

## Appendix B2 – System/Component Cause Codes

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### FLUIDIZED BED COMBUSTION UNITS INDEX TO SYSTEM/COMPONENT CAUSE CODES

(Unit Codes 650-699)

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|  | <b>Cause Code</b> |                 |
|--|-------------------|-----------------|
|  | <u>Ranges</u>     | <u>Page No.</u> |
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## BOILER

This set of codes contains the following:

- Boiler.
- Boiler internals (tubes, refractory, supports, etc.) .
- All the fuel handling, storage fuel preparation, and burning equipment.
- The forced/induced draft air system.
- Slag and ash removal except for particulate and gas cleanup. These latter items are covered under pollution control equipment.
- The main steam and reheat steam systems up to but not including the turbine stop or isolation valves.
- The feedwater system downstream of the final valve prior to entry into the economizer or boiler.
- Boiler blowdown systems.
- The startup bypass system including drains up to the heaters or condenser.
- Boiler water chemistry problems not due to problems in the condensate/feedwater system, the chemical addition system, or the demineralizer/polisher system.
- The instruments and controls associated with the above equipment.

### Boiler Fuel Supply to Bunker

#### Coal Handling Equipment up Through Bunkers

|      |   |
|------|---|
| 0010 | Thaw shed failure or fire                               |
| 0020 | Coal car dumpers, shakers, and unloaders                |
| 0022 | Unloading/receiving hopper (train/truck)                |
| 0024 | Rotary plow   |
| 0026 | Dust suppression system                                 |
| 0028 | Dust collection system                                  |
| 0030 | Coal conveyors and feeders                              |
| 0035 | Metal detector/collector (including magnetic separator) |
| 0040 | Coal elevators  |
| 0050 | Coal storage fires                                      |
| 0060 | Coal crushers including motors                          |
| 0070 | Coal samplers   |
| 0075 | Storage silos/hoppers                                   |
| 0080 | Stackers/reclaimers                                     |
| 0084 | Coal conveyor scales-storage coal pile                  |
| 0085 | Bunker feeder coal scales                               |
| 0090 | Bunker fires  |
| 0095 | Bunker flow problems                                    |
| 0100 | Bunker gates  |
| 0105 | Bunker structures                                       |
| 0106 | Coal drying system                                      |
| 0107 | Screen (prior to bunkers)                               |
| 0110 | Other coal fuel supply problems up through bunkers      |
| 0125 | Coal crusher dryer hammers                              |
| 0126 | Coal crusher lube oil system                            |
| 0127 | Other coal crusher dryer problems                       |

**Solid Fuel Feed Equipment from Bunkers to Boiler (FBC only)**

- 0111 Solid fuel feeder conveyors
- 0112 Solid fuel feed tanks/hoppers
- 0113 Solid fuel tank/hopper fires
- 0114 Solid fuel volumetric feeder
- 0115 Solid fuel gravimetric feeder
- 0116 Solid fuel feeder motors
- 0117 Solid fuel pneumatic transport system including piping and valves
- 0118 Solid fuel drying system including screens
- 0119 Solid fuel crushers
- 0120 Solid fuel crusher motors
- 0121 Other solid fuel feed problems
- 0129 Other coal processing system problems

**Sorbent Supply (FBC only)**

**Sorbent Handling System up Through Bunkers (FBC only)**

- 0130 Sorbent handling tanks/hoppers
- 0131 Sorbent handling conveyors
- 0132 Sorbent handling feeders
- 0133 Sorbent handling feeder motors
- 0134 Sorbent handling crushers
- 0135 Sorbent handling crusher motors
- 0136 Sorbent handling blowers/fans
- 0137 Sorbent handling blower/fan motors
- 0138 Sorbent handling baghouse
- 0139 Sorbent handling drying equipment
- 0140 Sorbent handling screens
- 0141 Other sorbent handling equipment problems

**Sorbent Feed Equipment from Bunkers to Boiler (FBC only)**

- 0150 Sorbent feed conveyors
- 0151 Sorbent feed tanks/hoppers
- 0152 Sorbent feed volumetric feeder
- 0153 Sorbent feed gravimetric feeder
- 0154 Sorbent feed feeder motors
- 0155 Sorbent feed pneumatic transport system including piping and valves
- 0156 Other sorbent feed problems

**Bed Material Preparation System (FBC only)**

- 0160 Bed material tanks/hoppers
- 0162 Bed material conveyors
- 0163 Bed material feeders
- 0164 Bed material feeder motors
- 0165 Bed material crushers
- 0166 Bed material crusher motors
- 0167 Bed material screens
- 0168 Bed material blowers/fans
- 0169 Bed material blower/fan motors
- 0170 Bed material cyclone

**Bed Material Preparation System (FBC only) (continued)**

- 0171 Bed material baghouse
- 0172 Bed material drying equipment
- 0173 Bed material pneumatic transport system including piping and valves
- 0174 Other bed material handling equipment

**Boiler Fuel Supply from Bunkers to Boiler**

**Pulverizers, Primary Air Fans, and Associated Ducts**

- 0200 Pulverizer exhauster fan (for indirect firing)
- 0205 Pulverizer exhauster fan drive
- 0210 Pulverizer heater (for indirect firing)
- 0220 Pulverizer system cyclone separator
- 0230 Pulverizer bag filter
- 0240 Pulverized coal bin
- 0250 Pulverizer feeders
- 0253 Pulverizer feeder motor
- 0255 Pulverizer feeder coal scales
- 0256 Seal air system (air to pulverizers)
- 0260 Primary air fan
- 0262 Primary air fan lube oil system
- 0263 Primary air fan drives
- 0264 Other primary air fan problems
- 0265 Primary air heater
- 0266 Primary air heater fouling
- 0267 Primary air flow instrumentation
- 0270 Primary air duct and dampers
- 0280 Pulverizer fires
- 0290 Pulverizer reduced capacity due to wear
- 0300 Pulverizer motors and drives
- 0310 Pulverizer mills
- 0312 Pulverizer classifiers
- 0313 Pulverizer trunnion seals
- 0314 Pulverizer mill ball charger hopper (ball mills only)
- 0315 Pulverizer coal level controls
- 0320 Foreign object in mill
- 0325 Pulverizer skidding
- 0330 Pulverizer coal leak (pulverizer only)
- 0331 Pulverizer system coal leaks (other than pulverizers, see code 0330)
- 0335 Pulverizer lube oil system
- 0338 Pulverizer control systems (temperature and pressure)
- 0340 Other pulverizer problems
- 0344 Pulverizer inspection
- 0345 Pulverizer overhaul
- 0346 Pulverizer pyrite removal system
- 0350 Pulverized fuel and air piping (from pulverizer to wind box)  
(see code 0898 for pulverizer reject system problems)

## **Burners**

- 0358 Oil burner piping and valves
- 0359 Gas burner piping and valves
- 0360 Burners
- 0361 Burner orifices
- 0362 Burner tilts
- 0365 Bed warmup burners (FBC only)
- 0366 Duct burners (FBC only)
- 0370 Burner instruments and controls (except light-off)
- 0375 Burner instruments and controls (FBC light-off system)
- 0380 Light-off (igniter) systems (including fuel supply)
- 0385 Igniters
- 0390 Burner wind boxes and dampers
- 0400 Burner wind box fires
- 0410 Other burner problems

