November 11, 2015 Meeting

The November 11, 2015 Waterloo Technical Society (WTS) meeting was called to order by President Gary Dorhout at 7:20 pm.

A total of 48 were in attendance. President Dorhout gave a brief financial condition report from memory in the absence of a report from the Treasurer. To his recollection there was a balance of $1,311.08 with the purchase of the public address speaker system for $337.92 still outstanding. To his knowledge there were 45 paid members. A Treasurer's report would be presented at the January 2016 meeting.

Old Business. No old business was discussed.

New Business. President Dorhout requested that members begin inviting speakers for the 2016-2017 year. A reminder that there will be no meeting in December 2015.

President Dorhout introduced our guest speaker, Mr. Brent Maitland, who spoke on the operation of the UNI Powerplant (Thanks to Tom Pfiffner). Mr. Brent Maitland, UNI Power Plant Manager, served in the US Navy from 1988-1994 in the Naval Nuclear Power Program. He graduated from the UNI Industrial Technology Program in May 2000 and was the UNI Power Plant Operations Manager from 2000-2010. He was named UNI Power Plant Manager in 2010 and continues in that role today.

Brent hosted a tour of the UNI Power Plant following the meeting.

History. In 1896 a steam generation plant was constructed at the present site of Maucker Union. In 1902 electricity generation was added to help reduce some of the cost of steam generation and power purchase. In 1969 the Power Plant was moved to its current location. By 2004 the combined heat and electricity power plant provided 40% of its energy as electricity, 40% as heat and 20% was rejected to the environment as wasted energy. A typical Power Plant wastes 60% of its energy and sells only 40% to customers.

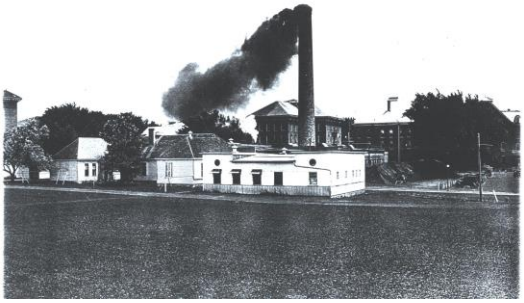


Figure 1. 1896 Steam Plant

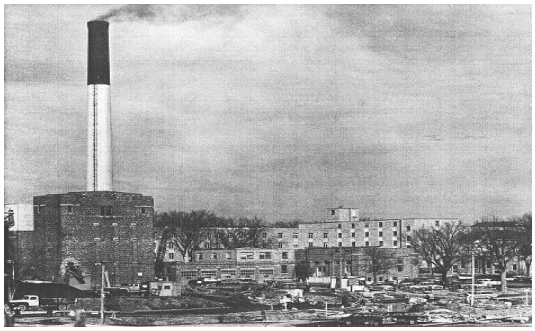


Figure 2. 1933 Power Plant

Staff.

- 17 Shift employees
  - 4 Shift Supervisors
  - 13 Operators
- 6 Maintenance
  - 4 Maintenance Mechanics
  - 2 Steamfitters
- 2 Utility Plant Material Handlers
- 1 Electronics and Instrumentation Technician



Figure 3. 1969 Power Plant

Fuels burned and Boilers.

Table 1. Steam production

Component	Steam, Klb	Percent
Boilers 1 & 2	86,239	12.8
Boiler 3	129,005	19.1
Boiler 4	461,025	68.1
Total Steam Produced	676,269	100.0



Figure 4. Control panel for Boilers 1 and 2.

