Kansas City Deaerator
COMPANY

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DEAERATOR INSPECTION REPORT

PREPARED FOR
EAST KENTUCKY POWER ELECTRIC COOPERATIVE

SPURLOCK STATION, MAYSVILLE, KY
UNIT 1 DEAERATOR

KCD Work Order: SP5004
P.O. #: EKPC-0000154734

Jobsite Contacts: Eddy Meek
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Inspection Date: 3/22/2022

Inspector: Andrew Rafferty, Kansas City Deaerator

DEAERATOR DATA

Site Name(s):	Unit 1 Deaerator
DA Manufacturer:	Chicago Heater
Fabricated by:	Mississippi Tank, Hattiesburg, MS
Year built:	1973
Code of Construction:	ASME Section VIII, Div 1
Design Pressure:	100 psig / at 650° F
Shell / Head Material:	Not Listed
Shell Thickness:	0.50″
Head Thickness:	0.375″
PWHT:	Unknown
RT:	Unknown
Size (Heater):	6′-6″OD x 26′-0″ Seam to Seam

STORAGE TANK DATA

Site Name(s):	Unit 1 Deaerator storage tank
DA Manufacturer:	Chicago Heater
Fabricated by:	Mississippi Tank, Hattiesburg, MS
Year built:	1973
Code of Construction:	ASME Section VIII, Div 1
Design Pressure:	100 psig / at 650° F
Shell / Head Material:	Not Listed
Shell Thickness:	0.75″
Head Thickness:	0.5625″
PWHT:	Unknown
RT:	Unknown
Size (Heater):	11′-6″OD x 58′-0″ Straight length

OBJECTIVE AND HISTORY

Kansas City Deaerator (KCD) was contracted to perform a visual inspection of the deaerator and storage tank at the Spurlock Power Station in Maysville, Kentucky and to report on the condition of the unit. A previous inspection was done by Kansas City Deaerator in October of 2015.

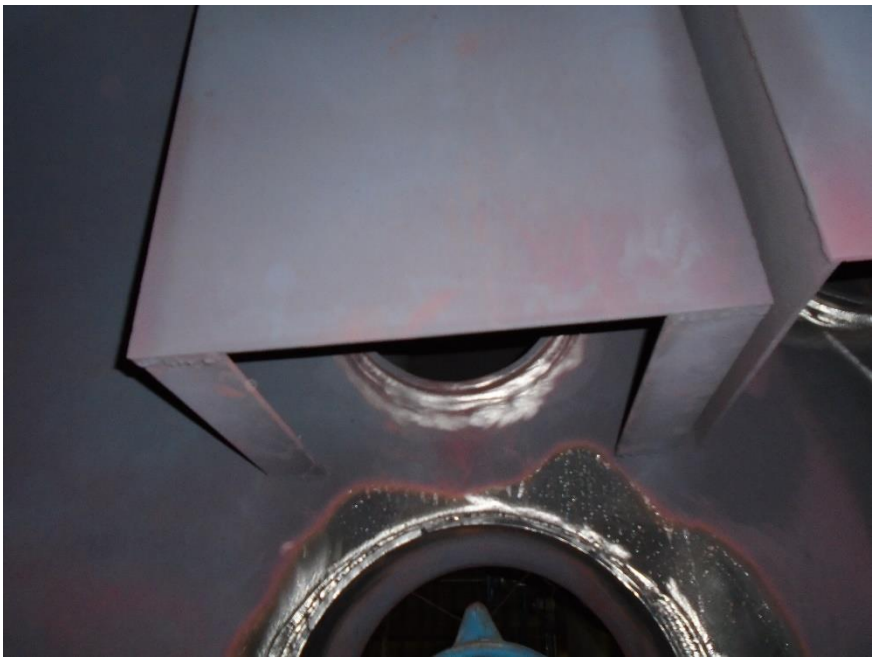
DEAERATOR

Upon entering the deaerator, the trays had been removed, which allowed for easy access throughout the tray enclosure. It was first noted that several openings had been cut out from the tray enclosure, most likely so the circumferential welds of the vessel could be tested. It has been noted in past inspections that small holes have developed in certain areas of the tray enclosure—most notably in areas where previous repairs have been done, and in the corners of the tray enclosure. These small holes, often referred to as “pin holes”, can allow non-condensable gases to escape the tray enclosure, which can contribute to further oxygen problems. Be sure these openings and “pin holes” are properly sealed to minimize these problems and increase performance.

Tray enclosure opening.

