

July 1953

Mr. Harry Young
Mech Chief Denver Plants

The following work was done at the Arapahoe Station during the month of July 1953.

The first 10 days were spent in routine maint. and getting ready for no. 2 unit insp.

July 1 Repair roof where rigging pulled out over 7th stage heater no. 1 unit. cut weeds. Weld broken blowdown line at no. 3 blr. blowdown tank. Insulate.

July 2 Start no. 1C feedwater pump repair. Stencil air conditioning units as per suggestion. Build jet for silencing blowdown line from no. 2 blr.

July 6 Line up runner in 1C feedwater pump. Build guards for ID fan couplings. Schaefer and Rogers off for union meeting. Remove S2 air conditioning circulating pump and repair one of the nozzles from spray system was found in suction side of runner. Runner cleaned up and pump back in service. Run lines from city water to fan rooms for cleaning water tanks. Repair doors in plant.

July 7 Install new water gauge no. 1 boiler. Repair compressor on locomotive. Wittner, Gartz, Otko off sick.

July 8 Finish 1C feedwater pump. Pump tested and put in service. Install new Republic control cyl on 2B feedwater pump. Recirculating valve. Clean ash conveyor system no. 1 and 2 units. Burn out no. 2 unit coal bunkers.

Boiler feedwater pump 1C. Repair was started on this pump July 2. The shaft sleeve leaked very badly on the inboard end of pump. The shaft sleeve adjusting nut was so badly galled on shaft that it was impossible to tighten enough to stop the leakage. Byron Jackson has redesigned the shaft sleeve nuts on the later pumps so that there is some shaft clearance on each end of the nuts. We have made up the new type nuts for installation on each pump, when new shaft sleeve gaskets are needed. The runner was removed from 1C pump, and inspected. Impellers were in good condition on all stages. The wear rings show a small amount of wear. on both the impeller and casing rings. The shaft sleeves were very loose on shaft at both ends. The runner will have to be sent to the machine shop to have the shaft sleeve nuts machined off. When new gaskets and nuts are installed, the runner will be good for more service. The new runner ~~which~~ which we have fitted with the relieved shaft sleeve nuts was installed in 1C pump. Total thrust of runner without thrust shoes .125". Runner was set center of thrust .064" then .016" thrust was set at thrust shoes. This lets runner thrust toward thrust end of pump .016". This leaves a min. clearance toward thrust end of .048" max. .064" thrust toward line bearing .064. The pump is bolted tight to base and dowelled on line bearing end and slotted for expansion on thrust end. Bearing clearance line bearing .003" thrust end .004" coupling alignment with pump hot, motor cold. Pump .002" high. Pump in service July 8. Runs good.

July 9 Repack IK 4 sootblower no. 3 unit. Inspect 2C coal mill. Mill OK. Trouble was found to be in feeder clutch tightened mill worked OK. Build and install min. stop on Bailey gas valve no. 1 unit.

July 10 Remove shields and blankes on high press steam chest no. 2 turb to locate leak. Get tools and equip ready for no. 2 overhaul. Set safety valves on no. 2 blr. No. 2 turbine on turning gear.

July 13 Start overhaul 66 no. 2 unit. Open up boiler brums, headers, furnace doors, ash pit, air ducts breechings. Boiler dirty on both combustion and water side. Started getting equipment ready to turbine tubes in boiler and air heater.

No. 2 boiler overhaul July 1953

No. 2 turb shut down July 10 and pressure raised and all safety valves tested. Boiler cooled and drained. Spade valve turned July 13 and boiler opened up. A soft black deposit about 1/16" thick was found in steam drum and generating tubes. One scrubber was removed and inspected. The deposit was light on this. The drums and water wall headers were washed. All crossover tubes were removed and generating tubes turbed.

