2.2.3.12.2 Auxiliary AC Power Loads

An auxiliary transformer in the substation would provide maintenance power from the Benton REA system. The connected auxiliary power loads would be approximately 5 MW. A small diesel generator would supply critical AC loads during emergency situations.

2.2.3.12.3 125-Volt DC System

A 125-volt DC battery distribution system would be provided to supply power to critical equipment and protective devices, such as the turbine generator bearing and shaft seal oil generator pumps, protective relaying schemes, breaker controls, the vital AC inverter, annunciation, and various other control circuits, for a minimum of 8 hours following a complete loss of normal AC power.

The DC system consists of one battery, two chargers (one operating, one standby), a distribution switchboard, and a distribution panelboard.

2.2.3.12.4 Uninterruptible Power Supplies

Uninterruptible power supplies (UPS) would be provided for loads for which the loss of supply power would immediately affect unit operations. The UPS system would consist of a 125-V-DC-to-120-V-AC inverter supplied from the station battery. A make-before-break static transfer switch (with manual bypass) is connected to the inverter output and the instrument AC distribution panel, and a vital AC distribution panel.

The inverter output would be the normal source to the vital AC loads. Upon inverter malfunction or manual initiation, the loads would be automatically transferred to the instrument AC source and require manual retransfer. The inverter would be equipped so as to be synchronous with the phase-lock to the AC bypass source.

2.2.4 WATER SUPPLY

Overall water supply requirements are a maximum of 1,100 acre feet per year (af/yr) and a maximum flow rate of 673 gallons per minute (gpm). Final water supply requirements would be determined during final design but would not exceed 1,100 af/yr.

Water would be supplied to the PGF from two existing water supplies:

- **PGF 960 af/yr –** This supply would originate from a well located on the Plymouth Farm adjacent to Christy Road. The water rights associated with this well would be transferred to the PGF. An application to transfer this right has been reviewed by the Benton County Water Conservancy Board, which has forwarded its Record of Decision (ROD) for approval to the Washington State Department of Ecology (Ecology). Ecology will give final approval to the water right transfer.

- **Plymouth Farm 140 af/yr –** This supply would be leased by Plymouth Farm to the PGF and would be supplied from the existing farm water supply. Plymouth Farm maintains water rights totaling 2,184 af/yr in aggregate. These rights include points of withdrawal either from the Columbia River or from groundwater wells.

Plymouth Energy and Plymouth Farm have entered into a Water and Wastewater Agreement. Under the terms of that agreement, additional water as required for operation of the PGF would be leased from Plymouth Farm as authorized by its other water rights and pursuant to the Water and Wastewater Agreement. Under the terms of the same agreement, water used by Plymouth Energy would be returned to Plymouth Farm for irrigation use, as described in Section 2.2.6, Wastewater.

Raw water entering the PGF would be stored in a 2-million-gallon raw water storage tank. A second 2-million-gallon fire water tank would store the water supply for the fire protection system. A small portion of the raw water would flow to the water treatment plant and be purified for domestic use and as HRSG makeup.

An analysis of the water quality of the well water available is presented in Table 2-1.

Table 2-1
Water Analysis

Sample Constituent	Plymouth Energy Well Mg/L as $CaCO_3$
Calcium	130
Magnesium	46
Sodium	7
Ammonium	1.4
Total Cations	184.4
Bicarbonate	6
Carbonate	41
Chloride	34
Nitrate	23
Sulfate	66
Total Cations	170
Total Hardness	176
P-Alkalinity	3
M-Alkalinity	47
pH Units	8.3
Silica as SiO_2	10.4
Phosphate as PO_4	0.1
Specific Conductance mmho	393
Iron as Fe	0.01
Total Dissolved Solids Calc.	275

Notes:

mg/L = milligrams per liter

Sample Location:	Well – Plymouth, WA	Date Sampled:	10-25-01
Company Name:	Plymouth Energy L.L.C.	Date Received:	10-29-01
Address:	335 Parkplace Suite 110	Date Analyzed:	10-29-01
City, State:	Kirkland, WA 98033	Report Number:	011029-01

2.2.5 FUEL

The combustion turbine and duct burners would be fueled with pipeline natural gas delivered by Williams Co. The Williams Co. compressor station and the junction of the three principal gas transmission pipelines serving Portland to the west, Wenatchee to the northwest, and Spokane to the northeast, are located in the Williams Co. facility adjacent to the plant site.

