

Appendix E: Pulverized Coal-Fired Boiler System Descriptions and Troubleshooting Diagrams

This TSG Appendix deals with identifying and solving potential coal quality related problems that can be encountered in pulverized coal-fired boiler systems. A general description of this system is included, but is limited to describing the major components that make up a complete pulverized coal-fired system. For those interested, more detailed descriptions are provided in reference 10.

This Appendix includes a generalized block flow diagram of a complete overfeed stoker-fired boiler system that:

- identifies the specific components comprising the major subsystems of an overfeed stoker-fired boiler system
- logically presents the flow of coal, flue gas, and ash through the system
- helps determine the existence and location of subsystems and specific components comprising the system.

Following the block flow diagram is a component/symptom table that serves to identify:

- typical symptoms (problems) that may be encountered in the system
- the various components shown in the block flow diagram affected by these symptoms
- the logic diagram to determine whether the problem is due to operational procedures or to out-of-specification coal.

The Troubleshooting Logic Diagrams for this Appendix are presented next. However, before proceeding, the reader is encouraged to read Chapter 2 to understand the structure of each Appendix and how to apply these logic diagrams to diagnosing coal quality-related problems. The Glossary, List of Abbreviations, and References preceding the Appendixes should resolve any questions that arise regarding terminology and laboratory procedures.

E1 System Description

Pulverized coal-fired (PC) boilers are commonly used in larger industrial facilities and utility power-generating units. PC boilers have an extensive and successful history in the power industry. Almost any coal can be burned successfully in pulverized form or in some type of stoker. However, with the development of pulverized-coal systems, capacity limitations imposed by stokers have been overcome. Pulverized coal firing systems offer the following advantages over stoker firing:

- ability to use fine coal and coarse coal—up to 2 in. in size
- improved response to load changes
- increase in thermal efficiency due to lower excess air for combustion and lower carbon loss
- ability to burn coal in combination with oil and gas.

Figure 5-1 shows a medium-speed pulverizer.

In PC firing, coal is pulverized so it is the consistency of talcum powder and is then introduced into the combustion chamber (furnace) where it is burned in suspension.

In the basic pulverized coal system (refer to Figure 5-3), the coal bunker (1) stores the coal before it flows onto the coal conveyor (2). The coal drops into the coal scale (3) and is weighed before being dumped into the coal chute (4) that leads to the coal feeder (5).

The coal feeder controls the flow of coal entering the pulverizer (6), which is motor driven. The pulverizer grinds the coal to a fine powder. Hot air (8) enters the pulverizer and mixes the coal powder before passing to the exhauster. More commonly a blower would be located on the inlet side of the pulverizer to pick up the pulverized coal and deliver it to the burners. The mixture of coal and air is then discharged to the burner (10).

E1.1 Pulverized-Coal Systems

The function of a pulverized-coal system is to:

- pulverize the coal
- deliver the coal to the fuel-burning equipment
- accomplish complete combustion in the furnace with minimum excess air.

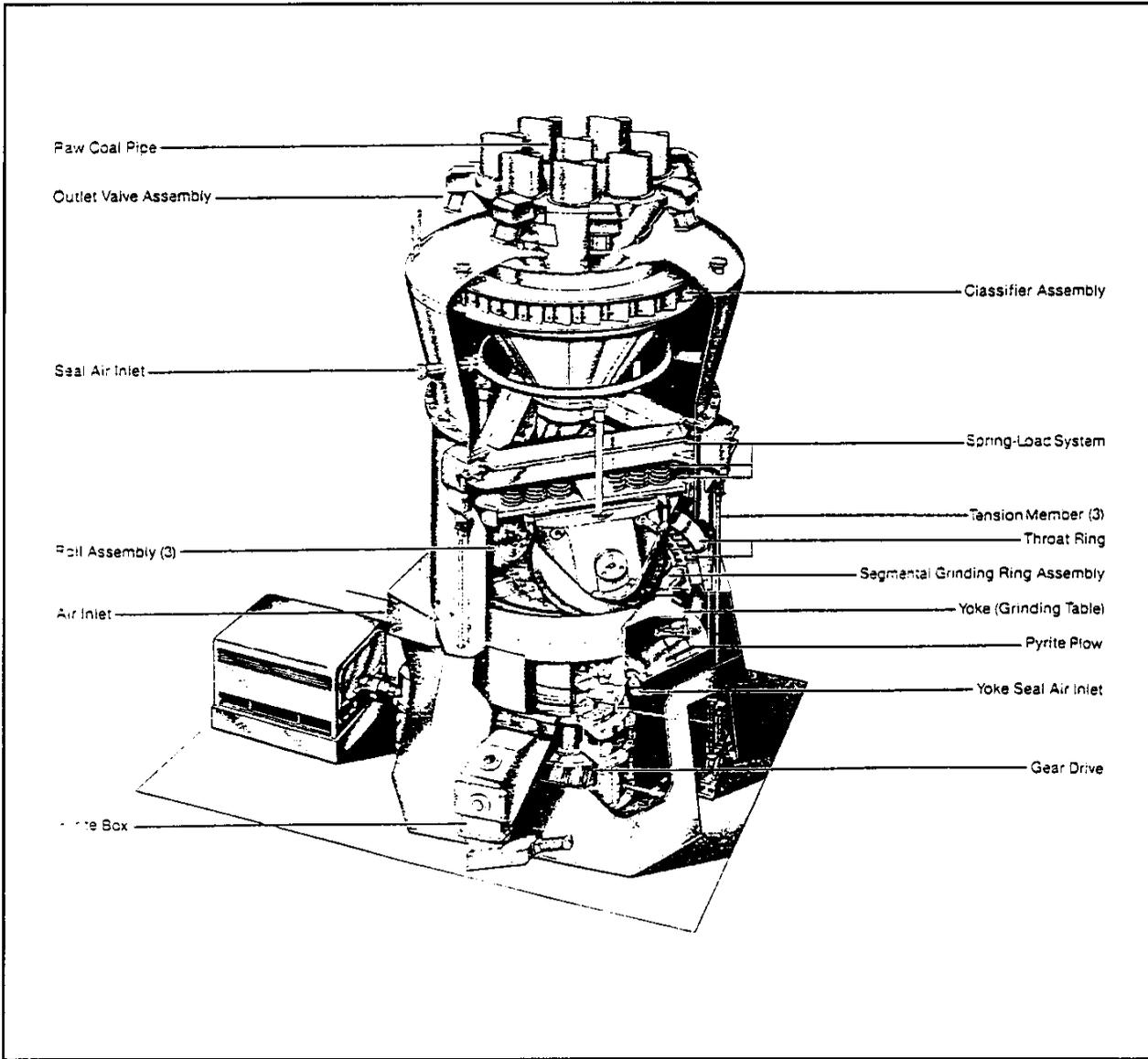


Figure 5-1. Medium speed pulverizer mill.

The system must operate as a continuous process and, within specified design limitations, the coal supply or feed can be varied as rapidly and as widely as required by the combustion process.

A small portion of air—known as primary air—required for combustion (15 to 20 percent in current installations) is used to transport the coal to the burner and to dry the coal in the pulverizer. The remainder of the combustion air (80 to 85 percent)—known as secondary air—is introduced at the burner to adjust for proper fuel-to-air ratio.

Some basic equipment components of a pulverized coal system are:

- the pulverizer, which pulverizes the coal to the fineness required (usually 70 percent passing 200 mesh)
- the burners, which mix the pulverized coal primary-air mixture with secondary air in the right proportions
- fan(s) to supply the pulverizer with air and deliver the coal-air mixture to the burners
- coal feeder(s) to control the coal feed rate to each pulverizer
- coal and air conveying lines.

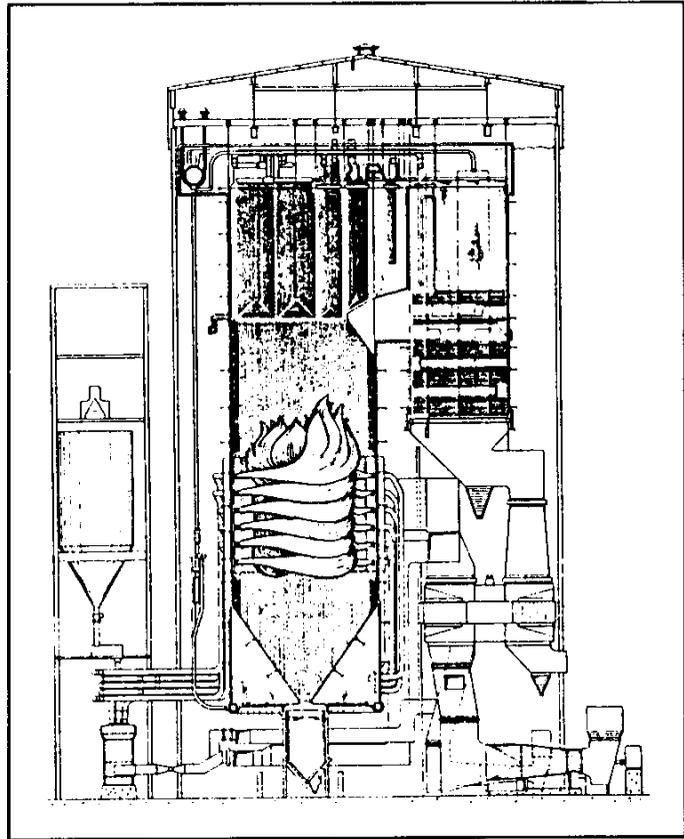


Figure 5-2. Pulverized coal boiler.

Two principal systems—the bin system and the direct firing system—have been used for processing (pulverizing), distributing, and burning pulverized coal. The direct-firing system is the one being installed almost exclusively today.

E1.2 Direct-Firing System

The pulverizing equipment developed for the direct-firing system permits continuous use of raw coal directly from bunker(s) with a storage capacity compatible with plant operation. Coal at a maximum 2-in. top size is fed directly into the pulverizer(s) where it is dried, pulverized, and delivered to the burners in a single continuous operation.

Components of the direct-firing system are:

- raw-coal feeder
- source (steam or gas air heater) to supply hot primary air to the pulverizer for drying the coal
- pulverizer fan, also known as the primary-air fan
- pulverizer
- coal-and-air conveying lines
- burners.

E2 Block Flow Diagram

The pulverized coal-fired boiler system has been divided into 13 specific sub-systems or components—whose performance can be significantly impacted by coal quality—sequentially arranged to show:

- coal flow through the coal handling equipment
- flue gas flow through the boiler/components, flyash recycle, the induced draft fan, and chimney/stack
- ash discharge to the ash hopper/pit.

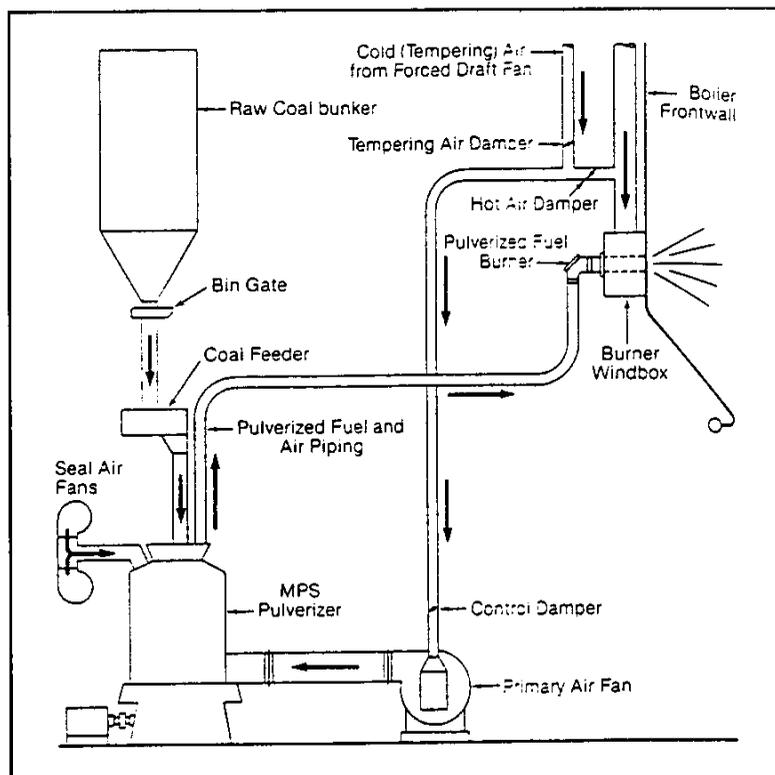


Figure 5-3. Pulverized coal system.

These specific components are identified in Figure 5-4. The first four components have been grouped collectively under a category entitled coal handling equipment. The coal handling equipment includes all components that process the coal from its delivery on site to the boiler. It includes equipment that, depending on plant design, may include:

- coal reclaim systems such as belt feeders, vibrating feeders, screw feeders, and reciprocating feeders
- coal feed conveyors such as belt conveyors, screw conveyors, bucket conveyors, redler conveyors, and chutes
- components that store the coal such as bunkers and hoppers
- coal feeders that transport raw and pulverized coal.

The next four components have been loosely grouped under the category entitled Boiler/Components. Again, it includes equipment that depending on plant design may include:

- forced draft fan
- heat transfer surfaces—boiler tubes, water walls and baffles.

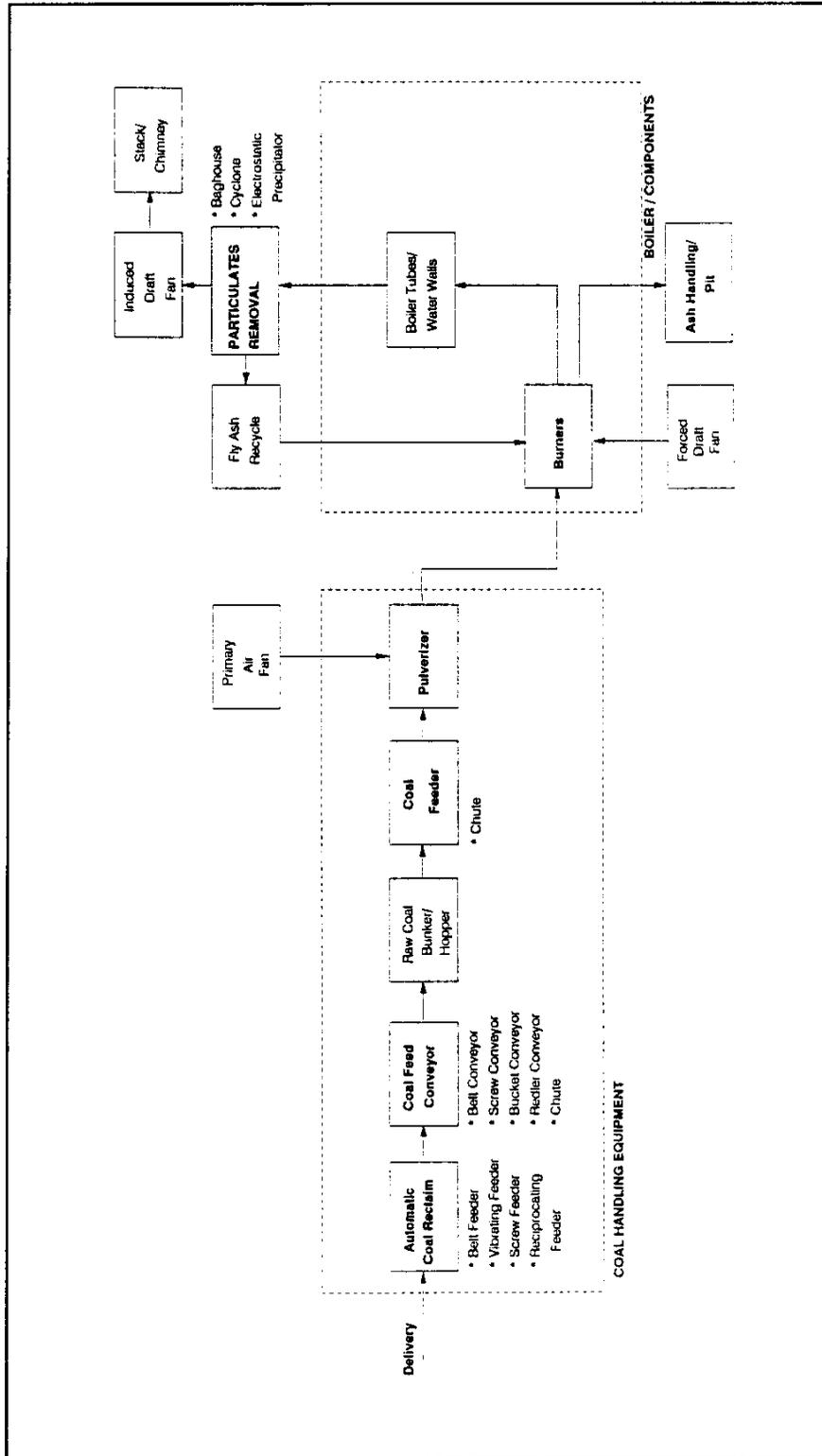


Figure 5-4. Pulverizer coal-fired boiler system components block flow diagram.

The next two blocks represent the flyash recycle and particulate removal subsystem. Three particulate removal options separately or in combination will be considered: cyclones, electrostatic precipitators, and baghouses.

The next subsystem identified in the block flow diagram is the fan subsystem. Pulverized coal-fired boiler systems use a number of fans to move air and flue gas. The major fan types addressed in the guide include:

- primary air (PA) fans, which supply air to the pulverizers
- forced draft (FD) fans, which supply air to the windbox (burner)
- induced draft (ID) fans, which withdraw flue gas from the furnace and balance furnace pressure.

All the fans can be impacted by changes in coal quality.

The final subsystems addressed in the guide include those components supplied to handle ash. Specific components include the chimney/stack and the ash hopper/ pit.

E3 Troubleshooting Logic

The component/symptom guide table (Figure 5-5) serves to identify:

- Typical symptoms (problems) that may be encountered in pulverized coal-fired boiler systems. These symptoms are arranged horizontally along the top of the table.
- The various components shown in the block flow diagram affected by these symptoms. These components are listed down the left hand side of the table in the same logical fashion as they are arranged in the block flow diagram.
- The location of the logic diagrams.

The remainder of this Appendix consists of 78 logic diagrams, arranged by component and all the symptoms that can affect that component.

(Part 1): PULVERIZED COAL - COMPONENT/SYMPTO

COMPONENT	EXCESS WEAR	PLUGGAGE SYMPTOM	INSUFFICIENT CAPACITY	ERRATIC FEEDING	CORROSION	UNEVEN ASH BED	INSUFFICIENT PULVERIZING	UNEVEN BURNING	EXCESSIVE PULVERIZING	CLINKERS	CARBON BURNOUT	REDUCED EFFICIENCY	SMOKING	EROSION	SLAGGING/SPALLING	FOULING	EXCESS PARTICULATE EMISSIONS	SO2 EMISSIONS	INSUFFICIENT DRYING
COAL HANDLING EQUIPMENT																			
Automatic Coal Reclaim																			
1) Belt Feeder	5-6	5-7	5-8	5-9															
2) Vibrating Feeder	5-10	5-11	5-12	5-13															
3) Screw Feeder	5-14	5-15	5-16	5-17															
4) Reciprocating Feeder	5-18	5-19	5-20	5-21															
Coal Feed Conveyor																			
1) Belt Conveyor	5-22	5-23	5-24	5-25															
2) Screw Conveyor	5-26	5-27	5-28	5-29															
3) Bucket Conveyor	5-30	5-31	5-32	5-33															
4) Hectler Conveyor	5-34	5-35	5-36	5-37															
5) Chute	5-38	5-39	5-40																

Figure 5-5. Pulverized coal—component system guide (part 1).

(Part 2): PULVERIZED COAL - COMPONENT/SYMPTO

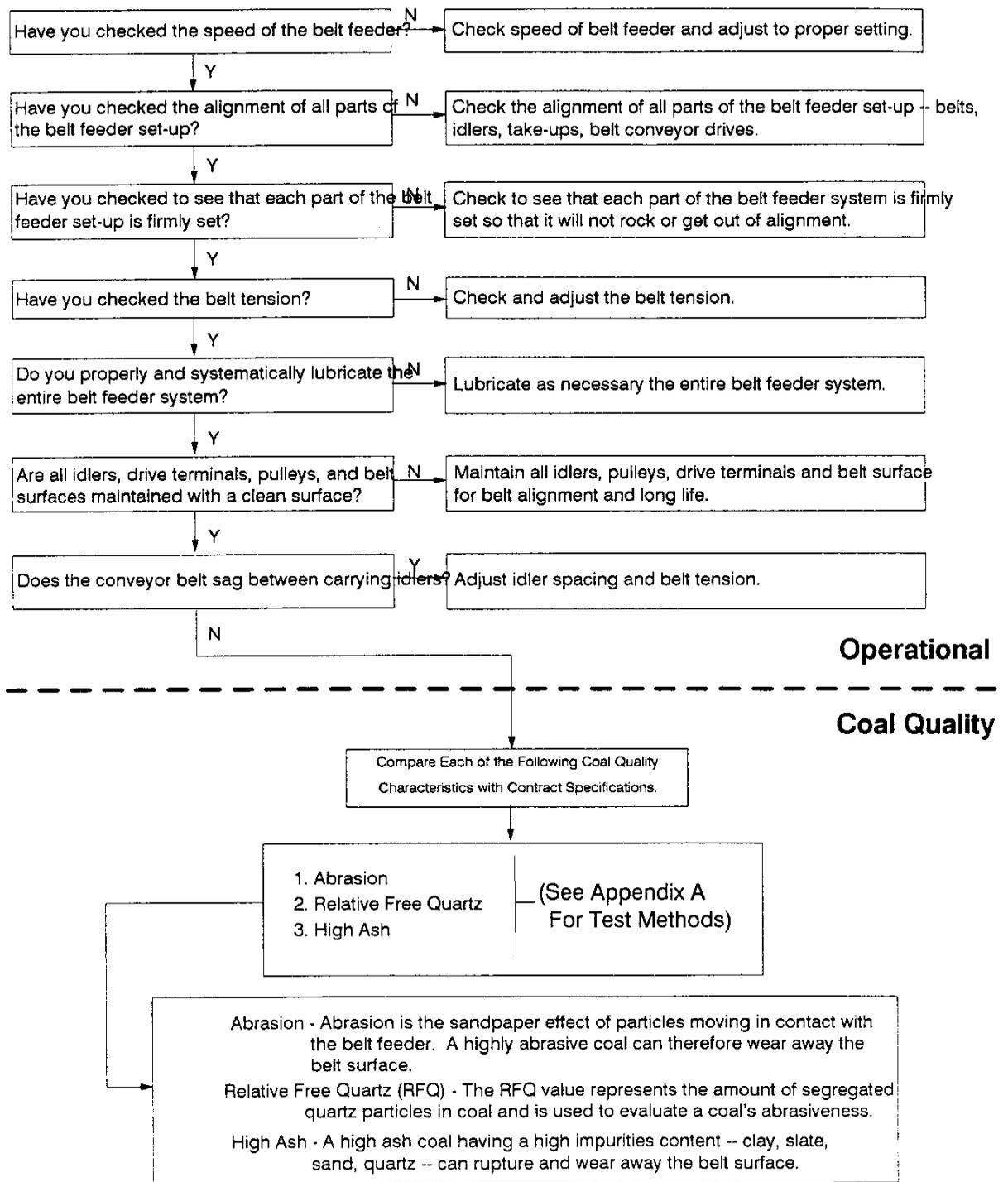
COMPONENT	EXCESS WEAR	PLUGGAGE SYMPTOM	INSUFFICIENT CAPACITY	ERRATIC FEEDING	CORROSION	UNEVEN ASH BED	INSUFFICIENT PULVERIZING	UNEVEN BURNING	EXCESSIVE PULVERIZING	CLINKERS	CARBON BURNOUT	REDUCED EFFICIENCY	SMOKING	EROSION	SLAGGING/SPALLING	FOULING	EXCESS PARTICULATE EMISSIONS	SO2 EMISSIONS	INSUFFICIENT DRYING
COAL HANDLING EQUIP. (CONT'D)																			
Coal Feeders																			
Chute	5-41	5-42	5-43																
Coal Bunker	5-44	5-45	5-46																
Coal Hopper	5-47	5-48	5-49																
Pulverizer						5-50	5-51											5-52	
BOILER / COMPONENTS																			
Boiler		5-53									5-54								
1) Burners	5-55												5-56						
2) Boiler Tubes/Water Walls				5-57									5-58	5-59	5-60				

Figure 5-5. Pulverized coal—component system guide (part 2).

