JULY 01 – DECEMBER 31, 1987

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Report on Safety Related Occurrences and Reactor Trips

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STATENS KÄRNKRAFTINSPEKTION

SWEDISH NUCLEAR POWER INSPECTORATE

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REPORT ON SAFETY RELATED OCCURRENCES

AND REACTOR TRIPS

JULY 01 - DECEMBER 31, 1987

ABSTRACT

This is systematically arranged report on all safety-related occurrences and reactor trips in Swedish nuclear power plants in operation during the period from January 01 to June 30, 1987. It is based on the reports submitted by the utilities to the Swedish Nuclear Power Inspectorate according to Technical Specifications.

Twice a year since 1974 the Inspectorate has issued a compilation on such reported occurrences and reactor trips. Starting with the compilation of the second half of 1982 some new features have been introduced. The most important change is that the volume of information has been increased. The full text, provided by the utilities when reporting the incidents, is now attached to the codified information and also the layout has been altered to facilitate reading.

As in the previous reports the occurrences and reactor trips are arranged both alphabetically by facility name and chronologically by report number for each facility. Electricity generation charts for each facility are also presented.

The primary purpose of this report is thus to present all the information furnished by the utilities when they submit their reports according to Technical Specifications. The only evaluation made by the Inspectorate is the categorization on the incidents.

Like the previous reports this one also presents frequency of incidents as related to affected component, cause of incident etc. The information reported by the utilities is used. This is reason why a considerable proportion of the incidents are categorized as "other component or other fault".

The Inspectorate plans to put out a special report containing its own analyses of the most interesting events along with processed statistics and other information.

The semi-annual report will gradually be improved with graphical presentations. Earlier reports are not as complete as the reports from the beginning of 1983 when a new data base system was installed.

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SAFETY RELATED OCCURRENCS 870701-871231

B1-RO-013/87 - SYSTEM 311 MAIN STEAM SYSTEM INCLUDING DUMPING EQUIPMENT

LONG RUNNING TIME ON 311 V6

DATE:870729 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 106 203 304 409 502 605 701 812 906

THE VALVE HAD BEEN CLOSED SINCE 870728, 2100 HOURS. WHEN THE VALVE WAS OPENED ON 870729, 1200 HOURS, TESTING OF THE SYSTEM-MEDIUM CLOSING FUNCTION WAS CARRIED OUT, AND THIS CLOSURE DID NOT OCCUR. AT 1404 HOURS, THE VALVE CLOSED WITH SYSTEM MEDIUM. A NUMBER OF CLOSURE ATTEMPTS WERE MADE BETWEEN 1209 AND 1404 HOURS.
NON-FUNCTION OR LONG RUNNING TIME FOR 311 V6.
THE CAUSE WAS A STICKING SOLENOID VALVE FOR 311 V6 PILOT VALVES.
SYSTEM-MEDIUM CLOSURE OF THE VALVE WAS TESTED MANY TIMES, WHEREBY THE CLOSURE TIME WAS MEASURED WITH VARYING RESULTS. ALL SIGNS INDICATED THAT THE FAULT WAS DUE TO A STICKING SOLENOID VALVE FOR THE PILOT VALVES. A DECISION WAS MADE TO REPLACE THE SOLENOID VALVE. AFTER THE REPLACEMENT, 311 V6 WAS ONCE AGAIN TESTED MANY TIMES. AN ACCEPTABLE CLOSURE TIME OF 1.7 SECONDS WAS ACHIEVED WITH STEAM FLOW IN THE MAIN STEAM LINE.

B1-RO-014/87 - SYSTEM 354 HYDRAULIC SYSTEM FOR CONTROL ROD DRIVES (BWR)

LEAK IN SAFETY VALVE

DATE:870730 / EL.POWER 347 MWE / CATEGORY: 3

TYPE: 106 202 309 409 506 605 703 805 904

A LEAK WAS DISCOVERED DURING AN INSPECTION ROUND IN THE FLANGE FOR THE SAFETY VALVE ON GAS TANK T33.
THIS LED TO LARGE NITROGEN CONSUMPTION. GROUP 13 WAS TAKEN OUT OF SERVICE FOR CORRECTIVE ACTION ON 870802 AT 0440 HOURS AND WAS RESTORED AT 1150 HOURS. THE GROUP WAS INOPERABLE FOR 7 HOURS.
FLANGE CROOKED DUE TO STRESSES IN MAIN PIPE ON OUTLET SIDE.
FLANGE JOINT STRAIGHTENED AND FOUND TO BE LEAKTIGHT.

B1-RO-015/87 - SYSTEM 314 PRESSURE RELIEF SYSTEM

DEFECTIVE CIRCUITS IN VALVE POSITION INDICATION EQUIPMENT

DATE:870728 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 105 203 306 409 504 611 701

VALVE POSITION INDICATING SENSORS WERE REPLACED WITH INDUCTIVE-TYPE UNITS DURING THE 1987 REFUELLING OUTAGE. THE NEW SENSORS WERE

FUNCTION-TESTED BOTH IN THE COLD STATE AND DURING HEATING WITH APPROVED RESULTS. IN CONNECTION WITH PRESSURE REGULATION LATER AT A REACTOR PRESSURE OF 70 BAR, THE POSITION INDICATIONS FOR BOTH VALVES MALFUNCTIONED. MEASUREMENTS SHOWED THAT THE CIRCUITS WERE DEFECTIVE. 314 V50, V51 FUNCTION COMPLETELY INDEPENDENTLY OF THE POSITION INDICATION, WHICH IS ONLY USED FOR DISPLAY IN THE CONSOLE IN THE CENTRAL CONTROL ROOM. AS A CONSEQUENCE, IT IS IMPOSSIBLE TO SEE WHETHER THE VALVES ARE OPEN OR CLOSED.
THE CAUSE OF THE FAULT CANNOT BE DETERMINED WITHOUT REMOVING THE SENSORS IN THE CONTAINMENT. A PROBABLE CAUSE IS A WEAK CONNECTION BETWEEN THE COIL'S THIN WINDING WIRE AND THE CONNECTING STRANDS. THE MANUFACTURER HAS BEEN CONTACTED. A NEW DESIGN WILL BE DEVELOPED. IN THE MEANTIME, OPENING OF THE VALVES WILL BE VERIFIED BY BLOWING TESTS DURING THE REGULAR PERIODIC TESTS.

B1-RO-016/87 - SYSTEM 649 EL. SYSTEM FOR GAS TURBINE WITHIN STATION

START BLOCKING

DATE:870915 / EL.POWER 599 MWE / CATEGORY: 3

TYPE: 106 203 302 409 504 605 704 812 909

AFTER CONCLUSION OF TESTING OF G14:2, START BLOCKING WAS OBTAINED DUE TO THE FACT THAT THE LEAKAGE FUEL TANK WAS OVERFILLED.
RENEWED START OF G14:2 WAS INTERLOCKED.
SPRING FOR PRESSURE RELIEF VALVE ON START FUEL TANK WAS RELAXED, RESULTING IN LEAKAGE DIRECTLY TO THE LEAKAGE FUEL TANK.
FIRST THE FAULT WAS THOUGHT TO BE DUE TO LEVEL SENSORS IN THE LEAKAGE FUEL TANK. AFTER A DAY OR SO, HOWEVER, THE FAULT WAS FOUND TO BE DUE TO THE ABOVE, IN CONNECTION WITH RETESTING. CORRECTIVE ACTION WAS TAKEN ON THE VALVE. THE VALVES ON THE OTHER HALVES WILL BE EXAMINED IN CONNECTION WITH THE SCHEDULED OUTAGE DURING WEEKS 41 AND 42. THE DOWNTIME FOR G14:2 WAS ABOUT FOUR DAYS.

B1-RO-017/87 - SYSTEM 649 EL. SYSTEM FOR GAS TURBINE WITHIN STATION

FAULT IN INVERTER

DATE:871111 / EL.POWER 613 MWE / CATEGORY: 3

TYPE: 106 201 302 409 506 611 701 812 909

AT 1230 AN ALARM WAS RECEIVED IN THE CENTRAL CONTROL ROOM. TRIPPING RELAY COULD NOT BE RESET REMOTELY. THE FOLLOWING SIGNALS AND ANNUNCIATOR WINDOW LIGHTS WERE OBTAINED IN THE G14 CONTROL ROOM: - GENERAL 220 V AC FROM INVERTER 2 - TRIPPING RELAYS - DEFECTIVE BEARING INSULATION - HIGH TEMPERATURE IN GAS GENERATOR ANNUNCIATOR WINDOWS: - TRIPPING RELAY 51 AND TRIPPING RELAY 4 - 0 VOLTAGE V-N11 220 V AC - 0 VOLTAGE V-N1 220 V AC
GAS TURBINE G14:1 AND 2 START-BLOCKED BETWEEN 1230 AND 1310 HOURS.
A DEFECTIVE CAPACITOR IN INVERTER AA3 IS CAUSING DISCONNECTION OF THE INVERTER. WHEN THE INVERTER IS DISCONNECTED, ALTERNATIVE VOLTAGE IS CONNECTED. DURING THE CHANGEOVERS (BELL CLAPPER EFFECT) BETWEEN THE

VOLTAGES, MINIATURE CIRCUIT BREAKER VN1 TRIPPED. THIS LED TO BLOCKAGE OF G14:1 AND 2.
THE DEFECTIVE CAPACITOR WAS REPLACED. THE AUTOMATIC CHANGEOVER EQUIPMENT WAS MODIFIED TO PREVENT THE BELL CLAPPER EFFECT.

B1-RO-018/87 - SYSTEM 713 SALT WATER FOR NORMAL OPERATION

LONG PUMP CHANGEOVER TIME

DATE:871123 / EL.POWER 612 MWE / CATEGORY: 3

TYPE: 106 203 302 409 502 609 707

PERIODIC TESTING AS PER 1-D9.713 WAS CARRIED OUT. P6 DID NOT START IMMEDIATELY, BUT WITH A DELAY OF ABOUT 20 SECONDS.
THE FAULT HAD NO SAFETY-RELATED CONSEQUENCES.
THE TIME DELAY WAS FOUND TO BE DUE TO UNRELIABLE FUNCTION OF AN AUXILIARY RELAY.
RELAY CARD REPLACED. SUBSEQUENTLY TESTED WITH SATISFACTORY RESULTS.
THE DEFECTIVE CARD WAS SENT TO ASEA FOR CAUSE ANALYSIS.

B1-RO-019/87 - SYSTEM 354 HYDRAULIC SYSTEM FOR CONTROL ROD DRIVES (BWR)

LEAK IN DIAPHRAGM FOR ACTUATOR

DATE:871124 / EL.POWER 613 MWE / CATEGORY: 3

TYPE: 106 202 309 409 506 605 702 812 909

A LEAK WAS DISCOVERED FROM THE PILOT DISC IN THE ACTUATOR PART OF THE VALVE ON AN INSPECTION TOUR.
NO IMMEDIATE CONSEQUENCE. GROUP 15 INOPERABLE FOR 19 H IN CONNECTION WITH REPLACEMENT OF V415.
SEAL IN PILOT DISC LEAKY.
VALVE REPLACED WITH COMPLETE SPARE. FUNCTIONAL TEST OF GROUP 15 WITH MEASUREMENT OF OPENING TIME FOR V15 WITH SATISFACTORY RESULTS.

B1-RO-020/87 - SYSTEM 677 INDICATION AND ALARM SYSTEM SUPPLY

EARTH FAULT ON 677 B1 BAR

DATE:871215 / EL.POWER 614 MWE / CATEGORY: 3

TYPE: 106 201 301 409 506 611 707 809 909

SIGNAL FOR EARTH FAULT ON 677 B1 WAS OBTAINED IN CONTROL ROOM KB2.
THE FAULT WAS TRACED TO THE INDICATING UNIT FOR LPRM PROBE NO. 8 IN KA09.
REDUCED INSULATION VALUE FOR 677 B1 BETWEEN 0702 AND 0817 HOURS.
THE INDICATING UNIT FOR LPRM PROBE NO. 8 IN KA09 WAS NOT INSERTED ALL THE WAY AND THE LAMP UNIT WAS TOUCHING EARTH. THE FAULT PROBABLY OCCURRED IN CONNECTION WITH LAMP REPLACEMENT.
LAMP UNIT INSTALLED CORRECTLY.

B1-RO-021/87 - SYSTEM 354 HYDRAULIC SYSTEM FOR CONTROL ROD DRIVES (BWR)

LEAKAGE IN FITTING, GROUP 15 TAKEN OUT OF SERVICE

DATE:871218 / EL.POWER 612 MWE / CATEGORY: 3

TYPE: 106 202 309 409 502 604 705 801 904

A SMALL LEAK WAS NOTED AT THE COMPRESSION RING FITTING UPSTREAM OF 354 V335 ON NOVEMBER 25, 1987. THE LEAKAGE HASGRADUALLY INCREASED, REQUIRING CORRECTIVE ACTION (DECEMBER 18, 1987).
DURING CORRECTIVE ACTION, GROUP 15 WAS TAKEN OUT OF SERVICE AT 0340 HOURS ON DECEMBER 18, 1987. THE CORRECTIVE ACTION WAS COMPLETED AND GROUP 15 RESTORED AT 1117 HOURS ON DECEMBER 18, 1987.
THE CAUSE WAS A LEAK THROUGH A COMPRESSION RING FITTING.
THE FITTING WAS REMOVED ON DECEMBER 18, 1987. ALL SEALING SURFACES WERE CLEANED AND POLISHED. SEAL RINGS WERE LUBRICATED PRIOR TO REINSTALLATION.

B1-RO-022/87 - SYSTEM 847 EL FIRE PROTECTION SYSTEM

FAULT IN FIRE ALARM SECTION

DATE:871230 / EL.POWER 612 MWE / CATEGORY: 3

TYPE: 106 207 301 409 502 610 703 812 909

AT 0319 HOURS, ALARM WAS OBTAINED FOR A FAULT IN FIRE ALARM SECTION 72. THE ALARM COULD NOT BE CANCELLED, SO THE SECTION WAS SHUT OFF AND PUT UNDER MANUAL SUPERVISION IN ACCORDANCE WITH THE TECH SPEC. A NEW ATTEMPT WAS MADE TO RESTORE THE SECTION AT 0554 HOURS, BUT IT HAD TO BE SHUT OFF AGAIN. UPON RESTORATION OF THE CENTRAL UNIT, A FALSE FIRE ALARM WAS ISSUED IN SECTION 63. TROUBLESHOOTING AND REPAIR OF BOTH FAULTS WAS COMMENCED WHEN THE REGULAR STAFF ARRIVED IN THE MORNING. THE FIRE ALARM EQUIPMENT WAS COMPLETELY RESTORED AT 1405 HOURS.
AT 0319 HOURS, ALARM WAS OBTAINED FOR A FAULT IN FIRE ALARM SECTION 72. THE ALARM COULD NOT BE CANCELLED, SO THE SECTION WAS SHUT OFF AND PUT UNDER MANUAL SUPERVISION IN ACCORDANCE WITH THE TECH SPEC. A NEW ATTEMPT WAS MADE TO RESTORE THE SECTION AT 0554 HOURS, BUT IT HAD TO BE SHUT OFF AGAIN. UPON RESTORATION OF THE CENTRAL UNIT, A FALSE FIRE ALARM WAS ISSUED IN SECTION 63. TROUBLESHOOTING AND REPAIR OF BOTH FAULTS WAS COMMENCED WHEN THE REGULAR STAFF ARRIVED IN THE MORNING. THE FIRE ALARM EQUIPMENT WAS COMPLETELY RESTORED AT 1405 HOURS.
FIRE ALARM SECTION 72 WAS OUT OF SERVICE BETWEEN 0319 AND 1405 HOURS. CABLE DAMAGE BETWEEN DETECTORS 1 AND 2 IN SECTION 72 CAUSED THE FAULT ALARM IN THIS SECTION. A DEFECTIVE LOOP SENSING CARD IN THE CENTRAL UNIT ISSUED A FIRE ALARM IN SECTION 63 AS SOON AS SOMETHING WAS RESTORED IN THE CENTRAL UNIT.
DURING THE TIME SECTION 72 WAS OUT OF SERVICE, MONITORED AREAS WERE SUPERVISED IN AGREEMENT WITH THE TECH SPEC. THE LOOP SENSING CARD IN THE CENTRAL UNIT WAS REPLACED. A PROVISIONAL CABLE WAS INSTALLED IN SECTION 72 BETWEEN DETECTORS 1 AND 2. THIS WILL BE CORRECTED

PERMANENTLY AT THE NEXT OUTAGE.

B2-RO-020/87 - SYSTEM 351 BORON INJECTION SYSTEM (BWR)

REPLACEMENT OF SAFETY VALVE

DATE:870701 / EL.POWER 520 MWE / CATEGORY: 3

TYPE: 106 203 312 409 503 605 702 812 909

DURING PERIODIC TESTING OF 351 P1, AN ELEVATED PRESSURE WAS NOTED IN THE TEST LINE. BEFORE THE TESTING PERSONNEL HAD TIME TO OPEN THE GOVERNOR VALVE IN THE TEST LINE, THE PRESSURE REACHED THE OPENING PRESSURE OF THE SAFETY VALVE. THE VALVE RECLOSED AND THE TEST COULD BE CONCLUDED WITH SATISFACTORY RESULTS. OWING TO THE DESIGN OF THE SAFETY VALVE WITH AN O-RING SEAL BETWEEN THE SEAT AND THE DISC, A TEST WAS PERFORMED SEVERAL HOURS LATER TO SEE IF THE VALVE WAS COMPLETELY LEAKTIGHT. IT WAS NOT AND THE SAFETY VALVE WAS REPLACED.
351 P2 START-BLOCKED ON 870701 BETWEEN 1500 AND 1530 HOURS FOR REPLACEMENT OF SAFETY VALVE. DOWNTIME 0.5 H.
CAUSED BY CLOGGING OF THE RESTRICTION IN THE TEST LINE OR THE FACT THAT THE DISC IN THE CONTROL VALVE IN THE TEST LINE HAS FREEDOM OF MOVEMENT RELATIVE TO THE VALVE STEM.
A TOTAL REVIEW OF PUMPS, TANK AND PIPING WILL BE CARRIED OUT DURING THE 1987 REFUELLING OUTAGE.

B2-RO-021/87 - SYSTEM 847 EL FIRE PROTECTION SYSTEM

FIRE SECTION 92B IN MANUAL MODE DUE TO DETECTOR FAULT

DATE:870712 / EL.POWER 345 MWE / CATEGORY: 3

TYPE: 106 201 301 409 504 611 702 802 909

FAULT ALARM WAS OBTAINED FROM SECTION 92 B. THE SECTION WAS SHUT OFF AND THE CORRESPONDING SPRINKLER SECTIONS 40-43 WERE PLACED IN THE MANUAL MODE. INSPECTION TOURS OF THE SUPERVISED AREA WERE UNDERTAKEN ONCE AN HOUR.
CELLAR 2E0003 WAS STILL NORMALLY MONITORED.
THE TRANSMITTER LAMP FOR THE PHOTOCELL IN THE DETECTOR OF TYPE PYR 171 (SECURITAS) WAS FOUND TO BE BROKEN. (NORMAL LIFE 200 000 HOURS). THE DETECTOR WAS REPLACED ON 870712 AT 0900 HOURS.

B2-RO-022/87 - SYSTEM 751 COMPRESSED AIR PLANT FOR INSTRUMENT- AND AIR CONTROL

BOTTOM PLUG CAME LOOSE

DATE:870712 / EL.POWER 345 MWE / CATEGORY: 3

TYPE: 106 202 309 409 504 611 703 802 909

A LEAK IN THE THE BOTTOM PLUG SEAL ON FILTER C32 WAS FOUND ON AN INSPECTION TOUR.

INCREASED LEAKAGE COULD HAVE LED TO A PARTIAL SCRAM.
THE SEAL BEGAN TO LEAK, CAUSING THE PLUG TO COME LOOSE.
ISOLATION VALVE 354 V65 WAS TEMPORARILY CLOSED TO PERMIT SEALING. THE BOTTOM PLUG ON THE FILTER WAS SEALED PROVISIONALLY. ALL FILTERS WILL BE FITTED WITH PLUGS OF BRASS INSTEAD OF EXISTING PLASTIC.

B2-RO-023/87 - SYSTEM 312 MAIN FEED WATER SYSTEM

INCREASE TO MAXIMUM FLOW

DATE:870712 / EL.POWER 345 MWE / CATEGORY: 3

TYPE: 106 201 301 409 502 608 701 802 909

PUMP P1 INCREASED TO MAXIMUM FLOW, WHEREBY P2 DECREASED.
ALARM FOR HIGH TEMPERATURE IN THE MOTOR WAS OBTAINED.
FAULT IN FEED DEVICE TO PUMP'S SPEED TRANSMITTER.
FEED DEVICE REPLACED.

B2-RO-024/87 - SYSTEM 322 CONTAINMENT SPRAY SYSTEM

DAMAGED PUMP BEARING

DATE:870716 / EL.POWER 555 MWE / CATEGORY: 3

TYPE: 106 201 301 409 503 606 703

DURING OPERATION OF 322 P1, FIRE ALARM WAS OBTAINED FROM ROOM 2R1.10 AT 2124 HOURS ON 870716. INSPECTION REVEALED SMOKE ISSUING FROM THE AXIAL BEARING ON 322P1. THE PUMP WAS SHUT OFF IMMEDIATELY AT 2125 HOURS.
322 P1 INOPERABLE. CIRCUIT 1 WAS RENDERED OPERABLE AT 2144 HOURS BY CONNECTION OF 322 P2. SINCE 322 P2 IS USED FOR SYSTEM 322 AND IS NOT AVAILABLE FOR SYSTEM 323, THERE ARE LIMITATIONS IN ACCORDANCE WITH THE TECH SPEC.

B2-RO-025/87 - SYSTEM 361 FILTRA

FILTRA SYSTEM'S LEAKAGE FACTOR EXCEEDED

DATE:870719 / EL.POWER 562 MWE / CATEGORY: 3

TYPE: 106 209 309 409 506 611 707 812 909

THE EVENT OCCURRED DURING THE 1987 REFUELLING OUTAGE. THE RUPTURE DISC 1-361 V1 WAS GOING TO BE REPLACED. 1-361 V2 WAS OPENED BY MISTAKE. WHEN THE FLANGE FOR V1 WAS LOOSENED, NITROGEN FROM THE FILTRA LINE (FOR FILTERED VENTING) BEGAN TO LEAK OUT. THE PRESSURE DROPPED FROM 1073 MILLIBAR TO 1013 MILLIBAR IN ONE HOUR. THE MISTAKE WITH THE OPEN V2 WAS DISCOVERED, THE VALVE WAS CLOSED AND THE LEAKAGE STOPPED.
THE REQUIREMENT ON A MAXIMUM LEAKAGE FACTOR OF 0.2% DURING A 24-H PERIOD WAS EXCEEDED. IF THE FILTRA SYSTEM HAD BEEN REQUIRED TO OPERATE, THERE WOULD HAVE BEEN A SMALL UNCONTROLLED RELEASE IN UNIT 1.

FAULT CAUSED BY SHORTCOMING IN ADMINISTRATIVE ROUTINE WORK NOTIFICATION HANDLING.
REVIEW AND REVISION OF INSTRUCTIONS.

B2-RO-026/87 - SYSTEM 649 EL. SYSTEM FOR GAS TURBINE WITHIN STATION

G14:1 TRIPPED AT START

DATE:870725 / EL.POWER 565 MWE / CATEGORY: 3

TYPE: 106 203 304 409 502 605 702 812

IN CONNECTION WITH TEST DURING ONGOING REFUELLING OUTAGE ON UNIT 1, AUTOSTART WAS OBTAINED FOR G13 AND G14. THE GAS TURBINE HALF G14:1 TRIPPED AT 10 MW LOAD DUE TO LOW FUEL OIL PRESSURE.
THE CAUSE WAS AN OPEN CIRCUIT IN THE SOLENOID COIL FOR THE FIRE PROTECTION VALVE.
SOLENOID COIL REPLACED.

B2-RO-027/87 - SYSTEM 675 CONTINUES VOLTAGE 110 V NET

EARTH FAULT ON BUSBAR 675 B1

DATE:870726 / EL.POWER 555 MWE / CATEGORY: 3

TYPE: 106 201 301 409 502 609 701 809 909

ALARM 675 K058 "EARTH FAULT 675 B1" WAS OBTAINED SEVERAL TIMES ON 870726 BETWEEN 0150 AND 0219 HOURS. THE ALARM WAS NOT PERSISTENT AND THE CAUSE COULD NOT BE DETERMINED. THE SAME ALARM RECURRED ON 870730 AT 1040 HOURS AND PERSISTED UNTIL 1107 HOURS. (REACTOR POWER 95% AND GENERATOR OUTPUT 529 MW.) THE EARTH FAULT TREATMENT DEVICE WAS CONNECTED AND THE EARTH FAULT WAS TRACED TO PRESSURE SWITCH 472 K119. NO OPERATIONAL CONSEQUENCES. 472 K119 IS THE PRESSURE SWITCH FOR 472 P22, WHICH IS THE GREASE PUMP FOR 472 P2. K119 ONLYISSUES AN ALARM SIGNAL AND IS NOT CONNECTED TO ANY AUTOMATIC FUNCTIONS.
GREASE AND DIRT HAD ENTERED THE MICROSWITCH AND CAUSED EARTH FAULT. THE GLAND FOR THE PLUNGER THAT ACTIVATES THE MICROSWITCH WAS LEAKY. ENTIRE GREASE PUMP P22 REPLACED WITH STANDBY UNIT. CABLE TO MICROSWITCH REPLACED.

B2-RO-028/87 - SYSTEM 322 CONTAINMENT SPRAY SYSTEM

PUMP TAKEN OUT OF SERVICE FOR BALANCING

DATE:870728 / EL.POWER 348 MWE / CATEGORY: 3

TYPE: 106 202 308 409 506 606 707 803 909

HEAVY VIBRATION WAS DISCOVERED FROM THE PUMP SHAFT ON AN INSPECTION TOUR.
CONTINUED OPERATION WOULD PROBABLY HAVE LED TO ABNORMAL WEAR. THE PUMP WAS TAKEN OUT OF SERVICE FOR CORRECTIVE ACTION ON 870803 AT 0900

HOURS AND RESTORED ON 870805 AT 1300 HOURS. THE PUMP WAS INOPERABLE FOR 52 HOURS.
THE CAUSE OF THE FAULT CANNOT BE DETERMINED. ALIGNMENT AND PLAY CHECKED AND FOUND TO BE SATISFACTORY.
INTERMEDIATE SHAFT BALANCED. MINOR IMBALANCE FOUND IN SHAFT. PUMP TEST-RUN WITH SATISFACTORY RESULTS.

B2-RO-029/87 - SYSTEM 847 EL FIRE PROTECTION SYSTEM

FIRE SECTION 78 IN MANUAL MODE DUE TO DETECTOR FAULT

DATE:871001 / EL.POWER 543 MWE / CATEGORY: 3

TYPE: 106 201 301 409 504 611 702 810 909

FIRE ALARM WAS OBTAINED FROM SECTION 78, WHICH MONITORS THE LOW-PRESSURE TURBINE'S INTERCEPT VALVES, EAST SIDE. AN ON-SITE CHECK REVEALED STEAM LEAKAGE FROM 452 V8. THE FIRE ALARM SECTION WAS THEREFORE TAKEN OUT OF SERVICE AND THE AREA WAS MONITORED VIA CLOSED-CIRCUIT TV IN THE CENTRAL CONTROL ROOM.
THE CONSEQUENCE WAS REDUCED SYSTEM FUNCTION.
THE CAUSE WAS A SHORT CIRCUIT IN DETECTOR 2 IN SECTION 78 CAUSED BY STEAM LEAKAGE FROM 452 V8.
THE STEAM LEAKAGE FROM 452 V8 WAS CORRECTED, AFTER WHICH THE DETECTOR WAS REPLACED. THE SECTION WAS BACK IN SERVICE ON 1987-10-02 AT 2000 HOURS.

B2-RO-030/87 - SYSTEM 847 EL FIRE PROTECTION SYSTEM

BLOCKED FIRE ALARM DETECTOR

DATE:871007 / EL.POWER 300 MWE / CATEGORY: 3

TYPE: 106 201 301 409 504 611 706 812 909

FIRE ALARM WAS OBTAINED FROM SECTION 78, WHICH MONITORS THE LOW-PRESSURE TURBINE'S INTERCEPT VALVES (EAST SIDE) AT 2224 HOURS. STEAM LEAKAGE FROM 452 V8 WAS SUSPECTED TO BE THE CAUSE AND THE SECTION WAS BLOCKED. THE SPACE WAS MONITORED VIA TV IN THE CENTRAL CONTROL ROOM.
REDUCED SYSTEM FUNCTION, OTHERWISE NO OPERATIONAL CONSEQUENCES.
A MINOR STEAM LEAK IN CONNECTION WITH OPERATION OF 452 V8 PROBABLY TRIPPED THE DETECTOR.
THE DETECTOR WAS RESTORED ON THE FOLLOWING DAY (OCTOBER 8, 1987, 0825 HOURS). THE SECTION WAS THUS BLOCKED FOR A TOTAL OF 10 H.

B2-RO-031/87 - SYSTEM 341 GASEOUS WASTE PROCESSING SYSTEM

341 V18 FAILED TO OPERATE WHEN TESTED

DATE:871014 / EL.POWER 596 MWE / CATEGORY: 3

TYPE: 106 304 409 502 605 705 812 909

IN CONNECTION WITH PENETRATION TEST OF CHARCOAL FILTER C4, V18 WAS SUPPOSED TO OPEN TO ESTABLISH A FLOW THROUGH THE FILTER. THE DAMPER COULD NOT BE OPENED BY REMOTE CONTROL FROM THE CENTRAL CONTROL ROOM. LOCAL MANUAL ACTUATION COMBINED WITH AN OPEN COMMAND FROM THE CENTRAL CONTROL ROOM CAUSED V18 TO OPEN. THE DAMPER WAS THEN EXERCISED SEVERAL TIMES WITH SATISFACTORY OPERATION. V18 WAS INOPERABLE FOR ABOUT 15 MINUTES.
NO OPERATIONAL CONSEQUENCES.
SLIGHT ADHESION IN THE GASKET AROUND THE DAMPER BLADE (GASTIGHT DAMPER).
LUBRICATION AND EXERCISING. NO ADDITIONAL MEASURES PLANNED.

B2-RO-032/87 - SYSTEM 312 FEED WATER SYSTEM

ACTUATOR IMMOBILE

DATE:871017 / EL.POWER / CATEGORY: 3

TYPE: 106 201 304 409 504 608 701 812 903

IN CONNECTION WITH PUMP CHANGEOVER, 312 P3 MUST BE STARTED AND P1 STOPPED. THE CONTROL MODE WAS SWITCHED TO MANUAL AND WHEN THE ACTUATOR WAS TO BE OPERATED, NOTHING HAPPENED. CHECKING OF LOGGED VALUES IN THE COMPUTER FOR ACTUATOR POSITION VERIFIED THAT THE USUAL NOISE WAS LACKING. P2 HAD MANAGED LEVEL CONTROL ON ITS OWN. ACCORDING TO THE LOG, THE FAULT SHOULD HAVE ARISEN ON 14/10 AT 0200 HOURS.
IN THE EVENT OF REACTOR TRIP OR I-ISOLATION, P1 WOULD NOT HAVE REACTED TO THE LEVEL SETPOINT REDUCTION. FLOW LIMITATION TO 350 KG/S IN THE I-ISOLATION CASE WOULD ALSO HAVE FAILED TO OCCUR. THE LEVEL CONTROL FUNCTION OF P1 WAS INOPERABLE FOR ABOUT 92 HOURS.
BREAK IN A CONDUCTOR IN THE CONTROL CARD FOR THE ACTUATOR MOTOR. AS A RESULT OF THE FAULT, THE BRAKE WAS ON THE WHOLE TIME AND PREVENTED MOVEMENT. IT IS PROBABLE THAT THE BREAK WAS CAUSED BY A NOTCH IN THE WIRE MADE DURING INSULATION STRIPPING.
CONTROL CARD REPLACED WITH SPARE.

B2-RO-033/87 - SYSTEM 556

FILTRA (FILTED ATMOSPHERIC VENTING SYSTEM) - 556 K901 FAULT IN GAMMA MONITORING CHANNEL

DATE:871021 / EL.POWER 596 MWE / CATEGORY: 3

TYPE: 106 201 301 409 503 611 703 812 909

FAILURE OF FILTRA SYSTEM DETECTED BY PROCESS COMPUTER.
ACTIVITY MONITORING EQUIPMENT OUT OF SERVICE.
ELECTRONIC FAULT IN HIGH-VOLTAGE SUPPLY.
REPAIR OF HIGH-VOLTAGE SUPPLY.

B2-RO-034/87 - SYSTEM 721 CLOSED COOLING SYSTEM FOR 321 AND 322

LEAKAGE FROM SHAFT SEAL

DATE:871025 / EL.POWER 595 MWE / CATEGORY: 3

TYPE: 106 202 309 409 503 606 703 805 904

A HEAVY LEAK FROM 721 P1'S SHAFT SEAL WAS DISCOVERED ON AN INSPECTION TOUR.
THE PUMP HAD TO BE TAKEN OUT OF SERVICE. THE PUMP WAS ISOLATED. STANDBY PUMP P2 WAS CONNECTED. PUMP INOPERABLE BETWEEN NOVEMBER 25, 1987 AND NOVEMBER 29, 1987, 0823 HOURS. DOWNTIME: 93 HOURS.
THE PUMP'S THRUST BEARING HAD BEEN INSTALLED THE WRONG WAY AROUND.
REPLACEMENT OF SHAFT SEAL AND THRUST BEARING.

B2-RO-035/87 - SYSTEM 351 BORON INJECTION SYSTEM (BWR)

PRESSURE SWINGS DURING PERIODIC TEST

DATE:871111 / EL.POWER 602 MWE / CATEGORY: 3

TYPE: 106 203 312 409 503 606 701 812 909

DURING PERIODIC TEST OF P1, THE PRESSURE ROSE TO ABOUT 65 BAR WHEN THE CONTROL VALVE WAS THROTTLED. THE PRESSURE THEN FELL AND OSCILLATED BETWEEN 30 AND 50 BAR.
351P1 START-BLOCKED ON NOVEMBER 11, 1987 BETWEEN 1400 AND 2100 HOURS. DOWNTIME: 7 H.
NO VISIBLE FAULTS HAVE BEEN DISCOVERED.
THE PUMP'S INTERNAL SUCTION AND DELIVERY VALVES WERE REPLACED. PUMP TESTED WITH SATISFACTORY RESULT.

F1-RO-010/87 - SYSTEM 747 VENTILATION SYSTEM FOR ELECTRICAL BUILDING

V109 FAILED TO CLOSE IN CONNECTION WITH TEST OF CENTRAL SPRINKLER STATION

DATE:870712 / EL.POWER 386 MWE / CATEGORY: 3

TYPE: 106 203 304 409 503 605 705 801 901

DUPING PERIODIC TESTING OF CENTRAL SPRINKLER STATION 4, FIRE ALARM WAS ACTIVATED FOR THE SECTION IN QUESTION AND OBTAINED FUNCTIONS WERE CHECKED. IT WAS THEREBY FOUND THAT 747 V109 WAS NOT CLOSED. THE DAMPER WAS STUCK IN AN INTERMEDIATE POSITION. TECH SPEC 3.9B.
DAMPER STUCK.
THE DAMPER WAS LUBRICATED AND EXERCISED, AFTER WHICH IT WAS DECLARED OPERABLE. THE CAUSE OF THE STICKING WAS CORROSION IN THE DAMPER'S SHAFT BUSHINGS. THESE WILL BE FITTED WITH LUBE NIPPLES FOR GREASING AND THE DAMPER WILL BE INCLUDED IN THE MAINTENANCE PROGRAM. A LARGER MOTOR WILL BE INSTALLED.TOTAL DOWNTIME: 1 H.

F1-RO-011/87 - SYSTEM 411 MAIN STEAM SYSTEM INCLUDING DUMPING EQUIPMENT

MINIATURE CIRCUIT BREAKER FOR 411 V22 TRIPPED DURING REPLACEMENT OF

INDICATING LAMP

DATE:870721 / EL.POWER 480 MWE / CATEGORY: 3

TYPE: 106 205 302 409 503 609 706 810 901

DURING REPLACEMENT OF AN INDICATING LAMP IN THE SWITCHGEAR FOR 411 V22, THE MINIATURE CIRCUIT BREAKER FOR THE VALVE'S CONTROL VOLTAGE TRIPPED. THE VALVE REMAINED IN ITS OPERATING POSITION, OPEN. THE MINIATURE CIRCUIT BREAKER WAS RESET WITHIN 10 MINUTES.
THE CAUSE WAS A SHORT CIRCUIT IN THE INDICATING LAMP OR LAMP HOLDER DURING REPLACEMENT OF THE LAMP.
INDICATING LAMP REPLACED AND MINIATURE CIRCUIT BREAKER RESET.

F1-RO-012/87 - SYSTEM 211 REACTOR VESSEL

CRACKS IN BRACKETS FOR HEAD BEAMS DISCOVERED ON INSPECTION

DATE:870802 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 102 206 307 409 506 601 704 806 901

LINEAR INDICATIONS WERE OBTAINED IN PENETRANT TESTING OF THE WELDS ON TWO HEAD BEAM BRACKETS.
STRESS CONCENTRATIONS IN CONNECTION WITH MATERIAL INHOMOGENEITIES.
ONE DAMAGE SITE WAS GROUND OUT AND REPAIR-WELDED. THE OTHER WAS GROUND AND CHECKED.

F1-RO-013/87 - SYSTEM 321 RESIDUAL HEAT REMOVAL SYSTEM

ULTRASONIC TESTING OF PIPE JOINT AT CONTAINMENT PENETRATION GAVE CRACK INDICATION

DATE:870804 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 102 207 312 409 506 603 702 801 902

ULTRASONIC TESTING DURING RECURRENT TESTING GAVE AN INDICATION OF A 3-6 MM DEEP CRACK NEXT TO THE WELD BETWEEN THE CONTAINMENT PENETRATION AND THE PIPE BEND IN A 321 SUCTION LINE. THE LENGTH OF THE CRACK WAS 120 MM. PIPE SIZE IS 273 X 20 MM. THE TESTED WELD WAS INCLUDED IN A SPECIAL PROGRAM BEING CONDUCTED ON IGSCC-SUSCEPTIBLE MATERIAL.
CAUSED BY INTERGRANULAR STRESS CORROSION CRACKING.
REPLACEMENT OF PIPE BEND INCLUDING WELD ZONES IN CONNECTING PIPE. NEW BEND OF MATERIAL SS 2353-24 HAS BEEN MACHINE-WELDED AT A LOW MAXIMUM TEMPERATURE.

F1-RO-014/87 - SYSTEM 213 CORE SPRAY (BWR)

TV INSPECTION OF MODERATOR TANK HEAD WITH CHECK VALVE FOR CORE SPRAY REVEALED THAT ONE OF FOUR BOLTS FOR ATTACHMENT OF THE CHECK VALVE HAD FAILED

DATE:870807 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 102 206 307 409 502 604 701 801 902

TV INSPECTION OF THE MODERATOR TANK HEAD IN A WATER POOL REVEALED THAT ONE OF THE FOUR BOLTS FOR ATTACHMENT OF THE CHECK VALVE HAD BROKEN. THE BOLT PART WITH NUT IS MISSING AND HAS NOT BEEN FOUND BY INSPECTION IN THE REACTOR VESSEL. THE FRACTURE SURFACE WAS OXIDIZED. THE BOLT MATERIAL IS SIS 2570-04, WHICH HAS BEEN FOUND TO BE SUSCEPTIBLE TO IGSCC. THE FRACTURE SURFACE ON THE BOLT WILL BE ANALYZED TO DETERMINE THE CAUSE OF THE FRACTURE.
THE CHECK VALVE HAS BEEN REMOVED AND THE OTHER THREE BOLTS HAVE BEEN PENETRANT-TESTED WITH SATISFACTORY RESULTS. ALL FOUR BOLTS HAVE BEEN REPLACED. A SEARCH FOR THE MISSING PART HAS BEEN CARRIED OUT IN THE REACTOR VESSEL WITHOUT RESULT. CONSEQUENCE ANALYSIS CARRIED OUT BY ASEA-ATOM IS REPORTED IN REPORT RPD 87-118. IT IS NOT BELIEVED POSSIBLE THAT THE PART COULD HAVE LIFTED FROM THE BOTTOM OF THE REACTOR VESSEL.

F1-RO-015/87 - SYSTEM 762 WATER FOR FIRE PROTECTION

A NUMBER OF SPRINKLER HEADS WERE FOUND TO BE CLOGGED ON INSPECTION

DATE:870811 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 102 207 312 409 502 603 705 801 905

ON INSPECTION OF THE FIRE PROTECTION SYSTEMS, A NUMBER OF THE SPRINKLER HEADS IN THE SPRINKLER SYSTEM WERE FOUND TO BE MORE OR LESS CLOGGED. CLEANING OF ALL SPRINKLER HEADS WAS INITIATED. IN ORDER TO VERIFY FUNCTION, ONE BRANCH WITH HEAVY CLOGGING WAS THEN TEST-ACTUATED. THE RESULT WAS THAT OF 116 SPRINKLER HEADS, 2 GAVE NO FLOW AND 36 HAD A DISTURB SPRINKLING PATTERN. THE PIPING SYSTEM WAS THEN FLUSHED WITH A NUMBER OF SPRINKLER HEADS REMOVED, AFTER WHICH ALL SPRINKLER HEADS WERE REFITTED AND CLEANED. THE SAME WORK WAS DONE ON THE OTHER SPRINKLER CIRCUIT IN THE ELECTRICAL BUILDING.
SAMPLES TAKEN FROM THE MATTER CLOGGING THE SPRINKLER HEADS SHOWED THAT IT CONSISTED MAINLY OF CORROSION PRODUCTS. AN UNFAVOURABLE ATMOSPHERE WITH HIGH MOISTURE CONTENT HAS PROBABLY CAUSED CORROSION IN THE GALVANIZED PIPES.
ALL SPRINKLER HEADS WILL BE CLEANED. INSTRUCTIONS WILL BE PREPARED FOR MEASURES AFTER SPRINKLING. REVIEW OF SYSTEM DESIGN WITH RESPECT TO CORROSION PROTECTION. INSPECTION WILL BE INCLUDED IN THE MAINTENANCE PROGRAM.

F1-RO-016/87 - SYSTEM 747 VENTILATION SYSTEM FOR ELECTRICAL BUILDING

Q106 TRIPPED DURING PERIODIC TESTING

DATE:870820 / EL.POWER 580 MWE / CATEGORY: 3

TYPE: 106 203 302 409 503 607 701 812 909

DURING TESTING OF Q105-Q106 IN ACCORDANCE WITH THE OPERATING

INSTRUCTIONS, THE MOTOR PROTECTION FOR Q106 TRIPPED AND THERE WAS A SMELL OF SMOKE. TECH SPEC CHAP 3.9.B REPAIR CRITERION: 30 DAYS.
STATOR WINDING BURNT, PROBABLY DUE TO INSULATION FAULT.
MOTOR REPLACED. DOWNTIME 24 H 25 MIN.

F1-RO-017/87 - SYSTEM 711 CLOSED COOLING SYSTEM FOR 321 AND 322

LEAK IN SHAFT SEAL

DATE:870817 / EL.POWER 917 MWE / CATEGORY: 3

TYPE: 106 202 309 409 503 606 701 802 909

ON 870825 AT 0600 HOURS, 711 P1 WAS TAKEN OUT OF SERVICE DUE TO HEAVY SHAFT LEAKAGE. THE PUMP WAS BACK IN SERVICE ON 870825 AT 1715 HOURS. DOWNTIME 11 HOURS 15 MINUTES. REPAIR CRITERION ACCORDING TO TECH SPEC CHAP 3.8C: 30 DAYS.
THE SURFACE OF THE STATIONARY CARBON SEAL WAS DULL, WHICH COULD BE DUE TO EXCESSIVELY HIGH PRESSURE IN THE SEAL OR POOR OR NON-EXISTENT LUBRICATION OF THE SEAL. HOWEVER, NO ABNORMAL OPERATING PARAMETERS HAVE BEEN NOTED IN CONNECTION WITH PUMP OPERATION.
SHAFT SEAL REPLACED AND PUMP TEST-RUN WITH SATISFACTORY RESULTS. THE SEAL IS OF THE SPECMA DURAMETALLIC TYPE AND WAS LAST REPLACED IN 1986. ITS NORMAL LIFE IS 4 YEARS. THE POSSIBILITY OF SWITCHING TO ANOTHER SEAL OF THE CHESTERTON TYPE IS BEING INVESTIGATED.

F1-RO-018/87 - SYSTEM 172 COOLING WATER OUTLET

RECORDER FOR LEVEL IN SURGE SHAFT SHOWED UNSTABLE VALUE, ALARM OBTAINED FOR SENSOR FAULT

DATE:870909 / EL.POWER 885 MWE / CATEGORY: 3

TYPE: 106 201 302 409 504 611 702 812 909

LEVEL MONITORING IN SURGE SHAFT UNSTABLE. SCATTERED MEASUREMENT VALUES FOUND ON RECORDER CHART. REPAIR CRITERION AS PER TECH SPEC 3.8E.
TRANSDUCER BROKEN. ELECTRONIC FAULT.
LEVEL SENSOR REPLACED. MOISTURE PROTECTION IMPROVED. TRANSDUCER REPLACED. INVESTIGATION COMMENCED TO DETERMINE THE FAULT IN THE TRANSDUCER, IF POSSIBLE. TOTAL TIME DURING WHICH MONITORING WAS OUT OF SERVICE AND MANUAL SURVEILLANCE APPLIED: ABOUT 1 HOUR.

F1-RO-019/87 - SYSTEM 747 VENTILATION SYSTEM FOR ELECTRICAL BUILDING

DURING PERIODIC TESTING OF 747 V107, THE DAMPER DID NOT OPEN AS EXPECTED

DATE:870917 / EL.POWER 720 MWE / CATEGORY: 3

TYPE: 106 203 304 409 503 607 702 812 909

ON 1987-09-17 AT 1530 HOURS, PERIODIC TESTING WAS CARRIED OUT ON 747

V107, WHEREBY IT WAS FOUND THAT THE DAMPER DID NOT OPEN AS EXPECTED.
THE REPAIR CRITERION ACCORDING TO TECH SPEC 3.9B IS 30 DAYS.
THE DAMPER MOTOR HAS BURNT OUT.
THE DAMPER WAS OPENED MANUALLY AND SYSTEM 747 WAS DECLARED OPERABLE.
DOWNTIME 10 MINUTES. ALL DAMPER MOTORS OF THE SAME TYPE ON TECH SPEC-RELATED OBJECTS WILL BE EXAMINED AND REPLACED WITH LARGER ONES.

F1-RO-020/87 - SYSTEM 747 VENTILATION SYSTEM FOR ELECTRICAL BUILDING

FILTER FAILED TO PASS TEST

DATE:871019 / EL.POWER 687 MWE / CATEGORY: 3

TYPE: 106 203 303 409 502 611 701 801 909

IN CONNECTION WITH DOP TEST PRIOR TO TESTING OF COLLECTIONEFFICIENCY FOR IODINE, IT WAS DISCOVERED THAT 747C105 FELL SHORT OF THE PARTICLE SEPARATION EFFICIENCY SPECIFIED BY THE NATIONAL INSTITUTE OF RADIATION PROTECTION: 99.97%. THE PARTICLE SEPARATION EFFICIENCY MEASURED WAS 99.96%.
ONE FILTER CARTRIDGE PROBABLY SLIPPED THROUGH THE SUPPLIER'S PRE-DELIVERY INSPECTION. THERE WAS NO RECEIVING INSPECTION AT DELIVERY. THE METHOD OF MEASUREMENT FOR IN-SITU TESTING HAS BEEN IMPROVED, AND THIS IS PROBABLY THE REASON FOR THE DISCOVERY. NOTE: C105 WAS REPLACED ON 86-10-20 DUE TO A LOW COLLECTION EFFICIENCY FOR IODINE. THE DOP TEST WAS CARRIED OUT WITH APPROVED RESULTS, BUT USING ANOTHER METHOD OF MEASUREMENT.
747C105 WAS REPLACED AND RETESTED AND MET THE PRESRIBED MINIMUM EFFICIENCY OF 99.97%.

F1-RO-021/87 - SYSTEM 749 RADIOACTIV FILTER SYSTEM FOR OFF GASES

FILTERS FAILED TO PASS TEST

DATE:871023 / EL.POWER 689 MWE / CATEGORY: 3

TYPE: 106 203 303 409 502 611 701 812 909

PERIODIC TESTING REVEALED THAT 749 C4 AND C8 HAD A LOW IODINE COLLECTION EFFICIENCY. THE COLLECTION EFFICIENCY WAS 98.0% AND 98.3%, RESPECTIVELY.
THE CAUSE IS AGING. FILTER C4 WAS LAST CHANGED IN 1981 AND C8 IN 1984. C8 WAS IN USE FOR ABOUT 460 HOURS DURING AN OUTAGE FOR CONTAINMENT VENTILATION.
THE FILTER CARTRIDGES FOR EACH FILTER WERE REPLACED AND TESTED WITH SATISFACTORY RESULTS. COLLECTION EFFICIENCY AFTER REPLACEMENT > 99.9% FOR BOTH FILTERS. TOTAL DOWNTIME ABOUT 12 HOURS.

