

Cooper Cameron Corporation
Cooper-Bessemer
Reciprocating Products Division
1351 Harbor Bay Parkway, Suite 1000
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I-MOSBA-223

DOCKETED
USNRC

'95 OCT 20 P5:15

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH
Cooper Energy Services

ROBERT A. JOHNSTON'S PERSONAL OUTAGE NOTES

COPY

9601190212 951006
PDR ADDCK 05000424
G PDR

NUCLEAR REGULATORY COMMISSION
Docket No. 50-424/425-OLA-3 EXHIBIT NO. II-223
In the matter of Georgia Power Co. et al., Vogtle Units 1 & 2
☐ Staff ☐ Applicant ☒ Intervenor ☐ Other
☐ Identified ☒ Received ☐ Rejected Reporter SD
Date 10/6/95 Witness

Conroy
Conroy
3468
Haulinger
4278

To BEEP Howard
out 826 3025 119 7 #1
Plant
Four #10

Cop Machine 3469

LANCE BLOCK EXT 3596

DAYS RAY HOWARD 3596

NIGHT PAUL HUDSON 3427

STEVE PHILLIPS 3469

DAY SHIFT 7:30 AM TO 6:00 PM

NIGHT SHIFT 7:30 AM TO 6:00 AM

733-3660 HOTEL

LANCE 5:00 AM TO 4:00 PM

SHELDON 11:00 AM TO 10:00 PM

BOB 7:00 PM TO 6:00 AM

Require:

Left & Right Bank Starting

Air Pressure

CB's
7-10

AC & DC Control Panel Power

Need pressure on both

O-RINGS

air receivers

Need remote control function

Do we have point to points?

Need clearance for test

(2) 160M's with leads

(1) Freq. Generator

(26) Jumpers

Release Time

Schedule

Scope

Procedure

Continuation Sheets

Time Accounting

Log

POINTS

- Keep Clean

Bag & Tag

Tools - clean - boxes

- keep procedure clean

appropriate section

next to you

Engine room presence

Dodge Shadow

CA DDP 211

3-2

Control schematics for Sholden

Vacuum cleaner

Boroscope equipment

Daily hour reports

Boroscope facts

Do we change injector tips?

Parts for air start valves?

Start generator

UNLESS BOROSCOPE SHOWS

OTHERWISE, Pull 243 RB.

2-26-90
Monday ~~2-27-90~~

Travel Seaboard to
Augusta GA

Left Sask. @ 8:00 AM PST

Arrive Hotel Augusta 9:00 PM EST

2-27-90
Tuesday ~~2-28-90~~

Review work scope and general
procedural ideas with Lance

Block. Went out and purchased
uniforms & office supply materials.

Pick TR up @ airport

8 Hours

2-28-90
Wednesday ~~3-1-90~~

Present QC and Technical

Administrative training to
workforce with Lance, Doug

Travel out to site with a room
and attend hazardous material

GET training 8 Hours

Thursday 3-2-40

APC changed our training schedule on us from an original two day schedule to an accelerated one day bootcamp program. Start 7:30 AM on site and received badge at 10:30 AM.

Non stop activity from security, emergency, radiation, suit out, breather, finger printing to badge issue.

Friday 3-2-

Started work on first engine, 76021. Work a swing shift between day (7:30 to 6:00) and night (7:30 to 6:00) I worked 11:00 AM to 9:30 PM. Got control drawings for station, set up procedure packages track paperwork, turnover

and train for 2nd shift

Saturday 3-3-90 11:00 AM To 10:00 PM

Work pedestal bearing major
and generator cleaning/examination.
Straighten up engine room and
paperwork. Turnover to second
shift. Cylinder block top inspection
and general supervision/administration

Sunday 3-4-90 11:00 AM To 10:00 PM

Change rental cars and pick up
boroscope at airport. Run boroscope
thru GPC warehouse to uncrate
then move same on site. Work
with Alfred to extract broken
top from LB exhaust inlet
adapter, at least four bolt
holes badly damaged by
screws/bolts backing at
drilling thru, thru bolting and
nut

Turn over - need to review
the (8) basic elements of
filling out a continuation
sheet with TR³ troops.

Need to complete exciter
brush rigging to close out pedestal
bearing examination.

