

Internal Review and Recommendations (IR&R) for NCWSA				
PWS Name:	Encina Fort Union LLC			
Summary description of the internal review and decision process:				
This NCWS application was submitted by Encina Fort Union LLC on May 4, 2023. The application was deemed administratively complete on May 17, 2023. An email listing technical deficiencies was sent on July 6, 2023. A response to the deficiencies was received on September 12, 2023. Although this is a NCWS, it was agreed that the technical services section would be responsible for the entire review.				
Add additional sheets if necessary				
	Print	Sign	Date	Approve/Deny
Sanitarian	N/A			
Sanitarian Supervisor	N/A			
Operations Chief	N/A			
Technical Services Section review (if necessary)				
Explain how new sources meet guidance (or justified alternative to guidance), including new source location and setbacks, well construction, pump testing, new source sampling, and surface water influence evaluation. Write "N/A" if Technical Services review is unnecessary.				
Engineer IRR:				
<p>This project includes a new NTNCWS to serve a proposed plastic recycling/circular chemical facility in Point Township, Northumberland County to be known as "Point Township Circular Manufacturing Facility". The new PWS was designed to meet a maximum daily potable water demand of approximately 8,920 gpd (6.2 gpm) with a peak demand of 24.8 gpm. The project will be completed in two phases. Phase 1 will include the construction and operation of the groundwater well, treatment system, storage facilities, and approximately 1500 linear feet of SS 316/316L and HDPE pipe. Phase 2 will include the construction and operation of approximately 5,800 linear feet of SS 316/316L and HDPE pipe to connect the remaining buildings throughout the facility. The maximum daily water demand and peak demand projections include the combined Phase 1 and Phase 2 usage for about 223 employees. There will be a time span of approximately 1.5 years between the completion of Phase 1 and Phase 2.</p> <p>At the completion of the 24-hour aquifer test on November 10, 2022, new source sampling was secured for Well NP-1. Iron and Manganese levels were reportedly 0.893 and 0.266 mg/l, respectively. Both the iron and manganese are above the secondary MCLs. No other primary or secondary MCLs were exceeded. Greensand filtration is proposed to remove the elevated concentrations of iron and manganese.</p> <p>Well NP-1 raw water will be pumped to the treatment building at a safe yield of up to 35 gpm. The 2HP, NSF 61 certified submersible well pump, will be manufactured by Franklin Electric, model 35 FH2S4-PE. It will have a capacity of 30 gpm at 250 feet TDH. For a detailed review of Well NP-1, refer to the PG IRR (below). An NSF 61 certified, Rosemount, model 8705, magnetic flow rate indicating/totalizing meter will be provided. Sodium hypochlorite will be injected into the raw water for disinfection and oxidation. The injection point will be into a Westfall Manufacturing Company Inc, model 2800, NSF 61 certified, inline static mixer. Duplicate Prominent, Fluid Controls, Sigma/2, chemical feed pumps (online and spare), a 264-gallon Poly Processing day tank (3.3' diameter, 4.3' height) and curbed containment area will be provided. The NSF 61 certified diaphragm metering pump is rated for 14.8-111 gph. Next, water will flow through an iron and manganese filtration system, manufactured by Pentair, model 30x60 COMP 6" TF. The two, parallel, NSF Standard 61 certified, vessels will be 24-inches in diameter, 64.3-inches in height, with a surface area of 3.14 ft²). A depth of 8 inches of gravel underbedding will be installed. The NSF 61 certified gravel will be supplied by APAC-Central Inc. Gravel effective size will be 1/8"-2.5", with a uniformity coefficient of 1.2-1.7. Next, there will be 30 inches of Greensand Plus. The manganese dioxide coated silica sand media will be manufactured by Inversand, Greensand Plus, with an effective size of 0.30-0.35 mm and a uniformity coefficient of less than 1.6. This media is WQA certified to meet NSF 61. Finally, a 6" anthracite cap will be provided. The NSF 61 certified anthracite will be supplied by Carbon Sales Inc. The anthracite will have an effective size of 0.6-1.2 mm, with a uniformity coefficient of 1.4. The method of operation of the filters will be Catalytic Oxidation (CO), where continuous chlorine is fed upstream of the filters to maintain the Greensand Plus in a continuously regenerated condition. Permanganate is not needed for regeneration. The maximum hydraulic loading rate will be 9.5 gpm/sf or 30 gpm per vessel, with</p>				

