participant in a nationally recognized agricultural laboratory proficiency testing program.*

	Comments	Ecology's Responses
	accreditation for all soil and crop analytes listed in this draft permit.	
20	S3.A. Item #8; REC is proposing an alternative to groundwater monitoring that would affect item 8b. As such, REC requests that sampling occur monthly until such time as the proposed monitoring goes into effect (see #15 above).	*See Response to Comment #15.*
21	S3.A. Item #8b; REC appreciates Ecology's assistance in creating and managing DMR reporting through WQWebDMR. REC respectfully requests to forego the annual DMR requirement as all data would have been reported on a monthly basis previously. An annual DMR would be a regurgitation of data already submitted and may require extensive assistance from Ecology to create the reporting template and assist with any issues in WQWebDMR. Also, quarterly DMR reporting for groundwater monitoring would reflect REC's request in #15 above whereby monthly groundwater sampling would continue and be reported monthly through the WQWebDMR portal.	*The WQWebDMR system reporting coincides with monitoring frequencies: monthly sampling goes into a monthly DMR reporting form; quarterly sampling goes into a quarterly DMR reporting form; and annual sampling goes into an annual DMR reporting form.* *The system does not require duplicative entries of monitoring data. Ecology is available to assist in the monthly/quarterly/annual WQWebDMRs.*
22	S3.B. 2nd paragraph, 1st sentence; REC respectfully requests this paragraph to read '…the permittee must ensure that it is postmarked no later than the dates specified by this permit…' In the past, received or postmarked has caused uncertainty as to whether or not a required submittal was completed on time.	*Ecology would typically use the postmark date to determine whether a submittal is timely. However, there may be times when a Permittee may wish to submit reports via alternative means (e.g. email or hand delivery).*
23	Page 20, 1st paragraph; please add the following to the end of this paragraph; 'in writing.'	*This has been added to the final permit.*
24	S3.D. Item #1; please remove the word 'method' as this is a change from the current permit. The methods for sampling are well defined in the previous sections of the permit (e.g., composite, grab, continuous, or others).	*The Permittee must record the method of sampling measurement. If the permit requires sampling of a parameter using a 24-hour composite sample, the Permittee must make a record that they indeed did use a 24-hour composite for that sample collection.*
25	S3.E. Please clarify this paragraph by including the following sentence…'The additional monitoring must be conducted by the appropriate sample type and analytical method specified in the appropriate section of this permit, relevant to the sample locations listed in the current and draft permits, to meet the minimum criteria for inclusion in the DMR.' Additional monitoring should be conducted in the same manner as that which has been submitted for reporting to be a relevant comparison (i.e., not introducing error from sampling or laboratory analysis).	*The reporting of additional monitoring data applies to 'any pollutant' that the Permittee monitors more frequently than required in Permit Condition S2; as long as the analysis is conducted using Appendix A requirements or 40 CFR Part 136 test methods.* *Consider the case where the Permittee collects and analyzes a grab sample for BOD at Outfall 001 on a Monday. The Permittee then collects the 1/week permit required 24-hour composite sample on Wednesday. The Permittee must include the grab sample results in the calculation and reporting of BOD results on the DMR form.*
26	S3.F.d. Page 21, 1st sentence. The title of S3.A. is Discharge monitoring reports.	*This reference has been corrected in the final permit.*