To close out the generator
cleaning and inspection we
have to get one average
bolt installed at the bearing
side, all others have been
torqued, install on bearing
end, need to install remaining
bolts and torque same on
flywheel side.

Liners have been disassembled
and have been documented?
in NWD data sheet, so we
can start installing heads
on the right side.

Day's started the air start
valve inspection, Andy can
finish today or tomorrow

Let Andy work the injectors.

⇒ Try to get one fuel injection
pump (BR) examination
complete tonight and get
liver bore scope finished so that
schedule reflects current
progress.

Also get started on gear
train work.

⇒ Get time sheets in!

↓ 316 Stainless

B.7 Would be OK but
would have to be
cut off later for
sore.

Memo required to Ken Stokes

Turbine inlet adapter Flange
Thickness 1 inch

Female coupling thickness

$3\frac{3}{4}$ x 12 holes

$\frac{13}{16}$ x 8 holes

+ $\frac{1}{4}$ THICK STAYS

MAKE $\frac{11}{16}$ ϕ THRU

$\frac{5}{8}$ - 11 Socket Head

Verify prior to modification
that a nut can land
square against the back
face of the flange.

Nut thickness $\frac{5}{8}$ Inch

Write memo to Ken Stokes

regarding remark of turbine
inlet adapter.

Turnover to night shift
Leave @ 9:00 PM

L.O. 21 $\frac{1}{16}$ O.D. $\frac{1}{2}$ W.I.D.
5/16 Thick

BRASS

J.W. 23 $\frac{1}{16}$ O.D. $\frac{1}{2}$ W.I.D.
5/16 THICK

BRASS

FRIDAY 3-5-90

On site 11:00 AM

Went with Ray Howard to identify
L.O. cooler labyrinth seal per
dimensional into above.

Continue work on turbo bolting
modification, spec out and

ASTM A193 grade B8M

75 KSI yield minimum

Consulted Bill Chouault at
SENI per request of
Ken Stokes and discussed
intent of governor and
overspeed governor drive
gear/assemblies inspections.
I am to issue letter
indicating that inspection
scope can be satisfied by
visual gear/hub to shaft
inspections, we ^{should} not
have to remove carriers or
disassemble parts.

Today finished:

Air Start Valves

Injectors

Periscope

All Thermocouples are out
and cleaned

CRANKCASE doors all
finished.

Tonight

1. P.T. two subcovers
2. Install subcovers
3. Install injectors
4. Finish cylinder head installation
5. Gear train work as much as possible
6. Clean rockers?
7. Control panel stuff.

NOTE REQUIREMENTS
ON PAGE 45, 46, 47
FOR ROCKERS & PUSH RODS

We were to look to
4.9.16 check to
see if correct.

ASTM A193 B8M

CLASS II

Eq. To 316

with 75 ksi min yield
14 K for 30 pieces

Reper booster pump
thrust and radial clearance

Monday 3-5 - 10 hrs

Heads torqued, air start valves
and injectors completed. Work
on repair method and bolting
specification for turbo turbine
inlet adaptor broken bolts, review
ASTM A193 ... per above.

Tuesday 3-6 10 hrs

Get drawings and MFR for
sketch, start setup for functional
test. Document review, turn over

Dial Indicator 0-1" Starrett
VP-3-2732 Cal 10/2/89 Due 4/2/90
Wednesday 3-7-90 10:45 am
11 Hours

OK { Accessory drive gear carrier
thrust .0085

Backlash ~~.0135~~ ?

.007

.0065

OK {

.007

.0065

.007

.007

OK {

Bushing clearance x .003 & y .003

Governor (RH)

Right angle drive backlash

.008

.008

.009

.011

Horizontal thrust .006

Vertical thrust .003

OK { Governor drive to idler lash
.004
.005
.004
.004

Starratt 0 - .200
VP-3-2718

Cal 12-2-89 Due 6-2-90

Perform governor and overspeed
governor drive inspections.
Document deviations from
procedure to allow in situ
examinations. Document
review and turn over. Inspect
turbine inlet rework in progress

Thursday 3-8

Review mwo, disposition error
on rocker arm clearances. Torque
up slip ring cover. Document review
and turnover

3-9-90

Sheldon:

While checking procedure
prelim. found found
sliding link on L32, trip
delay closed, opened same
per step 4.1.8.11
hit neutral from hour
meter, can not locate
toggle switch.