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with wire brushes. Drums, tubes and water wall headers were then washed with 150# water from the fire pump. Crossover tubes and scrubber replaced. One broken feed-water line hanger was welded back in place. All handhole plugs that showed signs of seepage were removed and plugs replaced and handhole seats cleaned up. Plugs replaced with new gaskets. A new loop of sch. 80 1" pipe was installed on the Yarway water level recorder. Slag was cleaned from the 1" Yarway line and drums headed up. All valves on boiler freed up and packed. Boiler ready for hydrostatic test July 21. Hydrostatic pressure of 1000# put on no. 2 blr. July 22. All tubes, headers, superheaters, handholes and drum heads inspected. Everything in good condition. Spade valve turned and boiler drained to operating level. The A2E sootblowers were adjusted to the correct blowing cycle. No. 2 blr ready for service July 23. Fire started July 24. The combustion side of boiler was very dirty. The east half of the superheater passes were plugged badly with hard flyash. Several shifts were needed to blow the ash from the superheaters. Air from the sootblowing compressors was reduced to 150# and used for blowing. The air heater tubes had to be turbed. This took three men seven shifts. The dust separators were filled with hard ash. The separators were blown with 150# air to remove the soft ash. We then welded a line into the ash pump header to take a 1½" fire hose. The separators were then washed with water from the ash pumps at 125# pressure. The water was drained off from the ash hoppers by use of a flume to the storm sewer drain. About half of the separator tubes were plugged enough to hold water. These had to be cleaned with a water nozzle, pushed down each tube. There was a hard deposit of flyash at the bottom of each ash hopper about three feet deep and a foot thick. This had to be broken up with a pick for removal. All baffle plates were removed from the dust collectors and left out. This cleaning job took 3 men 4 days. Separator ready for service July 23. The ash pit was inspected and a few small cracks in sides of wet bottom repaired with chrome. All nozzles open. Burners are clean. Level of water seal checked and found to be good. Ash pit ready for service July 22.

July 53 repair of no. 2 turbine, generator and exciter.

Lagging was removed from high pressure steam chest to locate source of moisture at low loads. This was found to be coming from the joint in chest. New gaskets were installed in the flanges of the oil lines at front end of turbine. The turning gear was removed and a new gasket installed at the leaking joint there. The end shields were removed from the generator so that new bushings could be installed on the collector ring and field leads. While endshields were off, the hydrogen coolers were opened up for inspection at both ends. Coolers were very dirty. Tubes were cleaned with brass brushes. Exciter was dismantled and new collector rings installed. Machine put on turning gear and runout of rings checked. Inside ring .0" outside ring had a runout of .0005". Machine assembled and put on gear. Boiler up to pressure and turbine rolled July 24. A steam leak was found in the 1½" plug in the orifice pressure reducing chamber from the 900# steam line to the gland seal line. Chapman main steam valve shut in 900# header and pressure bled off and plug electric welded. Turbine put back on and overspeeded, overspeed gov tripped at 3960 RPM. Brushes checked on collector rings. Outer ring brushes had .004" to .005" vibration. Inner ring brushes .003" to .004". Turbine put back in gear. Collector rings were ground and exciter assembled by electricians. No. 2 unit put on line July 24.

While no. 2 turb was down the steam driven aux. oil pump was opened up and repaired. The throttle valve stem was replaced. The valve seat was ground. The collar under the valve control spring was rusted tight to the shaft. Spring was held in the compressed position. This would not let the governor have control of the throttle valve. The ID of the collar was relieved .010" so that it is free on the valve stem. The oil pump press. governor was opened up and cleaned. When turb. was put in service the oil pump gov. was rough. The swing was from 200# to 600#. Governor was adjusted by Bob Kailey and pump now runs normal. Pump in service July 24.

Lubricating system no. 2 turbo-generator

The flanges were tightened or new gaskets installed on front end of turbine. The seal oil cooler was opened up and cleaned with nylon brushes. The water valves were opened up on the seal oil cooler and inspected. A 3/4" vernier valve was welded in around

the 1½" discharge valve of cooler. The main oil coolers were opened up. These had a very heavy deposit of mud rust and silt. On top of tubes in top head, in bottom head and discharge line. The heads were removed from top and bottom. These were cleaned and painted with rust-oleum. The tubes were washed and cleaned with nylon brushes. The 3/4" pipe plugs were removed from bottom head and 3/4" gate valves were installed so that ~~and~~ may be flushed out while cooler is in service. These valves were then plugged with 3/4" pipe plugs. The packing on the bottom oil seal was removed and seals repacked with one ring of 3/4" Garlock no. 233 packing and one ring of 732. Both coolers headed up. The drain line on each cooler was connected together by means of a 1½" sch. 80 pipe welded in between the drain valve and cooler. A 1½" Hancock globe weld valve was installed in this line so that the coolers may be isolated if the need arises. This line is to insure against air getting to bearings while changing from one cooler to the other. After coolers had been in service two days the packing on bottom of cooler was pulled up tight and one more ring of 3/4" Garlock #233 packing added.