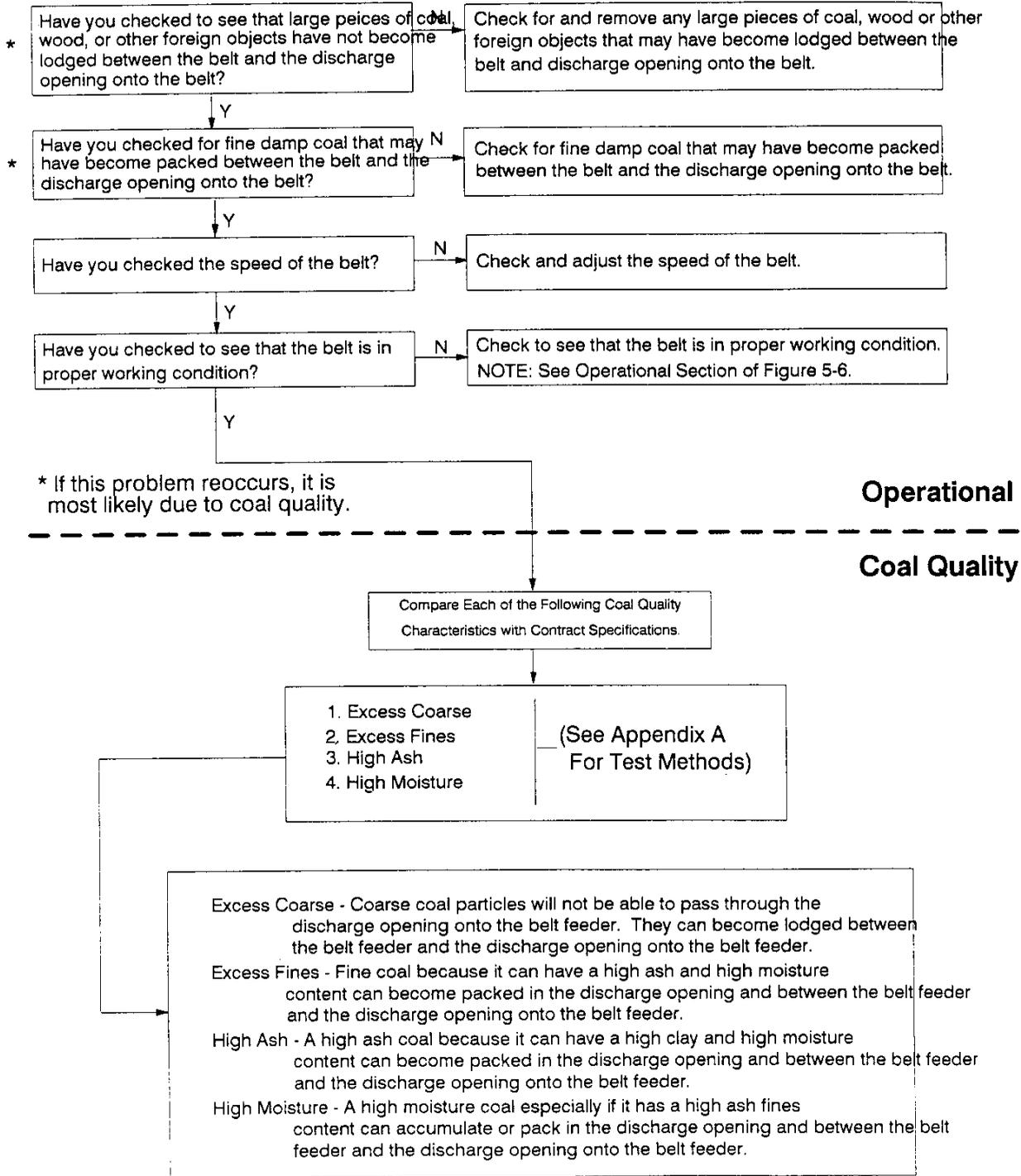
COMPONENT	EXCESS WEAR	PLUGGAGESYPTOM	INSUFFICIENT CAPACITY	ERRATIC FEEDING	CORROSION	UNEVEN ASH BED	INSUFFICIENT PULVERIZING	UNEVEN BURNING	EXCESSIVE PULVERIZING	CLINKERS	CARBON BURNOUT	REDUCED EFFICIENCY	SMOKING	EROSION	SLAGGING/SFALLING	FOULING	EXCESS PARTICULATE	SO2 EMISSIONS	INSUFFICIENT DRYING	
FANS																				
1) Forced Draft		5-61											5-62							
2) Induced Draft		5-63		5-64									5-65	5-66						
3) Primary Air		5-64											5-68							
PARTICULATE REMOVAL																				
1) Baghouse										5-69							5-70			
2) Cyclone										5-71			5-72				5-73			
3) Electrostatic Precipitator										5-74			5-75				5-76			
ASH HANDLING																				
1) Fly Ash Recycle										5-77										
2) Ash Hopper/Pit										5-78										
Stack/Chimney				5-79						5-80		5-81					5-82	5-83		

Figure 5-5. Pulverized coal—component system guide (part 3).

**FIGURE 5-6: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear Of The Automatic Coal Reclaim
(Belt Feeder)**



**FIGURE 5-7: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Automatic Coal Reclaim
(Belt Feeder)**



**FIGURE 5-8: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Automatic Coal Reclaim
(Belt Feeder)**

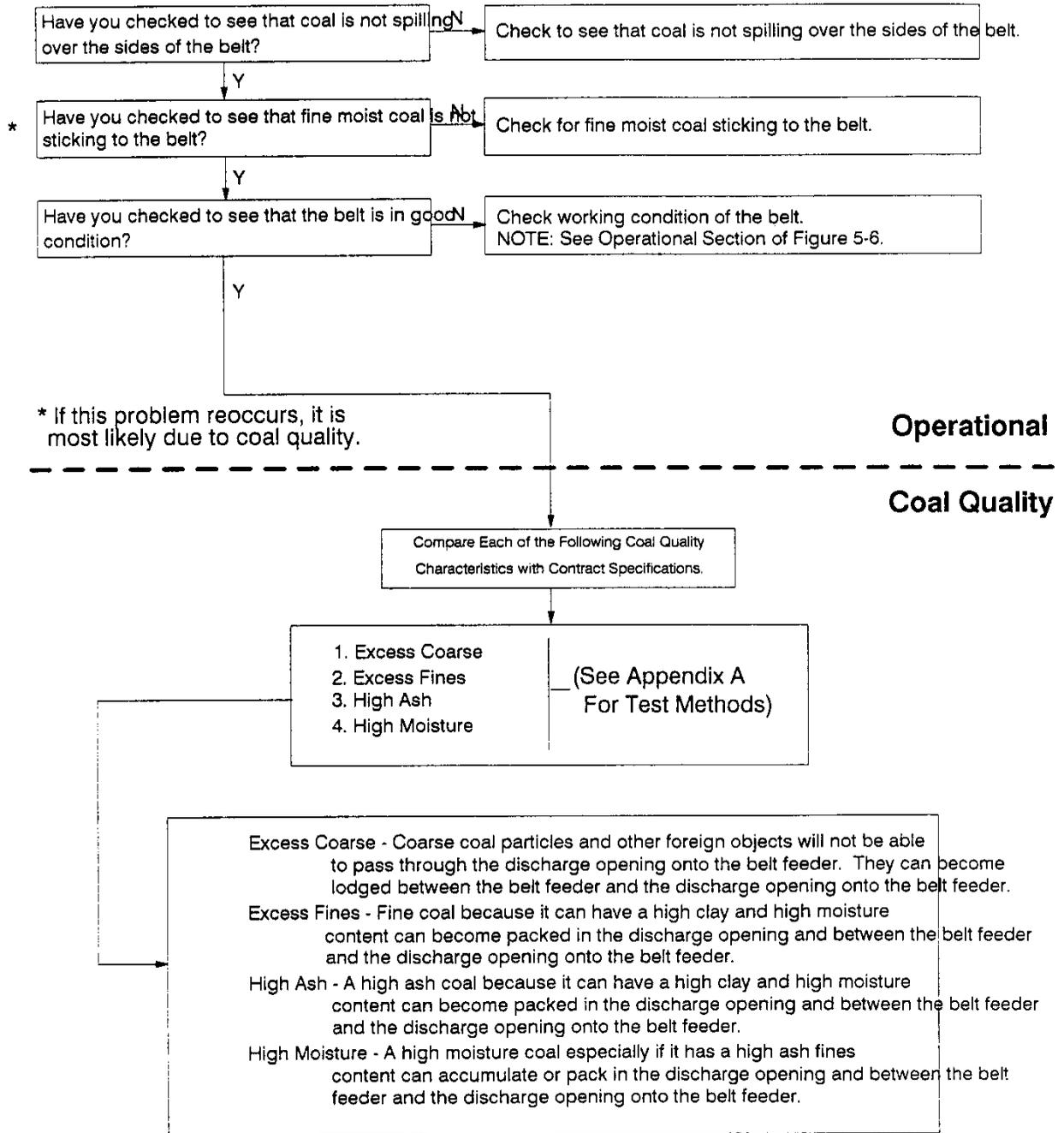
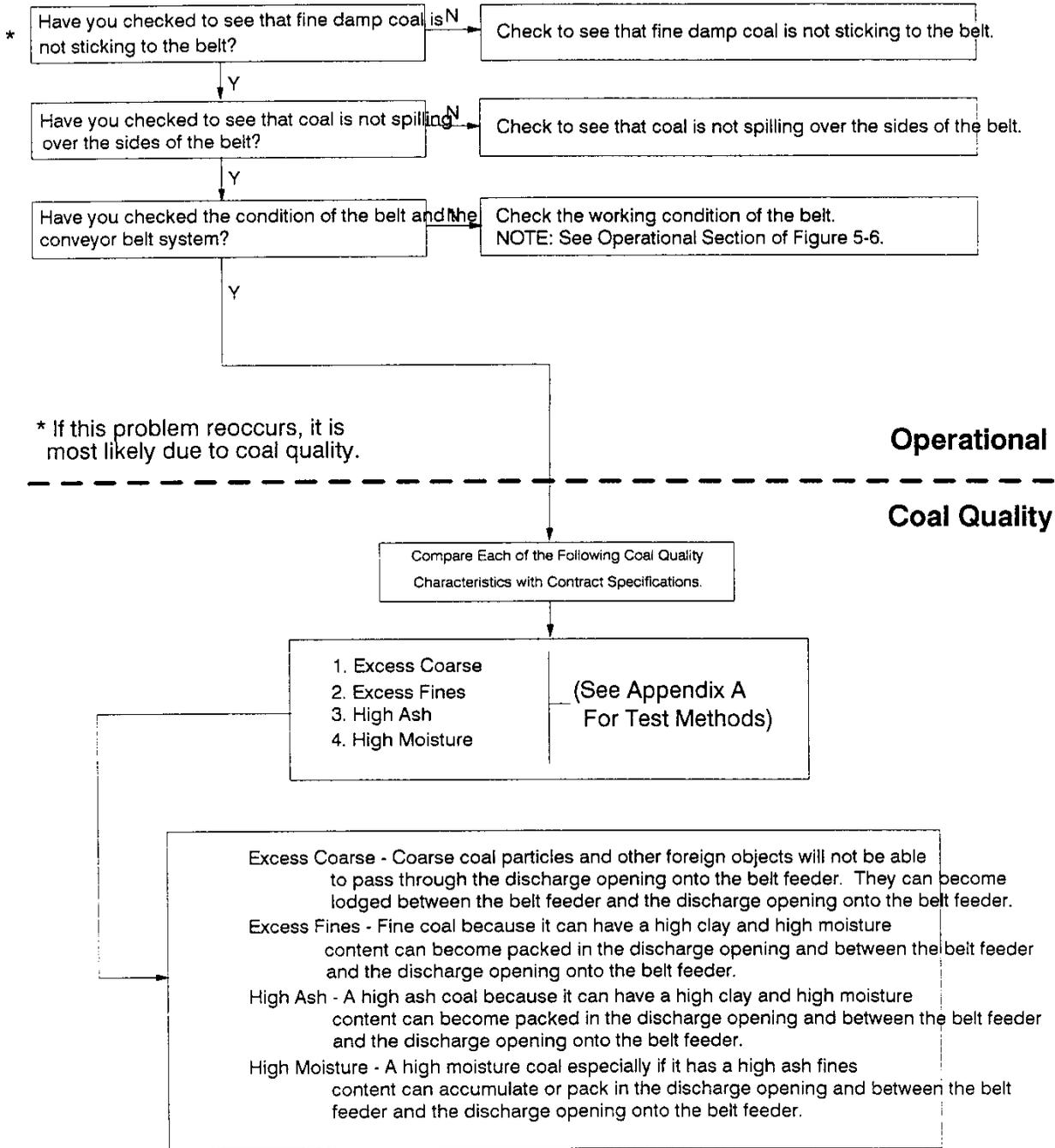
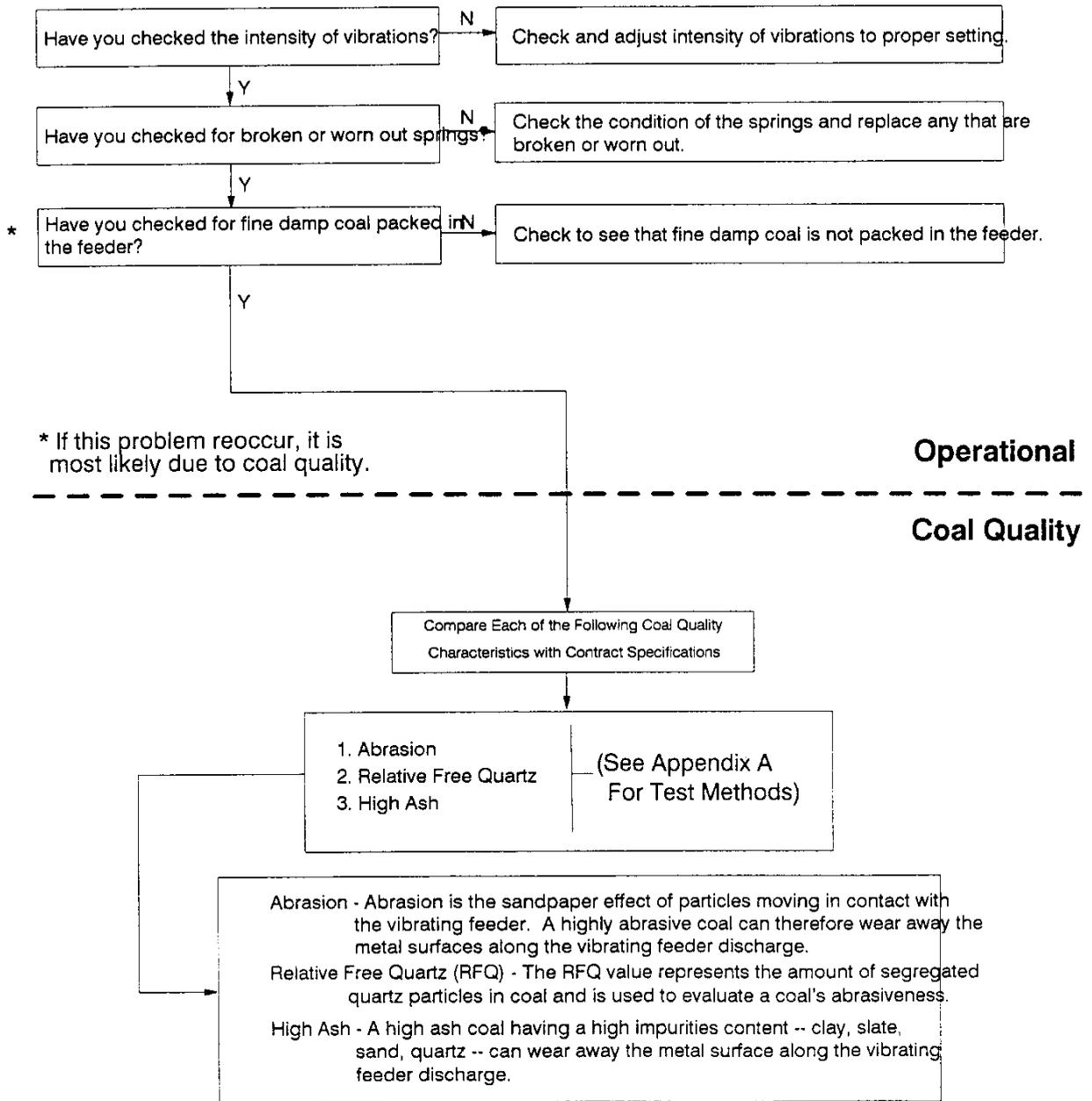


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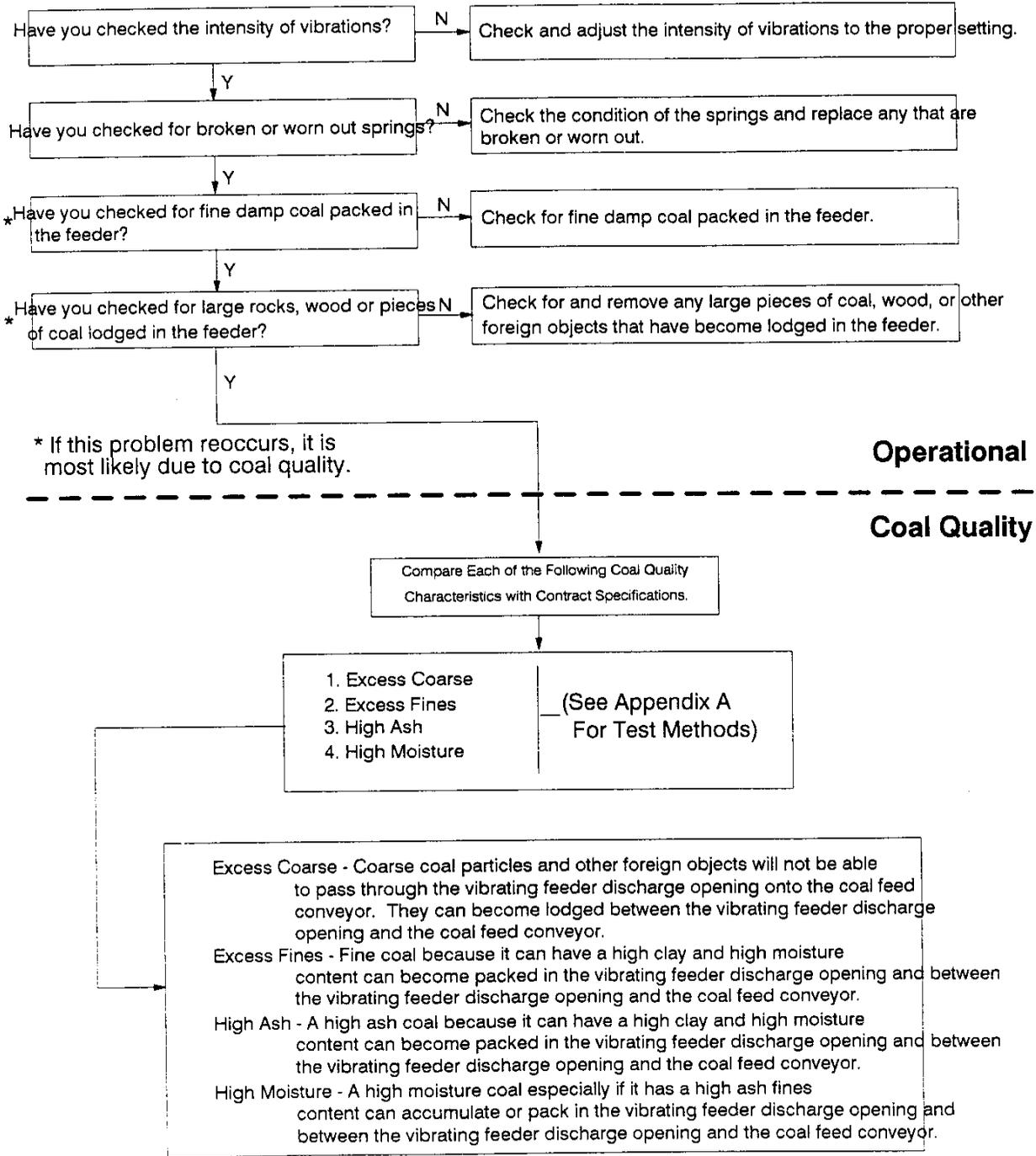
**FIGURE 5-9: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Automatic Coal Reclaim
(Belt Feeder)**



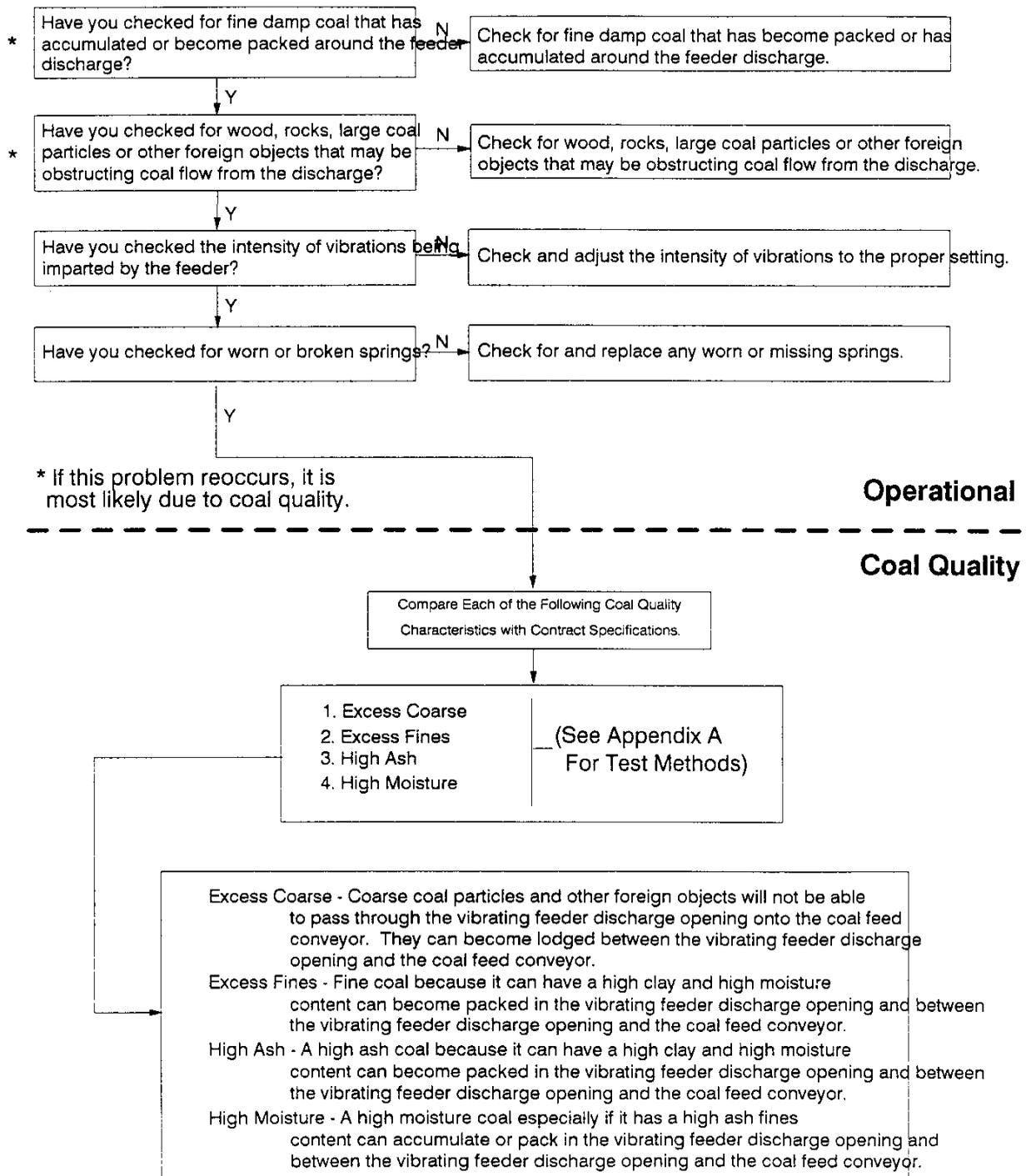
**FIGURE 5-10: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear Of The Automatic Coal Reclaim
(Vibrating Feeder)**