F1-RO-022/87 - SYSTEM 762 WATER FOR FIRE PROTECTION

AT START AND DURING PERFORMANCE TEST AS PER DI 1 761-18, 762 P1/M 1 DID NOT RECEIVE A START SIGNAL ON DRAINAGE OF PRESSURE SWITCH 762 K107

DATE:871115 / EL.POWER 1009 MW / CATEGORY: 3

TYPE: 106 203 304 409 502 607 706 812 909

DURING PERIODIC TESTING, START AND PERFORMANCE TEST AS PER DI 1 762-18, 762 P1/M1 DID NOT RECEIVE A START SIGNAL ON DRAINAGE OF PRESSURE SWITCH 762 K107. THE PUMP COULD BE STARTED MANUALLY, HOWEVER. TECH SPEC 3.15C.
IT HAS NOT BEEN POSSIBLE TO ESTABLISH THE CAUSE OF THE FAULT. FAULT TRACING OF MONITORING CHAIN DID NOT REVEAL ANYTHING ABNORMAL. ON RENEWED TESTING IN CONNECTION WITH FAULT TRACING, 762 P1/M1 STARTED AS INTENDED. TWO DAYS LATER ON NOVEMBER 17, A NEW START AND PERFORMANCE TEST WAS CARRIED OUT BY THE SAME PERSONNEL WITH SATISFACTORY RESULTS. TRANSMITTERS, LIMIT SWITCHES, RELAYS, TIME-DELAY RELAYS AND CABLE INCLUDED IN THE AUTOMATIC CONTROLS BETWEEN THE ELECTRIC BUILDING AND THE SERVICE BUILDING WERE CHECKED AND FOUND TO BE SATISFACTORY. RENEWED TEST START WAS CARRIED OUT ON NOVEMBER 24 WITH SATISFACTORY RESULTS.

F1-RO-023/87 - SYSTEM 346 LIQUID WASTE DISCHARGING SYSTEM

LEGAL SAMPLE NOT TAKEN DUE TO MALFUNCTION OF FLOW MONITORS

DATE:871130 / EL.POWER 934 MWE / CATEGORY: 3

TYPE: 106 202 304 409 503 611 701 812 901

OK 1. RELEASE TANK REMIXED BY MEANS OF CIRCULATION PUMPING. OK 2. PRELIMINARY SAMPLE TAKEN, MEASURED AND TANK APPROVED FOR RELEASE. OK 3. VALVES FOR RELEASE OPENED. OK 4. ACTIVITY MONITORING READING TAKEN, RECORDED AND APPROVED. OK 5. SAMPLING EQUIPMENT FOR LEGAL SAMPLE STARTED AUTOMATICALLY. OK 6. NO ALARM ISSUED DURING RELEASE (SHOULD HAVE BEEN ISSUED). FAULT 7. AFTER PUMPING-OUT WAS FINISHED, NO LEGAL SAMPLE HAD BEEN COLLECTED. 871109: 220 M3 OF WATER PUMPED OUT WITHOUT LEGAL SAMPLING. 871127: " 871130: "
BASIC CAUSE OF FAULT: CLOGGING OF SAMPLING LINES. 1. CONTRIBUTING FAULT: ELECTRICAL COMPONENT FAULT ON CIRCUIT BOARD THAT PROCESSES SIGNAL FROM 346 K312/K311. 2. FLOAT IN ROTAMETER WITH FLOW MONITOR 346K311 GOT STUCK IN UPPER POSITION. 3.
MEASURES REFER TO ABOVE NUMBERS: 1. CLEANING ALREADY CARRIED OUT, REDESIGN TO PREVENT CLOGGING STARTED. 2. CIRCUIT BOARD REPLACED. 3. CHANGE TO ANOTHER TYPE OF FLOW MONITOR IS PLANNED.

F1-RO-024/87 - SYSTEM 314 PRESSURE RELIEF SYSTEM

DURING PERIODIC TEST AS PER DI 1 314-3, V188, WHICH IS THE PILOT VALVE FOR 314V13, FAILED TO OPEN

DATE:871210 / EL.POWER 1011 MW / CATEGORY: 3

TYPE: 106 203 304 407 502 604 706 812 909

DURING PERIODIC TEST OF 314 SAFETY VALVES V6-V15 AS PER DI 1 341-3, ELECTRIC PILOT VALVE V188 FAILED TO OPEN ON ACTUATION, AS A RESULT OF WHICH MAIN VALVE V13 REMAINED IN THE CLOSED POSITION. REACTOR POWER

WAS REDUCED FROM 108 TO 100% IN ACCORDANCE WITH TECH SPEC CHAP. 3.5 F. CAUSED BY JAMMING OF ELECTRIC PILOT VALVE.
VOLTAGE/SIGNAL TEST FOR 314 V188 CARRIED OUT WITH SATISFACTORY RESULTS. RESISTANCE MEASUREMENT OF COIL IN PILOT VALVE CARRIED OUT WITH RESULT 68 OHMS. ACCEPTANCE CRITERION IS 60-80 OHMS FOR HOT COIL. AFTER HAVING VERIFIED THAT THERE WERE NO MALFUNCTIONS IN THE VOLTAGE/SIGNAL PATHWAYS AND THE SOLENOID COIL, A NEW TEST WAS CARRIED OUT WITH HIGHER CONTROL VOLTAGE. THE VOLTAGE WAS INCREASED FROM THE NORMAL VOLTAGE OF 197 V TO 230 V BY MEANS OF A PORTABLE ROTARY TRANSFORMER, TEST DEVICE 1775, WHEREBY THE VALVE OPENED SATISFACTORILY. TWO ADDITIONAL TESTS CARRIED OUT WITH NORMAL VOLTAGE WITH SATISFACTORY RESULTS. TOTAL OPENING TIME INCLUDING MAIN VALVE WAS, HOWEVER, LONGER (0.48 S) THAN FOR OTHER VALVES. THE VALVE WAS RETESTED ON 871215 AND 871229 WITH SATISFACTORY RESULTS. AN ADDITIONAL TEST WILL BE CARRIED OUT ON 880126 INACCORDANCE WITH A DECISION OF THE LOCAL SAFETY COMMITTEE. FURTHERMORE, ALL PILOT VALVES WILL BE EXERCISED EVERY OTHER MONTH UNTIL FURTHER NOTICE WITH CLOSED FORCED CLOSURE VALVE IN ORDER TO REDUCE THERMAL TRANSIENTS FOR THE SYSTEM. THE VALVES WILL BE INSPECTED DURING THE NEXT REFUELLING OUTAGE TO ESTABLISH THE CAUSE OF THE JAMMING, IF POSSIBLE.

F1-RO-025/87 - SYSTEM 747 VENTILATION SYSTEM FOR ELECTRICAL BUILDING

INCORRECT AUTO FUNCTIONS ON TRIPPED CONDITION X2

DATE:871216 / EL.POWER 1011 MW / CATEGORY: 3

TYPE: 106 201 304 409 502 605 704 812 904

DURING LIFT OF RADIOACTIVE MATERIAL IN CONNECTION WITH DECONTAMINATION IN THE REACTOR SERVICE ROOM, CONDITION X2 TRIPPED (HIGH ACTIVITY IN REACTOR SERVICE ROOM). THE VENTILATION SYSTEM IN THE REACTOR BUILDING (742) AND THE CONTROL ROOM (747) WAS AUTOMATICALLY SWITCHED OVER TO STANDBY VENTILATION, WHEREBY CORRECT AUTOMATIC FUNCTION WAS NOT OBTAINED IN SYSTEM 747. THE FOLLOWING MALFUNCTIONS WERE NOTED: 747E 105 AND Q105 FAILED TO START, V154 REMAINED OPEN AND V109 STOPPED IN THE INTERMEDIATE POSITION. TECH SPEC 3.9B
THE REASON DAMPER V109 STOPPED IN THE INTERMEDIATE POSITION WAS A MALADJUSTED LIMIT POSITION. THE CAUSE OF THE FAULT IN THE AUTO FUNCTION HAS NOT BEEN DETERMINED.
THE CONTROL ROOM VENTILATION WAS MANUALLY PUT IN THE ISOLATION/STANDBY VENTILATION MODE WHEN THE FAULT WAS DISCOVERED. LIMIT POSITION FOR V109 ADJUSTED AND DAMPER TESTED WITH SATISFACTORY RESULTS. LOGIC FUNCTION FOR CONCERNED ITEMS CHECKED AND FOUND SATISFACTORY. TEST CARRIED OUT BY TRIPPING OF CONDITION X2, WHEREBY ALL FUNCTIONS PERFORMED SATISFACTORILY. DOWNTIME X2 FUNCTION: DECEMBER 16, 1510 HOURS TO DECEMBER 17, 1110 HOURS. RETEST WITH TRIPPING OF X2 CONDITION CARRIED OUT ON 880118. ALL FUNCTIONS OBTAINED CORRECTLY, BUT THE LIMIT POSITION FOR CLOSE INDICATION HAD TO BE ADJUSTED FOR V109.

F2-RO-011/87 - SYSTEM 655 STANDBY BATTERY SYSTEM, INVERTERS AND BATTERIES

INVERTER OR 23 TRIPPED DUE TO HIGH SPEED

DATE:870710 / EL.POWER 290 MWE / CATEGORY: 3

TYPE: 106 201 304 407 502 611 701 802 905

INVERTER OR 23 TRIPPED ON EXTREMELY HIGH SPEED. AT 230 WAS CONNECTED AUTOMATICALLY 1.27 SECONDS AFTER INTERRUPTION ON AHC 23. THE PROCESS WAS AFFECTED BY THE FACT THAT TWO HC PUMPS TRIPPED, CAUSING A SMALL POWER REDUCTION. REPAIR CRITERION ACCORDING TO TECH SPEC 3.10 A5: 30 DAYS.
EXCITER BEARING FAILED. WHEN THIS BEARING CEASED, THE CENTRE TUBE WITH CABLING BEGAN TO ROTATE, WHEREBY THE CABLES FOR INVERTER CONTROL WERE TORN OFF.
GENERATOR PART FOR INVERTER OR 23 REPLACED. OR 23 TESTED WITH SATISFACTORY RESULTS ON 870715 AT 1330 HOURS. DOWNTIME: 4.5 DAYS. THE FAILED GENERATOR WAS SENT TO ASEA SERVICE IN LINKPING FOR REPAIR. SINCE IT WAS FOUND THAT THE LIFE OF THIS TYPE OF BEARING IS LIMITED (2 BEARING, PACKED WITH GREASE DURING MANUFACTURE), A MAINTENANCE PROGRAM WILL BE INTRODUCED WITH REPLACEMENT OF THE BEARING EVERY FOURTH YEAR IN CONNECTION WITH REVIEW AND OVERHAUL OF INVERTERS.

F2-RO-012/87 - SYSTEM 762 WATER FOR FIRE PROTECTION

CLOGGING OF SPRINKLERS IN SPRINKLER SYSTEM

DATE:870819 / EL.POWER 750 MWE / CATEGORY: 3

TYPE: 106 207 312 409 502 611 705 801 905

DURING SCHEDULED CLEANING OF CENTRAL SPRINKLER STATION 4'S SPRINKLERS, FOREIGN MATTER WAS DISCOVERED IN 40-50% OF THE STATION'S 114 SPRINKLERS. FIVE OF THESE WERE COMPLETELY CLOGGED, THE OTHERS ONLY PARTIALLY (EACH SPRINKLER HAS THREE HOLES).
CLOGGING CAUSED BY CORROSION PRODUCTS.
FLUSHING-OUT OF THE PIPING SYSTEM AND CLEANING OF ALL SPRINKLERS, FOLLOWED BY BLOWING/DRYING WITH COMPRESSED AIR. CONTINUED INSPECTION OF SPRINKLER EQUIPMENT. MANUAL PROVISIONAL ALTERNATIVE ARRANGEMENT TO SPRINKLING SHALL BE ARRANGED IN CONNECTION WITH SUCH INSPECTION IN ACCORDANCE WITH THE TECH SPEC (FIRE HOSE AND FIRE-FIGHTING PERSONNEL). THE RESULTS OF THESE INSPECTIONS ARE TO BE REPORTED IN A FINAL RO.

F2-RO-013/87 - SYSTEM 663 TRIP CIRCUIT SUPPLY, CHARGING EQUIPMENT AND BATTERIES

RECTIFIER LR232 TRIPPED DUE TO BURNT CONTACTOR COIL

DATE:870902 / EL.POWER 976 MWE / CATEGORY: 3

TYPE: 106 201 301 409 503 609 701 803 909

ON 870902 AT 1143 HOURS, ALARM "ABNORMAL VOLTAGE" WAS OBTAINED ON

BUSBAR LHC232 (110V). THE CAUSE OF THE ABNORMAL VOLTAGE WAS THAT RECTIFIER LR232 TRIPPED DUE TO A BURNT CONTACTOR COIL, WHEREBY THE BUSBAR WAS ONLY BEING SUPPLIED VIA BATTERIES. REPAIR CRITERION AS PER TECH SPEC CHAP 3.10.16: 4 HOURS.
THE CAUSE WAS A BURNT COIL IN CONTACTOR TYPE EG20L FOR SUPPLY VOLTAGE TO THE CONTROL UNIT. PREVIOUSLY ELEVATED SUPPLY VOLTAGE (27V) REDUCED IN CONNECTION WITH PLANT CHANGE.
CONTACTOR REPLACED. FAULT-REPORTED CONTACT TYPE EG20L WILL GRADUALLY BE REPLACED DURING "SCHEDULED INTERVENTION" BY A NEW CONTACTOR TYPE EH20 DUE TO PREVIOUSLY OBSERVED AGING PROBLEMS. RECTIFIER ONCE AGAIN OPERABLE ON 870902, 1245 HOURS. DOWNTIME ABOUT 1 HOUR.

F2-RO-014/87 - SYSTEM 661 HEAVY DUTY SYSTEM, CHARGING EQUIPMENT AND BATTERIES

RECTIFIER LR231 DID NOT CHARGE NORMALLY (440 V)

DATE:870909 / EL.POWER 970 MWE / CATEGORY: 3

TYPE: 106 201 301 409 502 609 701 812 909

ALARM FOR ABNORMAL VOLTAGE WAS OBTAINED ON BUSBAR LHC231. THE OUTPUT FROM RECTIFIER LR231 DROPPED AND THE RECTIFIER CHARGED POORLY. THE RECTIFIER WAS SHUT DOWN FOR TROUBLESHOOTING, AT WHICH TIME THE BUSBAR WAS ONLY ENERGIZED VIA BATTERY V231. REPAIR CRITERION AS PER TECH SPEC CHAP 3.10.A5: 30 DAYS.
MALFUNCTIONING CONTACT IN A MINIMUM VOLTAGE RELAY TYPE RXOTB23.
THE MINIMUM VOLTAGE RELAY, WHICH IS INCORPORATED IN THE RECTIFIER'S LOW LINE VOLTAGE MONITOR, WAS REPLACED.LR231 WAS RESTARTED ON 87-09-09 AT 1240 HOURS WITH SATISFACTORY RESULTS. TOTAL DOWNTIME 20 MINUTES. SUBSEQUENT TROUBLESHOOTING OF THE REPLACED RELAY REVEALED THAT A CONTACT IN THE MINIMUM VOLTAGE RELAY HAD OPENED, CAUSING THE OUTPUT OF THE RECTIFIER TO DROP. REPEATED SIMULATION ATTEMPTS IN A TEST RIG TO INDUCE THE CONTACTOR FAULT HAVE FAILED.

F2-RO-015/87 - SYSTEM 351 BORON INJECTION SYSTEM (BWR)

351P2 START-BLOCKED FOR TROUBLESHOOTING OF DRAIN VALVE

DATE:870910 / EL.POWER 980 MWE / CATEGORY: 3

TYPE: 106 207 309 409 502 606 706 812 909

IN CONNECTION WITH ROUTINE FOLLOW UP OF REACTOR WATER CHEMISTRY, A SLOW GROWTH OF ACID CONDUCTIVITY HAS BEEN NOTED SINCE THE END OF JULY. CONCRETE ANALYSIS OF THE BORON CONCENTRATION IN THE REACTOR WATER AT THE BEGINNING OF SEPTEMBER REVEALED ABOUT 8 PPM OF BORON. IN CONNECTION WITH PERIODIC TESTING OF 351P2, DRAIN VALVE 351 V215 DID NOT SEAL, ALLOWING BORON SOLUTION TO BE TRANSPORTED TO WASTE VIA A SYSTEM 352. THE BORON-CONTAINING WATER WAS THEN RETURNED TO THE PROCESS. ON 87-09-10, 351P2 WAS START-BLOCKED FOR TROUBLESHOOTING OF DRAIN VALVE 351 V215. REPAIR CRITERION ACCORDING TO TECH SPEC CHAP 3.3E: 30 DAYS.
LEAKAGE OF BORON SOLUTION THROUGH VALVE 351 V215.

CONTINUED DILUTION FEED FROM THE LIQUID WASTE PROCESSING SYSTEM 342 TO THE PROCESS WAS INTERRUPTED. REPLACED WITH DILUTION FEED FROM SYSTEM 733. BACK-FLUSHING AND RECOATING OF FILTERS IN SYSTEMS 331 AND 342. INTENSIFIED FOLLOW-UP OF THE PURIFICATION PROCESS WAS INITIATED. VALVE 351 V215 WAS DISMANTLED FOR INSPECTION OF SEAT AND DISC AS WELL AS POSITION INDICATION. NO DAMAGES FOUND. SYSTEM 351 ONCE AGAIN OPERABLE ON 87-09-10 AT 1330 HOURS. TOTAL DOWNTIME ABOUT 4 HOURS. THE OPERATING CASE FOR PERIODIC TESTING OF THE BORON PUMPS HAS BEEN REVISED SO THAT THE ABOVE CONSEQUENCE CANNOT BE REPEATED IN THE EVENT OF A MALFUNCTIONING VALVE.

F2-RO-016/87 - SYSTEM 546 OTHER AREA MONITORING

MALFUNCTIONING GAS ANALYZER

DATE:870924 / EL.POWER 910 MWE / CATEGORY: 3

TYPE: 106 201 301 409 503 611 701 812 909

DUE TO A MALFUNCTIONING THERMOSTAT IN THE MEASURING GAS COOLER, THE TEMPERATURE FELL TO -16OC. AS A RESULT, THE MOISTURE IN THE MEASURING GAS FROZE, FORMING ICE IN THE COOLER. THIS IN TURN REDUCED THE FLOW THROUGH THE GAS ANALYZERS, RESULTING IN A LOW-FLOW ALARM. REPAIR CRITERION ACCORDING TO TECH SPEC 3.7C: MANUAL SAMPLING AND ANALYSIS ONCE/DAY.
THE MEASURING GAS COOLER FROZE, THE THERMOSTAT FAILED.
ANALYSIS OF OXYGEN AND HYDROGEN CONCENTRATIONS IN THE CONTAINMENT HAD BEEN PERFORMED ON 87-09-23 WITH SATISFACTORY RESULTS. COOLER REPLACED, LEAKAGE TEST AND CALIBRATION CARRIED OUT WITH SATISFACTORY RESULTS. SUBSEQUENT READ-OFF AND ANALYSIS GAVE THE FOLLOWING VALUES: K801 (O2) K802 (H2) ANALYSIS RESULTS 0.25 0.30 READINGS 0.24 0.30 OPERABLE ON 87-09-24, 1500 HOURS. TOTAL DOWNTIME FOR GAS ANALYZER 546K801: 9 HOURS.

F2-RO-017/87 - SYSTEM 354 HYDRAULIC SYSTEM FOR CONTROL ROD DRIVES (BWR)

SHUTDOWN OF 354 SCRAM GROUP NO. 7 FOR CORRECTIVE ACTION ON LEAKING VALVE (V307)

DATE:870930 / EL.POWER 979 MWE / CATEGORY: 3

TYPE: 106 202 309 409 502 605 703 812 909

WHEN THE FAULT WAS DISCOVERED ON 1987-07-20, THE LEAKAGEFROM THE VALVE WAS JUDGED TO BE SO SMALL THAT NO IMMEDIATE CORRECTIVE ACTION WAS DEEMED NECESSARY. THE LEAKAGE HAS SINCE INCREASED PROGRESSIVELY, AND SINCE THERE WAS A RISK OF DEGRADATION OF THE FUNCTION OF SCRAM GROUP 7, IT WAS DECIDED TO TAKE CORRECTIVE ACTION ON THE LEAKING VALVE ON 1987-09-30. SCRAM GROUP NO. 7 WAS SHUT DOWN FOR CORRECTIVE ACTION OF 354 V307 AT 0435 HOURS ON 1987-09-30. THE CORRECTIVE ACTION WAS TAKEN AND THE VALVE TESTED WITH SATISFACTORY RESULTS, AND THE SCRAM GROUP WAS ONCE AGAIN OPERABLE AT 1340 HOURS ON 1987-09-30. REPAIR CRITERION ACCORDING TO TECH SPEC 3.3.B.

WHEN THE VALVE WAS DISMANTLED, THE VALVE SEAT WAS FOUND TO BE DAMAGED, CAUSING INTERNAL LEAKAGE. THIS INTERNAL LEAKAGE HAS PUT PRESSURE ON THE VALVE BODY ABOVE THE VALVE DISC, WHEREBY THE GLAND SEAL WAS SUBJECTED TO ABNORMAL STRESS AND THEREFORE FAILED.
VALVE SEAT GROUND. VALVE DISC REPLACED AND NEW GLAND SEAL INSTALLED.
TOTAL DOWNTIME FOR 354 SCRAM GROUP NO. 7: 9 H 5 MIN.

F2-RO-018/87 - SYSTEM 664 TRIP CIRCUIT SUPPLY,DISTRIBUTION SYSTEM

EARTH FAULT ON DC BUSBAR LHC232 (110 V)

DATE:871012 / EL.POWER 730 MWE / CATEGORY: 3

TYPE: 106 201 301 409 504 609 705 809 909

DURING LOADING TEST OF DG230, ALARM WAS OBTAINED FOR EARTH FAULT ON DC BUSBAR LHC232. THE FAULT WAS TRACED TO OVERSPEED SENSOR 652K983. LHC232 WAS THEREBY INOPERABLE. REPAIR CRITERION AS PER TECH SPEC CHAP 3.10A6: 7 DAYS.
OXIDIZED CONTACTS IN CONNECTOR TO 652K983 CAUSED EARTH FAULT IN SUPPLY MINIATURE CIRCUIT BREAKER KKB301.04. DRIP LEAK FROM CYLINDER 16, DG230, CAUSED OXIDATION IN THE CONNECTOR. THE FAULT WAS REMEDIED. THE EARTH FAULT WAS ISOLATED FROM LHC232 BY SEPARATE FEED TO MINIATURE CIRCUIT BREAKER KKB301.04, WHEREBY THE BUSBAR WAS ONCE AGAIN REGARDED AS OPERABLE AFTER 20 MINUTES. SINCE NO CONTINUOUS POWER SUPPLY TO THE EARTH FAULT TREATMENT DEVICE WAS AVAILABLE IN THE DIESEL SWITCHGEAR, THE SUPPLIED EQUIPMENT (TESTING EQUIPMENT FOR DIESEL) WAS REGARDED AS INOPERABLE. THE CONTACT SURFACES IN THE CONNECTOR TO 652K983 WERE CLEANED AND THE JUNCTION BOX WAS BLOWN OUT WITH COMPRESSED AIR. RENEWED INSULATION MEASUREMENT WAS CARRIED OUT WITH SATISFACTORY RESULTS. THE EARTH FAULT WAS THEREBY ELIMINATED AND REGULAR SUPPLY WAS RESTORED AT 2230 HOURS. TOTAL DOWNTIME 3 H 15 MIN.
OVERHAUL OF THE CONNECTORS WILL BE CARRIED OUT DURING THE AUTUMN CAMPAIGN OF "SCHEDULED INTERVENTION".

F2-RO-019/87 - SYSTEM 749 RADIOACTIV FILTER SYSTEM FOR OFF GASES

POOR COLLECTION EFFICIENCY FOR FILTERS C8 AND C9 IN CONNECTION WITH ANNUAL TEST

DATE:871014 / EL.POWER 482 MWE / CATEGORY: 3

TYPE: 106 209 312 409 502 611 702 812 909

IN CONNECTION WITH THE ANNUAL TEST OF FILTERS 749 C4-C9, FILTERS C8 AND C9 FAILED THE TEST. THE ANALYSIS RESULTS SHOWED THAT THE COLLECTION EFFICIENCY FOR METHYL IODIDE FOR FILTER C8 WAS 92.8% AND FOR FILTER C9 96.3%. REQUIREMENT ACCORDING TO TECH SPEC > 99%. FOR OTHER FILTERS, C4-C7, A COLLECTION EFFICIENCY > 99.7% WAS MEASURED. REPAIR CRITERION ACCORDING TO TECH SPEC CHAP 3.9A: 30 DAYS.
POOR COLLECTION EFFICIENCY.
THE FILTER BANKS C8 AND C9 WERE REPLACED, AFTER WHICH RENEWED TESTING OF THE COLLECTION EFFICIENCY FOR METHYL IODIDE AND DOP AEROSOL WAS CARRIED OUT. THE TEST RESULTS AFTER FILTER REPLACEMENT WERE:

COLLECTION EFFICIENCY FOR FILTER C8 99.9%, FILTER C9 99.7%. SYSTEM ONCE AGAIN OPERABLE ON 87-10-14 AT 1930 HOURS. TOTAL DOWNTIME: 16 H 30 MIN. A CHARCOAL FILTER CARTRIDGE FROM FILTER C9 WILL BE SENT TO STUDSVIK FOR LABORATORY TESTING. FILTERS C8 AND C9 ARE CONNECTED DURING ATMOSPHERE CHANGE AND VENTILATION OF THE REACTOR CONTAINMENT DURING THE ANNUAL REFUELLING OUTAGE. THE CONNECTION TIME DURING THE 1987 ANNUAL OUTAGE WAS ABOUT 500 HOURS. FILTER C9 HAS NOT BEEN REPLACED SINCE 1981 IN CONNECTION WITH TRIAL OPERATION AND FILTER C8 WAS REPLACED IN 1984 DUE TO A POOR COLLECTION EFFICIENCY (93.7%). IN THE 1986 ANNUAL TEST (AFTER AN EQUIVALENT PERIOD OF OPERATION), THE C8 HAD A COLLECTION EFFICIENCY OF 99.9% AND C9 99.9%, WELL ABOVE THE MINIMUM VALUE.

F2-RO-020/87 - SYSTEM 314 PRESSURE RELIEF SYSTEM

CONTROL VALVE 314V22 INOPERABLE DURING TROUBLESHOOTING AFTER TEST

DATE:871019 / EL.POWER 703 MWE / CATEGORY: 3

TYPE: 106 203 312 409 502 605 704 805 909

IN CONNECTION WITH PERIODIC TESTING ON 871019, CONTROL VALVE 314V22 WAS OPERATED IN THE "MANUAL" MODE. OPEN COMMAND DID NOT PRODUCE OPEN INDICATION, SO THE VALVE WENT AGAINST ITS MECHANICAL STOP AND TRIPPED ON TORQUE. THE VALVE IS NORMALLY OPEN AND CONNECTED TO THE "AUTO" MODE. IN THIS MODE, THE MAIN GOVERNOR ISSUES A MAXIMUM ACTIVATION SIGNAL, WHEREBY THE TORQUE LIMITOR CANNOT BE ACTIVATED. THIS MEANS THAT THE VALVE WOULD NOT HAVE TRIPPED ON HIGH POWER ON CHANGEOVER TO CONSTANT PRESSURE.
THE SIGNAL CURRENT FROM THE VALVE POSITION TRANSMITTER TO THE SULZER CUBICLE WAS TOO LOW TO GIVE OPEN INDICATION AND STOP SIGNAL. AS A RESULT, THE VALVE WENT AGAINST ITS MECHANICAL STOP WHEN OPERATED MANUALLY AND TRIPPED ON POWER. THE LOW SIGNAL CURRENT MAY BE DUE TO THE FACT THAT THE POSITION TRANSMITTER ON THE ACTUATOR HAS BEEN AFFECTED BY HEAT GENERATION DURING PERIODIC TESTING. THE VALVE POSITION TRANSMITTER IS MOUNTED IN RUBBER MOUNTS.
THE TOLERANCES FOR CLOSE AND OPEN INDICATION HAVE BEEN CHANGED SO THAT THE INDICATED POSITION IS OBTAINED EARLIER, PROVIDING A LARGER MARGIN TO THE TORQUE LIMIT. THE VALVE WAS TESTED WITH SATISFACTORY RESULTS ON OCTOBER 20, 1800 HOURS. DOWNTIME: 32 HOURS.

F2-RO-021/87 - SYSTEM 314 PRESSURE RELIEF SYSTEM

DURING PERIODIC TESTING OF SAFETY AND PRESSURE RELIEF VALVES IN SYSTEM 314, 314 V 184 FAILED TO OPEN

DATE:871022 / EL.POWER 720 MWE / CATEGORY: 3

TYPE: 106 203 304 409 502 605 707 812 909

DURING PERIODIC TESTING AS PER TECH SPEC OF 314 VALVES ON OCTOBER 22, 1987, 314 V 184 FAILED TO OPEN ON THE FIRST ATTEMPT. ON RETESTING, THE PILOT VALVE DID OPEN, HOWEVER, WITH AN ABNORMALLY LONG OPENING TIME (1.141 S). THE TEST WAS REPEATED AFTER ABOUT AN HOUR, WHEREBY A

SIMILAR SEQUENCE OF EVENTS WAS OBTAINED, BUT WITH HALF THE OPENING TIME (0.513S). OUTAGE LIMITS WITH INOPERABLE VALVE ACCORDING TO TECH SPEC CHAP 3.5F: MAX. REACTOR POWER 100%.
CAUSED BY INCREASED "INERTIAL FRICTION" IN INTERNAL PARTS.
THE PREVAILING POWER LEVEL (80%) DID NOT WARRANT ANY POWER REDUCTION. TESTING OF THE TESTING EQUIPMENT (TIME MEASUREMENT EQUIPMENT) WAS CARRIED OUT WITH SATISFACTORY RESULTS. COMPLETE TESTING/MEASUREMENT OF VOLTAGE AND CURRENT WAS THEN CARRIED OUT DURING A RETEST (0.302 S), WHICH INDICATED THAT THE VALVE RESUMED NORMAL POWER. VALVE 314 V184 WAS THEREBY REGARDED AS OPERABLE. A TEST WITH REDUCED FEED VOLTAGE TO THE COIL WAS CARRIED OUT ON OCTOBER 23, 1987, WHEREBY VALVE 314 V184 AT 101.6V AND 1.36A (0.625 S). THE REQUIREMENT ACCORDING TO PF REPORT 131/86 IS 1.52A, SO THE TEST RESULT WAS APPROVED WITH GOOD MARGIN. THE PRELIMINARY RO REPORT WAS DEALT WITH BY THE LOCAL SAFETY COMMITTEE AT MEETING NO. 307 WHERE FORSMARK 2 WAS ORDERED TO CARRY OUT TWO ADDITIONAL TESTS AT A 14-DAY INTERVAL AND THEN ONE TEST AT A ONE-MONTH INTERVAL BEFORE RETURNING TO THE REGULAR TESTING INTERVAL. THE FIRST RETEST WAS CARRIED OUT ON NOVEMBER 6, 1987 AND RESULTED IN A VALVE OPENING TIME OF 0.500 S. THE SECOND RETEST WAS CARRIED OUT ON NOVEMBER 22, WHEREBY AN INTERMITTENT FAULT WAS FOUND IN A RELEASE RELAY FOR MANUAL TESTING. AUTOMATIC FUNCTION WAS NOT AFFECTED BY THE DEFECTIVE RELAY. AFTER THE RELAY WAS REPLACED, THE VALVE WAS TESTED ON NOVEMBER 23 WITH THE RESULT 0.284 S. A THIRD RETEST WAS CARRIED OUT ON DECEMBER 15 WITH THE RESULT 0.284 S. A HIGHER EXERCISING FREQUENCY, TAKING INTO ACCOUNT THERMAL TRANSIENTS, WILL BE RECOMMENDED TO THE LOCAL SAFETY COMMITTEE.

F2-RO-022/87 - SYSTEM 747 VENTILATION SYSTEM FOR ELECTRICAL BUILDING

VALVE 747V118 FAILED TO OPEN AT PERIODIC TEST

DATE:871201 / EL.POWER 1002 MW / CATEGORY: 3

TYPE: 106 201 312 409 502 605 701 812 909

IN CONNECTION WITH ANNUAL TEST OF 747, 747V118 OPENED AUTOMATICALLY. THE VALVE WAS CLOSED MANUALLY. WHEN AN ATTEMPT WAS MADE TO OPEN THE VALVE MANUALLY, THE DAMPER DID NOT WORK. REPAIR CRITERION: 30 DAYS ACCORDING TO TECH SPEC CHAP 3.9.B.
MECHANICAL STIFFNESS IN THE DAMPER'S LINK ARMS RESULTS IN HIGH CURRENT IN THE STATOR WINDING, AND THE WINDING BURNS OUT.
THE LINK ARMS WERE LUBRICATED. THE DAMPER MOTOR WAS REPLACED. A REPORT IS AVAILABLE ON THE ENTIRE SYSTEM 747 (CONTROL ROOM VENTILATION). THIS REPORT RECOMMENDS THAT 747V118 BE EQUIPPED WITH A PNEUMATIC SPRING-OPENING ACTUATOR. DAMPER TESTED AS PER DI 2747-5, 1900 HOURS. TOTAL DOWNTIME 4 HOURS. WHEN DAMPER 747V118 MALFUNCTIONS, THE FILTER FUNCTION IS NEVERTHELESS OPERABLE VIA THE PRESSURE EQUALIZATION LINE WITH CHECK VALVE 747V119. FLOW CAPACITY IS SLIGHTLY REDUCED IN THIS CASE.

F3-RO-008/87 - SYSTEM 651 DIESEL ENGINES

DG310 INOPERABLE DUE TO OMISSION OF DEBLOCKING AFTER TESTING

DATE:870716 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 102 203 304 409 501 611 707 812 901

DURING TEST OF THE REACTOR'S LEVEL REGULATORS ON 870716 AT 1500 HOURS, IT WAS DISCOVERED THAT DG310 FAILED TO START ON RC ACTIVATION. DG310 HAD REMAINED BLOCKED SINCE 870715 AT 1310 HOURS WHEN TECH SPEC ANNUAL TRIPPING TEST OF SUB A ELECTRICAL SYSTEM WAS CARRIED OUT. IN THE EVENT OF A LOSS OF OFF-SITE POWER, THE DIESEL WOULD HAVE BEEN START-BLOCKED. DOWNTIME 26 HOURS, BUT IN THE REFUELLING MODE ABOUT 12 HOURS.
COMPUTER SIGNAL 654 KA704 (START BLOCK) WAS NOT NOTICED. PRESENT-DAY LOCAL DEBLOCKING OF NON-LOCALLY STEADILY INDICATING START BLOCKING (IN THE UNIT COMPUTER) IN COMBINATION WITH CENTRAL ALARM ANNUNCIATION IN UNIT COMPUTER MISLEADS THE OPERATOR IN THE LOCAL CONTROL ROOM INTO BELIEVING THAT RESTORATION IS NOT REQUIRED.
DEBLOCKING ACKNOWLEDGED, FUNCTIONAL TEST OF DIESEL CARRIED OUT. TESTING ROUTINE COMPLEMENTED TO INCLUDE START TEST OF DIESEL SUPPLYING ELECTRICAL BUSBAR INVOLVED IN TESTING. PROPOSED MODIFICATION OF CENTRAL ANNUNCIATION, BLOCKING TO BE INVESTIGATED FOR MODIFICATION AT NEXT DIESEL SHUTDOWN.

F3-RO-009/87 - SYSTEM 211 REACTOR PRESSURE VESSEL

3 BARS CAME LOOSE ON PROTECTIVE CAGE OVER TEMPERATURE MONITORING PROBES INSIDE REACTOR VESSEL BOTTOM

DATE:870715 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 101 206 312 409 506 611 707 807 903

INSPECTION IN CRD I35 TO DETERMINE THE CAUSE OF IMPAIRED MOBILITY BETWEEN 98% AND 100% WITHDRAWAL REVEALED THAT A NARROW PIECE OF STEEL, ABOUT 170 MM LONG, WAS THE OBSTACLE. IN THE CONTINUED SEARCH FOR ITS ORIGIN, TWO MORE PIECES WERE FOUND. ONE OF THEM WAS IN CRD L45 AND THE OTHER WAS WEDGED IN BETWEEN THE VESSEL BODY AND THE TENSION PIPE FOR 313PA1. MATERIAL ANALYSIS REVEALED THAT THE "PINS" WERE INCONEL 600. INSPECTION OF THE PROTECTION CAGE ABOVE TEMPERATURE MONITORING PROBES 211KX560 REVEALED THAT THERE WERE THREE MISSING ON KC560. THE CAUSE OF THESE THREE "PINS" COMING LOOSE FROM THEIR CAGE IS UNDER ANALYSIS.
FUEL AND CONTROL RODS WILL BE REMOVED IN SECTIONS ABOVE THE TEMPERATURE MONITORING PROBES IN QUESTION. CONTROL ROD GUIDE TUBES WILL BE DISMANTLED FOR INSPECTION AND TOOL MANUFACTURE. PROTECTIVE CAGES WILL BE CUT AWAY WITHOUT BEING REPLACED WITH ANY NEW PROTECTION, SINCE THEY ARE ONLY HANDLING PROTECTION.

F3-RO-010/87 - SYSTEM 314 PELIEF SYSTEM

NO VENTILATION FLOW IN ONE GROUP

DATE:870724 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 101 206 304 409 504 605 705 812 909

IN CONNECTION WITH ANNUAL TESTING IN ACCORDANCE WITH TECH SPEC 4.5.1, IT WAS FOUND THAT NO FLOW WAS PASSING THROUGH A GROUP OF BLOWDOWN PIPES DOWNSTREAM OF 314 VA17. THERE MAY ALSO HAVE BEEN NO FLOW DURING THE PREVIOUS OPERATING SEASON 86/87. NO CONSEQUENCES CAN BE ATTRIBUTED TO THE LACK OF FLOW AT THE PRESENT TIME.
CAUSED BY FOULING OF 314 VA16.
CLEANING OF RESTRICTION. RENEWED CHECK OF FLOW.

F3-RO-011/87 - SYSTEM 311 STEAM LINES

YIELD STRENGTH OF BOLTS EXCEEDED

DATE:870731 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 101 207 307 409 504 605 701 805 904

DURING WORK WITH 311 VA4, IT WAS OBSERVED THAT THE PART OF A RETAINING BOLT BETWEEN THE HEAD AND THE THREAD WAS HEAVILY DEFORMED. SEVERAL OF THE 24 BOLTS SHOWED SIGNS THAT THE MATERIAL'S YIELD STRENGTH HAD BEEN EXCEEDED.
WRONG HYDRAULIC TOOL USED FOR PRELOADING OF THE BOLTS.
REPLACEMENT OF BOLTS, INSPECTION OF THREADS, INSTALLATION WITH CORRECT PRELOADING FORCES. INSPECTION OF 311 VB1, WHICH IS ALSO INCORRECTLY INSTALLED. SAME MEASURES AS FOR VA4. MORE EXACT SPECIFICATION OF INSTRUCTIONS FOR TIGHTENING OF BOLTED JOINT. DEVELOPMENT OF UNIQUE TOOL FOR TIGHTENING OF ABOVE JOINT.

F3-RO-012/87 - SYSTEM 477 TURBINE PLANT SAMPLING SYSTEM

INACCURATE CONDUCTIVITY MONITOR

DATE:870816 / EL.POWER 1073 MW / CATEGORY: 3

TYPE: 106 201 305 409 504 611 704 812 905

MEASURING POINT FOUND TO INDICATE 0.00 MICROSIEVERTS/M. INSTRUMENT CALIBRATED. I/U TRANSDUCER WAS INCORRECTLY ADJUSTED, RESULTING IN ABOUT 10% ERROR, DESPITE CORRECT OUTPUT SIGNAL FROM TRANSMITTER.
CALIBRATION ERROR IN THE NORMALIZING AMPLIFIER.
OPERABLE 870816 1850 HOURS. CONTINUOUS REASONABLENESS CHECK INTRODUCED.CORRECT COMPLIANCE WITH MAINTENANCE INSTRUCTIONS.

F3-RO-013/87 - SYSTEM 231 REACTOR SERVICE BRIDGE

COLLISION IN FUEL POOL

DATE:870729 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 102 209 312 409 506 611 707 812 907

DURING USE OF A SERVICE OVERHEAD TRAVELLING CRANE, THE LOAD IN THE GRIPPER COLLIDED WITH OTHER OBJECTS. THE CONTROL ROD BEING HELD IN THE GRIPPER COLLIDED WITH ANOTHER CONTROL ROD IN THE FUEL POOL. AS A

RESULT OF THE COLLISION, THE CONTROL RODS INVOLVED MAY BE DAMAGED AND ARE THEREFORE NOT USEABLE FOR THE TIME BEING. NEITHER THE SERVICE CRANE NOR OTHER EQUIPMENT IS DAMAGED.
DURING TRANSPORT OF CONTROL RODS OVER THE CONTROL ROD RACK, THE LOWER PART OF THE TRANSPORTED ROD IS NOT HIGHER THAN THE TOP OF THE OTHER CONTROL RODS. THIS MEANS THAT THE TRANSPORTED CONTROL ROD MUST BE REMOVED FROM THE OTHER RODS IN THE RACK VIA FREE TRANSPORT PATHS OR CORRIDORS. THERE WAS NO NOTICE OF A TRANSPORT PATH, AN UNSUITABLE PATH WAS CHOSEN AND COLLISION OCCURRED DESPITE EXTRA SUPERVISION.
NEW SEQUENCE FOR FETCHING CONTROL RODS WILL BE DEVISED TO FACILITATE TRANSPORT FROM CONTROL ROD RACKS. FUTURE TRANSPORTS OVER THE CONTROL ROD RACK WILL BE PLANNED SO THAT A GOOD TRANSPORT PATH IS CLEAR.

F3-RO-014/87 - SYSTEM 321 SHUT-DOWN COOLING SYSTEM

STEAM LEAK FROM VALVE FOR BODY RELIEF OF 321VD4 CAUSED SHUTOFF OF COOLING PATH

DATE:870818 / EL.POWER 1073 MW / CATEGORY: 3

TYPE: 106 201 309 409 506 605 703 812 902

LEAK IN 321VD4'S BODY RELIEF DEVICE.
DEFORMED GASKET DUE TO USE OF UNSUITABLE GASKET MATERIAL (SILVER GASKET).
321 HIGH-PRESSURE CIRCUIT D SHUT OFF FOR REPAIR OF LEAK. GASKET REPLACED WITH DIFFERENT TYPE. COOLING PATH INOPERABLE FROM 870818 1010 HOURS TO 870819 1200 HOURS.

F3-RO-015/87 - SYSTEM 869 FIRE ALARM AND TRIP SYSTEM

ALARM 869 KA871, DETECTOR 00

DATE:870913 / EL.POWER 774 MWE / CATEGORY: 3

TYPE: 106 201 301 409 502 611 701 812 902

ALARM FROM 869 KA871 DETECTOR 00. DETECTOR 00 DOES NOT EXIST, BUT IS AN INTERNAL ELECTRONICS CHECK FOR CIRCUIT BOARDS. SMOKE TEST PERFORMED ON DETECTORS, NO RESULT. DETECTION CAPACITY OF CONCERNED FIRE CELL INOPERABLE.
FAULT IN CIRCUIT BOARD BSC-2.
REPLACEMENT OF CIRCUIT BOARD BSC-2. SMOKE TEST CARRIED OUT WITH SATISFACTORY RESULTS. OPERABLE LOOP KA871 AT 0845 HOURS ON 87-09-13.
DOWNTIME 0413-0845 = 4 H 37 MIN.

F3-RO-016/87 - SYSTEM 327 AUXILIARY FEED-WATER SYSTEM

PUMP TRIPPED ON HIGH CURRENT

DATE:870926 / EL.POWER 1083 MW / CATEGORY: 3

TYPE: 106 201 301 409 503 606 701 802 905

THE PUMP'S OVERCURRENT PROTECTION TRIPPED. THE PUMP WAS RESTARTED BRIEFLY. SOUNDED VERY BAD. 323 KA401 L1 WAS OBTAINED AND 323 PA1 WAS START-BLOCKED. ACCORDING TO TECH SPEC 3.4 C, 323 PA1 SHALL BE START-BLOCKED IF THE LEVEL IS FOUND TO FALL BELOW KA401 L1.
PUMP BEARING AND IMPELLER WORN OUT.
REPLACED SHAFT, IMPELLER AND BEARING. TESTED AND VERIFIED OPERABLE ON 87-09-26. TOTAL DOWNTIME 0321-1607 HOURS = 13 HOURS. MAINTENANCE INTERVAL FOR OVERHAUL OF THESE PUMPS CHANGED TO ONE YEAR.

F3-RO-017/87 - SYSTEM 583 CONTAINMENT VESSEL INSTRUMENTS

FLASHBACK ARRESTER CD41 PARTIALLY CLOGGED, RESULTING IN LOW FLOW IN MONITORING LOOP, CC41 CLEANED

DATE:871009 / EL.POWER 1087 MW / CATEGORY: 3

TYPE: 106 201 301 409 502 611 705 812

ON 87-10-09 AT 1227 HOURS, ALARM WAS OBTAINED FOR 583KD341L1 (FLOW GAS ANALYSIS). TROUBLESHOOTING REVEALED THAT FLASHBACK ARRESTER 583CD41 WAS PARTIALLY CLOGGED WITH DIRT. THE FLASHBACK ARRESTER WAS CLEANED, AND AFTER 2 HOURS AND 20 MINUTES THE MONITORING LOOP WAS ONCE AGAIN OPERABLE. AS A PREVENTIVE MEASURE, 583CC41 ON THE REDUNDANT MONITORING LOOP WAS ALSO CLEANED; THE DOWNTIME FOR THIS WAS 17 MINUTES.
PARTIALLY CLOGGED FLASHBACK ARRESTER CD41.
FLASHBACK ARRESTERS 583CD41 AND 583CC41 CLEANED.

F3-RO-018/87 - SYSTEM 671 DC SYSTEM, VOLTAGE 220 V OR ABOVE

RECTIFIER LR 331 P OUT OF ORDER

DATE:871201 / EL.POWER 1100 MW / CATEGORY: 3

TYPE: 106 201 301 409 502 611 701 810 902

ON 871201 AT 1349 HOURS, ALARM WAS OBTAINED FROM 671 KC701 "LR331P FAULT IN RECTIFIER". THE ALARM DISAPPEARED AFTER 10 MINUTES. FAULT TRACING WAS COMMENCED AND REPAIRS WERECARRIED OUT, AFTER WHICH THE RECTIFIER WAS ONCE AGAIN OPERABLE ON 871201 AT 1955 HOURS.
ACCORDING TO TECH SPEC 3.10 H, THE DIESEL-BACKED RECTIFIER (LR331 P) SHALL BE OPERABLE IN ORDER FOR THE DC BUSBAR LHC331 TO BE REGARDED AS OPERABLE. THE PARALLEL RECTIFIER LR331 Q WAS IN SERVICE DURING THIS ENTIRE PERIOD. EXEMPTION AS PER 3.10 H PERMITS CONTINUED REACTOR OPERATION FOR 30 DAYS.
COMPONENT FAULT IN MONITORING EQUIPMENT, WHICH LED TO TRIPPING OF THE RECTIFIER.
REPAIR OF RECTIFIER CARRIED OUT - THE WORK TOOK 6 HOURS. FAULT TRACING REVEALED THAT AMMETER QAG 0210, CONTROL CARD YXP135F AND RECTIFIER UNIT YXE143 WERE BROKEN. THE UNITS WERE REPLACED AND ADJUSTED, AFTER WHICH THE RECTIFIER WAS PUT INTO SERVICE.
INVESTIGATION TO DETERMINE WHY THE ALARM DISAPPEARED DESPITE THE FACT THAT THE RECTIFIER HAD TRIPPED REVEALED THAT THE TIME-DELAY RELAY FOR ALARM DELAY WAS BROKEN. THE RELAY WAS REPLACED AFTER WHICH THE SIGNAL

WAS TESTED.

F3-RO-020/87 - SYSTEM 323 LOW PRESSURE COOLANT INJECTION SYSTEM

LOW-LEVEL ALARM OBTAINED A NUMBER OF TIMES ON KD401

DATE:871214 / EL.POWER 1100 MW / CATEGORY: 3

TYPE: 106 201 301 409 501 611 705 812 909

THE LEVEL ALARM CAME AND WENT A COUPLE OF TIMES. 323 PD1 WAS START-BLOCKED AS PER TECH SPEC 3.4 C. FAULT TRACING WAS COMMENCED. REPAIR CRITERION ACCORDING TO TECH SPEC 3.4 C: 30 DAYS.
WHEN THE LEVEL SWITCH WAS DISMANTLED, SOME SLIME DEPOSIT WAS FOUND ON THE ULTRASONIC SENSOR AND OTHER WATER-WETTED SURFACES. A SIGNAL CAN BE OBTAINED IN THE MANNER WHICH OCCURRED BY THE ACTION OF OTHER MEDIA THAN WATER ON THESE SENSORS.
FLOWS CHECKED, BLEEDING CARRIED OUT. SENSOR BODY REMOVED, CLEANED, REINSTALLED AND TESTED WITH SATISFACTORY RESULTS. TOTAL DOWNTIME 1 HOUR 20 MINUTES, AND FOR SUBSEQUENT TESTING OF KD401 1 HOUR 35 MINUTES. SINCE THE SAME PROBLEM CAN BE ASSUMED TO EXIST ON OTHER SENSORS IN SYSTEMS 322 AND 323, THEY MUST ALSO BE CHECKED. THIS WILL BE DONE DURING THE LAST WEEK OF 1987. SKI WAS INFORMED OF THE ABOVE ON 871215.

