

River Corridor Closure Contract

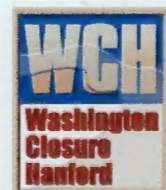
Project Report for Cryptosporidium Filtration Improvements at the 186-N Potable Water Treatment Plant

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Washington Closure Hanford

Prepared for the U.S. Department of Energy, Richland Operations Office
Office of Assistant Manager for River Corridor



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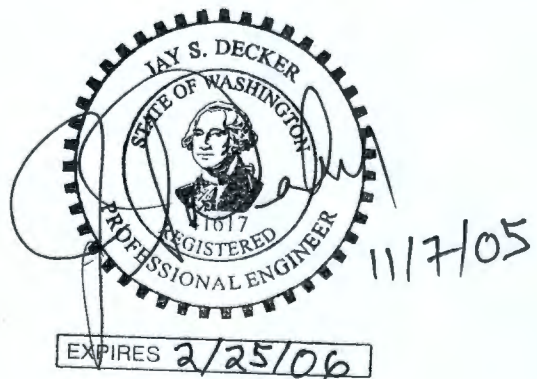
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1.0 INTRODUCTION

This project report describes proposed filtration improvements to an existing potable water treatment plant to meet new U.S. Environmental Protection Agency (EPA) treatment requirements. The water treatment plant is located at the 100-N Area on the U.S. Department of Energy's (DOE's) Hanford Site. The plant, called the 186-N Potable Water Treatment Plant, is an alternative treatment system employing cartridge filtration and hypochlorite disinfection. The plant is small with a design capacity of 72,000 gal/day. The proposed filtration improvements would include incorporating a State of Washington Department of Health (WDOH)-approved filter cartridge arrangement for cryptosporidium removal, modifying instrumentation to monitor the differential pressure across the new filter cartridge arrangement, and reducing the maximum flow through the new filter cartridge arrangement.

2.0 PROJECT DESCRIPTION

2.1 PROJECT PURPOSE

The EPA's Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) was promulgated on January 14, 2002 (67 *Federal Register* 1812). LT1ESWTR is intended to reduce the risk of exposure to microbiological pathogens, specifically the protozoan *Cryptosporidium*, by improving the filtration process for water systems serving populations less than 10,000 that use surface water or groundwater under the direct influence of surface water. The LT1ESWTR is applicable to the 186-N Water Plant. The proposed project will implement filtration improvements necessary to comply with the 2-log, 99% cryptosporidium oocyst removal. The original implementation date under the LT1ESWTR was January 14, 2005; however, this date was extended to December 31, 2006, by the WDOH (WDOH 2004).

The WDOH has approved a specific filter cartridge arrangement to attain LT1ESWTR compliance (WDOH 2005). The proposed filtration improvements incorporate WDOH-approved filtration cartridges with only minor alterations to the differential pressure instrumentation and minor piping modifications. Therefore, many portions of the project report requirements outlined in *Washington Administrative Code* (WAC) 246-290-110 are not applicable; however, each element is discussed briefly below for completeness.

2.2 STATE ENVIRONMENTAL POLICY ACT (SEPA)

This project is categorically exempt per WAC 197-11.

2.3 SOURCE DEVELOPMENT

The proposed project would not change or modify the source of water supply.

2.4 TREATMENT

The 186-N Water Plant treatment system is described in a previous project report and engineering documents reviewed and approved by the WDOH under DOH Project #00-0207, 418532 (BHI 2000, DOE-RL 2000). The subject proposed minor modifications are described subsequently in Section 9.0 of this report.

2.5 SUMMARY OF CONSUMER AND USER COMPLAINTS

There have been no complaints since the current system was commissioned for service.

2.6 MANAGEMENT RESPONSIBILITIES

The proposed improvements will not substantively increase the management responsibilities associated with the system.

3.0 PLANNING DATA

3.1 SERVICE POPULATION AND WATER DEMAND

There will be no change to service population or water demand associated with the proposed project.

3.2 NEIGHBORING WATER SYSTEM IMPACTS

The proposed project will not impact neighboring water systems.