	Comments	Ecology's Responses
27	S4.A.a. #2; REC expects that this requirement will be satisfied when there are changes that require an engineering report to be submitted to Ecology. REC respectfully requests this clarification to be added to this section.	*The Permittee must submit any substantial changes or updates to the O&M manual for Ecology review and approval (whenever the Permittee incorporates them into the manual). This requirement applies independent of submission of an engineering report.*
28	S4.A.a. #5; REC respectfully requests this requirement to be removed. REC has in place a current O&M manual that it reviews on an annual basis. As such, Ecology has already approved the manual which was submitted with the permit renewal in June, 2014. REC will continue to complete annual reviews, provide Ecology with any minor changes that occur during each review, and submit significant changes for approval as part of the engineering report process for any changes to the wastewater systems.	*Ecology has removed this condition in the final permit.*
29	S4.A.a. #6; REC acknowledges this is a change from the paper copies submitted previously and may request Ecology's assistance to facilitate this transition.	*Comment noted.*
30	S4.B. 1st paragraph; please clarify the definition by amending the sentence to read, 'This permit prohibits a bypass, which is the intentional diversion of waste streams from any portion of a treatment facility at the REC plant site prior to discharge to any of the outfalls 001—004, which may allow for the discharge of water that does not meet the discharge requirements for that specific outfall. REC believes this clarifies the intention of this first sentence.	*Ecology has re-worded the 1st paragraph to read:* *This permit prohibits a bypass, defined as the intentional diversion of wastestreams from any portion of the Permittee's treatment facilities (Outfalls 001, 003, and 004).*
31	S4.C. #8; REC contracts the farming activities as an open bidding process with long term contracts. As such, REC will always attempt to conduct farming activities but cannot guarantee with absolute certainty that farming will occur in every year. As such, REC respectfully requests this requirement to be deleted.	*If the permittee applies wastewater during an irrigation season, a viable and healthy crop cover must be maintained on all fields that receive that wastewater.* *Ecology has changed this condition in the final permit to read:* *The Permittee must…'Maintain a viable and healthy cover crop on all fields that receive wastewater; except in the case where the Permittee does not apply wastewater on a field at any time during the irrigation season.'*
32	S10; Ecology's Criteria for Sewage Works Design, pub. No. 98-37, G3-3.5.2, page 165, paragraphs 3-5 provide for the use of two alternatives—a double liner with leak detection or a single liner with ground water monitoring. REC is meeting the single liner with ground water monitoring alternative. REC's current liners consist of single 100 mil HDPE liners. REC also conducts groundwater monitoring on a monthly	*Ecology has changed 'must use' to 'must consider the use of' in the first sentence of this condition; it now reads:* *The Permittee must consider the use of a double membrane liner system with leak detection and recovery when replacing an existing liner system for any process wastewater evaporation pond.*

	Comments	Ecology's Responses
	basis (satisfying the second method of demonstrating compliance in paragraph 5 of that section of the 'Orange Book'). REC has 11 ponds/stormwater basins that hold water which is evaporated. In 2014, the single liner in Pond 2 was replaced at a cost of ~$150,000 for the entire project. The estimated cost to double line all process wastewater evaporation ponds is $5.98 million. Stormwater ponds are included in this estimate because WAC 173-240-020(8) includes contaminated stormwater in the definition of industrial wastewater. Double lining all ponds represents a significant cost. This estimate also does not include the two 21 million gallon ponds that REC leases for offsite evaporation. These ponds are leased from a third party and the cost to double line those two ponds is unknown. In 2011 and 2013, REC completed leak location surveys in both of these ponds. Accordingly, REC respectfully requests that this requirement be removed from the permit as REC is satisfying the allowable alternative in the 'Orange Book' by conducting groundwater monitoring. Additionally, REC expects to have a better understanding of groundwater quality at the site after the proposed enhanced groundwater monitoring is completed, as discussed in comment #15 above. It is also a standard practice that the replacement of any liners is tested using a leak location service (as was the case in Pond 2) before the pond is put into service.	
33	S10, 2nd paragraph; the purpose and scope in WAC 173-240-010 references RCW 90.48.110(3), which provides for a 90 day time period for review and approval unless insufficient time exists to adequately review the plan. REC respectfully requests that the 90 day time period be adhered to in this section and the relevant portion of S8 when a modification of the facility is requested (180 days is acceptable for the permit renewal period, which is also a change from the 1 year requirement in the current permit).	*The final permit includes a timeline for review and approval of at least 30 days, consistent with Chapter 173-240-110 WAC.*
34	S13.b.4; due to the proprietary and competitive nature of our industry and safety sensitive information potentially governed under other federal programs, REC respectfully requests this requirement be deleted. Ecology may access this information at the REC Moses Lake facility upon request and approval in person.	*Ecology has retained the language in the final permit. If the Permittee believes that any of information contained in this requirement (a list of all raw materials, products, chemicals, and hazardous materials used, processed, or stored at the facility; the normal quantity maintained on the premises for each listed material; and a map showing where they are located), the Permittee may request this information be kept confidential. WAC 173-216-080 and RCW 43.21A.160 outlines the procedure for requesting a certification of records as confidential.*