'B' SIDE TACH RELAY X-FER

202 rpm	551	241	221	220	219
200 rpm	552	217	218	218	
442 rpm	553	483	481	484	
442 rpm	554	483	481	481	

490 Hz = 450 RPM

Steps 4.2.18.1 & 2

occur within approx 40 sec

Step 4.2.18 unit stopping?

I'm not getting the horn
STEP 4.2.28.3

TRIP LOW PRESS TURBO OIL

Pos 5-2 aux contacts
don't fully close read
195.8 in (195.8 c)

4.2.28 After venting off
E 92 we get required
contact states, it it clears
itself within about 15 sec?
and contacts return to open
Step 4.2.28.1

Maintenance lock out alarm
remained deenergized until
manual release of 7.10 B Contacts
then energized and will not
reset. [until I pushed operation mode]
Control room indicates ground
on bus when diesel alarms.
Overspeed trip 4.2.32.1 worked
but horn cleared itself?

Step 4.2.32

All functions as should be
accept we have unit starting
light? No voltage at
24 & 65

Step 4.2.41.1 appears they
never changed out optical
isolator because we still
do not get disabled non-reset
of emergency trip alarm, ref
page 48 of EOC 1 functional
test. Jumpered 411 and 502
same as last time and all
works well.

Step 4.2.45, I performed
all previous steps with
CB-1 & CB-2 closed!

All day on preparation for
functional, expedite power
supply installation. 12 hours

Saturday 3-10-90 10:00 am
Disposition leaking intercooler
Tubes and "B-train" air comp.
rod/rod bearing. Review and
process final documentation—
purchase 9 hours

Sunday 11 hours
Started preparation for
governor fill and vent
got up to air rolls when
block and vent failed open.
Site reports that this
happens often. Worked
with Hawk to get new
circle seal solenoid valve
had turnover with Sheldon
and Steve.

Prep

Monday 3-12-90

Stand by during governor
fill & vent and warm up
runs for hot retorque, yet
caught up on paperwork 8 hours

Tuesday 3-13-90

Release of engine 76022
delayed until usage of
non-Q Garbott gasket
material on intercooler
head plate - left bank
76021. Problem resolved
and operations started
engine 76022 at 4:15 pm
for cold compression
pressures. Data collated
and engine loaded against
grid at 5:30 pm. Allowed
unit to run continuously for
8 hours to do hot web.
Turnover 9 hours

Wednesday

3-14-90

Review and document
analysis of cold
compression data and
firing pressure / rack /
exhaust temperatures.

Get control system
schematics and point to
points as well as MWO
from 1st refueling outage.
Work on set up of
data sheets in new MWO.

Examine some of the
liners with Davey.

Determine no.s 1 & 8 LB
heads required for removal.

Get work started on
injectors, airtight valves,
turbo thrust, foundation exam,
generator cleaning.

Turnover

10 hours

Thursday 3-15-90

Review voltage regulation and governor problem symptoms with Ken Stokes re. unit 2. Review and help disposition number 7 main bearing shell exam with Doug. Disposition no. 8 R.B. fuel injection pump plunger spring.

Work going on - finish of generator/pedestal bearings, main bearings, air start valves, air distributor filters, start block top. Continue preparation of data sheets in the MUO and start review for documentation completion and do turnover 12 hours

FRIDAY 3-16-90

Ran parts down from
warehouse. Disposition
loose cylinder head
studs. Examine and
measure main bearing
shells. Chase down
M&T. No 7 main
closed up. No 5
main rolled in but
not torqued. All
injectors air start
valves in, heads
checked and knurled.
Review documentation
and turnover.

10 hrs

Saturday 3-18-90

Rotor arms inspected, no.s
1 & 2 cylinder heads torqued.
Air start valves pulled
again from 1 & 2 CB
heads to allow reexamination
for cleanliness. Worked
towards getting clearance
lifted for control panel
functional, turnover. 10 hours

Sunday 3-¹⁸19-90

Control panel functional
started. Had to get
clearance lifted from
maintenance push button,
1. Step 4.2.2

Had to lift link at
F10 to clear loss
of generator control
panel power.