No. 2 condenser hot well and gland seal tank.

No. 2 condenser was opened up and inspected July 13. No scale in tubes, tube sheet was clean. The rust or scale deposit on heads was not very heavy. 15 tubes were plugged. The plugged tubes were opened up with water. The condenser heads were scrapped and painted with one coat of rustoleum primer and 1 coat of rustoleum marine red paint. The hot well was washed out then what deposit was left in bottom was cleaned out with brushes. Condenser and hot well headed up and ready for service July 23. The gland seal tank was in good condition. The Apexior paint was still on above the water level. There was some rust on the part of tank that is under water. This rust was wire brushed and tank treated with manganized phospholene. Tank was then painted with rustoleum. One coat of primer and one coat of marine red paint. Tank headed up and ready for service July 20.

High pressure drip pump 2A 2B

Both high pressure drip pumps were opened up and impellers checked for looseness on shaft--both pump impellers were tight. The shaft nut on 2B pump is showing wear. The wear rings on 2B casing and impeller are worn slightly. A small piece of scrap metal 3/16 x 1" square was found in the suction side of 2B pump. This made pump sound like the impeller might be loose. The 4" suction lines were cut on both pumps and raised face flanges installed in line so that repair can be made on these pumps without removing motor and pump from base. This has been done on all units now. Drip pumps ready for service July 20.

No. 2 Zeolite water softener

No. 2 softener taken out of service July 17. A large amount of rust and scale was present. The gravel pack was dirty and rust colored. The baffle was cut out of bottom of tank. The tank was then scrapped and wire brushed. It was then treated with manganized phospholene and painted with rustoleum. One coat of primer and one coat of paint. The baffle plate was then welded back in place. New gravel was used on the refill. The old Zeolite was put back. Tank headed up and washed for 30 min. Opened up and level measured at 16" from top. Zeolite tank ready for service July 22.

Forced draft fans 2A 2B inspection July 1953.

2B FD fan was opened up for bearing inspection July 16. Bearing were good. Thrust bearing good. High spots scrapped, housings cleaned and bearings assembled. Oil rings were soldered at the joint. Bearing clearance is Inboard end .001" to .012" Outboard end .010" to .011" Coupling between faces .0015" Concentricity top .0 South -.002" bottom plus .001" north plus .001" Motor was opened up and cleaned. Bearings inspected. These were in good condition. Bearing clearance is inboard end .011" to .013" outboard end .012" to .013" motor assembled and oil changed in all bearings motor and fan. Vanes and dampers inspected. Fan tested and ready for service July 23. 2A FD fan opened up for bearing inspection July. Bearings were in good condition high spots were scrapped and bearings assembled. Thrust bearing was OK. Oil rings were soldered at the joint to prevent opening up in service. Bearing clearance is inboard end .012" at all points outboard end .009" to .010" coupling

faces within .001" concentricity top .0" south plus .001" bottom .0" north -.001" Motor opened up and cleaned bearings were good. Clearance of bearings inboard .011" to .015" outboard .011" to .013". Oil changed in all bearings on fan and motor. Coupling greased. Vanes and dampers cleaned and adjusted. 2A forced draft fan tested and ready for service July 23.

ID fans 2A 2B inspection July 1953

ID fan 2B opened up for bearing and coupling inspection July 13. Bearings in good condition on both ends of fan. High spots in bearings scrapped and bearings replaced. Dodge oil rings were installed and the joint in rings soldered for added protection against separation. The bolt that adjusts the bearing aligning pad was too long on the inboard bearing. This was machined to proper length and bearings adjusted. Bearing clearance inboard end .012" .013" outboard end .011" coupling alignment between faces, within .0015" concentricity top .0" south plus .001 bottom plus .003" north plus .002" fan .0015" low. The motor was opened up. The bearings inspected and motor cleaned. Bearings in good condition. Motor windings were not very dirty. Bearing clearance on motor inboard .012" to .015" outboard .012" to .015" Motor assembled and oil put in bearings in motor, fan and coupling. Vanes and dampers cleaned and inspected. Fan doors closed up and 2B ID fan tested and ready for service July 16.