- Boilers #1 and #2, Dual Fuel (Natural Gas, #2 Fuel Oil)
- Boiler #3, Pulverized Coal with #2 Fuel Oil Backup
- Boiler #4
  - Circulating Fluidized Bed
  - 3/8” Crushed Coal
  - Green Delayed Petroleum Coke

Boilers 1 and 2

- Erie City Package Boilers
- Installed 1969 at 250 PSIG and 575 deg F superheat
- Normally operated at 125 PSIG and 550 deg F superheat
- Used for backup and peaking
- Originally installed to burn #6 fuel oil and Natural Gas
- In the early 80’s switched to #2 fuel oil instead of #6 fuel oil

Boiler 3

- Babcock and Wilcox Pulverized Coal Boiler
- Installed 1979 at 250 PSIG operating pressure and 575 deg F superheat
- In 1982 the Turbine Generator installed and Boiler #3 pressure increased to 600 PSIG at 750 deg F superheat

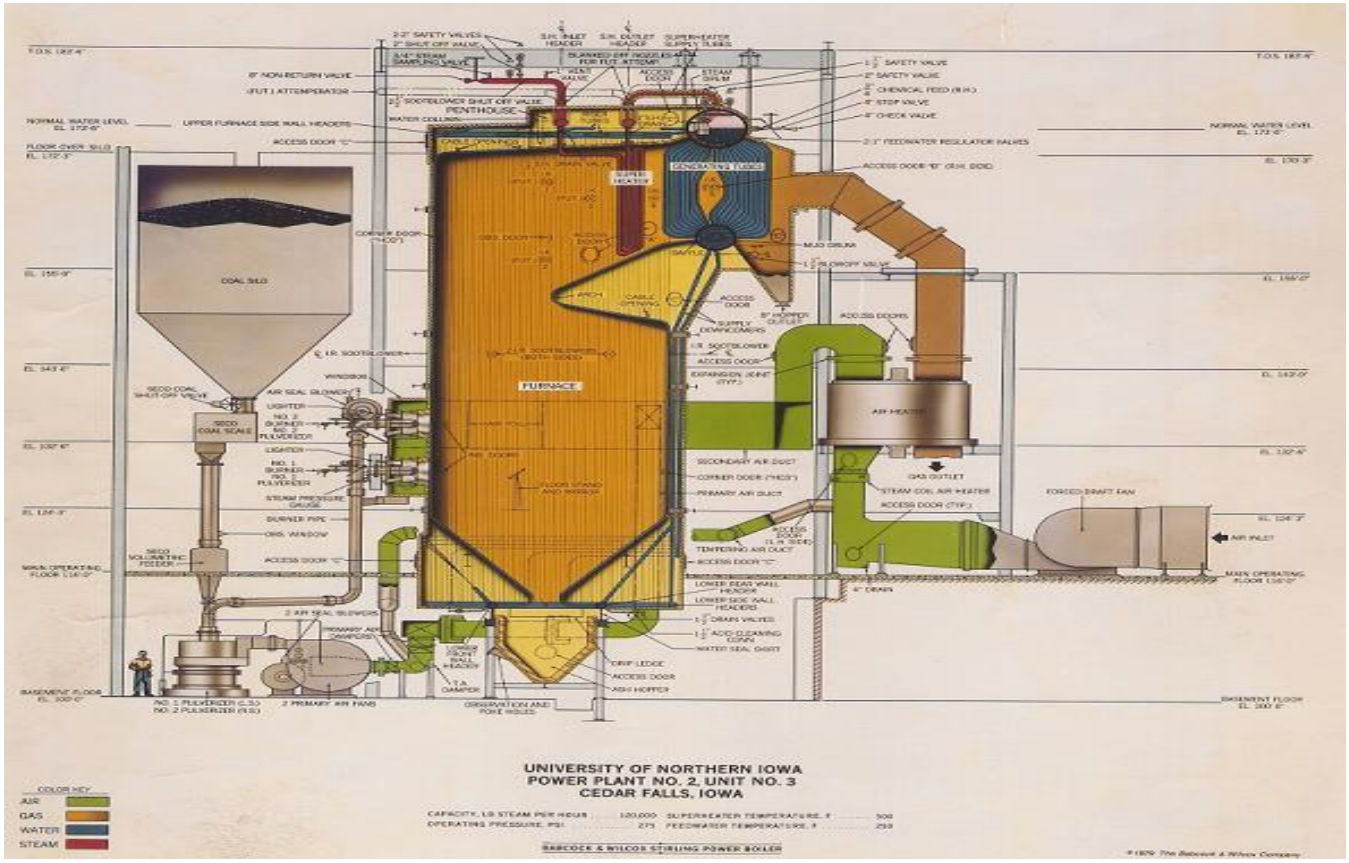


Figure 5. Boiler 3. Generates 874 tons of ash each year.



