



Michael S. Kuenzi, P.E.
Director

MEMORANDUM

TO: Mike Kuenzi, Director
FROM: Ted Kyle, Capacity Program Manager
DATE: July 20, 2007
SUBJECT: Interim Capacity Cost Estimates

We have completed the capital cost estimate for interim capacity improvements. During the last week the team value-engineered the initial program scope to solidify the minimum investment needed to meet the District's goal of providing 8 to 10 years of interim capacity on an accelerated track, and do so without substantially increasing the operational risk to either CCSD No. 1 or Tri-City Service District. Our analysis identified several improvements that could be deferred to reduce near-term pressure on rates. However, these deferred improvements will be necessary if the interim capacity need stretches beyond a 10 year timeframe. With these scope reductions taken into account, the total CCSD No.1 investment is \$109.3 million.

The engineers took an alternative approach to providing interim capacity by limiting the peak flow being diverted to the Tri-City Plant, while providing enough organic treatment capacity at the Tri-City Plant to handle the loading from 20,000 Equivalent Dwelling Units (EDUs). This resulted in a substantial reduction in the liquids treatment process train. Table 1 lists the major process units to be built, items deferred, and items Tri-City Service District needs. The total CCSD No. 1 cost for interim capacity is \$58.9 million. There are two primary risks associated with this approach; 1) the continuing hydraulic conditions at Kellogg will not reduce the risk of a potential permit violation during wet weather events, and 2) servicing CCSD No. 1 will push the existing biosolids treatment and storage at TriCity to its limits and may require periodic disposal at a landfill, thus increasing the operational cost to CCSD No. 1.

The near-term improvements at Kellogg have also been reevaluated to include only those items needed to meet known reliability requirements and to handle the peak flow that are not being diverted to the Tri-City Plant. Improvements to treat ammonia and other minor replacement items have been deferred until such time as DEQ has ruled on the permit reconsideration. The risk of this approach is that the District may have to borrow more money for additional process improvements at Kellogg if DEQ upholds the current permit condition. Table 2 shows the Kellogg Improvement costs and divides them into needed improvements and differed items.

Conveyance is planned to be built in two stages, with the first stage being sized to move dry weather flow from the Clackamas Interceptor through the existing Clackamas Pump Station and Force Main. The initial diversion upgrade is expected to cost \$9.3 million, the gravity connection to bring flow from the Clackamas Interceptor being the major cost element. New pumps and associated equipment are needed at the Clackamas Pump Station to maximize the existing pipeline's capacity. The second stage is planned to augment the diversion so that 20,000 EDUs of load and average flow can be conveyed. This project will need to be initiated within two to three years, but delays additional conveyance expenditures until after a decision is made regarding the new plant's location. The risk in this two stage approach is that the Kellogg Plant may be overloaded before the second stage is built. Both stages are needed to fully utilize the proposed interim capacity. The second stage diversion is estimated to cost \$33.2 million. Conveyance costs are summarized on Table 3.

The Citizen's Advisory Council requested that we consider retrofitting the Kellogg plant to meet these interim capacity needs. We developed a plan for this retrofit that considers all of the impacts to process units in both the liquids and solids process trains. The liquids process would install membranes in the aeration basins and includes related support facilities, which brings the organic capacity of the plant to 40,000 EDUs. Fine screens are needed to protect the membranes from being fouled, which requires increasing the hydraulic grade of the headworks. The biosolids thickener needs to be upsized for additional load from the liquids process and moved to allow for the headworks modifications. A new digester will be needed to handle the increased loads. Biosolids dewatering is also included in this plan so that biosolids can be hauled to eastern Oregon sites. The membrane support facilities will be built where the existing administration building is, requiring a new administration building.

In order to achieve the District's goal of implementing these improvements within a three to four year window, half of the current flow at the Kellogg Plant will need to be treated elsewhere. Staff believes that Oak Lodge does not have the capacity to take this much flow on an interim basis therefore the Tri-City plant is the only location that can be modified to accommodate this additional flow in a timely fashion. The total cost is estimated at \$238.6 million.