## **Cyclone**

- 0415 Cyclone feeders
- 0420 Cyclone crusher
- 0425 Cyclone dampers
- 0426 Cyclone air ducts
- 0430 Cyclone furnace
- 0435 Other cyclone problems

## **Oil and Gas Systems (except light-off)**

- 0440 Fuel oil pumps (general)
- 0441 Fuel oil pumps (burner supply)
- 0442 Fuel oil pumps (forwarding/transfer)
- 0443 Fuel oil (burner supply) pump drives
- 0444 Fuel oil (forwarding/transfer) pump drives
- 0450 Fuel oil heaters
- 0460 Fuel oil atomizers
- 0470 Oil and gas fires
- 0475 Fuel lance (FBC only)
- 0480 Other oil and gas fuel supply problems (see codes 0360-0410 for burner problems)

## **Boiler Piping System**

### **Main Steam**

- 0500 Main steam piping up to turbine stop valves
- 0510 Main steam relief/safety valves
- 0520 Other main steam valves (including vent and drain valves but not including the turbine stop valves)
- 0530 Other main steam system problems

### **Cold and Hot Reheat Steam**

- 0540 Hot reheat steam piping up to turbine stop valves
- 0541 Cold reheat steam piping up to boiler
- 0550 Reheat steam relief/safety valves
- 0560 Other hot reheat steam valves (not including turbine stop or intercept valves)
- 0561 Other cold reheat steam valves (not including turbine stop or intercept valves)
- 0570 Other reheat steam problems

### **Desuperheaters/Attemperators**

- 0580 Desuperheater/attemperator piping
- 0590 Desuperheater/attemperator valves
- 0600 Desuperheater/attemperator spray nozzles
- 0610 Desuperheater/attemperator drums
- 0620 Other desuperheater/attemperator problems

### **Startup Bypass**

- 0630 Startup bypass system piping (including drain lines up to heaters or condenser)
- 0640 Startup bypass system valves
- 0650 Startup bypass tanks or flash tanks
- 0655 Steam by-pass system instrumentation and controls
- 0660 Other startup bypass system problems

### **Feedwater and Blowdown**

- 0670 Feedwater piping downstream of feedwater regulating valve
- 0680 Feedwater valves (not feedwater regulating valve)
- 0690 Other feedwater problems downstream of feedwater regulating valve (use codes 3401 to 3499 for remainder of feedwater system)
- 0700 Blowdown system valves
- 0710 Blowdown system piping
- 0720 Blowdown system controls /instrumentation
- 0730 Other blowdown system problems

### **Boiler Recirculation**

- 0740 Boiler recirculation pumps
- 0741 Boiler recirculation pumps - motors
- 0750 Boiler recirculation piping (including downcomers)
- 0760 Boiler recirculation valves
- 0770 Other boiler recirculation problems

### **Miscellaneous (Piping)**

- 0775 Economizer piping
- 0780 Headers between tube bundles
- 0782 Headers and caps
- 0790 Pipe hangers, brackets, supports (general)
- 0799 Other miscellaneous piping system problems

### **Boiler Internals and Structures**

|      |  |
|------|--|
| 0800 | Drums and drum internals (single drum)                           |
| 0810 | Boiler supports and structures (use code 1320 for tube supports) |
| 0811 | Convection pass enclosure (FBC only)                             |
| 0812 | Distribution plate (FBC only)                                    |
| 0813 | Lower furnace (in-bed) tube supports (FBC only)                  |
| 0814 | In-bed bubble caps (FBC only)                                    |
| 0820 | Casing   |
| 0830 | Doors  |
| 0840 | Refractory and insulation  |
| 0845 | Windbox expansion joints   |
| 0846 | Convection pass expansion joints (FBC only)                      |
| 0847 | Other expansion joints   |
| 0850 | Other internal or structural problems                            |
| 0855 | Drum relief/safety valves (single drum)                          |
| 0859 | Tube external fins/membranes                                     |

### **Slag and Ash Removal**

|      |  |
|------|--|
| 0860 | Soot blowers - air (see code 3844 for air delivery system)                                 |
| 0870 | Soot blowers - steam   |
| 0871 | Soot blowers - sonic   |
| 0872 | Soot blowers - water   |
| 0873 | Soot blower drives   |
| 0876 | Soot blower controls   |
| 0880 | Fly ash Removal System (not precipitators, scrubbers, mechanical collectors, or baghouses) |
| 0885 | Fly ash Removal System – wet transport   |
| 0890 | Bottom ash systems (wet or dry)  |
| 0891 | Bottom ash hoppers (including gates)   |
| 0892 | Bottom ash clinker grinders  |
| 0893 | Bottom ash water pumps and motors  |
| 0894 | Bottom ash piping and valves   |
| 0895 | Ashpit trouble   |
| 0896 | Bottom ash dewatering bin system, instruments and controls                                 |
| 0897 | Bottom ash rotary (drag chain type) conveyor and motor                                     |
| 0898 | Bottom ash pyrite hopper (pulverizer reject) system  |
| 0899 | Bottom ash controls and instrumentation  |
| 0900 | Slag-tap (cyclone furnace)   |
| 0910 | Slag-tap (other than cyclone furnace)  |
| 0920 | Other slag and ash removal problems  |

### **Bed Material Removal System**

|      |   |
|------|---|
| 0930 | Bed material coolers                            |
| 0931 | Bed material transport piping/valves            |
| 0932 | Bed material transport tanks/hoppers            |
| 0933 | Bed material fans/blowers                       |
| 0934 | Bed material fan/blower motors                  |
| 0935 | Bed material disposal conditioner               |
| 0936 | Bed material conveyors                          |
| 0937 | Bed material mechanical separators and baghouse |
| 0950 | Other bed material system problems              |

### **Bed Solids Recirculation**

|      |   |
|------|---|
| 0951 | Char reinjection feeders                                  |
| 0952 | Char reinjection piping/valves                            |
| 0953 | Char reinjection controls                                 |
| 0959 | Other char reinjection equipment problems                 |
| 0960 | Char transport piping and valves                          |
| 0961 | Char transfer tanks/hoppers                               |
| 0962 | Char conditioner  |
| 0969 | Other char equipment problems                             |
| 0970 | Flue gas-solids separator                                 |
| 0971 | Flue gas-solids separator piping and valves               |
| 0972 | Flue gas-solids separator controls                        |
| 0973 | Flue gas-solids separator refractory                      |
| 0980 | High pressure loop seal recirculation fans/blowers        |
| 0981 | High pressure loop seal recirculation fan/blower motors   |
| 0982 | High pressure loop seal recirculation fan/blower controls |
| 0989 | Other bed solids recirculation problems                   |

### **External Fluidized Bed Heat Exchanger**

|      |                               |
|------|-------------------------------|
| 0990 | Refractory                    |
| 0991 | Tube leaks                    |
| 0992 | Tube supports                 |
| 0999 | Other heat exchanger problems |