	Comments	Ecology's Responses
35	S14.5.a. REC respectfully requests that the data for the graphs in this section be for the calendar year 2012 and forward. The 2011 data may not be available.	*The final permit changes the beginning year from 2011 to 2012.*
36	S14.7. REC respectfully requests this section be removed. REC anticipates completing a report following the enhanced groundwater sampling discussed in comment #15 above. Additionally, the groundwater data will have already been reported through the monthly DMRs in the WQWebDMR portal.	*Ecology has deleted this requirement from this section of the final permit. However, the permit requires a summary of groundwater and surface data after the first year of monthly groundwater sample collection, then with the permit renewal application. This data summary report will include the requirement for time series graphs and treading analysis of the data.*
37	S15. Please see specific comment #32 above. REC is currently using single membrane liners and conducting monthly groundwater monitoring in accordance with the allowed alternatives outlined in Ecology's 'Orange Book.' Accordingly, REC respectfully requests this section to be removed. REC will commit to conducting leak detection following the replacement of any liner or repair when pond cleaning activities result in the pond being completely de-inventoried (i.e., removing all water and solids from any evaporation pond).	*This condition remains in the final permit. The Leak Detection Plan should describe how the Permittee will monitor, test, and report the membrane liner integrity for all wastewater impoundments on a routine basis. Ecology believes this language provides flexibility in developing the Leak Detection Plan.*
38	S16. REC is respectfully requesting an alternative to installing any new monitoring wells until such time as after the enhanced groundwater monitoring (discussed in comment #15 above) is completed, analyzed, and findings reported to Ecology. REC and Ecology have discussed this issue previously; from March 9th e-mail to Pat Hallinan from Paul Stenhouse… 1. REC would sample the irrigation ditch that runs along the irrigated field for the same routine analysis that happens for MW-11, MW-12, MW-13, and MW-14. 2. To pump out/clean/redevelop the 8 wells REC currently samples to ensure that deposited sediment in the wells/near the screen are removed. 3. That MW-2, MW-3, MW-4, and MW-6 be sampled for the same routine analysis that happens in MW-11 through MW-14. REC would propose to conduct this extra sampling for 12 months after well cleanout/redevelopment to have an accurate up-, mid-, and down-gradient set of groundwater quality data through the plant along the groundwater potentiometric flow maps in the 2012 Hydrogeology Report. Additionally, surveying and monitoring the irrigation canal would lend itself to understanding if there is a surface influence of groundwater quality.	*See Response to Comment #15.*
39	G1. Signatory Requirements; REC is respectfully requesting clarification as to which report requires differing levels of signatory authority.	*Ecology has reviewed the applicable State and Federal rules for signatory requirements contained*

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	Currently, the environmental engineer signs monthly DMRs and various other review/update reports and information. The vice president of operations signs other documents. REC is requesting this clarification to understand accurately and correctly how to meet this condition for all applications/reports/information submitted as documented in the permit. Additionally, REC is seeking clarification on this section's requirement; all things submitted to Ecology have to be signed and include a certification statement. How far reaching is this requirement and could it possibly extend to e-mail communication to Ecology?	*in Chapter 173-216-070 WAC and 40 CFR Part 403.12(l).* *The final permit includes revised General Condition G1 consistent with these rules. In summary, permit applications, reports, and other information submitted to Ecology must be signed and certified.*
40	G4. Reporting a cause for modification. Please see comment #33 above. REC is respectfully requesting this paragraph to be modified to reflect 90 days. The current permit allows for 60 days. REC feels the 180 day requirement proposed to be a significant extension and reduce flexibility.	*Ecology has changed the time period in the final permit for reporting a cause for modification to 60 days, consistent with WAC 173-216-110(5). These changes include conditions S8. Application for permit renewal or modification for facility changes; and G4. Reporting a cause for modification.*
41	G5. Plan Review required. Please see comment #33 above. REC is respectfully requesting this paragraph to be modified to reflect 90 days.	*Ecology has changed the time period in the final permit for required plan review to 30 days, consistent with WAC 173-240-110.*
42	Draft Permit Fact Sheet	
43	Page 1, paragraph 7; please see comments #15 & #38 above regarding additional wells.	*In this Response to Comments form, Ecology has summarized substantive comments and responded to them. Ecology has included this summary and responses to comments as Appendix E - Response to Comments in the fact sheet. Ecology has not revised the rest of the fact sheet, except for topographical and factual errors. This full document will become part of the legal history contained in the facility's permit file.* *See Response to Comment #15.*
44	Page 1, paragraph 7; please see comment #32 above regarding leak detection, and double lining evaporation ponds.	*See Responses to Comments #32 and #43.*
45	Page 8, Wastewater pretreatment: Please amend the spelling of segregation and add 'ing' to follow in this first paragraph.	*These typographical errors have been corrected in the final fact sheet.*
46	Page 9, 1st Bullet: Please delete "metal chloride dryer (MCD) scrubbers" and replace with "Emergency Vent Scrubbers". The high chloride (HC) system receives discharge from the lime based scrubbers, which include process scrubber, maintenance scrubber, and both emergency vent scrubbers. The HC system also receives waste water from the byproducts sump (the sump encompasses the scrubber, influent water treatment systems, and the LC and HC	*These factual corrections have been made in the final fact sheet.*

