13 November 2020

Memorandum

To: Nicholas Green, City Manager

John Day, Oregon

From: Kennedy Jenks; Dean Wood, Michael Humm, PE

Subject: Site Walk Findings – October 29,2020
K/J 2076017.00

Kennedy Jenks (KJ) staff (Dean Wood, Michael Humm, Amanda Mesick) completed a site tour of the John Day Wastewater treatment Plant (WWTP) on 29 October 2020. The purpose of the visit was to obtain site data and information needed to complete an alternative evaluation as part of the scope of work contracted under Flagline Engineering. This evaluation is expected to include performance and cost based comparisons of 3 treatment process alternatives, including one option which evaluates the ability to rehabilitee the existing WWTF. The objective of the evaluation is to determine the best cost solution meeting the City's discharge permit requirements. Each alternative must provide the same level of service and operational life expectancy across each alternative.

The purpose of this memo is to document the observations and initial findings of the site visit and the potential impacts to rehabilitating the existing WWTP.

Age

Generally, the equipment is all of the same original installation; design drawings obtained during the sitewalk are dated 1978, far exceeding an expected 20 year lifecycle on major treatment plant equipment.

Resulting approach to alternative evaluation: the age of equipment was expected prior to the site walk. All mechanical equipment will need to be replaced in the rehabilitation option.

Concrete Structures

Concrete basins including both the primary clarifier and the secondary clarifier, and the trickling filter flow splitting structure were found to have visible cracking with active seepage. (Photos 1-2). The cracking appeared to be uniform across the basins and may be indicative of a poor cold joint developed during initial concrete placement. Repair of this type of condition in this age of concrete is difficult and can have limited success.

The primary (heated) digester and secondary (unheated) digester were both found to be in near failing condition. The primary digester has significant concrete deterioration at the roof and digested sludge overflow vault. (Photo 3). Digester lid equipment, including flame resistors, pressure relief valves, and gas handling piping was corroded and may provide limited functionality. An access port in the primary digester lid was significantly corroded and had been dislodged from the digester roof (Photo 4). This penetration allows passive venting of digester gas and creates a significant safety concern. The secondary digester lid is a floating steel lid. Digester contents had overtopped the floating lid and the lid remains stuck and unable to travel. (Photo 5)

Resulting approach to alternative evaluation: the ability to reuse existing concrete tankage is very limited. The active weeping across many of the structures is concerning and indicates the basins are at or near the useful life of the structures. Repair methods, particularly on the clarifiers with the fluted architectural exterior are going to be very difficult and costly and even with repair, the crack will never be fully restored to a remaining life similar to what a new concrete structure would provide. The findings suggest if the existing site is to be used for continued WWTP operations, new basins would need to be constructed.

Primary and secondary digester roof replacement is needed. Operations staff indicate the primary digester mixer has significant bearing issues and there is no known condition assessment of either digester's interiors. The ability to reuse the digesters is unknown, but based on roof top condition and aging and leaking concrete structures onsite, the ability to rehabilitate the digester is unlikely.

Hazardous (Classified) Locations

The control building is located at the center of the plant. The building encompasses many unit processes; it is common walled with the below grade influent wet well, common walled and directly above the below grade trickling filter effluent wet well; the building interior shares common walls with both the primary and secondary digester, the building includes gas piping and gas handling equipment such as sediment and condensation traps, and the control building houses the WWTP main power feed, motor control centers, and SCADA control terminal.

The equipment within the control building includes influent pumps, a self priming engine driven influent pump, trickling filter effluent pumps, sludge pumps, gas handling equipment, a boiler, as well as an active workshop/tool bench. The control building has a connected laboratory and is also common walled to the adjacent gaseous chlorine room.

The central control building presents challenges, specifically related to NFPA 820, the *Standard for Fire Protection in Wastewater Treatment and Collection Facilities.* NFPA 820 is an industry

standard, that Kennedy Jenks uses prescriptively, which is a common approach in the wastewater industry.

Based on the site walk and review of as-built information, the existing control building layout triggers several classification criteria with NFPA 820: influent pumping (Table 4.2.2 Row 17), sludge pumping (Table 6.2.2(a) row 9), and anaerobic digester gas handing (piping) (Table 6.2.2(a) Row 17). Each of these criteria trigger the need for ventilation requirements. Without nameplate data of the ventilation system, we are unable to determine exact classification, however, if less than 12 air changes per hour as determined by the presence of gas handling equipment, the entire building space is classified as Class 1 Division 1. If air changes exceed 12 air changes per hour, the building space is classified as Class 1 Division 2, except within 5 feet of the digester walls. In addition to ventilation criteria, the standard also prescribes air monitoring and alarming.