2A ID fan opened up for inspection July 21. Bearings in good condition. High spots scrapped and bearings assembled. The adjusting pad bolts were too long on both bearings in this fan. These were machined to proper length. This fan was equipped with Dodge oil rings last year. Bearing clearance on this fan is inboard end .012" at all points. Outboard end .009" to .010" coupling faces within .001" concentricity top .0 south plus .001" bottom .0" north -.001. Motor opened up for cleaning and bearing inspection. Motor winding not very dirty some dust but no oil in windings. Motor blown out. Bearings were good. Bearing clearance inboard .013" to .016" outboard .014" to .015" Motor assembled and oil put in bearings on motor and fan coupling oiled. Vanes and dampers cleaned and inspected. Doors on fan headed up. Fan tested and ready for service July 23.

Feedwater pumps 2A 2B 2C

The Ross heat exchangers were opened up on both ends and tube cleaned with brushes. This was done on all pumps. All valves were freed up and packed. The motors were opened up and cleaned and couplings checked for grease. Bearing clearance on motors. 2A inboard end .014" to .015" outboard end .012" to .013" 2C inboard end .011" to .014" outboard end .010" to .012". Feedwater pumps ready for service July 23. The cold fill valve on feedwater line was also opened up and seats and disk ground. Valve now holds tight. The 2" orifice valve on the no. 2 deaerator vent condenser was badly cut on the seat and disk. This valve was replaced with a new valve in which we drilled a 5/32 orifice. The 4" chick valve on vent condenser was also opened up and seat and disk ground. All gauge glasses on deaerator, evaporator, high and low pressure flash tanks and 29th stage heater were cleaned and new gaskets installed. New gauge glasses and gauge shutoff valves were installed on the 15th stage heater no. 2 unit new gauge valves were also installed on the 7th stage heater. All valves on deaerator, evaporator heaters, high and low press flash tanks and condensate lines were freed up and packed. The valves on the extraction lines were also freed up and repacked.

July 53 forced draft air ducts no. 2 unit inspection and repair.

The cold air duct was cracked at the point where braces welded to sides of case and several braces broken loose. This duct was not in as bad condition as no. 1 unit. Cracks were all repaired by electric welding. More struts were welded in center row. This was done the same as no. 1 no. 3 units. A directional vane was welded in bottom of air duct where the air starts up. This is also the same as the vanes we installed in no. 1 and 3 units. One 3/4" pipe strut was missing and several broken loose at top of boiler, just upstream from the burners. The 3/4" pipe braces were cut out and replaced with 1 1/2" pipe braces. The secondary air dampers were inspected, freed up,

and greased. The air duct into stack was opened up and combustion cleaned. The sides of duct were warped slightly where duct enters inner stack. This is a sliding joint for expansion. Stiffeners were made of $4" \times \frac{1}{4}"$ angle iron 5 ft. long. These were welded up the side of duct at an angle of about 30° from vertical 32" apart. Four pieces were installed on each side of duct. Starting about 12" from inner edge of duct and installed one above the other 32" apart each piece lapping about 12". This seems to stiffen sides pretty well. Ready for service July 23.

Gas lines and valves no. 2 unit.

July 20 the gas fuel valves at burners were greased and all flanges tightened. The spool was removed from the line between the Bailey gas valve and the plug valves. All valves were in perfect condition. The Bailey valve has full travel. The plug valves are spring loaded and have 4 grease grooves to seal plug against leakage. Valves assembled and greased ready for service July 22. The flanges on the coal piping from coal valves to burners were tightened. The packing on coal valves was inspected, packing is still soft and is good for another season. The stems were cleaned and oiled and slide gates cleaned. No. 2 unit was back in service July 25.