#2 Step 4.2.2

Had to depress
operational push button
to perform step.

#3 Step 4.2.2

Opened sliding link
at E33, same as
last year, cleared
disabled engine
control in local
but nothing else,
jumped E33
& E28 but could
not get H9 & H10
to open.

Left links at
E33 and F10
open, am
frustrated and
ready to quit.

Step 4.2.2

Find that PS 31V1
and PS 41V1 do not
reset with 230 lbs
on the receivers and
thus R20 not energized
with resulting failure
to open 149/1-110.

The switches are
close enough to
their set points that
tampering with their
wires at 230 psi is
enough to reset.

Have notified I&C
to find out what
hysteresis is. Either
A.C.'s are too low
or switch setpoint
is too high.

Question, did you fix
all of the sign off
errors between
procedure and sign
off sheets, I have
not been there are
too many of them.

Note air compressor
on at 225 psi.

Have to cycle front end
push pull to reset
Humphrey? under turbo.

Note: I & C came out
to look at pressure
switches, van off
and may come back
in force to recal.

Right bank pressure
switch reset at 231
psi per ECP gage.

While performing
engine roll and
start tests in
maintenance lockout
P3 started to vent
and would not reset.
Turned off control panel
air to reset and then
retested many times
without problem
repeating. I have
great trouble dealing
with one logic board
schematic, it is
ridiculous.

Steps 4.2.18.1 & 2
occur after approx 90 secs.

$\frac{3}{8}$ INCH tubing ^{plug} ~~grip~~ installed
on overspeed tube at
gearcase. tagged line,
did not log.

Did not log F10 or E33

Fancl pneumatic tubing
nuts less than finger
tight on P5 30 B
and P5 35 B1

Relay flag on TR 1 sticks
back.

Time → Seconds

70 ← JW HITWT

80 ← JW press sensor
can do this

Monday 19
3-22-90

Troubleshoot 2 out 3
logic board problem
and work on repair
of accessory drive.

Thrust collar ground
down to restore
specified thrust.

Resolved logic problem
with Cw Young, find
garbage in an or
element. Turnover
and paperwork. 11 hours

Delta 724-2641

4-3-90 Augusta to KCI

4-7-90 KCI to OAK

4-3-90

DELTA 10:05 AM Augusta

FLT 1037 10:50 Atlanta

11:45 Atlanta

FLT 436 12:42 KCI

4-7-90 12:25 PM KCI

FLT 1891 1:50 Salt Lake

2:59 Salt Lake

1687 3:45 Oakland

589.00

JOEL 7420

Tuesday 3-20-70

A train to run tonight

LOOP and normal local start
are the same, only the load
sequencer makes a difference.

Emergency is a shutdown inactive
operating mode.

Work on document review
and close out of MWC 95,
sign off final approval
and turn document over
to customer.

Attended meeting to discuss
day's events re LOOP.

Decided to initiate 4
normal starts on 76021.

All worked well.

We moved over to 76022
to do Full Grant. Wait

on operations till 6:00
when relieved by PAT.
Never did run.

Check valve and solenoid
valve rocky in Cook
panel, his fault, could
not run. 20 hours

Wednesday

Waiting to run T6022
because Cook relay
chatter, T35, all his
fault that siles DC
power supply for gen
panel went t.t.s up.

However will start
soon. 8 hours

Thursday 3-22

Costumed delays for engine start mostly due to a result of tooling problems, our people on standby on site for run. 4 hours

Friday 3-23

Get 8 hour hot torque completed, move to 4 hour run, 2 fail to start, observe P-3 vent, restart OK, get hot torque, another fail to start ^{shot} _{ps} ^{down} _{9 hours}

Saturday

3-24-90

Out with Lance Blak, Shoklon called back for retest, got into several meetings to discuss P-3 reset, test spare P-3 in I&C dept. 6 hours

Sunday

3-25-90

On site meeting to discuss strategy for testing and troubleshooting. Get H&TE & misc tooling. Review and mark up functional test scope with Shoklon. Print sign off

pages with Skeleton. Clearance
hung and memo issued to
start work at approx 3:30 pm.

Final j.w. temp trips venting.