Figure A.6.2(e is an illustration of Row 17 and the presence of sludge gas piping and gas processing equipment as found in the control building during our site walk.

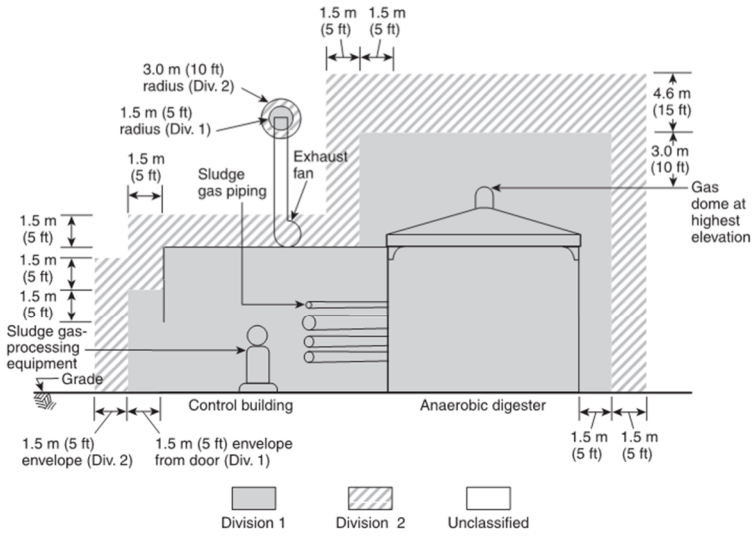

FIGURE A.6.2(e) Anaerobic Digester Control Building Containing Sludge Gas–Processing Equipment not Physically Separated and Using Ventilation Method (A); Illustration of Table 6.2.2(a), Row 17.

Resulting approach to alternative evaluation:

Ventilation improvements may be able to bring the existing space to a Class 1 Division 2 rating, however Class 1 Division 1 space will remain within 5' of the existing digesters. Replacement of existing motors and equipment is pervasive and requires all rated equipment to be installed. Additionally, a new electrical room outside the classification space would be required for the motor control center.

Flood Plain

The City of John Day provided Kennedy Jenks with flood plain mapping prior to the site visit. The mapping indicates the existing plant is within the flood plain. While onsite, the operations staff described how the John Day river overtops its banks upstream of the plant, but due to the low lying site, the WWTP becomes flooded. Plant staff have historical knowledge of past flooding events. Flood plain elevations indication the floodwaters are estimated to be 6' to 9' above existing grade onsite at the WWTP, including the threshold elevation into the control building.

Resulting approach to alternative evaluation: Top of wall elevations in both process basins and electrical and control buildings would be required to be above the flood plain elevation. This essentially eliminates the ability to reuse structures, the control building, and the overall layout of the existing treatment plant. This assumes that filling within the floodplain, such as constructing a dike around the perimeter of the property is not permittable.

Site Conclusions and Next Steps

Overall the treatment plant was found to be in marginal to poor condition. The greatest challenge in continuing to use this site is the need to address the flood plain issues. Without a dike system, all new taller facilities above the floodplain elevation would be required. This approach essentially results in a new treatment plant but with the added complexity of trying to design and then construct the plant while working in, around, and with existing treatment works. Construction of this nature is typically wrought with challenges including temporary operations, bypass pumping, temporary electrical and control feeds, and overall more challenging design and construction resulting in a longer duration construction period with greater change order risk.

With these findings, the existing site does not present the City with a viable alternative given expected cost for rehabilitation of all structures and complexity to maintain operations while continuing to meet the City's discharge permit requirements.

Enclosure(s) (Photo Attachments)

Photo Attachments

Photo 1 – Primary Clarifier – concrete cracking/weeping

Photo 2 – Trickling Filter flow splitting structure – concrete cracking/weeping

Photo 3 - Primary Digester roof – concrete corrosion

Photo 4 - Primary Digester roof – penetration failure – passive venting

Photo 5 - Secondary Digester roof – failed floating lid