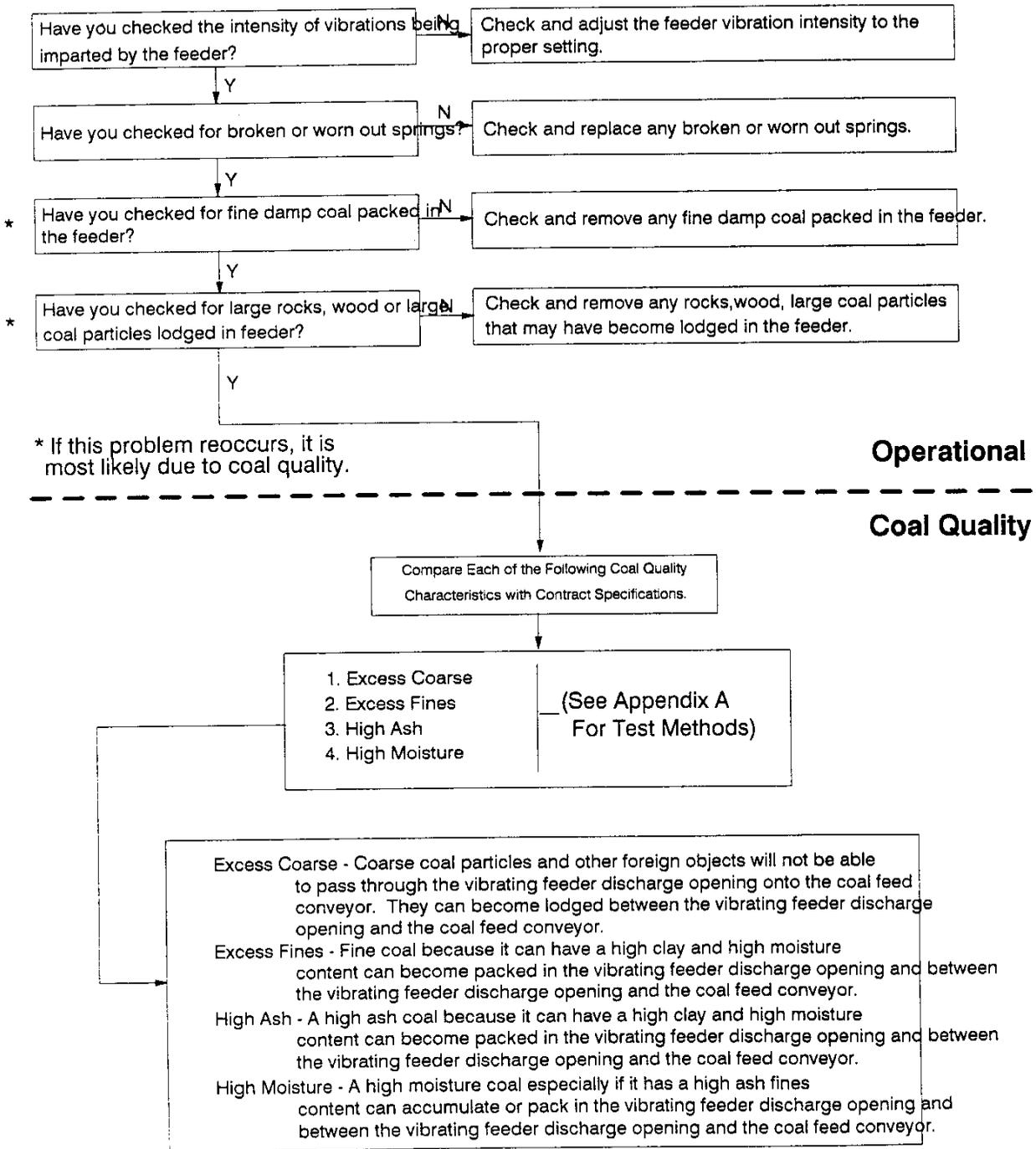
**FIGURE 5-11: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Automatic Coal Reclaim
(Vibrating Feeder)**



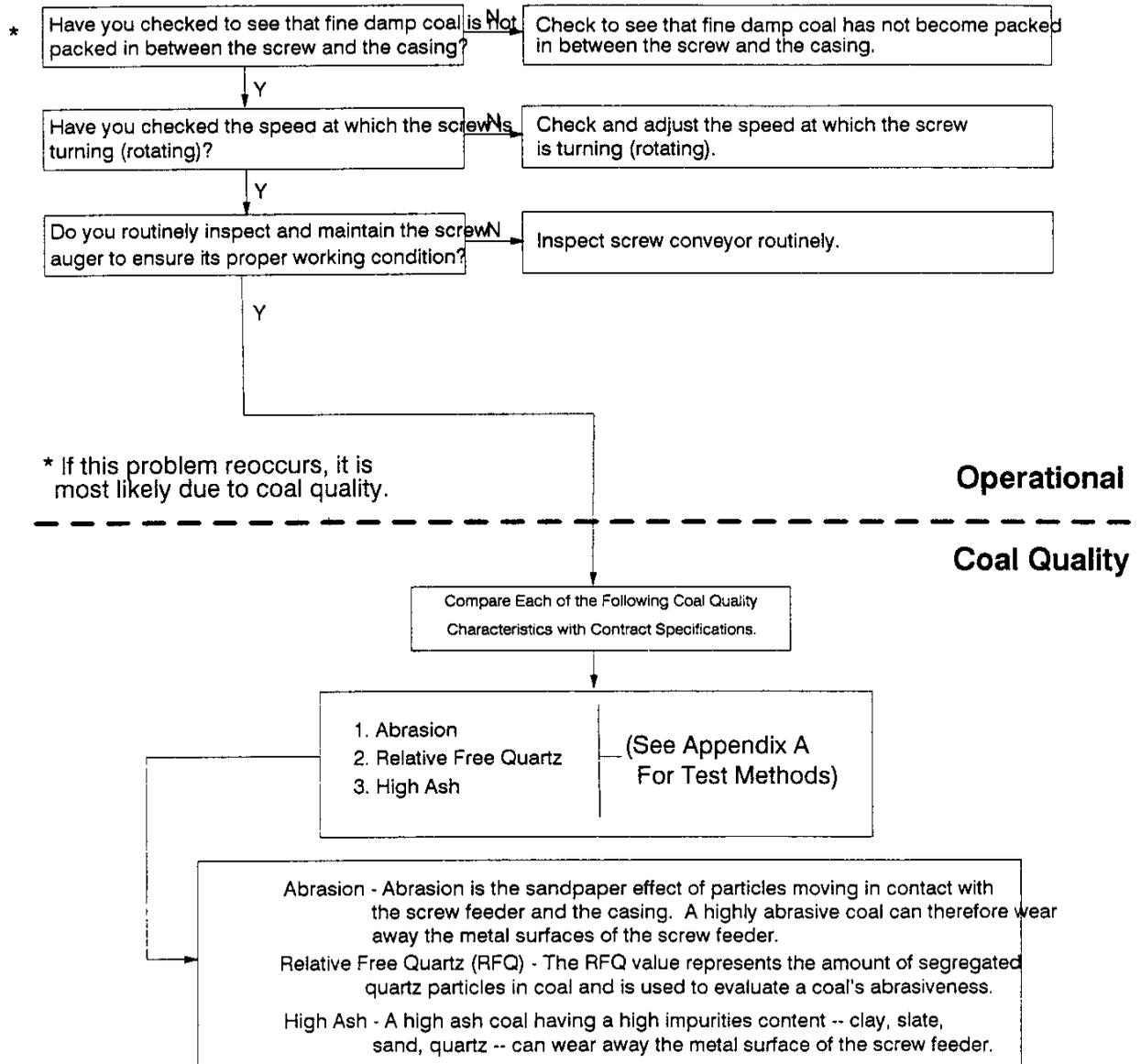
**FIGURE 5-12: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Automatic Coal Reclaim
(Vibrating Feeder)**



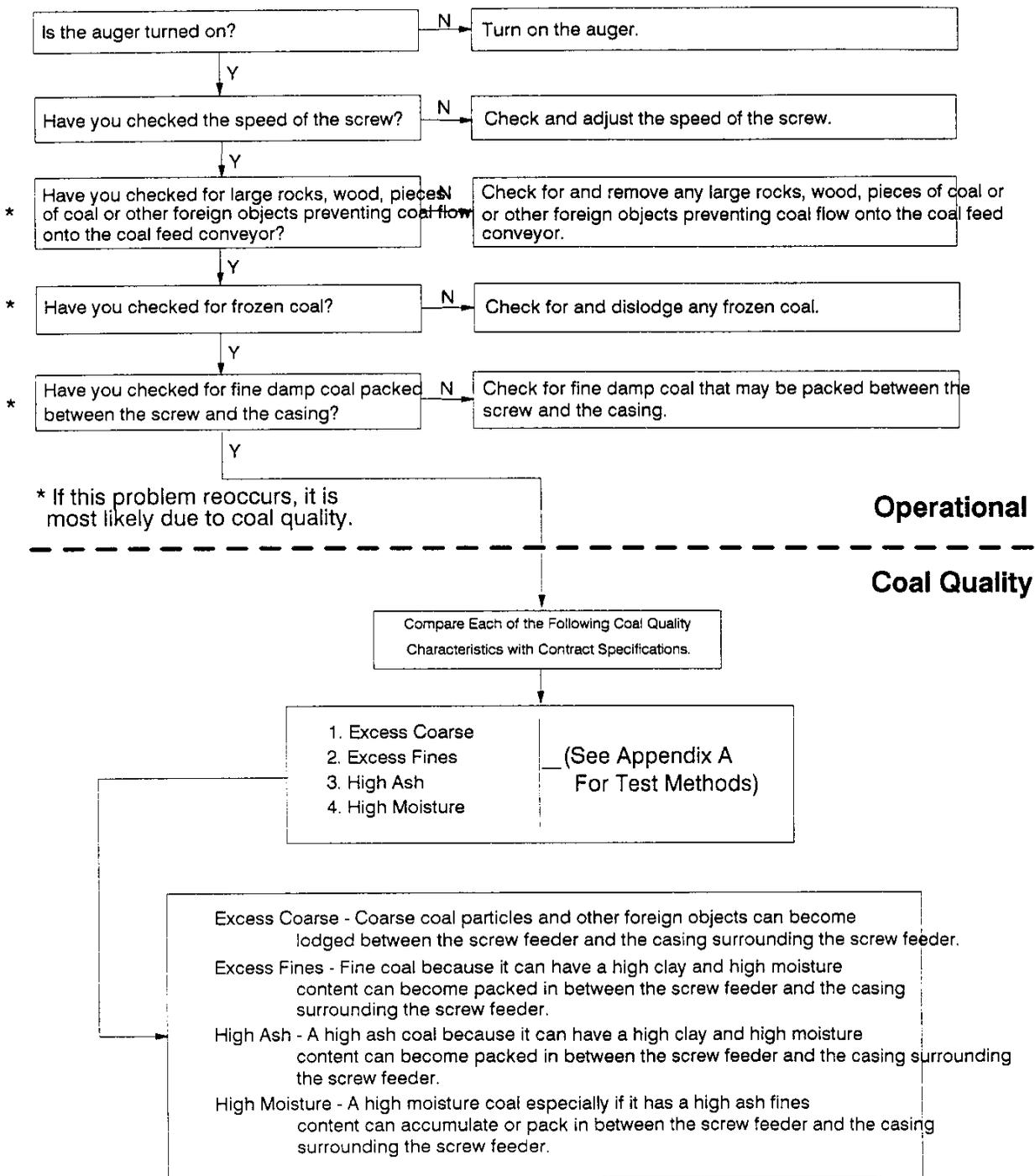
**FIGURE 5-13: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Automatic Coal Reclaim
(Vibrating Feeder)**



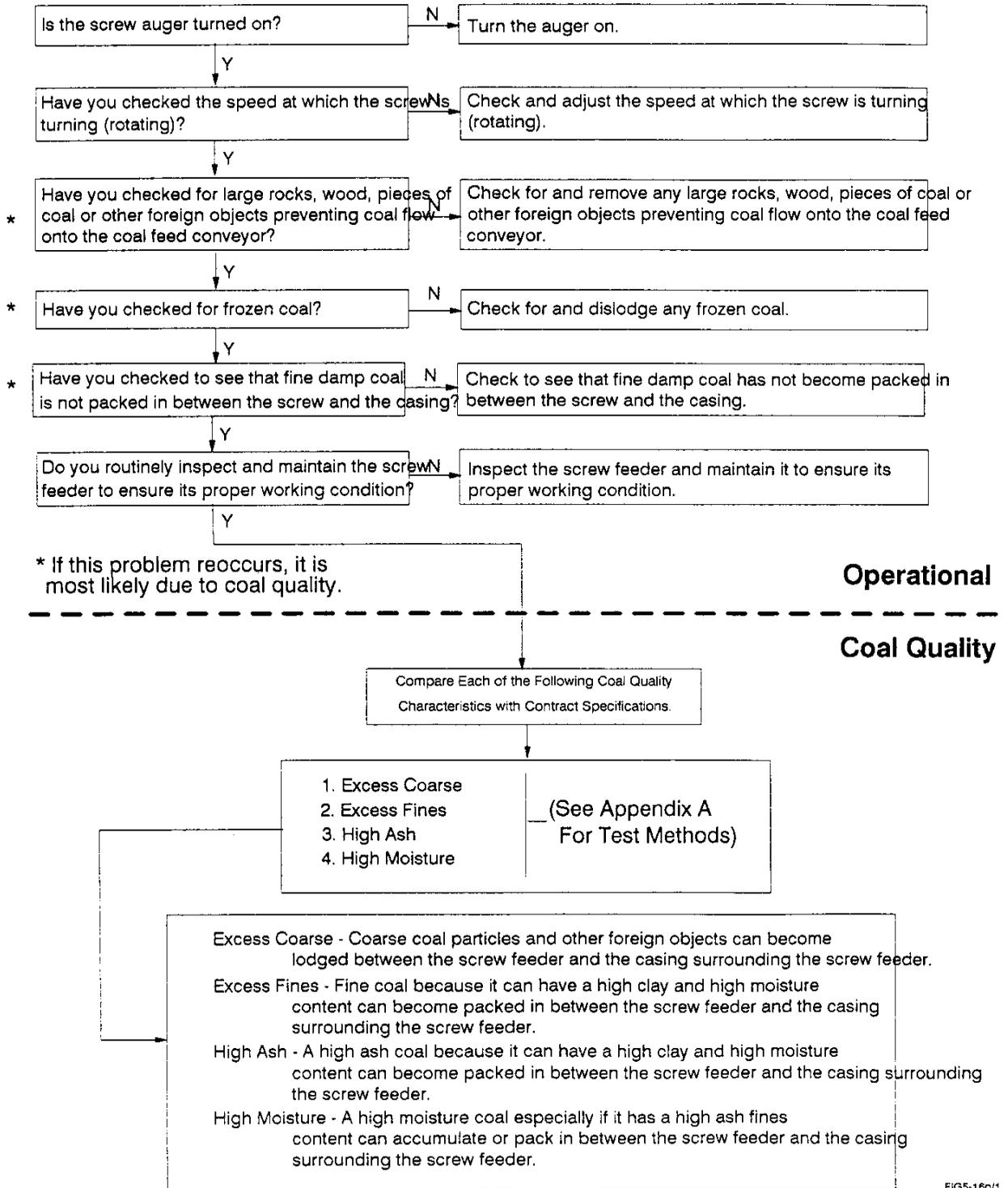
**FIGURE 5-14: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear Of The Automatic Coal Reclaim
(Screw Feeder)**



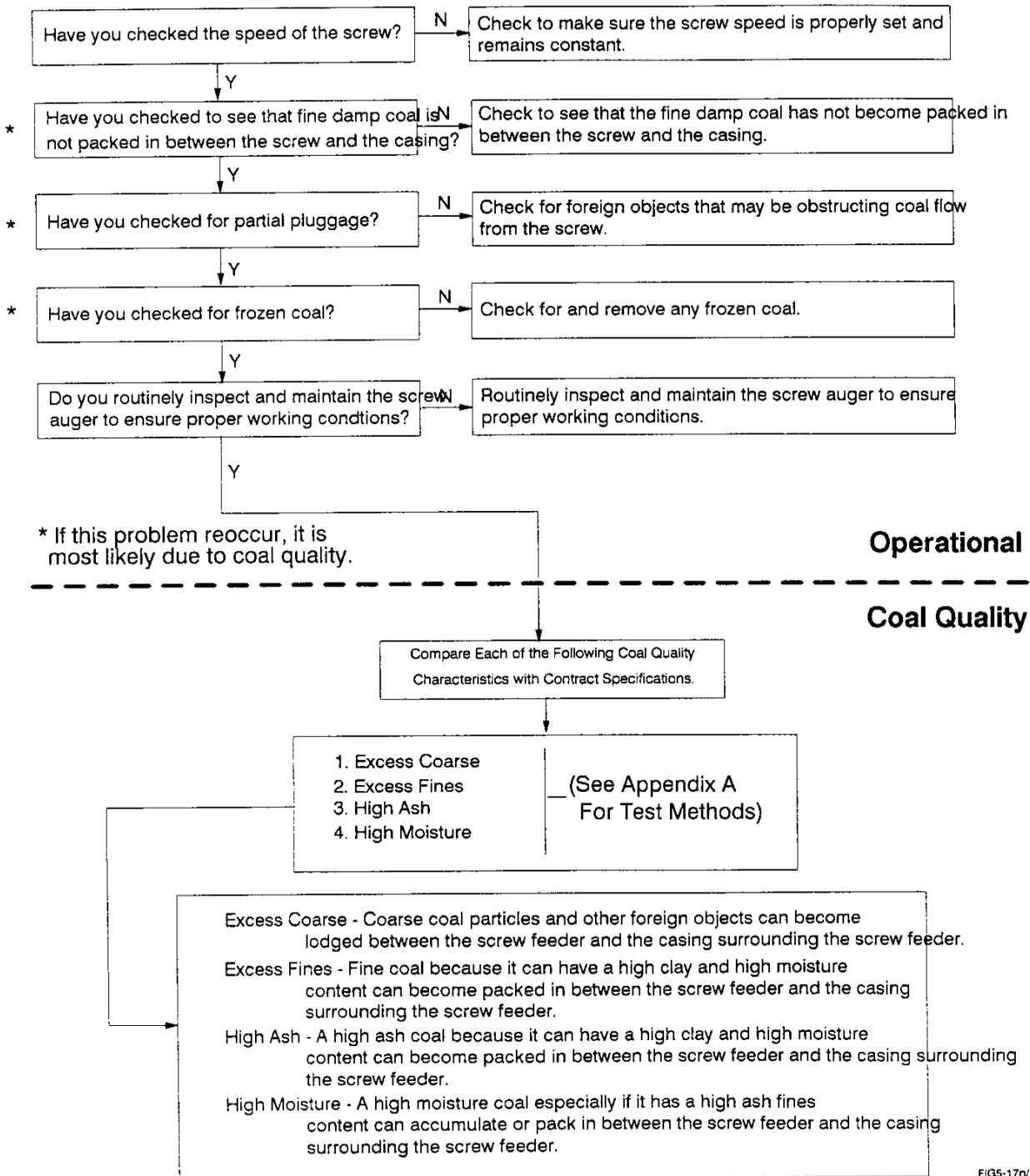
**FIGURE 5-15: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Automatic Coal Reclaim
(Screw Feeder)**



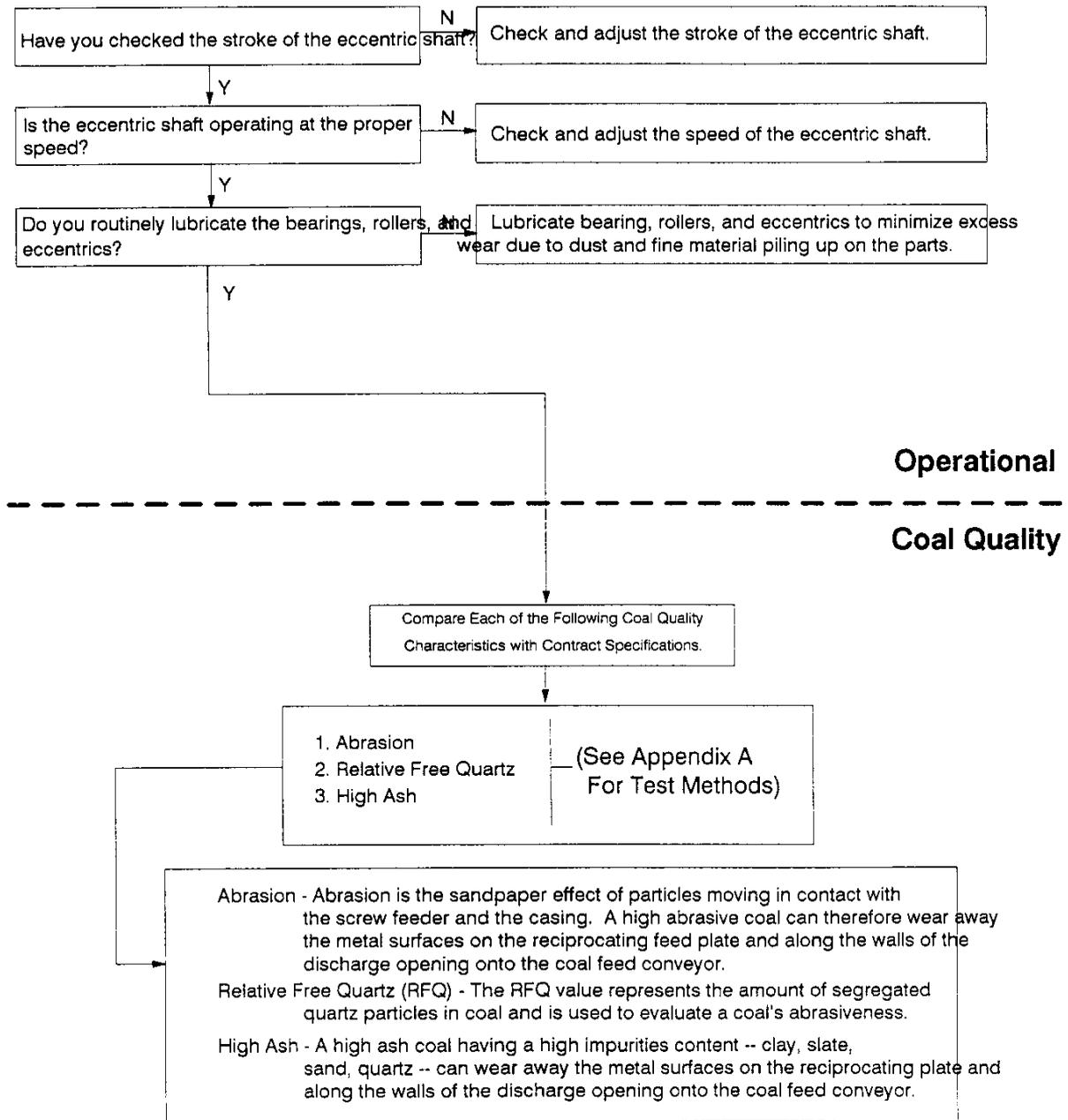
**FIGURE 5-16: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Automatic Coal Reclaim
(Screw Feeder)**



