ITEM # ___32__
DATE: 09-24-19

COUNCIL ACTION FORM

SUBJECT: POWER PLANT UNIT #8 MAINTENANCE OUTAGE IMPACTS

BACKGROUND:

Presently, Unit #7 is undergoing a boiler tube replacement with Inconel-coated tubes to protect against tube wastage caused by the burning of Refuse-Derived-Fuel (RDF). Unit #8 is planned to undergo a project to replace its boiler's superheater tubes with Inconel-coated tubes once Unit #7 is again operational. Staff's intent has been to continue to operate Power Plant Unit #8 until Unit #7 was operational; sometime in December.

This year, the condition of Unit #8's boiler tubes continues to create plant outages. Each outage requires several days to cool the unit down, locate the source of the tube leak, make repairs, and re-fire the boiler. **Since these leaks are occurring in the superheater section, each repair is taking place in a section of the boiler that will be reconstructed in a few months. These temporary repairs are also costly (an average tube leak costs $30,000 to repair and recently the unit has operated for less than a week at a time between leaks). It is unlikely that Unit #8 can remain operational until Unit #7 is returned to service without spending several hundred thousand dollars.**

The question is at what point should the utility discontinue making these temporary repairs? This decision has significant impacts on the Electric utility, the Resource Recovery Plant, our private refuse haulers, the Boone County Landfill, and the Electric Services customers of Ames. These impacts include:

1. **Impacts on the Resource Recovery Plant** (RRP)

   When Electric Services is unable to burn RDF in either boiler for an extended period, the RRP must divert all haulers to Boone Co. Landfill. RRP, therefore, forgoes the $58/ton tipping fee which represents a major source of revenue for the system.

   The sooner Electric Services chooses to shut down Unit #8, the more tipping fee revenue is lost by RRP. It is estimated that RRP typically receives approximately 1,000 tons of waste per week, meaning RRP forgoes $58,000 in tipping fee revenue per week while Unit #8 is unavailable. However, a significant amount of this loss of revenue is offset by the reduced expenses (transportation of rejects to the Boone Landfill and the associated tipping fee at the Boone Landfill) incurred by RRP.

2. **Impacts on the Waste Haulers**

   The waste haulers are directly impacted by the decision made by RRP above. Interestingly, the tipping fee is less at the Boone Co. Landfill than at RRP.

However, what the haulers save in tipping fees is more than offset by the additional staff time and fuel it takes to transport the refuse to Boone, the wait time at the landfill, and the potentially unsafe driving conditions during bad weather. **Since the customer fee has already been established by the private haulers, it is not practical for the haulers to pass these increased expenses on to their customers on a short-term basis.**

3. **Impacts on the Power Plant Maintenance Budget**

   As of September 19, 2019, approximately $100,000 remains in the Boiler Maintenance budget. During every boiler tube outage the plant expends $6,000 per day and each outage typically runs five or more days. Based on current estimates, the budget can support at most three more outages before staff will need to return to the City Council for a Change Order to increase this budget item.

   If the decision was made to continue repairing Unit #8's tube leaks until Unit #7 is operational, staff anticipates approximately seven more repairs will be necessary, at a cost of approximately $210,000.

4. **Impacts on the Unit's Value in the MISO Market**

   The City uses its generation resources to meet MISO requirements. Unit #7 & Unit #8, together with our peaking units, provide "capacity" to meet our electric load obligations. Electric Services runs an operational test to determine each unit's capability, then MISO applies a "factor" to discount the capacity for units that have poor reliability. Every time one of our units trips off-line the discount increases and MISO shows less value for our units. This discount becomes even more critical as Electric Services heads into the extended outage to replace boiler tubes.

   If a boiler tube ruptures, and the City does not repair it, the entire time the unit is down is considered a "Forced Outage," which reduces our capacity rating for the unit. Alternatively, if a unit is in operational condition when it is taken out of service, the time the unit is off-line would be considered a "Reserve Shutdown," which would not result in a further decrease to the unit's capacity rating.

