3.4 WATER QUALITY

The following section describes existing water quality in the region of the proposed BP Cherry Point cogeneration facility, and assesses the project's potential for affecting water quality. Mitigation measures to reduce or eliminate impacts that would result from the project are also discussed. The analysis in this section is primarily based on information provided by the Applicant in the ASC (BP 2002, Appendix F).

3.4.1 Existing Conditions

Surface water resources are described detail in Section 3.3. The cogeneration project, including all its ancillary facilities, is located within what is commonly called the Mountain View Upland of Whatcom County (Newcomb et al. 1949).

The cogeneration facility, refinery site interface, and transmission line intertie are situated near the western end of the Terrell Creek drainage basin. Lake Terrell is the headwaters for Terrell Creek. The creek generally passes through the basin from east to west to its discharge point into Birch Bay at the Strait of Georgia. Stormwater from the project site would be discharged to the Terrell Creek drainage basin.

The Bonneville Transmission Line No. 2 corridor between Custer and the cogeneration facility site traverses both the Terrell Creek Basin and the California Creek Basin. The California Creek Basin, which lies north of the Terrell Creek basin, is also located in the Mountain View Upland and has very similar geology, geography, topography, historical development, and surface water characteristics to the Terrell Creek Basin. It does not, however, have a lake at its headwaters. California Creek flows generally northwest to Drayton Harbor.

Terrell Creek is classified as Class AA, extraordinary waters. Class AA waters must meet the water quality criteria as found in Chapter 173-201A–030. The Washington State Department of Ecology has established a water quality monitoring station on Terrell Creek near Jackson Road, northwest of the cogeneration facility. Sampling during 2001 and 2002 revealed exceedances from state water quality criteria for Class AA waters for fecal coliform bacteria (two exceedances) and dissolved oxygen (seven exceedances).

Neither Terrell Creek nor Lake Terrell are included in Ecology's section 303(d) list of impaired waters and there are no Total Maximum Daily Load (TMDL) plans or other existing water quality limitations in effect for either water body.

No water quality data were found for California Creek in Ecology's Internet databases. No specific classification for California Creek was found in WAC 173-201a. Therefore, California Creek falls under WAC 173-201A-120 general classification and is classified as Class AA. Given that the California Creek Basin is similar in physical makeup and land use to the Terrell Creek Basin, it is reasonable to assume that water quality conditions and concerns are also similar.

Industrial wastewater from the cogeneration facility would be discharged to the Strait of Georgia via the BP Cherry Point Refinery's wastewater treatment system. Cogeneration facility wastewater would be treated and combined with the refinery's wastewater and discharged through the NPDES-permitted (WA-002290-0) Outfall 001. This outfall was established during the original refinery construction and was put in place between 1969 and 1971. The Strait of Georgia is designated as a Class AA marine receiving water in the vicinity of the outfall. No surface water quality information for the Strait of Georgia in the vicinity of the outfall could be found.

The Nooksack River is the source of industrial process water for the project. Water from the Nooksack River would be piped to the site by the Whatcom County PUD, either from once through non-contact cooling water from a jacketed air compressor at the Alcoa Intalco Works if that facility is operational or directly from the river. Water quality parameters of once through non-contact cooling water are presented in Table 3.4-1. It is expected that the jacketed air compressor would alter only temperature (an increase of approximately 5°F) of the once through non-contact cooling water (Torpey, pers. comm., 2003).

The Nooksack River is a Class A surface water. Ecology maintains five water quality monitoring stations on the Nooksack River. The closest is located southeast of the cogeneration site at Brennan in western Whatcom County. Sampling between 1996 and 2002 revealed exceedances from state water quality criteria for Class A waters for fecal coliform bacteria (five exceedances) and total mercury (two exceedances).

Table 3.4-1: Source Water Quality

Constituent	Result	Units
Dissolved Oxygen	8.2	mg/l
Hydrogen Ion	7.2	pH
Temperature	21.4	C
Chemical Oxygen Demand	ND	mg/l
Total Organic Carbon	0.55	mg/l
Total Nitrate/Nitrite	0.15	mg/l
Fluoride	ND	mg/l
Bromide	ND	mg/l
Vanadium	0.009	mg/l
Aluminum	0.523	mg/l
Antimony	ND	mg/l
Arsenic	ND	mg/l
Barium	0.010	mg/l
Beryllium	ND	mg/l
Cadmium	ND	mg/l
Chromium	ND	mg/l
Cobalt	ND	mg/l
Copper	ND	mg/l
Iron	0.368	mg/l

Table 3.4-1: Continued

Constituent	Result	Units
Lead	ND	mg/l
Manganese	0.009	mg/l
Mercury	ND	mg/l
Nickel	0.001	mg/l
Selenium	ND	mg/l
Thallium	ND	mg/l
Tin	ND	mg/l
Zinc	0.005	mg/l

Source: Bechtel 2001

Groundwater Quality

The physical setting for regional and local groundwater is described in Section 3.3.

Groundwater within the Whatcom Basin in general, and specifically within the Mountain View Upland, typically has low dissolved solid content and is suitable for domestic and public water supply. The salinity of the aquifers in this area is low (generally below 20 ppm of chloride). Reports indicate that the deeper pre-Vashon sediments also contain water of good quality even from strata hundreds of feet below sea level (Newcomb et al. 1949). By contrast, groundwater in Tertiary bedrock, which primarily acts as an aquitard, commonly has elevated salinity levels when encountered.

The most objectionable constituent in basin groundwater in the western Whatcom Basin is elevated iron (Newcomb et al. 1949). Its occurrence is confined almost entirely to recessional outwash sands and gravels and recent alluvial deposits. A borehole log of well 40/1E-33 G reports a “sulfur smell odor,” possibly hydrogen sulfide. Such occurrence may be due to peat or swamp deposits in close proximity to the aquifer (Newcomb et al. 1949).