### **Boiler Tube Leaks**

(use code 0859 for tube/membrane failures)

|      |   |
|------|---|
| 1000 | Waterwall (Furnace wall)  |
| 1005 | Generating tubes between steam drum and mud drum                        |
| 1006 | In-bed reheat tubes (FBC only - includes external heat exchangers)      |
| 1010 | Cyclone furnace (in cyclone area only)                                  |
| 1020 | Convection pass wall (water tubes only)                                 |
| 1030 | Boiler screen, wing wall, or slag screen (water tubes only)             |
| 1035 | Platen superheater  |
| 1040 | First superheater   |
| 1045 | In-bed superheater tubes (FBC only - includes external heat exchangers) |
| 1050 | Second superheater  |
| 1055 | External superheater link tubing  |
| 1060 | First reheater  |
| 1070 | Second reheater   |
| 1075 | External reheater link tubing   |
| 1080 | Economizer  |
| 1085 | In-bed evaporative tubes (FBC only - includes external heat exchangers) |
| 1090 | Other boiler tube leaks   |

### **Boiler Tube Fireside Slagging or Fouling**

(use codes 0860 and 0870 for fouling or slagging due to unavailability of soot blowers or their air or steam supply)

- 1100 Waterwall (Furnace wall)
- 1105 Generating tubes between steam drum and mud drum
- 1110 Cyclone Furnace (in cyclone area only)
- 1120 Convection Pass Wall
- 1130 Boiler screen, wing wall, or slag screen (water tubes only)
- 1140 First superheater
- 1150 Second superheater
- 1160 First reheater
- 1170 Second reheater
- 1180 Economizer
- 1190 Other tube slagging or fouling
- 1191 Bed agglomeration (FBC only)
- 1200 Operation at reduced power to avoid slagging or fouling (use codes 1100 to 1190 to report power reductions for slag accumulation or slag removal)

### **Miscellaneous Boiler Tube Problems**

- 1300 Water side fouling
- 1305 Fireside cleaning (requires a full outage) Use code 1200 for cleanings that cause deratings.
- 1310 Water side cleaning (acid cleaning)
- 1320 Tube supports/attachments
- 1330 Slag fall damage
- 1340 Tube modifications (including addition and removal of tubes)
- 1350 Other miscellaneous boiler tube problems
- 1360 Boiler drains system

### **Boiler Air and Gas Systems**

(excluding burner pipes, wind boxes, primary air, or pulverize exhausters)

#### **Air Supply**

- 1400 Forced draft fans\*
- 1401 Forced draft fan dampers
- 1407 Forced draft fan lubrication system\*
- 1410 Forced draft fan motors\*
- 1411 Forced draft fan motors - variable speed\*
- 1412 Forced draft fan drives (other than motor)\*
- 1413 Forced draft fan couplings
- 1415 Forced draft fan controls\*
- 1420 Other forced draft fan problems\*
- 1421 Secondary air fans/blowers
- 1422 Secondary air fan/blower motors - single speed
- 1423 Secondary air fan/blower motors - variable speed
- 1424 Secondary air fan/blower controls
- 1430 Air supply ducts from FD fan
- 1431 Air supply dampers from FD fan
- 1432 Air supply duct expansion joints
- 1440 Air supply dampers
- 1450 Other air supply problems
- 1451 Fluidized Air Fan (FBC Only)

\*For FBC units, this is the same as primary air fans and their motors.

## Flue Gas

- 1455 Induced draft fans
- 1456 Induced draft fan dampers
- 1457 Induced draft fan lubrication systems
- 1460 Induced draft fan fouling
- 1470 Induced draft fan motors and drives
- 1471 Induced draft fan motors - variable speed
- 1472 Inducted draft fan coupling
- 1475 Induced draft fan controls
- 1476 Induced draft fan speed changer
- 1480 Other induced draft fan problems
- 1487 Air heater (tubular)
- 1488 Air heater (regenerative)
- 1489 Air heater (heat pipe, plate-type)
- 1492 Air heater fouling (tubular)
- 1493 Air heater fouling (regenerative)
- 1495 Other air heater fouling (heat pipe, plate-type)
- 1500 Air heater soot blowers
- 1510 Flue gas ducts (except recirculation)
- 1512 Flue gas expansion joints
- 1520 Flue gas dampers (except recirculation)
- 1530 Other flue gas problems

## Flue Gas Recirculation

- 1535 Flue gas recirculating fan
- 1536 Flue gas recirculating fan dampers
- 1537 Flue gas recirculating fan lubrication systems
- 1540 Flue gas recirculation fan fouling
- 1550 Flue gas recirculation fan motors
- 1555 Flue gas recirculation fan controls
- 1560 Other flue gas recirculation fan problems
- 1570 Flue gas recirculation ducts
- 1572 Flue gas recirculation duct expansion joints
- 1580 Flue gas recirculation dampers

## Miscellaneous (Boiler Air and Gas Systems)

- 1590 Stacks (use code 8430 for stack problems due to pollution control equipment)
- 1591 Stack damper and linkage
- 1592 Stack damper linkage motor
- 1599 Other miscellaneous boiler air and gas system problems

### **Boiler Control Systems**

(including instruments that input to the controls)

- 1700 Feedwater controls (report local controls – feedwater pump, feedwater regulator valve, etc., – with component or system)
- 1710 Combustion/steam condition controls (report local controls – burners, pulverizers, etc., – with component or system)
- 1720 Desuperheater/attemperator controls
- 1730 Boiler explosion or implosion
- 1740 Gage glasses
- 1741 Furnace and water gauge television auxiliary system
- 1750 Burner management system
- 1760 Feedwater instrumentation (not local controls)
- 1761 Combustion /Steam condition instrumentation (not local controls)
- 1762 Desuperheater/attemperator instrumentation (not local controls)
- 1799 Other boiler instrumentation and control problems

### **Boiler Overhaul and Inspections**

- 1800 Major boiler overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-FS-2)
- 1801 Minor boiler overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-FS-2)
- 1810 Other boiler inspections
- 1811 Boiler Inspections – problem identification/investigation
- 1812 Boiler Inspections – scheduled or routine
- 1820 Chemical cleaning/steam blows

### **Boiler Water Condition**

- 1850 Boiler water condition (not feedwater water quality)

### **Boiler Design Limitations**

- 1900 Improper balance between tube sections not due to fouling or plugging
- 1910 Inadequate air not due to equipment problems

### **Miscellaneous (Boiler)**

(use more specific codes – other slagging and fouling problems, other control problems, etc. – whenever possible. Describe miscellaneous problems in the verbal description.)

- 1980 Boiler safety valve test
- 1990 Boiler performance testing (use code 9999 for total unit performance testing)
- 1999 Boiler, miscellaneous

## BALANCE OF PLANT

### Condensing System

#### Condenser Tubes

- 3110 Condenser tube leaks
- 3111 Condenser tube fouling shell side
- 3112 Condenser tube fouling tube side
- 3113 Condenser tube and water box cleaning (including circulating water flow reversal)
- 3114 Air-cooled condenser tubes
- 3115 Air-cooled condenser pumps
- 3116 Air-cooled condenser fans
- 3117 Air-cooled condenser fan motors
- 3118 Other Air-cooled condenser problems
- 3119 Other condenser tube casing or shell and internal problems

#### Condenser Casing or Shell and Internals

- 3120 Tube sheets
- 3121 Expansion joint
- 3122 Gaskets and seals
- 3123 Hot well
- 3124 Tube sheet fouling
- 3129 Other condenser casing or shell and internal problems

#### Vacuum Equipment

- 3130 Air ejectors
- 3131 Air ejector piping and valves
- 3132 Inter and after condensers
- 3133 Vacuum pumps
- 3134 Vacuum pump piping and valves
- 3135 Vacuum pump motor and auxiliaries
- 3139 Other air extraction system problems - general
- 3149 Loss of vacuum not attributable to a particular component such as air ejectors or valves; or, high back pressure not attributable to high circulating water temperature, or vacuum losses from a known cause.