O1-RO-014/87 - SYSTEM 660 AUXILIARY POWER SYSTEM, PRIORITY AC NET, GENERAL

DG111 TAKEN OUT OF SERVICE FOR REPAIR OF EXTERNAL LEAK FROM CLOSED COOLING CIRCUIT

DATE:870702 / EL.POWER 338 MWE / CATEGORY: 3

TYPE: 106 201 309 409 504 603 701

ON AN INSPECTION TOUR, WATER LEAKAGE WAS DISCOVERED FROM THE BLEED LINE ON DG111'S PREHEATER.
THE BLEED LINE HAD SUFFERED MECHANICAL DAMAGE, CAUSING CRACKING OF THE PIPE.
BLEED LINE REPLACED. DG111 OUT OF SERVICE NINE HOURS.

O1-RO-015/87 - SYSTEM 211 REACTOR VESSEL

PERSISTENT FALSE LOW-LEVEL SIGNAL FROM LEVEL SWITCH

DATE:870728 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 103 201 301 409 504 611

AT REACTOR TRIP ON 870728 AT 1605 HOURS, THE WATER LEVEL IN THE REACTOR VESSEL TEMPORARILY FELL BELOW L2, 2.2 METRES ABOVE SEA LEVEL. EVALUATION OF THE CONSEQUENTIAL FUNCTIONS OBTAINED AFTER THE REACTOR TRIP REVEALED THAT THERE WAS A PERSISTANT LOW-LEVEL SIGNAL COMING FROM 211 K405, ONE OF 4 SWITCHES IN THE L2 CONDITION. IT WAS DIRECTLY

DETERMINED VIA THE OTHER LEVEL INSTRUMENTATION THAT THE LEVEL IN THE REACTOR VESSEL WAS NORMAL.
CAUSE NOT DETERMINED.
IN ACCORDANCE WITH THE TECH SPEC, 211 K405 IN SS4 WASBYPASSED SO THAT SS4 HAD A 2-OF-3 LOGIC INSTEAD OF A 2-OF-4. ON 870730 AT 1036 HOURS, THE LOW-LEVEL SIGNAL DISAPPEARED. THE BYPASS WAS THEREFORE REMOVED, SINCE THIS ENTAILS A MORE CONSERVATIVE CONDITION FORMATION. THE LEVEL SWITCH WILL BE MORE CLOSELY EXAMINED IN CONNECTION WITH THE NEXT COLD SHUTDOWN.

O1-RO-016/87 - SYSTEM 622 130 KV SWITCHGEAR

TEMPORARY LOSS OF FEED FROM OFF-SITE GRID

DATE:870805 / EL.POWER 460 MWE / CATEGORY: 3

TYPE: 106 201 305 409 503 609 706 812 909

ON 870805 AT 0909 HOURS, BREAKER 0126 BETWEEN THE 130 KV SWITCHGEAR AND BUSBAR K1 IN THE STEP-DOWN SWITCHGEAR OPENED, WHEREBY 6 KV BUSBAR C WAS DE-ENERGIZED. AFTER HAVING CHECKED THAT BUSBAR K1 WAS FAULTLESS AND THAT NO PROTECTIVE RELAYS WERE TRIPPED, IT WAS DECIDED TO CLOSE SECTIONING DISCONNECTOR F100 BETWEEN BUSBARS K1 AND K2. WHEN THIS WAS DONE, 0127 ALSO TRIPPED, WHEREBY UNIT 2 WAS WITHOUT FEED, AS WAS THE KYB SWITCHGEAR, IN OTHER WORDS THE OFF-SITE LOADS ON THE PENINSULA, ESPECIALLY CLAB. ON UNIT 2, DG212 AND G23 STARTED UP AUTOMATICALLY. DG212 ENERGIZED THE B SIDE, WHILE THE A SIDE WAS ENERGIZED BY CLOSING 0127 MANUALLY BEFORE G23'S STARTUP SEQUENCE HAD BEEN CONCLUDED.
AT THIS TIME, UNIT 2 WAS SHUT DOWN FOR MAINTENANCE AND GAS TURBINE G13 WAS UNDERGOING SERVICE. TESTING OF THE INTERLOCKING AND TRIPPING CIRCUITS REQUIRED BYPASSING OF A RELAY CONTACT FOR G13-S. DUE TO AN IMPROPER BYPASS, A COMMAND WAS OBTAINED TO 0126. WHEN F100 WAS LATER CLOSED, 0127 RECEIVED THE SAME OPEN COMMAND. THE AUTOMATIC FUNCTIONS OBTAINED WERE CORRECT WITH THE FAULTY BYPASS.
VOLTAGE FEED TO THE C BUSBAR WAS RESTORED BY CABLE CONNECTION FROM BUSBAR H6 ON UNIT 2 AT 0953 HOURS. AFTER THE CAUSE OF THE FAULT WAS ESTABLISHED, A RETURN TO NORMAL OFF-GRID POWER FEED TO UNIT 1 WAS CARRIED OUT VIA 0126 AT 1340 HOURS. DOWNTIME: 5 HOURS.

O1-RO-017/87 - SYSTEM 351 BORON INJECTION SYSTEM (BWR)

351 P1/P2 TAKEN OUT OF SERVICE FOR REPLACEMENT OF LINE FROM SAFETY VALVE

DATE:871005 / EL.POWER 460 MWE / CATEGORY: 3

TYPE: 106 203 309 409 502 603 701 805 901

DURING TESTING OF 351 P1, LEAKAGE WAS DISCOVERED IN THE COUPLING DOWNSTREAM OF 351 V27.
THE PIPE DOWNSTREAM OF 351 V27 IS DISCONNECTED EVERY YEAR FOR CHECKING OF SAFETY VALVE 351 V27. A POOR FIT OF THE PIPE BETWEEN P1 AND V27 HAS CAUSED ABNORMAL WEAR OF THE JOINT, LEADING TO LEAKAGE. THE PIPE AND JOINT WERE REPLACED WITH A SLIMMER DESIGN WITH A BETTER

FIT. DOWNTIME 1.5 HOURS. SINCE THE DESIGN FOR 351 P2 IS THE SAME AND A TENDENCY TOWARDS LEAKAGE CAN ALSO BE SEEN THERE, THE EQUIVALENT JOINT ON P2/V28 WAS REPLACED ON 1987-10-07. DOWNTIME 3.5 HOURS.

O1-RO-018/87 - SYSTEM 741 GAS TREATMENT SYSTEM FOR THE ATOMSPHERE IN THE REACTOR CONTAINMENT (BWR)

ABNORMAL NOISE IN FAN

DATE:871104 / EL.POWER 464 MWE / CATEGORY: 3

TYPE: 106 202 303 409 503 606 702 812 909

DURING AN INSPECTION TOUR IN ROOM 5.42, ABNORMAL NOISE WAS HEARD FROM 741 F2. THE STANDBY FAN 741 F1 WAS STARTED AND 741 F2 WAS STOPPED. THE CAUSE WAS BEARING DAMAGE DUE TO MOISTURE.
THE STANDBY UNIT WAS PUT INTO SERVICE. THE FAN WAS DISMANTLED AND BEARING DAMAGE DUE TO MOISTURE WAS FOUND. 741 F2 OUT OF SERVICE FOR ABOUT 20 HOURS.

O1-RO-019/87 - SYSTEM 314 PRESSURE RELIEF SYSTEM

PILOT VALVE STUCK ON 314 V116

DATE:871116 / EL.POWER 464 MWE / CATEGORY: 3

TYPE: 106 201 304 409 502 605 701 812 909

DURING REGULAR TURBINE VALVE TEST, 411 V1 CLOSED ALL THE WAY INSTEAD OF REVERSING AT THE INTERMEDIATE POSITION AND CAUSED TRIP OF CONDITION TS14 (TURBINE TRIP AND DUMP PROHIBITION. DUE TO HIGH NEUTRON POWER, SS10 CAUSED REACTOR TRIP. THE VALVES 314 V113-V116 OPENED. VALVE V116 DID NOT RETURN TO THE CLOSED POSITION, WHEREBY FORCED CLOSURE VALVE V64 CLOSED AUTOMATICALLY. THE SIGNAL PICTURE FOR V116 WAS UNCLEAR. A DECISION WAS MADE TO DESCEND TO THE COLD SHUTDOWN MODE FOR INSPECTION OF 314 V116.
THE PILOT VALVE FOR V116 HAD STUCK IN THE OPEN POSITION DUE TO BINDING BETWEEN THE SOLENOID COIL AND THE ARMATURE. THE BINDING WAS CAUSED BY ALUMINIUM DUST THAT HAD FORMED DUE TO THE FACT THAT THE INDICATING UNIT HAD COME LOOSE AND RUBBED AGAINST THE COIL HOUSING. THE THREE SCREWS (M4X12) THAT HOLD THE INDICATING UNITS IN PLACE HAD COME LOOSE, PROBABLY DUE TO TOO LOW TIGHTENING TORQUE.
SOLENOID UNIT AND INDICATING UNIT REPLACED ON V116. WHEN THE THREE OTHER VALVES (V113-V115) WERE CHECKED, TWO SCREWS WERE FOUND TO BE LOOSE ON VALVE 114. THE SCREWS WERE TIGHTENED. THE PILOT VALVES FOR V113-V115 WILL BE REPLACED DURING THE 1988 REFUELLING OUTAGE. AT THE SAME TIME CARE WILL BE TAKEN TO MAKE SURE THAT THE SCREWS ARE LOCKED. DOWNTIME: ABOUT 28 HOURS.

O1-RO-020/87 - SYSTEM 533 ROD POSITION INDICATION SYSTEM

MALFUNCTIONING ONES INDICATION ON CRD D12

DATE:871118 / EL.POWER 267 MWE / CATEGORY: 3

TYPE: 106 201 304 409 504 612 707

DURING OPERATION OF CRD D12, THE ONES INDICATION MALFUNCTIONED.
INSULATION FAULT IN PULSE GENERATOR.
THE CONTROL ROD WAS GROUP-MANOEUVRED UNDER THE SUPERVISION OF THE SHIFT ENGINEER. ESTABLISHMENT OF CAUSE OF FAULT AND REPAIR WILL BE CARRIED OUT NO LATER THAN THE 1988 REFUELLING OUTAGE.

O1-RO-021/87 - SYSTEM 100 GENERAL

DOOR LOCK ON RESERVE CONTROL BUILDING COULD NOT BE OPENED

DATE:871123 / EL.POWER 464 MWE / CATEGORY: 3

TYPE: 106 202 312 409 506 611 702 812 909

DURING AN INSPECTION TOUR, THE DOOR TO THE RESERVE CONTROL BUILDING COULD NOT BE UNLOCKED. THE RESERVE CONTROL BUILDING WAS THEREFORE INACCESSIBLE.
THE LOCK CYLINDER HAD BECOME DISLOCATED DUE TO LOOSE CYLINDER SCREWS. LOCK REPLACED. LOCKING WASHER FITTED ON CYLINDER SCREW.

O1-RO-022/87 - SYSTEM 532 ROD CONTROL SYSTEM

CRD B61 IN SYSTEM 532 FAILED TO OPERATE

DATE:871215 / EL.POWER 466 MWE / CATEGORY: 3

TYPE: 106 203 304 409 503 609 703 812 909

IN CONNECTION WITH PERIODIC TESTING OF CRDS, CRD B61 COULD NOT BE INSERTED. THE ROD WAS FULLY WITHDRAWN, 100%.
OPEN CIRCUIT IN CHOKE COIL IN ONE PHASE BETWEEN THE CONTACTOR FOR INSERTION AND THE MOTOR.
THE CHOKE COIL IN THE MALFUNCTIONING PHASE WAS BYPASSED. CRD B61 WAS OPERATED 100%-98%-100% WITH SATISFACTORY RESULTS AND DECLARED OPERABLE. DOWNTIME: 2 HOURS. PERMANENT CORRECTIVE ACTION WILL BE TAKEN DURING THE 1988 REFUELLING OUTAGE.

O1-RO-023/87 - SYSTEM 661 DIESEL ENGINE

661 DG 111 TRIPPED DUE TO LOW LEVEL IN EXPANSION TANK

DATE:871222 / EL.POWER 465 MWE / CATEGORY: 3

TYPE: 106 203 301 409 502 611 701 909

IN CONNECTION WITH REGULAR PERIODIC TEST, 661 DG 111 TRIPPED AFTER 5

MINUTES OF OPERATION JUST BEFORE SYNCHRONIZATION. ALARM WAS OBTAINED FROM 660 K401/K403. LOCAL INSPECTION IN THE DIESEL ROOM REVEALED THAT WATER WAS LEAKING FROM A HOSE BETWEEN THE EXPANSION TANK AND THE DIESEL.

CRACK IN HOSE CAUSED BY AGING OF RUBBER.
HOSE REPLACED AND DIESEL TESTED WITH SATISFACTORY RESULTS. DOWNTIME: 5.5 HOURS.

O2-RO-018/87 - SYSTEM 677 24 V DC-NET, BATTERY POWERED

EARTH FAULT INDICATION ON BLO.02

DATE:870701 / EL.POWER 518 MWE / CATEGORY: 3

TYPE: 106 201 301 409 502 611 707 909

ON 870701, AT 1430 HOURS, EARTH FAULT SIGNAL WAS OBTAINED FOR BUSBAR BLO.02.
SHORT CIRCUIT BETWEEN CONDUCTORS (TERMINALS) AT CONTAINMENT PENETRATION.
ON 870201, 1530 HOURS, THE FAULT WAS ISOLATED BY PLACING THE POSITION INDICATION ("IN" AND "OUT" POSITIONS) FOR CRD D11 ON SPECIAL VOLTAGE VIA ISOLATION AMPLIFIER. ON 870702, 0900 HOURS, SHORT CIRCUIT WAS DISCOVERED TO D11'S 90% INDICATION. THE RESISTANCE IN THE CIRCUIT WAS 400 OHMS. THE FAULT WAS "BURNED" AWAY WITH 10 V AND 9 MA FROM A FEED DEVICE CONNECTED TO THE FAULTY TERMINALS. DURING THE 1987 REFUELLING OUTAGE, CORRECTIVE ACTION WILL BE TAKEN ON THE PENETRATIONS THAT EXHIBIT SIMILAR FAULTS IN ACCORDANCE WITH A SPECIAL PROGRAM.

O2-RO-019/87 - SYSTEM 221 FULL LENGTH CONTROL ROD DRIVES

TOO LONG INSERTION TIME FOR CRD A24

DATE:870713 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 103 209 303 409 504 611 705 812 909

IN CONNECTION WITH REACTOR TRIP ON MONDAY, JULY 13, 1987, IT WAS FOUND THAT 824 HAD A SCRAM TIME OF >6 SECONDS. ON RENEWED TESTING ON WEDNESDAY JULY 14, 1987, >10 SECONDS INSERTION TIME WAS OBTAINED IN THE FIRST TEST, AND IN THE SECOND TEST 824 STOPPED AT ABOUT 60%. THIS WAS VERIFIED UPON RETRIEVAL WITH THE DRIVE NUT. ACCORDING TO TECH SPEC 3.3.C, A24 IS INOPERABLE IN THIS POSITION. IN ORDER FOR A24 TO BE REGARDED AS OPERABLE, THE CRD MUST BE INSERTED ALL THE WAY AND THE FUSES REMOVED, TECH SPEC 3.3.B1.
THE CAUSE OF THE LONG INSERTION TIME WAS THAT THE VALVE DISC WAS STICKING IN THE COMPLETELY OR PARTIALLY CLOSED POSITION. THIS WAS CAUSED BY OXIDE COATING ON SLIDE SURFACES ON THE PLUNGER AND VALVE BODY. OF 109 CHECK VALVES, 33 HAD A TENDENCY TO STICK. THE STICKING WAS USUALLY INDICATED ONLY IN CERTAIN ROTATIONAL ANGLES, HOWEVER. METALLURGICAL EXAMINATION CARRIED OUT BY STUDSVIK ENERGITEKNIK AB ON A CHECK VALVE INDICATES THE PRESENCE OF OXIDE COATING. THE MAIN ELEMENTS IN THE OXIDE ARE TI, CR, FE AND NI, WHICH ARE ALSO THE MAIN COMPONENTS IN THE PLUNGER BUT IN DIFFERENT PROPORTIONS. A REVIEW OF THE WATER CHEMISTRY RECORDS DURING THE OPERATING PERIOD IN QUESTION 1979-1987 DOES NOT REVEAL ANYTHING TO INDICATE THAT THE OXIDE COATING MIGHT HAVE RESULTED FROM DEVIATING WATER CHEMISTRY DURING ANY PERIOD. A24 WAS INSERTED ALL THE WAY AND THE FUSES REMOVED. THE CRD IS

THEREBY OPERABLE. RESTART - POWER ASCENT. A24 WILL BE EXAMINED DURING THE 1987 REFUELLING OUTAGE.

O2-RO-020/87 - SYSTEM 221 FULL LENGTH CONTROL ROD DRIVES

INOPERABLE 221 C15, C34

DATE:870713 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 103 201 303 409 504 611 707 812 909

WHEN A DECISION WAS MADE TO LEAVE CRDS A24 AND A43 INSIDE THE CORE WITH THEIR FUSES REMOVED, A NEW SEQUENCE WAS CALCULATED WHERE THE SYMMETRY RODS C43, C24 SHOULD ALSO BE LEFT INSERTED IN ACCORDANCE WITH THE SEQUENCE LIST, WHICH WAS HANDED OVER FROM THE MORNING TO THE AFTERNOON SHIFT. WHEN THE SYMMETRY RODS WERE REMOVED FROM THE SEQUENCE LIST'S CORE PATTERN, HOWEVER, IT WAS NOT OBSERVED THAT THE BOTTOMMOST ROW ON THE CORE PATTERN WAS ON THE REVERSE SIDE. AS A CONSEQUENCE, C15 AND C34 AGREED WITH THE CORE PATTERN. WHEN THE STATION ENGINEER REMOVED THE FUSES FOR C15 AND C34, ROD WITHDRAWAL HAD BEGUN AND C15 AND C34 WERE WITHDRAWN TO 95 AND 100% RESPECTIVELY. IN CONNECTION WITH SUBSEQUENT REACTOR TRIP, HYDRAULIC SCRAM FUNCTIONED SATISFACTORILY BUT THERE WAS NO SCREW SCRAM.
THE CAUSE WAS DEFICIENT CHECKING OF THE SEQUENCE LIST IN CONNECTION WITH REMOVAL OF FUSES FOR SYMMETRY RODS AND THE LACK OF AN OPERATING BULLETIN THAT CLEARLY STATED WHICH RODS WERE TO BE LEFT IN THE INSERTED POSITION.
THE RIGHT CONTROL RODS A24, A43, C24 AND C43 HAVE BEEN LEFT IN WITH THEIR FUSES REMOVED. C15 AND C34 HAVE BEEN TESTED AND ARE OPERABLE. THE ROUTINES FOR THIS TYPE OF PROCEDURE WILL BE REVIEWED.

O2-RO-021/87 - SYSTEM 533 ROD POSITION INDICATION SYSTEM

EARTH FAULT AT 90% FOR 221 D13

DATE:870715 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 103 201 301 409 506 611 707 809 909

EARTH FAULT WAS OBTAINED ON DL01 VIA 677 KO63. SUBSEQUENT EXAMINATION ARRIVED AT THE FACT THAT THE EARTH FAULT WAS BETWEEN 90% INDICATION AND THE POSITIVE FEED TO ABSORBER IN AND OUT INDICATION. THE EARTH FAULT DID NOT CAUSE ANY MALFUNCTION.
SHORT CIRCUIT BETWEEN THE STRANDS IN THE CONTAINMENT PENETRATION KNOWN AS WHISKERS. THE RESISTANCE BETWEEN THE WHISKERS WAS 860 OHMS. THE SHORT CIRCUIT WAS BURNT AWAY WITH AN IMPOSED VOLTAGE OF 8 VOLTS AND 7 MA, WHEREBY THE EARTH FAULT DISAPPEARED.

O2-RO-022/87 - SYSTEM 312 FEED WATER SYSTEM

312 V4 WILL NOT OPEN

DATE:870715 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 105 209 304 409 503 605 701 802 909

WHEN AN ATTEMPT WAS MADE TO OPEN 312 V4 AT RESTART, IT WAS FOUND THAT THE VALVE DID NOT MOVE FROM THE CLOSED POSITION BUT THAT THE ACTUATOR'S MOTOR OPERATED IN THE OPEN DIRECTION.
THE ACTUATOR WAS INSPECTED AND IT WAS FOUND THAT 3 TEETH IN THE FIBRE GEAR THAT TRANSMITS POWER FROM THE MOTOR TO THE GEARBOX WERE BROKEN. SINCE THE ACTUATOR ALWAYS STOPS IN THE SAME POSITION ON CLOSING, SO THAT THE SAME TEETH ARE ENGAGED, AND SINCE THE TORQUE IS GREATEST DURING OPENING, THE PROBABLE CAUSE OF THE FRACTURE IS FATIGUE OF THE TEETH DUE TO A LARGE NUMBER OF OPENINGS.
THE FIBRE GEAR WAS REPLACED AND THE VALVE TEST-RUN WITH SATISFACTORY RESULTS. THE MAINTENANCE ROUTINES FOR THIS TYPE OF MOTORIZED ACTUATOR WILL BE REVIEWED.

O2-RO-023/87 - SYSTEM 546 AREA MONITORING IN REACTOR BUILDING FOR ISOLATION OF THE REACTOR CONTAINMENT

TRIPPED PRESSURE SWITCH IN I CHAIN DURING AIRING OF CONTAINMENT

DATE:870730 / EL.POWER 300 MWE / CATEGORY: 3

TYPE: 106 201 305 409 503 611 705 812 909

ON 870730 AT 1646 HOURS, 546 K101, INCLUDED IN CONDITION I3 IN THE I CHAIN, TRIPPED AT THE START OF AIRING OF THE REACTOR CONTAINMENT. AT TRIP, THE PRESSURE HAD INCREASED FROM -50 TO -30 MILLIBAR. AIRING WAS INTERRUPTED PENDING RESTORATION OF THE PRESSURE SWITCH. WHEN THIS DID NOT OCCUR, THE SWITCH WAS BYPASSED AND THE STANDBY SWITCH IN CONDITION I3 WAS CONNECTED. THE I CHAIN WAS OPERABLE THROUGHOUT THE PROCEDURE, SINCE THE A CHANNEL WAS TRIPPED.
CONDENSATION IN THE LINE BETWEEN THE DIFFERENTIAL PRESSURE SWITCH AND THE DELAY VOLUME CAUSED BLOCKAGE OF THE DERIVATIVE FUNCTION.
THE PRESSURE SWITCH WAS INSPECTED AT THE BEGINNING OF THE REFUELLING OUTAGE, THE CAUSE OF THE FAULT WAS IDENTIFIED AND CORRECTIVE ACTION WAS TAKEN.

O2-RO-024/87 - SYSTEM 553 EQUIPMENT FOR MAIN STACK

STACK MONITORING SYSTEM OUT OF SERVICE DUE TO LOSS OF VOLTAGE

DATE:870806 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 101 201 312 409 501 606 707 811 909

IN CONNECTION WITH A TEMPORARY OUTAGE OF THE OFF-SITE GRID (REPORT RO-O1-016/87), A DISTURBANCE OCCURRED ON BUSBAR GO4 IN UNIT 2. THE DISTURBANCE IN UNIT 2 WAS CAUSED BY THE FACT THAT 666 MG221 WAS OUT OF SERVICE FOR OVERHAUL IN CONNECTION WITH THE REFUELLING OUTAGE AND BUSBAR GO4 WAS CONNECTED TO THE OFF-SITE GRID VIA T233. IN CONNECTION WITH THE OUTAGE, CLEARING AND SEQUENCE RESTART WAS OBTAINED ON UNDERLYING BUSBARS WITH FEED VIA DIESEL DG211. WHEN GO4 WAS DE-ENERGIZED, 553 F6, F7 STOPPED AND THE HIGH-VOLTAGE SECTION DISCONNECTED. THIS LED TO LOSS OF MONITORING.

THE CAUSE OF THE FAULT WAS THAT THE SYSTEM COMPONENTS ARE NOT INCLUDED IN AUTOMATIC SEQUENCE REINSERTION, DUE TO THEFACT THAT THE HIGH-VOLTAGE SECTION CANNOT WITHSTAND INSTANTANEOUS RECONNECTION BUT INSTEAD REQUIRES MANUAL CONNECTION IN SEVERAL STAGES.
OPERATING INSTRUCTIONS 2-D3.533.1 WILL BE COMPLEMENTED SO THAT MANUAL RESTORATION OF THE HIGH-VOLTAGE SECTION IS CARRIED OUT IMMEDIATELY AFTER VOLTAGE IS RESTORED ON BUSBAR G04. LOSS OF MONITORING FOR 33 HOURS.

O2-RO-025/87 - SYSTEM 516 TRIP AND INTERLOCK SYSTEM

CONDITION SS5 BYPASSED AT STARTUP

DATE:870831 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 106 209 312 409 502 611 707 812 909

ON THE MORNING OF 870801, IT WAS DISCOVERED THAT CONDITION 516 SS5 (HIGH LEVEL REACTOR) WAS BYPASSED VIA SWITCHES ON TEST BOXES, ONE PER CHANNEL, CONNECTED TO THE CONTROL PANELS IN THE RELAY ROOM. THE TEST BOXES ARE HOOKED UP IN CONNECTION WITH DESCENT FOR ANNUAL REFUELLING OUTAGE, AND THE BYPASS IS MADE PRIOR TO FILLING-UP OF THE REACTOR VESSEL. THE CONDITION IS SUPPOSED TO BE RESTORED TOWARDS THE END OF THE REFUELLING OUTAGE, WHEN THE REACTOR VESSEL HAS BEEN DRAINED TO NORMAL LEVEL. THIS WAS NOT DONE.
THE BYPASS WAS CONTROLLED BY THE OPERATING ORDER FOR THE OUTAGE. THE RESTORATION WAS NOT COVERED BY AN OPERATING ORDER. THE BYPASS WAS UNSIGNALLED. THE BYPASS WAS NOT DISCOVERED BY THE JUMPER CHECK OWING TO THE FACT THAT IT WAS DONE VIA TEST BOXES.
MEASURE ADOPTED IMMEDIATELY: THE CONDITION WAS RESTORED AND THE TEST BOXES DISCONNECTED. PLANNED MEASURES: INVESTIGATE WHETHER THE CONDITION IS TO BE BYPASSED IN THE FUTURE. IF BYPASS IS TO BE APPLIED IN THE FUTURE AS WELL DURING REFUELLING OUTAGES, THE FOLLOWING MEASURES SHALL BE ADOPTED. BYPASS SHALL BE SIGNALLED IN CONTROL DESK PA. BYPASS AND RESTORATION OF THE CONDITION SHALL BE CONTROLLED BY AN OPERATING ORDER. HOOKING-UP OF THE TEST BOXES SHALL BE DONE VIA A MODIFICATION SCHEME, WHICH SHALL BE CHECKED PRIOR TO STARTUP. FINALLY ADOPTED MEASURES: AFTER REVIEW OF THE PROBLEM WITH SS5 BYPASS, THE FOLLOWING COURSE OF ACTION HAS BEEN DECIDED ON: BYPASS OF SS5 IS NO LONGER DONE DUE TO PULSED OUTPUT FUNCTIONS FROM SS CHAIN.
INSTRUCTIONS FOR FILLING-UP OF THE REACTOR VESSEL IN CONNECTION WITH REFUELLING HAVE BEEN MODIFIED.

O2-RO-026/87 - SYSTEM 721 CLOSED COOLING SYSTEM FOR 321 AND 322

UTILIZATION OF REPAIR CRITERION - BACK-FLUSHING OF HEAT EXCHANGERS 721 E3/E4

DATE:870831 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 106 201 301 409 502 602 705 812 909

ALARM WAS OBTAINED FOR LOW 712 FLOW THROUGH 721 E3/E4. THE HEAT EXCHANGERS WERE TAKEN OUT OF SERVICE AND BACK-FLUSHED TO REMOVE

MUSSELS BLOCKING THE INLET.
BLOCKAGE CAUSED BY AQUATIC ORGANISMS.
721 E3/E4 WERE OUT OF SERVICE BETWEEN 0800 AND 0900 HOURS ON 870831 FOR BACK-FLUSHING.

O2-RO-027/87 - SYSTEM 649 EL. SYSTEM FOR GAS TURBINE WITHIN STATION

GAS TURBINE FAILED TO START DURING PERIODIC TESTING

DATE:870910 / EL.POWER 620 MWE / CATEGORY: 3

TYPE: 106 203 304 409 501 609 703 812 909

GAS TURBINE 649 G13 FAILED TO START DURING PERIODIC TESTING DUE TO LOW LUBRICATING OIL PRESSURE.
THE LUBRICATING OIL PUMP FAILED TO START DUE TO A DEFECTIVE CONTACTOR. THE CONTACT ONLY CLOSED IN TWO PHASES, SO THAT THE PUMP MOTOR TRIPPED ON ITS THERMAL PROTECTOR AFTER ABOUT 25 SECONDS.
CONTACTOR REPLACED. OVERHAUL OF AUTOMATIC CONTROLS FOR PUMP CHANGEOVER IN CONNECTION WITH START. DOWNTIME: 2.5 HOURS.

O2-RO-028/87 - SYSTEM 675 110V DC, BATTERYFUSED

EARTH FAULT ON BUSBAR 675 B1.01

DATE:870913 / EL.POWER 623 MWE / CATEGORY: 3

TYPE: 106 201 301 409 506 605 707 809 909

EARTH FAULT ON BUSBAR 675 B1.01 WAS OBTAINED ON 870913 AT 0846 HOURS.
EARTH FAULT TRACING REVEALED THAT THE EARTH FAULT STEMMED FROM THE OPEN AND CLOSE INDICATIONS FOR 314 V91.
THE PROBABLE CAUSE OF THE FAULT IS MOISTURE IN THE LIMIT SWITCH FOR CLOSE INDICATION ON 314 V91. LEAKAGE IN VALVE GLAND DISCOVERED WITH TV CAMERA. THIS IS THE ACTUAL CAUSE OF THE FAULT.
POSITION INDICATION, OPEN AND CLOSED VALVE, FOR 314 V91 JUMPERED OUT IN ACCORDANCE WITH MODIFICATION SCHEDULE. THE FAULT WILL BE CORRECTED AT FIRST ACCESS TO THE CONTAINMENT. VALVE GLAND ON 314 V91 REPLACED IN CONNECTION WITH DESCENT TO COLD SHUTDOWN ON 871228. POSITION INDICATION RESTORED AND VALVE TESTED WITH SATISFACTORY RESULTS.

O2-RO-029/87 - SYSTEM 649 EL. SYSTEM FOR GAS TURBINE WITHIN STATION

FAILURE TO START IN CONNECTION WITH PERIODIC TESTING

DATE:870924 / EL.POWER 625 MWE / CATEGORY: 3

TYPE: 106 203 304 409 501 608 707 812 907

DURING PERIODIC TESTING OF GAS TURBINE G13 ON 87-09-25, THE SET FAILED TO START. FAULT TRACING REVEALED THAT THIS WAS DUE TO AN INCORRECTLY CLOSED INSTRUMENT VALVE TO A PRESSURE BISTABLE FOR ONE OF THE LUBRICATING OIL PUMPS. ON TEST START OF THE GAS TURBINE, THE SELECTED MAIN OIL PUMP STARTS FIRST AND THEN THE BACKUP OIL PUMP. THE

SYSTEM CONTAINS TWO MAIN OIL PUMPS + BACKUP OIL. DUE TO THE FACT THAT THE PRESSURE BISTABLE FOR THE BACKUP OIL PUMP WAS ISOLATED, THE LOGIC PERCEIVED THE OIL SYSTEM TO BE INCOMPLETE AND THEN DOES NOT ALLOW START OF THE GAS TURBINE SET.
INCORRECTLY CLOSED INSTRUMENT VALVE. THE CAUSE OF THIS CAN BE FOUND IN THE DISTURBANCE THAT OCCURRED ON 1987-09-10 WHEN G13 FAILED TO START DUE TO A DEFECTIVE CONTACTOR FOR ONE OF THE LUBRICATING OIL PUMPS. AS A COMPLEMENT TO REPLACEMENT OF THE CONTACTOR, IT WAS DECIDED TO CALIBRATE THE PRESSURE BISTABLES FOR THE THREE LUBRICATING OIL PUMPS. THIS WAS DONE BY MAINTENANCE PERSONNEL AFTER FAULT NOTIFICATION IN ACCORDANCE WITH APPLICABLE ROUTINES. AFTER THE WORK WAS FINISHED, THEY FORGOT TO OPEN THE INSTRUMENT VALVE TO ONE OF THE PRESSURE BISTABLES.
INSTRUMENT VALVE RESTORED, RENEWED TEST START CARRIED OUT WITH SATISFACTORY RESULTS. RETRAINING IN TECH SPEC KNOWLEDGE AND ADMINISTRATIVE ROUTINES FOR SAFETY-RELATED EQUIPMENT HAS BEEN COMMENCED. DOWNTIME: 310 HOURS.

O2-RO-030/87 - SYSTEM 649 EL. SYSTEM FOR GAS TURBINE WITHIN STATION

OIL LEAKAGE AT INSULATION PORCELAIN ON TRANSFORMER 649 T13

DATE:870925 / EL.POWER 624 MWE / CATEGORY: 3

TYPE: 106 202 309 409 502 609 701 806 902

AN INSPECTION TOUR BY THE SHIFT PERSONNEL REVEALED AN OIL LEAK ON TRANSFORMER 649 T13 BELONGING TO GAS TURBINE SET G13. THE TRANSFORMER WAS TAKEN OUT OF SERVICE AT 1854 HOURS, WHEREBY G13 BECAME UNAVAILABLE.
THE LEAK WAS CAUSED BY A BROKEN CENTER TUBE IN THE ELECTRICAL PENETRATION FOR THE 130 KV NEUTRAL POINT FOR T13.
NEW PENETRATION INSTALLED. THE WORK WAS CONCLUDED ON 1987-09-30 AT 1645 HOURS. DOWNTIME: 120 H. PENETRATIONS WILL UNDERGO TECHNICAL EXAMINATION BY THE SUPPLIER.

O2-RO-031/87 - SYSTEM 861 FIRE PROTECTION SYSTEM

AUTOMATIC STARTER OUT OF ORDER

DATE:870926 / EL.POWER 624 MWE / CATEGORY: 3

TYPE: 106 201 312 409 501 608 707 811 909

LIGHTNING DISABLED AUTOMATIC CONTROL EQUIPMENT FOR FIRE WATER. ALL FUNCTION GROUPS WERE OUT OF SERVICE. THE DISTURBANCE DID NOT PREVENT PRESSURE-ACTUATED START OF THE FIRE WATER DIESEL IF NECESSARY.
FREQUENCY/VOLTAGE DISTURBANCES DISABLED AUTOMATIC CONTROL EQUIPMENT FOR THE FIRE WATER SYSTEM.
STARTUP OF AUTOMATIC CONTROL EQUIPMENT AFTER FAULT TRACING AND INSPECTION. DOWNTIME: 9 HOURS.

O2-RO-032/87 - SYSTEM 713 SALT WATER SYSTEM FOR NORMAL OPERATION

OVERHEATING IN JUNCTION BOX FOR 713 P1

DATE:871009 / EL.POWER 623 MWE / CATEGORY: 3

TYPE: 106 201 312 409 504 608 704 805 909

AN INSPECTION TOUR OF THE SCREENING STATION DURING THE NIGHT OF 1987-10-09 REVEALED THAT THE JUNCTION BOX FOR 713 P1 WASABNORMALLY HOT.
FAULT IN CRIMP SPLICE BETWEEN CABLES (ALUMINIUM) AND CABLE TERMINALS IN THE JUNCTION BOX.
THE PUMP WAS SHUT OFF FOR CORRECTION OF THE FAULT ON THE SAME MORNING. THE CABLE TERMINALS FOR THE PHASES WERE REPLACED, AFTER WHICH THE PUMP WAS RESTORED TO SERVICE. THE PUMP WAS OUT OF SERVICE ON 1987-10-09 BETWEEN 0811 AND 1610 HOURS. DOWNTIME: 8 H.

02-RO-033/87 - SYSTEM 861 FIRE PROTECTION SYSTEM

CORRECTIVE ACTION ON LEAKING FIRE HYDRANTS

DATE:870701 / EL.POWER / CATEGORY: 3

TYPE: 106 207 309 409 504 611 703 812 909

IN CONNECTION WITH INSPECTION OF FIRE HYDRANTS DURING THE SUMMER, LEAKAGE WAS DISCOVERED IN THE SHUTOFF VALVE ON CERTAIN FIRE HYDRANTS. IT WAS JUDGED THAT THE FAULT WAS NOT FUNCTION-IMPAIRING, BUT THAT IT SHOULD BE CORRECTED IN THE LONG RUN.
THE CAUSE OF THE LEAKAGE THROUGH THE SHUTOFF VALVES WAS THAT GRAVEL AND OTHER DEBRIS HAD FALLEN DOWN THROUGH THE STEM EXTENSION TUBE AND LANDED ON THE RUBBER DIAPHRAGM BETWEEN THE SEAT AND THE DISC. WHEN THE VALVE WAS TIGHTENED, THE RUBBER DIAPHRAGM WAS DAMAGED, CAUSING LEAKAGE. THE CRACKED RISERS WERE THEREFORE CAUSED BY LEAKAGE. THE LEAKAGE CAUSED THE RISER TO FILL WITH WATER, WHICH THENFROZE SOMETIME DURING THE WINTER AND BURST THE RISER.
THE LEAKING FIRE HYDRANTS WERE SHUT OFF AND CORRECTIVE ACTION TAKEN AS FOLLOWS: BP 12 OUT OF SERVICE BETWEEN 870817 1100 HOURS AND 870825 0900 HOURS FOR REPLACEMENT OF RISER BP 14 OUT OF SERVICE BETWEEN 870921 1200 HOURS AND 870925 2200 HOURS FOR REPLACEMENT OF RISER BP 6 AND BP 25 OUT OF SERVICE BETWEEN 870928 0900 HOURS AND 871001 1400 HOURS FOR REPLACEMENT OF RISER BP 24 OUT OF SERVICE BETWEEN 871123 0800 HOURS AND 871124 1600 HOURS FOR REPLACEMENT OF RISER BP 4 OUT OF SERVICE BETWEEN 871207 0800 HOURS AND 871208 1400 HOURS FOR REPLACEMENT OF RISER BP 7 AND BP 13 OUT OF SERVICE BETWEEN 871211 0800 HOURS AND 1500 HOURS FOR REPLACEMENT OF RUBBER DIAPHRAGM IN SHUTOFF VALVE. REMOVAL OF BP 04, BP 06, BP12, BP 24 AND BP 25 FROM SERVICE MEANT THAT THE OUTER RING LINE WAS ISOLATED ALONG A CERTAIN SECTION. REMOVAL OF BP 04 FROM SERVICE ALSO MEANT THAT BP 05, WHICH COVERS THE STAIRWELL IN UNIT 1'S REACTOR SECTION, WAS ISOLATED. IN ADDITION, ALL FIRE HYDRANTS IN SYSTEM 61 HAVE BEEN INSPECTED WITH RESPECT TO LEAKAGE THROUGH THE SHUTOFF VALVE IN PREPARATION FOR THE COMING WINTER. FURTHERMORE, RISERS HAVE BEEN FILLED WITH AN ANTIFREEZE MIXTURE TO PREVENT FROST BURSTING DUE TO LEAKAGE.

O2-RO-034/87 - SYSTEM 861 FIRE PROTECTION SYSTEM

861 P3 TAKEN OUT OF SERVICE FOR CORRECTIVE ACTION ON V118

DATE:871012 / EL.POWER 522 MWE / CATEGORY: 3

TYPE: 106 202 309 409 502 605 702

LEAKAGE FROM THE STUFFING BOX ON 861 V118 WAS DISCOVERED ON AN INSPECTION TOUR.
NORMAL WEAR OF STEM SEAL.
PRESSURE TANK 861 T3 AND PRESSURIZING PUMP P3 WERE TAKEN OUT OF SERVICE FOR ONE HOUR ON 871013 FOR REPLACEMENT OF V118.

O2-RO-035/87 - SYSTEM 221 FULL LENGTH CONTROL ROD DRIVES

STUCK CRD

DATE:871016 / EL.POWER 275 MWE / CATEGORY: 3

TYPE: 106 203 303 409 504 611 812 909

CRD A31 HAD DISPLAYED A TENDENCY TOWARDS HIGH POWER CONSUMPTION DURING OPERATION. A FULL-STROKE TEST OF THE CRD WAS CARRIED OUT ON 871016. DURING INSERTION, THE POWER ROSE CONTINUOUSLY FROM 0.62 TO 1.1 KW AT A CONTROL ROD POSITION OF 40%, WHERE THE SLIP CLUTCH ALSO TRIPPED. THE SAME TENDENCY EXISTED DURING WITHDRAWAL.
INADEQUATE CLEARANCE BETWEEN A GRAPHITE BEARING AND THE CRD SCREW. DURING OPERATION, THIS LEADS TO A TEMPERATURE INCREASE IN THE CRD SCREW, RESULTING IN STICKING.
IN ORDER TO RUN IN THE GRAPHITE BEARING, THE CRD WAS EXERCISED A NUMBER OF TIMES. AFTER EXERCISING, A NEW MOBILITY TEST WAS CARRIED OUT ON 871018. THE CRD EXHIBITED NORMAL POWER CONSUMPTION THROUGHOUT ITS STROKE, 0.55 KW ON INSERTION AND 0.50 KW ON WITHDRAWAL. THE CRD IS JUDGED TO BE OPERABLE. THE CAUSE OF THE FAULT WILL BE DETERMINED NO LATER THAN THE 1988 REFUELLING OUTAGE.

O2-RO-036/87 - SYSTEM 352 LEAKAGE COLLECTION SYSTEM

REPLACEMENT OF WORN SUPPORT BEARINGS ON 352 F1 AND BALANCING OF FAN

DATE:871022 / EL.POWER 580 MWE / CATEGORY: 3

TYPE: 106 202 308 409 503 606 701 812 909

IN CONNECTION WITH AN INSPECTION TOUR ON 871022, IT WAS OBSERVED THAT 352 F1 WAS VIBRATING. THE FAN WAS SHUT OFF AND 352 F2 WAS CONNECTED AS A STANDBY. AFTER FAN CHANGEOVER, IN CONNECTION WITH AN INSPECTION TOUR ON 871101, OVERHEATING AND BEARING NOISE WERE ONCE AGAIN OBSERVED IN 352 F1.
IMBALANCE DUE TO BEARING WEAR IN MOTOR AND FAN BEARING. THE LOOSE BELT PULLEY WAS RUBBING AGAINST THE BEARING.
BEARINGS IN MOTOR AND FAN REPLACED. FAN BALANCED. 352 F1 ONCE AGAIN OPERABLE ON 871030. DOWNTIME: 9 DAYS. BELT PULLEY ADJUSTED AND

SECURED WITH NEW KEY. DOWNTIME: 2 DAYS.

02-RO-037/87 - SYSTEM 861 FIRE PROTECTION SYSTEM

LOSS OF VOLTAGE IN FIRE PROTECTION SYSTEM 861

DATE:871023 / EL.POWER 622 MWE / CATEGORY: 3

TYPE: 106 202 304 409 502 611 707 811 909

IN CONNECTION WITH MAINTENANCE WORK ON A 6 KV BREAKER, SKA 10-6-S IN SWITCHGEAR KYB, THE CONTROL VOLTAGE FOR THE AUTOMATIC CONTROLS FOR 861 WAS CUT OFF INADVERTENTLY. CONTROL VOLTAGE WAS ALSO CUT OFF TO THE PRESSURIZING PUMPS 861 P3, P7. IN CONNECTION WITH THE MAINTENANCE WORK ON THE 6 KV BREAKER, TWO BRIEF POWER INTERRUPTIONS OF ABOUT 1 MINUTE EACH WERE MADE. THIS WAS DONE AT 1330 HOURS. AT 1530 HOURS, DIESEL PUMP 861 P2 STARTED DUE TO LOW SYSTEM PRESSURE, WHICH IS NORMAL FUNCTION. AN INSPECTION TOUR AT 1630 REVEALED THAT 861 P2 WAS IN OPERATION AND THAT TWO MINIATURE CIRCUIT BREAKERS VM01 AND VM02 WERE TRIPPED ON THE 220 V SIDE. AT 1730 HOURS, THE MINIATURE CIRCUIT BREAKERS WERE RESET AND CONTROL VOLTAGE WAS THEREBY RESTORED AND THE DIESEL PUMPCOULD BE STOPPED.
WHEN THE POWER SUPPLY FROM KYB WAS RESTORED AT 1330 HOURS, THE TWO MINIATURE CIRCUIT BREAKERS DROPPED AND CUT OFF THE CONTROL VOLTAGE FOR 861 P1, P3 AND P7.
TESTS ACCORDING TO A SEPARATE TESTING PROGRAM CARRIED OUT ON 871027 BETWEEN 0930 AND 1015 HOURS CONFIRM THAT THE CLOSING CURRENT SURGE CAUSES THE MINIATURE CIRCUIT BREAKERS TO OPEN. PLANNED MEASURES REARRANGEMENT OF POWER FEED SO THAT NORMAL CONNECTION WILL BE VIA RECTIFIER, BATTERY AND INVERTER INSTEAD OF VIA THE OFF-SITE GRID AND CONTROL VOLTAGE TRANSFORMER, AS IT IS TODAY. CHANGE OF MINIATURE CIRCUIT BREAKER FROM 4 AMPS TO 10 AMPS. AUGMENTATION OF SIGNAL PATTERN FOR LOSS OF PLC. THE ABOVE PLANNED MEASURES WERE IMPLEMENTED AND TESTED ON 871216. SKI DISPENSATION FOR POWER OUTAGE OBTAINED. THE REARRANGEMENT OF THE POWER FEED RESULTED IN O2-RO-043/87 DUE TO TRANSPOSED TERMINALS IN CONTACTOR.

O2-RO-038/87 - SYSTEM 711 SCREENING PLANT FOR SALT WATER

SPRAY WATER PUMP 711 P8 OUT OF ORDER

DATE:871028 / EL.POWER 624 MWE / CATEGORY: 3

TYPE: 106 202 304 409 502 606 701 812 909

IN CONNECTION WITH AN INSPECTION TOUR IN THE SCREENING PLANT BUILDING, IT WAS DISCOVERED THAT 711 P8 WAS IN OPERATION DESPITE THE FACT THAT THE LOGIC SHOULD HAVE STOPPED IT BECAUSE THE BASKET BELT STRAINERS IN TRAINS 1 AND 2 WERE NOT IN OPERATION. THE PUMP MOTOR WAS HOT AND WAS CONSUMING MORE CURRENT THAN NORMAL. THE PUMP WAS SWITCHED OFF AT 0630 HOURS.
A CHECK REVEALED THAT TWO CONTACTS HAD "WELDED" SHUT WHEN PUMP TRIP WAS ACTUATED, WHICH WAS THE REASON WHY THE PUMP WAS IN OPERATION. THE NEXT TIME START WAS CALLED FOR, THE MOTOR RAN ON TWO PHASES, CAUSING

OVERHEATING. THE FAULT IS THE RESULT OF NORMAL WEAR.
CONTACTOR REPLACED. 711 P8 PUT INTO SERVICE. DOWNTIME: 9 HOURS.

O2-RO-039/87 - SYSTEM 851 FIRE PROTECTION SYSTEM (WATER SPRAY)

BLOCKED FIRE SPRINKLER FOR ELECTRICAL TUNNEL A

DATE:871103 / EL.POWER 626 MWE / CATEGORY: 3

TYPE: 106 203 304 409 502 605 704 812 907

IN CONNECTION WITH PERIODIC TESTING OF THE SPRINKLER VALVES 851 V17-V19 (FIRE SPRINKLER FOR ELECTRICAL TUNNEL A), IT WAS DISCOVERED THAT THE COMPARTMENTALIZING VALVE 851 V15 WAS CLOSED. TESTING OF SPRINKLER VALVES IS CARRIED OUT ACCORDING TO TECH SPEC 4.15 EVERY THREE MONTHS.
THE VALVE HANDLE, WHICH CONSTITUTES THE VALVE POSITION INDICATION FOR THE VALVE, HAD BEEN REMOVED AT SOME POINT AND INCORRECTLY REFITTED. AS A RESULT, THE VALVE HAD BEEN PLACED IN THE CLOSED POSITION INSTEAD OF THE OPEN POSITION.
VALVE 851 V15 WAS OPENED. ALL COMPARTMENTALIZING VALVES IN THE FIRE PROTECTION SYSTEM WILL BE CHECKED TO MAKE SURE THAT CORRECT VALVE POSITION INDICATION IS OBTAINED.

O2-RO-040/87 - SYSTEM 352 LEAKAGE COLLECTION SYSTEM

352 F1 TAKEN OUT OF SERVICE FOR REPLACEMENT OF BELT PULLEY

DATE:871111 / EL.POWER 627 MWE / CATEGORY: 3

TYPE: 106 202 308 409 503 606 701 805 909

NOISE COMBINED WITH RISING TEMPERATURE AND VIBRATION OF THE FAN HOUSING AND BEARING WAS DISCOVERED ON 352 F1 DURING AN INSPECTION TOUR AND THE FAN WAS THEREFORE TAKEN OUT OF SERVICE.
THE BELT PULLEY HAD MOVED TOWARDS THE FAN COVER AND BEARING.
BELT PULLEY REPLACED AND SHAFT RETURNED. THE FAN WAS INOPERABLE DURING THE PERIOD 871111, 1725 HOURS TO 871112, 1329 HOURS. DOWNTIME: 20 H.

