Wastewater Treatment Plant History

Original Plant

Built:	1957
Engineers:	Earl Ruble Consulting (Duluth, MN)
Type:	Primary Treatment with screening, grit removal, sludge dewatering and disinfection (chlorine)
Status:	Still operational, but not used for City's wastewater. Houses the sludge removal equipment, lab and electrical monitoring panels.
Funding:	Don't know.
Capacity:	Don't know, but would assume it would handle a 1.2 MGD flow with a 2.4 MGD maximum flow. (The only reason I say this is because when the 1.2 to 2.4 MGD addition was added, nothing was changed in the original plant.) This plant had the ability (and did quite frequently) bypass raw sewage into Lake Superior during high flows.

Secondary Plant (First Major Update)

Plans Submitted: 1972

Engineers:	Pfeiffer & Shultz
Type:	Walker Process (complete mix aeration plant). This consisted of 3 aeration zones, one aerobic digester and a clarifier. The building structure along with this contained housing areas for primary and secondary pumps, dissolved air flotation thickener, 4 air blowers and a room for 4 tertiary filters.
Status:	The aeration units and clarifier are still operating. (A new clarifier drive was installed in 2006.) Pumps are still operating, although one has been totally replaced. All 4 air blowers have been replaced by 3 new ones.
Funding:	I am not sure on everything; but money was made available by the "Clean Water Act" in 1972. I **think** the Federal Government paid 70%, the State paid 20% and the City paid 10%.
Capacity:	Average design flow was 1.2 MGD and maximum design flow was 2.4 MGD. (We still bypassed)

With bypassing still a problem, our I & I (Infiltration & Inflow) issues had to be addressed. This resulted in the construction of a "By-pass Monitoring Station" at the WWTP in 1979. This was for the purpose of studying excessive flows during rain storms and winter snow thaws. This study was supposed to last for two years where information collected would aid the city in rectifying their I & I problems.

Bypass Monitoring Station

Plans Submitted: 1979
Built: 1979
Engineer: Pfeiffer & Shultz HDR
Type: Facility made to monitor excessive flows related to rain events.
Status: Building and infrastructure still in place, but not operational.
Funding: I think this was 100% federally funded. (Only one in USA)
Capacity: More than sewer lines could physically pass.

Sludge Handling Equipment:

Plans Submitted: 1989
Built: 1990
Engineer: RMA (Richard Anthony) Engineering (Duluth, MN)
Type: Eimco HDP 1.1 meter press. (Removed Eimco vacuum filter)
Status: Still in operation
Funding: Don't know
Capacity: Has the ability to dewater 75 GPM of 2.25% liquid sludge to a "cake" sludge of about 20% solids. We operate this about 600 hours per year and put out about 180 dry tons of sludge.

The city now started on an I & I reduction program of sealing off manhole covers as well as smoke testing and dyeing sanitary and storm sewers for identifying any cross connections. This action did not solve our problems. The city was now under intense pressure from the MPCA to stop all bypasses resulting from I & I. This prompted the construction of a new preliminary treatment building at the WWTP.

Data collected from the by-pass monitoring station helped in sizing of the new preliminary treatment building which was put on line January 1, 1995. The preliminary treatment building only address the issues of pumping ability, screening, grit removal and flow measurement. This building was designed to handle a flow of 10.0 MGD. Some of the issues addressed in this construction stopped some of the by-passing, but not all of it.

Preliminary Treatment Building

Plans Submitted: 1993
Engineer: SEC Donohue (started) which got bought out by RUST Eng.
Built: Went on-line January 1, 1995
Type: New preliminary Treatment Facility with updated screening removal, grit removal and raw sewage pumping to existing plant. This update included some of the items previously mentioned such as the new air blowers and new primary effluent pump. Also was an update to the secondary aeration tank (new inner walls with

valving) updated electrical controls on all new equipment and misc. older pieces of equipment.

Status: This is still our main line operating facility which works quite well.

Funding: Don't know.

Capacity: The preliminary Treatment works can now treat up to a 10 MGD flow. The rest of the plant can still only handle about 2.6 MGD, so pumps were set to only pump at this rate through the remaining plant. Higher flows were still being bypassed.

Our continued by-passing had caused the MPCA to put in a "Schedule of Compliance" in our NPDES Permit. These permits to discharge have a 5 year time frame before they have to be renewed. Ours had run out on January 31, 2003. The "Schedule of Compliance" section stated that we must have eliminated all by-passing by March 31, 2001. We hadn't.

This didn't happen without effort on the city's part. We went through a sump pump installation program, which did help. The city also bought a TV camera for televising and identifying problem sewer areas. A pavement replacement study was done with the cost estimates for the replacement of the utilities under the street. These studies have helped the city in prioritizing the areas needing upgrades.

The city now applied for a new NPDES Permit in 2002. Before issuance of the new permit, a new "Schedule of Compliance" was issued. This schedule will define time lines for the elimination of our by-passing. If we do not adhere to these time lines, a sewer moratorium could be placed on the city. Our options had run out, and the only alternative left was to build a by-pass detention facility at the WWTP.

With more data collected after the sump pump installation program, the city hired MSA engineering to determine the tank size needed to contain the flows. We were required to contain all flows, caused by rain, up to what is defined as a 25 year event.

Equalization (EQ) Basin

Plans Submitted: 2004

Engineer: MSA (Duluth, MN)

Built: On-line 2005

Type: EQ Basin has the ability to hold 2.5 million gallons. If flows exceed this, it will be chlorinated as it leaves this structure and flows into a "chlorine basin" where detention time occurs for disinfection. This chlorine basin has a capacity of 109,000 gallons and upon its discharge of this flow, will add sodium bisulfite for dechlorination.

Funding: Some grant money. Don't know percentages.

Capacity: EQ Basin can contain 2.5 MG. Chlorine Basin can contain 0.109 MG.

Mercury Reduction Project

Engineer:	MSA (Duluth, MN)
Built:	Started June 2014 and finished September 2015.
Type:	Tonka sand filters for tertiary treatment for removal of mercury. This project also included plant upgrades to our Pri. Eff. Pumps, Sec. Eff. Pumps and alum pumps. Along with these were new controllers also. Building #30 got 4" of blue Styrofoam insulation and new metal siding. The Walker Process aeration tank also got a new wall erected around its perimeter. This project was done to meet our new mercury discharge limit of 1.8 ng/l. We did.
Funding:	Received some IRRRB money; but mostly PSIG grant money (TMDL was old name). This grant paid half of everything in the project that was related to mercury removal. The city paid for the rest. This was about a $3,000,000 project. The city bought the big ticket items like the pumps and the sand filters to save on the sales tax. The contractors provided the rest of the items. The general contractor was Magney Construction.
Capacity:	These new sand filter were built to handle a flow of 2.6 MGD with one filter out of service and one in a back wash. There are 8 cells.