A potential exists for shallow groundwater beneath the project site to be contaminated because of its proximity to the BP industrial operation. The area appears hydraulically upgradient of facility operations, however, and therefore is not especially vulnerable to releases from the facility, if they have occurred in the past.

Refinery Wastewater

Process water from the BP Cherry Point refinery receives primary and secondary treatment in a wastewater treatment system consisting of parallel oil/water separators, an equalization tank, an activated sludge unit, a secondary clarifier, and two clarification ponds. The discharge from the wastewater treatment system is pumped into the Strait of Georgia. An NPDES permit was issued to BP by Ecology on October 1, 1999. Table 3.4-2 lists the limitations on the treated process wastewater discharged from the refinery, as outlined in the NPDES permit:

Table 3.4-2: Refinery Effluent Limitations (pounds per day, except where noted)

Parameters	Monthly Average	Daily Maximum
Biochemical Oxygen Demand (five-day)	1,240	2,260
Chemical Oxygen Demand	8,540	16,610
Total Suspended Solids	990	1,570
Oil and Grease	360	680
Oil and Grease	Concentration shall at no time exceed 15 mg/l and shall not exceed 10 mg/l more than three days per month.	
Phenolic Compounds	8.1	16.7
Ammonia as N	870	1,910
Sulfide	6.7	14.7
Total Chromium	12.5	27.5
Hexavalent Chromium	0.9	2.0
pH	Within the range of 6.0 to 9.0	

In a report dated May 28, 2002, BP documented the results of a study conducted in 2000-2001 to determine the treatment and removal efficiencies of its wastewater treatment system. This report also includes an engineering analysis of the wastewater treatment system's design capacity. The refinery currently uses approximately 50% of the organic and hydraulic capacity of the wastewater treatment system (EFSEC 2003). Once treated, the water is discharged via the refinery's existing wastewater discharge point at the Cherry Point terminal through Outfall 001 under an existing NPDES permit to the Strait of Georgia.

3.4.2 Impacts of the Proposed Action

Construction

This section describes potential impacts to water quality from construction activities and project design elements proposed by the Applicant to minimize or eliminate those potential impacts.

<u>Cogeneration Facility</u>

Potable Water and Construction Wastewater

During construction, nonpotable water would be necessary for dust control (anticipated to be about 7 million gallons over the entire construction period). Drinking water for construction workers would be provided by a water service to be contracted by the site contractor. There should be no impacts on the quality of the potable water source from these activities.

Water for HRSG and export steam line steam-blow tests and hydrostatic tests would be required for the commissioning of the cogeneration facility, natural gas connections, and water supply/discharge connections. The source of the test water would be the fresh industrial water supplied by the PUD. About 15.5 million gallons of water would be needed for HRSG steam-blow testing. Export steam line steam-blow testing would require about 1.2 million gallons, and hydrostatic testing would require no more than 4.8 million gallons. Testing would take place near the completion of construction over a period of two to three months.

The water generated from these activities is anticipated to be "clean," but could contain small amounts of oil and grease. Consequently, the Applicant plans to collect and discharge the test water to the refinery wastewater treatment system. As described above, the refinery wastewater treatment system currently operates at approximately 50% of its organic and hydraulic capacity. Impacts on the refinery wastewater treatment system are not anticipated.

Water used for HRSG steam-blow tests would be discharged as steam to the atmosphere. If contaminants are present in the water, the contaminants may be discharged to the atmosphere with the steam.

Stormwater (Surface Runoff)

The potential exists for impacts on stormwater quality either from sediment loading or from accidental spills and leaks. Turbid sediment-laden surface water runoff could discharge relatively directly to Terrell Creek along the Blaine Road ditch, or more circuitously to Terrell Creek by way of the wetland/pond areas north of Grandview Road.

A Construction SWPP plan would be developed in accordance with BMPs and would detail the sediment and erosion control measures and accidental spill prevention and control measures. The BMPs would be implemented, inspected, and maintained to minimize the potential for adversely affecting downstream water quality. These may include such things as silt fencing and hay bales, and placement of polyethylene tarps to cover exposed surfaces. Control of fuel storage and equipment fueling operations for spill prevention and control would be detailed in the SWPP plan. These BMPs would be inspected after every storm event greater than 0.5 inches of precipitation in 24-hours to assess damage and maintenance requirements, if any.

As described in Section 3.3, the construction stormwater collection and treatment system would include diversion ditches to prevent runoff from areas outside the cogeneration project site from entering the site. Stormwater runoff from within the cogeneration project site would be contained, collected, and routed to the stormwater treatment and detention system. Silt fences and temporary swales on the construction site would lead runoff to the treatment and detention system. Perimeter silt fences around the construction zone would be installed to remove sediment from runoff before it reaches the site boundary. Additional localized silt fencing would be used as required during construction to minimize erosion and transport of soil. Temporary swales would be constructed to accommodate areas being excavated or filled. Once the preliminary cut-and-fill work is complete, the swales would likely remain in place until final grading. Wherever possible, temporary swales would be incorporated into the permanent stormwater collection system. The perimeter silt fence would not be removed until the site has been stabilized. In general, the stormwater treatment and detention system would consist of oil/water separation system equipped with a shutoff valve in case of an accidental release for containment. Emergency cleanup equipment and supplies would be available onsite for rapid response. Stormwater would be discharged from the oil/water separation system into a final treatment and detention pond (1) located near the northwest corner of the site. The unlined pond would be properly sized in accordance with Whatcom County and Ecology requirements, and then eventually discharged to wetlands from the treatment/detention pond. Additional stormwater quality treatment would be achieved when water discharged from the construction stormwater treatment system reaches the wetlands between the project area and Terrell Creek.

As elements of the permanent stormwater collection system are installed within the cogeneration project site (see discussion below), they would be used to contain, collect, and treat construction runoff. Silt fencing intended to prevent sediments from entering would protect inlets to the permanent system. Seeding and mulching would be used where practical for slope stabilization as rough grading is completed.