one unit out of service. Normal operation will be two units online at 30 gpm total, with a hydraulic loading rate 4.8 gpm/sf or 15 gpm per vessel. When using CO for iron and manganese removal via Greensand Plus, no oxidation detention time is required. Greensand Plus manufacturer recommends flow rates of 2 to 12 gpm/sf. The manufacturer's specifications contain a contaminant loading calculation. 2022 sample results showed raw water concentrations of 0.893 mg/l iron and 0.266 mg/l manganese. Contaminant loading = $(1 \times 0.893 \text{ mg/l Fe}) + (2 \times 0.266 \text{ mg/l Mn}) = 1.425 \text{ mg/l}$ or $1.425/17.11 = 0.08$ grains per gallon (gpg); $1,200 \text{ grains/sf loading} / 0.08 \text{ gpg} = 15,000 \text{ gal/sf}$. With 2 filters operating and normal filtration rate of 4.8 gpm/sf, the service length will be about 3,125 minutes per filter. This equates to a backwash frequency of about once every 52 hours of operation per filter. Filters will be backwashed at 12 gpm/ft² or 37.7 gpm/vessel. Backwash water will exit the vessel through the control valve, which will route it through the drainline to a holding tank. The rectangular holding tank will be 15 feet in height, 8 feet in width, and 8 feet in depth, with a useable capacity of about 7000 gallons. After backwash, the control valve will initiate a rinse of the media, during which the water will flow downward through the media, up through the riser tube and out through a screened airgap to the drainline. Normal operation will be to backwash one vessel per day. The estimated volume of backwash (10 minutes at 37.7 gpm/vessel) and filter-to-waste (3 minutes at 15 gpm/vessel) will be about 422 gallons per filter. The holding tank will be emptied via a vacuum truck and disposed of at an approved treatment facility by a contracted 3rd party professional in accordance with all applicable Rules and Regulations. It is anticipated that the holding tank will need to be emptied about every two weeks.

Following Greensand Plus filtration, water will flow through a 1,500 gallon contact tank. The NSF 61 certified, SS316L, pressure tank will be manufactured by Highland Tank. It will be 4 feet in diameter and 17.9 feet in length, with inlet and outlet on opposite ends of the tank. The tank inlet will be equipped a perforated diffusion baffle plate. This type of tank without a baffle plate would normally be assigned a baffling factor of 0.5. With the addition of an inlet baffle plate, a BF of 0.6 has been assigned. Greater than 20 minutes of chlorine contact time will be available through the treatment system. [$1500 \text{ gallons} * 0.6 / 30 \text{ gpm} = 30 \text{ min}$] At the time of issuance of this approval, the Permittee has not triggered into 4-Log Treatment of Viruses.

After exiting the contact tank, finished water will flow into the distribution system or a 19,820-gallon finished water storage tank. The NSF 61 certified tank will be a factory powder coated, bolted steel tank. It will be manufactured by Balmor Tanks Limited or Superior Tank Company. The tank will be 15 feet in diameter, 15 feet in height, with a maximum water depth of 10' 11". The new tank will be equipped with a screened overflow pipe and roof vent. The tank access cage will be locked.

A booster pump system will ensure adequate water pressures in the distribution system and fill the finished water storage tank. It will include duplicate vertical, multistage centrifugal pumps. The pumps will be manufactured by Grundfos, model Hydro MPC-E/CRE 20-3. These pumps are UL certified to meet NSF 61. Each pump will have a capacity of up to 85 gpm at 180 feet TDH. One Amtrol Thermo-X-Trol, model ST-80V, hydropneumatic tank will be provided. This NSF 61 certified pressure tank will have a working volume of 44.0 gallons.

It is recommended that approval be issued for construction of this new NTNCWS with the following Special Conditions:

1. The maximum instantaneous pumping rate from Well NP-1 shall not exceed 35 gallons per minute (gpm). Note that the treatment facilities, as designed, only allow a maximum pumping rate of 30 gpm.
2. The maximum instantaneous flow rate through the detention tank (with inlet baffle plate) shall not exceed 30 gpm and the minimum contact tank volume shall not be less than 1000 gallons to maintain a minimum of 20 minutes of contact time at the entry point. The theoretical superior baffling factor for the detention tank is 0.6.
3. Sodium Hypochlorite used in the treatment system shall be NSF Standard 60 certified.
4. The Public Water System shall monitor *daily* for free chlorine residual at the entry point when in operation. A detectable chlorine residual is required. Records of chlorine residual monitoring shall be kept onsite for a minimum of five years and made available to the Department upon request.