O2-RO-041/87 - SYSTEM 733 SYSTEM FOR STORAGE AND DISTRIBUTION OF DEMINERALIZED WATER

733 P23 FAILED TO START WHEN TESTED

DATE:871130 / EL.POWER 628 MWE / CATEGORY: 3

TYPE: 106 203 304 409 503 606 703

TEST START CARRIED OUT DUE TO UNCLEAR OPERATING INDICATION IN COMPUTER. PUMP FAILED TO START.
CABLING BETWEEN WATERWORKS AND CENTRAL CONTROL ROOM WAS DAMAGED AT UNDERGROUND JUNCTION. SIX OF THE CABLE'S 48 CORES HAD BEEN DAMAGED WHEN THE CABLE WAS LAID, RESULTING IN FLASHOVER WHEN MOISTURE

PENETRATED.
REPAIR OF DAMAGED CORES IN CONTROL CABLE EFFECTED BY REMOVAL OF DAMAGED PARTS AND SPLICING-IN OF NEW ONES. THE CABLE WAS THEN INSULATED WITH SHRINKAGE TUBING AND VULCANIZING TAPE. THE FAULT HAS THEREBY BEEN CORRECTED. THE PUMP WAS TESTED WITH SATISFACTORY RESULTS. DOWNTIME: 30 NOVEMBER, 1610 HOURS TO 3 DECEMBER, 1300 HOURS = 70 HOURS.

O2-RO-042/87 - SYSTEM 661 STANDBY DIESEL SYSTEM DIESELSET

DG212 TAKEN OUT OF SERVICE FOR REPLACEMENT OF TURBO SET

DATE:871208 / EL.POWER 629 MWE / CATEGORY: 3

TYPE: 106 209 309 409 506 607 701 812 909

DURING TESTING OF DG212 IN THE FINAL PHASE OF LAST YEAR'S REFUELLING OUTAGE, A SLIGHT LEAK WAS DISCOVERED VIA AN OVERFLOW PIPE IN THE TURBO SET. IT WAS ASSUMED THAT THE LEAK CAME FROM THE TURBO SET'S INTERCOOLER, WHICH WAS THEREFORE REPLACED. BUT THE LEAK PERSISTED AFTER THE REPLACEMENT, AND IT WAS THEREFORE CONCLUDED THAT THE LEAK MUST COME FROM THE TURBO SET ITSELF. THE LEAK WAS SO SMALL THAT IT COULD NOT JEOPARDIZE THE SAFE OPERATION OF DG212, WHICH WAS THEREFORE DECLARED OPERABLE. A NEW TURBO SET WAS ORDERED AND DELIVERY AWAITED. DURING THE DELIVERY TIME FOR THE NEW TURBO SET, DG212 HAS BEEN FUNCTION-TESTED A TOTAL OF SEVEN TIMES WITH SATISFACTORY RESULTS. THE TURBOCHARGER WAS CLEANED AND INSPECTED BY BBC SVENSKA AKTIEBOLAG. NO EXPLANATION HAS BEEN FOUND FOR THE LEAK.
AFTER DELIVERY OF A NEW TURBO SET AND TRANSPORTS OF SPENT FUEL TO CLAB, DG212 WAS TAKEN OUT OF SERVICE ON 871208 AT 0554 HOURS AND THE TURBO SET REPLACED. THE DEFECTIVE SET WILL BE SENT TO THE SUPPLIER FOR DETAILED INVESTIGATION TO DETERMINE THE CAUSE OF THE FAULT. DG212 WAS ONCE AGAIN OPERABLE ON 871208 AT 2114 HOURS. DOWNTIME: 15.5 H. RECONDITIONED TURBO SET REINSTALLED IN CONNECTION WITH SHUTDOWN OF DG212 FOR REPLACEMENT OF GOVERNOR ON 880209.

O2-RO-043/87 - SYSTEM 861 FIRE PROTECTION SYSTEM

INVERTER 861 VXA1 TRIPPED DURING TESTING

DATE:871216 / EL.POWER 630 MWE / CATEGORY: 3

TYPE: 106 205 304 409 502 611 707 812

ON DECEMBER 16 AT 0900 HOURS, A JOB WAS BEGUN INVOLVING REPLACEMENT OF TWO MINIATURE CIRCUIT BREAKERS TO OBTAIN SELECTIVITY. THE JOB REQUIRED ISOLATION OF THE CONTROL EQUIPMENT FOR THE FIRE PROTECTION STATION FROM THE POWER SUPPLY. A DISPENSATION HAD BEEN OBTAINED FROM SKI ON 871210 FOR A POWER OUTAGE OF 5 HOURS. REPLACEMENT OF THE MINIATURE CIRCUIT BREAKERS WAS FINISHED AFTER 2.5 HOURS. ON STARTUP, INVERTER VXA1 TRIPPED DUE TO INTERCONNECTION OF TWO DIFFERENT AC GRIDS. THE CONTROL EQUIPMENT FOR THE FIRE WATER STATION WAS PUT INTO SERVICE, SINCE AN ALTERNATIVE FEED PATH WAS OPERABLE. THE CONTROL EQUIPMENT HAD BEEN DE-ENERGIZED FOR ABOUT 3 HOURS.

THE INVERTER'S FUSE TRIPPED DUE TO INCORRECT CONNECTION OF A CONTACT FUNCTION (FAULT IN DOCUMENTATION).
NEW FUSE INSTALLED IN INVERTER AND CORRECT CONNECTION OF CONTACTS CARRIED OUT. TESTING OF ALL FUNCTIONS WITH SATISFACTORY RESULTS. JOB COMPLETED AFTER 25 HOURS. THE CONTROL EQUIPMENT FOR THE FIRE WATER STATION WAS ISOLATED FROM THE POWER SUPPLY FOR A TOTAL OF THREE HOURS.

03-RO-009/87 - SYSTEM 354 HYDRAULIC SCRAM SYSTEM

LOCAL CRITICAL MEASUREMENTS BEGUN WITHOUT 354 BEING OPERABLE

DATE:870724 / EL.POWER 0 MWE / CATEGORY: 4

TYPE: 104 201 301 409 506 611 707 812 909

IN CONNECTION WITH VERIFICATION OF THE LEAKTIGHTNESS OF THE CONTAINMENT, LOCAL CRITICAL MEASUREMENTS WERE PLANNED. A PREREQUISITE FOR LOCAL CRITICAL TESTS IS THAT THE SCRAM SYSTEMS 354, 351 AND THE RR CHAIN (1-OF-3 LOGIC) SHALL BE OPERABLE. WHEN THE MEASUREMENTS WERE BEING CARRIED OUT, IT WAS DISCOVERED THAT SYSTEM 354 WAS NOT OPERABLE, SO THE TEST WAS INTERRUPTED.
THE PREREQUISITE MENTIONED IN THE OPERATING ORDER THAT SYSTEM 354 WAS TO BE OPERABLE WAS OVERLOOKED BY THE PERSONNEL INVOLVED.
OPERATING ORDERS WILL BE MODIFIED. ROUTINES FOR CHECKING PREREQUISITES AND EXECUTION SEQUENCES IN OPERATING ORDERS WILL BE REVIEWED AND MODIFIED. EXAMINATION ROUTINES FOR OPERATING ORDERS WILL BE AUGMENTED. REVIEW OF OPERATING ORDER ROUTINES WITH ALL SHIFT CREWS AND CONCERNED DAYTIME PERSONNEL.

03-RO-010/87 - SYSTEM 311 STEAM LINES

LONG RUNNING TIME FOR PILOT VALVE IN CONNECTION WITH VALVE TEST

DATE:870807 / EL.POWER 100 MWE / CATEGORY: 3

TYPE: 106 203 312 409 504

DURING PERIODIC TESTING OF THE ISOLATION VALVES IN SYSTEM 311, A LONG RUNNING TIME WAS FOUND FOR PILOT VALVE 311 VA4.V3. THE OTHER VALVES FUNCTIONED SATISFACTORILY. THE VALVE WAS TESTED ON JULY 26, 1987 AT 1337 HOURS WITH SATISFACTORY RESULTS.
1. THE VALVE WAS RETESTED AND FOUND TO FUNCTION SATISFACTORILY. 2. TESTING WILL BE REPEATED WITHIN A WEEK.

03-RO-011/87 - SYSTEM 861 FIRE FIGHTING WATER SYSTEM

FIRE WATER PUMP INOPERABLE

DATE:870810 / EL.POWER 770 MWE / CATEGORY: 3

TYPE: 106 201 301 409 501 611 707 810 909

0255 HOURS: INDICATING LAMP IN AUTO BUTTON FOR FIRE WATER PUMP 861 PB3 WAS REPLACED. DURING THE REPLACEMENT PROCEDURE, THE LAMP GLASS

WAS BROKEN AND A SHORT CIRCUIT OCCURRED. THE FUSE FOR THE INPUT BOARD IN THE PC CONTROL EQUIPMENT TRIPPED, WHEREBY AUTOMATIC CONTROL OF PB3, PB4 AND PB5 WAS LOST.
THE CAUSE WAS A SHORT CIRCUIT DURING REPLACEMENT OF INDICATING LAMP. WHEN THE FIRE WATER SYSTEM WAS FOUND TO BE INOPERABLE, THE FOLLOWING WAS DONE: 861 PB4 ELECTRIC FIRE WATER PUMP WAS STARTED LOCALLY IN THE SWITCHGEAR. 861 PD3 AND PD4, DIESEL-DRIVEN AND ELECTRIC FIRE WATER PUMPS, WERE TESTED WITH SATISFACTORY RESULTS. THE SYSTEM WAS ONCE AGAIN OPERABLE AT 0355 HOURS. PLANNED MEASURES: A SERIES RESISTANCE THAT LIMITS THE SHORT-CIRCUIT CURRENT WILL BE INSTALLED.

O3-RO-012/87 - SYSTEM 358

SYSTEM 358 INOPERABLE DURING REPLACEMENT OF CIRCUIT BOARD

DATE:870809 / EL.POWER 680 MWE / CATEGOPY: 3

TYPE: 106 201 301 409 504 611 701 812 909

ALARM 516 KD725 FAULT, IN 2-OF-4 LOGIC FOR TRIPPING OF X3 CONDITION FOR 358 VD1 AND VD2, WAS OBTAINED VIA THE UNIT COMPUTER SYSTEM. THE ALARM OCCURRED SPORADICALLY AND NO FAULT IN THE 2-OF-4 LOGIC COULD BE DISCOVERED BY FAULT TRACING. TO PERMIT CLOSER INSPECTION OF THE BOARD, THE RPS SELECTOR SWITCH FOR SYSTEM 358 WAS PLACED IN THE OFF POSITION AND THE 2-OF-4 BOARD WAS REPLACED. SYSTEM 358 D SUB WAS INOPERABLE DURING THE PERIOD 1746-1758 HOURS ON AUGUST 10 1987.
THE CAUSE OF THE FAULT HAS NOT BEEN DETERMINED.
THE CIRCUIT BOARD OF TYPE QESI 203 WAS REPLACED AND THE REMOVED BOARD WAS BENCH-CONNECTED FOR FAULT TRACING. NO FAULT HAS BEEN FOUND ON THE CIRCUIT BOARD. IT IS ASSUMED THAT THE FAULT ALARM IS DUE TO DISTURBANCES ON THE INPUT BOARD TO THE UNIT COMPUTER SYSTEM. THE INPUT BOARD IN QUESTION WILL BE TESTED IF THE FAULT ALARM RECURS.

O3-RO-013/87 - SYSTEM 553 STACK RADIATION MONITORING

INOPERABLE MONITORING POINT

DATE:870926 / EL.POWER 720 MWE / CATEGORY: 3

TYPE: 106 201 301 409 503 611 702 812 909

ALARM WAS OBTAINED FROM 553 KD732L1, MONITORING CHANNEL OUT OF ORDER. THE BACKGROUND PREPARATION WAS LOWERED, WHEREBY THE ALARM TEMPORARILY DISAPPEARED. INSPECTION REVEALED ICE FORMATION IN THE LINE BETWEEN THE CRYO TANK AND THE DETECTOR. MONITORING OF RELEASES TO THE ENVIRONMENT VIA 553 KD742 OPERABLE ALL THE TIME.
A VACUUM LEAK HAS ARISEN IN THE DETECTOR DUE TO VIBRATION OR INADVERTENT CONTACT, WHICH HAS GRADUALLY IMPAIRED THE ABILITY TO COOL THE DETECTOR BY MEANS OF LIQUID NITROGEN. AS A RESULT, ITS MONITORING CAPACITY HAS PROGRESSIVELY DETERIORATED.
DETECTOR REPLACED AND CALIBRATED. THE REPLACED DETECTOR IS BEING SENT AWAY FOR EXAMINATION AND REPAIR. THE DETECTOR WILL BE PROVIDED WITH A WARNING PLATE TO PREVENT INADVERTENT CONTACT CAUSING DAMAGE. 553 KD732 ONCE AGAIN OPERABLE ON 870928 AT 0925 HOURS, WHICH MEANS IT WAS

INOPERABLE FOR 48 HOURS.

03-RO-014/87 - SYSTEM 327 AUXILIARY FEED-WATER SYSTEM

LOW ALARM WAS NOT OBTAINED DURING PERIODIC TESTING OF LEVEL REGULATOR

DATE:870930 / EL.POWER 690 MWE / CATEGORY: 3

TYPE: 106 203 304 409 [illegible] 611 704 812 909

DURING PERIODIC TESTING, ALARM WAS NOT OBTAINED FOR LOW LEVEL IN 327 CIRCUIT C. AT THE TIME, 327 PC1 WAS BLOCKED ON ACCOUNT OF ONGOING SUB SHUTDOWN.
THE CONTACTS WERE PROBABLY SET TOO CLOSELY.
THE CONTACTS FOR THE LEVEL REGULATOR WERE ADJUSTED. THE REGULATOR WAS TESTED WITH SATISFACTORY RESULTS ON 1 OCTOBER AT 0910 HOURS.

03-RO-015/87 - SYSTEM 531 NEUTRON FLUX MEASUREMENTS

OPERATION OUTSIDE OF PERMITTED CONTROL RANGE

DATE:871012 / EL.POWER 910 MWE / CATEGORY: 3

TYPE: 106 201 301 409 506 608 707 812 909

ON POWER ASCENT FROM 65% TO 85% ON 12 OCTOBER 1987 AT 0615 HOURS, ALARM WAS OBTAINED FROM 531 KW082 INDICATING THAT THE OPERATING POINT FOR THE CORE COOLANT FLOW WAS OUTSIDE OF THE PERMITTED RANGE. DURING THE SUBSEQUENT XENON TRANSIENT, THE CORE COOLANT FLOW DECREASED TO A LEVEL EQUIVALENT TO 400 KG/S BELOW THE LOWEST PERMISSIBLE HC FLOW AT THE CONTROL POWER LEVEL IN QUESTION.
CONTROL ROOM ENGINEER MISJUDGED EFFECT OF XENON TRANSIENT ON HC FLOW. CONTROL ROD INSERTION SO THAT THE OPERATING POINT WAS ONCE AGAIN WITHIN THE PERMITTED RANGE. THE CORE OPERATING INSTRUCTIONS WILL BE CLARIFIED. OPERATING POINT ONCE AGAIN WITHIN PERMITTED CONTROL RANGE AT 0800 HOURS.

03-RO-016/87 - SYSTEM 583 CONTAINMENT VESSEL INSTRUMENTS

583 MONITORING LOOP SUB C OUT OF ORDER

DATE:871023 / EL.POWER 800 MWE / CATEGORY: 3

TYPE: 106 201 301 409 502 602 704 812 909

ALARM WAS OBTAINED FOR LOW FLOW IN THE MONITORING LOOP FOR OXYGEN AND HYDROGEN ANALYSIS, 583 KC342L1. IT WAS FOUND THAT AN ICE PLUG HAD FORMED IN THE MONITORING LINE DUE TO EXCESSIVELY HIGH COOLING CAPACITY OF 583 EC42. THE MONITORING LOOP WAS INOPERABLE IN SUB C BETWEEN 1825 AND 2325 HOURS ON 87-10-23.
TEMPERATURE SETTING FOR 583 EC42 TOO LOW SO THAT THE MOIST GAS FROM THE WET-WELL FORMED AN ICE PLUG, CAUSING INTERRUPTION OF THE FLOW. REFRIGERATOR 583 EC42 DEFROSTED AND MONITORING LOOP RESTORED. THE TEMPERATURE SENSOR WILL BE MOVED SO THAT THE TEMPERATURE IS MEASURED

IN THE REFRIGERATOR'S REFRIGERANT INSTEAD OF ON THE OUTGOING TUBE.

03-RO-017/87 - SYSTEM 520 COMPUTER SYSTEMS

LOSS OF UNIT COMPUTER

DATE:871112 / EL.POWER 980 MWE / CATEGORY: 3

TYPE: 106 201 304 409 501 611 707 812 909

IMAGE GENERATION IN COMPUTER HALF B WAS EXECUTED BY COMMANDING SYSTEM B TO BE THE MAIN SYSTEM. THERE WAS THEN AN UNAPPROVED IMAGE IN COMPUTER HALF A, RESULTING IN DISCREPANCIES BETWEEN THE A AND B DATABASES, LEADING TO LOSS OF BOTH COMPUTER A AND COMPUTER B.
CAUSED BY ATTEMPT TO GENERATE AN IMAGE IN COMPUTER HALF B WHEN AN UNAPPROVED IMAGE WAS IN THE DATABASE IN SIDE A.
THE SYSTEM WAS RESTARTED WITH BACKUP DISCS AND WAS OPERABLE AFTER 50 MINUTES, EXCEPT FOR POINT 4. ON DUMPING OF PROGRAM TO POINT 4, A PARITY ERROR WAS OBTAINED. AFTER REPLACEMENT OF MEMORY CARD IN POINT 4, THE UNIT COMPUTER SYSTEM WAS OPERABLE ON 871113 AT 0105 HOURS (TOTAL DOWNTIME 3 H 20 MIN). THE INSTRUCTIONS FOR GENERATION IN THE UNIT COMPUTER SYSTEM WILL BE REVISED.

03-RO-018/87 - SYSTEM 520 COMPUTER SYSTEMS

LOSS OF COMPUTER DUE TO POWER FEED FAULT

DATE:871117 / EL.POWER 1101 MW / CATEGORY: 3

TYPE: 106 201 304 409 501 611 701

AT 1710 HOURS, COMPUTER B WENT DOWN DUE TO DEFECTIVE VOLTAGE UNIT. THE FAULT ALSO CAUSED COMPUTER A TO GO DOWN.
SHORT CIRCUIT IN VOLTAGE UNIT FROM MAIN COMPUTER B, CAUSING COMPUTER B TO GO DOWN. THE SHORT CIRCUIT ALSO CUT OFF POWER TO THE COMMUNICATIONS EQUIPMENT BETWEEN COMPUTERS A AND B.
COMPUTER A STARTED, BACK IN OPERATION AT 1831 HOURS. VOLTAGE UNIT REPLACED. COMPUTER B DIAGNOSTICALLY TESTED AND STARTED AS BACKUP. MANUAL CHANGEOVER TO MAIN COMPUTER ON NOVEMBER 18 AT 1331 HOURS.

03-RO-019/87 - SYSTEM 311 STEAM LINES

LONG RUNNING TIME FOR PILOT VALVE

DATE:871120 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 103 201 312 409 504 605 702

UPON DESCENT TO SHORT SHUTDOWN, A LONG RUNNING TIME FOR PILOT VALVE 311 VC3.V3 WAS FOUND IN CONNECTION WITH CLOSURE OF 311 ISOLATION VALVES. OTHER VALVES FUNCTIONED SATISFACTORILY. MALFUNCTION OCCURRED AFTER THE VALVE HAD NOT BEEN UNOPERATED FOR FOUR WEEKS, IN OTHER WORDS THE FIRST OPERATION AFTER A TEST INTERVAL OF 3 WEEKS.
PROBABLY DUE TO STICKING IN VALVE, CAUSE UNKNOWN.

PILOT VALVE REPLACED AND TESTED DURING ASCENT WITH SATISFACTORY RESULTS. RETURN TO TEST INTERVAL THAT APPLIED AFTER RESTART FOLLOWING 1987 REFUELLING OUTAGE, IE GRADUALLY INCREASING TEST INTERVAL IF THE TEST HAS SATISFACTORY RESULTS: FROM TWO 2-WEEK TEST INTERVALS FOLLOWED BY TWO 3-WEEK TEST INTERVALS TO TEST ONCE A MONTH ACCORDING TO TECH SPEC.

O3-RO-020/87 - SYSTEM 653 STAND-BY POWER GENERATORS AND AUXILIARY SYSTEMS

TRIP OF DIESEL B DURING TESTING

DATE:871124 / EL.POWER 790 MWE / CATEGORY: 3

TYPE: 106 203 301 409 503 607 707 812 909

DURING TEST OPERATION OF DIESEL B AFTER ADDITION OF AMEROID, 653 GB1 TRIPPED DUE TO LOW LEVEL IN 654/652 KB483L2, LOW LEVEL IN TB5.
THE CAUSE WAS THAT 652 VB149 (A 3-WAY VALVE) WAS SET TO ITS MIDDLE POSITION SO THAT COOLING WATER LEAKED FROM THE SERVICE WATER SYSTEM TO THE INTERNAL COOLING SYSTEM, CAUSING EXPANSION VESSEL TA2 TO OVERFLOW.
THE VALVE WAS PLACED IN THE RIGHT POSITION AND THE LEVEL ADJUSTED. THE DIESEL WAS THEN TEST-RUN AND FOUND TO BE SATISFACTORY AT 0259 HOURS. THE DIESEL WAS INOPERABLE FOR 2 HOURS AND 13 MINUTES. PLANNED MEASURES: THE OPERATING INSTRUCTIONS WILL BE CLARIFIED REGARDING THE OPERATING AND CHEMICALS ADDITION POSITIONS OF THE VALVE. IN THE LONG RUN, ALL DIESELS WILL BE REBUILT TO ELIMINATE SUCH AMBIGUITIES.

O3-RO-021/87 - SYSTEM 861 FIRE FIGHTING WATER SYSTEM

BOTH FIRE DIESELS START-BLOCKED

DATE:871216 / EL.POWER 1085 MW / CATEGORY: 3

TYPE: 106 209 312 409 502 606 707 812 907

DURING CAPACITY TEST OF BATTERIES FOR FIRE DIESEL 861 PD3, THE WRONG DIESEL FIRE WATER PUMP 861 PB3 WAS DELIMITED. AS A CONSEQUENCE, BOTH FIRE WATER PUMPS 861 PD3 AND 861 PB3 WERE START-BLOCKED DURING THE PERIOD FROM DECEMBER 15, 1987 0758 HOURS UNTIL DECEMBER 16, 1987 1340 HOURS. DOWNTIME: 30 HOURS.
THE WORK NOTIFICATION CONTAINED CORRECT INFORMATION ON THE OBJECT IN QUESTION, BUT THE ROOM DESIGNATION WAS WRONG. S1.14 INSTEAD OF S1.17 ON THE LOCAL/AUTO SWITCH.
SWITCH PLACED IN CORRECT POSITION AND PB3 AND PD3 TEST-RUN. IMPROVED SIGNALLING FROM DIESEL'S FUNCTION-IMPAIRING FAULTS WILL BE INTRODUCED IN ACCORDANCE WITH MODIFICATION PROPOSAL.

O3-RO-022/87 - SYSTEM 861 FIRE FIGHTING WATER SYSTEM

FIRE PUMPS 861 PB3, PB4 INOPERABLE

DATE:871217 / EL.POWER 1085 MW / CATEGORY: 3

TYPE: 106 205 301 409 502 606 707 812 909

IN CONNECTION WITH PERIODIC BACKING-UP OF PROGRAM FOR AUTOMATIC EQUIPMENT, THE OBJECTS SWITCHED OVER FROM AUTOMATIC TO MANUAL MODE. WHEN THE COMMUNICATIONS CARD FOR THE TAPE RECORDER WAS CHECKED, TWO SOLDERING TABS WERE FOUND TO BE TOUCHING. AS A RESULT, THE PROGRAM OBTAINED INCORRECT INFORMATION AND THEREBY SWITCHED OVER TO ITS SAFE MODE WITH ALL OBJECTS IN MANUAL.
ALL OBJECTS WERE PLACED IN AUTOMATIC, RENDERING SYSTEM 861 OPERABLE ONCE AGAIN. THE SYSTEM'S AUTOMATIC FUNCTION WAS INOPERABLE FOR 37 MINUTES. OPERATING PERSONNEL WILL BE PRESENT DURING PERIODIC BACKING-UP OF PROGRAMS SO THAT THEY CAN START FIRE PUMPS MANUALLY IF NEEDED, THEREBY FULFILLING THE OPERABILITY OF THE SYSTEM.

R1-RO-014/87 - SYSTEM 752 COMPRESSED AIR PLANT FOR DIESEL START-UP

STICKING START AIR VALVE

DATE:870706 / EL.POWER 614 MWE / CATEGORY: 3

TYPE: 106 203 301 409 503 605 702

DURING START OF DG130, LOW PRESSURE WAS OBTAINED IN THE START AIR TANKS. THE START AIR VALVE FAILED TO CLOSE (SOLENOID VALVE). HAND VALVES CLOSED. THE DIESEL WAS KEPT IN OPERATION UNTIL THE FAULT HAD BEEN REMEDIED.
PARTICLES IN AIR LINE.
SOLENOID VALVE REPLACED. DG130 STOPPED AND SUBSEQUENTLY STARTED WITH SATISFACTORY RESULTS.

R1-RO-015/87 - SYSTEM 185 COOLING WATER PLANT

TRIPPED MOTOR BREAKER

DATE:870712 / EL.POWER 348 MWE / CATEGORY: 3

TYPE: 106 203 302 409 502 605 705 801 907

IN CONNECTION WITH RECURRENT TESTING OF GATE 185V111, THE MOTOR PROTECTIVE BREAKER TRIPPED ON THE APPURTENANT VALVEACTUATOR. THE GATE TRIPPED AT 100% OPENING, WHICH IS A SAFE POSITION AND PERMITS CONTINUED OPERATION IN THE SAME OPERATING MODE.
THE CAUSE OF TRIPPING OF THE VALVE ACTUATOR IS THAT RUST AND FOREIGN MATTER ON THE VALVE STEM CAUSED THE STEM TO STICK IN ITS GUIDE.
GUIDE AND STEM CLEANED AND LUBRICATED. GATE EXERCISED AND OPERABLE.
THE GUIDE WILL BE FITTED WITH A LUBE NIPPLE. DOWNTIME: 20 MIN.

R1-RO-016/87 - SYSTEM 185 COOLING WATER PLANT

DEFUSING OF 185V111 AND V112

DATE:870714 / EL.POWER 609 MWE / CATEGORY: 3

TYPE: 106 201 409 502 608 707 907

THE GATES 185V111 AND V112 OPENED DUE TO THE FACT THAT 185K406 INDICATED HIGH LEVEL DIFFERENCE OVER SCREEN COMPARTMENT 7. IT WAS FOUND THAT THE LEVEL INDICATION WAS INCORRECT, THE GATES WERE CLOSED AND THE VALVE ACTUATORS WERE DEFUSED TO PREVENT TEMPERATURE INCREASE IN THE AUXILIARY COOLING WATER INLET.
NO FAULT WAS FOUND DURING CALIBRATION OF THE LEVEL MONITORING EQUIPMENT. ONE POSSIBLE CAUSE IS THAT SEAWEED HAD TEMPORARILY BLOCKED THE BUBBLE TUBE.
WHEN THE VALVE ACTUATORS WERE DEFUSED, THE REDUNDANT AUXILIARY COOLING WATER FUNCTION WAS NOT MADE OPERABLE. THE LEVEL DIFFERENCE IS MEASURED OVER SCREEN COMPARTMENTS 7 AND 9. THE MEASURING POINTS ARE CALLED 185K405 AND K406. THE OPENING FUNCTION IS 1-OF-2 CONNECTED. IN THE FUTURE, A DEFECTIVE MEASURING POINT WILL BE BYPASSED IN ORDER TO KEEP AUTOMATIC OPENING OPERABLE. DOWNTIME: 10 MINUTES.

R1-RO-017/87 - SYSTEM 745 VENTILATION SYSTEM FOR OTHER BUILDINGS

745 Q123 FAILED TO START

DATE:870715 / EL.POWER 585 MWE / CATEGORY: 3

TYPE: 106 203 304 409 506 607 701 812 909

DURING TESTING OF THE FAN, "FAN ON" INDICATION WAS NOTOBTAINED. AFTER CHANGE OF FUSE AND RESETTING OF THE OVERLOAD PROTECTIVE DEVICE, THE FAN INDICATED "FAN ON" AND WAS THEREFORE DECLARED OPERABLE. WHEN CURRENT MEASUREMENT WAS PERFORMED ON 870716, THE FAN WAS NOT CONSUMING ANY CURRENT WHILE INDICATING "FAN ON". THE MOTOR (SHUNT-CONNECTED DC MOTOR 370 W) WAS REPLACED ON 870717, AND WHEN A START ATTEMPT WAS MADE THE FUSES AND OVERLOAD PROTECTIVE DEVICE TRIPPED. THE OUTAGE LIMIT IN THE TECH SPEC EXPIRED AND A DISPENSATION FOR CONTINUED OPERATION WAS OBTAINED ORALLY FROM SKI. THE FAN MOTOR WAS TAKEN TO THE SHOP FOR INSPECTION. CARBON DUST AND SMALL SCORES WERE FOUND IN THE COLLECTOR, AND AFTER CLEANING, THE MOTOR WAS STARTED WITH THE DC STARTER. THE FAN MOTOR'S STARTER EQUIPMENT WAS MODIFIED BY INSTALLATION OF A SERIES RESISTANCE IN THE STARTER CIRCUIT. THE STARTING CURRENT AND STARTING TIME WERE CHECKED AND THE FAN WAS DECLARED OPERABLE ON 870719 AT 1230 HOURS. THE PURPOSE OF THE FAN IS TO VENTILATE 416 TURBINE SPACE IN THE EVENT OF A LOSS OF OFF-SITE POWER. THE SPACE IS NORMALLY VENTILATED BY THE INTERMEDIATE BUILDING'S DIESEL-BACKED EXHAUST AIR FANS.
THE STARTER EQUIPMENT DID NOT HAVE A SERIES RESISTANCE TO REDUCE THE STARTING CURRENT. THIS HAS CAUSED EXCESSIVE WEAR OF CARBON BRUSHES UNTIL FINALLY THE BRUSH DID NOT HAVE CONTACT WITH THE COLLECTOR.
FAN MOTOR REPLACED AND STARTER EQUIPMENT MODIFIED. THE MAINTENANCE PROGRAM FOR 745 Q123 WILL BE MODIFIED WITH RESPECT TO INTERVAL AND SCOPE. AMMETER AND/OR DIFFERENTIAL PRESSURE MEASUREMENT OVER THE FAN WILL BE INTRODUCED TO OBTAIN MORE RELIABLE OPERATION INDICATION. THE SUITABILITY OF HAVING A DC MOTOR IN THIS APPLICATION WILL BE INVESTIGATED. DOWNTIME: 4 DAYS 1 HOUR 30 MINUTES.

R1-RO-018/87 - SYSTEM 545 AREA MONITORING IN REACTOR BUILDING FOR

ISOLATION OF THE REACTOR CONTAINMENT

MALFUNCTIONING ROOM MONITORS DURING 1987 REFUELLING OUTAGE

DATE:870918 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 102 203 304 409 504 611 701 812 909

ALL ROOM MONITORS WERE CHECKED DURING THE 1987 REFUELLING OUTAGE. THE FOLLOWING FAULTS WERE FOUND: 545K504 (A3.93) - TRIP LIMIT 60C TOO HIGH. COULD NOT BE ADJUSTED. MONITOR REPLACED. 545K505 (A3.93) - TRIP OK. COULD NOT BE RESET. MONITOR REPLACED. 545K512 (A03.91) - TRIP VALUE SLIGHTLY HIGH. COULD NOT BE ADJUSTED. MONITOR REPLACED. 11-549K441 - SWITCH FAULTY, DOES NOT ALARM. MONITOR REPLACED. 545K510 (A03.91) - TRIP 80C TOO HIGH. MONITOR ADJUSTED. 545K513 (B01.42) - TRIP 60C TOO HIGH. MONITOR ADJUSTED. 545K515 (B01.42) - TRIP 100C TOO HIGH. MONITOR ADJUSTED. 545K537 (B3.79) - TRIP 90C TOO HIGH. MONITOR ADJUSTED. 545K411 (B3.18) - FAILED TO ALARM. MECHANICAL STICKING. MONITOR CLEANED. 545K418 (B3.59) - FAILED TO ALARM. MECHANICAL STICKING. MONITOR CLEANED. 545K426 (B.03.10) - FAILED TO ALARM. MECHANICAL STICKING. MONITOR CLEANED.
ROOM MONITORS TESTED AFTER REPLACEMENT, ADJUSTMENT.

R1-RO-019/87 - SYSTEM 322 CONTAINMENT SPRAY SYSTEM

VALVE FAILED TO TRIP ON TORQUE IN CLOSED POSITION

DATE:870922 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 104 203 305 409 504 605 701 812 903

DURING FUNCTIONAL TESTING OF 322V1, THE VALVE REMAINED IN THE CLOSED POSITION, DESPITE THE FACT THAT THE AUTOMATIC CONTROLS WANTED TO OPEN THE VALVE AGAIN. AFTER ABOUT 5-10 MINUTES, THE VALVE OPENED AUTOMATICALLY. THE VALVE ACTUATOR DID NOT TRIP ON TORQUE; INSTEAD, THE THERMAL PROTECTOR TRIPPED FOR THE ACTUATOR.
DUE TO THE FACT THAT THE CUP SPRING ASSEMBLY FOR TORQUE TRIP WAS INCORRECTLY ASSEMBLED, TORQUE TRIP DID NOT FUNCTION SATISFACTORILY. MOST TESTS OF TORQUE TRIP FAILED. THEMOTORIZED ACTUATOR WAS MOST RECENTLY RENOVATED IN 1981, AND ACTUATOR WEAR HAS NOW LED TO THE MALFUNCTION.
NEW MOTORIZED ACTUATOR, TESTED IN TEST RIG, INSTALLED IN PLACE OF THE FAULTY ACTUATOR. VALVE TEST-RUN AND LEAKAGE-TESTED WITH SATISFACTORY RESULTS. DOWNTIME: 2 HOURS.

R1-RO-020/87 - SYSTEM 322 CONTAINMENT SPRAY SYSTEM

AUTOMATIC START FUNCTION REDUCED

DATE:870921 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 101 203 304 409 504 606 708 811 909

DURING 516 TESTING ON 870921, IT WAS DISCOVERED THAT 322P1 FAILED TO

START ON TRIP OF THE I CHAIN'S A AND B CHANNELS. THE FAULT WAS TRACED TO A REBUILDING OF SYSTEM 354 DURING THE 1986 REFUELLING OUTAGE. AT THAT TIME, COMBINED TRIP OF CHANNELS A AND C WAS TESTED IN 516 WITH SATISFACTORY RESULTS. IN OTHER WORDS, DURING THE 86/87 SEASON, TRIP OF CHANNELS A AND C HAS GIVEN START OF 322P1 IN CONNECTION WITH I ISOLATION. THE OTHER CHANNEL COMBINATIONS A, B AND B, C HAVE NOT FUNCTIONED CORRECTLY. OTHER START CONDITIONS ARE NOT AFFECTED.
WHEN THE ASSEMBLY DRAWINGS WERE BEING PREPARED, A WIRE WAS CROSSED OUT IN THE BELIEF THAT IT WAS NOT BEING USED, SINCE THERE WAS NO CIRCUIT DIAGRAM REFERENCE IN THE WIRING TABLE.
RESTORATION OF REMOVED WIRE. START FUNCTION FOR 322P1 TESTED IN ALL COMBINATIONS. THE ROUTINES FOR REMOVAL OF EQUIPMENT DURING DESIGN WORK WILL BE REVIEWED.

R1-RO-021/87 - SYSTEM 314 PRESSURE RELIEF SYSTEM

LEAKAGE IN A25 LINE FOR PRESSURE-CONTROLLED OPENING OF 314V20.

DATE:870923 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 105 207 309 409 506 603 701 806 904

DURING INSPECTION IN THE REACTOR CONTAINMENT IN CONNECTION WITH POWER ASCENT AFTER REFUELLING OUTAGE, LEAKAGE WAS DISCOVERED FROM A MIXED JOINT ON THE A25 LINE, THE PILOT LINE TO PRESSURE-CONTROLLED VALVE 314V156.
THE CRACK WAS PROBABLY INITIATED IN AN UNDERCUT IN THE CARBON STEEL PART OF THE MIXED JOINT.
THE LINE WAS CUT ON BOTH SIDES OF THE MIXED JOINT. A NEW MIXED JOINT WAS WELDED IN THE SHOP AND A NEW ASSEMBLY JOINT WAS WELDED IN CARBON STEEL. OF OTHER CORRESPONDING MIXED JOINTS, 2 HAVE BEEN X-RAYED AND 11 HAVE BEEN PENETRANT-TESTED WITHOUT ANY DEFECTS BEING DISCOVERED. WHEN THE NEW ASSEMBLY JOINT WAS X-RAYED, THE OLD ONE WAS ALSO X-RAYED AND FOUND TO HAVE A LARGE ROOT REINFORCEMENT ALL AROUND. RADIOGRAPHIC ELLIPSE INSPECTION INDICATED THAT THERE COULD BE A CRACK IN THIS REINFORCEMENT. THE JOINT WAS CUT OUT. EXAMINATION REVEALED THAT THERE WERE NO CRACKS.

R1-RO-022/87 - SYSTEM 551 EQUIPMENT IN MAIN STEAM LINES (BWR)

DEFECTIVE MEASURING CHANNEL

DATE:871006 / EL.POWER 747 MWE / CATEGORY: 3

TYPE: 106 203 304 409 503 611 701 812 909

IN CONNECTION WITH FUNCTIONAL TESTING OF ACTIVITY MONITORING IN THE STEAM LINES ON 871006, IT WAS FOUND THAT ONE OF THE THREE MEASURING POINTS FOR TURBINE 12 WAS NOT OPERABLE, BUT WAS ISSUING AN ALARM FOR LOW MEASURED VALUE. SUBSEQUENT CHECK OF THE PRINTOUT FROM THE SIGNAL SEQUENCE RECORDER SHOWED THAT THE MEASURING POINT HAD BEEN ISSUING AN ALARM SINCE STARTUP OF TURBINE 12, ON 870925, WITH THE EXCEPTION OF A PERIOD WITH HYDROGEN ADDITION ON 871003. TRIP OF 551K804-K806 IN 2-OF-3 GIVES A ISOLATION. THIS HAS NOW BEEN CONNECTED 2-OF-2.

INTEGRATED CIRCUIT IN ELECTRONICS UNIT DEFECTIVE.
HIGH-VOLTAGE CONTACT REPAIRED. THE FAULT IN THIS ARISES DUE TO FREQUENT TESTING ONCE A MONTH. FAULTS OF THIS KIND ARE DISCOVERED BY TESTING AND ARE REMEDIED AT THAT TIME. ELECTRONICS UNIT REPLACED. INVESTIGATION OF CAUSE OF FAULT IN ELECTRONICS UNIT UNDERWAY. EXISTING INSTRUCTIONS WILL BE REVIEWED WITH RESPECT TO PERSISTENT ALARM IN CONNECTION WITH SHIFT TEAM TRAINING DURING WEEKS 41-47, 1987. DOWNTIME: 12 DAYS.

R1-RO-023/87 - SYSTEM 531 NUCLEAR INSTRUMENTATION SYSTEM

INOPERABLE MEASURING CHANNEL IN WRNM

DATE:871006 / EL.POWER 750 MWE / CATEGORY: 3

TYPE: 106 201 305 409 503

DURING STARTUP OF R1 AT 50%, SPIKES HAVE BEEN SEEN AT MEASURING POINT 531K960. PLATEAU CURVES WERE RECORDED SHOWING THAT THE MEASURING POINT WAS FUNCTIONING NORMALLY. ON 871006 AT 1100 HOURS, THE OUTPUT SIGNAL FROM 531K960 DECLINED SHARPLY. THE FAULT HAS BEEN TRACED TO THE REACTOR CONTAINMENT. CABLE OR DETECTOR. 531K960 IS A DETECTOR IN THE WIDE RANGE NEUTRON MONITORING SYSTEM. IT IS ONE OF SIX MEASURING CHANNELS.
LIMIT SWITCHES FROM 531K960 PLACED IN TRIPPED POSITION.THE CAUSE OF THE FAULT WILL BE INVESTIGATED WHEN THE CONTAINMENT BECOMES ACCESSIBLE.

R1-RO-024/87 - SYSTEM 655 STANDBY BATTERY SYSTEM, INVERTERS AND BATTERIES

ABNORMAL SPARKING IN CONVERTER

DATE:871005 / EL.POWER 720 MWE / CATEGORY: 3

TYPE: 106 202 302 409 503 607 705 802 904

ABNORMAL HIGH SPARKING ON COLLECTOR ON CONVERTER OR11, DC MOTOR.
BRUSH ROCKER INCORRECTLY ADJUSTED.
COLLECTOR GROUND AND BRUSH ROCKER ADJUSTED. DOWNTIME FOR OR11: 0820-1030 HOURS.

R1-RO-025/87 - SYSTEM 354 HYDRAULIC SYSTEM FOR CONTROL ROD DRIVES (BWR)

EXTERNAL LEAKAGE FROM SHUTOFF VALVE

DATE:871023 / EL.POWER 750 MWE / CATEGORY: 3

TYPE: 106 202 309 409 504 605 703 812

DURING AN INSPECTION TOUR, NITROGEN GAS LEAKAGE WAS DISCOVERED FROM THE STEM ON 354 V1325 ON SCRAM TANK T101. THE LEAKAGE DID NOT IMPAIR FUNCTION BUT WAS OF SUCH A MAGNITUDE THAT REPAIR WAS JUDGED

NECESSARY. THE SCRAM GROUP WAS INOPERABLE DURING THE REPAIR PERIOD.
WEAR OF TEFLON SEAL.
GROUP TAKEN OUT OF SERVICE ON 871023, 1126 HOURS. GROUP ONCE AGAIN OPERABLE ON 871023 AT 1600 HOURS. DOWNTIME: 5 HOURS.

R1-RO-026/87 - SYSTEM 322 CONTAINMENT SPRAY SYSTEM

INCORRECT BREAKER INDICATION ASEA TYPE ALC 340

DATE:871026 / EL.POWER 702 MWE / CATEGORY: 3

TYPE: 106 201 312 409 503 611 701 805 902

ON FRIDAY 871023 AT 1905 HOURS AT START OF 10-322 P1 IN CONNECTION WITH COOLING OF THE CONDENSATION POOL, A STEADY LIGHT WAS OBTAINED ON THE CONTROL/MONITORING UNIT. THE PUMP STARTED WITHOUT PROBLEM, HOWEVER. DURING FAULT TRACING ON MONDAY 871026, THE PUMP'S 500V BREAKER WAS FOUND TO BE DEFECTIVE AND HAD TO BE REPAIRED. 10-322 P1 WAS TAKEN OUT OF SERVICE AT 1200 HOURS AND REPAIR AND ADJUSTMENT OF THE BREAKER WAS CARRIED OUT. 10-322 P1 WAS TEST-RUN AND DECLARED OPERABLE AT 1652 HOURS.
FAULT RACING REVEALED THAT THE CAUSE OF THE DEFECTIVE CONTROL/MONITORING UNIT SIGNAL WAS THAT THE LINK ARM TO THE AUXILIARY CONTACTS ON THE BREAKER HAD COME LOOSE AT ONE END, RESULTING IN DEFECTIVE CONTACT CLOSURE. IN CONNECTION WITH REPAIR AND ADJUSTMENT, IT WAS DISCOVERED THAT AN AUXILIARY CONTACTOR OF TYPE EG10-LK WAS BURNT OUT, SO THE CONTACTOR WAS REPLACED.
WAS TAKEN OUT OF SERVICE AT 1200 HOURS AND REPAIR AND ADJUSTMENT OF THE BREAKER WAS CARRIED OUT. 10-322 P1 WAS TEST-RUN AND DECLARED OPERABLE AT 1652 HOURS.
FAULT RACING REVEALED THAT THE CAUSE OF THE DEFECTIVE CONTROL/MONITORING UNIT SIGNAL WAS THAT THE LINK ARM TO THE AUXILIARY CONTACTS ON THE BREAKER HAD COME LOOSE AT ONE END, RESULTING IN DEFECTIVE CONTACT CLOSURE. IN CONNECTION WITH REPAIR AND ADJUSTMENT, IT WAS DISCOVERED THAT AN AUXILIARY CONTACTOR OF TYPE EG10-LK WAS BURNT OUT, SO THE CONTACTOR WAS REPLACED.
REPAIR OF LINK ARM FOR AUXILIARY CONTACTS AND REPLACEMENT OF CONTACTOR AG10-L. THE AUXILIARY CONTACTOR IS OF THE CLOSED CIRCUIT TYPE AND SHOULD THEREFORE NORMALLY BE REPLACED WITH AN EH TYPE. IT WAS NOT POSSIBLE TO CHANGE TO AN EH TYPE ON THIS OCCASION DUE TO TOO SHORT CABLING AND FOR SPACE REASONS, SO A NEW EG10-L WAS INSTALLED. DURING THE 1988 REFUELLING OUTAGE, ALL EG10-L CONTACTORS IN 500V BREAKERS FOR SAFETY-RELATED SYSTEMS WILL BE REPLACED. DOWNTIME: 1200-1652 HOURS = 4 HOURS 52 MINUTES.

R1-RO-027/87 - SYSTEM 351 BORON INJECTION SYSTEM (BWR)

UTILIZATION OF REPAIR CRITERION

DATE:871030 / EL.POWER 753 MWE / CATEGORY: 3

TYPE: 106 202 312 409 502 605 706 812 909

A SAFETY VALVE ON THE DISCHARGE SIDE OF A PISTON PUMP LIFTED DURING

TRIAL OPERATION. THE PRESSURE IS INCREASED TO 87 BAR DURING TRIAL OPERATION. THE CONTROL VALVE IS SENSITIVE AT THIS PRESSURE; SMALL CHANGES GIVE RISE TO LARGE PRESSURE CHANGES. THE OUTLET ON THIS SAFETY VALVE IS INTERCONNECTED WITH THE OUTLET ON THE SAFETY VALVE (351V14) ON THE SUCTION SIDE. THE SAFETY VALVE ON THE DISCHARGE SIDE IS SEALED BY A BELLOWS, WHICH IS NOT THE CASE ON THE SUCTION SIDE. BORON HAS ESCAPED FROM THE STEM SEAL ON THE SAFETY VALVE ON THE SUCTION SIDE.
SAFETY VALVE ON THE DISCHARGE SIDE HAS CAUSED PRESSURE ON THE OUTLET OF THE SAFETY VALVE ON THE SUCTION SIDE. THIS HAS LED TO LEAKAGE FROM THE STEM SEAL.
351V14 CLEANED TO REMOVE BORON CRYSTALS. 351P1 TEST-RUN ON 871030 AT 1130 HOURS WITH SATISFACTORY RESULTS. DOWNTIME: 3 HOURS.

R1-RO-028/87 - SYSTEM 533 ROD POSITION INDICATION SYSTEM

EARTH FAULT ON CONTROL ROD INDICATION

DATE:871108 / EL.POWER 749 MWE / CATEGORY: 3

TYPE: 106 201 301 409 502

ON 871108 AT 0001 HOURS, EARTH FAULT WAS OBTAINED ON LHC117. THE EARTH FAULT WAS TRACED TO 533 D444. ROD IN, ROD OUT AND TENS INDICATION HAVE EARTH FAULT. MONITORING IS PROVIDED BY A COUNTER (0-99%). DRIVE NUT IN AND OUT WORK. OPERATION OF THE CONTROL ROD IS REGULATED IN THE TECH SPEC.
ON 871108 AT 1200 HOURS, THE EARTH FAULT WAS PUT ON THE EARTH FAULT TREATMENT DEVICE. ON 871109, ROD OUT AND TENS INDICATION WERE SHUNTED OUT. A COUNTER (PULSE COUNTER) WAS PUT IN AT 1000 HOURS. ON 871109 AT 1500 HOURS, FAULT WAS OBTAINED ON THE ROD IN INDICATION AS WELL.

R1-RO-029/87 - SYSTEM 323 SAFETY INJECTION SYSTEM

UTILIZATION OF REPAIR CRITERION

DATE:871124 / EL.POWER 380 MWE / CATEGORY: 3

TYPE: 106 202 309 409 503 605 704 812 909

DURING PREVIOUS TRIAL OPERATION, A SMALL OIL LEAK, WHICH DOES NOT IMPAIR FUNCTION, WAS DISCOVERED FROM A FLANGE ON THROTTLE VALVE 323V55. IN CONNECTION WITH TRIAL OPERATION ON 871124, IT WAS DECIDED TO SHUT OFF THE OIL PUMP FOR GASKET REPLACEMENT.
GASKET SLIGHTLY MISALIGNED.
OIL PUMP SHUT OFF AT 1327 HOURS. REPLACEMENT OF GASKET. OIL PUMP STARTED AT 1342 HOURS. DOWNTIME: 15 MINUTES.