Upgrading Kellogg and download capacity will take five years to design and construct because it must be built in two phases. The first phase could be built in three years, and includes building download capacity and moving existing Kellogg process units to make space for the second phase units. The second phase could be built in the following two years. The risk of this approach is that constructing modification in the middle of an operating treatment plant is difficult and construction claims are possible. Plant operations will also be difficult because construction will interrupt plant operations, making permit compliance problematic. Table 4 shows a breakdown of the capital cost for this approach.

The cost estimates presented in this memo are based on scaling back the preliminary design and adjusting the construction cost estimate developed by CH2M Hill and HDR for the initial near-term recommendation. They indicate that the final cost could be 15% lower or 25% higher and that variance is based on the low level of detail in the preliminary design. Once this scope of near term improvements is accepted, we will begin final design and update the detailed cost estimate. The cost estimate is in July 2007 dollars and includes no inflation to the time of construction. Inflation adjustment will be made by the financial forecasting model.

Interim Capacity Program

Table 1

Interim Capacity At Tri-City

Item	Project Cost	CCSD	TCSO	Deferred
Tri-City Issues	3,600,000		3,600,000	
Landfill	4,900,000		4,900,000	
Liquids	55,100,000	55,100,000		
New Digester	6,900,000			6,900,000
Solids Complex	17,800,000			17,800,000
Site/Yard Piping/Roads	3,800,000	3,800,000		
Admin/Shop/Lab	23,800,000			23,800,000
Screenings	2,900,000			2,900,000
Grit Removal	4,300,000			4,300,000
Future Site Work	10,100,000			10,100,000
Total	133,200,000	58,900,000	8,500,000	65,800,000

Table 2

Kellogg Near-Term Improvements

Item	Project Cost			Deferred
Aeration Basin and Blowers	3,600,000	3,600,000		
Hypochlorite System Replacement	670,000	670,000		
Sedimentation Chemical Addition	630,000	630,000		
Hydraulic Improvements	700,000	700,000		
SCADA System	1,300,000	1,300,000		
Digester Equipment Replacement	2,000,000			2,000,000
Engine Generator	1,400,000			1,400,000
Ammonia Removal System	8,000,000			8,000,000
Underground Utilities	700,000			700,000
Minor Equipment Replacement	500,000			500,000
Odor Control	300,000			300,000
Total Kellogg	19,800,000	6,900,000	0	12,900,000

Table 3

Conveyance

Bridge Fix up	1,000,000	1,000,000		
Clackamas PS and Pipelines		9,300,000		
Three Creeks PS and Pipelines		33,200,000		
Total Conveyance	34,200,000	43,500,000	-	-
Total Near Term Improvements	187,200,000	109,300,000	8,500,000	78,700,000

Table 4

Kellogg Conversion to Membranes

Item	Cost
Kellogg Plant Upgrade	
Influent Pump Upgrade	1,000,000
Headworks	11,100,000
Primary/Secondary Chem.	900,000
Hydraulic Blending	700,000
Aeration System Improvements	7,000,000
MBR System	48,200,000
UV Disinfection	5,600,000
Chlor/Dechlor	1,000,000
Outfall	6,600,000
Admin Bldg	4,300,000
Other Replacements	600,000
Underground Utilities	700,000
Odor Control	3,100,000
New Digester	15,700,000
Existing Digester	2,700,000
HMI/SCADA	2,100,000
Dewatering Complex	13,800,000
Thickener	6,600,000
Landscaping/mitigation	1,400,000
Site Support	3,100,000
Total Kellogg Upgrade	136,200,000
Tri-City Capacity Improvements	
Liquids Treatment	55,100,000
Site Work	3,800,000
Total	58,900,000
Conveyance	
Bridge Fix up	1,000,000
Clackamas PS and Pipelines	9,300,000
Three Creeks PS and Pipelines	33,200,000
Total Conveyance	43,500,000
Total Program	238,600,000