Find inconsistent operation
of P-3 valve. Lay out
schedule for Monday 15 hours

Monday

3-26-90

P-3 valve changed, continue
troubleshooting final questionable
pressure drop between P3 or
element of shut down board
and group I sensor pressure.

1 1/2 - 10 - 16 psig respectively

Failure to trip can be

brought about by very

slowly venting sensor line,

even though P3 goes to

full vent the logic board
does not trip. Changed cut

1A 7055 and problem
resolved. Continue to functional
test. Left site with I&C
to calibrate the three high
temp jacket water trips 12400

Tuesday 3-27-90

I&C not able to calibrate one
sensor during the night. By
discussions regarding calibration
procedures, afterwards procedure
revised and while watching them
got the three sensors done in
about 2 hours. Sheldon demonstrates
that high temp L.O. trip can be
calibrated in shop and perform
exactly same in engine room.
Once sensors completed continue
and complete functional test.
Get engine operating in
LOCK mode vent shutdown
lines one at a time and

1. Establish a water bath
at $200^{\circ}\text{F} \pm 2$.

2. Raise the sensor trip point
adjustment to some arbitrary
setting above water bath
temp. Try two turns at
first, some trial and error
may be required.

→ 2.5 Connect a 60 psi air supply thru a .028
in. orifice with test gauge between sensor
and orifice.

3. Immerse sensor temperature
probe in water bath and
allow to soak for a
minimum of five minutes.
Direct immersion is acceptable.

4. Slowly decrease sensor
setpoint

and leak test with bubbler,
final all to be satisfactory.

Proceed on after schedule
change: delay and flip
unit from normal operation
by venting at various
on engine sensors.

Close out review and
sign off of work order
package. Write memo to
allow hot retrograde to
take credit for accumulated
operating time after
multiple start/stops. 16 hours

Wednesday 3-28-90

Start with meeting with
folks from Birmingham to
discuss revision that will
make LOP control same
as LOCK.

Met with Gary Hazlet in
I&C lab to test devices
Plant personnel in meeting
to determine course of
action - 6 HOURS

Should discuss nuisance
alarms:

1. A/P - vent tubes
2. Action packs in line filters.

Thursday 3/29/90
Sheldon meets with NRC
to discuss CALCON
devices. Get MWC
and M&TE prepared for
control panel functional
testing. Released to
test at about 5:00 pm
Finish with satisfactory
results at around
9:00. Final JW sensor
venting, I&C got 10 hours,
MWC to recalibrate.

Friday 3/30/90

Did not do shit

ent. 1 Sheldon got out
of NRC meeting 12
hours it took to get
engine released and
operators stayed to
do operational bubble
test and trip tests.

Found many leaky
tubes below bulkhead

in panel. Newly
calibrated TW temp
sensor stuck and
gave announcement of
sensor malfunction.

Found others not leak
tight but satisfactory.

Whole thing inconclusive
but raised a lot more

questions. Another NRC
meeting slated for
tomorrow 18 hours

Saturday 3-31-90

Perform additional functional testing following meeting with NRC. Started unit to see if high temp JW sensor reset a set overnight, overruling CB. Vented two high temp JW sensors and started. Got following:

At start 1st { Low press S.A.
{ Under freq gen. → cleared.

~60 sec { Low press JW Trip
{ Turbo oil press Trip

~65 sec { Malfunction JW Sensor
{ Trip Jacket Water Temp
{ High Temp L.O.
" " J.W.

These appear to be what most people reported at time of problem.

Most probable cause
of incident is fault
in jacket water
temp sensor due to
calibration or device
defect.

During those tests,
instrumentation monitored
gen freq. and voltage
and 1559 - trip circuit.
This showed breaker
closure window and
timed at approx 71 sec
corresponding with the
70 to 80 sec reported
during the Tuesday
event.

High level of confidence
that temp sensors
caused problem. Replace
sensors with new ones
and retested at
7 hours

SUNDAY

4-1-90

Met with George Backholer
and engineering to discuss
results of Saturday's
testing and prepare for
NRL next meeting.

Root cause attributed to
intermittent sensor activation
and/or calibration procedures.

Joined in afternoon by
Mark Brinay of I/C who
reviewed calibration methods
presented copy of sensor
maintenance history

5 hours.