Containment pits or other means of confinement would be provided locally near each potential source of contaminating materials to provide for protection against spillage. A SWPP plan would be established prior to commencement of construction activities.

With implementation of the planned construction stormwater collection and treatment system, SWPP plan, and BMPs, there would be no adverse change to the returning quality of the collected stormwater to the Terrell Creek drainage basin.

Sanitary Waste

Portable sanitation units would be used during construction of the cogeneration facility. These units would be maintained on a regular basis, and a licensed Sanitary Waste Management Contractor would collect waste from the units for disposal in accordance with applicable regulations. Sanitary waste generation is anticipated to be 500 gallons per day in conjunction with the construction phase.

Groundwater

A potential exists for impacts on groundwater through accidental spills of construction chemicals or through fuel and lubricant leaks from construction equipment. A list of chemicals anticipated to be used during construction is provided in Table 3.4-3.

If an accidental release did occur and reached bare ground, the surface soils and underlying Bellingham drift are expected to be an effective medium for chemical absorption and retardation. Both the surface soils and Bellingham drift contain fine-grained silts and clays, which would slow infiltration but not prevent it.

There is limited potential for impacts to the Deming aquifer from construction-related spills or leaks due to the thickness of the overlying Bellingham drift and its low permeability. By contrast, there is a greater potential for impacts to the upper water-bearing zone due to its shallow depth and higher permeability soils. Impacts to this shallow groundwater zone would likely require a large-volume spill that was undetected for an extended period of time. A large-volume spill that was immediately detected and cleaned up would have a very low potential for impacting the upper water-bearing zone.

Table 3.4-3: Chemicals to Be Used and Stored During Construction

Chemical	Purpose	Estimated Quantity	Storage Location
STG and pre-boiler piping cleaners	STG and pre-boiler piping cleaning waste, chelant chemical cleaner, or demineralized water treated with oxygen scavenger and amine	400,000 gallons	Brought to site by equipment vendor/ contractor
Solvents, used equipment lube oils, paints, adhesives	Used in construction	200 gallons monthly	Not known at this time
Used and waste oils	For CGT and STG lube oil flushes	200 55-gallon drums over life of construction	Not known at this time
Spent lead batteries	Various	3 batteries annually	Not known at this time
Spent alkaline batteries	Various	80 batteries monthly	Not known at this time
Waste oil from oily waste holding tank	Collected onsite	25 gallons monthly	Not known at this time
Oil rags, oil absorbent	Generated during normal construction activities, excluding lube oil flushes	55 gallons monthly	Not known at this time
Argon Gas	Welding and HRSG components	Not known at this time	Temporary warehouse
Acetylene	Cutting torches	Not known at this time	Temporary warehouse
Helium	Welding aluminum ducts	Not known at this time	Temporary warehouse
Nitrogen	Welding	Not known at this time	Temporary warehouse
Oxygen	Cutting torches	Not known at this time	Temporary warehouse

Source: BP 2002

<u>Refinery Interface</u>

Stormwater treatment measures for the refinery interface would be similar to those described for the cogeneration facility. Construction stormwater would be routed through oil/water separation facilities then to an unlined stormwater detention pond (2) located in the southwest corner of Laydown Area 2.

The refinery interface includes most of the piping systems that would require hydrostatic testing prior to operation. As discussed above, this test water would be routed through the refinery wastewater treatment system prior to discharge to the Strait of Georgia via Outfall 001. No impact on the refinery's wastewater treatment system nor the Strait of Georgia surface water and sediment is expected. The refinery wastewater treatment system currently operates at 50% of its capacity and should, therefore, accommodate the additional temporary inputs without reduction in outfall quality.

<u>Transmission System</u>

This new 0.8-mile transmission line would require the construction of five towers. As described above for the cogeneration facility, the potential for contamination of stormwater from sediment or accidental spills is possible during tower construction. Implementation of the construction SWPP plan and appropriate BMPs would protect against adverse impacts on surface water and groundwater quality.

The 150-foot-wide electrical transmission line corridor has not yet been cleared of trees, although the access/maintenance roads leading to the transmission line corridor have been developed. Three pads for the transmission towers have already been constructed. The gravel pads are approximately 50 feet by 50 feet. One additional pad will be constructed at a later date adjacent to the existing Bonneville Transmission Corridor. There are two gravel access roads, approximately 15 feet wide, which have been developed for construction and access of the transmission pads and footings. These pads and access roads were constructed under an existing Clean Water Act permit. BMPs such as silt fences, straw bales, and munching would be used as necessary during clearing of the corridor and construction of the remaining tower pad to control erosion until the area can be stabilized with gravel or vegetation.

Custer/Intalco Transmission Line No. 2

Upgrading the existing approximately 5-mile corridor may require placement of several new towers (the number of new towers required has not been determined). Potential impacts on surface water and groundwater quality are similar to those described for the cogeneration facility. Implementation of the construction SWPP plan and appropriate BMPs would protect against adverse impacts on surface water and groundwater quality.

The upgrade option involving the Remedial Action Scheme, rather than the option requiring placement of new towers, would not impact water quality.

Other Project Components

Potential impacts on surface water and groundwater quality during construction of the other project components are similar to those described for the cogeneration facility. Implementation of the construction SWPP plan and appropriate BMPs would protect against adverse impacts on surface water and groundwater quality.

The new section of the industrial water supply pipeline would need to be hydrostatically tested prior to operation. As discussed above, this test water would be routed through the refinery wastewater treatment system prior to discharge to the Strait of Georgia via Outfall 001. No impact to the refinery's wastewater treatment system nor the Strait of Georgia surface water and sediment is expected.

Operation

Cogeneration Facility

Process Wastewater

Wastewater sources would include the following:

- Treatment of raw water to produce high-quality boiler feedwater (BFW) and refinery return condensate treatment;

- Equipment drains - collection of water and/or other minor drainage from various types of equipment ("oily wastewater"); and
- Cooling tower blowdown.