#### Condenser Controls

- 3150 Hot well level controls
- 3151 Vacuum pump and air ejector controls
- 3152 Air-cooled condenser controls
- 3159 Other condensing system controls and instruments

#### Miscellaneous (Condensing System)

- 3170 Condenser inspection (use code 3110 to report looking for tube leaks)
- 3171 Air-cooled condenser inspections
- 3180 Major condenser overhaul
- 3185 Water side cathodic protection
- 3186 Auxiliary condenser and associated equipment
- 3190 Air leakage (for losses not attributable to previously noted equipment related codes)
- 3199 Other miscellaneous condensing system problems

### **Circulating Water Systems**

- 3210 Circulating water pumps
- 3211 Circulating water pump motors
- 3220 Circulating water piping
- 3221 Circulating water piping fouling
- 3230 Circulating water valves
- 3231 Waterbox
- 3232 Condenser tube cleaning system including debris filter
- 3233 Circulating water priming system
- 3235 Cooling tower booster pump
- 3236 Cooling tower booster motor
- 3238 Cooling tower fan motors
- 3239 Cooling tower fan motors - variable speed
- 3240 Cooling tower fans
- 3241 Cooling tower efficiency below design
- 3242 Cooling tower fill damage
- 3243 Cooling tower icing
- 3244 Cooling tower fires
- 3245 Other cooling tower problems
- 3246 Cooling tower fouling
- 3247 Cooling tower instrumentation
- 3250 Circulating water system instruments and controls
- 3260 Traveling screens
- 3261 Traveling screen fouling
- 3269 Circulating water biological conditions (ie, zebra mussels)
- 3270 Intake system problems other than traveling screens
- 3271 Intake grating fouling
- 3272 Circulating water screenwash system
- 3273 Debris in circulating water from outside sources (leaves, mud, etc.)
- 3274 Ice blockages at intake structures including frazil ice, sheets, blocks of ice, etc.
- 3280 High circulating water temperature (not due to season, tower efficiency below design, or other listed equipment problem)
- 3281 Circulating water tempering system
- 3282 Circulating water cooling ponds
- 3285 Circulating water chemistry

### **Waste Water (zero discharge) Systems**

- 3290 Waste water (zero discharge) tanks, pumps and motors
- 3291 Waste water (zero discharge) system fouling
- 3292 Waste water (zero discharge) piping
- 3293 Waste water (zero discharge) valves
- 3294 Waste water (zero discharge) controls and instrumentation
- 3295 Other waste water (zero discharge) problems
- 3299 Other circulating water system problems

## Condensate System

### **Pumps, Piping, and Valves**

- 3300 Condensate water pre-treatment
- 3310 Condensate/hotwell pumps
- 3311 Condensate/hotwell pump motor
- 3312 Condensate booster pump
- 3313 Condensate booster pump motor
- 3314 Condensate booster pump motor - variable speed
- 3315 Condensate booster pump drive (other than 3313 and 3314)
- 3320 Condensate piping
- 3330 Condensate valves

### **Low/Intermediate Pressure Heater and Deaerators**

- 3339 LP heater head leaks
- 3340 LP heater tube leaks
- 3341 Other LP heater – general
- 3342 IP heater tube leaks
- 3343 Other IP heater – general
- 3344 Deaerator (including level control)
- 3345 IP heater head leaks

### **Polishers/Chemical Addition**

- 3350 Condensate polishing and filtering systems
- 3351 Chemical addition systems
- 3352 Feedwater chemistry (not specific to condenser, polishers, or chemical addition)

### **Miscellaneous (Condensate System)**

- 3360 Condensate makeup and return (including storage tanks)
- 3370 Condensate system controls and instrumentation (not hotwell level, heater level, or deaerator level controls: see codes 3150-3159, 3344, 3502.
- 3380 Condensate coolers
- 3399 Other miscellaneous condensate system problems

## Feedwater System

(excluding extraction or drain systems)

- 3401 Startup feedwater pump
- 3402 Startup feedwater pump drives - all types
- 3407 Feedwater pump suction screens
- 3408 Feedwater pump drive – local controls
- 3409 Feedwater pump drive motor - variable speed
- 3410 Feedwater pump
- 3411 Feedwater pump drive - motor
- 3412 Feedwater pump drive - steam turbine
- 3413 Feedwater pump coupling and drive shaft
- 3414 Feedwater pump local controls
- 3415 Feedwater pump/drive lube oil system

**Feedwater System (continued)**

- 3416 Other feedwater pump problems
- 3417 Feedwater pump drive - main shaft
- 3418 Feedwater pump drive - other
- 3419 Feedwater pump drive - gear
- 3420 Feedwater piping and supports
- 3430 Feedwater regulating (boiler level control) valve
- 3431 Other feedwater valves
- 3439 HP heater head leaks
- 3440 High pressure heater tube leaks
- 3441 Other high pressure heater problems (see condensate system for LP and IP heater codes)
- 3451 Feedwater booster pump suction screens
- 3452 Feedwater booster pump drive - local controls
- 3453 Feedwater booster pump drive motor - variable speed
- 3454 Feedwater booster pump
- 3455 Feedwater booster pump drive - motor
- 3456 Feedwater booster pump drive - steam turbine
- 3457 Feedwater booster pump coupling and drive shaft
- 3458 Feedwater booster pump local controls
- 3459 Feedwater booster pump/drive lube oil system
- 3460 Other feedwater booster pump problems
- 3461 Feedwater booster pump drive - main shaft
- 3462 Feedwater booster pump drive - other
- 3463 Feedwater booster pump drive - gear
- 3499 Other feedwater system problems

**Heater Drain Systems**

- 3501 Heater drain pumps
- 3502 Heater level control
- 3503 Heater drain piping
- 3504 Heater drain valves
- 3505 Heater drain pump drive
- 3509 Other heater drain system problems

**Extraction Steam**

- 3520 HP Extraction steam piping
- 3521 HP Extraction steam valves
- 3522 HP Extraction steam instruments and controls
- 3529 Other HP extraction steam system problems
- 3530 IP Extraction steam piping
- 3531 IP Extraction steam valves
- 3532 IP Extraction steam instruments and controls
- 3539 Other IP extraction steam system problems
- 3540 LP Extraction steam piping
- 3541 LP Extraction steam valves
- 3542 LP Extraction steam instruments and controls
- 3549 Other LP extraction steam system problems