R1-RO-030/87 - SYSTEM 323 SAFETY INJECTION SYSTEM

SULZER VALVE, CHANGEOVER TO MANUAL CONTROL

DATE:871202 / EL.POWER 378 MWE / CATEGORY: 3

TYPE: 106 201 301 409 502 608 701 812

ON 871202 AT 2206 HOURS, ALARM WAS OBTAINED FROM SIGNAL SEQUENCE RECORDER. CORE SPRAY CONTROL VALVE: "323 V10 AUTOMATIC SWITCHDOWN TO MANUAL". THIS MEANS THAT THE VALVE REMAINS IN ITS NORMAL POSITION, 70%. IF VALVE OPERATION IS CALLED FOR, THE OPERATOR MUST CONTROL THE VALVE MANUALLY.
CAUSED BY STICKING RELAY.
A RELAY IN THE MONITORING OF THE SULZER ELECTRONICS HAD STUCK. RELAY REPLACED. VALVE ONCE AGAIN OPERABLE ON 871203 AT 0005 HOURS. DOWNTIME: 2 HOURS.

R1-RO-031/87 - SYSTEM 354 HYDRAULIC SYSTEM FOR CONTROL ROD DRIVES (BWR)

BREAK IN MAGNETIC COIL FOR SCRAM VALVE

DATE:871221 / EL.POWER 750 MWE / CATEGORY: 3

TYPE: 106 201 409 506 611 703 811 909

ON 871221 AT 2114 HOURS, ALARM WAS OBTAINED FOR LOW DIFFERENTIAL PRESSURE ON THE SOLENOID VALVE FOR SCRAM VALVE 354V1621. THE DIFFERENTIAL PRESSURE SWITCH ISSUES AN ALARM IF ONE SOLENOID HAS A POSITION DIFFERENT THAN THE OTHERS.
CAUSED BY AGING. THE COIL HAS BEEN INSTALLED SINCE STARTUP. NO TREND CAN BE DISCERNED. THE MALFUNCTIONING COIL HAD A BREAK IN ITS WINDING (TYPE SEITZ 2A14 110V DC).
COIL REPLACED ON 871222, 0052 HOURS. ALL 354 SOLENOID VALVES TESTED ON 871222 AT 0100 HOURS. DOWNTIME: 3 H 38 MIN.

R2-RO-015/87 - SYSTEM 711 COMPONENT COOLING SYSTEM,REACTOR PART

COMPONENT COOLING WATER PUMP FAILED TO START

DATE:870807 / EL.POWER 630 MWE / CATEGORY: 3

TYPE: 106 203 304 409 504 606 708 812 909

IN CONNECTION WITH MONTHLY CHANGE OF COMPONENT COOLING WATER PUMPS IN ACCORDANCE WITH THE WORK SCHEDULE FOR THE SHIFT, IT WAS DISCOVERED THAT COMPONENT COOLING WATER PUMP 1 COULD NOT BE STARTED FROM THE CONTROL ROOM. THE PUMP WAS DISCONNECTED AND THE BREAKER TRUCK WAS DRIVEN OUT ON THE FLOOR. THE FUNCTION OF THE BREAKER TRUCK WAS CHECKED, BUT NO FAULT WAS DISCOVERED. ANOTHER START ATTEMPT WAS MADE BUT WITHOUT RESULT. THE ELECTRICAL MAINTENANCE CREW WAS SUMMONED. UPON RENEWED START ATTEMPT WHEN THE ELECTRICAL MAINTENANCE CREW ARRIVED, THE PUMP STARTED.
NO REAL CAUSE OF THE FAULT HAS BEEN FOUND. SINCE ALL THAT HAS BEEN DONE IS THAT THE BREAKER TRUCK HAS BEEN RUN OUT AND BACK IN AGAIN AND THAT THE DISCONNECTOR HAS BEEN OPERATED, TWO POSITION SWITCHES AND ONE CONNECTOR CAN BE SUSPECTED. THE SWITCHGEAR CUBICLE D22-B6 CUBICLE 5, IS, INCIDENTLY, THE SAME SWITCHGEAR CUBICLE IN WHICH TWO PHASES WERE SHORT-CIRCUITED, SEE R2-RO-013/87, SO IT IS POSSIBLE THAT

CONTACT SURFACES HAVE BEEN AFFECTED (DIRT OR OXIDATION).
CHECK OF POSITION SWITCHES FOR BREAKER TRUCK AND OF TRUCK CONNECTOR IS PLANNED (OUTAGE JOB; COLD SHUTDOWN; FAULT REPORT NO. 09518580).
DOWNTIME: 2 HOURS AND 30 MINUTES.

R2-RO-016/87 - SYSTEM 711 COMPONENT COOLING SYSTEM,REACTOR PART

LEAKAGE IN VALVE DIAPHRAGM

DATE:870807 / EL.POWER 630 MWE / CATEGORY: 3

TYPE: 106 203 304 409 504 605 701 806 909

DURING MONTHLY TEST OF VALVES IN THE CC SYSTEM IN ACCORDANCE WITH THE WORK SCHEDULE FOR THE SHIFT, IT WAS FOUND THAT VALVE HCV 3035 COULD NOT BE CLOSED FROM THE CONTROL ROOM WITHOUT HELP (LOCAL OPERATION VIA A HANDWHEEL). THE VALVE IS "FAIL OPEN". THE OPEN FUNCTION WORKED SATISFACTORILY. THE VALVE IS NORMALLY IN THE CLOSED POSITION AND SHALL BE OPENED FROM THE CONTROL ROOM IF THE COMPONENT COOLING SYSTEM (711) IS NEEDED.
CRACKED DIAPHRAGM CAUSED BY AGING.
DIAPHRAGM REPLACED. THE VALVE WAS OPEN DURING THE REPLACEMENT PROCEDURE, WHICH MEANS THAT THE SAFETY FUNCTION OF THE SYSTEM WAS NEVER REDUCED. INTERVALS FOR DIAPHRAGM REPLACEMENT WILL BE REVIEWED.
DOWNTIME: THE TIME REQUIRED TO REPLACE THE DIAPHRAGM WAS JUST UNDER TWO HOURS (1036 TO 1221 HOURS).

R2-RO-017/87 - SYSTEM 539 REACTOR PROTECTION SYSTEM

OVERPOWER DELTA T CIRCUIT ERRS HIGH

DATE:870813 / EL.POWER 630 MWE / CATEGORY: 3

TYPE: 106 201 312 409 502 611 703 812 909

THE POINTER INSTRUMENT FOR OVERPOWER DELTA T CIRCUIT 2 INDICATED TOO HIGH. THE TEST SWITCHES WERE PLACED IN THE TRIPPED POSITION, LEADING TO ONE-OF-TWO CONNECTION INSTEAD OF TWO-OF-THREE CONNECTION IN ORDER TO OBTAIN REACTOR TRIP ON OVERPOWER DELTA T. FAULT TRACING DURING THE MORNING OF 14 AUGUST LED TO REPLACEMENT OF A FOXBORO UNIT (TY 422B). THE FAULT INDICATION DID NOT AFFECT THE SAFETY CIRCUITS, ONLY THE COMPUTER INPUT, THE POINTER INSTRUMENT AND THE RECORDER, BUT THIS CANNOT BE DETERMINED AT FIRST. DEALT WITH BY LOCAL SAFETY COMMITTEE ON 870902.
NO CONCRETE FAULT HAS BEEN DISCOVERED.
COMPONENT REPLACED. FAULT TRACING IN WORKSHOP. NO FAULT FOUND. RETURN TO NORMAL VALUE. OUTPUT TRANSISTORS REPLACED AS PRECAUTIONARY MEASURE.

R2-RO-018/87 - SYSTEM 322 CONTAINMENT SPRAY SYSTEM

SPURIOUS TRIP OF OVERCURRENT PROTECTIVE RELAY

DATE:870818 / EL.POWER 632 MWE / CATEGORY: 3

TYPE: 106 201 301 409 503 611 703 812 909

AFTER ALARM IN CONTROL DESK SECTION ALB24 "D21-A6 OVERCURRENT", THE SOURCE OF THE FAULT WAS TRACED TO THE OVERCURRENT PROTECTIVE RELAY FOR SPRAY PUMP 1 (SIAPCS-1). THE FUNCTION OF THE PROTECTIVE RELAY IS TO TRIP THE PUMP'S CIRCUIT BREAKER AND TO BLOCK STAGE 1 FOR THE TRIP FUNCTION OF THE OVERLYING BREAKER WITH SIMULTANEOUS ALARM TO THE CONTROL ROOM. IN THIS CASE, ONLY THE LATTER FUNCTION WAS DEFECTIVE. A DECISION WAS MADE TO JUMPER OUT THIS FUNCTION (1530 HOURS 870818), BUT LATER (2400 HOURS 870818) THE PUMP WAS DISCONNECTED SO AS NOT TO DISTURB THE SELECTIVITY OF BREAKER TRIP IN THE EVENT OF A PUMP START WITH SIMULTANEOUS FAULT IN THE PUMP MOTOR.
COMPONENT FAULT IN PROTECTIVE RELAY BBC IKS 701. MALFUNCTIONING PROTECTIVE RELAYS OF THE SAME TYPE HAVE PREVIOUSLY BEEN EXAMINED BY THE MANUFACTURER, WITHOUT DEFECTIVE COMPONENTS BEING LOCATED. REPLACEMENT OF PROTECTIVE RELAY WITH NEW TYPE, BBC IKT 943. PUMP TESTED AT 1216 HOURS.TOTAL DOWNTIME: 12 H 16 MIN. REPLACEMENT OF THE PROTECTIVE RELAYS BELONGING TO SAFETY-RELATED OBJECTS IS PLANNED. THE OVERCURRENT PROTECTIVE RELAY FOR OTHER OBJECTS WILL BE REPLACED WHEN SIMILAR FAULTS ARE REVEALED IN ACCORDANCE WITH AN EARLIER DECISION, SEE PR-PM 258/86.

R2-RO-019/87 - SYSTEM 411 MAIN STEAM SYSTEM INCLUDING DUMPING EQUIPMENT

LOOSE SCREW ON CHECK VALVE DISK

DATE:870925 / EL.POWER 637 MWE / CATEGORY: 3

TYPE: 106 207 312 409 506 605 703 812 909

EXPERIENCE FOLLOW-UP FROM RINGHALS 4, SEE R4-RO-016/87, RESULTED IN AN ORDER TO CHECK EQUIVALENT CHECK VALVES IN R2 IN THE STEAMLINES THAT LEAD TO THE TURBINE-DRIVEN AUXILIARY FEEDWATER PUMP. RADIOGRAPHING WITH THE SYSTEM PRESSURIZED WAS THE METHOD THAT WAS AVAILABLE WITH UNDIMINISHED OPERABILITY. ON 87-09-25 AT 1300 HOURS, RADIOGRAPHS WERE PRESENTED OF 3908 SHOWING CLEARLY THAT THE WASHER AND LOCKNUT WERE MISSING ON THE DISK CUP SCREW. COMPARATIVE RADIOGRAPHS WERE TAKEN IMMEDIATELY ON THE OTHER CHECK VALVE 3900, WHICH WAS SATISFACTORY. AT 1525 HOURS ON 87-09-25, AFAPTD-01 WAS ISOLATED FOR REPAIR OF 3908. AFTER THE REPAIRS WERE CONCLUDED (FITTING OF NEW WASHER, LOCKNUT AND LOCK WIRE PLUS INSPECTION OF OTHER PARTS), THE PUMP WAS PUT BACK INTO SERVICE AND TESTING WAS FINISHED WITH SATISFACTORY RESULTS AT 1830 HOURS. NO LOOSE PARTS WERE FOUND AND THE VALVE DISK/SEAT WAS UNDAMAGED AND IN THE NORMAL POSITION, INDICATING THAT THE CHECK VALVE HAS BEEN FUNCTIONAL DESPITE A LOOSE SCREW. THE VALVE UNDERWENT MAINTENANCE IN 1982 AND IT IS NOT POSSIBLE TO ESTIMATE HOW LONG THE NUT HAS BEEN GONE. NO SYMPTOMS ATTRIBUTABLE TO LOOSE PARTS IN THE STEAM LINE HAVE BEEN OBSERVED IN CONNECTION WITH ROUTINE TESTING OF THE AUXILIARY FEEDWATER PUMP. IT WAS CONCLUDED THAT THE LOOSE PARTS HAVE NOT BEEN ABLE TO CAUSE DAMAGE TO THE CONTROL VALVE OR TURBINE. CONSEQUENCE: THE PURPOSE OF V3908 AND V3900 IS TO PREVENT A CROSS-FLOW OF STEAM BETWEEN STEAM GENERATORS 1 AND 3. INCOMPLETE STEAM ISOLATION IS THUS THE

CONSEQUENCE OF A MALFUNCTIONING 3908 AND SECONDARY RUPTURE IN SG 3, WHICH LEADS TO A COMPLETE LOSS OF STEAM SUPPLY TO AFAPTD-01.
NO CAUSE OF FAULT. THE STRAINER HAS FUNCTIONED AS INTENDED AND DOES NOT HAVE TO BE REPLACED.
1. RADIOGRAPHING OF V3900 AND 3908. 2. NEW SCREW AND WASHER FITTED ON 3908. 3. AFAPTD-01 TEST-RUN WITH SATISFACTORY RESULTS. 4. INVESTIGATION AS TO WHETHER THE MAINTENANCE INTERVAL NEEDS TO BE CHANGED. 5. CONTINUED INVESTIGATION OF STEAM LINES, CONDENSATE TRAPS, YCV1108 AND STRAINER AT TURBINE IN ORDER TO FIND THE MISSING NUT AND WASHER. RADIOGRAPHING OF POSSIBLE COLLECTION POINTS. DOWNTIME AFAPTD: 2.5 HOURS.

R2-RO-020/87 - SYSTEM 711 COMPONENT COOLING SYSTEM,REACTOR PART

COMPONENT COOLANT PUMP FAILED TO START AT MONTHLY TEST

DATE:871002 / EL.POWER 650 MWE / CATEGORY: 3

TYPE: 106 203 304 409 504 609 703 812 904

MONTHLY TESTING AND SWITCHING OF COMPONENT COOLANT PUMPS WAS CARRIED OUT ON 871002 AT 0400 HOURS IN ACCORDANCE WITH OPERATING INSTRUCTIONS 2-D4-231. ACAPCC-01 FAILED TO START ON MANUAL START ATTEMPT FROM CONTROL ROOM PANEL B01. THE OPERATOR CONCLUDED THAT FAULT TRACING IN THE CONTROL CIRCUITS SHOULD BE CARRIED OUT WHILE THE FAULT STILL REMAINED AND CONTACTED THE ELECTRICAL MAINTENANCE CREW. THE SYMPTOM HAS EXISTED EARLIER, BUT THE PUMP HAS THEN STARTED AFTER REPEATED START ATTEMPTS. FAULT TRACING OF CONTROL CIRCUITS WAS STARTED AND A SIGNIFICANT FAULT WAS FOUND AND REPAIRED IMMEDIATELY. ACAPCC-01 TEST-RUN WITH SATISFACTORY RESULT AT 0953 HOURS. CONSEQUENCE: THE FAULT CAN PREVENT START AS WELL AS STOP SIGNALS FROM REACHING THE 6 KV BREAKER.
THE CAUSE WAS A LOOSE CONNECTION IN THE CONTROL CIRCUIT. A LOOSE CONNECTION WAS FOUND IN THE 6 KV BREAKER'S INTERNAL CONTROL CIRCUIT IN A CABLE JOINT (FLAT-PIN MALE AND FEMALE TYPE) WHERE AN INSULATING RUBBER SLEEVE HAD HELD THE CABLES TOGETHER WITH THE CONTACT PINS SEPARATED.
SWITCHING OF CC PUMPS INTERRUPTED FOR FAULT TRACING. FAULT REVEALED AND REPAIRED AS PER ABOVE. CHECK OF ALL 6 KV BREAKERS WITH RESPECT TO FLAT PIN CONTACT IS PLANNED IN CONNECTION WITH REGULAR BREAKER MAINTENANCE. ACAPCC-01 TEST-RUN WITH SATISFACTORY RESULTS AND PUT INTO SERVICE AS ON-DUTY PUMP. DOWNTIME: 6 HOURS.

R2-RO-021/87 - SYSTEM 651 STANDBY DIESEL SYSTEM DIESELSET

DG210 TAKEN OUT OF SERVICE FOR REPAIR OF EXTERNAL LEAK IN CHECK VALVE IN LUBRICATING OIL SYSTEM

DATE:871103 / EL.POWER 650 MWE / CATEGORY: 3

TYPE: 106 203 309 409 501 605 701 812 909

TUESDAY 871103, 0800 HOURS. PRIOR TO REGULAR TESTING OF DG210, THE PRELIMINARY LUBRICATING OIL PUMPS WERE CHANGED OVER, WHEREBY AN

EXTERNAL LEAK FROM CHECK VALVE 651 V472 REQUIRED IMMEDIATE ATTENTION. DIESEL GENERATOR DG210 WAS START-BLOCKED FOR ABOUT 4 MINUTES WHILE MAINTENANCE PERSONNEL REPLACED THE BONNET GASKET ON THE CHECK VALVE. THE DIESEL GENERATOR WAS SUBSEQUENTLY TEST-RUN WITH SATISFACTORY RESULTS.
LEAKAGE IN GASKET. CRACK IN KLINGERITE GASKET.
OLD GASKET REPLACED WITH COPPER GASKET FOR SCREW BONNET 20-651 V472. TRIAL OPERATION OF DG210 WITH SATISFACTORY RESULTS IN ACCORDANCE WITH OPERATING INSTRUCTIONS 2-D5-203A POINT 2 PAGE 3 AT 0805 HOURS ON 871103. DOWNTIME FOR DG210 4 MINUTES.

R2-RO-022/87 - SYSTEM 415 MAIN FEED WATER SYSTEM

INOPERABLE TURBINE-DRIVEN AUXILIARY FEEDWATER PUMP

DATE:871117 / EL.POWER 650 MWE / CATEGORY: 3

TYPE: 106 207 312 409 503 606 706 812 909

THE BACKGROUND TO THIS SHUTDOWN OF AFAPTD IS DESCRIBED IN R2-RO-019/87. LOOSE PARTS THAT WERE MISSING FROM STEAMLINE CHECK VALVE 3908 HAVE BEEN FOUND IN THE STRAINER UPSTREAM OF THROTTLE VALVE 1147A BY MEANS OF RADIOGRAPHY. THE STRAINER PREVENTED FOREIGN OBJECTS FROM PROGRESSING FURTHER INTO THE SYSTEM. IN A LONGER TIME PERSPECTIVE, HOWEVER, IT WAS FEARED THAT THE FOREIGN OBJECTS COULD POSSIBLY DAMAGE THE STRAINER MESH AND THEN DAMAGE THE TURBINE. A DISPENSATION WAS APPLIED FOR AND OBTAINED FROM SKI TO TAKE AFAPTD OUT OF SERVICE. ON 17 NOVEMBER, THE PUMP WAS SHUT OFF BETWEEN 0750 AND 1100 HOURS AND THE FOREIGN OBJECTS WERE REMOVED FROM THE STRAINER.
NO CAUSE OF FAULT. THE STRAINER HAS FUNCTIONED AS INTENDED AND DOES NOT HAVE TO BE REPLACED.
REMOVAL OF FOREIGN OBJECTS IN STRAINER UPSTREAM OF INTERNAL THROTTLE VALVE 1147. AFAPTD WAS TEST-RUN AFTER RESTORATION WITH SATISFACTORY RESULTS. AN OPERATING REPORT WILL BE ISSUED DEALING WITH THESE EVENTS. DOWNTIME 3 HOURS 10 MINUTES.

R2-RO-023/87 - SYSTEM 554 AREA GAMMA MONITORING SYSTEM

REDUCED FLOW TO R11

DATE:871202 / EL.POWER 654 MWE / CATEGORY: 3

TYPE: 106 202 303 409 502 611 705 812 909

DURING AN INSPECTION TOUR ON 871202, IT WAS DISCOVERED THAT THE BYPASS VALVE FOR ACTIVITY MONITOR R11 (PARTICLE MONITORING, CONTAINMENT) WAS OPEN. THIS MEANS THAT R11 IS MEASURING A PARTIAL FLOW INSTEAD OF THE FULL FLOW. THE ALARM LIMIT IS SET TO INDICATE LEAKAGE IN THE CONTAINMENT SO THAT THE ALARM LIMIT IS 50-100% ABOVE NORMAL VALUES (TECH SPEC TABLE 3.3-6). THIS MEANS THAT AT A LOWER FLOW THROUGH R11 (GIVING LOWER READINGS), THE ALARM LIMIT WILL ALSO BE ADJUSTED DOWNWARD ACCORDINGLY. THE ALARM LIMIT VERSES THE CURRENT READING IS CHECKED DAILY BY RTS2. IF THE ALARM LIMIT NEEDS TO BE RAISED, PROTECTION AND SAFETY INSTRUCTIONS 178 MUST BE FOLLOWED, IE

THE RADIOLOGICAL SUPERINTENDENT SHALL APPROVE THE INCREASE. INQUIRIES REVEAL THAT THE BYPASS VALVE HAS BEEN OPEN SINCE 870628. MANUAL SAMPLES TAKEN SINCE STARTUP AFTER 1987 REFUELLING OUTAGE: 870622, 7.1X10-2 DAC 871204, 6.3X10-2 DAC IN OTHER WORDS, AIRBORNE ACTIVITY HAS NOT INCREASED DURING THIS PERIOD. ANY INCREASE IS SEEN FIRST IN THE NOBLE GASES, IE R12, WHICH HAVE NOT BEEN BYPASSED.
INCORRECT OPERATIONAL BASE SETTING.
- BYPASS VALVE CLOSED - MANUAL MEASUREMENT PERFORMED - CHECKLIST ADJUSTED

R2-RO-024/87 - SYSTEM 321 RESIDUAL HEAT REMOVAL SYSTEM

VALVE NOT FULLY MOBILE

DATE:870712 / EL.POWER 653 MWE / CATEGORY: 3

TYPE: 106 203 303 409 502 605 701 812 909

PERIODIC TESTING OF THE RESIDUAL HEAT REMOVAL SYSTEM ON 871207 REVEALED THAT VALVE HCV 603 A COULD NOT BE CLOSED ALL THE WAY. A PIN IN THE LINKAGE FROM THE ACTUATOR TO THE VALVE STEM HAD LOST ITS LOCK NUT AND THE PIN HAD SLID OUT HALF WAY, PREVENTING VALVE MOTION. THE PIN AND LOCK NUT WERE PUT BACK INTO PLACE, AFTER WHICH THE VALVE FUNCTIONED SATISFACTORILY.
FAULTY INSTALLATION.
OTHER VALVES WITH SIMILAR CONTROL SYSTEMS IN THE RESIDUAL HEAT REMOVAL SYSTEM WERE CHECKED AND FOUND TO BE SATISFACTORY. LOST LOCK NUT REPLACED.

R2-RO-025/87 - SYSTEM 651 STANDBY DIESEL SYSTEM DIESELSET

REPLACEMENT OF FUEL INJECTION TUBE ON CYLINDER 10

DATE:871222 / EL.POWER 655 MWE / CATEGORY: 3

TYPE: 106 203 309 409 503 607 701 812 909

DURING REGULAR TRIAL OPERATION OF DIESEL GENERATOR 240 AT 0950 HOURS ON 87-12-22, A MINOR FUEL OIL LEAK WAS DISCOVERED FROM THE INJECTION TUBE TO CYLINDER 10. THE OPERATOR MADETHE JUDGEMENT THAT TIGHTENING OF THE TUBE CONNECTION WAS NEEDED AND NOTIFIED THE MECHANICAL MAINTENANCE DEPARTMENT OF THE LEAKAGE. NEW TRIAL OPERATION OF THE DIESEL ON 87-12-23 FOR TIGHTENING OF THE LEAK REVEALED THAT THE TUBE NEEDED TO BE REPLACED. DG240 WAS START-BLOCKED BETWEEN 0922 AND 0940 HOURS FOR REPLACEMENT OF THE FUEL INJECTION TUBE. THE DIESEL WAS TEST-RUN WITH SATISFACTORY RESULTS AFTER THE TUBE CHANGE.
A MINOR LEAK WAS FOUND IN THE MIDDLE OF THE TUBE, WHICH COULD NOT BE IDENTIFIED AS A PORE OR A CRACK. RADIOGRAPHY AND PENETRANT TESTING OF THE FUEL INJECTION TUBE WILL BE PERFORMED IN ORDER TO ESTABLISH THE CAUSE OF THE FAULT. SUCH LEAKS HAVE OCCURRED BEFORE ON INJECTION TUBES OF THE ORIGINAL TYPE, WHICH HAVE BEEN REPLACED IF THEY LEAKED. THE NEWER TYPE OF TUBE INSTALLED IN THEIR PLACE HAS SO FAR SHOWN NO TENDENCY TOWARDS LEAKAGE.
INJECTOR TUBE TO CYLINDER 10 REPLACED. DG240 TEST-RUN WITH

SATISFACTORY RESULTS. PREVIOUSLY OCCURRING LEAKS OF A SIMILAR TYPE AT RINGHALS UNIT 1 ARE DESCRIBED IN STUDSVIK REPORT E1-80/63. THE NEED TO REPLACE INJECTOR TUBES AS A PREVENTIVE MEASURE WILL BE EVALUATED BY THE MAINTENANCE DEPARTMENT. DOWNTIME 18 MINUTES.

R3-RO-013/87 - SYSTEM 313 REACTOR COOLANT SYSTEM

LOW BORON CONTENT IN REACTOR COOLANT SYSTEM

DATE:870718 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 102 209 312 409 506 611 708 812 909

DRAINAGE OF REFUELLING POOL AFTER LOADING WAS IN PROGRESS. IN ORDER TO REDUCE THE RADIATION FROM THE POOL WALLS, THEY ARE AUTOMATICALLY SPRAYED AT A GIVEN FREQUENCY. A BORON SAMPLE SHOWED THAT THE BORON CONTENT OF THE REACTOR COOLANT SYSTEM WAS 1935 PPM, AS COMPARED WITH THE REQUIRED 2000 PPM.
THE CAUSE IS TOO MUCH SPRAYING OF THE POOL WALLS.
REBORATION OF THE REACTOR COOLANT SYSTEM TO 2005 PPM WAS UNDERTAKEN.
DOWNTIME: 30 MINUTES.

R3-RO-014/87 - SYSTEM 323 SAFETY INJECTION SYSTEM

ACCUMULATOR LEVEL DROPPED

DATE:870803 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 105 201 312 409 502 601 707 812 909

DURING TESTING OF SI CHECK VALVES IN CONNECTION WITH RESTART AFTER REFUELLING OUTAGE, V8808 B AND C WERE OPENED. DUE TO THE FACT THAT THE LINE BETWEEN 8808 B AND C AND CHECK VALVES 8956 B AND C WAS NOT FULL, THE LEVEL IN ACCUMULATOR 2 DROPPED TO 14 CM. THE PRESSURE FELL TO 40.5 BARG. TECH SPEC LIMIT IN OPERATING CONDITIONS 1,2,3: PRESSURE = 41.8 BARG - 44.8 BARG. LEVEL = 18.5 CM - 28 CM.
FILLING FINISHED ON 870803, 0955 HOURS. DOWNTIME: 2 HOURS 25 MINUTES.

R3-RO-015/87 - SYSTEM 323 SAFETY INJECTION SYSTEM

HAND VALVE COULD NOT BE OPENED

DATE:870803 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 105 203 312 409 502 605 707 812 909

THE VALVE IS LOCATED ON THE CROSSOVER LINE ON THE DISCHARGE SIDE OF THE RH PUMPS. IN CONNECTION WITH LEAKAGE TESTING OF THE RC ACCUMULATORS' CHECK VALVES, HAND VALVE 8807A WAS CLOSED. AFTER THE TEST, OPERATORS COULD NOT OPEN THE VALVE.
THE VALVE IS AN 8-INCH GATE VALVE.
THE MAINTENANCE CREW EXERCISED THE VALVE A FEW TIMES. NO OTHER MEASURE WAS CONSIDERED NECESSARY. DOWNTIME: 12 HOURS.

R3-RO-016/87 - SYSTEM 327 AUXILIARY FEED WATER SYSTEM

INTERNAL VALVE LEAKAGE

DATE:870804 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 103 203 312 409 506 605 704 812 904

DURING FUNCTIONAL TESTING WITH FULL PRESSURE AND TEMPERATURE IN RC, IT WAS DISCOVERED THAT VALVE 9687 WAS LEAKING INTERNALLY. THE VALVE WAS REPLACED DURING THE 1987 REFUELLING OUTAGE. LEAKTIGHTNESS WAS NOT CHECKED. ADJUSTMENT OF VALVE STROKE. DOWNTIME: 2 HOURS 30 MINUTES.

R3-RO-017/87 - SYSTEM 327 AUXILIARY FEED WATER SYSTEM

LOW LEVEL IN CONDENSATE STORAGE TANK

DATE:870804 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 105 201 312 409 502 611 708 812 909

IN OPERATING CONDITIONS 1,2,3 AND 4 THE CONDENSATE STORAGE TANK SHALL CONTAIN AT LEAST 627 M3 OF WATER (ABOUT 61%). IN CONNECTION WITH STARTUP OF THE FIRST TURBINE AFTER THE REFUELLING OUTAGE, THE TANK CONTAINED APPROXIMATELY 2% LESS THAN THIS MINIMUM. TURBINE STARTUP WAS INTERRUPTED AND THE WATER LEVEL WAS RESTORED. MINIMUM LEVEL IN CST RESTORED IMMEDIATELY. DOWNTIME: 1 HOUR.

R3-RO-018/87 - SYSTEM 651 STANDBY DIESEL SYSTEM DIESELSET

DG320 START-BLOCKED DUE TO DOUBLE EARTH FAULT

DATE:870806 / EL.POWER 143 MWE / CATEGORY: 3

TYPE: 106 201 312 409 506 605 705 809 909

DURING THE REFUELLING OUTAGE, EARTH FAULT ON BUSBAR LHC321 (110 DC) HAS RECURRED 4-6 TIMES A DAY AND DISAPPEARED AFTER 5-10 MINUTES. THIS HAS PREVENTED LOCATION OF THE FAULT. AT 0954 HOURS, EARTH FAULT ALARM WAS OBTAINED AGAIN. AT 1033 HOURS, THE EARTH FAULT DISAPPEARED AND ALARM WAS OBTAINED FOR 1) TRIPPED MINIATURE CIRCUIT BREAKER IN RELAY ROOM FOR LHC321, 2) NON-TRIPPING FAULT DG320 (DUE TO TRIPPED MINIATURE CIRCUIT BREAKER DG320), 3) TRIPPING FAULT (DUE TO LOSS OF VOLTAGE TO START/STOP VALVES) AND THE EARTH FAULT ALARM CAME AND WENT. THE MINIATURE CIRCUIT BREAKER IN THE RELAY ROOM COULD BE RESTORED, AFTER WHICH THE EARTH FAULT RECURRED. WHEN THE MINIATURE CIRCUIT BREAKER IN DG320 CONTROL ROOM (SUPPLIED FROM LHC321) WAS RESTORED, THE EVENT FROM 1033 HOURS WAS REPEATED. DG320 THUS REMAINED START-BLOCKED DUE TO LOSS OF CONTROL VOLTAGE.
DOUBLE EARTH FAULT. ON DG320, THE FAULT WAS TRACED TO THE CABLE TO THE SOLENOID COIL FOR THE DRAINAGE VALVE ON THE START AIR SYSTEM'S REFRIGERATION DRYER. THE CABLE HAD SLIPPED OUT OF ITS ATTACHMENT AND THE NEGATIVE POLE WAS TOUCHING EARTH. THE COIL HAS 2-POLE CONTROL AND

IS ENERGIZED WHEN THE START AIR COMPRESSOR IS RUNNING. START FREQUENCY AND RUNNING TIME INDICATE THAT THE INTERMITTENT EARTH FAULT THAT WAS FOUND DURING THE REFUELLING OUTAGE HAS NOW BEEN LOCATED. THE EARTH FAULT THAT WAS SUPPLIED FROM THE MINIATURE CIRCUIT BREAKER IN THE RELAY ROOM WAS TRACED TO 32-426V4. THE CABLE TO THE OPEN LIMIT SWITCH HAD BEEN PINCHED BY THE COVER WHEN IT WAS REFITTED AT THE TIME OF THE EVENT SO THAT THE POSITIVE POLE WAS TOUCHING EARTH.
DG310, 330 AND 340 TEST-RUN AND VERIFIED OPERABLE IN ACCORDANCE WITH TECH SPEC. DG320 DRAINAGE VALVE JUMPERED OUT AND DG320 ONCE AGAIN OPERABLE AT 1305 HOURS. CABLE ADJUSTED AND JUMPER REMOVED. THE MINIATURE CIRCUIT BREAKER IN THE RELAY ROOM WAS PLACED ON THE EARTH FAULT TRACING EQUIPMENT DURING THE TIME FAULT TRACING WAS IN PROGRESS. DOWNTIME: 2 HOURS 32 MINUTES.

R3-RO-019/87 - SYSTEM 334 CHEMICAL AND VOLUME CONTROL SYSTEM (PWR)

CSAPCH-01 TAKEN OUT OF SERVICE DUE TO HIGH VIBRATION

DATE:870825 / EL.POWER 940 MWE / CATEGORY: 3

TYPE: 106 202 308 409 503 606 705 812 909

DURING PERIODIC CHANGEOVER OF CHARGING PUMPS, IT WAS FOUND THAT VIBRATION OF CSAPCH-01 TENDED TO RISE WHEN IT HAD BEEN SWITCHED IN AS THE DUTY PUMP. VIBRATION MEASUREMENTS WERE CARRIED OUT BY THE MEASUREMENT CREW AND THE RESULTS OF THESE MEASUREMENTS INDICATED THAT THE PUMP WAS PROBABLY MISALIGNED. IT WAS DECIDED TO TAKE THE PUMP OUT OF SERVICE FOR ALIGNMENT CHECK. THE PUMP WAS DECLARED INOPERABLE ON 870825 AT 0645 HOURS.OUTAGE LIMIT ACCORDING TO TECH SPEC: 48 H.
CAUSE WAS MISALIGNMENT.
CHECK AND ALIGNMENT PERFORMED ON GEARBOX AND MOTOR. NEW VIBRATION MEASUREMENT CARRIED OUT AND RESULTS SHOWED THAT THE VIBRATION LEVEL HAD DECLINED TO ACCEPTABLE VALUES. THE PUMP WAS DECLARED OPERABLE ONCE AGAIN ON 870825 AT 1700 HOURS. DOWNTIME: 10 H 15 MIN.

R3-RO-020/87 - SYSTEM 322 CONTAINMENT SPRAY SYSTEM

REPAIR OF VALVE FCV949B

DATE:870902 / EL.POWER 480 MWE / CATEGORY: 3

TYPE: 106 209 312 409 503 605 704 812 909

SAMPLING BEFORE SPRAY TESTING REVEALED HIGH NAOH LEVEL IN THE SPRAY SYSTEM. THE SYSTEM HAD BEEN RINSED A FEW DAYS EARLIER. THE CAUSTIC SODA MUST THEREFORE HAVE LEAKED THROUGH EITHER FCV949A OR B. THE CAUSTIC SODA SYSTEM WAS TAKEN OUT OF SERVICE ON 870902 FROM 0941 TO 1303 HOURS AND ON 870903 FOR RINSING BETWEEN 1130 AND 2000 HOURS. OUTAGE LIMIT AS PER TECH SPEC: 12 HOURS.
THE VALVE WAS NOT CLOSED ALL THE WAY. BOTH FCV949A AND B COULD REPORTEDLY BE TURNED SLIGHTLY BY HAND.
THE MAINTENANCE CREW U3E HAS RECORDED CURRENT CURVES ON BOTH FCV949A AND B. THE CLOSING TORQUE ON FCV949B WAS INCREASED TO GET THE VALVE TO SEAL BETTER. THE VALVE WAS THEN RETESTEDAND FUNCTIONED

SATISFACTORILY. DURING THE SUBSEQUENT RINSE WITH DISTILLED WATER, THE VALVES 9462A,B AND 9466A,B WERE CLOSED SO AS NOT TO RISK GETTING CAUSTIC SODA IN THE RWST. DOWNTIME: 11 HOURS AND 52 MINUTES.

R3-RO-021/87 - SYSTEM 336 SAMPLING SYSTEM

RE-19 TAKEN OUT OF SERVICE DUE TO REPAIR OF FAULTY FLOWMETER 336-711 C

DATE:870910 / EL.POWER 950 MWE / CATEGORY: 3

TYPE: 106 202 303 409 503 611 705 812 909

ON 870910 IT WAS FOUND THAT FLOWMETER FI-711 C WAS INDICATING A STABLE STEADY FLOW REGARDLESS OF HOW THE CONTROL VALVE UPSTREAM OF THE FLOWMETER WAS ADJUSTED. THIS MEANT THAT IT WAS NOT POSSIBLE TO VERIFY ANY FLOW FROM STEAM GENERATOR 3 THROUGH R-19. IT WAS THEN DECIDED TO TAKE THE FLOWMETER OUT OF SERVICE FOR REPAIR, AND R-19 WAS THEN ALSO TAKEN OUT OF SERVICE. OUTAGE LIMIT AS PER TECH SPEC: CORRECTIVE ACTION 22 APPLIES, WHICH MEANS THAT THE CHANNEL SHALL BE RESTORED AS SOON AS POSSIBLE.
MAGNETITE DEPOSITS IN FI-711 C. WHEN THE FLOWMETER WAS TAKEN APART, DIRT WAS FOUND INSIDE.
FI-711 C DISMANTLED AND CLEANED. DOWNTIME: 4 HOURS 5 MINUTES.

R3-RO-022/87 - SYSTEM 411 MAIN STEAM SYSTEM INCLUDING DUMPING EQUIPMENT

CHECK VALVES IN STEAM LINE BEFORE STEAM-DRIVEN AUXILIARY FEED WATER PUMP DECLARED INOPERABLE

DATE:870914 / EL.POWER 480 MWE / CATEGORY: 3

TYPE: 106 207 312 409 502 605 701 812 909

DURING THE REFUELLING OUTAGE ON RINGHALS 4, EXTENSIVE DAMAGES WERE FOUND ON CORRESPONDING VALVES, SEE R4-RO-016/87. IN ORDER TO DETERMINE WHETHER THESE VALVES ON RINGHALS 3 WERE FIT FOR USE, RADIOGRAPHS HAVE BEEN TAKEN OF THE VALVES ON A NUMBER OF OCCASIONS. THE STEAM-DRIVEN AUXILIARY FEED WATER PUMP HAS BEEN TESTED WITH SATISFACTORY RESULTS. ON 871014, A SUMMATION OF THE SITUATION WAS PERFORMED WHEREBY REPRESENTATIVES OF RK, RQ, RP3 AND RUM PARTICIPATED. THE CONCLUSION WAS THAT THE VALVES WERE DECLARED INOPERABLE AND THAT A SHUTDOWN WAS TO BE DONE IN ORDER TO INSPECT THE VALVES. WHEN THE WORK WAS BEING PERFORMED, THE STEAM SUPPLY TO THE STEAM-DRIVEN AUXILIARY FEED WATER PUMP WAS SHUT OFF. THE REDUNDANT ELECTRIC PUMPS WERE TEST-RUN WITH SATISFACTORY RESULTS. OUTAGE LIMIT AS PER TECH SPEC: 48 HOURS.
THE CAUSE IS STEAM LEAKAGE THROUGH THE VALVES STEMMING BACK TO A PREVIOUS LEAKAGE THROUGH 9687.
CHECK VALVES DISMANTLED FOR INSPECTION. INSPECTION OF 1181 B SHOWED THAT IT WAS IN ACCEPTABLE CONDITION. A NEW DISC, SWING ARM AND ARM BUSHINGS WERE INSTALLED ON 1181 A. THE STEAM-DRIVEN AUXILIARY FEED WATER PUMP WAS THEN TEST-RUN WITH SATISFACTORY RESULTS. OVERHAUL OF THE VALVES WILL BE CARRIED OUT DURING THE 1988 REFUELLING OUTAGE. DOWNTIME: 4 HOURS AND 45 MINUTES.

R3-RO-023/87 - SYSTEM 322 CONTAINMENT SPRAY SYSTEM

SAFETY VALVE IN SPRAY SYSTEM MALFUNCTIONED DURING PERIODIC TEST

DATE:871003 / EL.POWER 752 MWE / CATEGORY: 3

TYPE: 106 203 303 409 502 605 705 804 909

DURING THE MONTHLY TEST OF THE CONTAINMENT'S SPRAY SYSTEM, SAFETY VALVE 9496 A OPENED WHEN A TEST WITH SPRAY CIRCUIT 2 WAS CARRIED OUT. THE VALVE REMAINED OPEN UNTIL THE PUMP WAS STOPPED. TWO ATTEMPTS WERE MADE. TRAIN 2 DECLARED INOPERABLE. OUTAGE LIMIT AS PER TECH SPEC: 7 DAYS.
THE SYSTEM PRESSURE DURING TEST OPERATION LIES TOO CLOSE TO THE SETPOINT ON THE SAFETY VALVE, WHICH THEREFORE HAS TO BE SET WITHIN A NARROW RANGE. THE SAFETY VALVE OPENS AT ABOUT 21 BARG AND IS SUPPOSED TO CLOSE AGAIN BEFORE 18.5 BARG, WHICH IS THE PRESSURE DURING TEST OPERATION. NORMALLY, A SAFETY VALVE CLOSES AT A VALUE ABOUT 10% LOWER THAN THE OPEN SETPOINT. WHEN THE PUMP IS STARTED, AN OVERSHOOT OF 1-2 BAR IS OBTAINED, WHICH CAN CAUSE THE VALVE TO OPEN.
THREE MAINTENANCE MEASURES WERE CARRIED OUT BEFORE THE VALVE FUNCTIONED SATISFACTORILY AND COULD BE DECLARED OPERABLE: 1 SINCE PROBLEMS HAD PREVIOUSLY EXISTED WITH THE SETTING FOR CLOSURE OF THE VALVE, THE ADJUSTING RING WAS ADJUSTED FIRST BY TIGHTENING IT SLIGHTLY IN ORDER TO GET THE VALVE TO CLOSE SOONER AFTER AN OPENING. THE VALVE WAS TEST RUN, WHEREBY IT OPENED AND REMAINED OPEN WHEN THE PUMP WAS IN SERVICE. 2 THE VALVE WAS REMOVED FOR OVERHAUL AND THE OPEN AND CLOSE VALUES WERE ADJUSTED. DIRT (GRAPHITE) WAS LODGED BETWEEN THESEAT AND THE DISC, WHICH WAS ASSUMED TO BE THE CAUSE FOR IT NOT SEALING. WHEN TESTED, THE VALVE LIFTED AND REMAINED OPEN. 3 THE VALVE WAS REMOVED ONCE AGAIN AND THE OPEN AND CLOSE SETPOINTS WERE ADJUSTED AGAIN IN ORDER TO GET IT TO WORK AT PREVAILING PRESSURE. RENEWED TEST OPERATION WAS CARRIED OUT WITH A RECORDER CONNECTED TO PERMIT PRESSURE VARIATIONS IN CONNECTION WITH PUMP START TO BE READ OFF. A PRESSURE SPIKE WAS OBTAINED AT 20 BARG AT THE START, AFTER WHICH THE PRESSURE LAY AT 18.2 BARG DURING OPERATION. THE SAFETY VALVE DID NOT OPEN AND TRAIN 2 WAS DECLARED OPERABLE ONCE AGAIN. DOWNTIME: 3 DAYS, 21 HOURS AND 25 MINUTES.

R3-RO-024/87 - SYSTEM 336 SAMPLING SYSTEM

SHUT-OFF FLOW TO R19

DATE:871208 / EL.POWER 960 MWE / CATEGORY: 3

TYPE: 106 203 304 409 503 605 707 812 909

ON DECEMBER 3, 336 V9615 A WAS REPORTED DEFECTIVE OWING TO THE FACT THAT IT DID NOT CLOSE. ON DECEMBER 7, THE INSTRUMENT MAINTENANCE GROUP EXAMINED THE VALVE AND OPERATED IT LOCALLY BY OPENING AND CLOSING THE AIR TO THE VALVE ACTUATOR. THE VALVE THEN WORKED FULLY SATISFACTORY. WHEN TESTED FROM THE CONTROL LOCATION IN THE CHEMISTRYLABORATORY, THE VALVE SHOWED TENDENCIES NOT TO WORK

SATISFACTORILY. INSPECTION IN THE CONTAINMENT ON DECEMBER 8 REVEALED THAT THE CONTROL AIR TO THE VALVE ACTUATOR WAS SHUT OFF AND V9615 A WAS CLOSED. THE FLOW THROUGH FI 711 A TO R19 HAD THEREBY ALSO CEASED. RADIATION MONITORING FROM STEAM GENERATOR 1'S BOTTOM BLOWING WAS THEREBY OUT OF SERVICE.
WHEN THE INSTRUMENT TECHNICIAN FINISHED EXERCISING THE VALVE, THE AIR FEED VALVE WAS LEFT IN THE CLOSED POSITION. AS THE AIR IN THE VALVE ACTUATOR LEAKED OUT, V9615 A STARTED TO CLOSE UNDER SPRING FORCE.
BY NO LATER THAN THE 1988 REFUELLING OUTAGE, FLOW DETECTORS FI 711 A, B AND C WILL BE EQUIPPED WITH ALARM FOR LOW FLOW. DOWNTIME: 24 HOURS

R3-RO-025/87 - SYSTEM 715 SALTWATER SYSTEM

PUMP CHANGEOVER FAILED TO OCCUR IN SALTWATER SYSTEM AT LOW PRESSURE

DATE:871217 / EL.POWER 960 MWE / CATEGORY: 3

TYPE: 106 201 301 409 502 606 708 812 909

ALARM FOR LOW-LOW PRESSURE (0.8 BARG, P5733) DOWNSTREAM OF SWAPCW 1 AND 2 WAS INDICATED IN THE CONTROL ROOM ON THURSDAY, 87-12-17, BUT PUMP CHANGEOVER DID NOT TAKE PLACE ON THE SALTWATER PUMPS. PUMP CHANGEOVER NORMALLY TAKES PLACE AT 0.9 BARG. SUBSEQUENT FAULT TRACING TRACED THE FAULT TO A RELAY WHERE THE ARMATURE HAD COME OUT OF ITS POSITION SO THAT IT COULD NOT ISSUE A CHANGEOVER SIGNAL. THE REASON THE ARMATURE HAD COME OUT OF ITS POSITION WAS THAT THE INSTRUMENT DEPARTMENT HAD MECHANICALLY ACTUATED THE RELAY DURING A FUNCTION TEST WHEN A RECORDER HAD BEEN CONNECTED ON MONDAY, 87-12-14. THE RECORDER WAS CONNECTED TO PERMIT PRESSURE FLUCTUATIONS IN THE SALTWATER SYSTEM TO BE FOLLOWED, SINCE SEVERAL PUMP CHANGEOVERS HAD TAKEN PLACE DURING WEEK 50 (4 CHANGEOVERS).
RELAY OUT OF ORDER DUE TO THE FACT THAT THE ARMATURE HAD COME OUT OF ITS POSITION.
THE INSTRUMENT DEPARTMENT WILL INFORM ITS PERSONNEL CONCERNING THE RISKS OF MECHANICALLY ACTUATING A RELAY AND OF THE FACT THAT THEY MUST MAKE SURE THAT AN OBJECT WORKS IN THE INTENDED MANNER AFTER CORRECTIVE ACTION. DOWNTIME: 66 HOURS.

R3-RO-026/87 - SYSTEM 550 RADIATION MONITORING,GENERAL

SPURIOUS ALARM

DATE:871219 / EL.POWER 959 MWE / CATEGORY: 3

TYPE: 106 201 301 409 502 611 707 812 909

AT 1854 HOURS ON 19 DECEMBER, ALARM WAS OBTAINED FROM RO3, WHICH MONITORS THE ACTIVITY IN CHARGING - PUMP ROOM 1. THE CHANNEL WAS PUT IN THE TEST MODE TO PREVENT OTHER ALARMS FROM GETTING THROUGH. ACTIVITY MEASUREMENT WAS CARRIED OUT IN THE PUMP ROOM BUT SHOWED NOTHING ABNORMAL. CHARGING PUMP 1 WAS NOT IN OPERATION AT THE TIME. THE SAME FAULT OCCURRED ON 15 DECEMBER, BUT NOTHING ABNORMAL COULD BE DEMONSTRATED THEN EITHER.
CAUSED BY INCIPIENT AGING IN GM TUBE.

THE CHANNEL WAS DEFUSED AND THEN REFUSED, WHEREBY IT WAS DETERMINED TO BE OPERABLE. AT 2025 HOURS, A CHANNEL FUNCTION TEST WAS PERFORMED WITH SATISFACTORY RESULTS. PLATEAN CURVES WERE RECORDED (UP TO 600V) SHOWING THAT THE GM TUBE IS OPERABLE. FURTHER TESTING OF THE GM TUBE WILL BE CARRIED OUT. DOWNTIME: 1 HOUR.