3.3 LOCAL REQUIREMENTS

The proposed project will not impact any applicable local requirements.

3.4 IMPLEMENTATION PLAN AND PROPOSED SCHEDULE

The proposed schedule is presented in Table 1.

Table 1. Proposed Schedule.

| Milestone | Date |
|--|-------------------|
| Submit project report and construction documents | December 1, 2005 |
| Procure equipment | January 31, 2006 |
| Install equipment | February 28, 2006 |
| LT1ESWTR implementation deadline | December 31, 2006 |

3.5 COSTS AND FUNDING

The estimated cost of the subject treatment modifications is less than \$10,000. The design, construction, and operation of the facilities are federally funded by the DOE.

4.0 ANALYSIS OF ALTERNATIVES

A formal analysis of alternatives was not performed, since the following conditions existed during the preplanning stage of this project:

- Cartridge filter manufacturers were working with regulatory agencies, including WDOH, to certify their filtration elements, or element combinations, as LT1ESWTR compliant.
- Substitution of filter element(s) within the existing three-stage cartridge filtration treatment train would be a common sense, no cost or insignificant cost alternative to designing and constructing new treatment facilities, e.g., a conventional technology treatment plant.
- The existing water use is approximately 7,300 gal/day. Therefore, a contingency plan, such as hauling water from a neighboring water system, could be implemented if WDOH approval of LT1ESWTR-compliant filter elements is delayed.

5.0 WATER QUALITY

There are no changes to source of supply or source water quality. Therefore, this project is not proposed in response to a change in water quality.

6.0 SOURCE AND CAPACITY

The proposed project would not involve any new sources or increase the capacity of the system.

7.0 ENGINEERING CALCULATIONS

The proposed project would not change the size of system components or the treatment system capacity. Therefore, engineering calculations and justification is not necessary.

8.0 DESIGN AND CONSTRUCTION STANDARDS

The proposed project would conform to the design and construction standards employed in the previous project report and engineering documents reviewed and approved by the WDOH under DOH Project #00-0207, 418532 (BHI 2000, DOE-RL 2000).

9.0 TREATMENT MODIFICATIONS

The current filtration system is three trains of three cartridge filters in series. The last cartridge filter stage is a Giardia filter. Differential pressure is monitored across the Giardia filter.

The filtration system improvements include the following changes and are depicted in Figure 1:

- 1. Second-Stage Filter Substitution:** The 0.5 μm pre-filter cartridges currently used in the second stage in each train (e.g., F-2, F-5, and F-8) will be replaced with Cryptosporidium filter cartridges that fit within the same filter housings. The new Cryptosporidium filter cartridge when used upstream and in series with the existing Giardia filter is approved by the WDOH as LT1ESWTR-compliant filtration. The approved LT1ESWTR alternative filtration technology configuration is a Rosedale model PS-520-PPP-241 pre-filter in series with a model GLR-PO-825-2 final filter. The filter housing for each filter is an existing Model 8-30-2P filter housing with model 5V-2787 hold-down devices (WDOH 2005).
- 2. Differential Pressure Monitoring:** The differential pressure monitoring will be modified to include the differential pressure drop across the second and third stages in each train. Monitoring the differential pressure across the Cryptosporidium and Giardia filters is necessary because both filter cartridges must be replaced when the maximum differential pressure across both stages reaches 20 psid, which is a system operating parameter under the approved acceptance testing. Operating procedures and monitoring software will be modified as necessary to incorporate the differential pressure measurement change and the new 20 psid operational parameter (WCH-FS-04, *Field Support Operating Procedures*, Vol. 1, Procedure N-100-006, "186-N Water Treatment Plant Operating Procedure").
- 3. Filter to Waste Piping:** The drain line for each filter housing downstream of the drain valves will be modified with the addition of a Camlock hose connection. This modification will be used to waste filtered water for at least 10 minutes after changing filter cartridges, which is a system operating parameter under the approved acceptance testing criteria. The typical filter-to-waste configuration is depicted in Figure 2. The hose discharge is designed to flow through an air gap to prevent backflow. The operating procedures will be modified to incorporate the wasting of filtered water for at least 10 minutes after changing the filter cartridges in the last two stages (WCH-FS-04, Procedure N-100-006). The wasted water will be collected and pumped into the Raw Water Storage Tank, T-1.