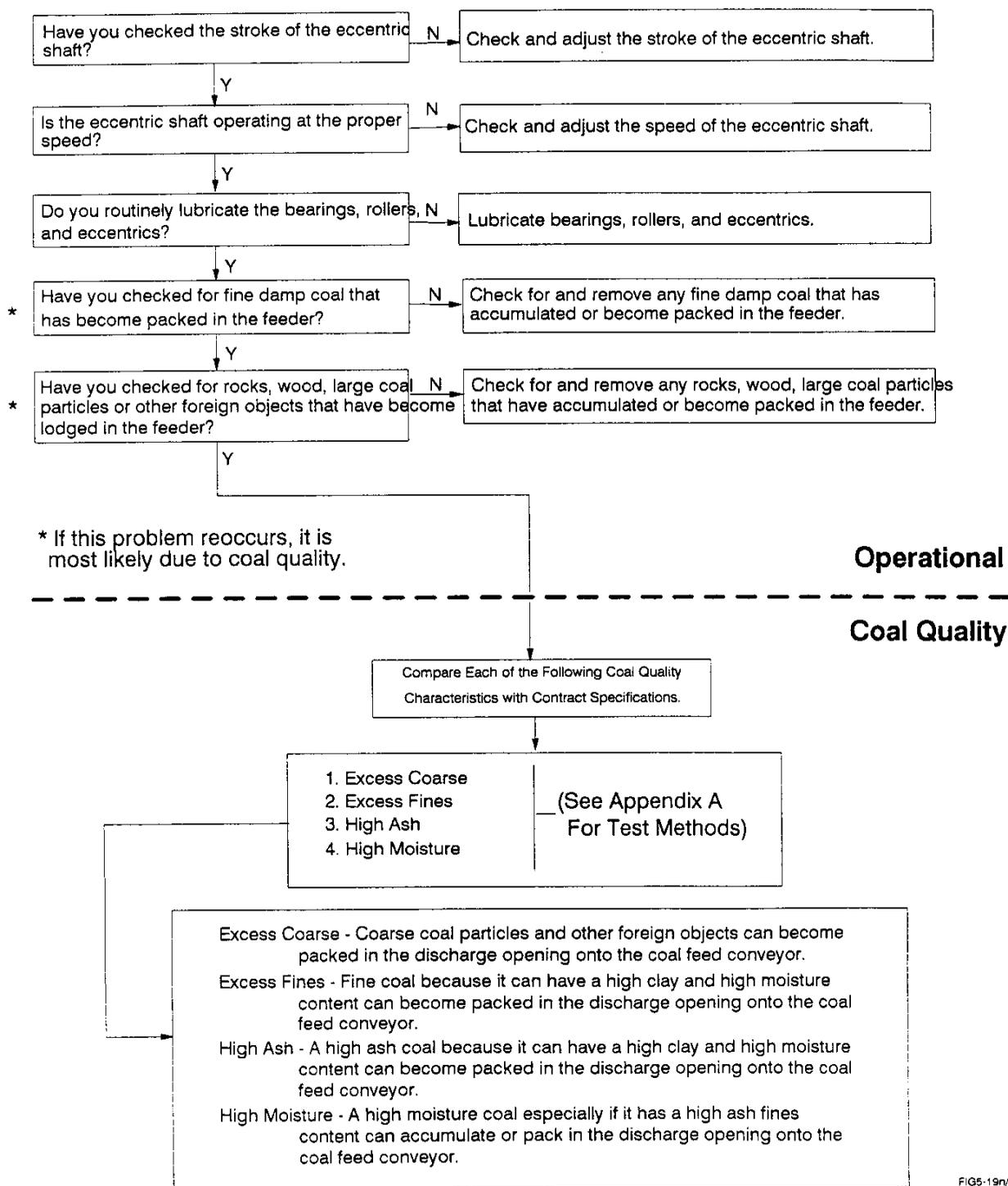
**FIGURE 5-17: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Automatic Coal Reclaim
(Screw Feeder)**



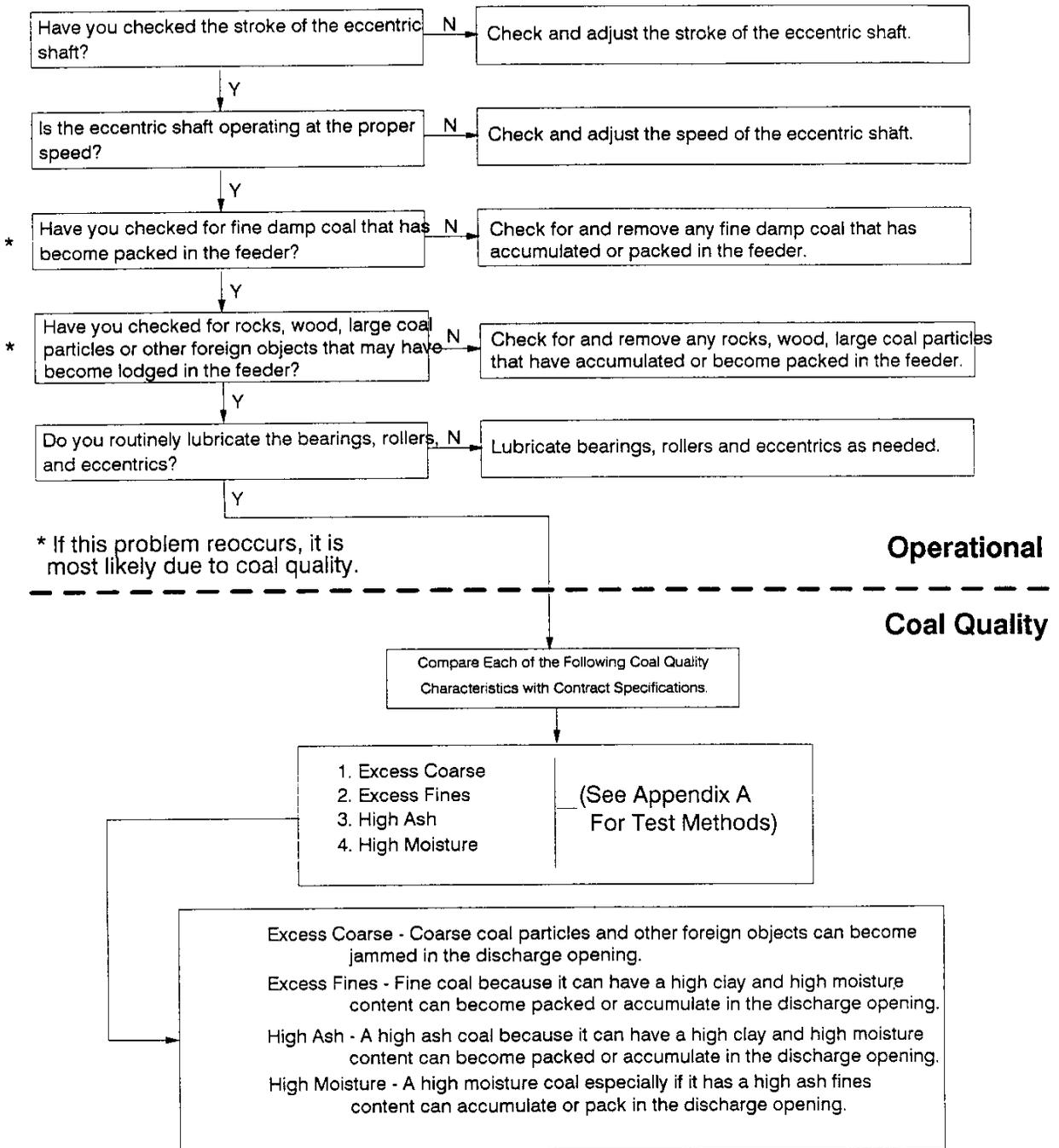
**FIGURE 5-18: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear Of The Automatic Coal Reclaim
(Reciprocating Feeder)**



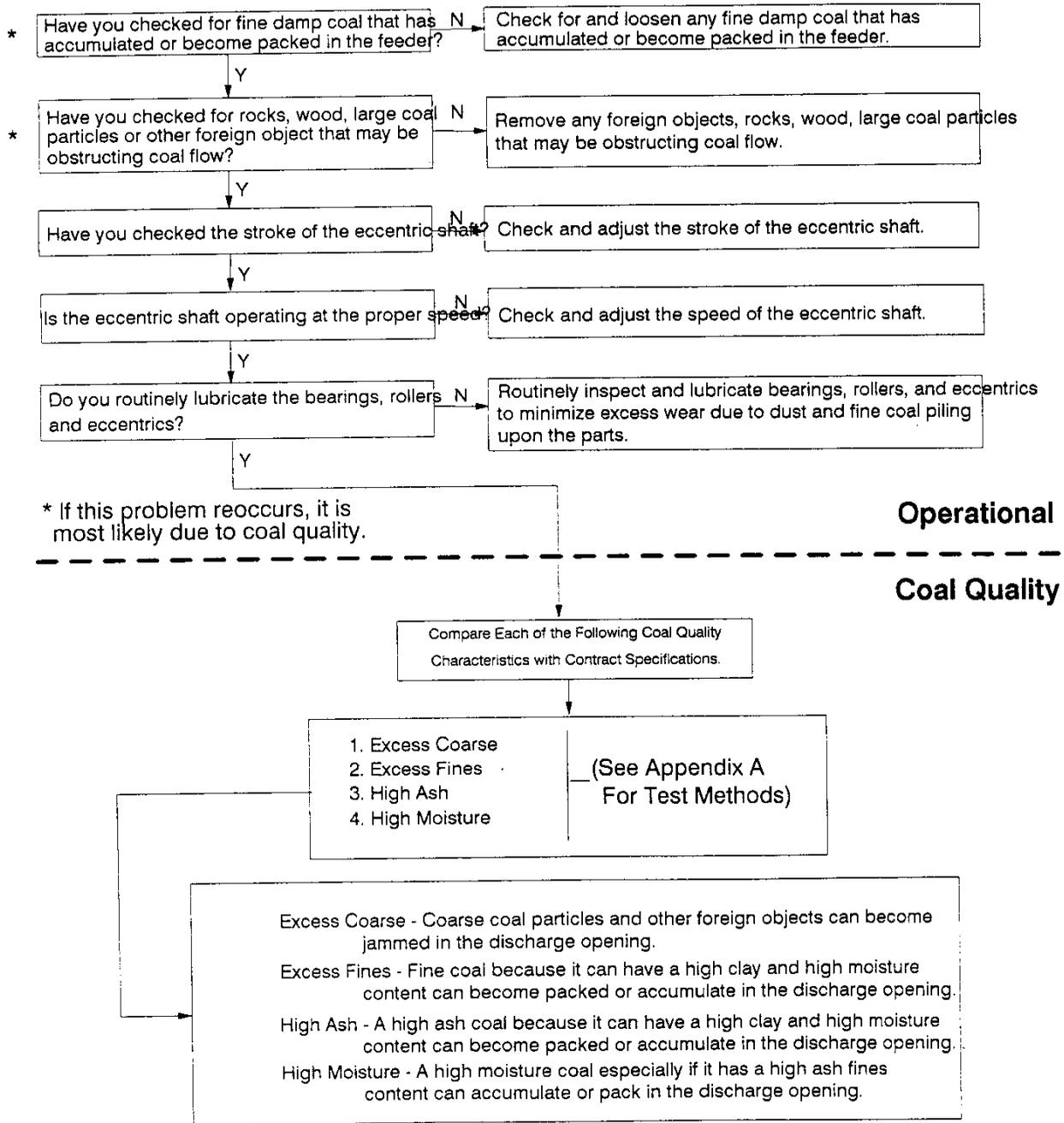
**FIGURE 5-19: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Automatic Coal Reclaim
(Reciprocating Feeder)**



**FIGURE 5-20: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Automatic Coal Reclaim
(Reciprocating Feeder)**



**FIGURE 5-21: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Automatic Coal Reclaim
(Reciprocating Feeder)**



**FIGURE 5-22: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear Of The Coal Feed Conveyor
(Belt Conveyor)**

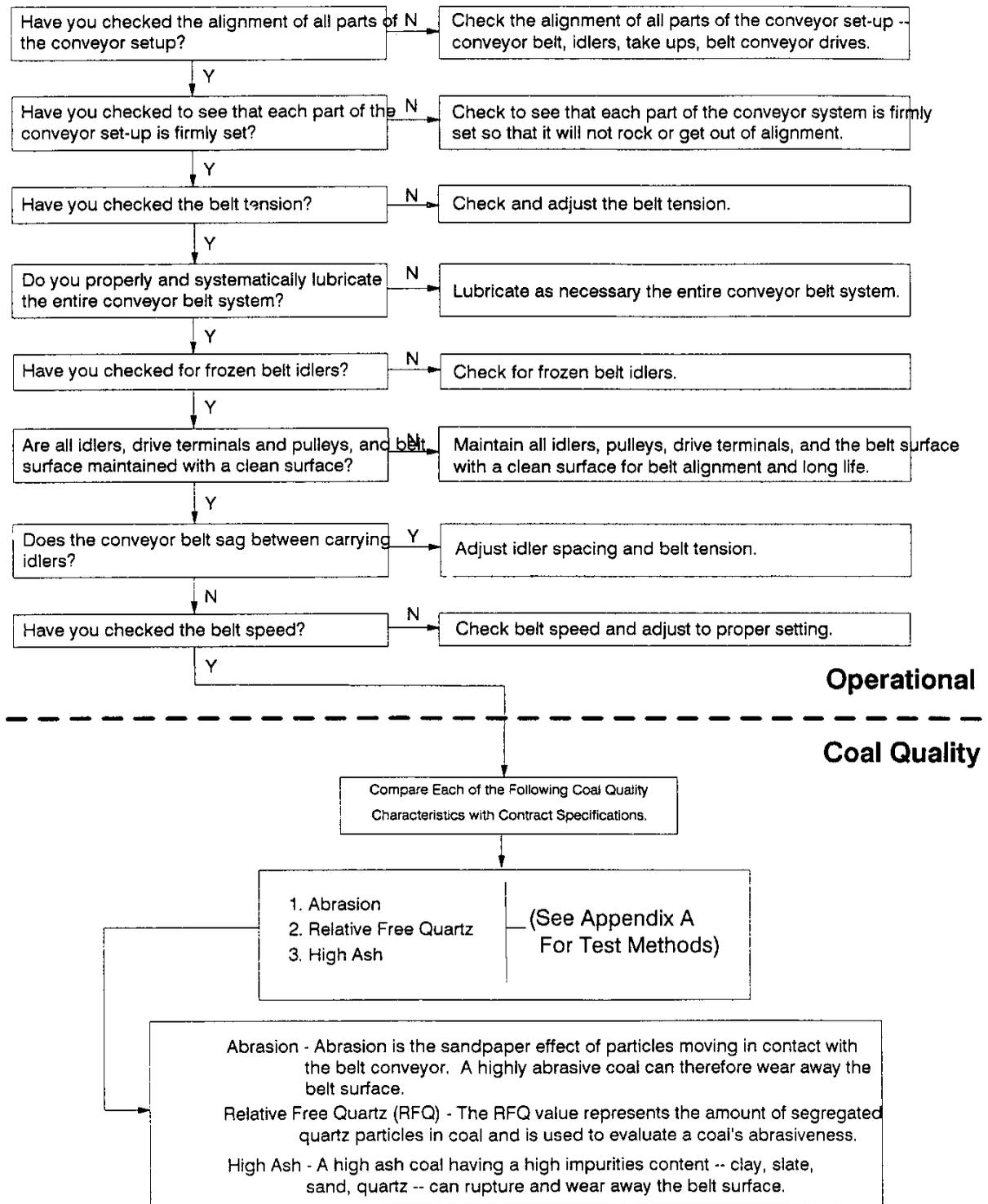
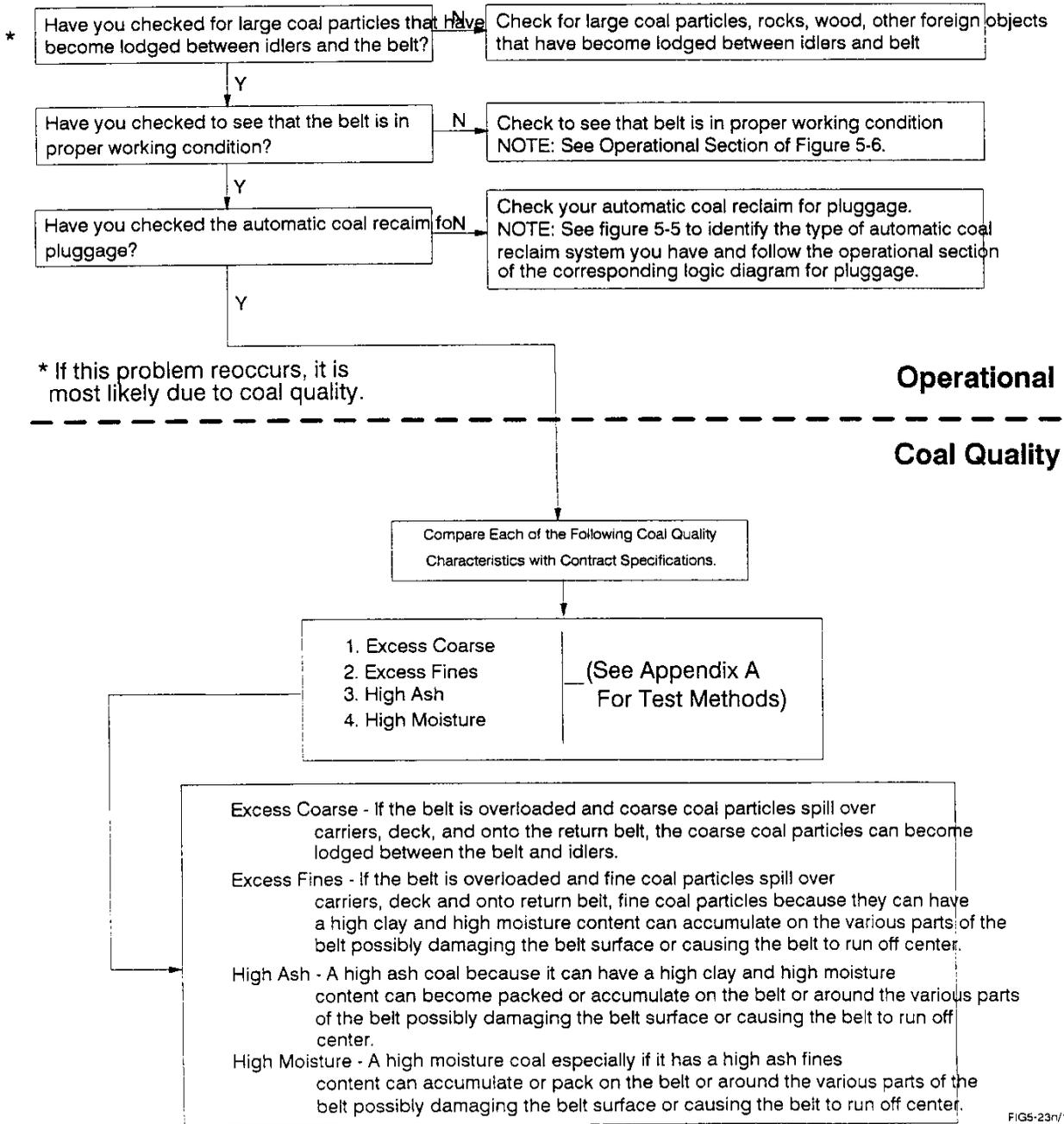
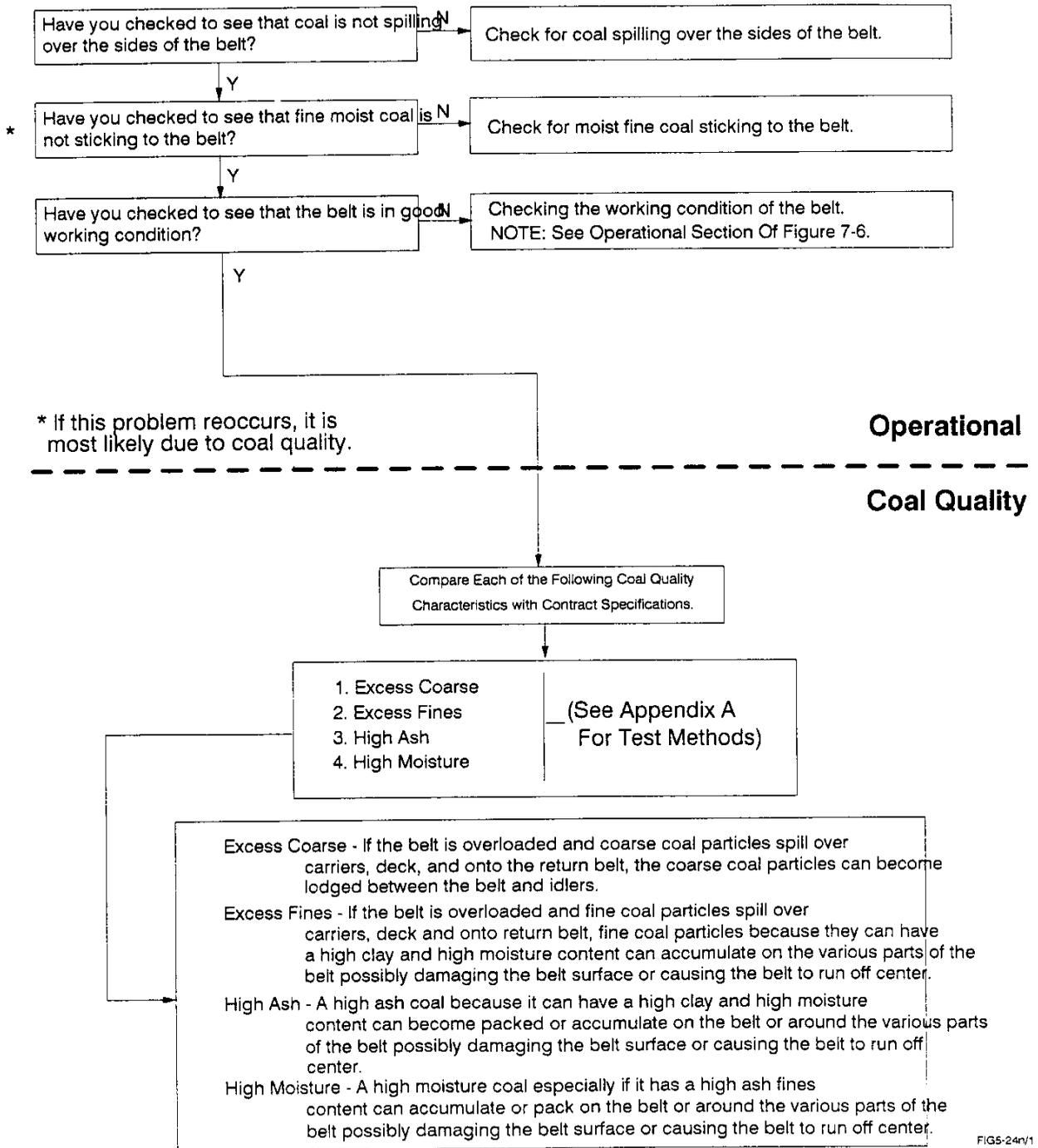