R3-RO-027/87 - SYSTEM 334 CHEMICAL AND VOLUME CONTROL SYSTEM (PWR)

CSAPCH-03 INOPERABLE DUE TO ALARM FOR HIGH AXIAL DISPLACEMENT

DATE:871228 / EL.POWER 958 MWE / CATEGORY: 3

TYPE: 106 201 301 409 503 606 705 812 909

DURING PERIODIC CHANGEOVER OF CHARGING PUMPS (STOP OF CHARGING PUMP 3), ALARM K836 WAS ISSUED INDICATING AXIAL DISPLACEMENT. THE ALARM COULD NOT BE CANCELLED, SO THE PUMP WAS DECLARED INOPERABLE ON 1987-12-28 AT 0100 HOURS.
THE ALARM FOR THE PUMP'S AXIAL CLEARANCE K836 WAS SET WITH TOO SMALL A MARGIN.
PUMP'S AXIAL CLEARANCE CHECKED AND FOUND TO BE WITHIN THE PERMITTED RANGE. ALARM LIMITS FOR PUMP'S AXIAL CLEARANCE CHECKED AND FOUND TO BE SET WITH TOO SMALL A MARGIN. ALARM LIMIT FOR K836 ADJUSTED AND PUMP TEST-RUN AND OPERABLE ON 1987-12-28, 1345 HOURS. DOWNTIME: 12 HOURS AND 45 MINUTES.

R4-RO-012/87 - SYSTEM 334 CHEMICAL AND VOLUME CONTROL SYSTEM (PWR)

MINIMUM FLOW VALVE (8109 C) FOR CHARGING PUMP 3 INOPERABLE

DATE:870731 / EL.POWER 276 MWE / CATEGORY: 3

TYPE: 106 209 306 409 503 610 703 811 909

IN CONNECTION WITH AN ADDITION TO THE PASS SYSTEM, A HOLE WAS GOING TO BE MADE FOR A CABLE BETWEEN H1.02 AND H1.24. THE CABLE TO 8109C WAS DAMAGED IN THE PROCESS. BTM5 INFORMED CONTROL ROOM 4 IMMEDIATELY WHEN THEY DISCOVERED THAT A CABLE HAD BEEN DAMAGED. 8109C, WHICH IS A MINIMUM FLOW VALVE TO CHARGING PUMP NO. 3, WAS THEREBY RENDERED INOPERABLE IN THE OPEN POSITION. 8109C IS SUPPOSED TO CLOSE ON SAFETY INJECTION SIGNAL. (CLOSING OF THE CHARGING PUMPS' MINIMUM FLOW VALVES ON S SIGNAL WILL BE TAKEN AWAY DURING THE 1987 REFUELLING OUTAGE IN ACCORDANCE WITH PR-PROJ-PM 35/87.)
THE CABLE LAY CROOKED IN THE CABLE PENETRATION.
870731, 1900 HOURS: RESERVE CONDUCTOR CONNECTED INSTEAD OF THE DAMAGED CONDUCTOR. VALVE TESTED WITH SATISFACTORY RESULTS. DURING THE 1987 REFUELLING OUTAGE, THE CABLE HAS BEEN EXTENDED AND RESPLICED TO ITS ORIGINAL CONDITION. DOWNTIME: 8 HOURS AND 15 MINUTES.

R4-RO-013/87 - SYSTEM 334 CHEMICAL AND VOLUME CONTROL SYSTEM (PWR)

CHARGING PUMP NO. 1 INOPERABLE

DATE:870801 / EL.POWER 276 MWE / CATEGORY: 3

TYPE: 106 203 304 409 502 606 707 812 907

IN CONNECTION WITH EXECUTION OF INSTRUCTIONS "PERIODIC TEST OF CS-BR-334 NO. 4-D4-306 T", THE MOTORIZED VALVES 8127 A AND B ON THE SUCTION SIDE OF CSAPCH-01 CLOSED. THIS MEANT THAT CSAPCH-01 WAS INOPERABLE. THE EVENT WAS OBSERVED IMMEDIATELY, SINCE THE PUMP LOAD DROPPED. TIMES: 0722 HOURS 8127 A CLOSED 0747 HOURS 8127 A OPEN 0754 HOURS CSAPCH-1 OFF 0756 HOURS CSAPCH-3 ON 0758 HOURS P121 CHARGING PRESSURE ONCE AGAIN NORMAL 2231 HOURS CSAPCH-1 ONCE AGAIN IN SERVICE AFTER TESTING, BLEEDING. OPERATING TIME WITH CLOSED SUCTION VALVES: 32 SECONDS.
THE REASON FOR THE SITUATION WAS THAT WHEN THE CHARGING PUMPS HAD BEEN SWITCHED EARLIER THE PRECEDING DAY OWING TO A MINIMUM FLOW PROBLEM, ONLY EXERCISING OF SURROUNDING VALVES WAS REQUIRED. THE PARAMETERS DID NOT AGREE WITH THE OPERATING INSTRUCTIONS, WHICH WAS NOT OBSERVED.
CHARGING PUMP 1 INSPECTED IMMEDIATELY, BLED AND RESTARTED AT 2231 HOURS TO TEST OPERABILITY. VIBRATION PATTERN AND OTHER OPERATING PARAMETERS NORMAL. DOWNTIME 0007-0022 HOURS = 15 MINUTES. A SIMILAR OPERATOR ERROR WAS MADE IN RINGHALS 4 ON 860920, AFTER WHICH A NUMBER OF MEASURES WERE TAKEN TO AVOID A REPEAT, INCLUDING CLARIFICATION OF THE OPERATINGINSTRUCTIONS AND INFORMATION TO ALL SHIFT CREWS CONCERNING THE IMPORTANCE OF USING A WRITTEN MODEL. FURTHER REFINEMENT OF THE OPERATING INSTRUCTIONS WAS NOT CONSIDERED NECESSARY, SINCE THE ERROR WAS BLAMED ON THE HUMAN FACTOR. IT CANNOT BE EMPHASIZED ENOUGH THAT PARAMETERS MUST BE CHECKED THOROUGHLY BEFORE THE START OF OPERATING MEASURES, WHICH WILL BE DISCUSSED WITH THE CONCERNED INDIVIDUALS AND ALL SHIFT CREWS.

R4-RO-014/87 - SYSTEM 553 EQUIPMENT FOR MAIN STACK

LOW ALARM ON K 802, DETECTOR FOR NOBLE GAS MONITORING

DATE:870810 / EL.POWER 252 MWE / CATEGORY: 3

TYPE: 106 201 301 409 501 611 705 811

ALARM FOR LOW ACTIVITY WAS OBTAINED FROM K802 AT 1525 HOURS. PUMPS, FANS AND FLOW PATHS WERE CHECKED AND FOUND TO BE SATISFACTORY. TECHNICIAN SUMMONED FOR MANUAL SAMPLING. AFTER ADJUSTMENT OF DETECTOR VOLTAGE, THE CHANNEL WAS ONCE AGAIN OPERABLE AT 1945 HOURS.
INCORRECT DETECTOR VOLTAGE.
ON 870811, A COMPLETE REVIEW OF CALIBRATION OF PUMP-FAN CONTROLS AND ADJUSTMENT OF HIGH VOLTAGE TO DETECTOR WERE CARRIED OUT. DOWNTIME 4 HOURS 10 MINUTES.

R4-RO-015/87 - SYSTEM RMS RADIATION MONITORING SYSTEM

R11 INOPERABLE (DETECTOR OUT OF ORDER)

DATE:870826 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 101 204 304 409 501 611 702 909

ON 870826 AT 1030 HOURS, LOW-LEVEL ALARM WAS OBTAINED ON R11. FAULT TRACING REVEALED THAT THE DETECTOR CANNOT BE REPAIRED BUT MUST BE REPLACED. THE DETECTORS ON STOCK ARE OF THE WRONG SIZE, SO A NEW ONE MUST BE ORDERED FROM HOLLAND. CONTAINMENT ISOLATION RELEASE IS THEREFORE OBTAINED ONLY FROM R12. THE CONTAINMENT ISOLATION SHALL BE OPERABLE IN THE REFUELLING MODE DURING CORE MODIFICATIONS OR SHUFFLING OF IRRADIATED FUEL WITHIN THE CONTAINMENT.
PROVISIONAL MONITORING DEVICE LOCATED AT +115 IN THE CONTAINMENT WILL BE MONITORED AND READ OFF CONTINUOUSLY DURING REFUELLING AND CORE CHANGES, THEREBY FULFILLING TECH SPEC REQUIREMENTS ON SAMPLING OF THE CONTAINMENT ATMOSPHERE AT LEAST ONCE EVERY 24 HOURS. PR-DM 283/87 HAS BEEN ISSUED, INSTRUCTING THE FUEL LOADING INSPECTOR TO NOTIFY CONTROL ROOM 4 WHEN ALARM IS OBTAINED FROM THE PROVISIONAL MONITORING DEVICE TO COMPARE WITH R12 IF SUFFICIENT CAUSE EXISTS FOR MANUAL CONTAINMENT ISOLATION.

R4-RO-016/87 - SYSTEM 327 AUXILIARY FEED WATER SYSTEM

DAMAGED CHECK VALVES IN STEAM LINES TO AFAPST-01.

DATE:870826 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 101 206 312 409 504 611 703 802 909

IN CONNECTION WITH OVERHAUL OF 1181A AND B DURING THE 1987 REFUELLING OUTAGE, EXTENSIVE DAMAGES WERE DISCOVERED. 1181A AND B PREVENT STEAM FROM PASSING BETWEEN STEAM GENERATORS 2 AND 3. IN ONE OF THE VALVES, THE DAMAGES WERE OF SUCH A NATURE THAT THE DISC HAD COME LOOSE. THIS COULD HAVE LED TO A RESTRICTION OF THE STEAM FLOW TO THE STEAM-DRIVEN PUMP AFAPST-01. NOTHING OUT OF THE ORDINARY HAS BEEN NOTED IN CONNECTION WITH THE MONTHLY TEST RUNS OF AFAPST-01.
MAY BE PARTIALLY DUE TO FAULTY DESIGN. MAY ALSO BE DUE TO SOME LEAKAGE THROUGH THE STEAM GOVERNING VALVE TO AFAPST-01, CAUSING 1181A AND B TO "FLUTTER" THE ENTIRE OPERATING SEASON.
DAMAGED PARTS HAVE BEEN REPLACED WITH NEW ONES WITH MODIFIED LOCKING. THE GOVERNING VALVE TO AFAPST-01 (9687) WAS REPLACED AS PLANNED WITH A NEW VALVE DURING THE 1987 REFUELLING OUTAGE. FROM NOW ON, 1181A AND B WILL BE SUBJECTED TO ANNUAL INSPECTION TO DETERMINE WHETHER THE CORRECTIVE ACTION ADOPTED HAS BEEN SATISFACTORY.

R4-RO-017/87 - SYSTEM 711 COMPONENT COOLING SYSTEM,REACTOR PART

CORROSION DAMAGE TO TUBES IN CCAHAH-01 DISCOVERED DURING ANNUAL OVERHAUL

DATE:870811 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 101 206 312 409 504 602 707 801 901

IN CONNECTION WITH OVERHAUL OF CCAHAH-01 DURING THE 1987 REFUELLING OUTAGE, SEVERE CORROSION DAMAGE WAS DISCOVERED BYMEANS OF EC MEASUREMENT.
THE CONCLUSION CAN BE DRAWN FROM THE RESULTS OF VATTENFALL'S MATERIAL

LABORATORY'S INVESTIGATION THAT THE TUBE DAMAGE WAS CAUSED BY CORROSION DUE TO SULPHIDE-BEARING WATER IN COMBINATION WITH WORN SOFT-IRON ANODES. CCAHAH-01 WAS OPENED DURING THE 1985 REFUELLING OUTAGE, AND IT WAS ESTIMATED THAT THE SOFT-IRON ANODES WOULD LAST FOR ANOTHER TWO YEARS, BUT THIS TURNED OUT TO BE AN INCORRECT JUDGEMENT. TO START WITH, THE MOST HEAVILY CORRODED TUBES - A TOTAL OF 151 OF 1 115 - WERE PLUGGED DURING THE 1987 REFUELLING OUTAGE. NEW SOFT-IRON ANODES WERE INSTALLED. A CALCULATION OF THE EFFECT OF THIS DEGREE OF PLUGGING ON THE PERFORMANCE OF THE HEAT EXCHANGER WAS CARRIED OUT AND REPORTED IN PR TECHNICAL REPORT 33/87. THE CALCULATIONS SHOW THAT AT NOMINAL REACTOR POWER, THE CC TEMPERATURE WILL INCREASE ABOUT 1OC, WHICH IS ACCEPTABLE. RETUBING OF THE HEAT EXCHANGER WILL BE CARRIED OUT DURING THE 1988 REFUELLING OUTAGE.

R4-RO-018/87 - SYSTEM 313 REACTOR COOLANT SYSTEM

LOW BORON CONTENT IN RC ON DRAINAGE OF REFUELLING POOL AFTER REFUELLING.

DATE:870908 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 101 209 312 409 506 611 707 812 909

DRAINAGE OF THE REFUELLING POOL AFTER CHARGING WAS IN PROGRESS AND WAS IN ITS FINAL PHASE. SINCE R3 HAD OBTAINED A DILUTION DURING A SIMILAR OPERATION, MORE EXTENSIVE SAMPLING HAD BEEN SPECIFIED IN THE OPERATING ORDER FOR DRAINAGE OF THE REFUELLING POOL. THE BORON CONCENTRATION WAS 2028 PPM AT THE START OF DRAINAGE ON 870907, 0900 HOURS, AND DECLINED SLOWLY DURING DRAINAGE TO 2011 PPM. WHEN THE LEVEL HAD REACHED THE REACTOR VESSEL FLANGE ON 870908, A BORON CONCENTRATION OF 1921 PPM IN RC WAS OBTAINED, WHICH IS BELOW THE TECH SPEC LIMIT OF 2000 PPM. AT THE TIME CONTROL ROOM 4 WAS NOTIFIED OF THE BORON CONCENTRATION ON 870908 AT 1100 HOURS, PREPARATIONS WEREMADE FOR LIFTING-ON OF THE REACTOR VESSEL HEAD. THERE WERE NO CORE CHANGES. BORATION WAS STARTED, BUT WAS NOT FULFILLED SINCE THE VESSEL HEAD WAS LIFTED ON AND OPERATION MODE 5* WAS REACHED. IN OPERATION MODE 5*, KEFF MUST BE 0.95 OR LESS, WHICH IS ABOUT 1800 PPM WITH WITHDRAWN SCRAM BANKS. WITH THE CONTROL RODS INSERTED, AS WAS NOW THE CASE, THE LIMIT IS ABOUT 100 PPM LOWER.
DURING DRAINAGE OF THE REFUELLING POOL, THE WALLS ARE SPRAYED AUTOMATICALLY FOR 30 SECONDS EVERY 30TH MINUTE TO REDUCE AIRBORNE ACTIVITY. AS THE VOLUME IN THE POOL DECREASES, THE BORON CONCENTRATION IS AFFECTED MORE BY THE SPRAYING, BUT THE SUDDEN DECLINE IN BORON CONCENTRATION THAT WAS OBTAINED IS DIFFICULT TO ATTRIBUTE TO SPRAYING. MORE PROBABLE IS THAT LAYERING OF THE WATER OCCURS, WHICH IS INTERRUPTED WHEN THE LEVEL DROPS BELOW THE REACTOR VESSEL FLANGE AND REMIXING OCCURS.
CHANGE TO OPERATING MODE 5* AT 1340 HOURS. MEASURES TO PREVENT A RECURRENCE: IT IS DIFFICULT TO PREVENT A RECURRENCE BY SAMPLING VIA NORMAL LINES, SINCE LAYERING PROBABLY OCCURS IN THE POOL. SAMPLING IN THE POOL IS NOT RELIABLE SINCE THERE ARE PROBABLY VARIATIONS IN THE BORON CONCENTRATION. TESTS WILL BE CONDUCTED DURING THE 1988 REFUELLING OUTAGE WITH A SAMPLING PUMP AND FREQUENT SAMPLING FROM A POOL LEVEL JUST ABOVE THE REACTOR VESSEL FLANGE. WITH THIS METHOD,

THE LAYERING WILL HOPEFULLY BE DETECTED AND BORATION WILL BE INITIATED BEFORE THE TECH SPEC LIMIT IS REACHED. WE ALSO INTEND TO USE A SUBMERSIBLE PUMP TO CIRCULATE THE WATER IN THE POOL TO PREVENT LAYERING. DOWNTIME: 4 HOURS 10 MINUTES

R4-RO-019/87 - SYSTEM 313 REACTOR COOLANT SYSTEM

LOW FLOW IN RTD CIRCUIT 1

DATE:870919 / EL.POWER 0 MWE / CATEGORY: 3

TYPE: 105 207 312 409 502 608 708 812 909

WHEN FULL PRESSURE AND TEMPERATURE WAS ACHIEVED IN THE REACTOR COOLING SYSTEM, THE RTD FLOW IN CIRCUIT 1 STABILIZED AT 8.3 KG/S. THE EQUIVALENT FLOW DURING THE 1986-87 OPERATING SEASON WAS 10.5-11 KG/S. THE ALARM LIMIT FOR LOW FLOW IS SET AT 9.1 KG/S, SINCE THE FLOW HAS BEEN LOWER DURING PREVIOUS OPERATING SEASONS. DURING THE 1987 REFUELLING OUTAGE, TWO VALVES (8089 A AND 8088 A) WERE REPLACED WITH A NEW TYPE OF VALVE. FIS 490 (THE FLOWMETER IN THE CIRCUIT) WAS BLED AND CALIBRATED WITHOUT BRINGING ABOUT ANY IMPROVEMENT IN FLOW. A TEST WAS CARRIED OUT IN ACCORDANCE WITH "START-UP PROCEDURE" 5.1.9. THE RESULTS INDICATED A TRANSPORT TIME OF WATER FROM THE REACTOR COOLING SYSTEM TO THE RTD MEASURING POINTS OF 0.49 S FOR THE COLD LEG AND 1.17 S FOR THE HOT LEG. THE MAXIMUM ALLOWABLE TIME ACCORDING TO SU 5.1.9 IS 1.0 S.
IT HAS NOT BEEN POSSIBLE TO IDENTIFY THE CAUSE OF THE REDUCTION IN TOTAL FLOW.
IT WAS DECIDED AT THE LOCAL SAFETY COMMITTEE MEETING ON 1987-09-19 THAT THE EXCESS TIME OF 0.17 S AS COMPARED WITH SU 5.1.9 SHOULD BE COMPENSATED FOR BY: 1 CHANGING THE LAG TIME FOR TY 412 J AND TY 412 K FROM 3 TO 1 SECONDS FOR DELTA T AND TAVE IN LOOP 1. THIS SHORTENS THE TOTAL RESPONSE TIME, COMPENSATING FOR THE 0.17 S IN EXCESS TRANSPORT TIME. 2 REDUCING THE ALARM SETPOINT FOR FIS 490 FROM 9.1 TO 8.0 KG/S. 3 ADDITIONAL INFORMATION SHALL BE GATHERED FOR CONSIDERATION BY THE LOCAL SAFETY COMMITTEE BEFORE 90% REACTOR POWER IS EXCEEDED. AT THE LOCAL SAFETY COMMITTEE MEETING ON 1987-09-24, A MORE DETAILED ANALYSIS (CARRIED OUT IN COOPERATION WITH W BRYSSEL) WAS PRESENTED SHOWING THAT THE MARGINS IN THE TOTAL RESPONSE TIME ARE OF SUCH AN ORDER OF MAGNITUDE THAT THE CHANGED LAG TIME ACCORDING TO POINT 1 ABOVE COULD BE RESTORED TO ITS ORIGINAL VALUE AND THAT AN EXTENDED TRANSPORT TIME CAN BE ALLOWED. A DETAILED ACCOUNT WILL BE PROVIDED IN A SEPARATE OPERATING REPORT.

R4-RO-020/87 - SYSTEM 411 MAIN STEAM SYSTEM INCLUDING DUMPING EQUIPMENT

ADJUSTMENT OF VALVE STROKE SEQUENCES OF EVENTS ON 1987-09-22, INTERNAL LEAKAGE WAS DISCOVERED THROUGH PRESSURE CONTROL VALVES PCV-1102 AND -1103. HAND VALVE 1190 WAS CLOSED AND THE STROKE FOR

DATE:870922 / EL.POWER 483 MWE / CATEGORY: 3

TYPE: 106 202 309 409 503 605 704 812 904

INTERNAL LEAKAGE.
ADJUSTMENTS MADE AS DESCRIBED ABOVE. DOWNTIME: 2 HOURS.

R4-RO-021/87 - SYSTEM 313 REACTOR COOLANT SYSTEM

ERRING LEVEL CHANNEL SG2

DATE:870929 / EL.POWER 960 MWE / CATEGORY: 3

TYPE: 106 201 304 409 504 608 704 812 909

IT WAS DISCOVERED IN THE MORNING THAT LI 484 (LEVEL INDICATION) HAD ERRED LOW. NO ALARM WAS OBTAINED. NO EFFECT ON OPERATION. THE CHANNEL WAS PLACED IN THE TRIPPED POSITION AT 0630 HOURS IN ACCORDANCE WITH TECH SPEC. AFTER REPAIR, IT WAS FOUND THAT ONLY THE INDICATION WAS DISABLED. THUS, THE REACTOR'S SCRAM SYSTEM AND THE FUNCTIONS OF THE SAFETY SYSTEM WERE ALWAYS OPERABLE.
TRANSISTORS Q1 AND Q2 REPLACED AND COLD SOLDER ON TWO POTENTIOMETERS ON ISOLATION AMPLIFIER LY 484 REPAIRED.
FAULT TRACING AND REPAIRS AS DESCRIBED ABOVE COMPLETED AT 0940 HOURS. DOWNTIME 3 HOURS 40 MINUTES.

R4-RO-022/87 - SYSTEM 531 NUCLEAR INSTRUMENTATION SYSTEM

N36 ERRS LOW

DATE:871020 / EL.POWER 410 MWE / CATEGORY: 3

TYPE: 106 201 312 409 502 611 701 812 909

AT 0700 HOURS ON 871020, IT WAS DISCOVERED THAT N36 WAS NOT SHOWING ANY READING AND WAS APPARENTLY DEAD. WHEN THIS OCCURS, NO ALARMS ARE OBTAINED. ALL THAT HAPPENS IS THAT LAMPS GO OUT IN THE TSLP IN THE REACTOR CONTROL DESK. IT CAN THEREFORE NOT BE DETERMINED AT WHAT TIME THE CHANNEL WENT DOWN. ACCORDING TO TECH SPEC TABLE 3.3-1 ON PAGE 3/4 3-8, CORRECTIVE ACTION 3, POWER OPERATION MAY CONTINUE WITH ONE CHANNEL OPERABLE. NATURALLY, IMMEDIATE CORRECTIVE ACTION WAS INITIATED ON THE DEFECTIVE CHANNEL.
FAULT IN LOG CURRENT AMPLIFIER. THE COMPONENT WAS INSTALLED DURING THE 1987 REFUELLING OUTAGE AFTER THE REGULAR UNIT HAD NOT BEHAVED CORRECTLY DURING THE TEST. THE COMPONENT HAD PREVIOUSLY BEEN INSTALLED IN R2, WHERE IT WAS REPLACED AFTER HAVING EXHIBITED THE SAME FAULT SYMPTOMS AS IT NOW EXHIBITED IN R4. AFTER REMOVAL FROM R2, THE UNIT WAS TESTED IN A TEST BENCH FOR ABOUT 4 MONTHS WITHOUT ANY FAULT BEING DETECTED.
THE CHANNEL WAS REPORTED DEFECTIVE AND RUEE CORRECTED THE FAULT. FINISHED 1100 HOURS. DOWNTIME 0700-1100 = 4 HOURS. NEW FAULT TRACING IS BEING CARRIED OUT ON THE DEFECTIVE LOGCURRENT AMPLIFIER. IF NO REAL FAULT IS FOUND, THE COMPONENT WILL BE DISCARDED.

R4-RO-023/87 - SYSTEM 653 STANDBY DIESEL SYSTEM,6 KV SWITCHGEAR

DEENERGIZED 6 KV BUSBAR

DATE:871021 / EL.POWER 820 MWE / CATEGORY: 3

TYPE: 106 207 312 409 506 609 704 812 907

0757 HOURS: DURING LOCAL INSPECTION IN 6 KV SWITCHGEAR D42-B6, THE WRONG CUBICLE DOOR WAS OPENED AND D42-H42-6-S WAS TRIPPED MANUALLY BY MISTAKE (SUPPLY FROM 6 KV MAIN GRID). THE PURPOSE WAS TO CARRY OUT INSPECTION AT D42-D41-6-S LOCATED AT THE SAME END OF THE SWITCHGEAR. D42-B6 WAS DEENERGIZED WITH ACCOMPANYING DIESEL SEQUENCE. 0805 HOURS: DURING PREPARATION FOR SYNCHRONIZATION TO THE OFF-SITE GRID, DISCONNECTION OF THE DIESEL-GENERATOR BREAKER DG420-S WAS OBTAINED WHEN ITS CONTROL/MONITORING UNIT WAS TOUCHED (NO CONTROL SEQUENCE). NEW, PARTIAL DIESEL SEQUENCE WAS OBTAINED. 0820 HOURS: SYNCHRONIZATION OF DG420 TO OFF SITE GRID. THE DIESEL WAS SHUT DOWN AND PLACED IN THE AUTO MODE.
0757 HOURS: MANUAL DISCONNECTION OF D42-H42-6-S. 0805 HOURS: FAULT IN CONTROL/MONITORING UNIT (MECHANICAL WEAR LEADING TO LOOSE CONNECTION). REPLACEMENT OF DEFECTIVE CONTROL/MONITORING UNIT. THE EVENT IS BEING INVESTIGATED, A REPORT IS BEING WRITTEN. DOWNTIME: 23 MINUTES (TIME WITH BUSBAR D42-B6 ENERGIZED FROM DG 420).

R4-RO-024/87 - SYSTEM 336 SAMPLING SYSTEM

EXTERNAL LEAKAGE FROM ISOLATION VALVE IN SAMPLING SYSTEM

DATE:871028 / EL.POWER 777 MWE / CATEGORY: 3

TYPE: 106 202 309 409 504 605 704 812 909

ON AN INSPECTION TOUR OF H01.06, HEAVY LEAKAGE WAS DISCOVERED FROM 9549 A IN THE SAMPLING SYSTEM. THE VALVE WAS RECENTLY INSTALLED IN CONNECTION WITH INSTALLATION OF THE PASS SYSTEM. BECAUSE IT IS AN ISOLATION VALVE, THE LEAKAGE AFFECTED THE INTEGRITY OF THE CONTAINMENT. THE LEAKAGE WAS FOUND TO COME FROM THE VALVE GLAND. THE LEAKAGE MAY BE DUE TO A LEAKING GASKET OR POOR INSTALLATION. SINCE THE VALVE IS NEW THE LATTER ALTERNATIVE IS THE MOST LIKELY. AS SOON AS THE LEAK WAS DISCOVERED, THE HAND VALVE 9532 IN THE CONTAINMENT WAS CLOSED. THIS TOOK ABOUT 10 MINUTES, AND THE CONTAINMENT'S INTEGRITY WAS THEREBY RE-ESTABLISHED. SINCE ONLY ONE SHUT-OFF AGAINST RC (154 BARG) COULD BE UTILIZED, NO CORRECTIVE ACTION WAS TAKEN IN THE VALVE. THE VALVE IS PROVIDED WITH THE POSSIBILITY OF TIGHT-WELDING OF THE GLAND. THIS POSSIBILITY WAS EXPLOITED AND THE WORK WAS CONCLUDED ON FRIDAY, 87-10-30. DOWNTIME WITH RESPECT TO CONTAINMENT INTEGRITY: 10 MINUTES.

R4-RO-025/87 - SYSTEM 651 STANDBY DIESEL SYSTEM DIESELSET

DG420 TRIPPED ON OVERSPEED

DATE:871107 / EL.POWER 964 MWE / CATEGORY: 3

TYPE: 106 203 305 409 502 611 705 812 909

DG420 WAS START-TESTED ON 87-11-07 AT 0430 HOURS IN ACCORDANCE WITH TECH SPEC. DURING THE TEST, THE DIESEL TRIPPED ON OVERSPEED. THE DIESEL WAS DECLARED INOPERABLE AND THE OTHER DIESELS WERE START-TESTED WITH SATISFACTORY RESULTS. FINISHED AT 0515 HOURS. THE EMERGENCY ELECTRICAL CREW WAS SUMMONED AND FURTHER TESTING REVEALED THAT THE DIESEL PASSED THE START TEST WITH ITS PRESET FREQUENCY SETPOINT AT 50.8 HZ. THE DIESEL WAS TEST-RUN WITH SATISFACTORY RESULTS AND WAS DECLARED OPERABLE AT 0745 HOURS. ON MONDAY 87-11-09, THE INCIDENT WAS DISCUSSED AND NEW START TESTS WERE CARRIED OUT. - THE FREQUENCY METER WAS CHECKED BY STROBOSCOPIC MEASUREMENT ON THE GENERATOR SHAFT WITH SATISFACTORY RESULTS. - THE ELECTRICAL OVERSPEED TRIP WAS CHECKED AND ADJUSTED TO 1 150 RPM. IT WAS SLIGHTLY TOO LOW (ABOUT 10 RPM). - IN THIS TEST, THE CALIBRATION CARD'S VALUE OF 27.6 VOLTS WAS ASSUMED TO CORRESPOND TO 1 150 RPM, WHICH LATER PROVED TO BE WRONG. - LOAD REJECTION TEST CARRIED OUT FROM 800 KW WITH APPROXIMATELY 20 RPM MARGIN TO OVERSPEED TRIP. - START TEST NORMAL START (NOT SOFT START) CARRIED OUT WITH PRESET FREQUENCY SETPOINT AT 51.0 HZ WITH SATISFACTORY RESULTS. - NOTATION: DIESEL TRIPS IF THE PRESET FREQUENCY SETPOINT IS 51.2 HZ. WEDNESDAY 1987-11-11 NOHAB SERVICE ENGINEER PRESENT. THE DIESEL WAS TEST-RUN AND THE DIESEL'S GOVERNOR WAS FOUND TO BE FAULTLESS. FORCED OPERATION OF THE DIESEL SPEED SHOWED THAT IT TRIPPED ON THE GENERATOR'S OVERSPEED SWITCH AT 1 110 RPM. TECHNICAL SPECIALISTS WERE SUMMONED AND FOUND THAT THE LIMIT SWITCH - WHICH ACCORDING TO THE CALIBRATION CARD WAS SUPPOSED TO BE SET AT 27.6 VOLTS - OUGHT TO BE SET AT 28.3 VOLTS IN ORDERTO TRIP THE DIESEL AT 1 150 RPM. ALL DIESELS IN R4 WERE SET TO 27.6 V WHILE THE R3 DIESELS HAD DIFFERENT VALUES, WHICH LED TO SUSPICION OF A SYSTEMATIC FAULT. ALL DIESELS IN R4 WERE TESTED AND NEW CALIBRATION CURVES WERE RECORDED. IT WAS FOUND THAT DG410 WAS ALSO INCORRECTLY SET. IT WAS CHANGED FROM 27.6 V TO 28.3 V. DG430 AND DG440 SET VALUE 27.6 V AGREED WITH THE TEST RESULT.
THE CALIBRATION CARDS FOR R4 WERE WRITTEN IN 1982, PATTERNED ON THE CALIBRATION CARD FOR DG310. IT WAS NOT KNOWN THEN THAT THE SENSOR FOR THE SWITCH WAS UNIQUE. PRESET FREQUENCY SETPOINT SLIGHTLY TOO HIGH, COMBINED WITH INADEQUATE MARGIN TO OVERSPEED TRIP.
ALL DIESELS WERE TEST-RUN WITH NORMAL START TEST AND DISCONNECT TEST FROM 800 KW WITH SATISFACTORY RESULTS. IN ADDITION, A START TEST WAS CARRIED OUT WITH A PRESET FREQUENCY SETPOINT OF 52 HZ, WITH SATISFACTORY RESULTS. DURING THE 1988 REFUELLING OUTAGE, THE OVERSPEED SWITCHES WILL BE REMOVED ON ALL DIESELS FOR SPEED/VOLTAGE CALIBRATION. A REPORT WILL BE WRITTEN. DOWNTIME: 3 HOURS AND 15 MINUTES.

R4-RO-026/87 - SYSTEM 539 REACTOR PROTECTION SYSTEM

TI 422 A ERRS HIGH

DATE:871108 / EL.POWER 965 MWE / CATEGORY: 3

TYPE: 106 201 301 409 502 611 701 812 909

AT 1605 HOURS, ALARM WAS OBTAINED IN KDE 8 FOR OVERPOWER/OVERTEMPERATURE DELTA T. REACTOR POWER WAS REDUCED 1.5% AS A PREVENTIVE ACTION. THE ALARM PERSISTED. THE EMERGENCY INSTRUMENT

CREW WAS SUMMONED. AT 1640 HOURS, THE CHANNELS FOR OVERPOWER/OVERTEMPERATURE DELTA T TRIPPED (TS 422 B-1, TG 422 B-2, TS 422 C-1, TS 422 C-2). THE EMERGENCY INSTRUMENT CREW FAULT-TRACED AND REPLACED TY 422 H (R/E CONVERTER). AT 2015 HOURS, TRIPPED SWITCHES WERE RETURNED TO THE NORMAL POSITION.
FAULT ON A PRINTED CIRCUIT BOARD. ZENER DIODE HAD OUTPUT VOLTAGE OF -9V INSTEAD OF -15.
TY 422 H REPLACED. ZENER DIODE REPLACED. COMPONENT TESTED IN CLIMATE CHAMBER AT 50OC FOR 4 DAYS WITH SATISFACTORY RESULTS. TRANSFERRED TO STORES. DOWNTIME: 4 HOURS AND 10 MINUTES.

R4-RO-027/87 - SYSTEM 411 MAIN STEAM SYSTEM INCLUDING DUMPING EQUIPMENT

INSTRUMENT FOR STEAM PRESSURE ON SG3 ERRS HIGH

DATE:871226 / EL.POWER 960 MWE / CATEGORY: 3

TYPE: 106 201 304 409 504 608 701 812 909

2330 HOURS ON 26 DECEMBER: FLUCTUATING READING DISCOVERED ON POINTER INSTRUMENT (SPIKES). NORMAL VALUE BETWEEN SPIKES. NO BISTABLE TRIPPED, NO ALARM, NO IMPACT ON OPERATION. 0005 HOURS ON 27 DECEMBER: TRIPPED CHANNEL FOR PI-494 (BISTABLES 484 B1, 484 B2, 494 B1, 494 B2, 494 C) AND SUMMONED EMERGENCY INSTRUMENT CREW WHEN THE POINTER INSTRUMENT HAD PEGGED AND STAYED THERE (STABLE FAULT).
DEFECTIVE ISOLATION AMPLIFIER CAUSED BY AGING.
EMERGENCY INSTRUMENT CREW INSTALLED NEW ISOLATION AMPLIFIER AND CALIBRATED IT. PI-494 ONCE AGAIN OPERABLE AT 0155 HOURS ON 27 DECEMBER (ALL ABOVE TRIPPED BISTABLES RESTORED). DOWNTIME: 2 HOURS 25 MINUTES.

END OF SAFETY RELATED OCCURRENCES.

REACTOR TRIPS

B1-SS-002/87 - TRIPSIGNALS: SS8

REACTOR TRIP ON SS8
EXTRA LOW REACTOR PRESSURE (< 60 BAR) AT LOW POWER ON PRM(< 5%) AND

EXTRA HIGH POWER ON IRM (SEE SYST. 531)

DATE:870813 / EL.POWER 0 MWE

THE REACTOR POWER WAS BALANCED TO KEEP THE REACTOR VESSEL PRESSURE CONSTANT AT ABOUT 69 BAR. PUMPING-IN WITH 327 WAS IN PROGRESS AT ABOUT 8 KG/S. SINCE THE REACTOR VESSEL LEVEL WAS DROPPING, THE 327 FLOW WAS INCREASED BY ABOUT 1 KG/S. THIS TOOK PLACE DISTINCTLY WITHOUT OVERRUNS. THE SMALL POWER INCREASE THAT RESULTED CAUSED SS8. APPROXIMATELY SIMULTANEOUSLY WITH THE FLOW INCREASE IN 327, SIRM HAD AUTOMATICALLY STEPPED DOWN ONE RANGE. WHEN THIS POWER INCREASE OCCURRED, SIRM STEPPED BACK TO ITS ORIGINAL RANGE. THIS WAS NOT ENOUGH, HOWEVER, SINCE THERE WAS A NEED FOR FURTHER STEPPING-UP. THIS COULD NOT TAKE PLACE PROMPTLY, SINCE SIRM HAS A MINIMUM TIME OF 32 S BETWEEN THE STEPS. SIRM COULD NOT STEP UP FAST ENOUGH AND SS8 WAS A FACT.
INVESTIGATION COMMENCED AS TO WHETHER THE MINIMUM TIME CAN BE REDUCED WITHOUT IMPAIRING SYSTEM FUNCTION.

F2-SS-001/87 - TRIPSIGNALS: SS1

REACTOR TRIP ON SS1
MANUAL TRIP

DATE:871215 / EL.POWER 1005 MW

MANUALLY ACTIVATED SS DUE TO OPERATOR ERROR AT CONTROL CONSOLE. THE OPERATOR MEANT TO RESTORE THE SS CHAIN DURING ROUTINE TESTING OF LOGIC CHANNELS B/D.
INADVERTANT DEPRESSION OF NEARBY TRIP BUTTON INSTEAD OF RESTORE BUTTON. (EVEN THOUGH THE TRIP BUTTON HAS A CAP, UNLIKE THE RESTORE BUTTON.)
AFTER A CHECK TO MAKE SURE THAT ALL AUTOMATIC FUNCTIONS WERE WORKING PROPERLY, CONTROL ROD WITHDRAWAL WAS COMMENCED AT 1020 HOURS.

F3-SS-002/87 - TRIPSIGNALS: SS10

REACTOR TRIP ON SS 10 (TURBINE TRIP WITH DUMPING PROHIBITION)
TURBINE SHUTDOWN WITH DUMPING PROHIBITION (TSXD)
THE TURBINE SUPPLIER FURNISHES FOUR REDUNDANT SIGNALS TO SYSTEM 516, WHERE EACH SIGNAL IS ACTUATED WHEN THE TURBINE INCL. CONDENSER CAN NO LONGER ACCEPT PRODUCED STEAM. THE CONDITION IS AUTOMATICALLY DISCONNECTED AT POWER LEVELS BELOW L1 ON THE APRM CHANNELS.

DATE:870925 / EL.POWER 1075 MW

DURING CORRECTION OF GENERATOR VOLTAGE, UNDEREXCITATION WAS OBTAINED WITH ACCOMPANYING LOSS OF TURBINE LOAD. WHEN DUMPING WAS INITIATED, THE DUMP SPRAY VALVE FAILED TO OPEN, WHICH LEADS TO DUMPING PROHIBITION. LOSS OF LOAD IN COMBINATION WITH DUMPING PROHIBITION LEADS TO TURBINE TRIP.
LOSS OF LOAD SHOULD NOT NORMALLY LEAD TO TURBINE TRIP, BUT DOES IF DUMPING PROHIBITION IS IN EFFECT. THUS, TWO CONCURRENT FAULTS LED TO REACTOR TRIP, OF WHICH LACK OF DUMPING WAS THE DIRECT CAUSE OF THE REACTOR TRIP.
THE CAUSE OF THE REACTOR TRIP WAS FAILURE OF DUMP SPRAY VALVE 462 VA35 TO OPEN. WHEN TESTED SUBSEQUENTLY, THE VALVE SOMETIMES FUNCTIONED CORRECTLY AND SOMETIMES WITH A TIME DELAY OF UP TO 1 MINUTE.
ALL SAFETY FEATURES OF THE REACTOR SYSTEMS WERE CHECKED. FAULT TRACING OF GENERATOR EXCITATION EQUIPMENT. FAULT TRACING AND EXERCISING OF 462 VA35.

01-SS-002/87 - TRIPSIGNALS: SS10

REACTOR TRIP ON SS10
HIGH POWER IN PRM CHANNELS (MORE THAN 120 %)

DATE:870728 / EL.POWER 310 MWE

A LIGHTNING TRANSIENT ON THE ONE OF THE 130 KV LINES TRIPPED "NEUTRAL POINT CURRENT PROTECTION STAGE 1" ON THE MAIN TRANSFORMER T1. THIS LED TO TRIP OF MAIN BREAKER 0125 AFTER 0.5 S. THIS RESULTED IN A FREQUENCY INCREASE ON THE TURBINE AND THE GENERATORS WHEREBY THE STEAM GOVERNING VALVE 411 V3 CLOSED. DUE TO THE FACT THAT 411 V3 CLOSED FASTER THAN THE DUMP VALVES OPENED, A PRESSURE SPIKE WAS OBTAINED THAT WAS PROPAGATED TO THE REACTOR AND LED TO AN INCREASE OF NEUTRON POWER FROM 70 TO 120%, WHEREBY SS10 TRIPPED.
DUE TO A LOGIC FAULT IN THE MAIN SWITCHGEAR, THE TRIP SIGNAL FOR 0125 ALSO CAUSED INSTANTANEOUS TRIP OF THE STATION TRANSFORMER'S FEED BREAKERS T11-A6-S AND T11-B6-S AS WELL AS THE GENERATORS' FIELD BREAKER. THIS WOULD HAVE PREVENTED TRANSITION TO HOUSE TURBINE OPERATION IF SS10 HAD NOT BEEN OBTAINED.
THE TRIP TIME FOR T1'S NEUTRAL POINT CURRENT PROTECTION STAGE 1 WAS CHANGED FROM 0.5 S (INCORRECT VALUE) TO THE RIGHT SET VALUE OF 2.8 S.

01-SS-003/87 - TRIPSIGNALS: SS7

REACTOR TRIP ON SS 7
COLLECTIVE CONDITION

DATE:870729 / EL.POWER 0 MWE

DURING START-UP AFTER DISTURBANCE ON JULY 28, 1987, THE CONTROL OIL TO THE TURBINE'S FAST-ACTING STOP VALVES WAS PRESSURIZED. HIGH PRESSURE WAS THEREBY OBTAINED IN PREHEATER FV4, LEADING TO TS5 (TURBINE TRIP). THIS IN TURN GIVES AUTOMATIC TRIP OF TS26, SS7, DUMPING PROHIBITION AND CLOSURE OF 311 ISOLATING VALVES.
THE REASON FOR HIGH PRESSURE IN PREHEATER FV4 WAS THAT THE POSITION REGULATOR FOR 441 V21 WAS MALADJUSTED SO THAT THE VALVE WAS 5% OPEN

ON MINIMUM SIGNAL FROM THE REGULATOR. AS A RESULT, THE WATER LEVEL DISAPPEARED IN ONE OF THE REHEAT SUPERHEATER'S DRAINAGE VESSELS, AFTER WHICH PREHEATER FV4 WAS PRESSURIZED FROM THE STEAM SIDE OUTLET IN THE REHEAT SUPERHEATER.
THE POSITION REGULATOR FOR 441 V21 WAS ADJUSTED SO THAT A MINIMUM SIGNAL CAUSES FULLY CLOSED VALVE.

O1-SS-004/87 - TRIPSIGNALS: SS10

REACTOR TRIP ON SS10
HIGH POWER IN PRM CHANNELS (MORE THAN 120 %)

DATE:871116 / EL.POWER 464 MWE

IN CONNECTION WITH COMMENCEMENT OF 14-DAY TEST OF THE TURBINE'S FAST CLOSURE VALVE 411 V1, THE VALVE DID NOT REVERSE AT THE INTERMEDIATE LIMIT SWITCH AFTER THE SET TIME DUE TO THE FACT THAT THE CLOSE LIMIT SWITCH WAS SPURIOUSLY ACTUATED. V1 THEREFORE CLOSED ALL THE WAY AND SEPARATION BETWEEN V1'S PILOT VALVE AND MAIN VALVE CAUSED IMBALANCE IN THE GOVERNING OIL PRESSURE, WHICH TRIPPED. CONDITION TS14 WAS OBTAINED.
VALVE 314 V116 FAILED TO CLOSE DUE TO STICKING PILOT VALVE (O1-RO-019/87). DOWNTIME: 40 HOURS.
WHEN THE TURBINE VALVES CLOSED, HIGH NEUTRON POWER WAS OBTAINED IN THE REACTOR, CAUSING REACTOR TRIP VIA CONDITION SS10.
LIMIT SWITCHES FOR 411 V1 ADJUSTED. SEVERAL TESTS PERFORMED TO VERIFY THE SEQUENCE OF EVENTS. ON RESTART, AN EXTRA 14-DAY TEST WAS CARRIED OUT, WHEREBY THE TURBINE VALVES FUNCTIONED CORRECTLY.

O2-SS-002/87 - TRIPSIGNALS: SS16

REACTOR TRIP ON SS 16
HIGH CONDUCTIVITY AFTER 442 P1-P3.

DATE:870713 / EL.POWER 500 MWE

AT 1551 HOURS, ALARM WAS OBTAINED FOR HIGH CONDUCTIVITY IN CONDENSER BAY 2, 431 K802. AT 1641 HOURS, SS 16 WAS OBTAINED DUE TO RISING CONDUCTIVITY > 5 MICROS/CM ON 441 K801-K804.
SALT WATER LEAKAGE IN THE CONDENSER VIA BROKEN BRACE IN OUTLET WATER BOX FOR BAY 2.
LEAKAGE CORRECTED AND ALL TUBES IN BAYS 2 AND 3 LEAK-DETECTED WITH SATISFACTORY RESULTS.

O2-SS-003/87 - TRIPSIGNALS: SS17

REACTOR TRIP ON SS17
REACTOR POWER (MORE THAN 5%) AND CONDENSOR PRESSURE (MORE THAN 0.25 BAR).

DATE:870715 / EL.POWER 0 MWE

REDUCED SEALING STEAM FLOW DUE TO MALFUNCTIONING 455V1, CONDENSER PRESSURE GREATER THAN 0.3 BAR.

AT REACTOR POWER GREATER THAN 5% AND CONDENSER PRESSURE GREATER THAN 0.3 BAR, SS17 IS OBTAINED.
CORRECTIVE ACTION TAKEN ON 455V1.

R3-SS-002/87 - TRIPSIGNALS: TRIPPED BYPASSBREAKER B

TRIPPED BYPASS BREAKER B

DATE:871029 / EL.POWER 780 MWE

DURING SSPS TEST ON THE B SIDE, TWO SPRINGS WERE TO BE CHANGED ON REACTOR TRIP BREAKER B. BYPASS BREAKER B WAS CLOSED BUT TRIPPED, LEADING TO REACTOR TRIPS.
REACTOR CRITICAL ON 1987-10-29 AT 2100 HOURS.
DURING THE WORK ON REACTOR TRIP BREAKER B, THE SENIOR MAINTENANCE OFFICER PROBABLY ACCIDENTALLY PRESSED THE TRIP BUTTON FOR BYPASS BREAKER B.
SSPS TEST AND REACTOR TRIP RESTORED. RESTART COMMENCED.

END OF REACTOR TRIPS.

SYMBOLS USED IN THE OCCURRENCE LIST

SYS : XXX SYSTEM NUMBER ACCORDING TO SYSTEM LISTS

CAT : CATEGORY

CAT : 1 ERROR IN A COMPONENT OR A SYSTEM WHICH IS NOT NEEDED FOR THE OPERATION OF THE UNIT OR FOR THE FUNCTION OF ANY SAFETY SYSTEM. NO SUCH ERRORS IN THE OCCURRENCE LIST

CAT : 2 ERROR IN A COMPONENT OR A SYSTEM WHICH IS NEEDED FOR THE OPERATION OF THE UNIT BUT NOT FOR THE FUNCTION OF ANY SAFETY SYSTEM. NO SUCH ERRORS IN THE OCCURRENCE LIST

CAT : 3 ERROR IN A COMPONENT OR A SYSTEM WHICH DUE TO AVAILABLE RESERVE DOES NOT REQUIRE IMMEDIATE SHUTDOWN ACCORDING TO THE TECHNICAL SPECIFICATIONS.

CAT : 4 ERROR IN A COMPONENT OR A SYSTEM WHICH ACCORDING TO THE TECHNICAL SPECIFICATIONS REQUIRES IMMEDIATE SHUTDOWN OR IS CONSIDERED BY THE INSPECTORATE TO BE OF SIMILAR SEVERITY.

CAT : 5 A CRACK OR A RUPTURE OF A SMALL PIPE (DIAMETER NOT GREATER THAN 50 MM) WITHIN THE PRESSURE BOUNDARY OF THE REACTOR COOLANT SYSTEM INSIDE THE CONTAINMENT. FOR PWR ALSO WITHIN THE PRESSURE BOUNDARY OF THE SECONDARY SIDE INSIDE THE CONTAINMENT.