A buried 8-inch gas pipeline, 800 feet in length, would be installed to interconnect the PGF with the Williams Co. compressor station and pipeline facility. This lateral would interconnect on the discharge side of the compressors in the Williams Co. compressor station. A flow meter and control valves would be installed within the PGF.

The combustion turbine gas supply pressure would be 450 to 475 psig. Plymouth Energy has requested that Williams Co. provide 500 psig at the delivery point. This delivery pressure allows for fuel gas filter and piping losses upstream of the combustion turbine. The normal gas pressure at the compressor station is well over 600 psig. The available pressures are adequate for the plant requirements. In addition, Williams Co. is currently planning to add additional compression at this site to support future system growth and demand. The PGF would not require additional gas compressors.

Fuel consumption during PGF operation is expected to be as presented in Table 2-2.

Table 2-2
Fuel Consumption During Operation

Ambient Temperature (F)	Million Btu/Hour	Million Cubic Feet/Day
59 (ISO)	1950.0	46.8
52 (average site temp.)	1980.4	47.5
20 (winter site temp.)	2141.6	51.4

Notes:

ISO = International Standards Organization
Estimates based on lower heating value (LHV)

The pipeline lateral serving the PGF has been designed to meet the maximum flow rate of 51.4 million cubic feet/day.

2.2.6 WASTEWATER

As described in Section 2.2.3.9 of this chapter, cooling tower blowdown and other plant wastewater streams (water treatment plant flush water, reverse osmosis rejects, and boiler blowdown water) would be transferred from the plant to the wastewater storage, then ultimately disposed by land application (agricultural irrigation).

Under the terms of a Water and Wastewater Agreement, Plymouth Farm would remove stored wastewater from the wastewater storage pond and, after blending it with Plymouth Farm irrigation water, would use the wastewater to irrigate the crops being grown on the Plymouth Farm. Disposal of wastewater by irrigation would be in accordance with an Industrial Wastewater Discharge Permit and under the terms of the Water and Wastewater Agreement.

The Industrial Wastewater Discharge Permit would include an Engineering Report and standards for blending such that long-term accumulation of dissolved solids would not occur in the soils. Plymouth Farm would be required to maintain a minimal acreage of appropriate crops to support irrigation at a level necessary to dispose of the wastewater generated by operation of the PGF. An evaluation of the requirement for continued agricultural operations on the Plymouth Farm is included in Appendix A.

The wastewater would be stored in the wastewater storage pond during times when irrigation is not possible. The wastewater pond would then be emptied during the irrigation period. As shown on Figure 2-4, 10 acres have been reserved for the wastewater storage pond. Final pond volume and dimensions would be determined during final project design. However, the pond area would not exceed 10 acres.

The following subsections describe the design basis for sizing and operation of the wastewater disposal system. As noted in Section 2.2.3.9, sanitary wastes and stormwater wastes would be disposed of by separate means and are not included as part of this system.

2.2.6.1 Wastewater Storage System

Design of the wastewater disposal system is determined by wastewater flow volume and wastewater quality. The design conservatively assumed 100 percent continuous operation and 10 cycles of concentration. Under this assumption, the most concentrated wastewater stream and, hence, the lowest quality wastewater for disposal would be produced by power plant operations.[7] At lower cycles of concentration, more dilute (and higher quality) wastewater would be generated for disposal and would require less blending.