Figure 6. Control panel for Boiler 3.



Figure 7. Control panel for Boiler 4.

Boiler 4.

- PyroPower Circulating Fluidized Bed Boiler
- Installed 1989 at 600 PSIG, 750 deg F
- Leading edge technology at the time of installation for sulfur capture and NOx reduction
- UNI unit was the third PyroPower CFB boiler installed at a University in the U.S. at this time

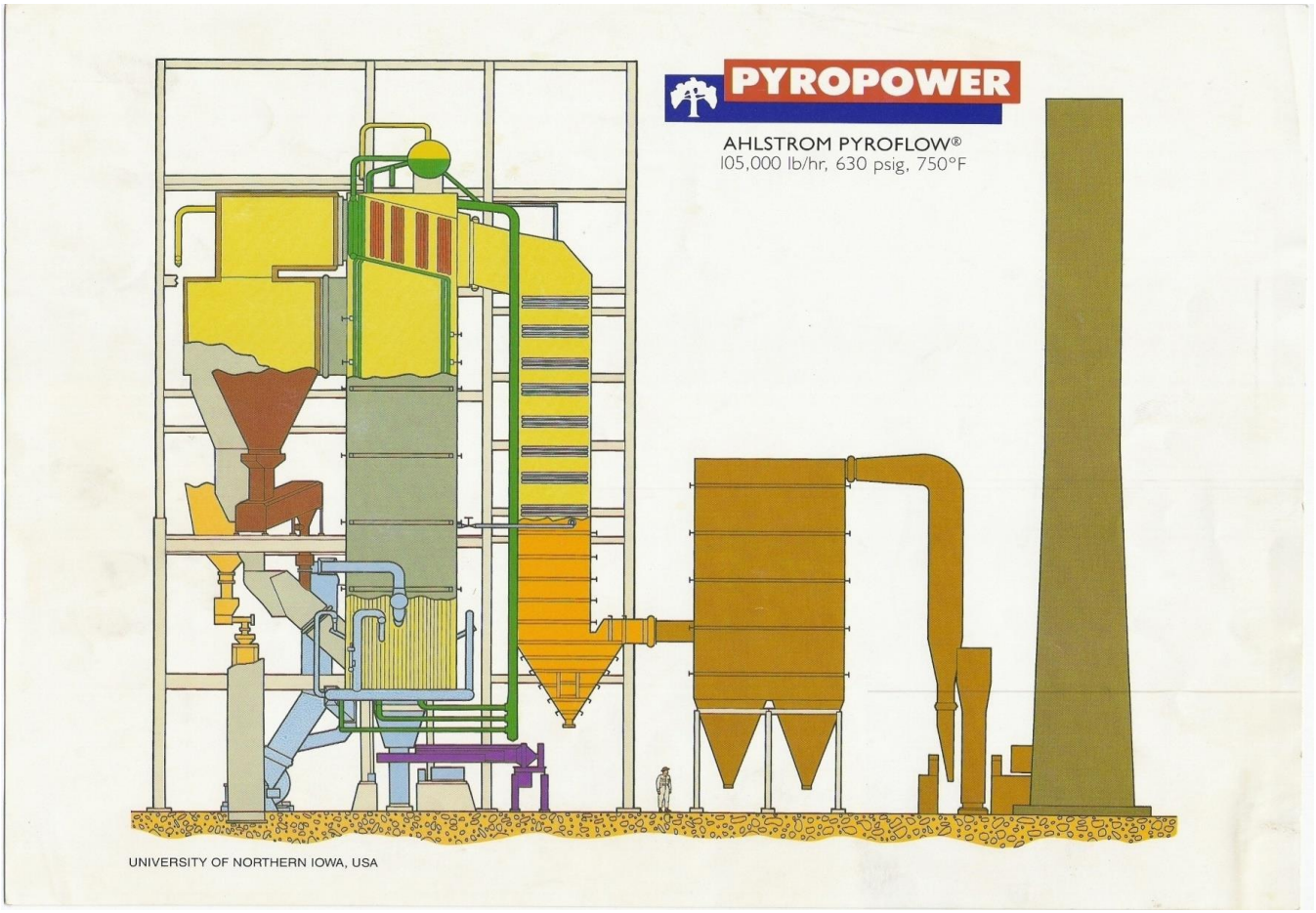


Figure 8. Boiler 4. Uses 7,677 tons of limestone per year to remove SO_2 gas. Generates 8,834 tons of ash.

Elliot Turbine Generator Set

- Installed 1982
- Elliot Turbine
  - 10,500 HP
  - Extraction Turbine
- Electric Machinery Generator
  - 7.5 MW
  - 12,500 Volt generator



Figure 9. Electric machinery generator, pic 1.

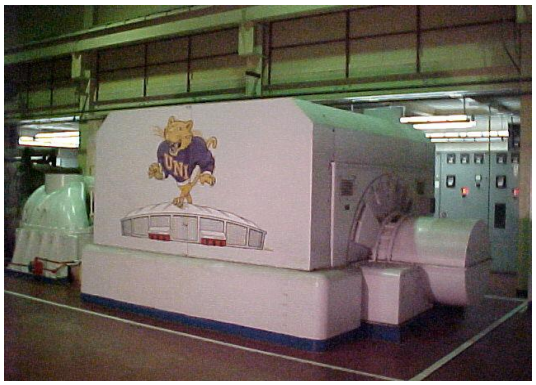


Figure 10. Electric machinery generator, pic 2.

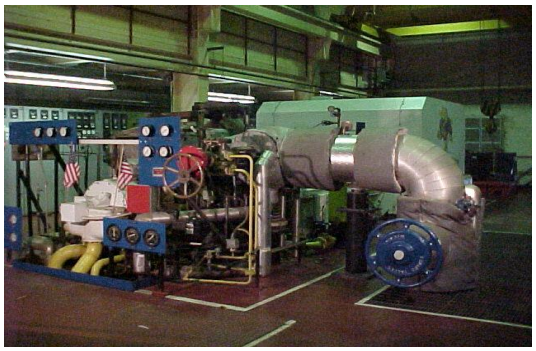


Figure 11. Elliot turbine generator.



Figure 12. Turbine generator control panel.



Figure 13. Cooling towers.

Table 2. Source of electricity for UNI.

Source	KWh	Percent
UNI Generated	20,367,000	35.6
CFU Purchased	36,922,000	64.4
Total Campus Use	57,289,000	100.0

The Power Plant operates under special permits and licenses primarily issued by Iowa Department of Health, Iowa Department of Natural Resources and Cedar Falls Public Works.

There are 17 special permits and licenses including:

- Industrial Wastewater Permit
- National Pollution Discharge Elimination System
- Federal Title V Clean Air Act
- Radioactive Materials License.
- Special Waste Authorizations (2)
- Construction Permits (10)
- Water Use Permit

UNI Power Plant is currently planning a covering for its coal pile to reduce runoff containment and wind erosion of the storage pile.

Next Meeting. The January 13, 2016 meeting will hear Mr. Jeff Ingels from XL Specialized Trailers in Manchester, Ia.

Meeting Adjourned. President Dorhout accepted a motion for adjournment at 8:15 pm. With a tour of the Power Plant following.

Respectfully submitted,

James R. Stevenson