**Electrical**

- 3600 Switchyard transformers and associated cooling systems – external (OMC)
- 3601 Switchyard transformers and associated cooling systems – external (not OMC)
- 3610 Switchyard circuit breakers – external (not OMC)
- 3611 Switchyard circuit breakers – external (OMC)
- 3612 Switchyard system protection devices – external (OMC)
- 3613 Switchyard system protection devices – external (not OMC)
- 3618 Other switchyard equipment – external (not OMC)
- 3619 Other switchyard equipment – external (OMC)
- 3620 Main transformer
- 3621 Unit auxiliaries transformer
- 3622 Station service startup transformer
- 3623 Auxiliary generators
- 3624 Auxiliary generator voltage supply system
- 3629 Other switchyard or high voltage system problems - external
- 3630 400-700-volt transformers
- 3631 400-700-volt circuit breakers
- 3632 400-700-volt conductors and buses
- 3633 400-700-volt insulators
- 3634 400-700-volt protection devices
- 3639 Other 400-700-volt problems
- 3640 AC instrument power transformers
- 3641 AC Circuit breakers
- 3642 AC Conductors and buses
- 3643 AC Inverters
- 3644 AC Protection devices
- 3649 Other AC instrument power problems
- 3650 DC instrument power battery chargers
- 3651 DC circuit breakers
- 3652 DC conductors and buses
- 3653 DC protection devices
- 3659 Other DC power problems
- 3660 4000-7000-volt transformers
- 3661 4000-7000-volt circuit breakers
- 3662 4000-7000-volt conductors and buses
- 3663 4000-7000-volt insulators
- 3664 4000-7000-volt protection devices
- 3669 Other 4000-7000-volt problems
- 3670 12-15kV transformers
- 3671 12-15kV circuit breakers
- 3672 12-15kV conductors and buses
- 3673 12-15kV insulators
- 3674 12-15kV protection devices
- 3679 Other 12-15kV problems
- 3680 other voltage transformers
- 3681 other voltage circuit breakers
- 3682 other voltage conductors and buses
- 3683 other voltage insulators
- 3684 other voltage protection devices
- 3689 Other voltage problems
- 3690 Station Service Power Distribution System, General

### **Power Station Switchyard**

- 3700 Power Station switchyard (non generating unit equipment)
- 3710 Transmission line (connected to powerhouse switchyard to 1st Substation)
- 3720 Transmission equipment at the 1st substation) (see code 9300 if applicable)
- 3730 Transmission equipment beyond the 1st substation (see code 9300 if applicable)

### **Auxiliary Systems**

#### **Open Cooling Water System**

- 3800 Open cooling water pumps and motors
- 3801 Open cooling water piping
- 3802 Open cooling water valves
- 3803 Open cooling water heat exchangers
- 3804 Open cooling water system fouling
- 3805 Open cooling water system instrumentation
- 3806 Open cooling water strainer
- 3809 Other open cooling water problems

#### **Service Water (Open System)**

- 3810 Service water pumps and motors
- 3811 Service water piping
- 3812 Service water valves
- 3813 Service water heat exchangers
- 3814 Service water system fouling
- 3815 Service water strainer
- 3819 Other service water problems

#### **Closed Cooling Water Systems**

- 3820 Closed cooling water pumps and motors
- 3821 Closed cooling water piping
- 3822 Closed cooling water valves
- 3823 Closed cooling water heat exchangers
- 3824 Closed cooling water system fouling
- 3825 Closed cooling water instrumentation
- 3826 Closed cooling water strainer
- 3829 Other closed cooling water system problems

#### **Auxiliary Steam**

- 3830 Auxiliary boiler
- 3831 Auxiliary steam piping
- 3832 Auxiliary steam valves
- 3833 Auxiliary steam controls and instruments
- 3834 Auxiliary boiler tube leaks
- 3835 Auxiliary boiler burner management system
- 3836 Steam transfer to other unit
- 3839 Other auxiliary steam problems (also see extraction steam codes 3520 to 3529; startup bypass codes 0630 to 0660; and soot blower steam code 0870)

**Service Air**

- 3840 Service air compressors
- 3841 Service air piping
- 3842 Service air valves
- 3843 Service air dryers
- 3844 Soot blowing air compressor and system
- 3849 Other service air problems

**Instrument Air**

- 3850 Instrument air compressors
- 3851 Instrument air piping
- 3852 Instrument air valves
- 3853 Instrument air dryers
- 3854 N<sub>2</sub> backup to instrument air
- 3859 Other instrument air problems

**Fire Protection System**

- 3860 Fire protection system pumps
- 3861 Fire protection system piping
- 3862 Fire protection system valves
- 3863 Fire protection system fouling
- 3864 Fire protection system instrumentation and controls
- 3869 Other fire protection system problems

**Low-pressure Gas Compression System**

- 3870 Fuel Gas Compressor and Motors
- 3871 Fuel Gas Compressor Piping
- 3872 Fuel Gas Compressor Valves
- 3873 Fuel Gas Compressor Heat Exchangers
- 3874 Fuel Gas Compressor Controls and Instrumentation
- 3875 Fuel Gas Compressor Filters
- 3876 Fuel Gas Compressor Fire System
- 3879 Fuel Gas Compressor – Other

**Seal Air Fans**

- 3880 Seal air fan
- 3881 Seal air fan drive - motor
- 3882 Seal air control dampers and drives
- 3883 Seal air filters
- 3889 Other seal air fan problems

**Miscellaneous (Auxiliary Systems)**

- 3898 Miscellaneous plant auxiliary process and services instrumentation and controls
- 3899 Other miscellaneous auxiliary system problems

### **Miscellaneous (Balance of Plant)**

|      |   |
|------|---|
| 3950 | Process computer  |
| 3960 | Thermal derating (thermal efficiency losses in balance of plant when specific cause(s) unknown) |
| 3970 | Distributive Control System (DCS) – process computer  |
| 3971 | DCS – data highway  |
| 3972 | DCS – hardware problems (including card failure)  |
| 3973 | DCS – internal and termination wiring   |
| 3974 | DCS – logic problems  |
| 3975 | DCS – upgrades  |
| 3979 | Other DCS problems  |
| 3980 | Programmable Logic Controller (PLC)   |
| 3981 | PLC – data highway  |
| 3982 | PLC – hardware problems (including card failure)  |
| 3983 | PLC – internal and termination wiring   |
| 3984 | PLC – logic problems  |
| 3985 | PLC – upgrades  |
| 3989 | Other PLC problems  |
| 3995 | Powerhouse heating and ventilating systems  |
| 3996 | Air conditioning systems – rooms and areas  |
| 3998 | Balance of plant overhaul / outage  |
| 3999 | Other miscellaneous balance of plant problems   |

## **STEAM TURBINE**

Besides the turbine, this set includes the steam stop/control valves, turbine control system, and the turbine auxiliaries. The extraction steam codes are contained in the Balance of Plant set.

