Oregon
Theodore R. Kulongoski., Governor

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December 20, 2010

Tamio Fukuyama, P.E.
Group Mackenzie
1515 SE Water Ave #100
Portland, OR 97214

Re: Camp Rilea (95443) New Wells #1, #2, & #3, Treatment & Reservoir
Group Mackenzie Project #2100230.02
Conditional Approval – PR# 186-2010

Dear Mr. Fukuyama:

On November 30, 2010, the Drinking Water Program (DWP) received a $150 review fee and plans calling for the construction of a new water system at Camp Rilea (assigned public water system ID#95443) in Clatsop County. The plans (assigned Plan Review #186-2010) call for the installation of 3 wells, an arsenic, manganese, and iron removal treatment system within a new 1,800 sq ft treatment building, an 0.4 MG finished water reservoir, and related distribution piping and appurtenances. Specifically, the plans call for the installation of:

1) Three wells numbered #1 (100 gpm), #2 (150 gpm), and #3 (150 gpm) with submersible vertical turbine pumps;
2) A pressure type, iron, manganese, and arsenic removal filtration system consisting of:
    a. Raw water turbidimeter and individual well and combined raw water flowmeters;
    b. Pre-filtration onsite generated sodium hypochlorite (ChlorTec, Severn Trent or equal NSF 61) injection system for pre-oxidation of arsenic (III) to arsenic (V);
    c. Pre-filtration ferric chloride coagulation injection system for arsenic adsorption onto pyrolusite media (backwash water disposal to new drainfields);
    d. Static mixer;
    e. Two 265-gal chemical contact vessels;

   f. Six 150-psig, 265-gallon pressure filters for a combined capacity of 250-gpm (5.9 gpm/sf) containing pyrolusite (manganese dioxide) media (AS-721) with gravel support beds;
   g. Combined filter effluent turbidimeter and pH and chlorine analyzer;
   h. Post-filtration zinc orthophosphate injection system;
   i. Post-filtration sodium hypochlorite injection system for injection into the fire suppression recirculation line influent to the finished water reservoir;
   j. Two 360-gpm distribution VFD booster pumps (one standby and one duty) and a 3,000-gpm fixed speed fire pump;
3) One 428,300 gallon (54-ft dia x 25-ft ht, 69.5-ft OF elev.) bolted glass fused-to-steel reservoir conforming to AWWA D-103 with cathodic protection used for distribution storage;
4) Related yard piping and appurtenances.

Geotechnical investigations were conducted by Shannon & Wilson, Inc. and documented in a report dated April 28, 2008 entitled "*Draft seismic site hazard investigation and geotechnical engineering report – water and wastewater treatment facilities*, *Camp Rilea*, *Oregon*" and a March 27, 2009 Project Memorandum entitled "*Preliminary Foundation Recommendation for Camp Rilea WTF Tank*"

The site plan for constructing the 3 wells was previously reviewed by our geologist, Tom Pattee, and approved in my letter dated November 24, 2010.

Pilot plant testing of the well water was conducted by ATEC, a pyrolusite filter supplier, on 29-30 April 2008 with an average loading rate of about 6.21 gpm/SF. Pilot testing demonstrated a reduction in average arsenic concentration from 16.7 mg/l to 5.6 mg/l. Testing also determined an optimum flow rate of 6-7 gpm/SF using six 36-inch diameter pressure filters to supply a design capacity of 250 gpm. The test results indicate a chlorine dosage of about 1.5 mg/l to maintain the effective iron and manganese adsorption capacity of the pyrolusite and about a 2 mg/l as iron in a ferric chloride solution of about 40% content is required for arsenic removal.

The project is approved for construction as proposed provided the following conditions are met:

1) The recommendations in final geotechnical data and design reports by Shannon and Wilson are followed (e.g., design earthquake of 9.0, Site Class D with a peak ground acceleration of 0.36g for the reservoir site, etc.), unless superseded by subsequent investigations (only preliminary and draft documents (mentioned above) which reference subsequent additional materials and design recommendations, were included in the plan submittal). Final geotechnical reports well need to be submitted prior to final approval.;
2) Each well is fitted with a raw water sample tap for annual coliform assessment monitoring;
3) The well houses are insulated, lighted and heated;
4) Reduced pressure principle backflow assemblies are installed were potable water is used as carrier water for the chemicals or for filter backwash water;
5) An air gap or RP is utilized where potable water is used for making up batch solution tanks;
6) The reservoir tank make and model and installation plans are submitted for our approval (the plans call for the installation of a Fusion, Aquastor, or equivalent tank. Our office needs to review and approve plans for the exact tank that is to be installed);
7) Materials intended for contact with potable water (e.g., protective coatings, metering pumps, pipelines, etc.) meet NSF Standard 61 for use in potable supply systems;
8) Chemicals (e.g., ferric chloride, zinc orthophosphate, and sodium hydroxide) used to treat the potable water supply meet NSF Standard 60;
9) Non-conductive piping is installed with No. 18 AWG (minimum) blue insulated tracer wire according to OAR 333-061-0050(8).
10) Disinfection of facilities and bacteriological testing is carried out in accordance with AWWA Standards C651-C654;
11) Discharge of the filter backwash water to the backwash settling basin and then to the wastewater treatment plant is in compliance with Oregon Department of Environmental Quality and local requirements (liquid waste streams that contain more than 5.0 mg/l of arsenic are typically considered hazardous waste);
12) Conditions under Water Right Permit #G-16125 need to be met. Permit #G-16125 only identifies two wells within the Neacoxie Creek Basin. Should three production wells be developed, the water right would need to be modified to include a third well.

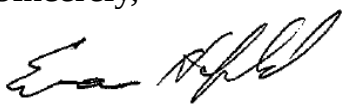
In addition to the conditions listed above, I have the following comments:

1) Chlorine residuals will have to be measured at least twice a week in the distribution system using a DPD type test kit and the results recorded and available on-site (records must be retained for a 2 years). This is done in order to ensure that there is a detectable residual throughout the entire distribution system.
2) Should 4.0-log viral inactivation be needed due to coliform contamination in the wells, contact time through the reservoir must be determined by conducting a tracer study.
3) Water Right Permit #G-16125 limits water withdrawal to as low as 130-gpm for the month of August and peaks at 300-gpm. Operations will need to comply with this restriction, even though the plant capacity is designed for 250-gpm and peak day demands are estimated to be 229 gpm with a peak hour demand of 381 gpm.

Once construction is complete, it must be demonstrated that the conditions listed above have been met and a set of as-built drawings submitted to our office. Before the wells can be put into use, an initial raw water sample set from each well will also need to be submitted including SOC, VOC, IOC (including nitrate, arsenic, lead and copper), uranium, radium 226/228, gross alpha, and coliform bacteria. Subsequent monitoring will depend upon the results of this initial sample set.

Thank you for your patience in this process and if you have any questions, or would like this in an alternate format, please feel free to contact me at (971) 673-0419 or via e-mail at evan.e.hofeld@state.or.us.

Sincerely,



Evan Hofeld
Regional Engineer
DHS - Drinking Water Program

cc: Ron Bush Engineering and Surveying
James Arnold, Oregon Military Department
Maureen Taylor, Clatsop County Health and Human Services