CAT : 6 OTHER MORE EXTENSIVE EVENTS

TYPE : GIVES INFORMATION OF

100 - MODE OF OPERATION AT THE TIME OF DISCOVERY

101 - COLD SHUTDOWN
102 - REACTOR MODE SWITCH IN THE REFUEL POSITION
103 - HOT SHUTDOWN
104 - NUCLEAR HEATING
105 - HOT STAND BY
106 - POWER OPERATION
107 - HOUSE LOAD TURBINE OPERATION

200 - WAY OF DISCOVERY

201 - CONTROL ROOM SUPERVISION
202 - OPERATOR ROUND
203 - FUNCTION TEST
204 - REPAIR
205 - PLANNED MAINTENCE
206 - ANNUAL OUTAGE, REVISION
207 - SPECIAL INSPECTION
208 - BY CHANCE
209 - OTHER WAY OF DISCOVERY

300 - SYMPTOM

301 - ALARM IN CONTROL ROOM
302 - MALFUNCTION OF ELECTRICAL SYSTEM
303 - MALFUNCTION OF MECHANICAL SYSTEM
304 - NO FUNCTION
305 - SPURIOUS FUNCTION
306 - DAMAGED ELECTRICAL EQUIPMENT
307 - DAMAGED MECHANICAL EQUIPMENT
308 - VIBRATIONS
309 - LEAK
310 - SMOKE, FIRE
311 - NOICE, SMELL
312 - OTHER SYMPTOM
313 - NO SYMPTOM

400 - EFFECT ON OPERATION

401 - AUTOMATIC REACTOR TRIP (HYDRAULIC OR DROP OF CONTROL RODS)
402 - AUTOMATIC REACTOR SHUT DOWN (EL MOTOR INSERTION OF CONTROL RODS)
403 - MANUAL REACTOR REACTOR TRIP OR SHUT DOWN
404 - ISOLATION
405 - TURBINE TRIP
406 - DUMP BLOCKING
407 - LOAD REDUCTION
408 - CHANGE-OVER TO HOUSE TURBINE LOAD OPERATION
409 - NO INFLUENCE ON OPERATION

500 - EFFECT ON EQUIPMENT

501 - SYSTEM OUT OF OPERATION
502 - SYSTEM FUNCTION REDUCED
503 - COMPONENT OUT OF OPERATION
504 - COMPONENT FUNCTION REDUCED
505 - DAMAGE ON OTHER PART OF THE PLANT
506 - NO CONSEQUENCE
507 - OTHER CONSEQUENCE

600 - COMPONENT

601 - PRESSURE VESSEL
602 - HEAT EXCHANGER
603 - PIPE
604 - FLANGED COUPLING
605 - VALVE INCLUDING POSITIONER
606 - PUMP, FAN
607 - MOTOR, GENERATOR
608 - REGULATING EQUIPMENT
609 - SWITCHGEAR EQUIPMENT
610 - CABLE
611 - OTHER ELECTRICAL COMPONENT
- UNCLASSIFIED

700 - ACTION TAKEN OR PLANNED

701 - EXCHANGE OF PART(S) WITHIN REPORTED OBJECT
702 - EXCHANGE OF REPORTED OBJECT
703 - REPAIR OF PART(S)
704 - ADJUSTMENT, CALIBRATION
705 - CLEANING, LUBRICATION
706 - NO ACTIONS TAKEN ON COMPONENT
707 - OTHER ACTION

800 - CAUSE

801 - CORROSION, EROSION
802 - ABNORMAL WEAR
803 - UNBALANCE, FATIGUE
804 - WATER HAMMER, PRESSURE THRUST
805 - DEFORMATION, DISPLACEMENT
806 - CRACK
807 - BREAK
808 - FIRE, EXPLOSION
809 - EARTH FAULT (ELECTRICAL)
810 - SHORT CIRCUIT
811 - LOSS OF VOLTAGE
812 - OTHER ELECTRICAL FAULT
- UNCLASSIFIED

900 - POSSIBLE CAUSE BEHIND

901 - DESIGN
902 - MATERIAL
903 - MANUFACTURE
904 - INSTALLATION/CONSTRUCTION
905 - MAINTENANCE
906 - OPERATING PROCEDURES
907 - OPERATIONAL ERROR
908 - INCORRECT WATER CHEMISTRY
909 - OTHER POSSIBLE CAUSE

TABLE 1

SAFETY RELATED OCCURRENCES 870701 TO 871231
CATEGORY VS UNIT

UNIT:	B1	B2	F1	F2	F3	O1	O2	O3	R1	R2	R3	R4	SUM
CATEGORY													
3	10	16	16	12	12	10	26	13	18	11	15	16	175
4	0	0	0	0	0	0	0	1	0	0	0	0	1
5	0	0	0	0	0	0	0	0	0	0	0	0	0
SUM:	10	16	16	12	12	10	26	14	18	11	15	16	176

TABLE 2

SAFETY RELATED OCCURRENCES 870701 TO 871231
SYSTEM VS UNIT

UNIT:	B1	B2	F1	F2	F3	O1	O2	O3	R1	R2	R3	R4	SUM
SYSTEM GROUPS													
100 - CONTAINMENT	0	0	1	0	0	1	0	0	2	0	0	0	4
200 - REACTOR	0	0	2	0	2	1	3	0	0	0	0	0	8
300 - REACTOR AUXILIARY SYSTEMS	5	8	3	4	5	2	3	5	9	2	11	7	64
400 - TURBO-GENERATOR PLANT	0	0	1	0	1	0	0	0	0	2	1	2	7
500 - CONTROL EQUIPMENT	0	1	0	1	1	2	4	5	4	2	1	4	25
600 - ELECTRICAL POWER EQUIPMENT	3	2	0	4	2	3	6	1	1	2	1	2	27
700 - SERVICE SYSTEMS & EQUIPMENT	1	2	9	3	0	1	4	0	2	3	1	1	27
800 - OTHER FACILITIES	1	3	0	0	1	0	6	3	0	0	0	0	14
SUM:	10	16	16	12	12	10	26	14	18	11	15	16	176

TABLE 3

SAFETY RELATED OCCURRENCES 870701 TO 871231
COMPONENT VS UNIT

UNIT:	B1	B2	F1	F2	F3	O1	O2	O3	R1	R2	R3	R4	SUM
TYPE													
600 - COMPONENT													
601 - PRESSURE VESSEL	0	0	1	0	0	0	0	0	0	0	1	0	2
602 - HEAT EXCHANGER	0	0	0	0	0	0	1	1	0	0	0	1	3
603 - PIPE	0	0	2	0	0	2	0	0	1	0	0	0	5
604 - FLANGED COUPLING	1	0	2	0	0	0	0	0	0	0	0	0	3
605 - VALVE INCLUDING POSITIONER	4	3	2	4	3	1	4	1	6	4	7	2	41
606 - PUMP, FAN	0	4	1	1	1	1	5	2	1	2	3	1	22
607 - MOTOR, GENERATOR	0	0	3	0	0	0	1	1	2	1	0	0	8
608 - REGULATING- OR CONTROL EQUIPMENT	0	2	0	0	0	0	3	1	2	0	0	3	11
609 - SWITCHGEAR EQUIPMENT	1	1	1	3	0	2	2	0	0	1	0	1	12
610 - CABLE	1	0	0	0	0	0	0	0	0	0	0	1	2
611 - OTHER COMPONENT	3	6	4	4	8	3	10	7	4	3	4	7	63
- UNCLASSIFIED	0	0	0	0	0	1	0	1	2	0	0	0	4
SUM:	10	16	16	12	12	10	26	14	18	11	15	16	176

TABLE 4

SAFETY RELATED OCCURRENCES 870701 TO 871231
CAUSE VS UNIT

UNIT:	B1	B2	F1	F2	F3	O1	O2	O3	R1	R2	R3	R4	SUM
TYPE													
800 - CAUSE													
801 - CORROSION, EROSION	1	0	5	1	0	0	0	0	1	0	0	1	9
802 - ABNORMAL WEAR	0	3	1	1	1	0	1	0	1	0	0	1	9
803 - UNBALANCE, FATIGUE	0	1	0	1	0	0	0	0	0	0	0	0	2
804 - WATER HAMMER, PRESSURE THRUST	0	0	0	0	0	0	0	0	0	0	1	0	1
805 - DEFORMATION, DISPLACEMENT	1	1	0	1	1	1	2	0	1	0	0	0	8
806 - CRACK	0	0	1	0	0	0	1	0	1	1	0	0	4
807 - BREAK	0	0	0	0	1	0	0	0	0	0	0	0	1
808 - FIRE, EXPLOSION	0	0	0	0	0	0	0	0	0	0	0	0	0
809 - EARTH FAULT (ELECTRICAL)	1	1	0	1	0	0	2	0	0	0	1	0	6
810 - SHORT CIRCUIT	0	1	1	0	1	0	0	1	0	0	0	0	4
811 - LOSS OF VOLTAGE	0	0	0	0	0	0	3	0	2	0	0	2	7
812 - OTHER FAULT	5	8	8	7	8	5	14	10	8	10	13	12	108
UNCLASSIFIED	2	1	0	0	0	4	3	3	4	0	0	0	17
SUM:	10	16	16	12	12	10	26	14	18	11	15	16	176

TABLE 5

SAFETY RELATED OCCURRENCES 830101 TO 871231
COMPONENT VS UNIT

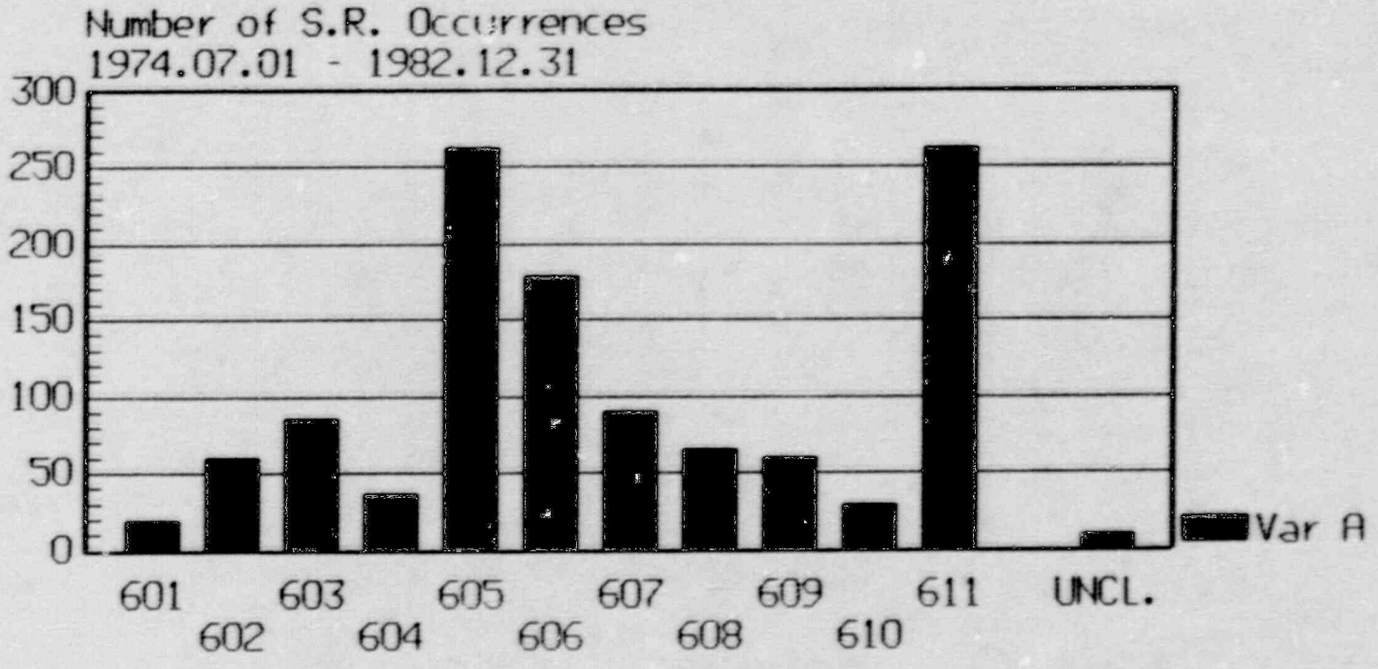
UNIT:	B1	B2	F1	F2	F3	O1	O2	O3	R1	R2	R3	R4	SUM
TYPE													
600 - COMPONENT													
601 - PRESSURE VESSEL	0	1	1	0	0	0	0	3	1	0	1	0	7
602 - HEAT EXCHANGER	5	4	1	0	0	6	7	1	3	1	3	1	32
603 - PIPE	5	2	5	5	2	10	6	0	5	10	2	3	55
604 - FLANGED COUPLING	1	4	4	0	0	1	2	0	2	4	0	4	22
605 - VALVE INCLUDING POSITIONER	35	31	19	23	25	23	23	17	31	29	32	32	320
606 - PUMP, FAN	22	22	12	9	9	12	34	8	11	25	23	17	204
607 - MOTOR, GENERATOR	4	3	9	11	4	7	10	2	5	3	1	4	63
608 - REGULATING- OR CONTROL EQUIPMENT	10	5	8	9	1	7	12	2	12	8	4	20	98
609 - SWITCHGEAR EQUIPMENT	14	9	8	15	9	12	9	7	15	10	4	3	115
610 - CABLE	2	0	3	1	2	0	2	0	0	0	1	3	14
611 - OTHER COMPONENT	53	34	39	52	62	37	55	60	56	29	52	43	572
- UNCLASSIFIED	2	1	1	0	4	2	3	5	17	2	2	4	43
SUM:	153	116	110	125	118	117	163	105	158	121	125	134	1545

TABLE 6

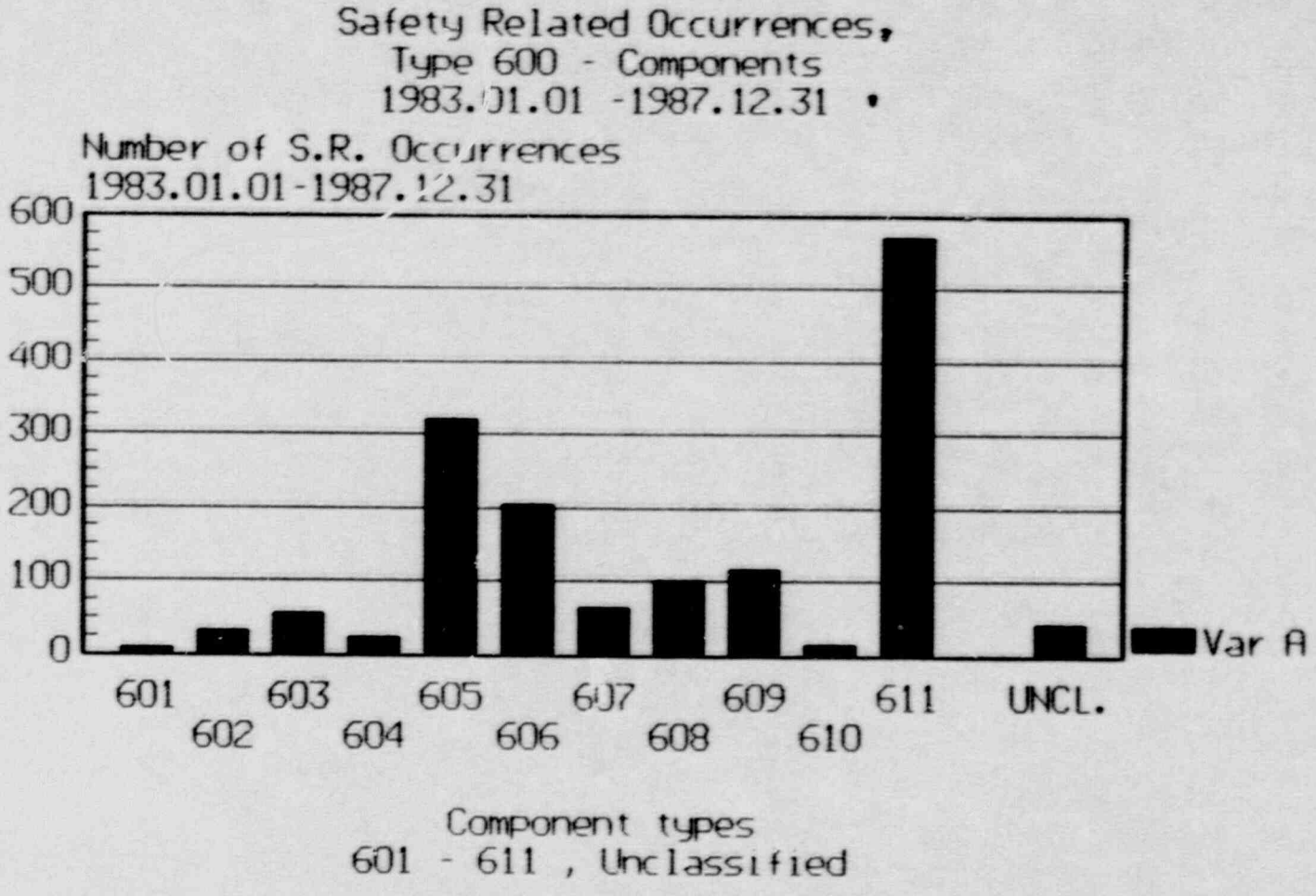
REACTOR TRIPS 870701 TO 871231
SYSTEM VS UNIT

UNIT:	B1	B2	F1	F2	F3	O1	O2	O3	R1	R2	R3	R4	SUM
SYSTEM GROUPS													
100 - CONTAINMENT	0	0	0	0	0	0	0	0	0	0	0	0	0
200 - REACTOR	0	0	0	0	0	0	0	0	0	0	0	0	0
300 - REACTOR AUXILIARY SYSTEMS	1	0	0	0	0	0	0	0	0	0	0	0	1
400 - TURBO-GENERATOR PLANT	0	0	0	0	1	2	2	0	0	0	0	0	5
500 - CONTROL EQUIPMENT	0	0	0	0	0	0	0	0	0	0	1	0	1
600 - ELECTRICAL POWER EQUIPMENT	0	0	0	0	0	1	0	0	0	0	0	0	1
700 - SERVICE SYSTEMS & EQUIPMENT	0	0	0	0	0	0	0	0	0	0	0	0	0
800 - OTHER FACILITIES	0	0	0	1	0	0	0	0	0	0	0	0	1
SUM:	1	0	0	1	1	3	2	0	0	0	1	0	9

Safety Related Occurrences,
Type 600 - Components
1974.07.01 - 1982.12.31



Component types
601 - 611 , Unclassified


Safety Related Occurrences,
Type 600 - Components
1983.01.01 -1987.12.31
Number of S.R. Occurrences
1983.01.01-1987.12.31
600
500
400
300
200
100
0
Var A
601
602
603
604
605
606
607
608
609
610
611
UNCL.
Component types
601 - 611 , Unclassified

Electricity generation between 1987-01-01--12-31

In the following electricity generation charts 100% is equal to

615 MW at unit B1

600 MW at unit B2

1008 MW at unit F1

985 MW at unit F2

1101 MW at unit F3

460 MW at unit O1

615 MW at unit O2

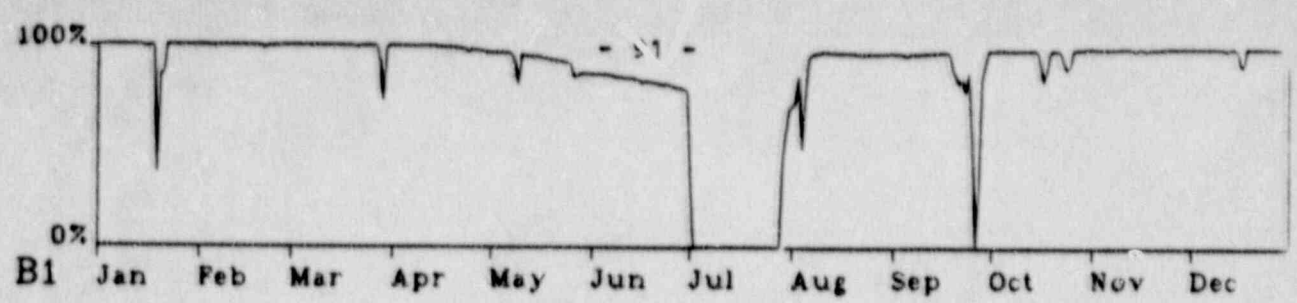
1110 MW at unit O3

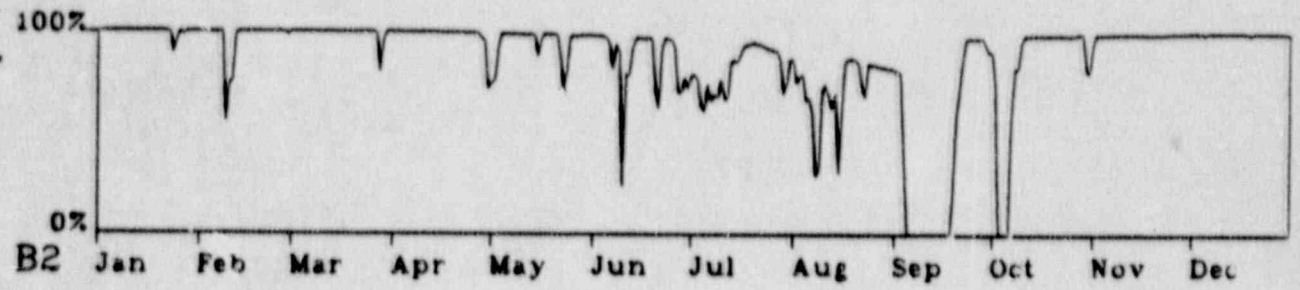
780 MW at unit R1

840 MW at unit R2

960 MW at unit R3

960 MW at unit R4


100%
0%
B1
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec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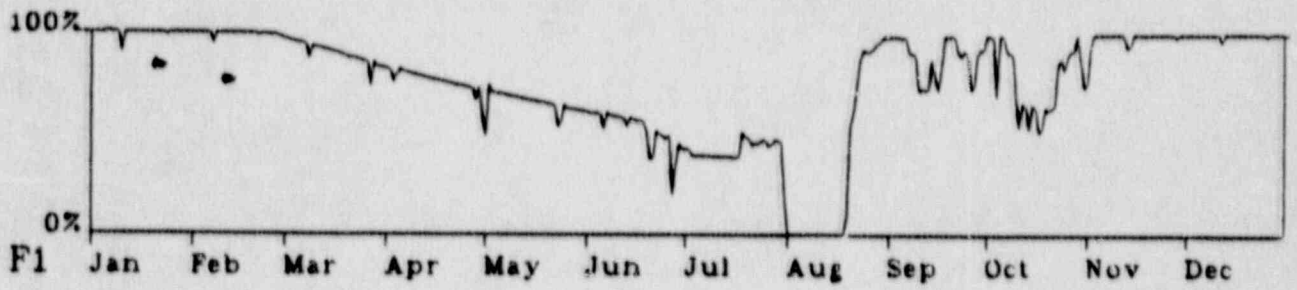
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


100%
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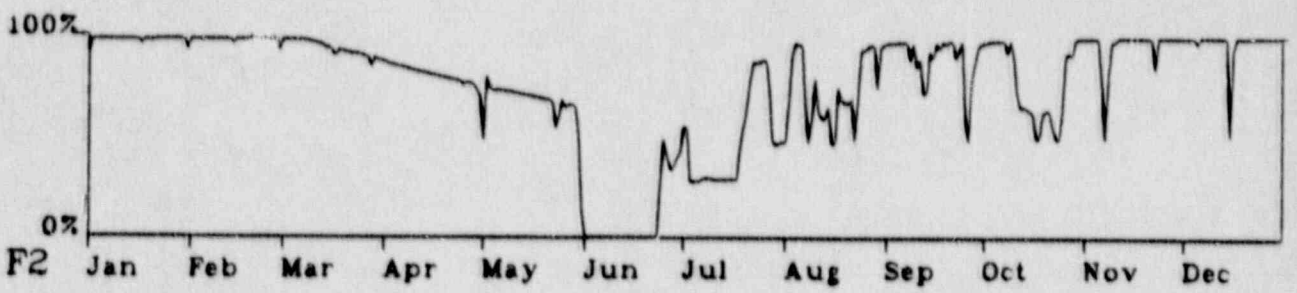
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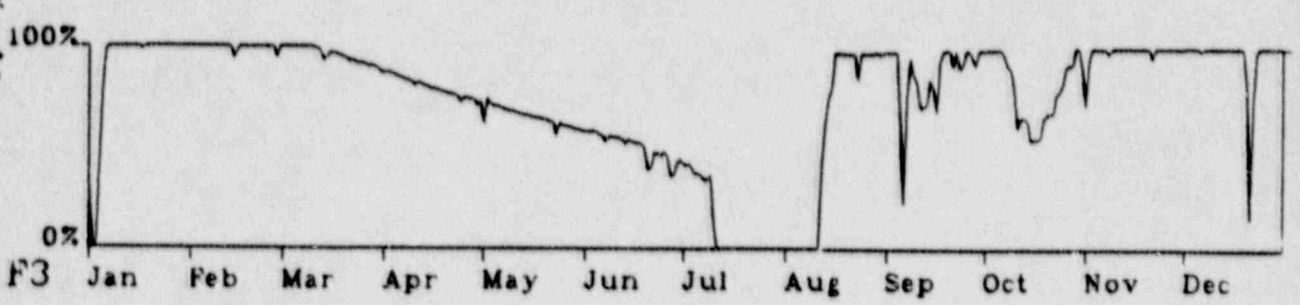
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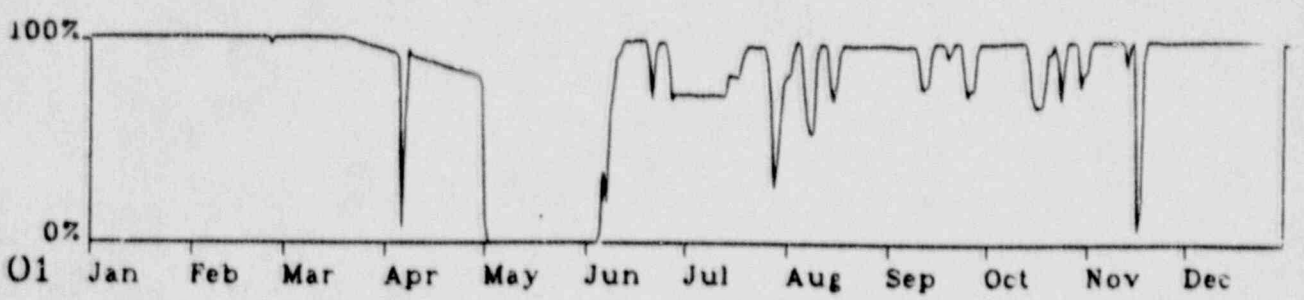
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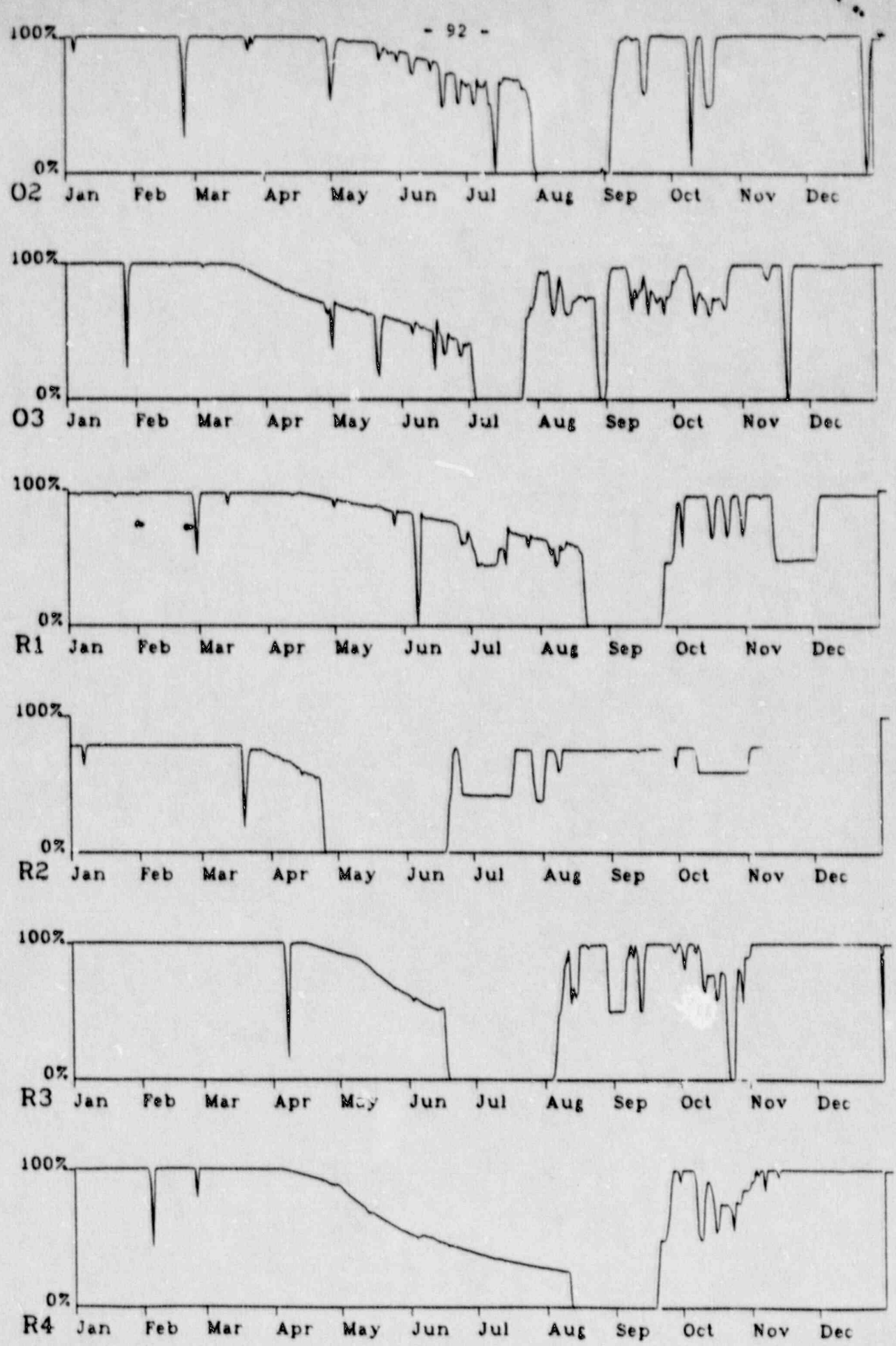
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TREDJE KVARTALET 1987

Kvartalsrapport

SKi

STATENS KÄRNKRAFTINSPEKTION

3

Innehållsförteckning

FÖRORD

Samverkan och ansvar är av fundamental betydelse för att upprätthålla och vidareutveckla säkerheten i kärnteknisk verksamhet.

Myndigheter och kraftföretag kan samverka för att skapa kunskapsbas och problemförståelse.

SKIs ansvar är att med integritet och objektivitet se till att företagen tar det fulla ansvaret för att i alla avseenden hålla säkerheten hög med efterhand reducerad risk för olyckor. Roller och ansvarslinjer måste vara klara mellan myndigheter och företag. Detta är en nödvändig förutsättning också inom företagen. Klart linjeansvar för säkerheten från företagsledning till de medarbetare som i olika funktioner driver en anläggning är ett eftergivligt krav och en nödvändig förutsättning för hög säkerhet.

Specialister i servicegrupper och staber har ansvar för sakkunniga åtgärder och för att därvid utnyttja bästa tillgängliga kunskap. Samverkan mellan specialister och linjeorganisation utan oklarheter i ansvarsbilden är en annan förutsättning för framgångsrikt arbete.

Individuellt ansvar innefattar att utveckla kunnande och att vara utvilad inför ansvarsfulla uppgifter.

I denna kvartalsrapport behandlas överträdelsen den 24 juli av de säkerhetstekniska föreskrifterna vid Oskarshamn 3. Händelsen och dess orsaker belyser betydelsen av klarhet i upplevelsen av ansvar och hur det uttryckes i organisationen, i rutiner och i ordergivning. SKI kommer att se över tillsynsverksamheten för alla kärnkraftverken mot bakgrund av vad som kommit fram i utredningen av Osakrshamnshändelsen.

Kunskap om hur individer, organisation och teknik samverkar är viktig för att ytterligare förbättra säkerheten. Jag har därför tagit initiativ till en grupp för samråd omkring utveckling och tillämpning av sådan kunskap. Gruppen kommer att ledas av Evert Ericsson, avgående chef för Ringhals. Deltagare i gruppen är i övrigt:

Bengt Ahlmann, Barsebäcksverket
Håkan Johansson, Ringhalsverket
Svante Nyman, KSU
Jan Runermark, Oskarshamnsverket
Karl Erik Sandstedt, Forsmarksverket
Sven Gustafsson och Lars Högberg, SKI

Sekreterare: Kerstin Dahlgren, SKI

Jag förväntar mig att gruppen skall bidraga till en utveckling som stärker myndighet och kraftföretag att var för sig leva upp till sitt ansvar för en hög och ständigt förbättrad säkerhet.

Olof Hörmander
Generaldirektör

SAMLAD BEDÖMNING AV KVARTAL 3 1987

Den 24 juli genomfördes lokala kritiska prov i Oskarshamn 3 på ett sätt som stred mot gällande säkerhetstekniska föreskrifter. Händelsen innebar inte någon påvisbar höjning av risken för onormala utsläpp av radioaktivitet. Trots detta har händelsen väckt stort uppseende och bedömts som mycket allvarlig av SKI. Den har utretts noga av SKI, och liksom av OKG, och resulterat i ett handlingsprogram för OKG som skall vara genomfört till nästa revision. För SKI innebär det inträffade att mer uppmärksamhet måste ägnas icke-tekniska frågor som t ex revisionsplanering och övertidsuttag. SKI har sålunda inlett en översyn vid samtliga verk av administrativa rutiner för styrning av säkerheten. Det innebär naturligtvis också att SKI måste granska sin egen verksamhet för att klarlägga vilka ändringar av inriktning och tillvägagångssätt som kan vara motiverade. När Oskarshamn 2 startade upp efter sin revision inträffade också en incident som tyder på brister i administrativa säkerhetsrutiner. Ett snabbstoppsvillkor som enligt föreskrift kopplats bort under revisionerna återställdes inte på föreskrivet sätt.

Under revisionerna av kokarreaktorerna påträffades ett antal skador som orsakats av korrosion, termisk utmattning eller vibrationer. Ingen enskild skada kan betecknas som speciellt oroväckande, men antalet skador visar klart behovet av att frågor som sammanhänger med material och hållfasthet även fortsättningsvis måste ägnas stor uppmärksamhet.

I Oskarshamn 3 konstaterades brott på två stag till en ångledning. Nya stag har monterats, och ett omfattande mätprogram genomförs nu för att få klarlagt vilka påkänningar ångledningarna utsätts för. Det kunde klarläggas att inga skador på ångledningarna uppstått på grund av de vibrationer, som resulterat i brott på stagen.

Transporterna av utbränt blandoxidbränsle, MOX-bränsle, inleddes under perioden. MOX-bränslet skiljer sig ur risksynpunkt endast marginellt från vanligt uranoxidbränsle. Transporterna möttes av demonstrationer både i Västtyskland och Sverige.

TABELL 1. SVENSKA KÄRNKRAFTVERK I DRIFT

KÄRNKRAFTVERK	ÄGARE	REAKTOR-TYP	LEVERANTÖR		TERMISK EFFEKT (MW)	ELEKTRISK EFFEKT BRUTTO/NETTO (MW)	BRÄNSLE-LADDNING	KOMMERSIELL DRIFT
			REAKTOR	TURBIN				
BARSEBÄCK 1	Sydkraft	BWR	ASEA-ATOM	Stal-Laval	1 800	615/600	1975	1975
BARSEBÄCK 2	Sydkraft	BWR	ASEA-ATOM	Stal-Laval	1 800	600/585	1976/77	1977
FORSMARK 1	Forsmarks Kraftgrupp AB	BWR	ASEA-ATOM	Stal-Laval	2 928	1 008/970	1980	1981
FORSMARK 2		BWR	ASEA-ATOM	Stal-Laval	2 928	985/949	1980	1981
FORSMARK 3		BWR	ASEA-ATOM	Stal-Laval	3 000	1 101/1 063	1984	1985
OSKARSHAMN 1	OKG AB	BWR	ASEA-ATOM	Stal-Laval	1 375	460/440	1970	1972
OSKARSHAMN 2	OKG AB	BWR	ASEA-ATOM	Stal-Laval	1 800	615/595	1974	1975
OSKARSHAMN 3	OKG AB	BWR	ASEA-ATOM	Stal Laval	3 000	1 110/1 070	1984	1985
RINGHALS 1	Vattenfall	BWR	ASEA-ATOM	General Electric Co	2 270	780/750	1973	1976
RINGHALS 2	Vattenfall	PWR	Westinghouse	Stal-Laval	2 440	840/800	1974	1975
RINGHALS 3	Vattenfall	PWR	Westinghouse	Stal-Laval	2 783	960/915	1980	1981
RINGHALS 4	Vattenfall	PWR	Westinghouse	Stal-Laval	2 783	960/915	1982	1983

BWR = kokvattenreaktor

PWR = tryckvattenreaktor

TABELL 2.

SVENSKA KÄRNKRAFTVERK I DRIFT Kvartal 3 1987

KÄRNKRAFTVERK	I DRIFT, % AV TOTAL TID		ENERGIUTNYTTJ-NINGSFAKTOR %		ANM.
	UNDER KVARTA-LET	UNDER SENASTE ÅRET	UNDER KVARTA-LET	UNDER SENASTE ÅRET	
BARSEBÄCK 1	67	89	62	84	100%=590 MW
BARSEBÄCK 2	84	94	66	87	106 %=590 MW
FORSMARK 1	79	93	55	72	108%=1 008 MW
FORSMARK 2	100	91	71	73	108%=1 008 MW
FORSMARK 3	64	87	52	70	100%=1 101 MW
OSKARSHAMN 1	98	86	87	82	
OSKARSHAMN 2	60	90	46	84	106%=652 MW
OSKARSHAMN 3	70	92	54	80	
RINGHALS 1	62	69	35	71	
RINGHALS 2	100	84	66	61	80%=658 MW
RINGHALS 3	61	85	50	78	
RINGHALS 4	58	89	11	73	

"I drift" anger den tid då generatorn varit inkopplad på kraftnätet.

"Energiutnyttjningsfaktorn" anger hur mycket elenergi som producerats under den aktuella tidsperioden i förhållande till den elenergi som teoretiskt kan produceras med full effekt under samma period.

$$\text{Energiutnyttjningsfaktor} = \frac{\text{Producerad elenergi under perioden}}{\text{Generatoreffekt x total tid under perioden}}$$

Att betrakta de ovan definierade parametrarna enbart för ett visst kvartal ger begränsad information. Därför de även för det senaste året.

KÄRNTEKNISKA ANLÄGGNINGAR

Barsebäck 1

Blocket ställdes av för årets revision den 1 juli 198/.

Ett nytt neutronflödesmätsystem, SIRM, installerades. SIRM-systemet är modernare och lättare att underhålla än tidigare konstruktion. Systemet är också driftsäkrare och har längre livslängd. Dessutom underlättar SIRM reaktoroperatörsarbete vid styrstavsdragning*) genom att omkoppling mellan mätområdena sker automatiskt.

Av utförda besiktningar kan nämnas en ny typ av mekaniserad provning av svetsskarvar i reaktorns huvudcirkulationskretsar provades. Erfarenheterna av provmetoden var goda. Samtliga kallbockade rörböjar i snabbstoppssystemet kontrollerades med ultraljud. Dessa befanns vara utan anmärkning.

Inför uppstart efter avslutad revision utfördes ett prov som görs tre gånger per tio år av PS-inneslutningens tätnet med provtryckning vid 0,30 MPa*) absolut tryck. Provet genomfördes utan anmärkning.

Den 29 juli fasades blocket till nätet igen och årets revision var avslutad.

Samma dag konstaterades att en skalventil i en huvudångledning hade för lång stängningstid. En magnetventil byttes ut och efterföljande prov gav godkänt resultat.

Den 4 augusti justerades magnet- och styrventilerna ytterligare under en varm avställning.

Ventilkäglor i högtrycksturbinens reglerventiler byttes den 25 september, när blocket togs ner till varm avställning.

På grund av lågt kraftbehov har effekten reducerats under sista delen av perioden.

Barsebäck 2

Vid periodens början och fram till årets revisionsavställning av blocket har effekten reducerats på grund av lågt kraftbehov.

Den 16 juli kom ett brandlarm från rumsövervakningen. En kontroll visade att rökutvecklingen kom från en pump i kylsystemet för reaktorinneslutningen. Pumpen stoppades och det konstaterades att axiallagret*) hade skurit. Reservkylkretsen sattes i drift och lagret byttes ut.

I samband med funktionsprov av gasturbiner den 25 juli stoppades en gasturbinhalva kort efter start på grund av lågt brännoljetryck. Orsaken var ett elfel i magnetspolen till brandskyddsventilen. Magnetspolen byttes ut.

*) se teknisk ordlista

Vid driftrondering*) den 28 juli upptäcktes att en axel till en pump i reaktorinneslutningens kylsystem vibrerade onormalt mycket. Pumpen ställdes av och axeln balanserades.

Den 4 september fasades blocket ur från nätet och årets revision inleddes. Årets revision var en kort revision och därför gjordes inga större ändringsarbeten. Det huvudsakliga arbetet bestod i att byta bränsle och utföra nödvändiga kontroller enligt fastställda kontrollprogram.

Den 18 september fasades blocket till nätet. Vid den fortsatta effektuppgången konstaterades att en fläns till en skalventil i en ångledning läckte. Effekten reducerades och flänsen reparerades. Därefter fasades blocket till nätet igen den 19 september.

Den 29 september reducerades effekten på grund av tubläckage i en mellanöverhettare. De åtgärder som vidtogs för att avhjälpa felet faller inom ramen för kvartal 1987/4 och kommer att redovisas i denna rapport.

Avfallsanläggningar

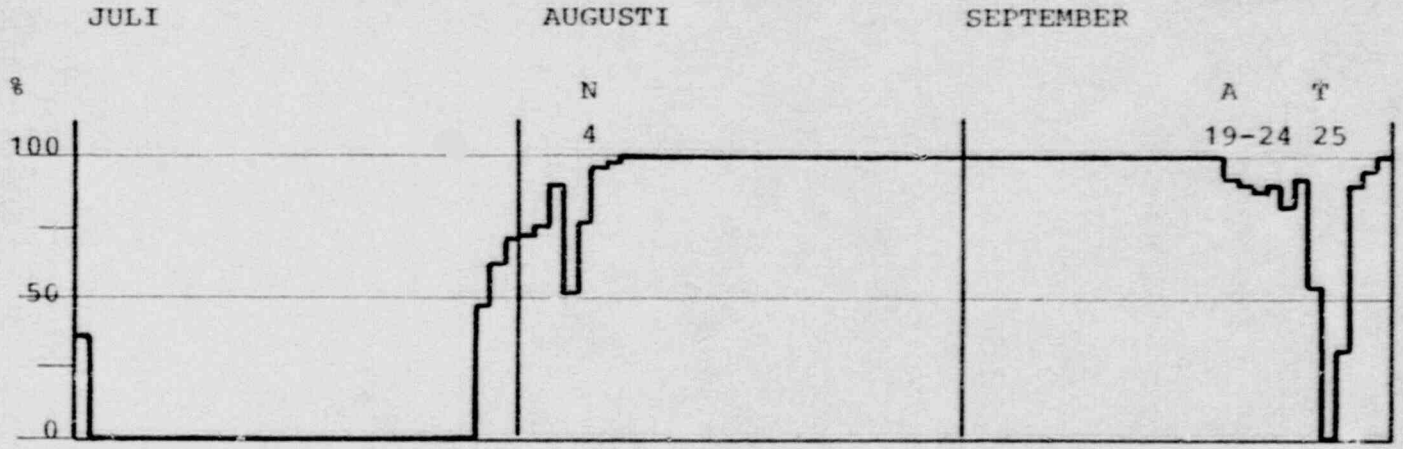
Ett provprogram för verificring av processen för ingjutning av jonbytarmassor i bitumen (asfalt) fortsätter. Prov av utrustning för hantering av skadade bitumenfat pågår.

*) se teknisk ordlista

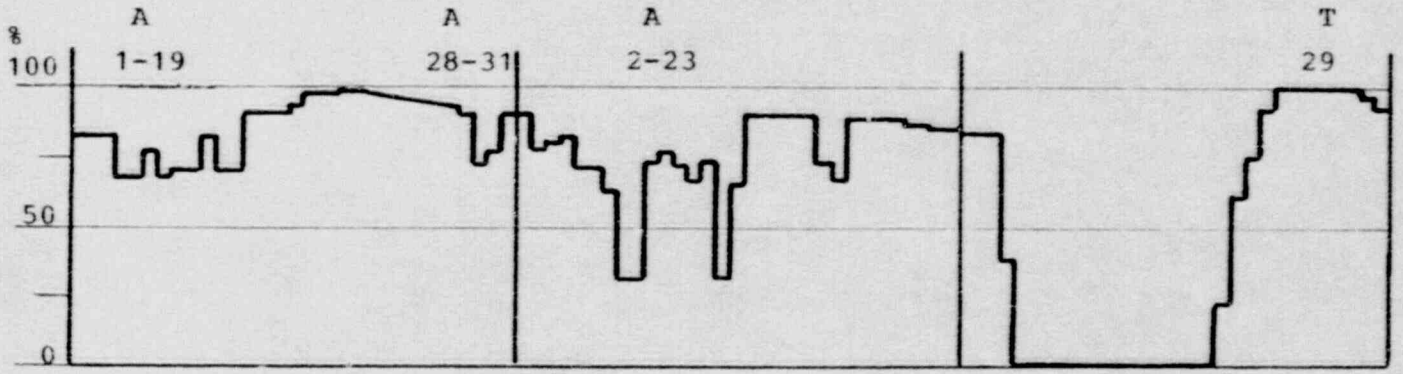
DYGNSMEDELEFFEKTEN, BRUTTO

B A R S E B Ä C K

3e Kvartalet 1987



Barsebäck 1 (100%=615 MW)



Barsebäck 2 (100%=600)

TECKENFÖRKLARING

R Störning i reaktor- eller reaktorhjälpsystem

T Störning i turbin, generator eller andra system

N Störningar som orsakat eller kunde ha orsakat nedsättning av funktion hos system med betydelse för säkerheten

A Avsiktligt driftstopp eller avsiktlig effektsänkning för provning, underhåll, bränslebyte och dylikt eller på grund av minskat behov av eleffekt

M Störning orsakad av mänskliga fel

Siffrorna anger datum i resp månad då händelsen inträffade

Forsmark 1

Kvartalet inleddes med coast-down-drift*) och nedreglering av kraftbalansskäl till en effekt av cirka 50 %.

Den 28 juli inleddes 1987 års planerade revision och en av de två ångturbinerna ställdes av. Den andra turbinen ställdes av tre dagar senare och samtidigt reaktorn. Revisionen pågick i 19 dygn. Bland annat byttes bränsle. Dessutom byttes en rörböj i kylsystemet för kall avställd reaktor. Vidare gjordes generatorarbeten. I övrigt genomfördes en mängd andra planerade åtgärder och ändringsarbeten.

Den 17 augusti började reaktorn värmas upp och den 20 augusti var båda turbinerna inkopplade till nätet. Den 31 augusti drevs blocket med 108 %. Under september har effekten stundtals varit nedreglerad av kraftbalansskäl.

Den 30 september var effekten 108 %.

Forsmark 2

Kvartalet inleddes med drift vid 45 % effekt. Reaktoreffekten har av kraftbalansskäl varit nedreglerad under en stor del av kvartalet. Nedregleringen medförde tidvis enturbindrift.

Inga störningar av vikt har inträffat under kvartalet.

Vid kvartalets slut den 30 september var effekten 105 %.

Forsmark 3

Kvartalet inleddes med coast-down-drift. Den 10 juli ställdes blocket av för den årliga revisionen. Forsmark 3 hade i år en kort revision vilket innebär att den skulle vara 22 dagar lång. Revisionen förlängdes med tio dygn dels på grund av att ett montageskydd för temperaturmätningsinstrument för huvudcirkulationsflödet hade tappat tre "pinnar", dels på grund av problem med huvudcirkulationspumpar.

De tre pinnarna återfanns i reaktorn. Nedre änden av pinnarna har brustit genom interkristallin spänningskorrosion*), och lossnat efter brott upptill genom vibration. Den skadade hylsan till temperaturstudsen har skurits bort. De övriga temperaturstudsarna uppvisade inga skador vid inspektion. De kommer ånyo att inspekteras under revisionen 1988. Två pinnar hade fastnat i drivdon. Drivdonen byttes.

*) se teknisk ordlista

När huvudcirkulationspumparna kontrollerades inför uppstart stannade två av dem på grund av jordfel, d v s överledning mellan spänningsförande del och och jord. Från en tredje huvudcirkulationspump hördes missljud. En av motorerna på den ena pumpen byttes ut mot en reservmotor och på den andra pumpen lokaliserades felet till omvandlaren från lik- till växelström. Felet åtgärdades. På den tredje pumpen byttes radiallagren*) ut.

Under revisionen gjordes en modifiering av styrventilerna till ångskalventilerna för att förbättra styrventilernas funktion. Man har försett styrventilerna med värmebehandlade pilotkäglor, ändrade magnetankare och förstärkta ventilfjädrar. Dessutom har de yttre ventilerna försetts med kylning för att öka livslängden på magnetspolarna. De inre ventilerna är redan kylda.

Revisionen avslutades den 7 augusti och blocket togs åter i drift.

Den 5 september fick Forsmark 3 ett snabbstopp orsakat av fel på magnetiseringen i generatorn och i dumpventilerna som öppnar för ånga till kondensorn vid dumpning.

Avfallsanläggningar

Vid Forsmarksverket fortsätter de om- och tillbyggnader av avfallsanläggningarna som inryms i projektet Avfall-90. Detta innebär bl a att anläggningen för hantering av låg-aktivt avfall vid Forsmark 1 och 2 helt byggs om och att ingjutningsanläggningen vid Forsmark 3 kompletteras för användning av plåtkokiller vid ingjutning av jonbytarmassor och indunstarkoncentrat.

SFR

Delen ovan jord är färdigställd och provdrift av systemen i delen under jord har påbörjats. Transportfordonet för transportbehållare har levererats. I silodelen har inlastningsutrustning monterats. Den 7 juli inkom SKB med en ansökan om drifttagning av terminalbyggnad med tillhörande driftområde; detta för att möjliggöra transport av avfall från kärnkraftverken innan isen lägger sig.