July 28 Some of the insulating pads under no. 2 turb steam chest started to smoke on the north side of chest. These pads were removed and a pair of pads that had been purchased for no. 1 GE turb were installed. At 9 PM another pad started to smoke on the front end of the steam chest. This was also removed and insulated with several small pads. The main oil coolers were leaking a little at the packing gland at bottom of cooler. One more ring of $3/4"$ Garlock 233 packing was added to each cooler. Started clean up after overhaul. Tools put away and warehouse and building cleaned up. Two men are insulating lines and valves where repairs were made. The air control system to steering and brakes on Tornadoizer were repaired.

July 29 The air outlets in no. 3 control room were removed from the sides of air conditioning ducts and installed on bottom of duct in an effort to cool the room. This dropped the temp. several degrees. A short section of line on the Polyphosphate pump discharge was replaced and line cleaned. A new 100# safety valve was installed on the suction header of LC boiler feed pump. We started tearing down no. 1B coal pulverizer to install wear plates in mill.

July 31 We removed the 30 HP motor from no. 1 control air compressor and installed the 40 HP motor, which has been rebuilt by Allis Chalmers after the bearing failure, several months ago. Compressor back in service 4 PM. The no. 2 sulphuric acid pump was rebuilt today. A new head and ceramic stem was installed when pump was put in service we found that we could not change the PH reading. Both pumps were opened up and inspected and primed several times. Air pressure was put on tank and lines bled. We found a lot of H_2 in the lines. Suction lines were very hot 120° or 130° F. After lines were drained, we again opened up both pumps. Packing, checks, seats, and plungers were OK but we still couldn't raise the PH. We knew the pumps had to be pumping. We then started looking for water leakage into the suction side of pumps. The only place leakage could take place seemed to be through the safety valves on the 1" pump discharge line. The lines were removed and found to be full of almost pure water. These safety valves have the blowdown lines tied into the suction line to the pumps. Acid had caused the springs to corrode and valves were leaking a small stream of water from the diffuser chamber into the pump suction. The pumps were circulating water only. The blowdown was removed from the pump suction and lines again drained. Pressure was put on tank and pumps primed. Pumps OK at 11 PM. A sample of acid was taken from tank and tested, acid tested OK.

This covers about all the work for July. All Saturday overtime was turned down by Jensen. Friday 24 overtime turned down by schaefer, rogers. gardner-gardner was not feeling well at this time. Sat. 25 overtime turned down by schaefer hartman. Sun. 26 fritz, hoover, c. reed, savage could not be reached for a small overtime job. Sat 18 braden reported for work. There is still some question if he worked at all. He went home sometime between 7 PM and 8:30 PM.

John Donaldson
Arapahoe Station

WAD00330

Mr. Wm. H. Young
Mech. Chief Maint Pool

The following work was done at the Arapahoe Station during the month of August.

Wear plates were installed in 1B coal pulverizer. This job was started July 31 and finished Aug. 14. A test was run on mill. The amperage swing was 20 amps more than normal. The mill turns free and no reason can be found for this amperage swing. Ball size measuring balls at random 10 5/16". Spring pressure set at 1200 lbs. at this grinding pressure, the spring pads measure 5 13/32" apart. Mill turned over for operation Aug. 14.

We started installing wear plates in 1D pulverizer Aug. 17. This mill was finished and tested Aug. 28. The spring tension bolts were all found to be worn in this mill. These were removed and built up with elect. weld and machined back to size. One broken spring was replaced. The nuts were removed from the spring adjusting bolts and thread freed up on bolts. To make the wear plate installation on a mill. The spring adjusting assembly has to be removed. The springs removed. The balls removed. The upper grinding ring moved to one side. The shims back of the throat ring have to be removed and narrowed 1 1/4". About 1 1/8" has to be burned off of the top of the throat ring. This ring is of some special hard alloy, that can't be cut with oxy, act. torch. The cutting was done with the elec. arc using Eutectic cuttrode rod. The wear plates are a poor fit. This leaves a hole under each plow. To fill this hole we left the section of the throat ring back of each plow, and fitted the wear plate up to it. The drilled holes in the wear plates were to be tapped with 3/4" standard thread. Some of these holes are a little large so that the thread is not full depth. Plates are held in place with 3/4" X 2" cap screws.