The estimated flows and chemical compositions of waste streams from the cogeneration project, except for sanitary wastewater, are provided in Table 3.4-4.

Table 3.4-4: Wastewater Flows and Chemical Composition

	Demineralization Plant Regeneration Water (Includes Filter Backwash)	Equipment Drain and Washdown Oily Wastewater	Cogeneration Cooling Tower Blowdown
Average Flow (gpm)	54	5	131 [10]
Peak Flow	300 gpm	50 gpm	400 gpm
Duration	1 hr/day	30 min/day	8 hrs/day
General Parameters			
pH (pH units)	6.5 – 8.5	7.0 – 7.5	8.0 – 9.5 [13]
Dissolved oxygen (mg/L)	8	8	8
COD	8 [1]	65 [1]	200 [12]
BOD	4 [1]	33 [1]	81 [12]
Oil and grease (mg/L)	2	20	0.3
TDS (mg/L)	5,000	62	2,200
TSS (mg/L)	28	20	50
Temperature (ºF)	< 80	< 80	< 100
Major Cation Concentration (mg/L)			
Ca	54	14	207
Mg	20	5	77
Na	1,688	11	165
K	3.6	1	14
Major Anions Concentration (mg/L)			
HCO_3	62	67	200
CO_3	0	0	0
Cl	12	3.2	287 [9]
SO_4	2,950	14	1,024 [9]
Trace Metals Concentration (mg/L)			
Ag [2a]	0.004	0.001	0.015
Al [2]	3.0	0.75	11.25
As [2a]	0.004	0.001	0.24 (0.512) [7]
Ba [2]	0.072	0.018	0.27
Trace Metals Concentration (mg/L)			
Be [2a]	0.004	0.001	0.015
Cd [2a]	0.004	0.001	0.015
Cr [2]	0.008	0.002	0.20 (0.918) [7]
Co [2a]	0.02	0.005	0.075
Cu [2a]	0.02	0.005	0.23 (0.291) [7]
Fe [2]	0.308	0.077	1.16
Hg [2a]	0.002	0.0005	0.0075
Mn [2]	0.588	0.147	2.205
Ni [2a]	0.004	0.001	0.015
Pb [2a]	0.004	0.001	0.015
Sb [2a]	0.004	0.001	0.015
Se [2a]	0.004	0.001	0.015

Table 3.4-4: Continued

	Demineralization Plant Regeneration Water (Includes Filter Backwash)	Equipment Drain and Washdown Oily Wastewater	Cogeneration Cooling Tower Blowdown
Sn [2a]	0.16	0.04	0.6
Tl [2a]	0.004	0.001	0.015
V [2]	0.036	0.009	0.135
Zn [2]	0.04	0.01	2.0 [9]
Other Anions Concentration (mg/L)			
SiO_3	40	10	150
PO_4	2.0	0.5	10 [9]
F [2a]	2.0	0.5	7.5
NO_3/NO_2	4.0	1.0	15
NH_3/NH_4	[3]	[3]	[3]
Br [2a]	0.02	0.005	0.075
Organics Concentration (mg/L)			
Dissolved organic carbon	[4]	[4]	[4]
Polymers (polyquarternaryamine)	19 [5]	0	0
Polymers (polyacrylamide)	0	0	10 [8]
Total organic carbon	48 [6]	12	50 [11]

Source: Bechtel 2001

Notes:

1 Based on typical ratio between oil and grease, COD and BOD in industrial wastewater.

2 Trace metal data reported, except aluminum (Al), are based on a single test report by Edge Analytical (Ref 01-4184, 08/29/2001). Actual quantities would be related to background concentrations as follows:

- For Denim Plant Regeneration Water (Includes Filter Backwash), the actual concentration would be approximately four times the background concentration in the Whatcom PUD water.
- For Equipment Drain and Washdown Oily Wastewater, the actual concentration would be the background concentration in the Whatcom PUD water.
- For Cogeneration Cooling Tower Blowdown, the actual concentration would be approximately 15 times the background concentration in the Whatcom PUD water.

Values for Aluminum are based on historical average values as supplied by Whatcom County PUD and concentrated on the same basis as the rest of the trace metals.

2a The Edge Analytical test showed no detectable quantity of this component. The quantities shown are based on the detection limit for the analytical test and are concentrated by 1, 4, or 15 times as described in Note 2.

3 Not detected in site samples; not normally present in surface waters at detectable levels.

4 Included with total organic carbon concentration value.

5 This type of polymer may be used to treat makeup water, which is filtered prior to demineralization.

6 This is an assumed value and is based on four times the value typical for surface waters subject to elevated TOC due to seasonal runoff.

7 This is an estimated value, and is 15 times the value obtained in a test performed by Edge Analytical (Reference # 01-4184) plus the highest anticipated leachate rate from CCA-C wood used in cooling tower construction. This highest concentration occurs initially upon cooling tower startup. Over a period of about one year, this initial concentration would decrease about 40–80%. The number in parentheses is the highest initial concentration; the other number in the cell is the longer-term concentration.

8 This type of polymer may be used as a dispersant in the cooling tower recirculating water.

9 This value reflects addition of this substance to the cooling tower recirculating water to control pH and limit biofouling and corrosion.

10 This value could increase to 203 gpm if the cooling tower is operated at 10 cycles of concentration as opposed to 15. Concentrations of chemical species relating to the cooling tower would then be reduced in inverse proportion. Total mass flow of species listed would remain constant. Because 10-cycle operation requires 72 gpm more makeup water on an average basis than 15-cycle operation, freshwater requirements for the cogeneration facility are given for 10-cycle operation.

11 This value is based on a typical average surface water TOC concentration of 3 to 4 mg/L, with the cooling tower operating at 15 cycles of concentration.

12 Based on typical ratios between TOC, COD, and BOD in municipal wastewater; which represent these relationships when the TOC, COD, and BOD are not derived from petrochemical wastes.