5. A water quality complaint log, equipment maintenance records, and chemical usage log shall be maintained onsite. These logs and records shall include the amount (gallons per day or inches per day) and mixing ratio of sodium hypochlorite fed daily. Records shall be kept for a minimum of five years and shall be made available to the Department upon request.
6. The Public Water System shall collect finished water samples from the entry point *once per calendar year quarter*. The samples shall be analyzed by a Department-accredited laboratory for total iron and total manganese and reported to the Department.
7. The Public Water System shall notify the Department within one (1) hour following discovery or receipt of any sample result of the finished water which exceeds 0.3 mg/L of manganese.
8. The Public Water System shall collect raw water samples from Well NP-1 at least *once per calendar year*. The samples shall be analyzed by a Department-accredited laboratory for total iron and total manganese and reported to the Department.
9. The Public Water System shall monitor and record the free chlorine at least *daily* at the sample tap on the filter effluent. The minimum free chlorine residual shall not be less than 0.2 mg/L. If the free chlorine residual falls below 0.2 mg/L, the Public Water System shall perform an investigation to determine the cause and take appropriate corrective actions. The Public Water System shall document all sample results and corrective actions in the operator's logbook.
10. With one unit out of service, the maximum allowable surface loading rate of the Greensand Plus filtration system is 9.5 gpm/ft², which equates to a maximum flow rate of 30 gpm per vessel. With both filters in operation, the routine surface loading rate of the Greensand Plus filtration system is 4.8 gpm/ft², which equates to a routine flow rate of 15 gpm per vessel.
11. The minimum backwash flow rate through the filter vessels shall be 38 gpm per vessel (loading rate of 12 gpm/ft²). Filter run time or volume throughput shall be recorded prior to each backwash. This data shall be kept for at least three years and shall be submitted to the Department for review upon request.
12. Prior to operation, the contact tank and finished water storage tank shall be properly disinfected in accordance with [25 PA Code Chapter 109.711](#) of the Safe Drinking Water regulations and the most recent procedures established by the American Water Works Association (AWWA). Water from the tanks shall be tested for total coliforms in accordance with AWWA standards. The samples shall be analyzed by a Department-accredited laboratory. Copies of the satisfactory microbiological test results shall be submitted to the Department.

Hydrogeologist IRR:

Introduction:

Eichelbergers Inc. Well Drilling (Eichelbergers), Mechanicsburg, Pennsylvania, constructed a water well (NP-1) on April 27, 2022 for the Encina Fort Union, LLC (Encina) plant, 3288 Point Township Drive, Northumberland, PA 17857, Northumberland County (PWSID #). Well NP-1 is a new well for the new non-transient non-community water supply; it is located in the northwestern portion of the property. The site is not yet fully developed, but there will be no chemical or petroleum storage or wastewater discharge within 300 feet (ft) of the well.

Well Construction:

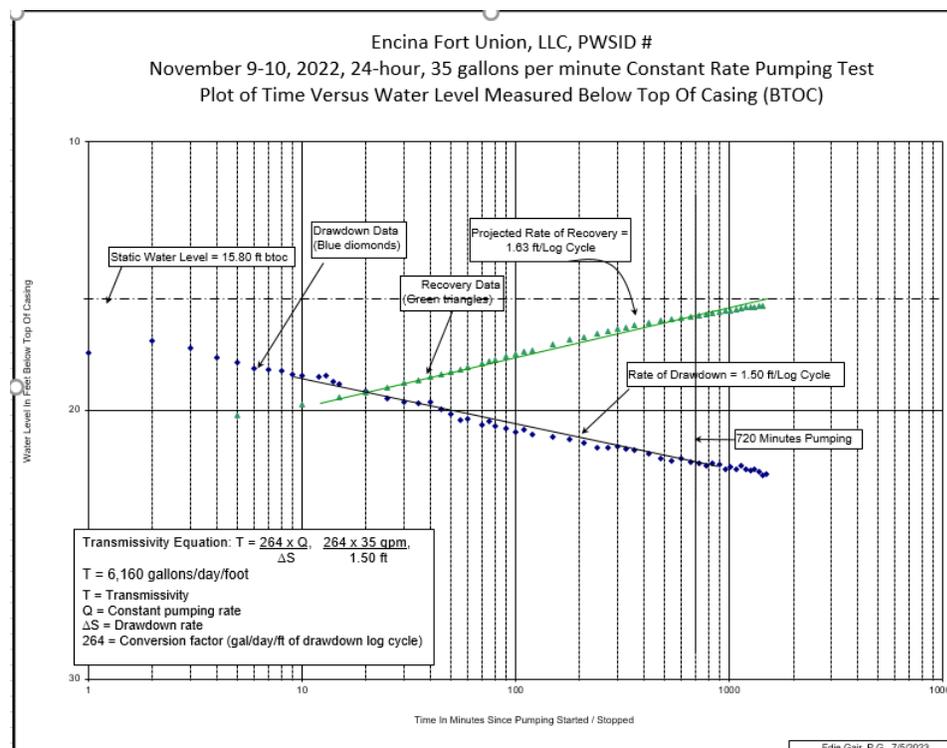
A 10-inch outside-diameter (OD) borehole was drilled through 8 feet (ft) of glacial outwash, consisting of sand, cobbles, silt, and clay. 11 ft of weathered shale, overlying gray limestone with interbeds of black shale and siltstone with some dolomite of the Keyser and Tonoloway Formations, undivided. A 6-inch inside-diameter (ID) steel casing, drive shoe, and centralizers were emplaced in the borehole to a depth of 108 ft below ground surface (ft bgs), and the annular space was tremie-grouted with a Portland cement/bentonite slurry. The borehole was drilled to a total depth of 365 ft bgs and intercepted a water-bearing zones at 115, 127, 134, 136.5, 147, 186, 193, and 255 ft bgs that produced a total blown yield of about 10 gpm.

