

FLUIDIZED BED COMBUSTION UNITS INDEX TO SYSTEM/COMPONENT CAUSE CODES

(Unit Codes 650-699)

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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

Bed Material Preparation System (FBC only) (Continued)

0170	Bed material cyclone
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

Bed Material Removal System (Continued)

- 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 pulverizer exhausters)

Air Supply

- 1400 Forced draft fans*
- 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

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

Flue Gas

1455	Induced draft fans
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
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 which 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/attenuator controls
1730	Boiler explosion or implosion
1740	Gage glasses

Boiler Control Systems (including instruments which input to the controls) (Continued)

- 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-1)
- 1801 Minor boiler overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-1)
- 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

Condensing System (Continued)

- 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
- 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
3416	Other feedwater pump problems
3417	Feedwater pump drive - main shaft
3418	Feedwater pump drive - other

Feedwater System (excluding extraction or drain systems) (Continued)

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

Electrical (Continued)

- 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 Powerhouse 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 N₂ 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
- 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

Low Pressure Turbine (Continued)

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

Controls (Continued)

- 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-1)
- 4401 Inspection
- 4402 Minor turbine overhaul (less than 720 hrs) (use for non-specific overhaul only; see page B-1)
- 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 including the generator output breaker are included in this set of codes.

Generator

- 4500 Rotor windings
- 4510 Rotor collector rings
 - 4511 Rotor, General
 - 4520 Stator windings, bushings, and terminals
 - 4530 Stator core iron
 - 4535 Stator, General
 - 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-1)
- 4831 Minor overhaul (less than 720 hrs.) (use for non-specific overhaul only; see page B-1)
- 4840 Inspection
- 4841 Generator double 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 ₂ 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 ₃ mitigation
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 ₂ analyzer problems
8720	NO _x analyzer problems
8730	CO analyzer problems
8740	CO ₂ analyzer problems
8750	O ₂ analyzer problems
8760	Opacity monitor problems
8770	Flow monitor problems
8780	Data acquisition system problems
8790	Miscellaneous CEMS problems

NO_x 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 _x Ammonia injection grid piping/valves"
8821	SCR NO _x Ammonia tanks, piping and valves (not injection)"
8822	SCR NO _x Ammonia air blowers"
8823	SCR NO _x 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
9010	Fire, not related to a specific component
9020	Lightning
9025	Geomagnetic disturbance
9030	Earthquake
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)
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)

Economic (Continued)

- 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)
- 9280 Frozen coal (OMC)
- 9281 Frozen coal (not OMC)
- 9290 Other fuel quality problems (OMC)
- 9291 Other fuel quality problems (not OMC)

Miscellaneous (External)

- 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 SO₂ stack emissions – fossil
- 9610 NO_x 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)