### **High Pressure Turbine**

|      |                                      |
|------|--------------------------------------|
| 4000 | Outer casing                         |
| 4001 | Inner casing                         |
| 4009 | Nozzle bolting                       |
| 4010 | Nozzles and nozzle blocks            |
| 4011 | Diaphragms                           |
| 4012 | Buckets or blades                    |
| 4013 | Diaphragms unit and shroud type      |
| 4014 | Bucket or blade fouling              |
| 4015 | Wheels or spindles                   |
| 4020 | Shaft seals                          |
| 4021 | Dummy rings                          |
| 4022 | Gland rings                          |
| 4030 | Rotor shaft                          |
| 4040 | Bearings                             |
| 4041 | Thrust bearings                      |
| 4099 | Other high pressure turbine problems |

### **Intermediate Pressure Turbine**

- 4100 Outer casing
- 4101 Inner casing
- 4109 Nozzle bolting
- 4110 Nozzles and nozzle blocks
- 4111 Diaphragms
- 4112 Buckets or blades
- 4113 Bucket or blade fouling
- 4115 Wheels or spindles
- 4120 Shaft seals
- 4121 Dummy rings
- 4122 Gland rings
- 4130 Rotor shaft
- 4140 Bearings
- 4141 Thrust bearings
- 4199 Other intermediate pressure turbine problems

### **Low Pressure Turbine**

- 4200 Outer casing
- 4201 Inner casing
- 4209 Nozzle bolting
- 4210 Nozzles and nozzle blocks
- 4211 Diaphragms
- 4212 Buckets or blades
- 4213 Bucket or blade fouling
- 4215 Wheels or spindles
- 4220 Shaft seals
- 4221 Dummy rings
- 4222 Gland rings
- 4230 Rotor shaft
- 4240 Bearings
- 4241 Thrust bearings
- 4250 Other low pressure turbine problems

### **Valves**

- 4260 Main stop valves
- 4261 Control valves
- 4262 Intercept valves
- 4263 Reheat stop valves
- 4264 Combined intercept valves
- 4265 Miscellaneous drain and vent valves
- 4266 Main stop valve testing
- 4267 Control valve testing
- 4268 Reheat/intercept valve testing
- 4269 Other turbine valves

### Piping

- 4270 Crossover or under piping
- 4279 Miscellaneous turbine piping

### Lube Oil

(do not include bearing failures due to lube oil)

- 4280 Lube oil pumps
- 4281 Lube oil coolers
- 4282 Lube oil conditioners
- 4283 Lube oil system valves and piping
- 4284 Lube oil pump drive
- 4289 Other lube oil system problems

### Controls

- 4290 Hydraulic system pumps
- 4291 Hydraulic system coolers
- 4292 Hydraulic system filters
- 4293 Hydraulic system pipes and valves
- 4299 Other hydraulic system problems
- 4300 Turbine supervisory system (use codes 4290 to 4299 for hydraulic oil)
- 4301 Turbine governing system
- 4302 Turbine trip devices (including instruments)
- 4303 Exhaust hood and spray controls
- 4304 Automatic turbine control systems - mechanical
- 4305 Automatic turbine control systems - mechanical - hydraulic
- 4306 Automatic turbine control systems - electro-hydraulic - analog
- 4307 Automatic turbine control systems - electro-hydraulic - digital
- 4308 Automatic turbine control systems - digital control and monitoring
- 4309 Other turbine instrument and control problems
- 4310 Steam Turbine Control System - data highway
- 4311 Steam Turbine Control System - hardware problems (including card failure)
- 4312 Steam Turbine Control System - internal and termination wiring
- 4313 Steam Turbine Control System - logic problems
- 4314 Steam Turbine Control System - upgrades

### Miscellaneous (Steam Turbine)

- 4400 Major turbine overhaul (720 hrs or longer) (use for non-specific overhaul only; see page B-FS-2)
- 4401 Inspection
- 4402 Minor turbine overhaul (less than 720 hrs) (use for non-specific overhaul only; see page B-FS-2)
- 4410 Turning gear and motor
- 4411 Steam turbine gear box (single shaft configuration)
- 4412 Steam turbine clutch (single shaft configuration)
- 4415 Shaft coupling mechanism
- 4420 Vibration of the turbine generator unit that cannot be attributed to a specific cause such as bearings or blades (use this code for balance moves)
- 4430 Gland seal system
- 4450 Water induction
- 4460 Turbine overspeed trip test
- 4470 Differential expansion
- 4490 Turbine performance testing (use code 9999 for total unit performance testing)
- 4499 Other miscellaneous steam turbine problems

## GENERATOR

This set of codes contains the generator, exciter, generator cooling systems, and generator controls. Note the main leads up to and includes the generator output breaker in this set of codes.

### Generator

|      |  |
|------|--|
| 4500 | Rotor windings   |
| 4510 | Rotor collector rings  |
| 4511 | Rotor, General   |
| 4512 | 4512 Retaining Rings   |
| 4520 | Stator windings, bushings, and terminals   |
| 4530 | Stator core iron   |
| 4535 | Stator, General  |
| 4536 | Generator Heaters  |
| 4540 | Brushes and brush rigging  |
| 4550 | Generator bearings and lube oil system   |
| 4551 | Generator bearings   |
| 4552 | Generator lube oil system  |
| 4555 | Bearing cooling system   |
| 4560 | Generator vibration (excluding vibration due to failed bearing and other components) |
| 4570 | Generator casing   |
| 4580 | Generator end bells and bolting  |

### Exciter

|      |                                |
|------|--------------------------------|
| 4600 | Exciter drive - motor          |
| 4601 | Exciter field rheostat         |
| 4602 | Exciter commutator and brushes |
| 4603 | Solid state exciter element    |
| 4604 | Exciter drive - shaft          |
| 4605 | Exciter transformer            |
| 4609 | Other exciter problems         |

### Cooling System

(report failures caused by water leaks into generator as codes 4500, 4510, etc.)

|      |   |
|------|---|
| 4610 | Hydrogen cooling system piping and valves |
| 4611 | Hydrogen coolers                          |
| 4612 | Hydrogen storage system                   |
| 4613 | Hydrogen seals                            |
| 4619 | Other hydrogen system problems            |
| 4620 | Air cooling system                        |
| 4630 | Liquid cooling system                     |
| 4640 | Seal oil system and seals                 |
| 4650 | Other cooling system problems             |

### Controls

- 4700 Generator voltage control
- 4710 Generator metering devices
- 4720 Generator synchronization equipment
- 4730 Generator current and potential transformers
- 4740 Emergency generator trip devices
- 4750 Other generator controls and metering problems

### Miscellaneous (Generator)

- 4800 Generator main leads
- 4805 Generator Bus Duct Cooling System
- 4810 Generator output breaker
- 4830 Major overhaul (720 hrs or longer) (use for non-specific overhaul only; see page B-FS-2)
- 4831 Minor overhaul (less than 720 hrs.) (use for non-specific overhaul only; see page B-FS-2)
- 4840 Inspection
- 4841 Generator dole testing
- 4842 Reactive and capability testing
- 4850 Core monitor alarm
- 4860 Generator neutral grounding equipment
- 4899 Other miscellaneous generator problems

## **POLLUTION CONTROL EQUIPMENT \***

Use this set of codes to report problems with flue gas desulphurization equipment and stack gas particulate removal equipment. If outages or deratings occur due to reasons other than equipment problems, use the set of codes for Regulatory, Safety, Environmental stack emission limits.