13 Normal control range: 8.2 to 8.8 pH

There would also be a periodic wastewater stream generated when a gas turbine is shut down in order to wash the turbine blades and restore peak operating efficiency. This is done once per quarter per gas turbine at most, depending on blade fouling severity. The operation generates approximately 2,300 gallons of water per wash that contains dirt deposits removed from the blades, along with detergents used for the cleaning operation. The current plan, because it is not know what effect the detergent would have on the refinery’s wastewater treatment system, is to collect this water in a sump and transport it offsite for treatment and disposal. The collected wash water would be tested, and if determined to be appropriate, would be treated by the refinery’s wastewater treatment system and discharged to the Strait of Georgia through Outfall 001.

Anticipated water quality from the boiler blowdown is also listed in Table 3.4-4.

The streams generated during normal operation represent the majority of the wastewater flows and are proposed to be handled as follows:

- Raw Water Treatment Waste and Refinery Return Condensate Treatment Waste: Filters are used to remove the relatively small amount of suspended solids present in the water received from the PUD. Filtration is required as a first step in the production of high-quality BFW. Periodically, each of the three filters in the unit would be backwashed to remove the solids from the filter media. The backwash water is collected in a large tank (equalization tank), which is then pumped at a controlled rate to the refinery’s wastewater treatment system.

  The condensate being returned from the refinery to the cogeneration facility would be treated through a precoat filter system to remove any trace oil. When the precoat filter material is replaced, the spent precoat material (a mixture of powdered cellulose and powdered activated carbon) would be collected in a tank and dewatered for disposal. The water removed as a result of the dewatering process would be sent to the refinery wastewater treatment plant.

  Ion exchange units are also used to purify water from the PUD and condensate returned from the refinery. Dissolved ionic species must be removed in order to generate high-pressure steam in the HRSGs without fouling or corroding the boiler tubes. The resins in the ion exchange units eventually become saturated as their capacity for removing ions has been reached. It is then necessary to regenerate these resins with dilute sulfuric acid and sodium hydroxide. These chemicals, along with the removed ions and rinse waters, are collected in the neutralization tank, neutralized to a pH of between 6.5 and 8.5, pumped to the equalization tank, and then pumped to the refinery’s wastewater treatment system. The filter backwash is also part of this stream.

- Equipment Drains: Some pumps and steam turbines may use small quantities of water to cool bearings or lubricate seals. Water draining from this equipment has the potential to come in contact with surfaces that may have lubricating oil on them. As such, this wastewater has the potential to contain trace free oil. In addition, some equipment must be flushed with water prior to being opened for maintenance. This water may also contain impurities, which would require treatment. These waters would be collected in a sump, held in an equalization tank, and pumped to the refinery's wastewater treatment system.

- Cooling Tower Blowdown: The blowdown from the cogeneration facility cooling tower would be held in an equalization tank with other cogeneration wastewater streams (except sanitary wastes) and pumped at a controlled rate to the refinery wastewater treatment system.

After treatment in the refinery wastewater treatment system, wastewater from the cogeneration facility would be discharged along with the refinery wastewater to the Strait of Georgia. The cogeneration facility would add approximately 190 gpm on average, assuming 15 cycles of concentration in the cooling tower of non-recyclable process wastewater, to the refinery discharge. Table 3.4-5 presents a numerical analysis of the potential impact of the cogeneration facility wastewater on the refinery's wastewater stream. The impact analysis is based on the average discharge from the refinery wastewater treatment study that was conducted in July, August, and September of 2001.

Table 3.4-5: Potential Impact of Proposed Cogeneration Facility on the Existing Refinery Wastewater Discharge to Outfall 001 to the Strait of Georgia

Parameter	Cogeneration Process Wastewater	Refinery Process Wastewater after Treatment	Percentage of Increase with Cogeneration Contribution (after treatment by refinery) [1]
Discharge Flow (gpm)	190	2,338	8.1%
Biochemical Oxygen Demand (BOD) lbs./day mg/l	132	275	1%
Chemical Oxygen Demand (COD) lbs./day	323	2,235	0.6%
Total Suspended Solids (TSS) lbs./day	98	427	14.9%
Oil and Grease (lbs./day)	3	115	0.1%
Total Chromium (lbs./day)	0.32 (1.45)	0	[2]
Temperature (^{o}F)	93.8	82.7	1%
pH	6.5 - 9.5	8.0 - 8.6 Minimum	-1%

1 Based upon treatment efficiencies documented in the BP Cherry Point Treatment Efficiency Study and Engineering Report, May 2002.

2 Not estimated – the Treatment Efficiency Study report does show that metal concentrations are reduced through the refinery wastewater treatment system.

Stormwater

The potential exists for impacts on stormwater quality from accidental spills of chemicals used during operations, from runoff across surfaces containing contaminants, or from runoff across areas of bare soil. Of these, runoff across bare soil is the least likely, given that most industrial facilities landscape those parts of the site that are not otherwise covered by buildings or pavement.

Chemicals anticipated to be used or stored during the cogeneration facility operation are listed in Table 3.4-6. There is a potential for accidental release of these chemicals to areas subject to stormwater runoff.