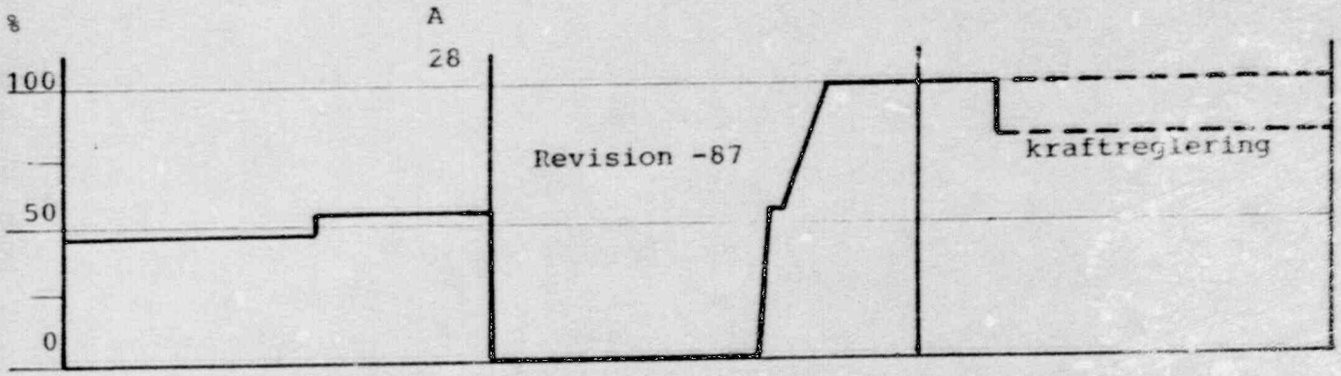
*) se teknisk ordlista

DYGNSMEDELEFFEKT, BRUTTO

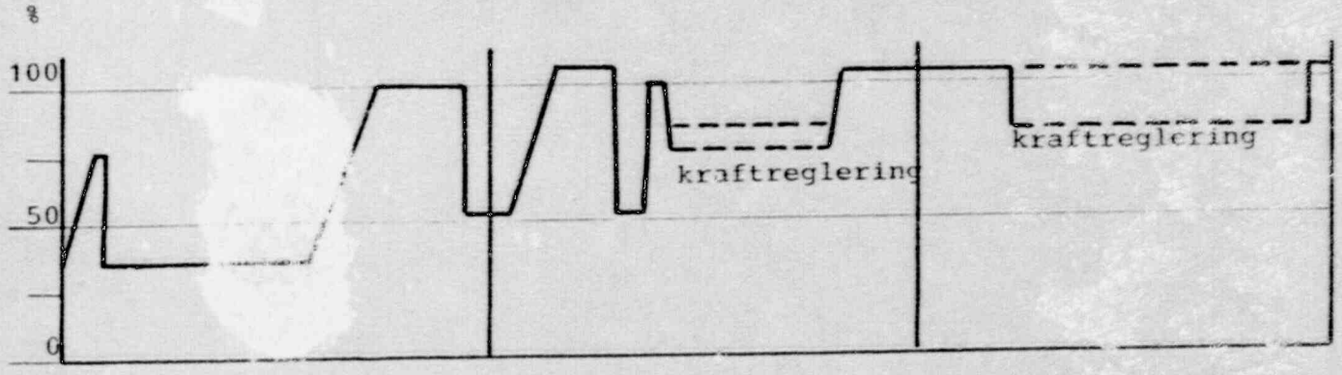
F O R S M A R K

3e Kvartalet 1987

JULI AUGUSTI SEPTEMBER



Forsmark 1 (100%=940 MW)



Forsmark 2 (100%=940)

TECKENFÖRKLARING

R Störning i reaktor- eller reaktorhjälpsystem

T Störning i turbin, generator eller andra system

N Störningar som orsakat eller kunde ha orsakat nedsättning av funktion hos system med betydelse för säkerheten

A Avsiktligt driftstopp eller avsiktlig effektsänkning för provning, underhåll, bränslebyte och dylikt eller på grund av minskat behov av eleffekt

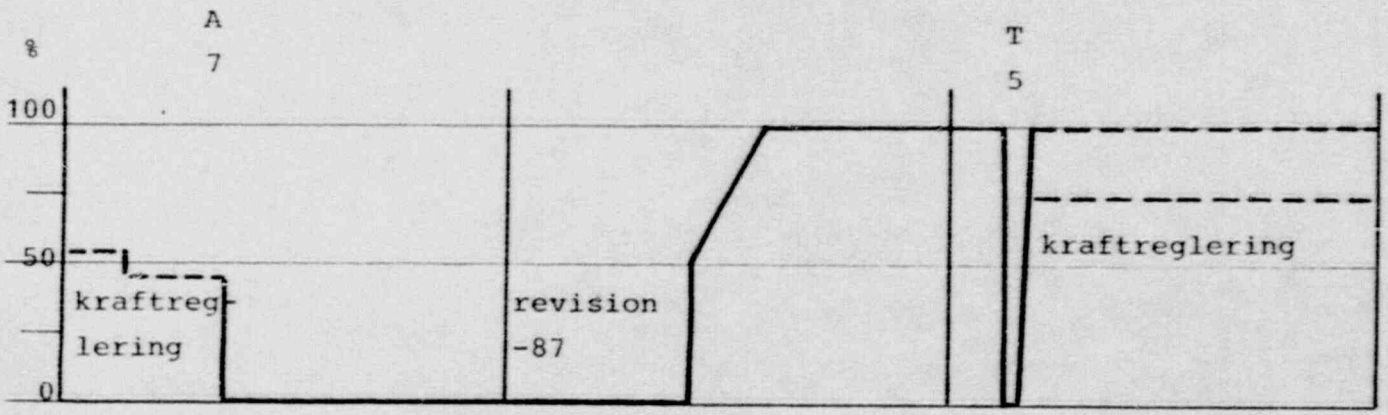
M Störning orsakad av mänskliga fel

Siffrorna anger datum i resp månad då händelsen inträffade

DYGNSMEDELEFFEKT, BRUTTO

F O R S M A R K

3e Kvartalet 1987



Forsmark 3 (100%=1 101 MW)

TECKENFÖRKLARING

R Störning i reaktor- eller reaktorhjälpsystem

T Störning i turbin, generator eller andra system

N Störningar som orsakat eller kunde ha orsakat nedsättning av funktion hos system med betydelse för säkerheten

A Avsiktligt driftstopp eller avsiktlig effektsänkning för provning, underhåll, bränslebyte och dylikt eller på grund av minskat behov av eleffekt

M Störning orsakad av mänskliga fel

Siffrorna anger datum i resp månad då händelsen inträffade

Oskarshamn 1

Kvartalet inleddes med 75 % reaktoreffekt. Effekten var ned reglerad pga det aktuella behovet av energi.

Den 19 juli höjdes reaktoreffekten till 100 %. Denna effekt bibehölls till den 26 juli då effekten åter reglerades ned till 75 %.

Den 28 juli inträffade reaktorsnabbstopp pga åskstörning. Reaktorns säkerhetssystem fungerade utan anmärkning. Blocke togs åter i drift och följande dag skedde infasning mot nätet. Därefter fortsatte reglering mellan 65 och 100 % reaktoreffekt.

Vid kvartalets utgång kördes blocket med 100 % reaktoreffekt.

Oskarshamn 2

Vid kvartalets början varierade reaktoreffekten mellan 90 och 50 % pga det aktuella kraftbehovet.

Lugn drift rådde fram till den 13 juli, då ett reaktorsnabbstopp inträffade. Orsaken till stoppet var hög konduktivitet*) i matarvattnet, vilket berodde på att det kom in saltvatten genom ett läckage i kondensorn. När kondensorläckaget reparerats inträffade ytterligare ett reaktorsnabbstopp. Högt tryck i kondensorn orsakat av felfungerande spärrångventil utlöste snabbstoppet.

Den 15 juli återupptogs driften.

Coast-down drift med dygnsreglering pågick fram till nedgån för revision den 31 juli. Reaktoreffekten var 46 % vid nedgången. Revisionen påbörjades planenligt.

När drivdonen inspekterades upptäcktes att en backventil till ett drivdon kärvade vilket förklarade den långa inskjutningstiden som tidigare rapporterats till SKI.

Vid den fortsatta inspektionen upptäcktes ytterligare backventiler med samma symptom. Driftledningen beslöt att se över samtliga drivdonsbackventiler. Detta resulterade i en omfattande rengöring; oxidskikt avlägsnades och ventilerna polerades.

Förutom sedvanliga underhållsarbeten och laddning av bränsle har en del arbeten gjorts. Bland annat har ett nytt system för vatteninpumpning till reaktorinneslutningen installerats. Detta ingår i programmet för konsekvenslindrande åtgärder vid svåra reaktorhaverier.

Återstart efter revisionen påbörjades den 28 augusti. Vid uppstarten upptäcktes att snabbstoppsvillkoret SS5 "Hög nivå i reaktortank" var bortkopplat. Bortkopplingen avlägsnades.

*) se teknisk ordlista

Den 31 augusti kyldes blocket ned till kall avställning för att fläns i sprinklingssystemet för reaktortanklock skulle åtgärdas. Därefter började värmning och uppgång. Den 4 september fasades blocket in mot nätet.

Uppgången till full effekt försenades något pga störningar i turbinens reglersystem. Den 28 september uppnåddes full effekt, 106 %, som hölls perioden ut.

Oskarshamn 3

Perioden inleddes med dygnsreglering. Reaktoreffekten varierade mellan 55 och 40 %. Den 3 juli kördes blocket ned för årets revision. Bränslet började tas ut den 4 juli.

När ångledningarna inspekterades upptäcktes brott på två stag till ångledning 2. Senare upptäcktes även brott på ett stag i avblåsningssystemet där det ansluter till ångledningssystemet.

Pga detta utfördes ultraljudsundersökningar på högt belastade delar av ångledningarna. En omfattande vibrationsmätutrustning monterades på ångledningssystemet. På de stag som monterades i stället för de brustna monterades trådtöjningsgivare. Kontinuerliga vibrations- och spänningsmätningar kan och kommer att utföras under drift.

Revisionen gick i övrigt planenligt. Återställning efter revisionen påbörjades den 21 juli.

I slutskedet av revisionen åsidosattes de säkerhetstekniska föreskrifterna vid lokala kritiska mätningar. Händelsen refereras på sid 22.

Efter avslutad revision togs blocket åter i drift. Fasning utfördes den 26 juli med fortsatt effektuppgång. Efter effektuppgången utlöstes delsnabbstopp orsakat av felaktigt mätvärde i matarvattensystemet.

Därefter fortsatte driften med kraftbalansreglering.

Den 27 augusti kördes blocket ned och kyldes ned till kall avställning för att komplettera vibrationsmätutrustningen på ångledningarna. Blocket återstartades därefter och den 1 september infasades blocket mot nätet.

Den 3 september uppnåddes full effekt, 100 %. Driften fortsatte lugnt med tidvis kraftbalansreglering perioden ut.

Avfallsanläggningar

Byggnadsarbetena för en anläggning för utlastning av avfall, som senare ska föras till slutförvaret för reaktoravfall (SFR) i Forsmark, pågår.

CLAB

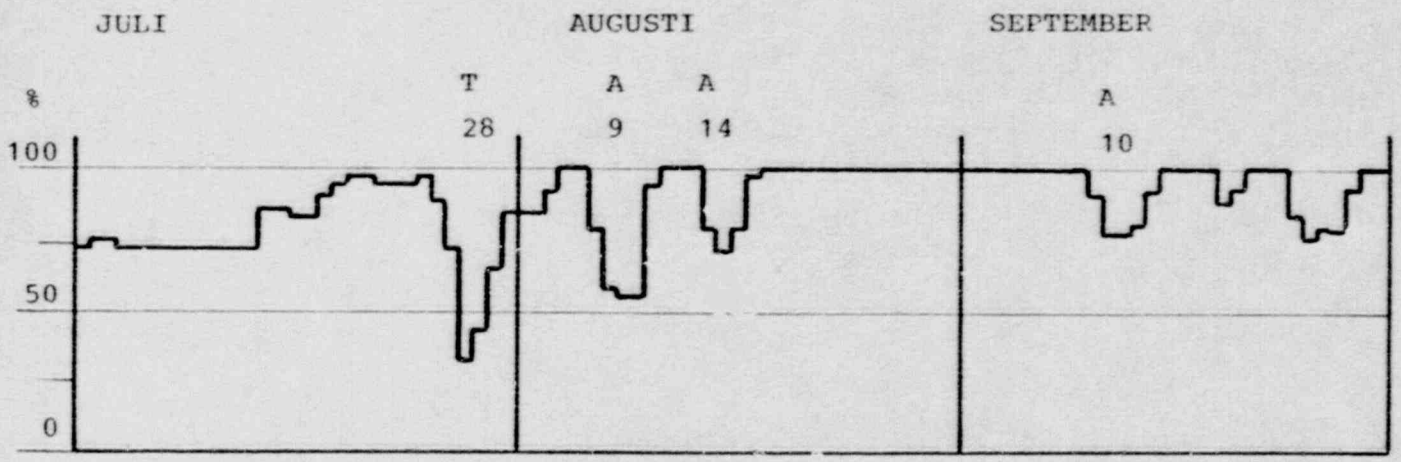
Perioden har präglats av lugn drift. Transporter av sk MOX-bränsle från Västtyskland till CLAB har inletts. Fyra transporter med blandoxidbränsle och sammanlagt 9 behållare har införts till stationen.

OKG har begärt att lågaktivt sopavfall från CLAB ska kunna behandlas tillsammans med liknande avfall från kärnkraftverket. Inspektionen har begärt en utredning om mängden långlivad aktivitet i avfallet innan beslut tas i ärendet.

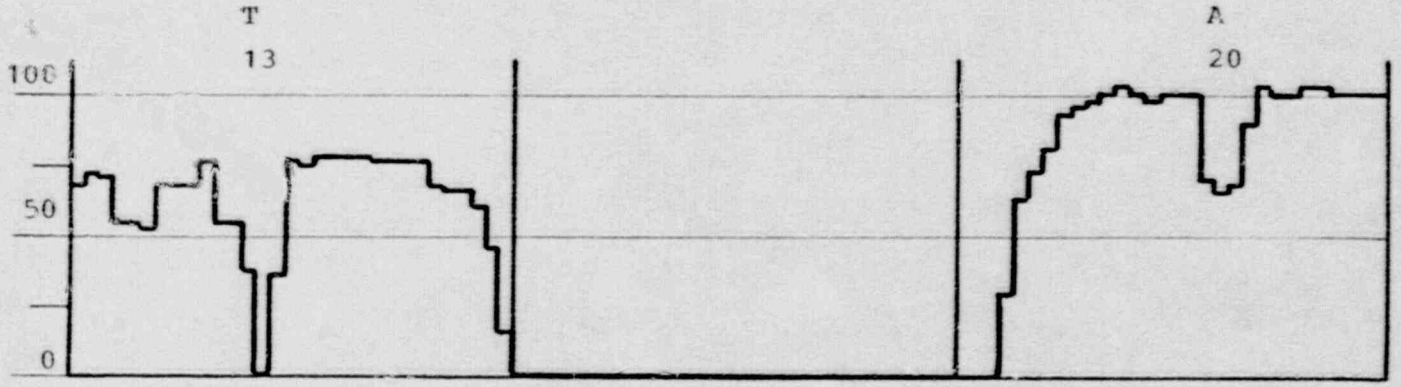
DYGNSMEDELEFFEKTEN, BRUTTO

O S K A R S H A M N

3e Kvartalet 1987



Oskarshamn 1 (100%=460 MW)



Oskarshamn 2 (100%=615 MW)

TECKENFÖRKLARING

R Störning i reaktor- eller reaktorhjälpsystem

T Störning i turbin, generator eller andra system

N Störningar som orsakat eller kunde ha orsakat nedsättning av funktion hos system med betydelse för säkerheten

A Avsiktligt driftstopp eller avsiktlig effektsänkning för provning, underhåll, bränslebyte och dylikt eller på grund av minskat behov av eleffekt

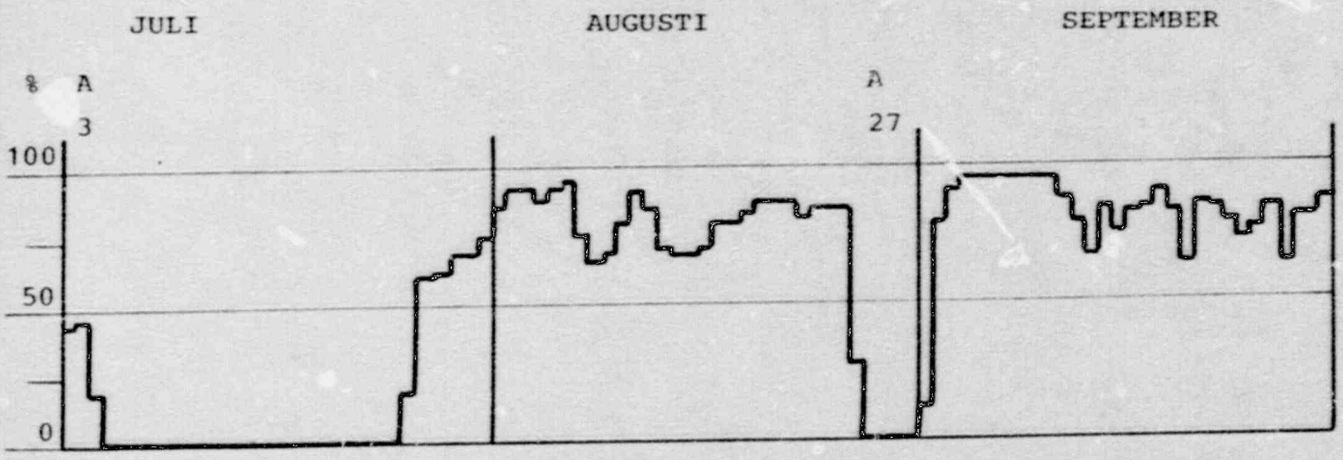
M Störning orsakad av mänskliga fel

Siffrorna anger datum i resp månad då händelsen inträffade

DYGNSMEDELEFFEKTEN, BRUTTO

O S K A R S H A M N

3e Kvartalet 1987



Oskarshamn 3 (100%=1 105 MW)

TECKENFÖRKLARING

R Störning i reaktor- eller reaktorhjälpsystem

T Störning i turbin, generator eller andra system

N Störningar som orsakat eller kunde ha orsakat nedsättning av funktion hos system med betydelse för säkerheten

A Avsiktligt driftstopp eller avsiktlig effektsänkning för provning, underhåll, bränslebyte och dylikt eller på grund av minskat behov av eleffekt

M Störning orsakad av mänskliga fel

Siffrorna anger datum i resp månad då händelsen inträffade

Ringhals 1

kvartalet inleddes med coast-down-drift vid ca 80 % reaktoreffekt. Driften av verket har under perioden i stort sett varit lugn och kännetecknats av effektregleringar beroende på behovet av energi i landet.

Den 17 augusti inträffade ett turbinsnabbstopp på grund av felaktig förvärmarreglering vid ett test under drift och den 21 augusti ställdes blocket av för revision.

Revisionsperioden innehöll en stor mängd aktiviteter. Bland annat installerades ett nytt system för neutronflödesmätning vid låga effekter som ger operatören bättre information vid uppstart och ger driftstekniska fördelar. I kondensationsbassängen utfördes förstärkningsarbeten och högtrycksdelen på turbinerna modifierades.

Blocket fasades åter den 25 september och nade vid kvartalets slut nått 74 % reaktoreffekt.

Ringhals 2

Driften av blo. et har varit lugn under kvartalet. Effekten har varierat på grund av rådande energibehov.

Ringhals 3

Vid kvartalets början var blocket avställt för revision. Ånggeneratorarbetena tog den längsta tiden. Tuberna virvelströmtestades och shot-peening*) av de tuber som ej behandlades under revisionsavställningen 1986 utfördes.

Blocket kopplades till nätet den 5 augusti och nådde den 12 augusti full effekt. Effektuppgången försenades på grund av vibrationsproblem i en av turbinerna. Vattenläckage i en generatorrotor*) orsakade ånyo avställning av en av turbinerna. Generatorrotor byttes varefter driften av blocket fortsatte utan störningar kvartalet ut.

Ringhals 4

Kvartalet inleddes med en lugn coast-down-drift från cirka 40 % vid periodens början och ned till 26 % reaktoreffekt då blocket den 13 augusti ställdes av för revision. Revisionsarbetena förlöpte väl och blocket startades den 20 september. Ett vattenläckage i en generatorrotor*) fördröjde effektuppgången.

Full effekt uppnåddes den 27 september.

) Se teknisk ordlista.

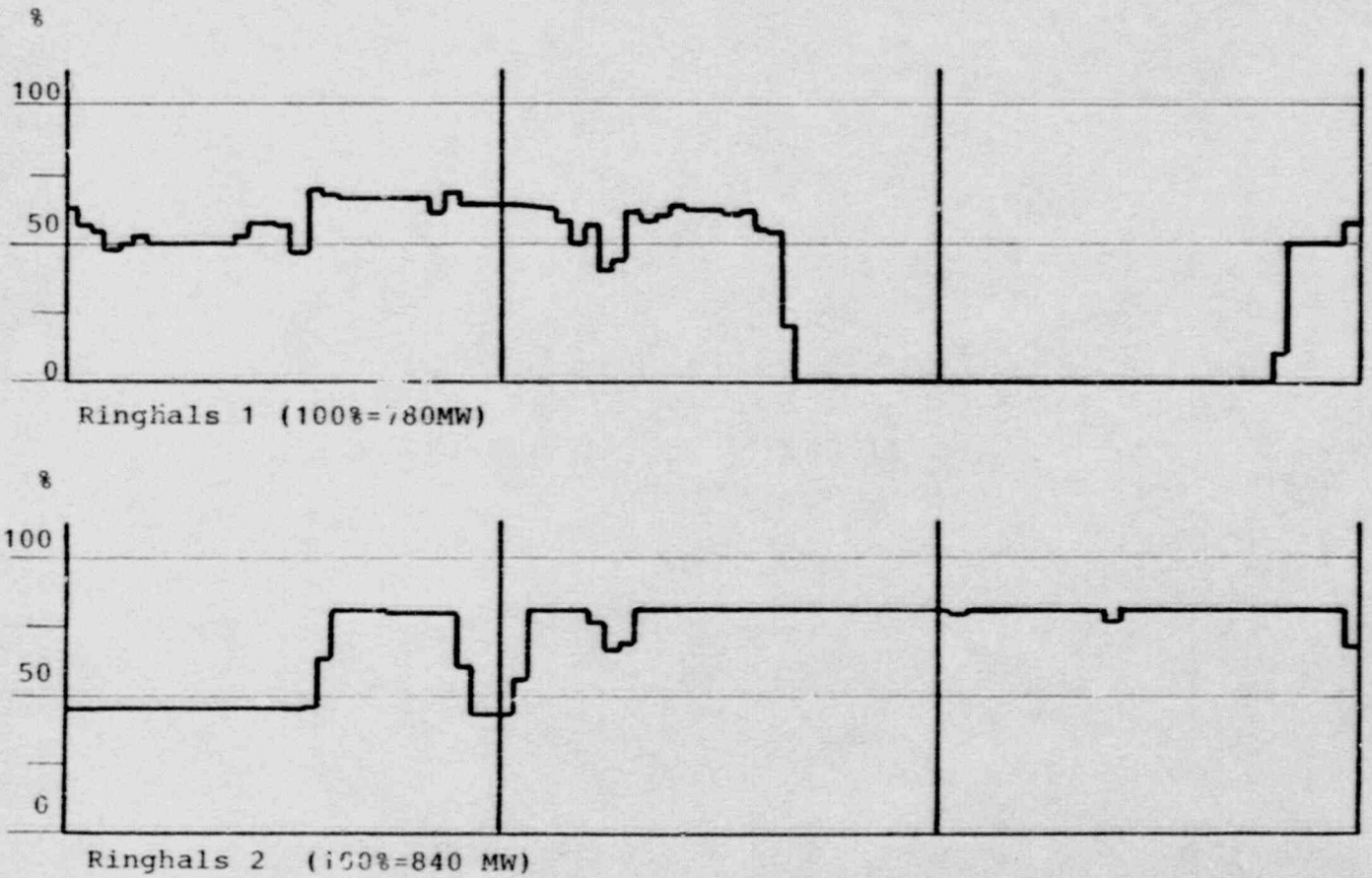
Avfallsanläggningar

Ett byggnadsprojekt som bl a innefattar terminalbyggnad för uppställning av avfallstransportbehållare (ATB) pågår. Dessa ATB ska senare fyllda med reaktoravfall föras till slutförvaret för reaktoravfall (SFR) vid Forsmark.

DYGNSMEDELEFFEKTEN, BRUTTO

R I N G H A L S

3e Kvartalet 1987



TECKENFÖRKLARING

R Störning i reaktor- eller reaktorhjälpsystem

T Störning i turbin, generator eller andra system

N Störningar som orsakat eller kunde ha orsakat nedsättning av funktion hos system med betydelse för säkerheten

A Avsiktligt driftstopp eller avsiktlig effektsänkning för provning, underhåll, bränslebyte och dylikt eller på grund av minskat behov av eleffekt

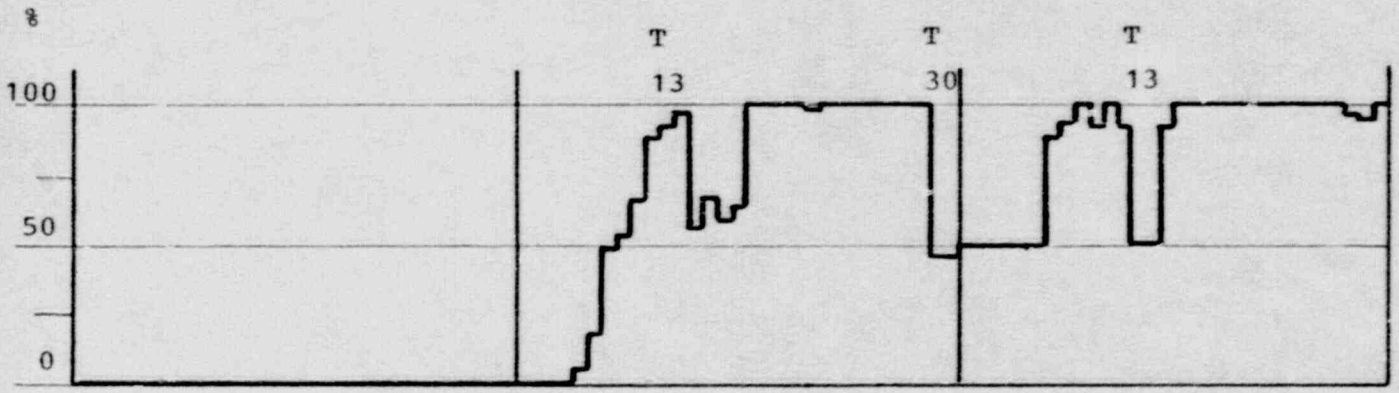
M Störning orsakad av mänskliga fel

Siffrorna anger datum i resp månad då händelsen inträffade

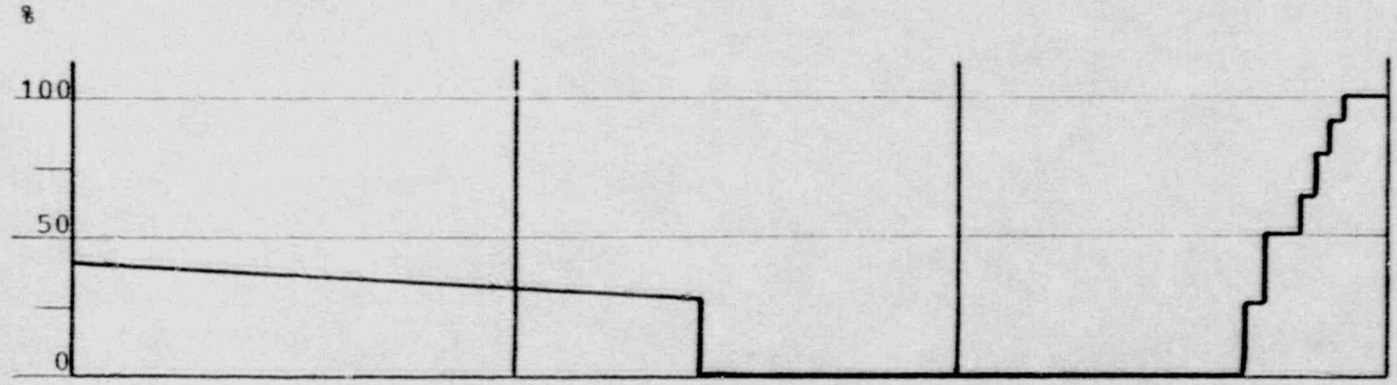
DYGNSMEDELEFFEKT, BRUTTO

R I N G H A L S

3e Kvartalet 1967



Ringhals 3 (100%=960 MW)



Ringhals 4 (100%=960 MW)

TECKENFÖRKLARING

R Störning i reaktor- eller reaktorhjälpsystem

T Störning i turbin, generator eller andra system

N Störningar som orsakat eller kunde ha orsakat nedsättning av funktion hos system med betydelse för säkerheten

A Avsiktligt driftstopp eller avsiktlig effektsänkning för provning, underhåll, bränslebyte och dylikt eller på grund av minskat behov av eleffekt

M Störning orsakad av mänskliga fel

Siffrorna anger datum i resp månad då händelsen inträffade

Överträdelse av säkerhetstekniska föreskrifter i Oskarshamn 3 den 24 juli 1987

Händelseförloppet

Tidigt på morgonen den 24 juli 1987 inträffade vid Oskarshamn 3 en händelse vilken bedömts som allvarlig av SKI. Reaktorn var avställd för revision och de sista proven inför uppstarten pågick. Bland de prov som skulle genomföras ingick sk lokala kritiska mätningar. Det innebär att man kontrollerar att de beräkningar man gjort av härdens egenskaper efter det genomförda bränslebytet stämmer. Provet går till så att man drar ut vissa utvalda styrstavar till den punkt där kriticitet*) uppnås.

Nattskiftlaget påbörjade proven utan att förutsättningarna enligt säkerhetstekniska föreskrifter (STF) och driftorder var uppfyllda. Det hydrauliska snabbstoppssystemet var varken inkopplat eller avprovat, vilket det skulle varit.

Det skiftlag som på fredagmorgonen avlöste nattskiftet avbröt proven sedan det noterat att snabbstoppssystemet inte var inkopplat.

Det dagliga driftmötet var redan avslutat då driftledningen nåddes av beskedet att proven avbrutits. Händelsen togs däremot upp i det sk styrgruppsmötet som hölls något senare på förmiddagen. Styrgruppsmötet är ett ledningsmöte som hålls dagligen under revisionen.

Efter styrgruppmötet tillsatte driftledningen en arbetsgrupp som skulle utreda händelsen och rapportera den till verkets centrala säkerhetskommitté under eftermiddagen.

Snabbstoppssystemet kopplades in och proven fortsattes. Ingen uppmärksammade att systemet enligt STF också skulle vara avprovat innan proven fick genomföras. Proven avbröts senare för att andra arbeten skulle genomföras inne i inneslutningen. På kvällen avprovades snabbstoppssystemet och därefter slutfördes de lokala kritiska mätningarna.

Verkets centrala säkerhetskommitté presidium inkallades till extra möte med anledning av händelsen. Resultatet av detta möte rapporterades till SKI per telefon på lördag morgon. Den formella rapporteringen gjordes på den ordinarie telexrapporten på måndagen. Denna rapport omfattar enligt praxis händelser som inträffat under perioden fredag - söndag.

Slutsatser av utredningar

Utredningar, såväl inom företaget, OKG, som SKI, sattes igång.

SKIs utredning är slutförd och visar på brister i de administrativa rutinerna vid Oskarshamn 3. Den visar också på brister i utbildning om och levandegörande av STF.

Vidare visar utredningen att personalen arbetat på övertid i stor omfattning. Detta har medfört att ett antal personer

*) se teknisk ordlista

med säkerhetsrelaterade arbetsuppgifter varit dåligt utvilade.

Utredningen finner att överträdelsen av STF inte skett med avsikt eller medveten nonchalans. Överträdelsen berodde på att man i första hand inriktat sig på målet att så snabbt som möjligt slutföra revisionen. Bestämmelser, rutiner och ansvarsfördelningar var inte nog tydliga.

I utredningen redovisas också att OKG snabbt vidtagit en rad åtgärder för att förhindra ett upprepande och för att förbättra säkerheten på de områden där händelsen visat svagheter.

Utredningen fastslår att det faktiska händelseförloppet inte innebar någon risk för bränsleskador även om det sk skruvstoppet inte heller fungerat. Vid en mycket osannolik kombination av ytterligare tekniska fel och olämplig mänsklig hantering skulle begränsade bränsleskador kunnat uppstå. Detta skulle ha medfört ekonomiska förluster för OKG, men inga väsentligt ökade hälsorisker för anställda och kringboende.

SKI drar för egen del slutsatsen att SKI inte utövat tillräckligt kraftfull tillsyn över kvalitetssäkring och organisatoriska förhållanden för att i tid uppmärksamma och påtala brister i administrativ styrning av säkerheten vid Oskarshamn 3. SKI har därför startat interna projekt, dels för översyn av administrativ styrning av säkerheten vid samtliga verk, dels för översyn av tillämpliga delar av SKIs egen tillsynsverksamhet.

Åtalsfrågan prövas

Oskarshamnshändelsen var av sådan art att SKI fann det motiverat att pröva om händelsen borde överlämnas till allmän åklagare. Bakgrunden till detta är att kärntekniklagen stadgar att den som åsidosätter villkor eller föreskrifter som meddelats med stöd av nämnda lag kan dömas till böter eller fängelse i högst två år. Lagen stadgar vidare att sådant brott endast kan åtalas om tillsynsmyndigheten, d v s SKI, lämnar ärendet till allmän åklagare. På grundval av vad som kommit fram i utredningen gjorde SKI följande överväganden i åtalsfrågan.

Kärntekniklagen lägger det primära ansvaret för att säkerheten är hög och ständigt förbättras på kraftföretaget. SKIs uppgift och ansvar är att se till att kraftföretaget tar sitt fulla ansvar för denna säkerhet. SKI tillämpar detta på ett sådant sätt att företagets ansvar inte bryts.

Svenskt reaktorsäkerhetsarbete har av lång tradition präglats av uppfattningen att säkerheten främjas bäst av att såväl tillsynsmyndighet som kraftföretag i första hand ägnar sina resurser åt att uppmärksamma problem och brister och att snabbt åtgärda dem. I vissa andra länder intar en formell, juridisk prövning av uppfyllandet av olika regler och föreskrifter en framträdande roll.

Kärntekniklagen och dess förarbeten ger ingen klar anvisning om när brott mot lagen är av så allvarlig art att ärendet skall överlämnas till åtal. Lagens övergripande syfte är att främja kärnsäkerheten, varför man vid prövningen måste ta ställning till om ett åtal skulle bidra till ökad säkerhet. SKI anser vidare att det skall vägas in i vad mån följande omständigheter av försvårande karaktär föreligger:

- Om avsikt förelegat att bryta mot föreskrifter.

- Om överträdelsen pekat på allvarliga brister i säkerhetsrutiner och säkerhetsmedvetande.

- Om företaget inte vidtagit erforderliga åtgärder för att rätta till brister och förbättra säkerheten samt att förhindra ett upprepande.

- Om händelsen inte har rapporterats till SKI på föreskrivet sätt.

- Om rättelse inte skett, trots påpekande från SKI.

SKI finner det styrkt att en överträdelse av STF skett på ett sätt som pekar på allvarliga brister i säkerhetsrutiner och säkerhetsmedvetande. Denna överträdelse har emellertid inte skett med avsikt eller medveten nonchalans.

OKG är efter händelsen väl medvetet om bristerna och har på eget initiativ snabbt vidtagit en rad åtgärder för att förhindra ett upprepande och för att förbättra säkerheten på de områden där det inträffade pekat på svagheter.

Händelsen har också rapporterats till SKI på föreskrivet sätt.

Vid en sammanvägd bedömning av åtalsfrågan bör man enligt SKIs mening dels se till omfattningen och karaktären av de försvårande omständigheterna, dels hur kärntekniklagens grundläggande syfte bäst uppnås. Syftet med ett åtal bör vara att inskärpa respekten för säkerhetsbestämmelserna och förmå företaget att strama upp säkerhetsarbetet. Den snabba reaktion som händelsen givit upphov till inom OKG och åtgärder som vidtagits visar att dessa syften redan har uppnåtts.

SKI överlämnar inte till åtal

Vid en samlad bedömning av händelsen finner SKI att det inte är befogat att överlämna ärendet till åtal för att inskärpa respekten för säkerhetsföreskrifterna och för att genomdriva förbättrad säkerhet på de områden där händelsen visat på brister.

SKIs styrelse beslutade därför den 13 november 1987 att inte överlämna ärendet till åtal. Ledamoten Karl-Erik Olsson reserverade sig mot beslutet.

Sammanslagning av ASEA och Brown Boveri

SKI anmodades av regeringen att yttra sig över sammanslagningen av ASEA och Brown Boveri. I remissyttrandet bedömer SKI att sammanslagningen troligen inte får negativ verkan med hänsyn till fortsatt säker drift av de svenska kärnkraftverken. Det kommer heller inte att försvåra SKIs arbete för kärnkraftens säkerhet.

Tvärtom är det troligt att ASEA ökar sin förmåga att vara en kompetent leverantör till de svenska verken eftersom företaget får en bättre internationell marknad. På så sätt kan den annars oundvikliga kompetensförlusten i och med kärnkraftens avveckling motverkas.

ASEAs verksamhet har betydelse för svensk kärnsäkerhet på fyra områden, nämligen kärnsäkerhetsforskning, bränslefabrik, safeguardverksamhet samt drift och underhåll.

SKI framhåller i sitt yttrande till industridepartementet över sammanslagningen att en förutsättning för SKIs tillsyn enligt kärntekniklagen är att de dotterbolag som berörs förblir registrerade i Sverige.

SKI påpekar också att det inte klarläggs i ASEAs ansökan hur framtida tekniköverföringar mellan de olika bolagen ska gå till. Förutom tillstånd för export av viss utrustning krävs nämligen enligt kärntekniklagen också exporttillstånd för överlåtelse av tillverkningsrätt.

STUDSVIK ENERGITEKNIK AB

Under kvartalet har inga störningar av säkerhetsmässig betydelse rapporterats.

Avfallsanläggningar

SKI har yttrat sig till SSI över en ansökan från Studsvik om tillstånd för införsel, transport och behandling av kärnavfall från kärnkraftverket Grohnde, Västtyskland. Kärnavfallet utgörs av 77 ton rostfritt stål i form av (tomma) lådor. Totala aktiviteten är mindre än 2 GBq,gigabequerel, huvudsakligen bestående av radioaktivt koboit, Co-60. Materialet ska dekontamineras,*) och/eller smältas i Studsvik. SKI har tillstyrkt ansökan.

Transporter

SKB, Svensk Kärnbränslehantering AB, har inkommit med en redovisning enligt SKIs "Föreskrifter med avseende på säkerheten vid transport av kärnämne och kärnavfall". Redovisningen gäller transport av visst blandoxidbränsle från fyra västtyska kärnkraftverk till CLAB.

SKI har godkänt denna redovisning. Totalt planeras 8 transporter av MOX-bränsle från Tyskland till CLAB. Under kvartalet har 4 av dessa genomförts.

Bakgrunden är regeringens beslut den 26 juni 1986 att godkänna den preliminära överenskommelse SKB träffat på uppdrag av Sydkraft och Vattenfall med de tyska kraftverken om utbyte av 57 ton svenskt använt kärnbränsle som lagrades i Cogema's upparbetningsanläggning i La Hague mot en kvantitet av sammanlagt 23,6 ton utbränt blandoxidbränsle, sk MOX--bränsle.

Vidare har Studsvik inkommit med en redovisning enligt ovan nämnda föreskrifter. Denna redovisning gäller transport av visst använt kärnbränsle till CLAB. Kärnbränslet utgörs dels av använt bränsle från Ågestareaktorn och från forskningsreaktorn R1, vilka båda numera är nedlagda, dels av bränslerester från Studsviks bränsleforskningsverksamhet. SKI har godkänt redovisningen

*) se teknisk ordlista

SKB har utarbetat en Slutlig Säkerhetsredovisning för sjötransport av reaktoravfall till SFR. SKI har till Sjöfartsverket lämnat ett yttrande angående rapporten i dess egenskap av sjötransportplan. Det för SFR avsedda sjötransportsystemet är i väsentliga delar detsamma som det som har byggts upp och nu utnyttjas för sjötransporter av använt kärnbränsle. Sammanfattningsvis har SKI inga invändningar mot redovisad plan.

ASEA-ATOM

Under kvartalet har inga störningar av säkerhetsmässig betydelse rapporterats.

KÄRNÄMNE

Kontroll av kärnämne

Under kvartalet genomförde IAEA i samarbete med SKI en inspektion vid ASEA-ATOMs bränslefabrik och tretton inspektioner vid kärnkraftverken och CLAB samt en inspektion vid Studsvik Energiteknik AB. Vid dessa inspektioner framkom ingenting som strider mot Sveriges åtaganden enligt fördraget om förhindrande av spridning av kärnvapen.

Införsel av kärnämne

Under kvartalet infördes sammanlagt 82 218 kg naturligt och låganrikat uran till landet enligt nedanstående tabell:

Avsändare	Mottagare	Kvantitet(kg)	Planerad användning
Frankrike			
- Fragema	Ringhals	6 463	Bränslepatroner till Ringhals 4
USA			
- Martin Marietta	ASEA-ATOM	16 891	Bränslepatroner till Barsebäck 2
USSR			
- Techsnab-export	ASEA-ATOM	10 224	Bränslepatroner till TVO 2
	ASEA-ATOM	26 715	Konvertering av UF_6 till RBU
	ASEA-ATOM	2 495	Bränslepatroner till Kernkraftwerke Phillipsburg
Västtyskland			
- RBU	ASEA-ATOM	9 954	Konvertering av UF_6 till UO_2 åt RBU
- Västtyska kärnkraftverk	CLAB	9 476	Lagring av MOX-bränsle (innehållande 203 kg Pu)

Utförsel kärnämne

AB ASEA-ATOM ansökte i juli om tillstånd att till Belgien få utföra 295 kg låganrikat uran i form av urandioxidpulver för tillverkning av SVEA-MOX-bränsle för användning i reaktorn Brunsbüttel, Västtyskland.

Vidare ansökte AB ASEA-ATOM i augusti om tillstånd att till RBU, Västtyskland få utföra 8 105 kg låganrikat uran i form av urandioxidpulver för tillverkning av bränsle till reaktorn TVO 1 i Finland.

AB ASEA-ATOM ansökte i augusti om tillstånd att till RBU, Västtyskland få utföra 18 610 kg låganrikat uran i form av urandioxidpulver för tillverkning av bränsle till reaktorn Necker Westheim 1 i Västtyskland.

AB ASEA-ATOM ansökte i augusti om tillstånd att till Finland få utföra 22 050 kg låganrikat uran i form av bränsleelement för användning som ersättningsbränsle i reaktorn TVO 2.

AB ASEA-ATOM ansökte i september om tillstånd att till RBU, Västtyskland få utföra 21 305 kg låganrikat uran i form av urandioxidpulver för tillverkning av bränsle till reaktorn DOEL i Belgien.

Studsvik Energiteknik AB ansökte i juli om tillstånd att till USA få utföra åtta kg höganrikat uran i form av bestrålade Material Test Reactor-bränsle-element, från R2-reaktorn i Studsvik.

Ansökningarna överlämnades, tillstyrkta av SKI, till regeringen för beslut.

Utförsel av kärnteknisk utrustning

AB ASEA-ATOM har i juli och augusti inlämnat fyra ansökningar om tillstånd att få utföra styrstavar till USA.

Scandiflash AB ansökte i juli om tillstånd att få utföra ett röntgenblixtaggregat till USA.

AB ASEA-ATOM har i juli inlämnat en ansökan om att till Förbundsrepubliken Tyskland få utföra 650 kg zirkoniumrör att användas som kapslingsrör för reaktorbränsle.

Sandvik Central Service ansökte i september om tillstånd att till Frankrike få utföra 700 kg zirkoniumrör att användas som kapslingsrör för reaktorbränsle.

Sandvik Central Service ansökte i september om tillstånd att till USA få utföra 4 600 kg zirkoniumrör att användas som kapslingsrör för reaktorbränsle.

Ansökningarna har tillstyrkts av SKI och överlämnats till regeringen för beslut.

KÄRNSÄKERHETSFORSKNING

Under kvartalet beställde SKI 34 projekt till ett värde av 6.3 MSEK, varav 2.1 MSEK inom Materialområdet, 1.2 MSEK inom området Systemanalys-Svåra haverier samt 1.1 MSEK inom området Systemanalys-Säkerhetsanalys. 14 projekt med ett sammanlagt beställningsvärde på 7.6 MSEK avslutades under kvartalet.

Termohydraulikområdet

Enligt beräkningar har SVEA-patronens geometri gynnsammare värmeöverföringsegenskaper än standardbränsle vid nödkylning i en externpumpreaktor. I beräkningarna förutsätts då att boxväggarna väts och kan fungera för att föra bort värmen. Ur SKIs synpunkt var det önskvärt att verifiera detta antagande genom ett strilkylningsexperiment i fullskala. Experimenten, som nu har slutförts vid ASEA-ATOMs laboratorium i Västerås, var ett samarbetsprojekt finansierat av ASEA-ATOM, Vattenfall och SKI. Även Westinghouse har fått tillgång till experimentdata genom att som motprestation bidra med avancerade analyser av experimenten med programmet COBRA-TF.

Provprogrammet har väl täckt tänkbara variationer i kritiska parametrar och resultatet visar att experimenten varit mycket reproducerbara. Den antaget goda kylbarheten för SVEA-knippet har kunnat verifieras, dock gäller detta under förutsättning att ett minsta strilflöde per delpatron på 30 g/sek kan garanteras för att säkerställa vätning av kors och bränslebox.

Systemanalys - Svåra olyckor

Projektet RAMA II avslutades och avrapporterades under tredje kvartalet.

Projektet RAMA ingår i det program för förstärkning av skyddet mot radioaktiva utsläpp i händelse av reaktorolyckor som beslöts av regering och riksdag med anledning av den inträffade olyckan med reaktorn TMI-2 i Harrisburg, USA, i mars 1979. Programmet bestod i en första etapp av att förse reaktorerna i Barsebäck med ett system för filtrerad ventilering, FILTRA, som står färdigt i beredskap sedan oktober 1985. Det hade från början klargjorts att behovet av motsvarande åtgärder på de övriga 10 blocken för att nå motsvarande skyddsnivå som vid Barsebäcksverket skulle utredas och att dessa åtgärder i så fall skulle vara genomförda senast till årsskiftet 1988/89. Utredningsarbetet organiserades som ett forskningsprojekt, RAMA (Reactor Accident Mitigation Analysis) i samarbete mellan SKI, SSI, Statens strålskyddsinstitut och kraftbolagen och i kombination med parallellt drivna utvecklingsprojekt inom respektive kraftbolag.

Den första etappen av RAMA, som pågick mellan 1983 och 1985, resulterade i en grundläggande kunskapsbas och gav SKI och kraftbolagen tillgång till koderna MAAP och RETAIN för beräkning av olycksförlopp och skyddseffekten av olika anordningar och åtgärder, exempelvis filtrerad tryckavlastning. Grunden var därmed lagd för det beslut om konsekvenslindrande åtgärder vid verken som regeringen tog i februari 1986.

Den andra etappen, RAMA II, hade till syfte dels att i efterhand verifiera kunskapsbasen och beräkningsprogrammen som tagits fram och dels att förbättra underlaget för framtida inre och yttre haveriberedskapsplanering.

RAMA II har främst varit inriktat på anpassning av MAAP för tillämpning på de svenska reaktorerna och på validering av koden genom känslighetsanalys och på annat sätt för att riktigt kunna förstå och bedöma dess trovärdighet och begränsningar.

Experimentell verksamhet har bedrivits vid KTH, Tekniska Högskolan, för undersökning av grundläggande frågor om kylbarheten hos härdsmälta i vatten samt vid Chalmers i Göteborg för närmare studium av kemiska frågor, det senare närmast i anslutning till de storskaliga aerosolförsöken*) Marviken-V-ATT och LACE.

Deltagande i internationella forskningsprojekt har utgjort en väsentlig del:

* "Severe Fuel Damage," SFD, ett internationellt projekt organiserat av USNRC

* IDCOR, den amerikanska kraftindustrins "Industry Degraded Core Rulemaking Program".

* EPRI's projekt LACE, LWR "Aerosol Containment Experiment"

* Marviken-V-ATT, "Aerosol Transport Tests", i Studsvik

* OECD LOFT, vad gäller testerna FP-1 och FP-2 med överhettning av reaktorbränsle

RAMA II har fördjupat förståelsen av fenomenen vid svåra reaktorolyckor och gett tillgång till en förbättrad version av koden MAAP som är lättare att använda i praktiskt analysarbete och ger mera trovärdiga resultat på väsentliga punkter. Bland annat finns återförångning av radioaktiva fissionsprodukter representerat i koden, ett fenomen av stor betydelse för risken av radioaktiva utsläpp. Dessa fenomen har uppmärksammats på senare tid.

Samtidigt har det kunnat klarläggas vilken betydelse det har att MAAP är resultatet av en kompromiss mellan avancerad modellering av fenomenen å ena sidan och enkelhet å den

*) Se teknisk ordförklaring