### Wet Scrubbers

#### **Chemical Supply**

- 8000 Chemical feed storage, mill feeders, and conveyors
- 8002 Screw conveyors
- 8003 Bucket elevators
- 8006 Weigh feeders
- 8010 Crushers/mills
- 8020 Mill slurry tanks supply problems
- 8030 Classifiers
- 8040 Slurry transfer pumps and motors
- 8050 Chemical unavailability
- 8099 Other chemical supply problems

#### **Wet Scrubber**

- 8100 Scrubber/absorber tower or module
- 8110 Spray nozzles
- 8115 Disc scrubber throats
- 8120 Spray pumps and motors
- 8125 Scrubber recycle (liquid) pumps
- 8127 Scrubber recycle (liquid) pump motors
- 8130 Recirculation tanks including agitators
- 8140 Reaction tanks including agitators

|      |   |
|------|---|
| 8150 | Tubes                                   |
| 8160 | Mist eliminators/demisters and washdown |
| 8199 | Other scrubber problems                 |

**Piping, Ducting, Dampers, and Fans**

|      |  |
|------|--|
| 8200 | Piping   |
| 8210 | Valves   |
| 8220 | Strainers or filters                                     |
| 8225 | Drain pots   |
| 8230 | Ducting  |
| 8235 | Demister   |
| 8240 | Bypass dampers   |
| 8250 | Dampers other than bypass                                |
| 8260 | Scrubber booster I.D. fan (fan specific to the scrubber) |

\* Use code 9510 for outages or deratings required to install pollution control equipment. Use codes 9600 to 9650 only when the pollution control equipment problems are not responsible for exceeding emission limits.

**Piping, Ducting, Dampers, and Fans (Continued)**

|      |  |
|------|--|
| 8261 | Scrubber booster I.D. fan drive                                    |
| 8262 | Scrubber booster I.D. fan vibration (fan specific to the scrubber) |
| 8264 | Scrubber booster I.D. fan blades (fan specific to the scrubber)    |
| 8270 | Scrubber booster F.D. fan (fan specific to the scrubber)           |
| 8271 | Scrubber booster F.D. fan drive                                    |
| 8272 | Scrubber booster F.D. fan vibration (fan specific to the scrubber) |
| 8274 | Scrubber booster F.D. fan blades (fan specific to the scrubber)    |
| 8280 | Reagent feed piping  |
| 8290 | Demister wash piping assembly                                      |
| 8299 | Other piping, ducting, damper, and fan problems                    |

**Waste Disposal and Recovery**

|      |  |
|------|--|
| 8300 | Waste disposal/recovery tanks                      |
| 8310 | Waste disposal/recovery pumps                      |
| 8320 | Waste disposal ponds                               |
| 8325 | Ash disposal problems                              |
| 8330 | Dewatering equipment (thickener, centrifuge, etc.) |
| 8335 | Dryers   |
| 8340 | Centrifuge/vacuum filter                           |
| 8345 | Calciners  |
| 8349 | Other waste disposal and recovery problems         |
| 8399 | Solids conveying and mixing system problems        |

**Miscellaneous (Wet Scrubbers)**

|      |   |
|------|---|
| 8400 | Scrubber gas discharge reheaters - general    |
| 8402 | Scrubber gas discharge reheaters - vibration  |
| 8404 | Scrubber gas discharge reheaters - tube leaks |
| 8406 | Scrubber gas discharge reheaters - ducts      |

- 8410 Scrubber instruments and controls
- 8415 Liquid level controls
- 8420 Heat tracer
- 8425 Miscellaneous mechanical failures
- 8426 Miscellaneous electrical failures
- 8430 Stack damage related to scrubber system
- 8440 Major overhaul
- 8450 Inspection
- 8460 Testing
- 8470 SO<sub>2</sub> monitor
- 8499 Other miscellaneous wet scrubber problems

### Dry Scrubbers

#### **Reagent\Slurry Supply**

- 8500 Slurry storage and feed tanks
- 8501 Reagent storage, feed bins, and conveyors
- 8502 Weigh feeders
- 8503 Screw conveyors
- 8504 Mills/slakers
- 8505 Scalping screens
- 8506 Slurry pipelines
- 8507 Reagent uploading and transfer systems
- 8508 Reagent unavailability
- 8510 Slurry mixers and agitators
- 8520 Slurry transfer pumps and motors
- 8521 Reagent/slurry problems

#### **Piping, Ducting, and Dampers**

- 8522 Piping
- 8523 Valves
- 8524 Strainers or filters
- 8525 Ducting
- 8526 Dampers
- 8527 Other piping, ducting, and damper problems

#### **Dry Scrubber**

- 8528 Dry scrubber instruments and controls
- 8529 Gas dispersers
- 8530 Spray towers
- 8531 Spray machine/atomizer
- 8532 Spray machine/atomizer motors
- 8533 Spray machine/atomizer lubrication systems
- 8534 Spray machine/atomizer vibration problems

### **Waste Disposal and Recovery**

- 8535 Fly ash conveyors
- 8536 Bucket elevators
- 8537 Weigh hoppers
- 8538 Recycle storage and feed tanks including agitators
- 8539 Recycle slurry transfer pumps
- 8540 Waste disposal
- 8541 Recycle feed bins
- 8542 Recycle feed bins aeration systems
- 8543 Powder coolers

### **Miscellaneous (Dry Scrubber)**

- 8544 Mechanical failures
- 8545 Electrical failures
- 8546 Major overhaul
- 8547 Inspection
- 8548 Testing
- 8549 Other dry scrubber problem

### **Precipitators**

- 8550 Electrostatic precipitator fouling
- 8551 Electrostatic precipitator field out of service
- 8560 Electrostatic precipitator problems
- 8570 Mechanical precipitator fouling
- 8580 Mechanical precipitator problems
- 8590 Other precipitator problems

### **Miscellaneous (Pollution Control Equipment)**

- 8600 Flue gas additives (furnace injection)
- 8601 SO<sub>3</sub> mitigation
- 8620 Mercury Abatement Equipment
- 8650 Baghouse systems, general
- 8651 Bag failures and rebagging
- 8652 Shakers and rappers
- 8653 Inflation and deflation fans and motors
- 8654 Baghouse booster fans and motors
- 8655 Structural duct work and dampers
- 8656 Controls and instrumentation
- 8657 Ash handling system and hoppers
- 8658 Slurry system from precipitators
- 8670 Emission monitors (other than CEMS)
- 8699 Other miscellaneous pollution control equipment problems

### **Continuous Emissions Monitoring Systems (CEMS)**

|      |  |
|------|--|
| 8700 | CEMS Certification and Recertification |
| 8710 | SO <sub>2</sub> analyzer problems      |
| 8720 | NO <sub>x</sub> analyzer problems      |
| 8730 | CO analyzer problems                   |
| 8740 | CO <sub>2</sub> analyzer problems      |
| 8750 | O <sub>2</sub> analyzer problems       |
| 8760 | Opacity monitor problems               |
| 8770 | Flow monitor problems                  |
| 8780 | Data acquisition system problems       |
| 8790 | Miscellaneous CEMS problems            |

### **NOxB Reduction Systems**

#### **Selective Non-Catalytic Reduction Systems**

|      |                          |
|------|--------------------------|
| 8800 | Reagent                  |
| 8801 | Carrier gas              |
| 8802 | Control system           |
| 8803 | SNCR Performance testing |
| 8809 | Other SNCR problems      |

#### **Selective Catalytic Reduction Systems**

|      |   |
|------|---|
| 8810 | Reactor   |
| 8811 | Reagent   |
| 8812 | Catalyst  |
| 8813 | Injection grid piping/valves  |
| 8814 | Catalyst support material   |
| 8815 | Soot blowers  |
| 8816 | Plugging  |
| 8817 | Control system  |
| 8820 | SCR NO <sub>x</sub> Ammonia injection grid piping/valves"             |
| 8821 | SCR NO <sub>x</sub> Ammonia tanks, piping and valves (not injection)" |
| 8822 | SCR NO <sub>x</sub> Ammonia air blowers"                              |
| 8823 | SCR NO <sub>x</sub> Other ammonia system problems"                    |
| 8825 | Other SCR problems  |

#### **Catalytic Air Heaters**

|      |                    |
|------|--------------------|
| 8830 | Active catalyst    |
| 8831 | Support materials  |
| 8832 | Plugging           |
| 8835 | Other CAH problems |

### CO Reduction

- 8840 Active catalyst
- 8841 Support materials
- 8842 Plugging
- 8845 Other CO reduction problems

## **EXTERNAL**

Use this set of codes to report events caused by external factors (flood, lightning, etc.); economic factors (lack of fuel, labor strikes, etc.); operator training; and transmission system problems external to the plant.