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**FIGURE 5-23: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feed Conveyor
(Belt Conveyor)**



**FIGURE 5-24: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Coal Feed Conveyor
(Belt Conveyor)**



**FIGURE 5-25: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Feed Conveyor
(Belt Conveyor)**

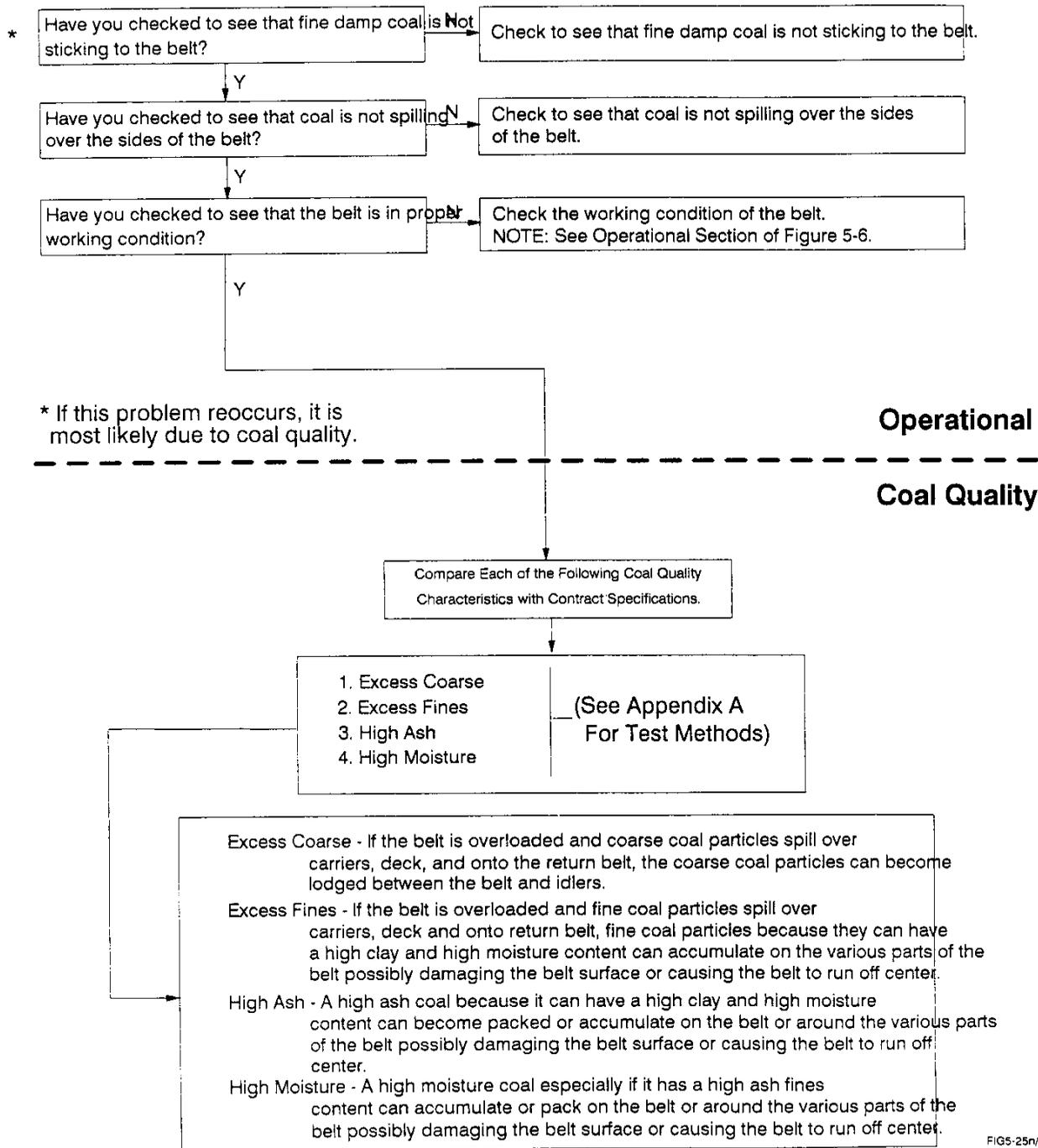
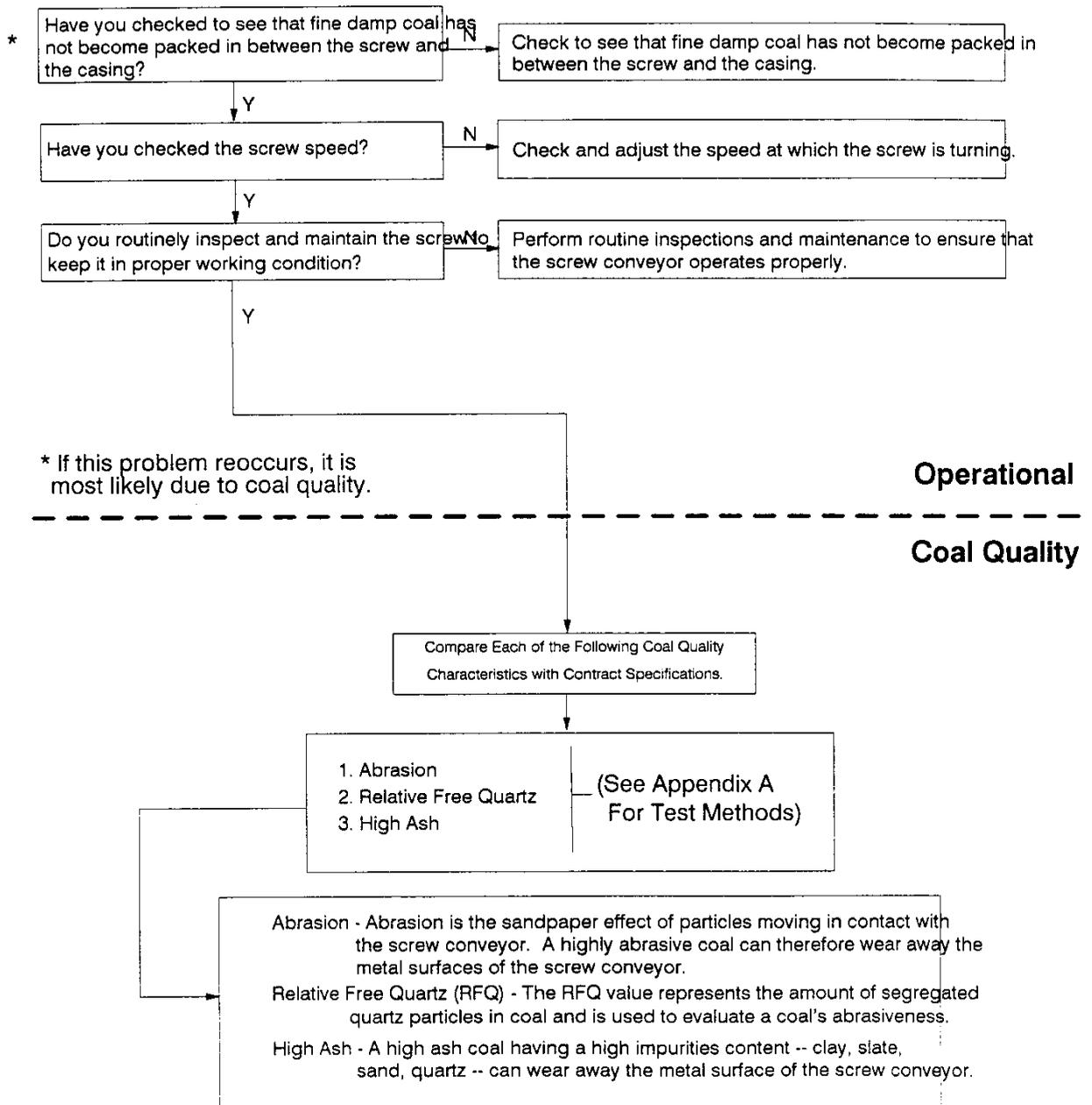
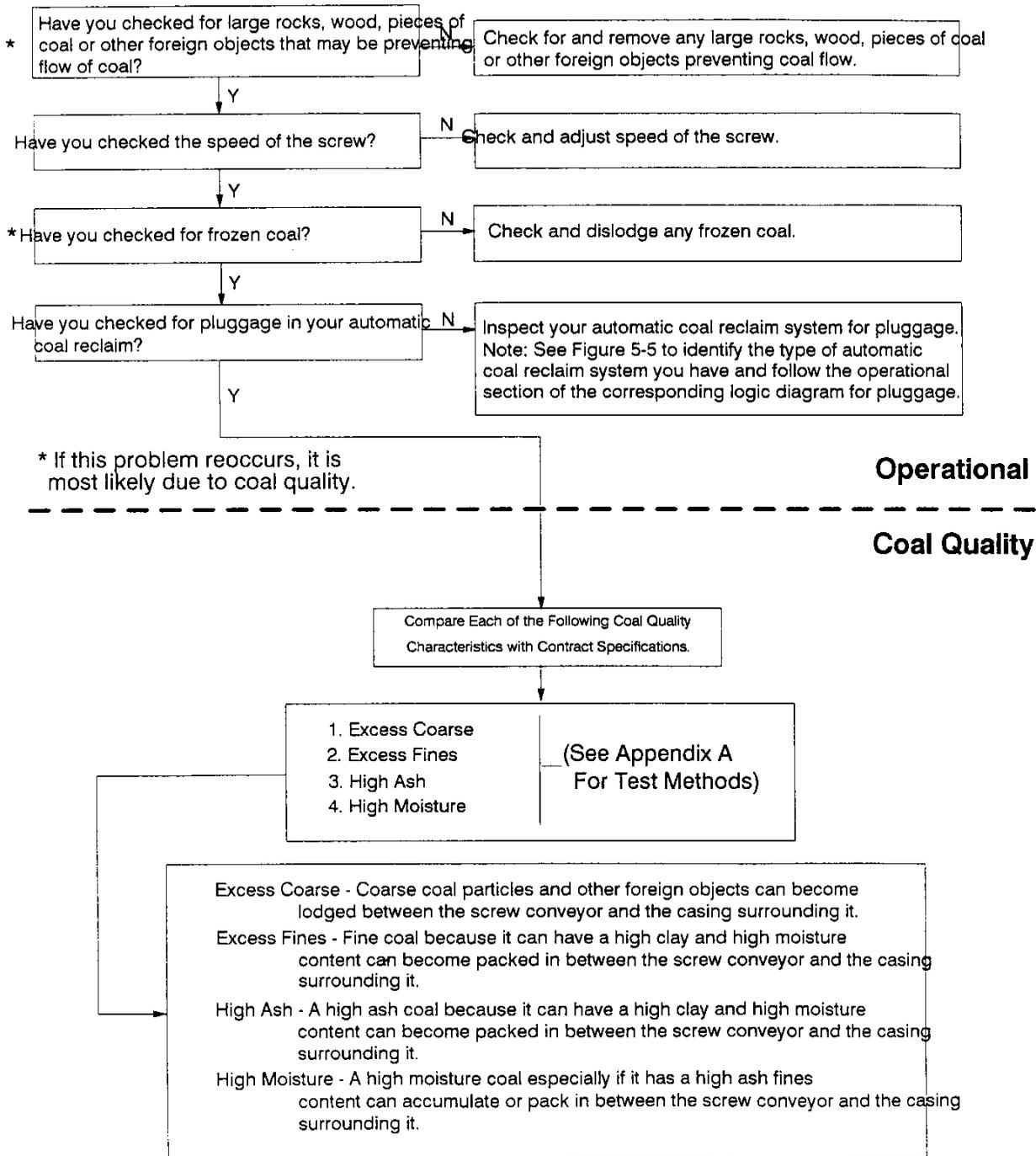


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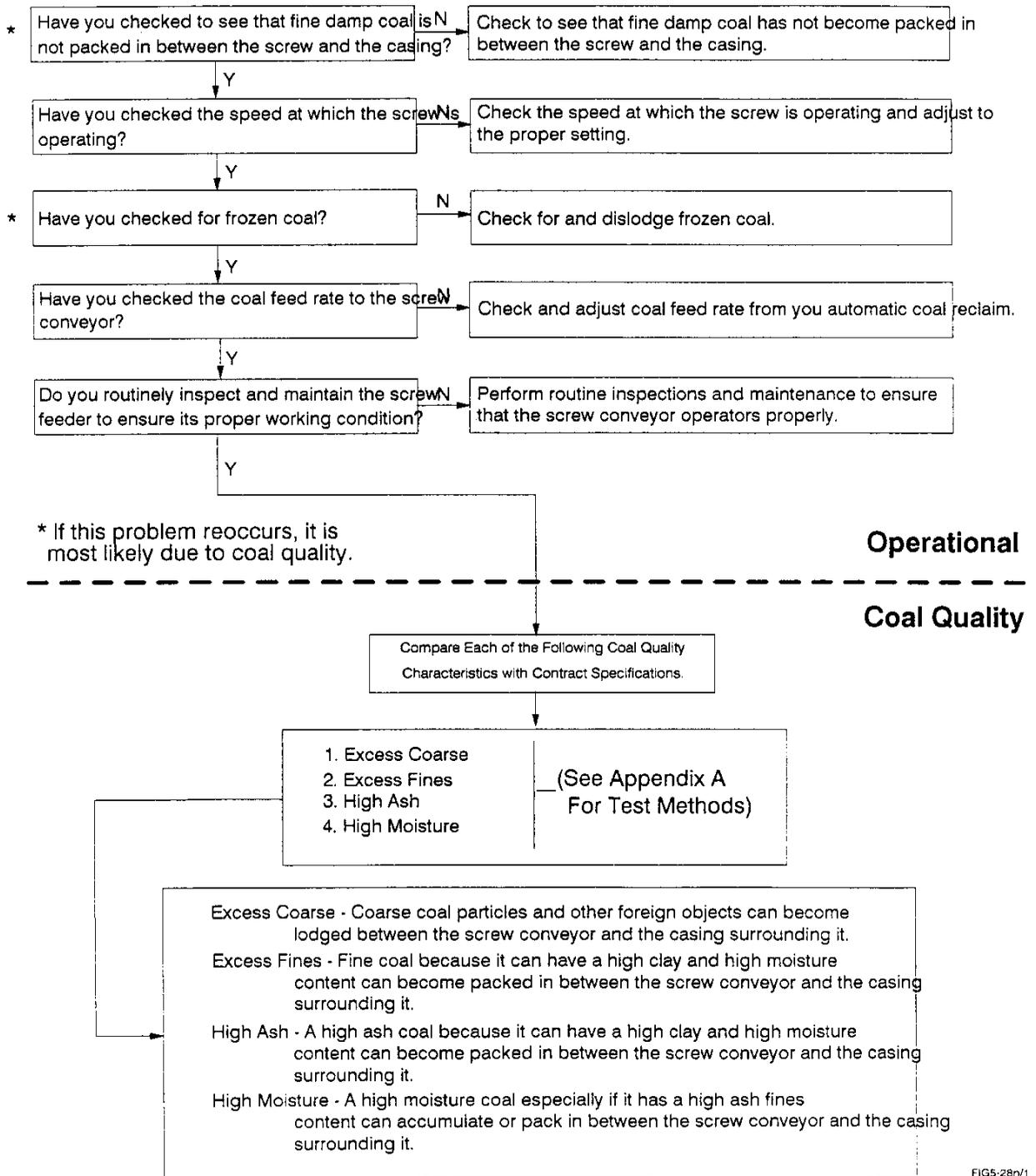
**FIGURE 5-26: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear In The Coal Feed Conveyor
(Screw Conveyor)**



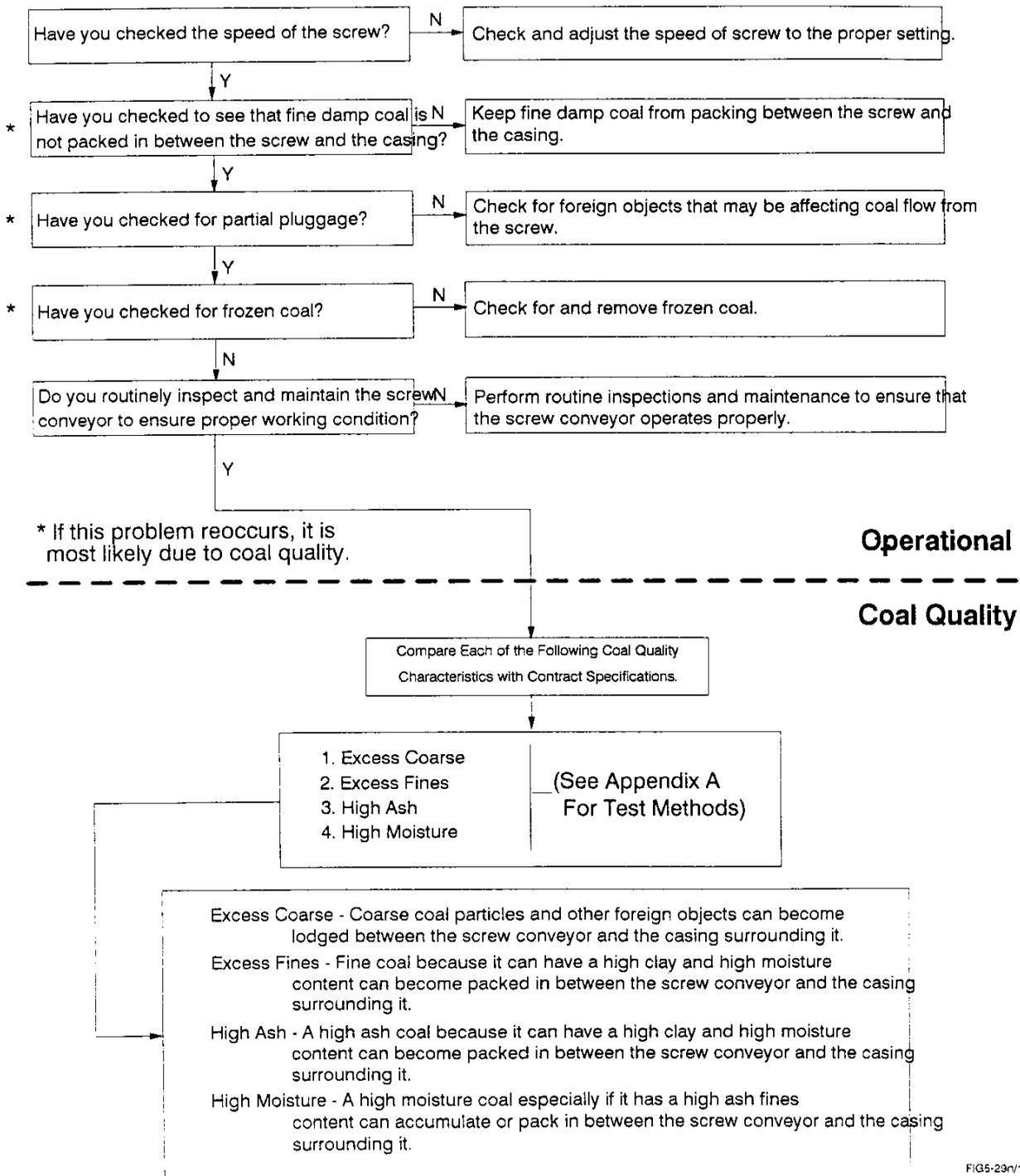
**FIGURE 5-27: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feed Conveyor
(Screw Conveyor)**



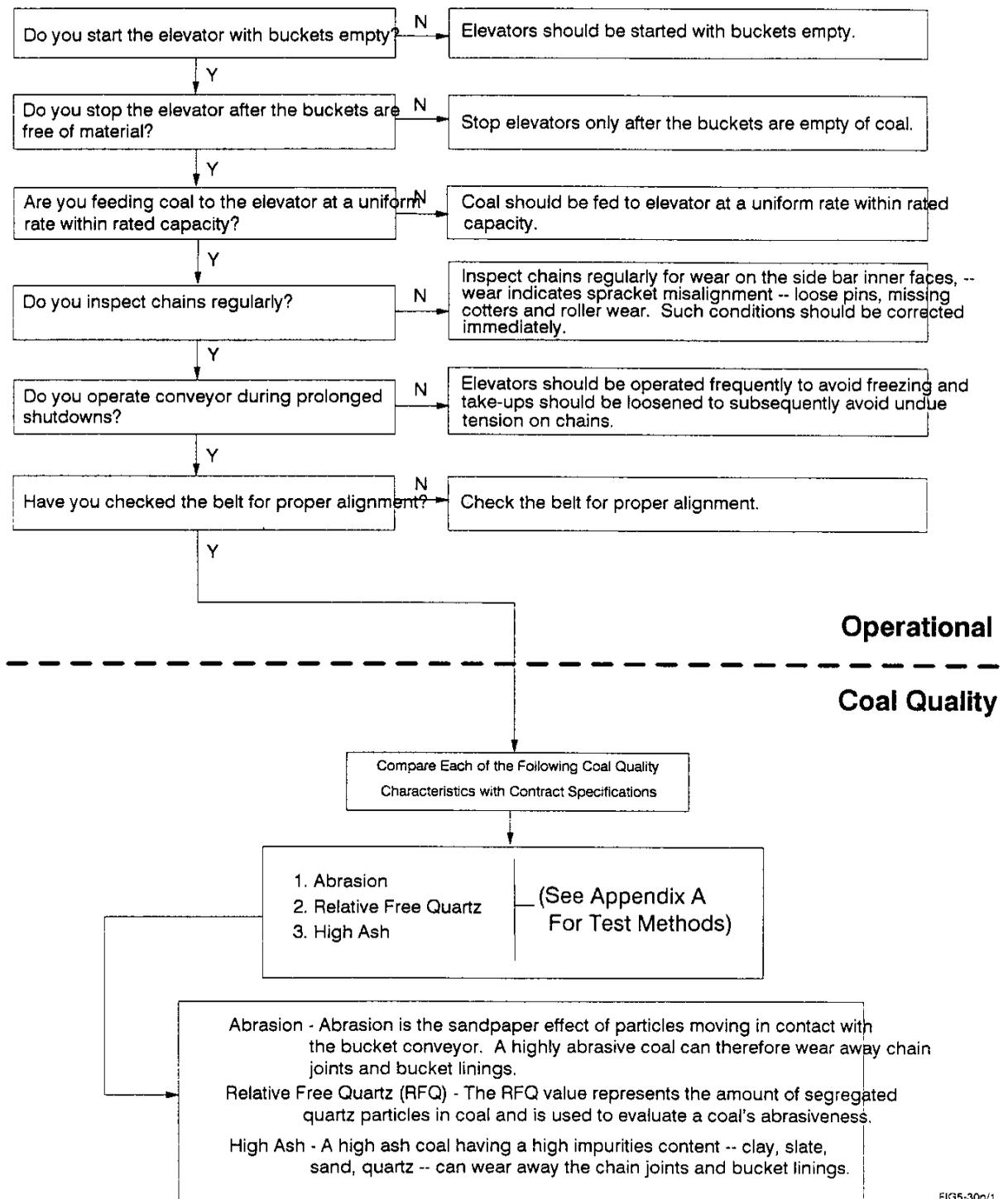
**FIGURE 5-28: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Coal Feed Conveyor
(Screw Conveyor)**