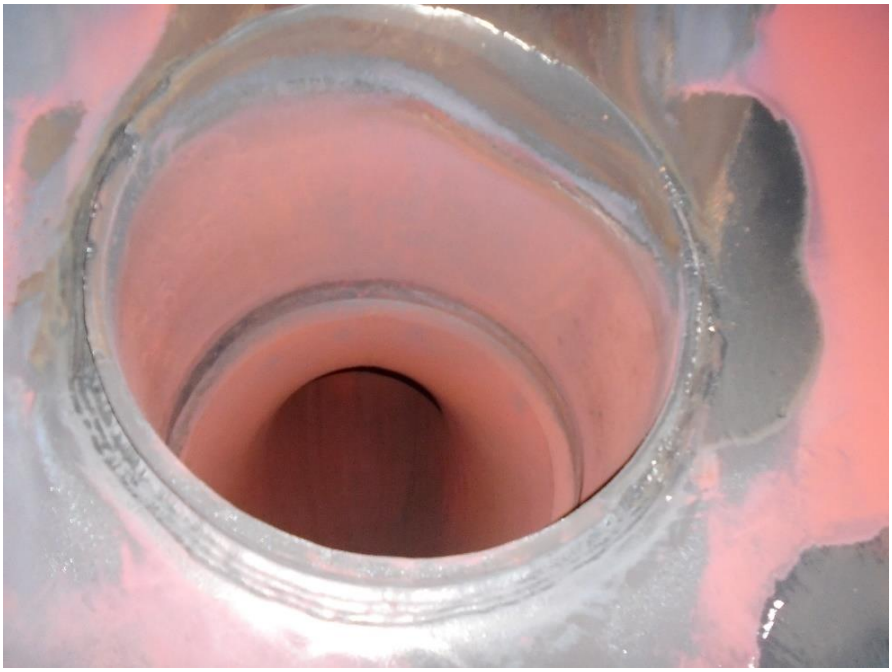
Spray valves and the sparger pipe near the top of the tray enclosure looked to be in good working order.

It has been noted in previous inspections that flow accelerated corrosion (FAC) has been a problem on both heads. Flow accelerated corrosion (FAC) is defined as metal loss that occurs in carbon steel equipment when the normally protective oxide layer is dissolved into a flowing stream (liquid, vapor or 2-phase flow). The carbon steel goes through a continuous cycling of oxide layer production followed by loosening and dissolution into the flowing stream. The oxide layer is not able to protect the metal surface and the continuous loss of the layer results in steady loss of metal thickness. In this vessel, the location of the steam inlets above the manways could possibly be causing stream impingement, subsequently resulting in FAC on the heads.



Erosion on West head near steam inlet and manway. Note the appearance of black magnetite around the nozzle.

The steam inlet nozzle itself also showed some signs of FAC. If left unchecked, this could contribute to further material loss in the deaerator head.



Steam inlet erosion.

There also appeared to be some material loss in the tray enclosure support angles.

Tray enclosure support angle material loss.

The cause of the material loss is unclear, however, as there are no inlets in the immediate area. One possible cause could be water escaping through holes in the tray enclosure. In past reports, numerous holes were found in the tray enclosure, which would easily allow

water to bypass the trays. The constant flow of steam against the water could then erode the outside of the box.

STORAGE TANK

The storage tank did appear to be in good condition. All nozzles and welds looked good, and there appeared to be a uniform oxide layer throughout the tank. It was noticed that the North end head baffle had suffered a major crack at the angle where the plates meet. Also, there did appear to be some debris laying in the bottom of the storage tank.

Cracked baffle plate in storage tank.

RECOMMENDATIONS

All spots susceptible to erosion should be monitored and tested by means of VT examination every outage to ensure no major loss of material is occurring. If material loss appears to be evident, these areas should be UT tested. All internal welds should be

inspected by MT per NACE RP0590 and the frequency per NBIC. If UT determines that any point on the head is less than the minimum thickness required by code, the area should be repaired by means of weld overlay. Multiple passes should be made to ensure full coverage of the thinned area. It is recommended that the heads and areas surrounding the steam inlet nozzles be the focus of the NDE being performed during the next outage.

There was a small amount of debris in the bottom of the storage tank. This should be removed to avoid damage to pumps and anything else downstream of the deaerator. Also, the cracked baffle plate support in the storage tank should be replaced or reinforced to prolong usage of the baffle plate.

It is important that the tray enclosure remains completely sealed to prevent non-condensable gases from escaping the enclosure and entering areas where they can do damage to the carbon steel pressure boundary of the vessel. Be sure that tray enclosure repairs are sealed with no openings to also maximize deaerator performance.

NOTE

Inspection by Kansas City Deaerator Co. is a visual inspection only to determine deaerator performance concerns and possible long term internal tray, spray valve, water box and tray enclosure damage or wear.
Visual inspection cannot always detect cracks and weld defects that can be detected by other NDE procedures such as MT, PT, UT and RT examination.
In addition to visual inspection by KCD, further inspection of internal welds is recommended in accordance with guidelines for deaerator and storage vessels from NACE, TAPPI, and NBIC using ASNT certified personnel.

For additional information or questions, please contact:

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