Figure 1. Filtration Instrumentation and Piping Modifications.

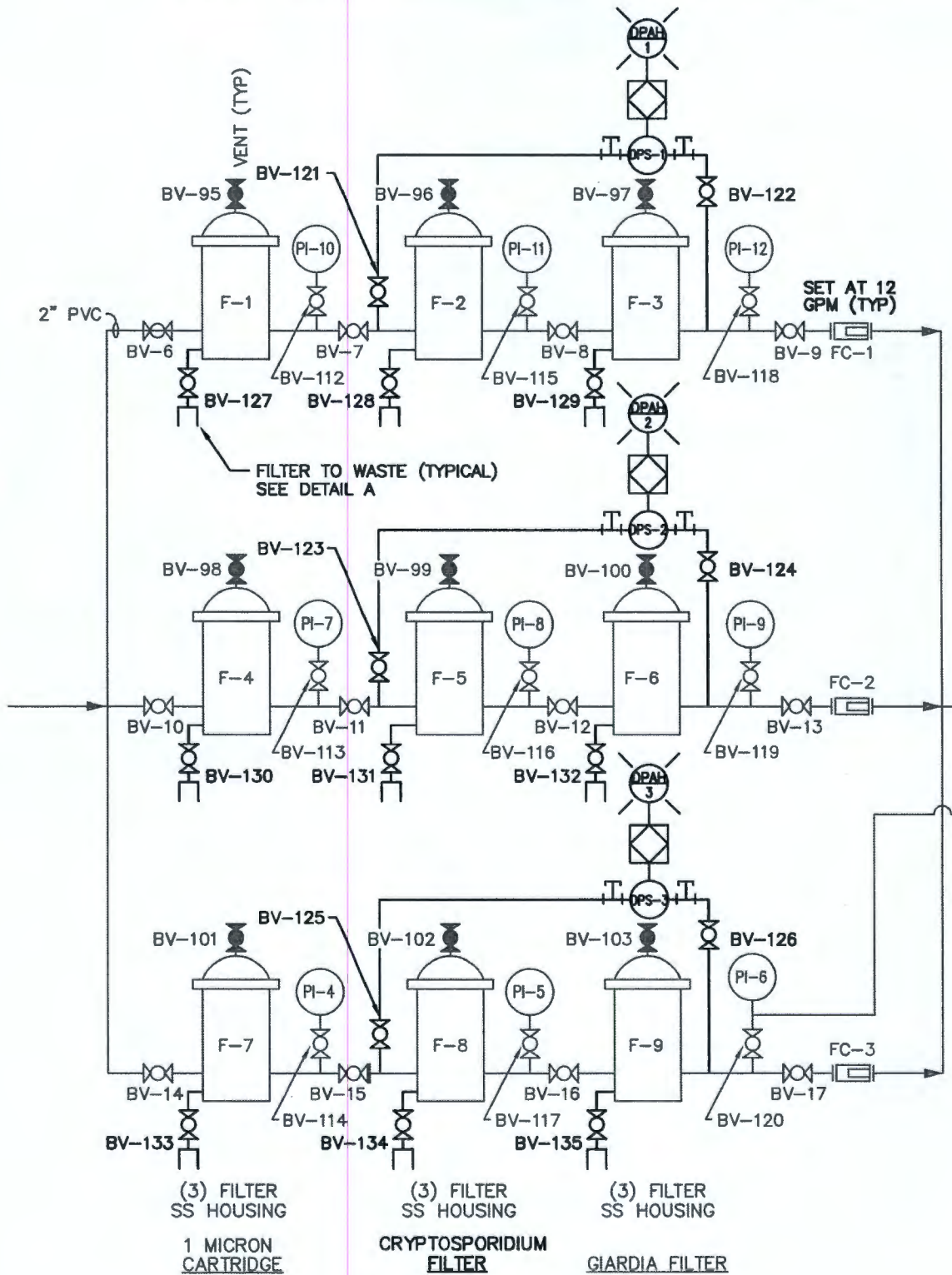
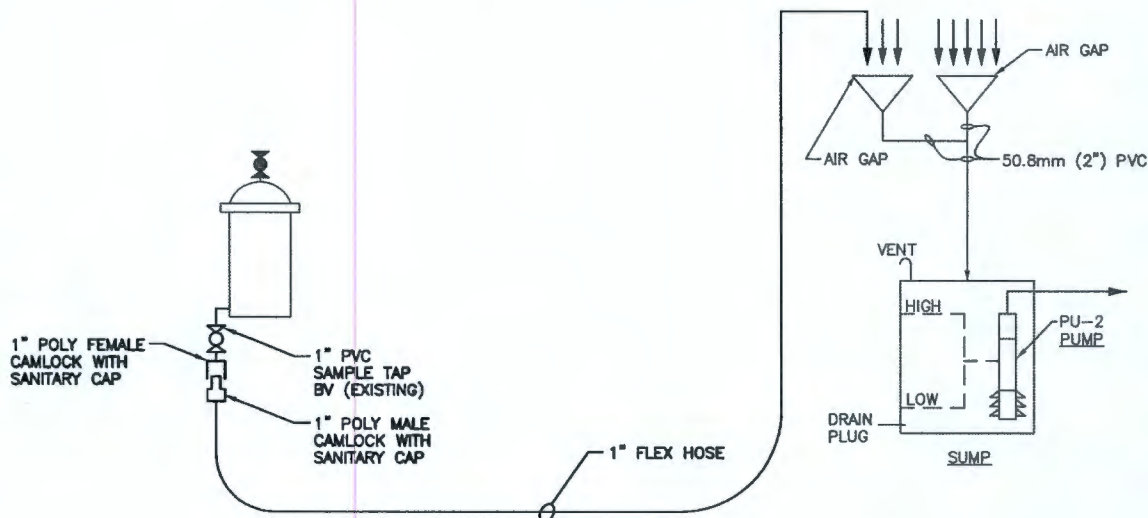