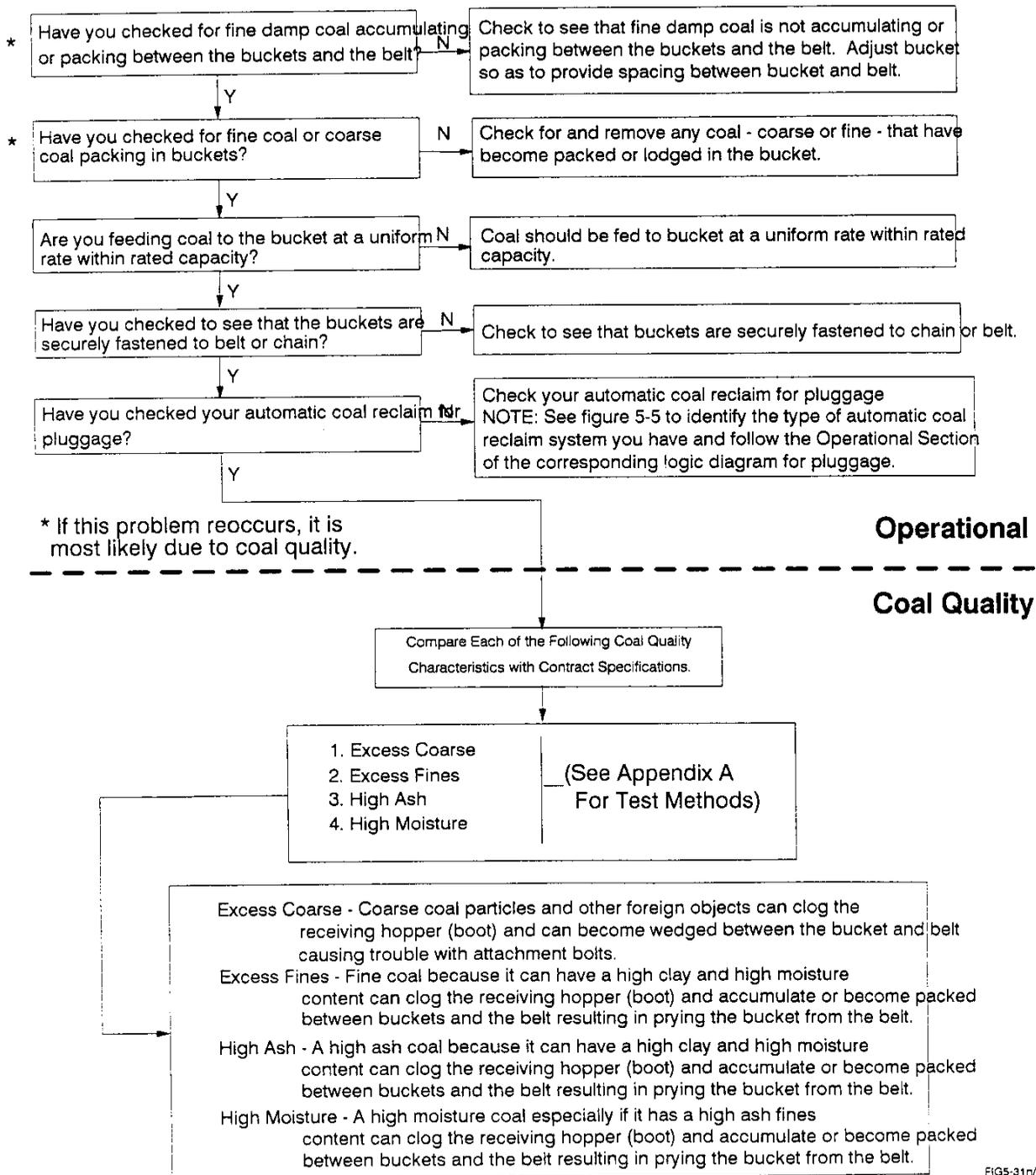
**FIGURE 5-29: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Feed Conveyor
(Screw Conveyor)**



**FIGURE 5-30: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear In The Coal Feed Conveyor
(Bucket Conveyor)**



**FIGURE 5-31: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feed Conveyor
(Bucket Conveyor)**



**FIGURE 5-32: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Coal Feed Conveyor
(Bucket Conveyor)**

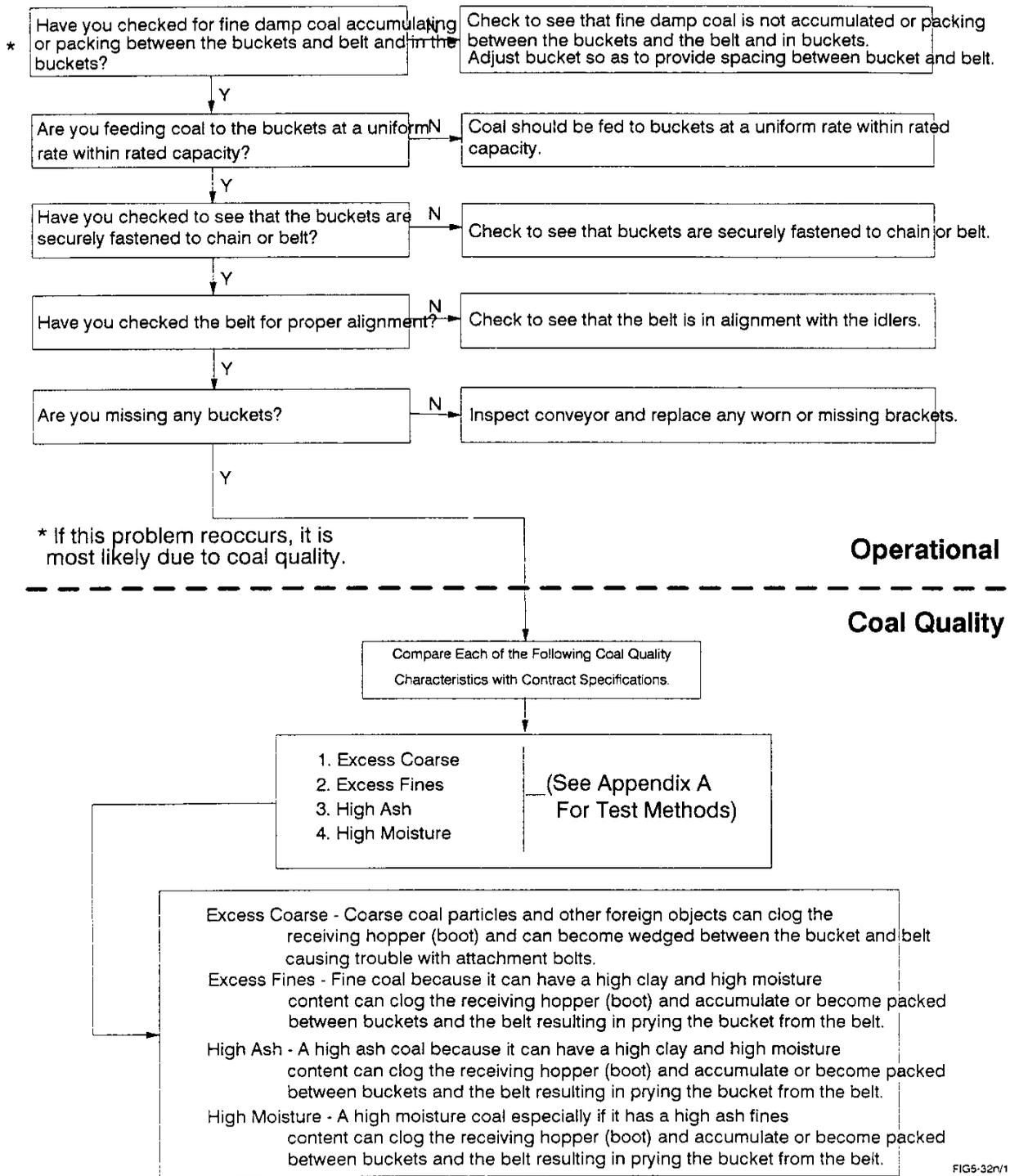
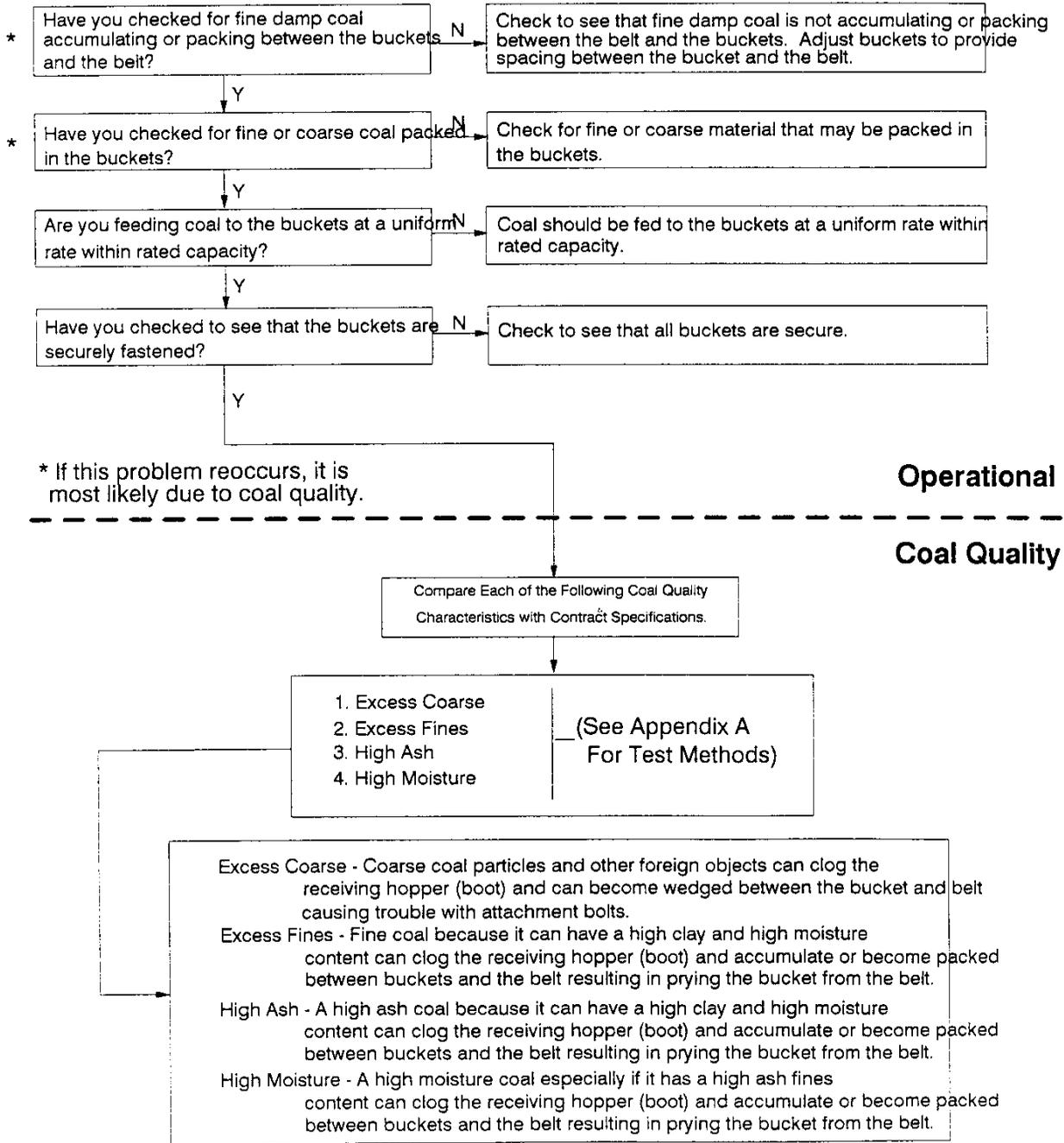
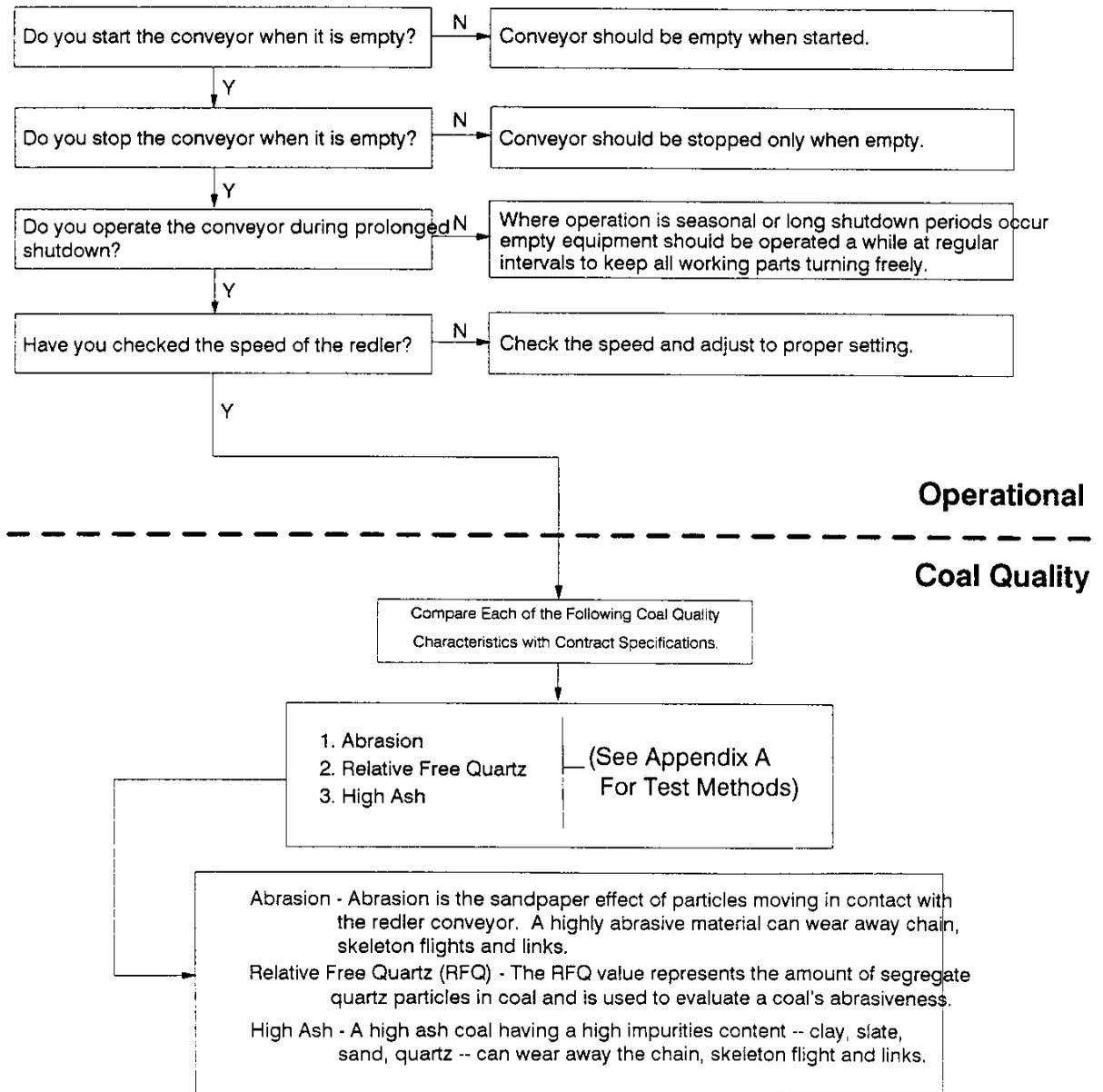


FIGURE 5-33: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
Erratic Feeding From The Coal Feed Conveyor
(Bucket Conveyor)



**FIGURE 5-34: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear Of The Coal Feed Conveyor
(Redler Conveyor)**



**FIGURE 5-35: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feed Conveyor
(Redler Conveyor)**

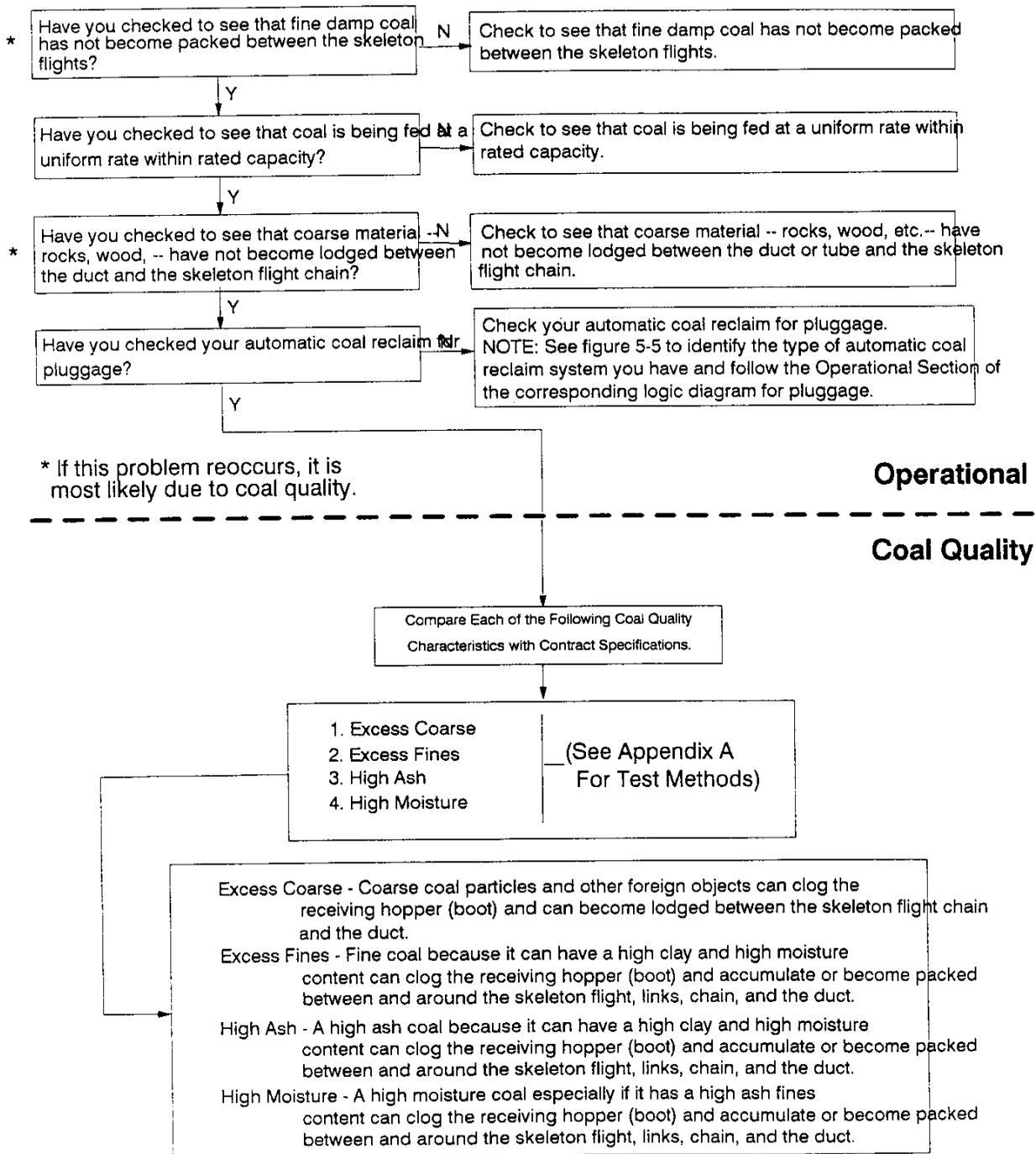
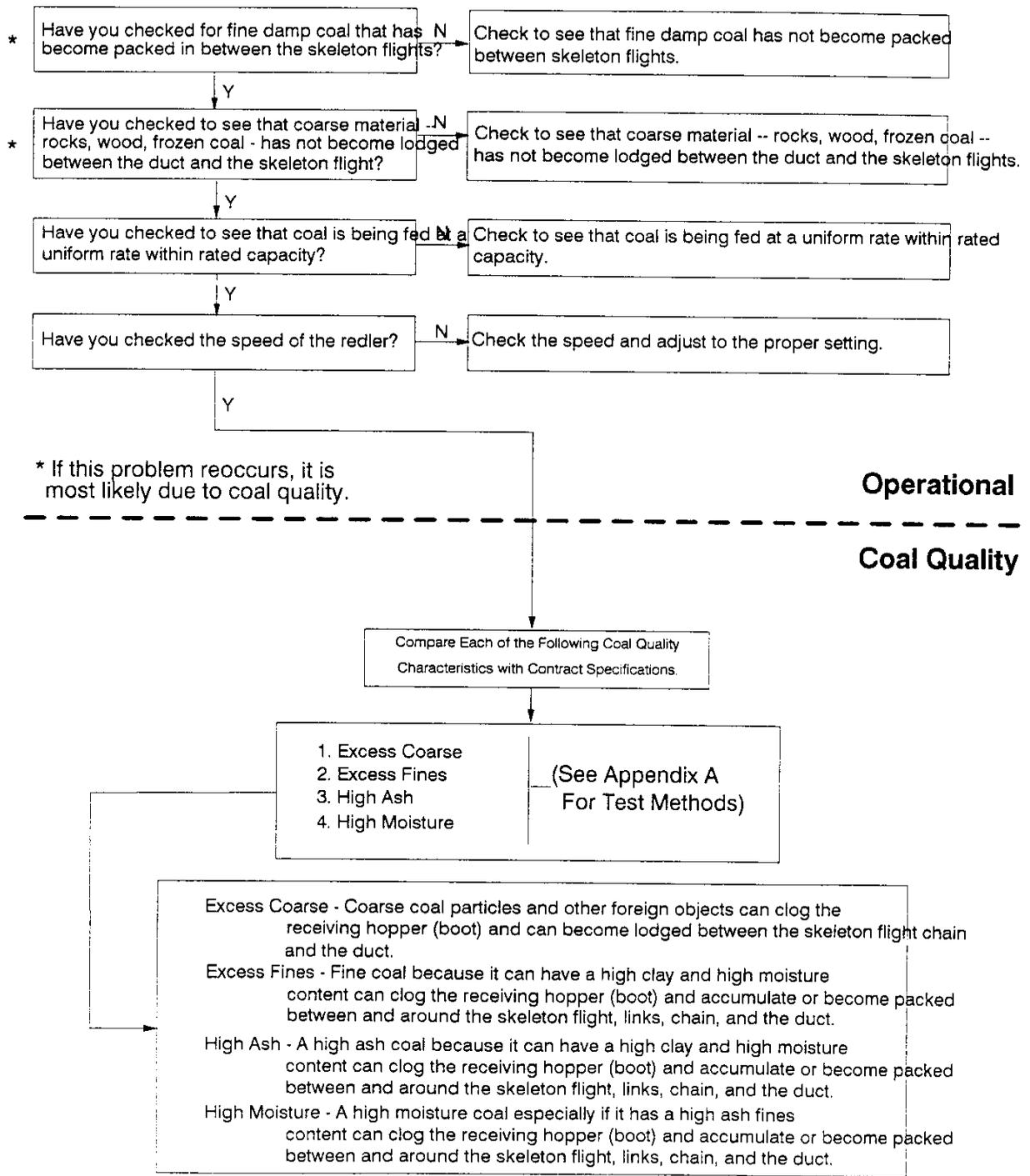
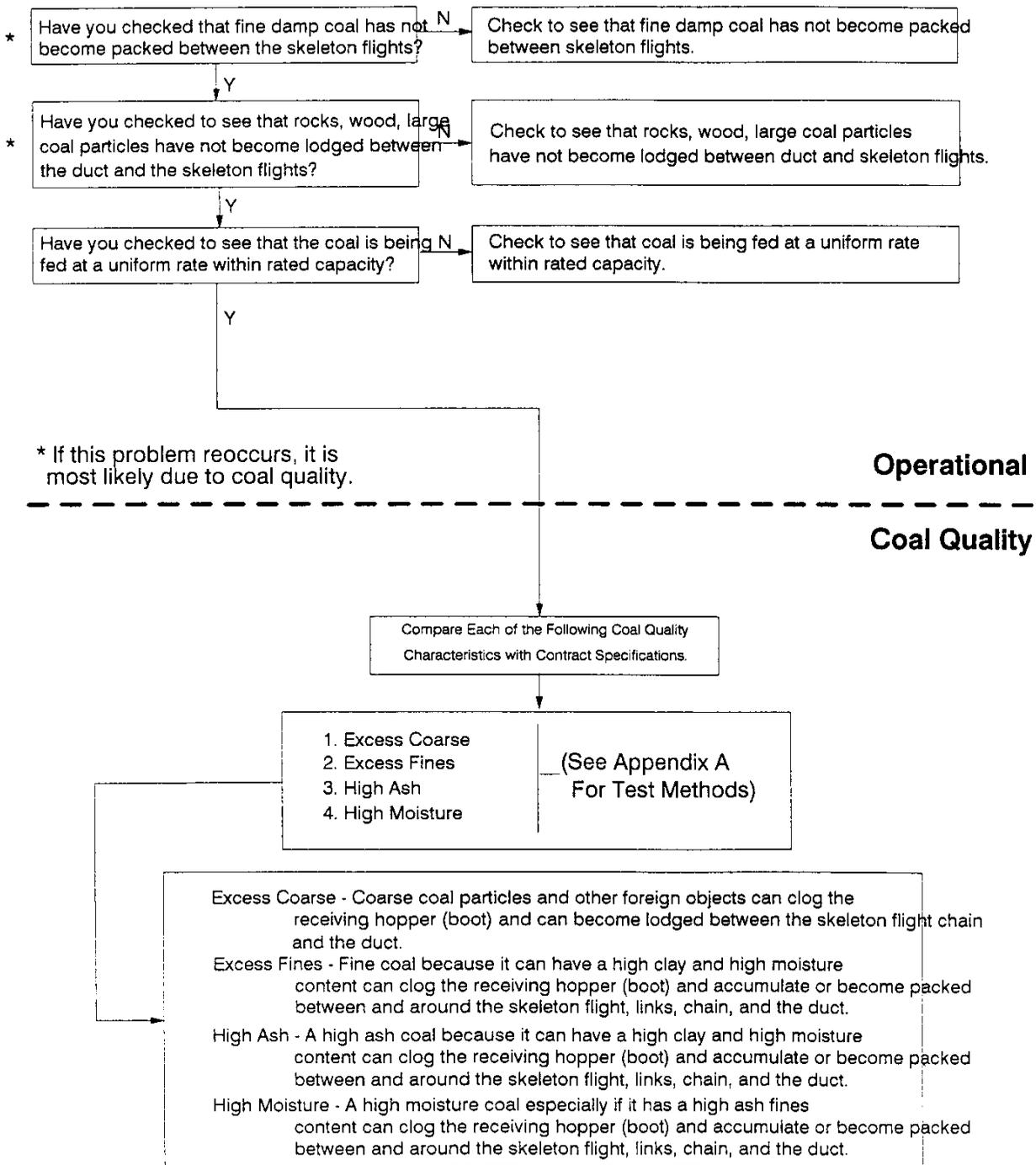