Table 3.4-6: Chemicals Used During Operations and Maintenance

Chemical	Estimated Quantity	Storage	Purpose
Lubricating oil	22,900 gallons	In STG and GTG equipment, lockers for smaller rotating equipment	Lubrication of rotating equipment
Control oil	230 gallons	In STG equipment	STG equipment
Hydrogen	60,400 scf	GTG/STG gas bottles	Coolant for power generation
Carbon dioxide	41,000 scf	GTG/STG gas bottles	Purge and fire protection for power generation equipment
Transformer oil	48,000 gallons	Combustion turbine transformers	Coolant
Transformer oil	30,000 gallons	Steam turbine transformer	Coolant
Transformer oil	6,000 gallons	Auxiliary transformers	Coolant
Anhydrous Ammonia	940,000 annually	Above grade horizontal cylindrical tank	No_x reduction
SCR Catalyst	4,800 ft^3	In HRSG	No_x reduction
CO Catalyst	990 ft^3	In HRSG	CO reduction
Propylene glycol	17,500 gallons	Above grade tank	Closed loop cooling water system
BPC-68170 (nitrate/borate) corrosion inhibitor	50 gallons	Drum	Closed loop cooling water system
BPB-59396 (diethyl hydroxylamine) oxygen scavenger	500 gallons	Tank	Water treatment system
BPB-59465 (morpholine) corrosion inhibitor	500 gallons	Tank	Water treatment system
Di- and trisodium phosphate pH/scale control agent	200 pounds	Bags/tank	Water treatment system
Cation resin	950 ft^3	Warehouse/tank	Water treatment system
Anion resin	900 ft^3	Warehouse/tank	Water treatment system
Caustic (50 wt%)	8,000 gallons	Tank	Water treatment system
Sulfuric acid (93 wt%)	8,000 gallons	Tank	Water treatment system
BPW-76321 (polyquaternary amine) polymer	350 gallons	Tank	Water treatment system
Natural Gas	N/A	Pipeline	Fuel

Source: Duke/Fluor Daniel 2001

Stormwater quality may also be impacted by runoff from surfaces containing oil and grease, such as parking areas or roadways.

A SWPP plan for operational procedures, in conjunction with the SPCC plan, would provide structural, operational, and erosion/spill control BMPs for all stormwater operational activities of the plant site.

The cogeneration facility site would be divided into three primary drainage areas for the purposes of runoff design. The first area would consist of the switchyard area on the eastern portion of the site. The second area would consist of the remainder of the developed site, which includes the power block, cooling tower, and administrative functions. The third would be stormwater that could become impacted from a storage tank accidental release.

The switchyard area would be surfaced with crushed rock to allow some percolation into the soil below. The area would be graded at about a 1 percent slope so as to sheet flow excess runoff toward a collection system consisting of swales, catch basins, manholes, and underground pipe.

Most of the remaining plant areas would be asphalt-paved, covered with crushed rock or grass, or covered with buildings or enclosures. The finish surfaces of the cogeneration facility site would be sloped from a high point located near the center of the main piperack toward low points along the edge of plant roads. Runoff would sheet flow across the site toward a collection system similar to that described above. All surface runoff would be captured by the surface drainage system then be directed through an underground piping system to the stormwater treatment and detention system. The stormwater treatment and detention system would consist of an oil/water separation system equipped with a shutoff value in case of an accidental release for containment. Emergency cleanup equipment and supplies would be available onsite for rapid response. Stormwater would be discharged from the oil/water separation system into a final treatment and detention pond properly sized in accordance with Whatcom County and Ecology requirements. The detention pond, located in the same location as the construction stormwater detention pond (1), will either be lined or unlined. If unlined, a groundwater impact evaluation would need to be preformed by the Applicant. Stormwater would be discharged to mitigation wetlands from the detention pond.

The third area for stormwater collection results from stormwater accumulating within the secondary containment structures for outside tanks and chemical storage areas. This stormwater, expected to be of small volume, would be separated from other stormwater because of releases that could potentially occur from the tanks. This stormwater would be retained within containment structures and analyzed for contaminants. If contaminants are present, this stormwater would be routed to the refinery wastewater system. The water would leave the cogeneration facility site along with the plant wastewater, be discharged into the existing refinery wastewater treatment system, and then processed by the refinery's wastewater treatment plant. If water quality analysis indicates no contaminants are present, the stormwater would be routed to the cogeneration facility's stormwater treatment system.

Sanitary Waste

Sanitary waste from cogeneration facility employees would be collected and routed for treatment by the Birch Bay Wastewater Treatment Plant (WWTP) via the refinery's sanitary wastewater system. The estimated amount of sanitary waste generated by the cogeneration facility is between 1 and 5 gpm. The Birch Bay Water and Sewer District has confirmed that it has the capacity to accommodate the incremental combined loading to its sanitary sewage wastewater treatment system from the refinery and the proposed cogeneration facility. The WWTP would treat the refinery and cogeneration facility sanitary wastes before discharge to the Strait of Georgia. The quantity of sanitary waste that would be generated by the cogeneration facility is not expected to affect receiving water quality in the Strait of Georgia.

Groundwater

Fuels, lubricants, and other chemicals that would be used during operation are listed in Table 3.4-6**.** There is a potential for short-term accidental spills or long-term leaks of these chemicals to affect the shallow (near surface) groundwater system. The upper water-bearing zone is at greatest risk due to its shallow depth. The deeper Deming aquifer is protected by the Bellingham drift aquitard and is at significantly less risk.

If an accidental release did occur, the surface soils and underlying Bellingham drift are expected to be an effective medium for chemical absorption and retardation. Both the surface soils and Bellingham drift contain fine-grained silts and clays, which would reduce infiltration and enhance retardation.

The operational SWPP plan and SPCC would outline measures to minimize and prevent impacts on groundwater from accidental spills during facility operations.

Refinery Interface

Maintenance activities on components of the refinery interface could result in chemical spills that could impact surface water and groundwater quality. Potential spills could enter the stormwater collection system, if not contained at the site of the spill, and eventually reach the oil/water separation system of the cogeneration facility stormwater collection and treatment system. Contaminated water would be isolated at the oil/water separator(s), collected, and treated as appropriate. Surface water and groundwater quality would not be affected.

Transmission System

Maintenance activities on the transmission system could result in chemical spills that could impact surface water and groundwater quality. A SWPP plan for maintenance procedures, in conjunction with the SPCC plan, would provide structural, operational, and erosion/spill control BMPs for all maintenance activities on the transmission system. The transmission intertie access roads and tower pads allow stormwater infiltration to occur and would not substantially increase the amount of stormwater runoff over existing conditions. The surrounding areas are undisturbed grassland and forest.