Monthly cooling tower makeup and blowdown flows were calculated based on average air temperatures. Maximum annual wastewater flow was calculated to be 200 acre-feet. The wastewater storage pond design assumes there would be no outflow from the pond during November, December, January, February, March, and April. The pond would be emptied during the irrigation months of May, June, July, August, September, and October. Pond sizing allows for rain additions to the stored volume and loss of volume due to evaporation. Preliminary design calculations show that a pond 10 acres or less, filled to a depth of 8 feet, would store all of the wastewater generated during 6 months. As stated above, although pond depth and area would be finalized (reduced) during project final design, a 10-acre pond has been assumed as a basis for initial design and environmental analysis.

The wastewater storage pond would be located on a portion of the plant site with a slight slope. Construction of the pond would require installation of a dike on the lower portion of the site and excavation below existing grade on the higher portion. Final pond design would limit any diked portion of the pond containment to 6 feet or less. To provide operational flexibility, a pipeline with an isolation valve would connect the pond and Plymouth Farm's existing irrigation water

[7] In contrast, sizing of the cooling tower and its ancillary systems was based on five cycles of concentration, which required higher makeup and blowdown water flow rates and hence some larger system components (cooling tower basin, piping and pump sizes, etc.).

pond. The wastewater storage pond maximum level would match the existing irrigation water pond level to allow transfer of water between ponds without the potential of overflowing either pond.

The wastewater storage pond would be lined with 60-mil high-density polyethylene (HPDE) liner installed on a 4-inch-thick sand cushion.

A pump station consisting of two 100 percent vertical pumps (one in service, the other standby) would transfer wastewater from the wastewater storage pond to the Plymouth Farm irrigation system. The pumps would be sized to empty the pond during the irrigation season of April 1 through November 1. The piping system would include flow meters and flow totalizer. Wastewater flow would be regulated to mix in the desired ratio with the normal irrigation water flow.

2.2.6.2 Wastewater Disposal/Irrigation System

Plymouth Farm currently uses approximately 2,100 af/yr for irrigation. A new pipe from the wastewater pond would connect at the irrigation inlet, and wastewater would be metered into the irrigation water for blending. The blended water would be pumped throughout the property for irrigation.

Wastewater would be blended with fresh water to obtain suitable irrigation water. A measurement of water purity is used as an index to classify water that can be detrimental to crops. Wastewater with higher conductivity would be diluted with low conductivity fresh water to obtain blended water acceptable for irrigation. Water acceptability for land application was evaluated based on the *Washington Irrigation Guide* (USDA 1985) and the Food and Agriculture Organization Irrigation and Drainage research papers (Ayers and Westcot 2001) (see Appendix A). Water conductivity (ECW) in millimhos per centimeter (mmh/cm), total dissolved solids (TDS) in milligrams per liter (mg/L), sodium in mg/L, and chloride in mg/L are the key parameters in measuring irrigation water impact on crops. The above values for the wastewater and blended water and the impacts on crops are presented in Table 2-3.

Table 2-3
Irrigation Water Quality

Constituent	Fresh Water[a]	Waste-water[b]	Blended Water[c]	Standard/Impact on Crops	
				No Impact	Slight Impact
Conductivity	0.39	3.93	0.55	0.70	0.70 – 3.0
TDS – mg/L	275	2750	382	450	450 – 2000
Sodium – mg/L	3	30	4	Below 69	Above 69
Chloride – mg/L	24	24	32	Below 106	Above 106

[a]Water quality of farm well water.
[b]Blowdown water quality at 10 cycles of concentration
[c]The most concentrated blowdown (10 cycles of concentration) when diluted by 25 parts of fresh water would meet water quality guidelines for use as irrigation water.

Based on the blending rate of 10:1 (fresh water/wastewater), sending wastewater to the irrigation water would not adversely affect crop production or agricultural productivity.

The disposal standards and monitoring requirements incorporated into the wastewater discharge permit would include consideration of existing soils, crop types appropriate for the local soils and growing conditions, the range of dissolved solids in the blending source water, and the range of dissolved solids and volume of the wastewater. The permit standards would be set to ensure that cumulative concentration of salts in the soils do not occur; the permit would include monitoring requirements to ensure maintenance of the standards.