FIG5-35r/1

**FIGURE 5-36: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity In The Coal Feed Conveyor
(Redler Conveyor)**

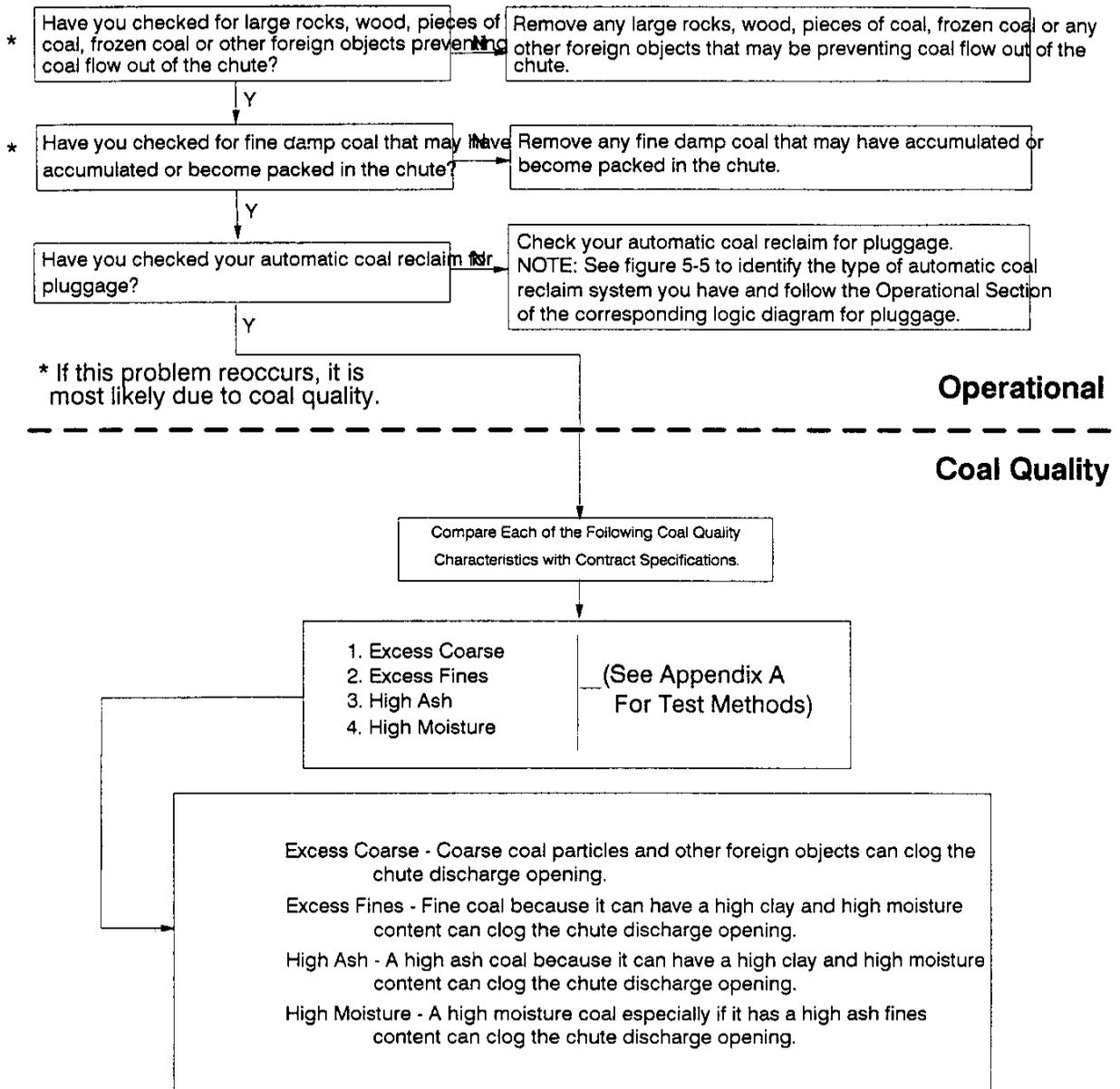


**FIGURE 5-37: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Feed Conveyor
(Redler Conveyor)**



FIGS-37/N/1

**FIGURE 5-38: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feed Conveyor
(Chute)**



**FIGURE 5-39: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity In The Coal Feed Conveyor
(Chute)**

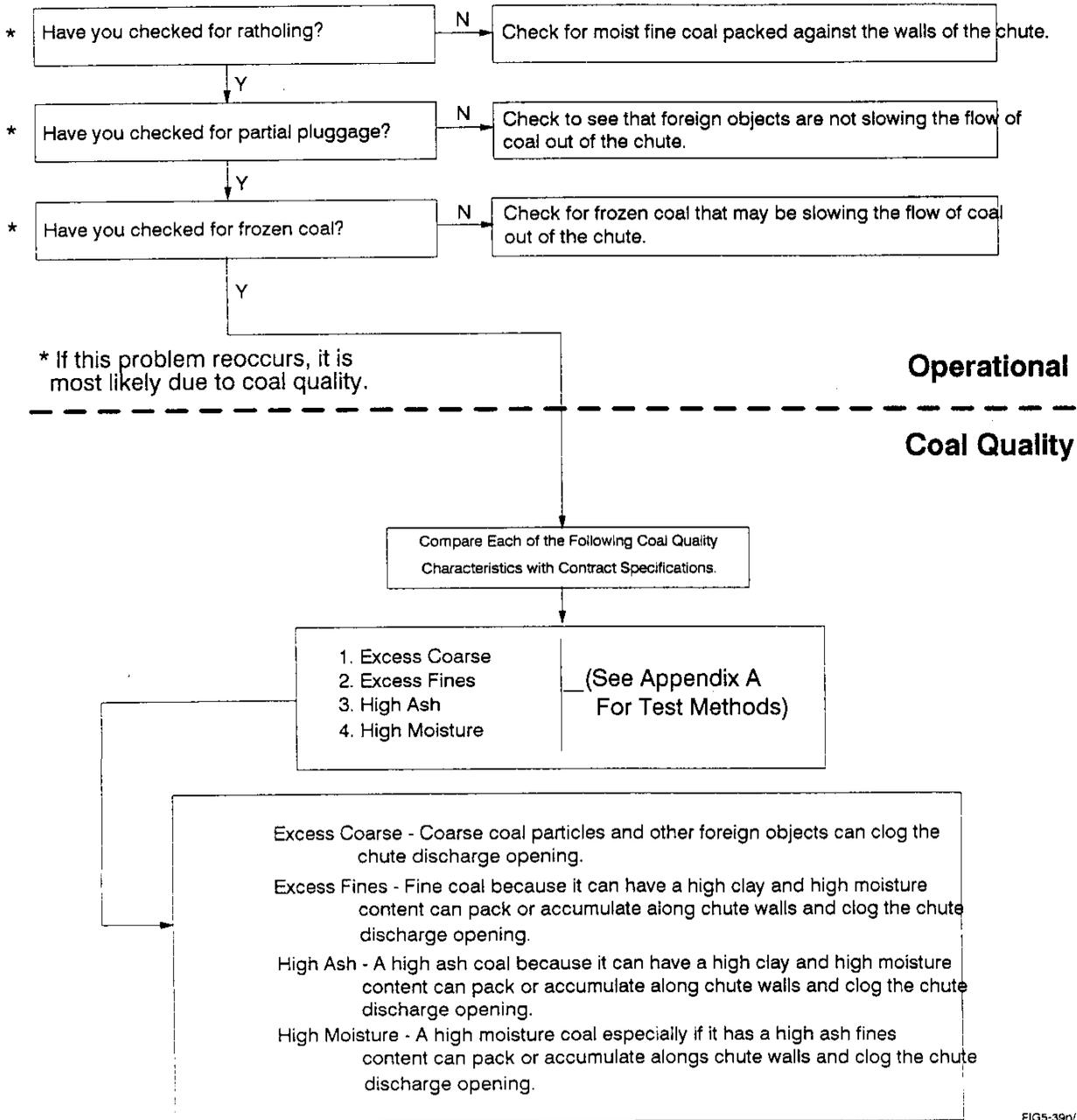
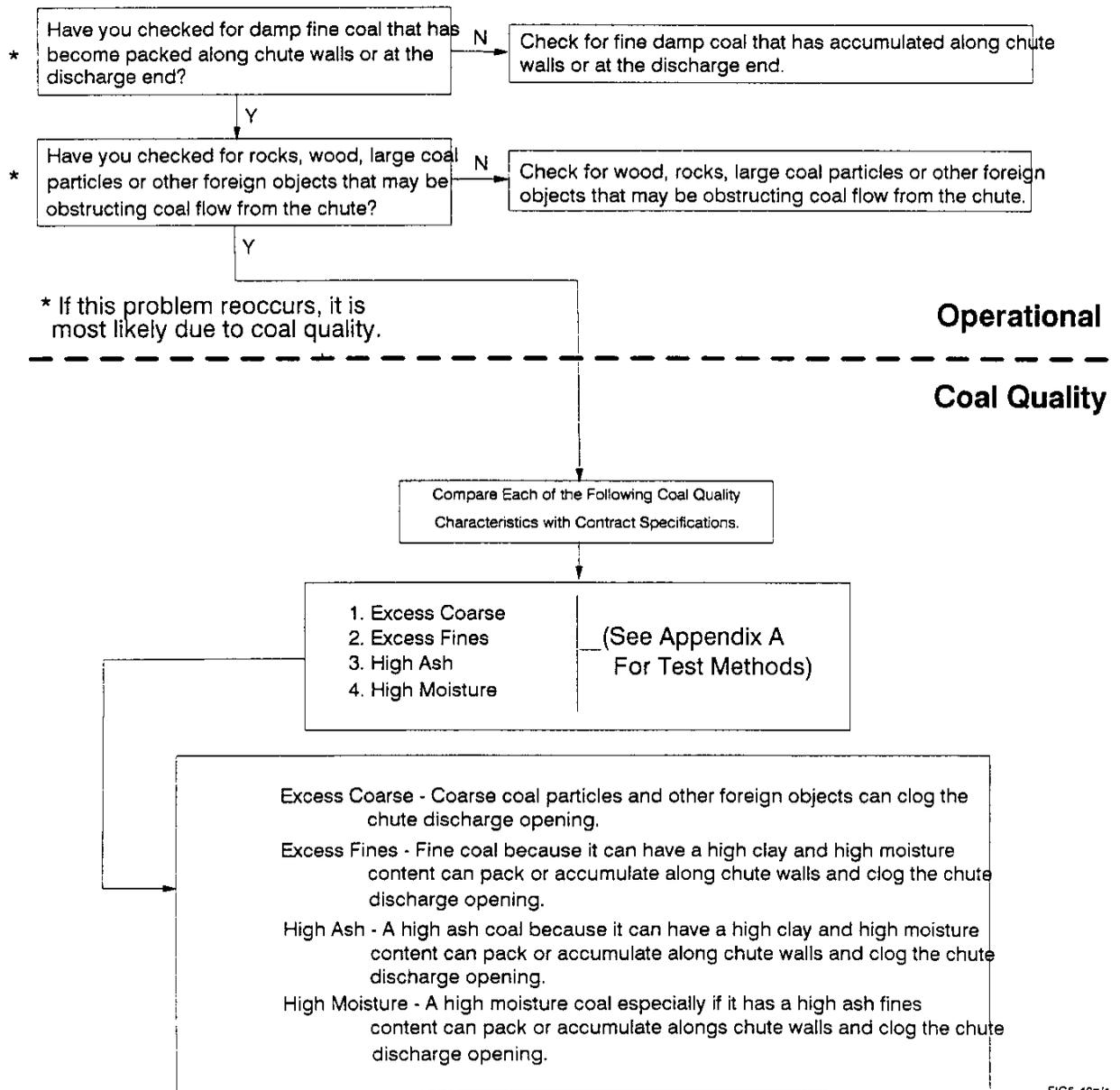
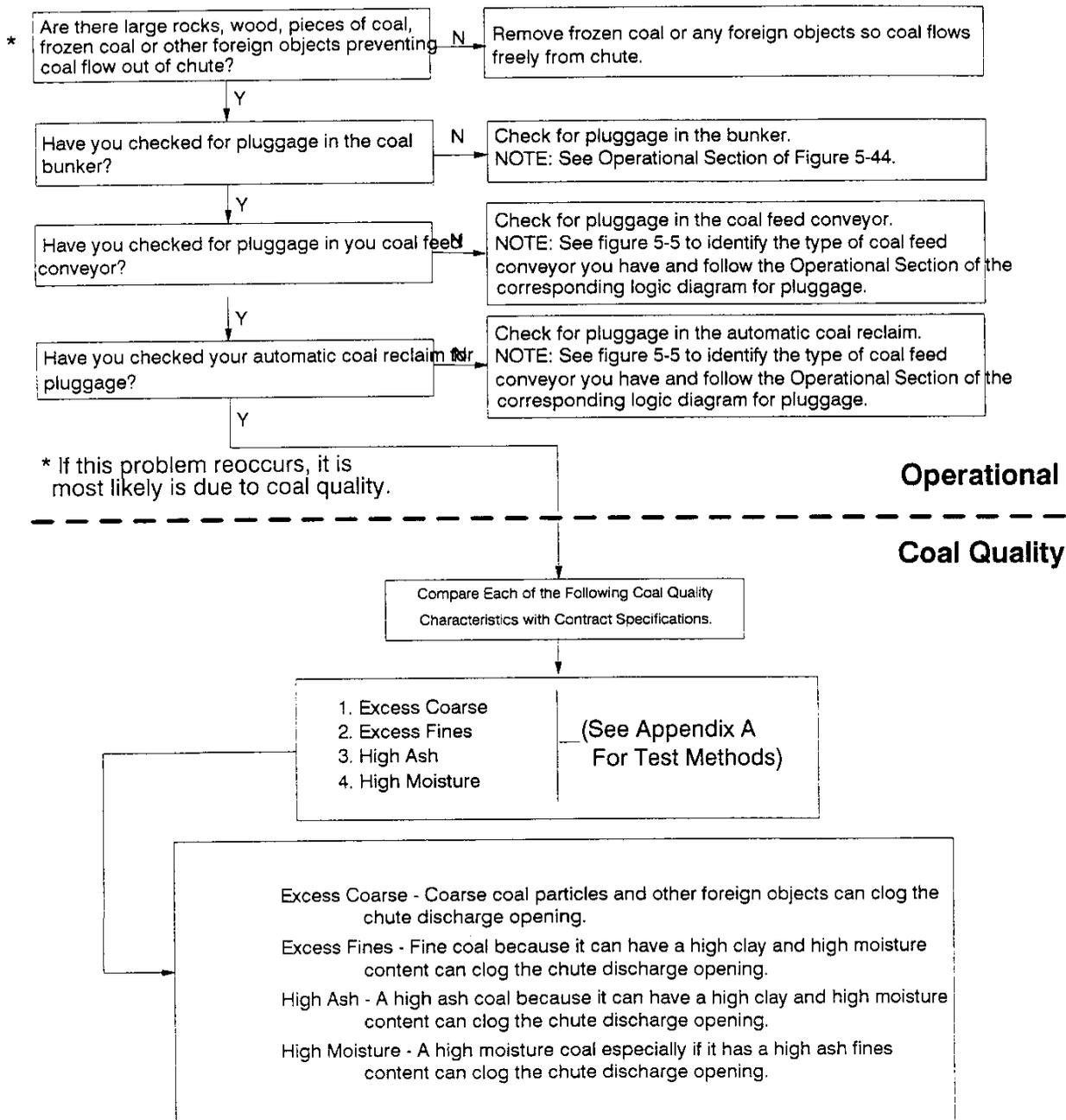


FIG5-39n/1

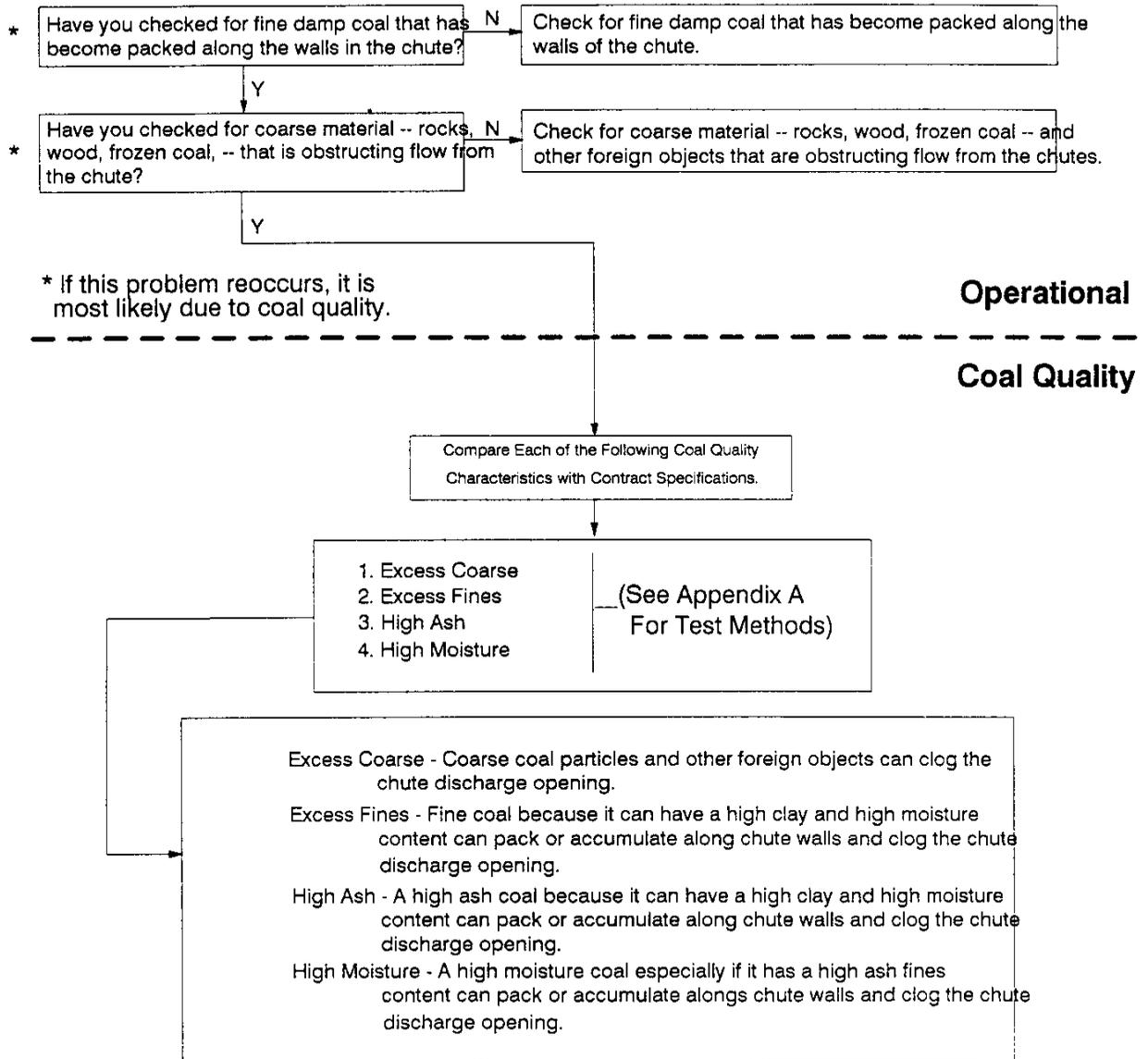
**FIGURE 5-40: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Feed Conveyor
(Chute)**