Custer/Intalco Transmission Line No. 2

Maintenance activities on the Custer/Intalco Transmission Line No. 2 could result in chemical spills that could impact surface water and groundwater quality. This element of the project would be owned and operated by the Bonneville Power Administration. Presumably, Bonneville has a SWPP plan for maintenance procedures, in conjunction with a SPCC plan that would provide structural, operational, and erosion/spill control BMPs for all maintenance activities on the transmission line.

Other Project Components

Operation and maintenance of the industrial water supply pipeline and associated components at the Alcoa Intalco Works could result in potential erosion/sedimentation and chemical spills that could impact surface water and groundwater quality. This element of the project would be owned and operated by Whatcom County PUD. Presumably, the PUD has a SWPP plan for maintenance procedures, in conjunction with a SPCC plan that would provide structural, operational, and erosion/spill control BMPs for maintenance activities at their facilities.

3.4.3 Impacts of No Action

Under the No Action Alternative, there would be no immediate plans to develop the proposed site. There would, therefore, be none of the impacts on water quality that are described above. The area is within the Heavy Impact Industrial area could be developed for another project in the future. Presumably, future industrial projects would have similar impacts to those described for the cogeneration project.

3.4.4 Secondary and Cumulative Impacts

Secondary Impacts

Construction and operation of the cogeneration project would result in the removal of 30.51 acres of wetland from the cogeneration facility site and laydown areas. There is a potential water quality impact to water reaching Terrell Creek from the loss of water quality treatment that those wetlands currently provide. This would be offset by the establishment of construction and operation stormwater collection and treatment systems on the affected areas and mitigation wetlands associated with the project.

Cumulative Impacts

Several industrial dischargers are located in the general vicinity of the proposed cogeneration project. These include the BP Cherry Point Refinery, the Conoco-Phillips Refinery, Tenaska Washington Cogeneration Power Plant, and Alcoa/Intalco. All these facilities currently discharge to the Strait of Georgia. Also in the general vicinity is the Birch Bay sewage treatment plant which discharges to Birch Bay, an embayment of the Strait of Georgia. The area is zoned heavy industrial. It is possible that additional industrial development would occur in the area in the future. Future industries locating in this area would likely discharge wastewater to the Straight of Georgia and stormwater to the Terrell Creek and California Creek basins.

The cogeneration facility would add 190 gpm of treated wastewater to the Strait of Georgia at Cherry Point, which is an increase of about 8% over the current discharge from the BP Cherry Point Refinery. Although a relatively small increase, this adds to the overall burden to water quality of the Strait of Georgia.

3.4.5 Mitigation Measures

Mitigation measures for potential water quality impacts from the project are discussed below. Much of what would typically be considered mitigation for impacts is inherent in the project design, and is discussed in greater detail in the impacts discussion above. Water quality impact mitigation would primarily be addressed by development and implementation of construction and operation SWPP plans that include erosion and sedimentation control plans and SPCC plans. A required State Waste Discharge Permit and Fact Sheet for construction and operation of the project are currently under development by EFSEC. The permit and fact sheet would outline water quality and quantity effluent limitations, required treatment strategies, and performance standards.

Construction

Mitigation Proposed by the Applicant

Industrial Water Mitigation Measures

Water used for hydrostatic testing would require capture and discharge. The destination of the hydrostatic test water would be to the refinery wastewater system. The quality of the water would be tested prior to discharge to that system. Hydrostatic test water would only be discharged to the refinery's wastewater treatment system if testing confirmed that it was within acceptable limits for discharge to that system. After treatment, the hydrostatic test water would be discharged to the Strait of Georgia through the Refinery Outfall 001.

Stormwater Mitigation Measures

Stormwater quality will be preserved during construction by preventing erosion on the site to the greatest extent possible and using settling and detention basins prior to discharging the stormwater into the natural drainage system north of Grandview Road. The construction stormwater treatment system design is discussed in Section 3.4.2. SWPP plans for construction activities would be prepared for the cogeneration facility site, and would include stormwater management procedures. The SWPP plan for construction would include a TESC plan for each phase of cogeneration facility construction. The SWPP plan and TESC plan would include the specification of all necessary BMPs for construction activities as specified in the Stormwater Management Manual for Western Washington (Ecology 2001b). The grading plan for the site would also specify the necessary BMPs for erosion. All erosion control BMPs would be in place and functioning prior to the start of construction.

The SWPP plan for construction would include a TESC plan with the 12 elements required by Ecology:

1. Mark Clearing Limits
2. Establish Construction Access
3. Control Flow Rates
4. Install Sediment Controls

5. Stabilize Soils
6. Protect Slopes
7. Protect Drain Inlets
8. Stabilize Channels and Outlets
9. Control Pollutants
10. Control Dewatering
11. Maintain BMPs
12. Manage the Project

The SWPP plan for construction also would include general operation and maintenance descriptions of the BMPs used onsite. This plan would be completed and onsite for implementation upon commencement of construction. Containment pits or other means of confinement would be provided locally near each potential source of contaminating materials to protect against spillage.

BMPs as described in the Stormwater Management Manual for Western Washington (Ecology 2001b) would be used to control stormwater runoff during construction and to minimize soil erosion. The stormwater design for the project is described in detail in Section 3.4.2.

Wastewater Mitigation Measures

Wastewater would be generated for HRSG and export steam line steam-blow and hydrostatic tests necessary for commissioning the cogeneration facility, natural gas connections, and water supply/discharge connections. About 15.5 million gallons of water would be needed for HRSG steam-blow testing. Export steam line steam-blow testing would require about 1.2 million gallons, and hydrostatic testing would likely require no more than 4.8 million gallons. Testing would take place near completion of construction over a period of two to three months.

The water generated from these activities is anticipated to be clean, but could contain small amounts of oil and grease. Consequently, the Applicant plans to collect and discharge the test water to the refinery's wastewater treatment system. The potential for deleterious impacts on the refinery system is expected to be low; the Applicant has stated that large volumes of test water have been routed to the refinery system in the past without difficulty (BP 2002, Responses to Comments).