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	effluent treatment systems). The HSHS system receives discharge from caustic based scrubbers which includes the process finishing column, maintenance finishing column, both 3.0 and 4.0 MCD scrubbers, and the silane scrubber.	
47	Page 9, 2nd Bullet: Please insert "finishing column" after process and maintenance in the parenthesis. To clarify these as the caustic based finishing columns as opposed to lime based scrubbers, this additional description is necessary.	*This factual correction has been made in the final fact sheet.*
48	Page 9, 3rd Bullet: Please change "MCD" to HC/LC. MCD sumps receive maintenance wash water.	*This factual correction has been made in the final fact sheet.*
49	Page 9, 3rd bullet: Please add 'to' between the words water and a in the second sentence.	*This typographical error has been corrected in the final fact sheet.*
50	Page 11, Table 2: Discharge Outfalls: Correct the discharge locations for Outfall 004. High Sodium, High Silicate (HSHS) Process Wastewater is sent to the Evaporation Pond System (Pond 6). High Chloride Process Wastewater is sent to Evaporation Pond System (Ponds 1, 2, 3, 4 & 5). Pond 6 can be pumped to HC ponds to equalize pond levels, when necessary.	*These factual corrections have been made in the final fact sheet.*
51	Please see comment #5 above to the Draft Permit ST0008121 section to address page 20, Table 7 effluent limits, specifically for TSS.	*See Responses to Comments #5 and #43.*
52	Page 23, Table 8. REC respectfully disagrees with the practice of removing real data from a dataset when used to calculate background water quality. These outliers represent real data that were collected unless sampling and laboratory error are proven to be the reason for errors in analytical data. In parallel, REC hopes to establish water quality data with the enhanced sampling that is proposed for all wells in comment #15 above.	*Comment noted.*
53	Please see comments #15, #32, & #38 above to the Draft Permit ST0008121 section to address the 1st and 2nd bullets on page 24. Additionally, REC leases the off-site evaporation ponds. Leak location was completed at the off-site evaporation ponds in 2011 and 2012 with no leaks found. REC respectfully requests to defer leak location surveys at the off-site evaporation ponds until such time as maintenance/de-inventorying/cleaning activities that may occur in the future.	*See Responses to Comments #15 and #43.*
54	Page 27, Section B: REC continues to update the operations and maintenance manual on an annual basis. Thus, the current manual, with	*See Responses to Comment #43.*

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	annual updates is respectfully requested to satisfy the requirement in the final sentence of this section.	
55	Draft Permit Technical Calculations	-
56	No comments or changes	-

Comments from October 25, 2016 email:

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57	[Condition S1.A, effluent temperature limit for Outfall 001] In conversations with the City, it's my understanding this temperature limitation is at the connection between REC and the main sewer trunk, along Wheeler Road. Accordingly, this 104 limit is imposed at that location, not at REC's outfall. REC respectfully requests this to be removed. See City of Moses Lake Municipal Code 13.05.070 for reference. The City of Moses Lake informed me their POTW connection to REC begins at Wheeler Road, not at REC's outfall.	*Ecology has reviewed the limits for temperature in the previous permit, and has removed the 104°F limit from Permit Condition S1 (Effluent Limits). Permit language in Condition S5.B.4 has been changed from:* *Heat in amounts which will inhibit biological activity in the POTW resulting in interference, but in no case heat in such quantities that the temperature at the POTW treatment plant exceeds 40 degrees C (104 degrees F) unless the approval authority, upon request of the POTW, approves alternative temperature limits.* *to:* *Heat in amounts which will inhibit biological activity in the POTW resulting in interference, but in no case heat in such quantities that the temperature at the POTW collection system exceeds 40°C (104°F) unless the approval authority, upon request of the POTW, approves alternative temperature limits.*
58	[Permit Condition S2.A. Monitoring Requirements for TSS at Outfall 001] REC's current permit requires mg/L only, whereas TDS is listed as requiring both concentration and loading. Is this correct? Mg/L is listed in the table above as a discharge limit and lbs/day is not included as a discharge limit.	*The final permit omits reporting of TSS in lbs/day.*
59	[Permit Conditon S2.E Monitoring Requirements for Supplemental Irrigation Water] There is no flow meter on this pump. However, REC can calculate the flow rate using pump run times and pump gpm rating.	*Estimating flows using pump run times and pump gpm rating may result in inaccurate readings, because actual pumping rates may not match the listed pumping rate (due to pump wear and varying pump head losses).* *The final permit retains the requirement to measure flow of the supplemental irrigation water using a meter.*
60	[Permit Condition S2.F. Groundwater Monitoring] Can there be a specific note that until the wells are redeveloped, MW-2, -3, -4, and -6 will be sampled as they are today? Otherwise, REC is going to collect up to 6 months of data that aren't	*The final permit specifies that groundwater montoring begin after the redevelopment of wells MW-2, -3, -4, and -6 (within 6 months after issuance date of the permit.*