Figure 2. Typical Filter-to-Waste Configuration



4. **Maximum Flow Rate Control:** The flow controller for each treatment train will be set to 12 gal/min, which is a system operating parameter under the approved acceptance testing. The resulting decrease in design capacity from 72,000 gal/day to 52,000 gal/day is inconsequential since the average water use is 7,300 gal/day and significant increases in water use are not expected.

10.0 LEGAL CONSIDERATIONS

10.1 OWNERSHIP

The 186-N Water Plant is a DOE facility and as such is owned by the U.S. federal government.

10.2 RIGHT-OF-WAY

The proposed project will not impact rights-of-way.

10.3 SANITARY CONTROL AREA

Sanitary control areas will not impact the proposed project.

10.4 RESTRICTIVE COVENANTS AND OTHER RESTRICTIONS

The proposed project will not impact or impose any restrictive covenants or other restrictions.

11.0 REFERENCES

- 67 FR 1812, "National Primary Drinking Water Regulations: Long Term 1 Enhanced Surface Water Treatment Rule; Final Rule," *Federal Register*, Vol. 17, No. 9, Monday, January 14, 2002.
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- WAC 246-290-110, "Project Report," *Washington Administrative Code*, as amended.
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- WDOH, 2004, *Energy, Dept. of/100N Water System, ID# 418532, Benton County Long Term 1 Enhanced Surface Water Treatment: Bag Filtration Extension*, CCN 118265 to O. M. Holgado, U.S. Department of Energy, from C. L. Riley, State of Washington Department of Health, Spokane, Washington.
- WDOH, 2005, *Energy, Dept. of/100N Water System, PWS ID# 418532, Benton County Surface Water Treatment: Compliance Options for the Long Term 1 Enhanced Surface Water Treatment Rule*, CCN 123328 to T. H. Leone, Bechtel Hanford, Inc., from M. D. Wilson, State of Washington Department of Health, Spokane, Washington.