We did not cut out the section of wear plate in front of the ball removal door. It will not be too difficult to remove this section of wear plate if balls have to be changed and will give added protection to the ball door. Installation of wear plates was started on 1A pulverizer Aug. 31

Control air compressors No. 1-2-3

Aug. 3 the 40 HP Allis Chalmers motor for no. 1 control air compressor was installed today. This is the motor that burned the bearing on the pulley end, and let the rotor down on the stator. The motor was rebuilt by Allis Chalmers. When this motor failed we installed one of the original 30 HP motors on this compressor and have been using it as a standby. Aug. 4 The new bearings that were furnished by Allis Chalmers were installed in no. 3 air comp. motor. Compressor back in service. The new bearings were installed in no. 2 control air compressor motor Aug. 5. This equips all the control air compressors with new bearings. There is still no way for the operator to inspect the oil rings on these motors.

Aug 10 We started installing the air operated cylinders on the air heater ash hoppers. No. 1 and 2 units are almost completed.

Aug. 14 We started repair on the locomotive cooling system. The radiator on no. 2 engine was sent to Day Radiator service for cleaning and repair. This radiator shows signs of corrosion. Day states that radiator may not last through the winter. The radiator on no. 1 engine was dirty and had leakage, but no corrosion was found. The air system on locomotive was inspected. The generators and motors cleaned and both engines in service Aug. 31.

On Aug. 7 we dug a water storage pond for the well diggers. So that they could dig no. 3 shallow well.

The recirculating line on 3C feedwater line cut through on Aug. 10. The bad section was removed between the orifice and the stop valve at the deaerator. A new section of 2 inch schd. 80 pipe was welded in. Pump back in service Aug. 10. We also started the job no. 9415 C on Aug. 10. This is to convert the air heater ash hoppers to automatic air operation. This job is not complete at the end of the month.

August 14 Both stuffing boxes on 3C feedwater pump repacked.

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Aug 18 no. 1 river well pump was pulled, to make changes necessary for installation as no. 4 shallow well pump. Pump is 30' 1" long. We will have to add 38" to make 33' 3". This job has not been completed at the month's end.

We had a good month as far as trouble was concerned. Most of the time was put in on coal mills, locomotive and the air controls on ash hoppers. Some of the smaller jobs are repack IK sootblower no. 1 no. 3 blr. We found the hose reel too close to the end of the tube on this blower causing the hose to kink and shut off the air. This reel was moved back 3 in.

We added 10 bbls oil to the turb oil storage tank.

Installed a new gauge glass in the 4th stage heater no. 1 unit.

Insulated steam, condensate and water lines. Did a little painting on outside handrails.

Some work was done on the air cond. system. Belts tightened, pumps packed, coils cleaned and floats adjusted. New bearings were installed in RV 3 fan. The filters were cleaned on all control, sootblowing and plant air compressors.

A new water glass and gaskets were installed in the lower East water gauge no. 1 blr.

Some of the thin piping was replaced on the polyphosphate water treating system.

Some work was done on the Republic recirculating controls on no. 3 feedwater pumps.

The brass gate valves were removed on the no. 3 Kemp air drier steam lines. These were replaced with 600# Hancock $\frac{1}{2}$ " weld valves. A new drain tank was built and installed on no. 1 Kemp air drier. The secondary air dampers on no. 3 blr were repaired. A and B needed new coupling pins. The rest were greased and freed up.

Schaefer spent several days helping the results dept. as they had two men at Cheyenne.

The service water strainer to the acid and Calgon service was removed from line and seats repaired. The cooling towers are being cleaned of Algae on all cells. This job is not yet completed.

Some of the leaks in the top of the circulating water tunnel were repaired with Quixent.

The electrical system of the Tournadoser was inspected by a factory man. He found that all wiring, motors, generator, rectifier and transformers were in good condition. The generators will put out 350 volts. The voltmeter on doser is not in good working order. At 350 volts on the test meter, it is reading from 150 to 200 volts. The air system on the Tournadoser has been cleaned and inspected.

We have had several vacations this month, Connell, Allen, Jackson, Jensen, Schaefer, and P. Reed.

Aug. 17 Gartz and Braden off sick.

Aug. 18 Gartz off sick.

I believe this covers about everything for the month of August.

John Donaldson

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