   If the unit continues to undergo periodic tube failures, each leak/shutdown/repair cycle has a negative impact on our capacity rating. The table below shows the relative impacts of the Forced Outage, Reserve Shutdown (October 15), and Reserve Shutdown (December 1) scenarios.

	Planning Year	Capacity Reduction	Unit 8 nameplate Rating	Unit 8 Lost Capacity (MW)
Forced Outage (as of Oct 1, 2019)	2020 2021 2022	60.6% 55.7% 39.4%	65	39.39 36.21 25.61
Reserve Shutdown (as of Oct 15, 2019)	2020 2021 2022	32.1% 24.3% 5.3%	65	20.87 15.80 3.45
Reserve Shutdown (as of Dec 1, 2019)	2020 2021 2022	33.8% 26.9% 11.1%	65	21.97 17.49 7.22

When the City falls short of its MISO capacity requirement, Electric Services is required to acquire capacity resources to make up the shortfall. In recent years, this is done through a capacity auction held once a year by MISO. Staff has evaluated the last six MISO capacity auctions. Using the lowest cost, highest cost, and the mean cost from these auctions, the table below outlines the potential financial risk to Electric Services associated with each of the scenarios.

	Boiler Maintenance Cost	Capacity Replacement Needed	Low Cost Auction Price	Mean Cost Auction Price	High Cost Auction Price
Forced Outage (as of Oct 1, 2019)	$0	39.39 36.21 25.61	$21,556 $19,882 $14,021 **$55,459**	$255,725 $235,048 $166,263 **$657,036**	$1,035,169 $951,467 $673,031 **$2,659,667**
Reserve Shutdown (as of Oct 15, 2019)	$100,000 (already budgeted)	20.87 15.80 3.45	$11,424 $8,648 $1,886 **$21,958**	$135,458 $102,543 $22,365 **$260,367**	$548,332 $415,092 $90,534 **$1,052,959**
Reserve Shutdown (as of Dec 1, 2019)	$310,000 ($210,000 additional required)	21.97 17.49 7.22	$12,028 $9,573 $3,950 **$25,551**	$142,632 $113,515 $46,840 **$302,987**	$577,372 $459,505 $189,610 **$1,226,487**

Electric Services staff has called for a special meeting of EUORAB to discuss this situation and provide a recommendation to the City Council. However, EUORAB was unable to meet until the afternoon of the September 24 City Council meeting. City staff will verbally convey EUORAB's discussion and recommendation at the City Council meeting.

ALTERNATIVES:

1. Direct staff to plan a reserve shutdown of Unit #8 as of the week of October 15.

2. Direct staff to plan a reserve shutdown of Unit #8 once Unit #7 is operational (estimated to be December 1). In addition, approve the addition of $210,000 to the Power Plant boiler maintenance contract to cover continuing repairs through this date.

3. Direct staff to no longer repair Unit #8 at the next forced outage.

CITY MANAGER'S RECOMMENDATION:

There is significant variability in the costs for the capacity auction the Utility must participate in when it does not have enough reliable capacity. This variability results in high risk that the Utility will be exposed to higher costs as a result of the auction. **Although the Utility cannot completely avoid participating in the auction, the best option to reduce risk is to reduce the amount of capacity the City must buy at the auction. This leads to the conclusion that a Reserve Shutdown as of October 15th is the best course of action for the Utility. Under this alternative, Electric Services will make any repairs required to insure Unit #8 is operable through the week of October 15, 2019. After that time, the Utility will shut down Unit # 8 and purchase energy from the market until Unit #7 is placed back in service.**

Unfortunately, this alternative comes at the expense of the refuse haulers and the Boone County Landfill. However, a planned date to discontinue accepting garbage at RRP will allow the haulers and the landfill to make plans in advance for this scenario, as opposed to the outages that are occurring now with no warning. City staff will continue to work diligently with contractors working on the Unit #7 overhaul projects to put that unit into operation as soon as possible, so it can begin disposing of refuse-derived fuel.

Therefore, it is the recommendation of the City Manager that the City Council adopt Alternative #1, as described above.