### Catastrophe

- 9000 Flood
- 9001 Drought
- 9010 Fire including wildfires, not related to a specific component
- 9020 Lightning
- 9025 Geomagnetic disturbance
- 9030 Earthquake
- 9031 Tornado
- 9035 Hurricane
- 9036 Storms (ice, snow, etc)
- 9040 Other catastrophe

### Economic

- 0000 Reserve shutdown
- 9130 Lack of fuel (water from rivers or lakes, coal mines, gas lines, etc) where the operator is not in control of contracts, supply lines, or delivery of fuels
- 9131 Lack of fuel (interruptible supply of fuel part of fuel contract)
- 9134 Fuel conservation
- 9130 Lack of fuel (water from rivers or lakes, coal mines, gas lines, etc) where the operator is not in control of contracts, supply lines, or delivery of fuels
- 9131 Lack of fuel (interruptible supply of fuel part of fuel contract)
- 9132 Wet Fuel - Biomass
- 9134 Fuel conservation
- 9136 Problems with Primary Fuel for Units with Secondary Fuel Operation
- 9137 Ground water or other water supply problems.
- 9140 Plant modifications to burn different fuel that are not regulatory mandated
- 9150 Labor strikes company-wide problems or strikes outside the company's jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.
- 9151 Labor strikes direct plant management grievances that result in a walkout or strike are under plant management control
- 9160 Other economic problems
- 9180 Economic (for internal use at plants only)
- 9181 Economic (for internal use at plants only)
- 9182 Economic (for internal use at plants only)
- 9183 Economic (for internal use at plants only)
- 9184 Economic (for internal use at plants only)

|      |  |
|------|--|
| 9185 | Economic (for internal use at plants only) |
| 9186 | Economic (for internal use at plants only) |
| 9187 | Economic (for internal use at plants only) |
| 9188 | Economic (for internal use at plants only) |
| 9189 | Economic (for internal use at plants only) |
| 9190 | Economic (for internal use at plants only) |
| 9191 | Economic (for internal use at plants only) |
| 9192 | Economic (for internal use at plants only) |
| 9193 | Economic (for internal use at plants only) |
| 9194 | Economic (for internal use at plants only) |
| 9195 | Economic (for internal use at plants only) |
| 9196 | Economic (for internal use at plants only) |
| 9197 | Economic (for internal use at plants only) |
| 9198 | Economic (for internal use at plants only) |
| 9199 | Economic (for internal use at plants only) |

### **Fuel Quality**

(Use code 9600 to 9650 if the fuel quality results in excess stack emissions through no fault in the pollution control equipment. Use the appropriate equipment code to report fouling and slagging.)

|      |   |
|------|---|
| 9200 | High ash content (OMC)                          |
| 9201 | High ash content (not OMC)                      |
| 9205 | Poor quality natural gas fuel, low heat content |
| 9210 | Low grindability (OMC)                          |
| 9211 | Low grindability (not OMC)                      |
| 9220 | High sulfur content (OMC)                       |
| 9221 | High sulfur content (not OMC)                   |
| 9230 | High vanadium content (OMC)                     |
| 9231 | High vanadium content (not OMC)                 |
| 9240 | High sodium content (OMC)                       |
| 9241 | High sodium content (not OMC)                   |
| 9250 | Low BTU coal (OMC)                              |
| 9251 | Low BTU coal (not OMC)                          |
| 9260 | Low BTU oil (OMC)                               |
| 9261 | Low BTU oil (not OMC)                           |
| 9270 | Wet coal (OMC)                                  |
| 9271 | Wet coal (not OMC)                              |
| 9272 | Wet Fuel (other than coal)                      |
| 9280 | Frozen coal (OMC)                               |
| 9281 | Frozen coal (not OMC)                           |
| 9290 | Other fuel quality problems (OMC)               |
| 9291 | Other fuel quality problems (not OMC)           |

### **Miscellaneous (External)**

|      |  |
|------|--|
| 9132 | Wet Fuel-Biomass   |
| 9300 | Transmission system problems other than catastrophes (do not include switchyard problems in this category; see codes 3600 to 3629, 3720 to 3730) |
| 9305 | Ash disposal problem   |
| 9310 | Operator training  |
| 9320 | Other miscellaneous external problems  |
| 9340 | Synchronous Condenser Operation  |

## REGULATORY, SAFETY, ENVIRONMENTAL

Use these codes only for events not directly attributable to equipment failures. Inspections or testing of certain equipment due to regulation are reported using the appropriate equipment cause codes, and the fact that it was a regulatory requirement noted in the verbal description section.

### Regulatory

- 9504 Regulatory (environmental) proceedings and hearings - regulatory agency initiated
- 9506 Regulatory (environmental) proceedings and hearings - intervener initiated
- 9510 Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
- 9520 Oil spill in Gulf of Mexico (OMC)
- 9590 Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related factor contributed to the primary cause of the event)

### Stack Emission (include exhaust emissions)

- 9600 SO<sub>2</sub> stack emissions – fossil
- 9610 NO<sub>x</sub> stack emissions – fossil
- 9620 Particulate stack emissions - fossil
- 9630 Opacity - fossil
- 9650 Other stack or exhaust emissions – fossil  
(use codes 9200 to 9290 if fuel quality causes pollution control equipment problems that result in excess stack emissions)
- 9656 Other stack or exhaust emissions testing - fossil

### Other Operating Environmental Limitations

- 9660 Thermal discharge limits – fossil and nuclear
- 9670 Noise limits (not for personnel safety) – fossil
- 9677 Noise limits testing - fossil
- 9680 Fish kill – fossil
- 9690 Other miscellaneous operational environmental limits – fossil and nuclear

### Safety

- 9700 OSHA-related retrofit or inspection
- 9720 Other safety problems

## PERSONNEL OR PROCEDURE ERRORS

- 9900 Operator error
- 9910 Maintenance personnel error
- 9920 Contractor error
- 9930 Operating procedure error
- 9940 Maintenance procedure error
- 9950 Contractor procedure error
- 9960 Staff shortage

## INACTIVE STATES

|      |                           |
|------|---------------------------|
| 0002 | Inactive Reserve Shutdown |
| 9990 | Retired unit              |
| 9991 | Mothballed unit           |

## PERFORMANCE

|      |   |
|------|---|
| 9997 | NERC Reliability Standard Requirement   |
| 9998 | Black start testing   |
| 9999 | Total unit performance testing (use appropriate codes for individual component testing) |