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	going to correlate to the post-well development efforts. Another option is suspending groundwater monitoring until the wells are re-developed within the 1st 6 months of this permit.	
61	[Permit Condition S2.G. Sampling and Analytical Procedures] REC respectfully requests the use of SOPs published by Ecology as the basis for conducting sampling. This referenced document is not free for public consumption.	*As specified in this condition, sampling and analytical procedures must conform to the latest revision of either 40 CFR Part 136 or Standard Method for the Examinaiton of Water and Wastewater. Indeed, Standard Methods is only available with cost. The Permittee should contact Ecology with any questions regarding appropriate sampling and analytical procedures.*
62	[Permit Condition S3.A.8.c Annual DMR Reporting] REC respectfully requests this date be extended to January 31st as the annual DMR may require extra effort to compile and check for accuracy. Also, it provides a clear separation of the same date of the monthly DMR from December.	*The final permit includes a January 31st annual reporting requirement for annual DMRs.*
63	[Permit Conditon S14 Surface Water and Groundwater Study Plan] Is it worth clarifying in the permit that all constituents are for total concentrations, where appropriate (metals, for example). Are there constituents where a dissolved fraction is required, including in SW concentrations?	*Ecology will rely on the Surface Water and Groundwater Study Plan to specify the appropriate fraction of metals (dissolved versus total). Ecology would recommend major cations/anions in both surface waters and groundwaters be measured as totals. For copper, Ecology would recommend testing for the dissolved fraction in both surface waters and groundwaters.*
64	[Permit Conditon S14.2.b Surface Water and Groundwater Study Plan] The sampling techniques in this guidance document are appropriate for part per trillion range metals, and not at concentrations normally found in untreated discharges. From Section 1.4 of this reference: *This method is not intended for determination of metals at concentrations normally found in treated and untreated discharges from industrial facilities. Existing regulations (40 CFR Parts 400-500) typically limit concentrations in industrial discharges to the mid to high part-per-billion (ppb) range, whereas ambient metals concentrations are normally in the low part-per-trillion (ppt) to low ppb range. This guidance is therefore directed at the collection of samples to be measured at or near the levels listed in Table 1.* REC intends to use low-flow sampling techniques and invest in equipment to support that collection method. REC respectfully requests the use of SOPs published by Ecology. http://www.ecy.wa.gov/programs/eap/quality.html	*Ecology has changed the final permit language in condition S14.2.b. from:* *Follow the clean sampling techniques (Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels, EPA Publication No. 821-R-95-034, April 1995).* *to:* *Follow sampling techniques appropriate for the parameter and target detection level in accordance with the following:* *Clean sampling techniques from Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels, EPA Publication No. 821-R-95-034, April 1995).* *Standard Operating Procedures (SOPs) for sampling, auditing, and field methodology from Ecology's Environmental Assessment Program (http://www.ecy.wa.gov/programs/eap/quality.html)* *Water-Quality Sampling by the U.S. Geological Survey: Standard Protocols and Procedures (http://pubs.usgs.gov/fs/2010/3121/fs2010-3121.pdf)*

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	Alteratively, the USGS publishes a widely accepted set of guidelines for various sampling. http://pubs.usgs.gov/fs/2010/3121/fs2010-3121.pdf	
64	[Fact Sheet, various locations] Typographical Corrections.	*Ecology has corrected these in the final Fact Sheet.*
65	[Fact Sheet, Section E Comparison of effluent limits with the previous permit issued on June 28, 2010] Can the table reflect the permit and response to comments where permit limits have changed?	*See Response to Comment #43.*
66	[Fact Sheet, Section E Comparison of effluent limits with the previous permit issued on June 28, 2010] REC's approval order (15AQ-E634; 'air permit') references the 2500 ppm TDS limit as specified in the water permit for cooling tower water blowdowns.	*Comment noted. The removal of the TDS limit would not relieve the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.*