Pumping Test:

Eichelbergers and Meiser and Earl conducted a 24-hour aquifer test on November 9-10, 2022. Results of the 35-gpm pumping test showed a total drawdown of 6.57 ft from a pre-pumping water level of 15.80 ft below top of casing (ft btoc) (see graph). The rate of water-level drawdown was about 1.5 ft per log cycle. The final water level 24 hours after pumping began was 22.373 ft btoc, which was 92± ft above the first water-bearing zone observed in the well. The final water level was approximately 73.63 ft above the pump intake, which was set at 96 ft bgs. Meiser & Earl projected the drawdown to 180 days of continuous pumping to evaluate potential drought conditions. The projected water level after 180 days of continuous pumping would be approximately 25 ft bgs, which is about 75 ft above the pump intake, and about 90 ft above the first water-bearing zone. The specific capacity of NP-1 was determined to be 7.72 gpm/ft.

Recovery Test:

Following completion of the pumping test, 180 minutes of recovery data was collected, with a final water level of 16.137 ft btoc. This final water-level shows that the well recovered 99% of the water removed during the 24-hour test. The 99% recovery is sufficient to meet the Non-Transient Noncommunity guidance for determining sustainability of the well and aquifer under intermittent pumping conditions.



Source Classification and Surface Water Identification Protocol

The well was constructed with grouted casing to a depth of 108 ft bgs with the first water-bearing zone at 115 ft bgs. There were no surface water features within 200 ft of the well. Therefore, additional surface water identification protocol measures weren't required and the source is considered groundwater.

Impacts to Adjacent Water Resources

Multiple attempts were made to contact property owners within 0.5 mile of the well to request access to monitor potential impact from pumping. Attempts were unsuccessful in obtaining access to domestic wells. Water levels in a test well on site, NP-3, were measured during the aquifer test and resulted in minimal impact (0.03 ft of drawdown) from pumping NP-1. Based on this minor measured impact, no adverse effects of pumping NP-1 are expected on water resources.

Conclusions:

Review of the Encina water supply application indicates that Well NP-1 meets DEP's construction and performance standards for materials, installation, and testing for a Non-Transient Noncommunity water supply

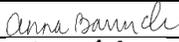
source. Well NP-1 produces enough water for the facility, delivering a hydraulic conductivity of 23.97 gallons/day/ft² at a 35-gpm pumping rate. A water-level recovery of 99% is also satisfactory. New source sampling was conducted and samples were analyzed for the full list of community water supply parameters with the exception of asbestos, PCBs, and dioxin. Total coliform was detected at 1 MPN/100 ml in the first sample; the subsequent two samples did not detect total coliforms. E. coli was not detected. Manganese was detected at a concentration of 0.266 milligrams per liter (mg/l), which exceeded the secondary maximum concentration limit (SMCL) of 0.05 mg/L, but was below EPA's Health Advisory Level of 0.3 mg/l. Iron was detected above the SMCL at a concentration of 0.893. All other analytes were either not detected or were detected below the MCLs. Water will be treated with sodium hypochlorite and will also pass through a Greensand filter to remove excess iron and manganese.

Permit Conditions:

1. Pumping rate = 35 gpm

Add additional sheets if necessary

Based on the information provided in the NCWSA, the proposed system/modification appears to meet the minimum requirements in the Part IV of the PWSM.

	Print	Sign	Date	Approve/Deny
Engineer	Anna Barrick, P.E.		9/28/2023	Approve
Geologist	Edie Gair, P.G.		07/05/2023	Approve
Tech Services Chief	Andy Eldred, PE		10/5/23	Approve
Program Manager	Chad Miller, P.E.		10/5/2023	Approve