An estimate of the minimum acreage of fruit trees that must be irrigated with blended wastewater from 10 cycles of concentration to dispose of wastewater generated by 100 percent operation of the PGF is:

- With river water–151 acres
- With well water–254 acres

Other crops would require different acreage, depending on their irrigation requirements. For example, alfalfa requires 31 inches of water per season as compared to 40 inches for apples. Reliance on an alfalfa crop for wastewater disposal would thus increase the requirement for the number of acres of production.

Plymouth Farm currently has 176 acres of fruit trees being irrigated, with the rest of the land fallow. The farm has 490 acres available for agricultural production that are adequate for disposal of PGF's wastewater with various types of crops and irrigation rates. While Plymouth Farm would be able to select and change crops in accordance with market conditions and good farming practices, the agreement between Plymouth Energy and Plymouth Farm for disposal of wastewater would require that sufficient agricultural production is maintained by the farm to provide for adequate disposal of PGF wastewater and meet the standards of the Industrial Wastewater Discharge Permit for the PGF.

If the cooling tower operation were changed to five cycles of concentration, the wastewater concentrations would be 50 percent of the concentrations shown above in Table 2-3, thereby proportionally reducing the acreage in agricultural production required for disposal of PGF wastewater.

2.2.7 ACCESS ROAD

Access to the PGF during both the construction and operation phases of the project would be via a new access road that would connect to the existing Plymouth Industrial Road, which in turn intersects SR 14. The location of this access road is shown on Figure 2-3. Except for the first 900 feet, Plymouth Industrial Road is a private road that provides access to AgriNorthwest's grain facility. Plymouth Energy would secure easements across adjacent properties for construction of the access road, which would begin at a point approximately 2,500 feet down Plymouth Industrial Road from its intersection with SR 14. At this point, approximately 5,300 feet of new road to the PGF plant site would be constructed. In addition, the existing portion of Plymouth Industrial Road from SR 14 to the beginning of the newly constructed road would be upgraded.

The new construction portion of the access road would be developed to a 24-foot wide paved surface, with 3-foot-wide shoulders extending on both sides. The upgraded portion of Plymouth Industrial Road would be widened to 36 feet to allow for two-way traffic to the grain facility and a turn lane to the PGF. A typical cross-section of the roadway is shown on Figure 2-5.

The new portion of the access road would cross Fourmile Canyon, an intermittent stream. This usually dry drainage would be crossed with a fill section which would include two culverts to allow water flows. The culverts would be designed to accommodate 100-year storm flows. A plan view of the Fourmile Canyon is also shown on Figure 2-5.

Due to topographic changes along the new construction portion of the access road, cut and fill grading would be required. The estimated cut volume is approximately 5,837 cubic yards; the fill volume is 4,997 cubic yards. The balance of excess material would be used in construction of the wastewater storage pond on the plant site (see Figure 2-3) or the temporary rail off-load platform (discussed below).

As part of providing site access, a temporary rail offload platform would be constructed adjacent to the BNSF rail siding that serves the AgriNorthwest grain facility (see Figure 2-3). This platform would be used to off-load equipment and materials transported to the plant site by rail. A graded pad surfaced with crushed rock would be constructed. The pad would provide a stable and level platform for location of an overhead crane to be used for off-loading the rail cars to heavy load transporters. The transporters would move material and equipment over the access road to the plant site. If necessary, portions of Plymouth Industrial Road may be repaired or upgraded to accommodate heavy equipment and material loads.

2.2.8 PROJECT CONSTRUCTION/CONSTRUCTION SCHEDULE

2.2.8.1 Construction Schedule

The overall development schedule for the PGF is as follows.

- An application for a Conditional Use/Special Permit was filed with Benton County to initiate the state regulatory review process on December 21, 2001.
- A request for transmission interconnection was filed with BPA on December 14, 2001 and initiated the federal review and NEPA process.
- Project permitting is anticipated to be completed in December 2002.
- Engineering, equipment procurement, and contractor selection would occur between first quarter 2003 and second quarter 2003.
- Project construction and pre-operational testing would occur from third quarter 2003 to third quarter 2005.
- The commercial on-line date for the PGF is August 2005.