Groundwater Mitigation Measures

A SWPP plan would be prepared and implemented for construction activities, which would include worker training, refueling procedures, and operational/structural controls to minimize the potential for spills and leaks to occur. To minimize the potential release of chemicals during construction, BMPs would be employed. These would include good housekeeping measures, inspections, containment facilities, minimum onsite inventory, and spill prevention practices. Construction personnel would be instructed regarding the management requirements, and the Applicant's onsite Project Manager would be responsible for their implementation.

Additional Recommended Mitigation Measures

EFSEC is currently developing State Waste Discharge Permit conditions for construction of the cogeneration facility project. These conditions would include elements of the proposed project design intended to reduce or eliminate impacts on water quality as well as additional measures not currently included in the project design. The State Waste Discharge Permit would specify construction stormwater effluent limits and monitoring requirements. The draft State Waste Discharge Permit effluent limitations are described in Table 3.4-7.

Monitoring of stormwater would commence at the beginning of construction.

Also covered under the State Waste Discharge Permit are conditions related to hydrostatic test water. The Applicant would be required to develop and implement a plan to characterize the hydrostatic test wastewater for conventional and priority pollutants and determine if this wastewater can be properly disposed of in the refinery's wastewater treatment system prior to discharge.

Table 3.4-7: Stormwater Effluent Limitations

Parameter	Daily Maximum	Monthly Average
Oil and Grease[1]	15 mg/L[2]	10 mg/L
Total Suspended Solids[3]	25 mg/L	15 mg/L
Toxics	No toxics in toxic amounts[4]	

1 Measured at discharge of oil/water separators.
2 The oil and grease concentration shall not exceed 10 mg/l more than three days each month.
3 Measured at discharge of stormwater treatment/detention pond.
4 No toxics in toxic amounts" is generally evaluated by comparing the results of priority pollutant testing to state and federal water quality standards to determine compliance.

Operation

Mitigation Proposed by the Applicant

Stormwater Mitigation Measures

SWPP plans for operational activities would be prepared for the cogeneration facility, and would include stormwater management procedures. The SWPP plan for operation would include structural and operational BMPs; a SPCC plan; a final stormwater management plan; and general operating procedures. This plan would be completed and onsite upon commencement of plant operation. The SPCC plan for operation would include structural, operational, and treatment BMPs. Structural BMPs would include impervious containment, covers, and spill control and cleanup equipment. Operational BMPs would include good housekeeping, employee training, spill prevention procedures, preventative maintenance, and inspections. Treatment BMPs would include oil-water separation systems and treatment/detention ponds as discussed below. The stormwater design for cogeneration facility operation is described in Section 3.4.2.

During cogeneration facility operation, runoff from operational areas within the facility site would be within required limits after treatment. Runoff from surfaces, which potentially may be impacted by grease or oil, would be treated using an oil-water separation system. Stormwater effluent limits would be contained within the State Waste Discharge Permit being prepared by EFSEC. Draft effluent limits for stormwater are presented in Table 3.4.7.

Runoff quantities from the water supply and natural gas connections during operation would be approximately the same as the natural (existing) conditions. Runoff quality from these areas would be controlled by revegetation of the surface after installation and backfilling. Therefore, additional mitigation would not be needed.

Wastewater Mitigation Measures

Industrial wastewater from the cogeneration facility would be treated in the refinery's wastewater treatment system prior to discharge to the Strait of Georgia through the refinery's NPDES-permitted outfall. Sanitary wastewater would be routed to the WWTP for treatment and discharge to the Strait of Georgia through Birch Bay Sewer District's NPDES permitted outfall.

Groundwater Mitigation Measures

Prior to operation of the cogeneration facility, a SPCC plan would be prepared. The SPCC plan would contain spill response, containment, and prevention procedures. The SPCC plan for operation of the facility would include structural, operational, and treatment BMPs. Structural BMPs include impervious containment, covers, and spill control kits. Operational BMPs include good housekeeping, employee training, spill prevention, preventative maintenance, and inspections. Treatment BMPs include Stormwater Treatment Pond 1 and oil water separators as discussed above.

A number of safeguards would be incorporated to mitigate the risks of a release to the environment from stored operational chemicals. These include but are not limited to secondary containment, tank overfill protection, routine maintenance, safe handling practices, supervision of all loading/unloading by plant personnel and the truck driver, and appropriate training of operation and maintenance staff.

<u>Additional Recommended Mitigation Measures</u>

EFSEC has developed draft State Waste Discharge Permit conditions for operation of the cogeneration facility. These conditions include discharge limitations, monitoring requirements, reporting and record keeping requirements, an operation and maintenance plan for water quality treatment facilities, development of SPCC and hazardous waste management plans, and a SWPP plan.

Stormwater effluent limits are presented in Table 3.4-7. Additionally, no discharge that causes or contributes to a violation of water quality standards established under section 307(a) of the Clean Water Act or Chapter 173-201A WAC shall be allowed. There shall be no discharge of polychlorinated biphenyl and there shall be no detectable concentrations in the discharge of priority pollutants as listed in 40 CFR Part 423.

Process water monitoring must begin 90 days after startup of the cogeneration facility. Monitoring will include measurement of pH, flow, and temperature on a daily basis, and priority pollutant metals semi-annually the first year and annually thereafter.

Additionally, it is recommended that bioswales be established at the outlet of detention pond 1 to further treat water quality and attenuate flow of treated stormwater being discharged from the pond.

3.4.6 Significant Unavoidable Adverse Impacts

Construction and operation of the cogeneration facility has the potential to affect surface and groundwater quality through contaminated stormwater runoff and wastewater discharge. The proposed project has numerous design elements and mitigation measures that, if employed, would reduce or eliminate impacts on water quality. Therefore, no significant unavoidable adverse impacts on water quality are expected.