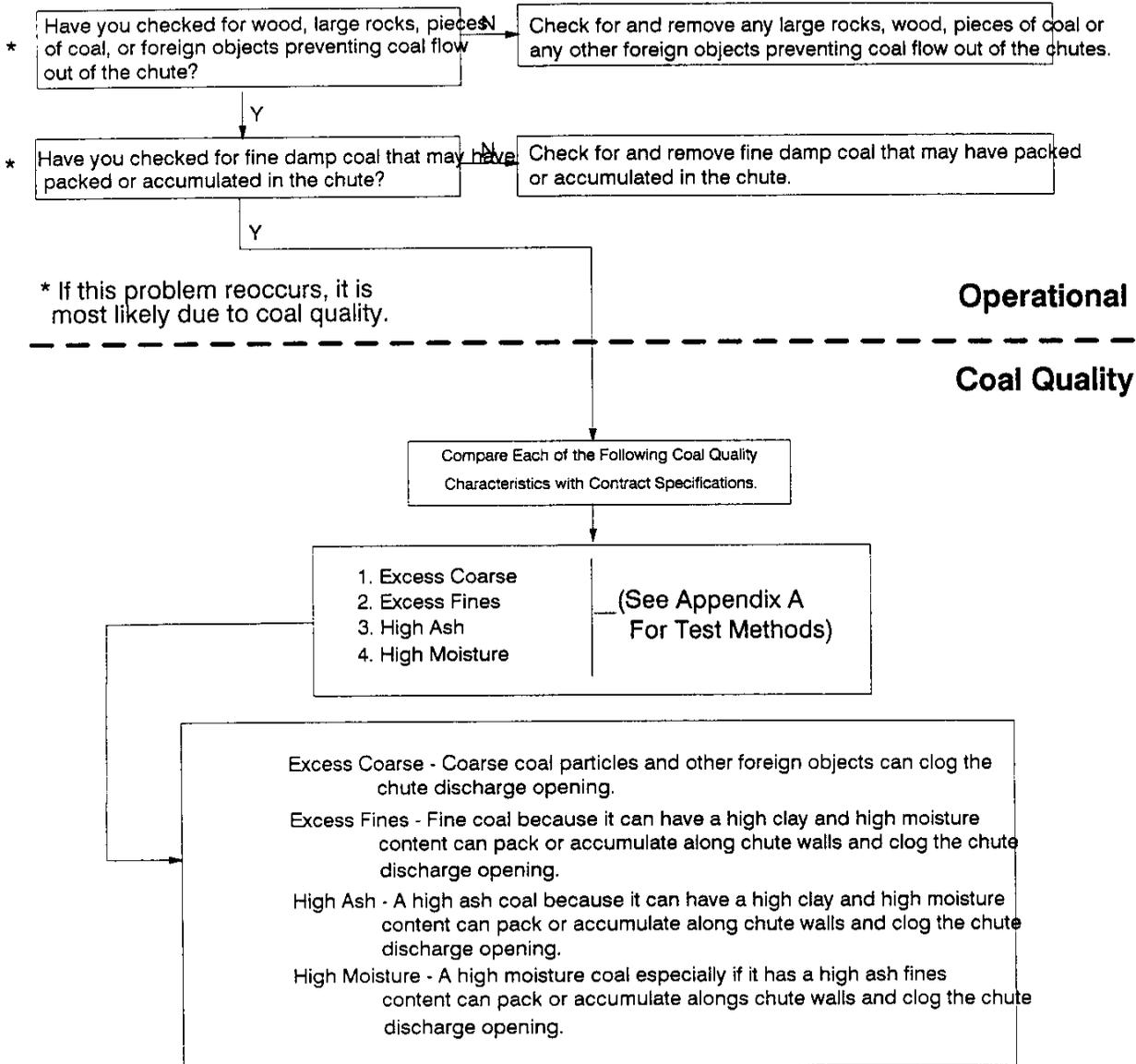
**FIGURE 5-41: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feeders
(Chute)**



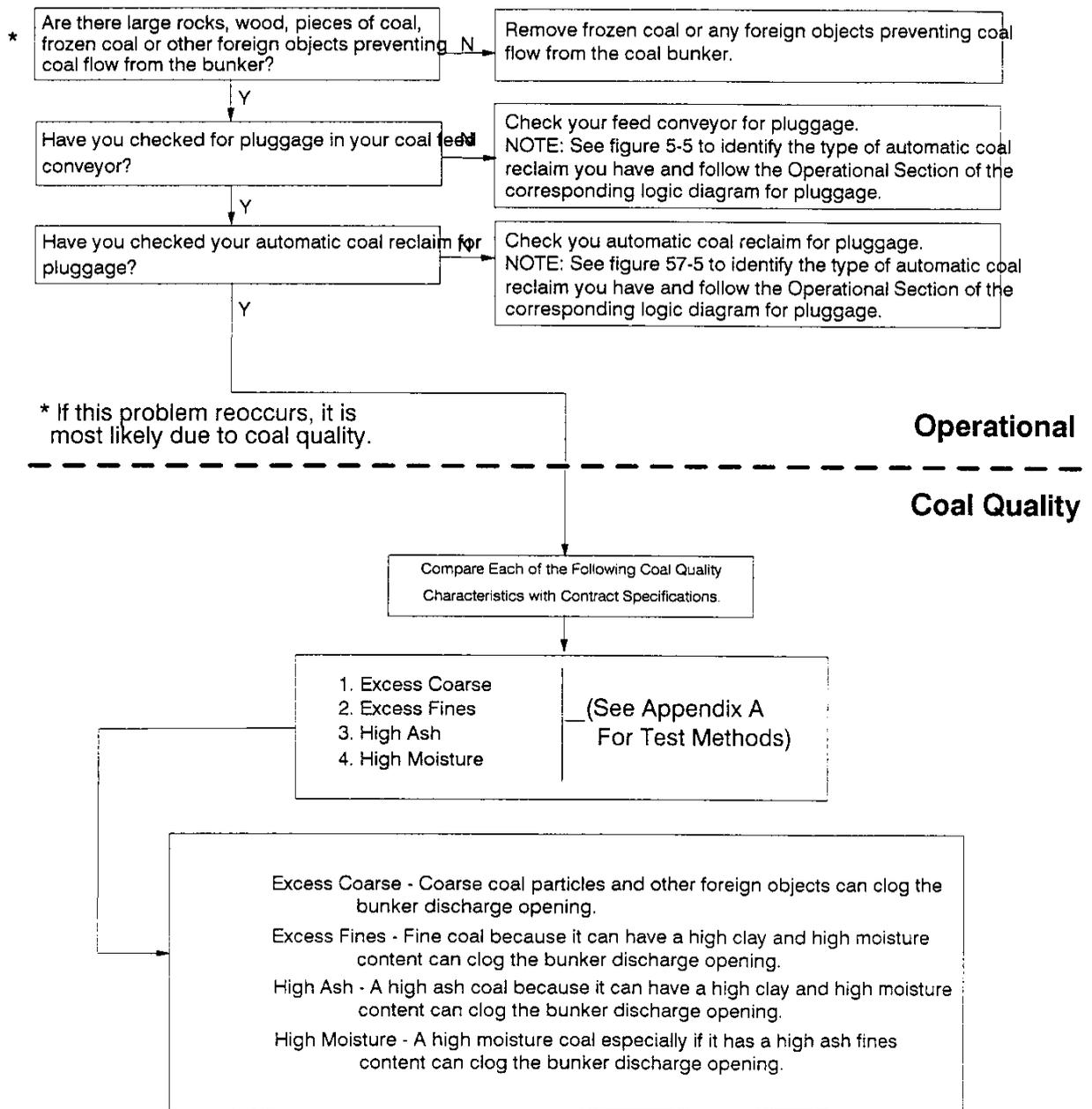
**FIGURE 5-42: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity In the Coal Feeder
(Chutes)**



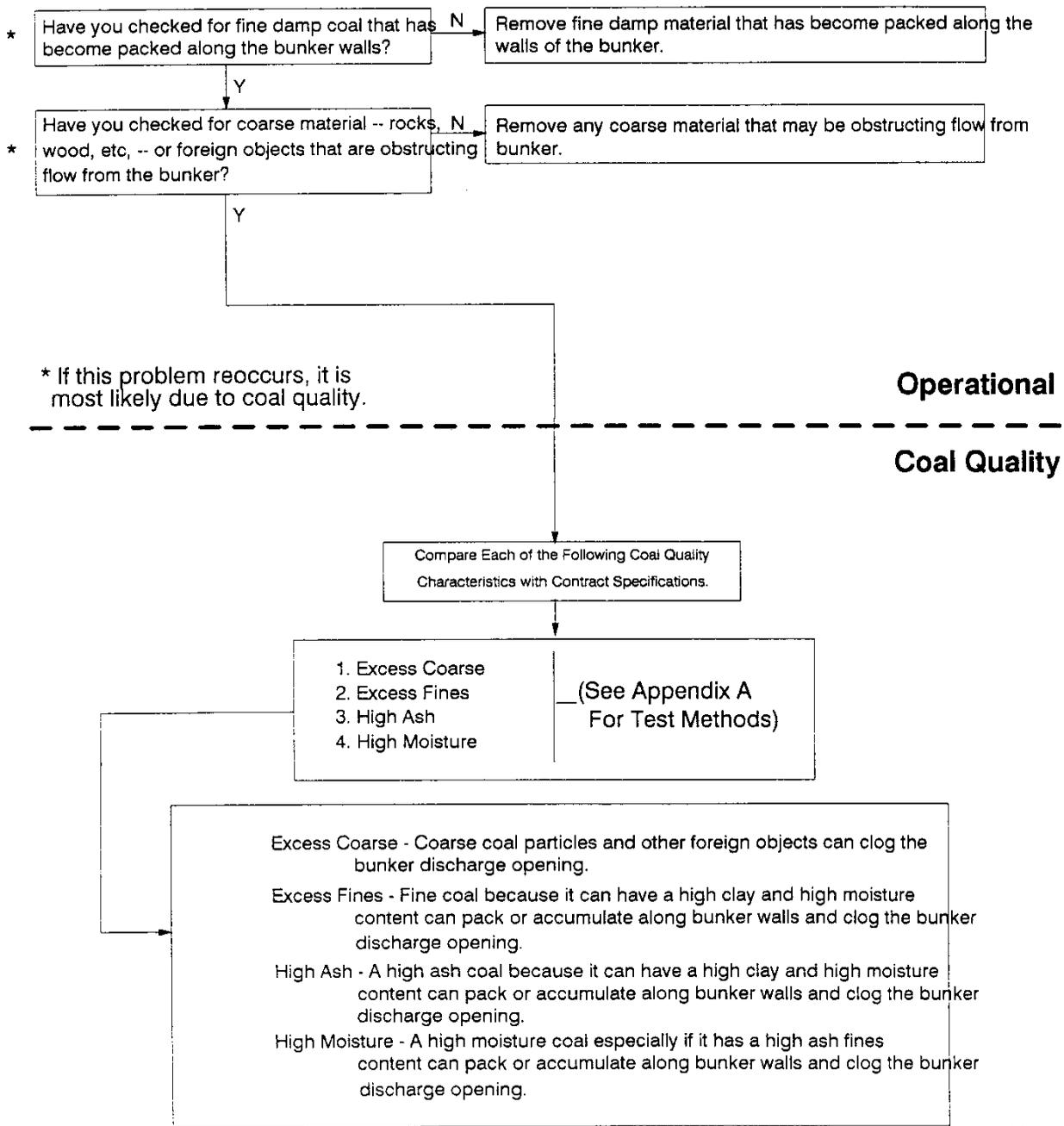
**FIGURE 5-43: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Feeder
(Chutes)**



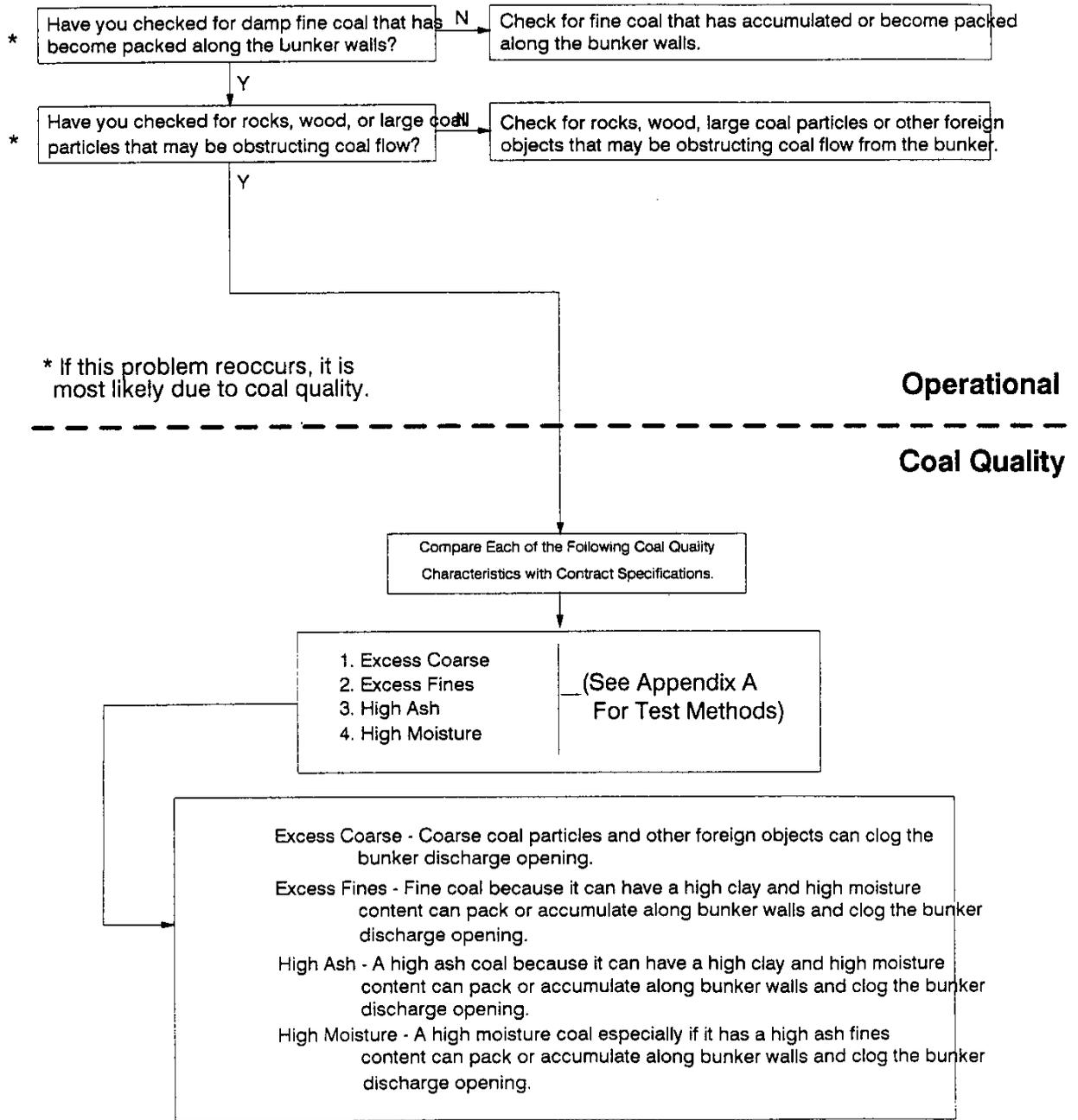
**FIGURE 5-44: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Bunker**



**FIGURE 5-45: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity In The Bunker**



**FIGURE 5-46: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Bunker**



**FIGURE 5-47: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Hopper**

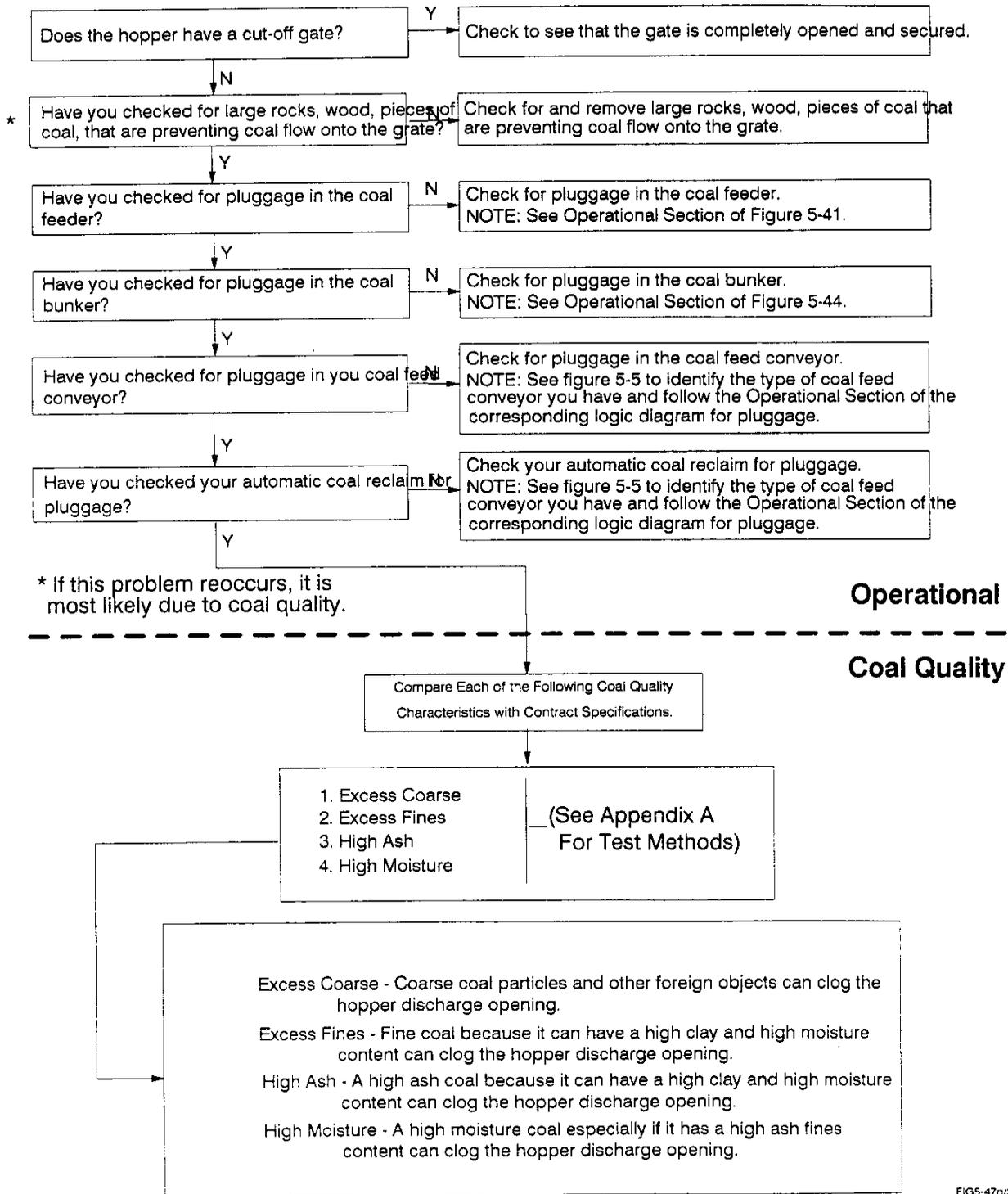
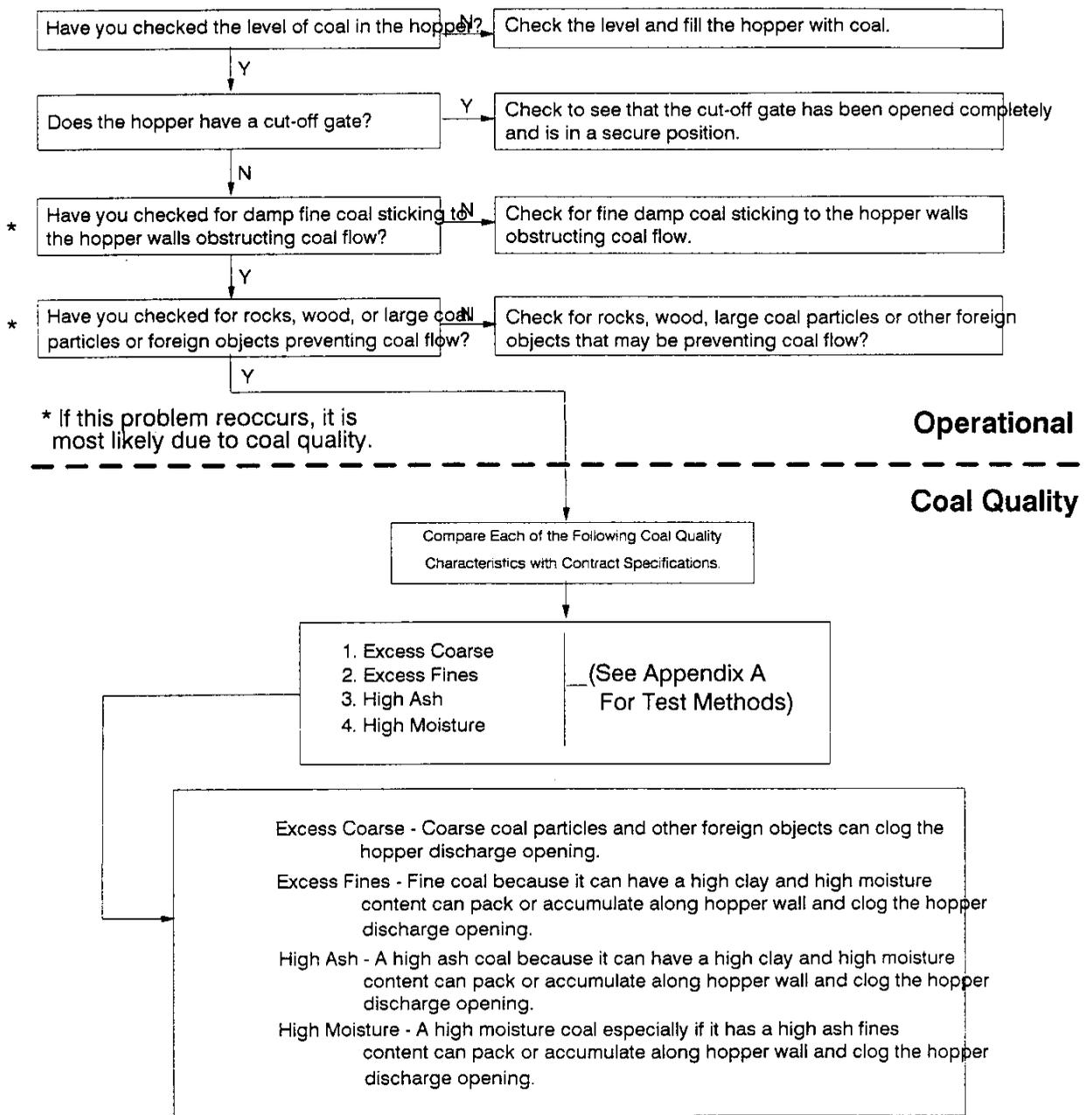
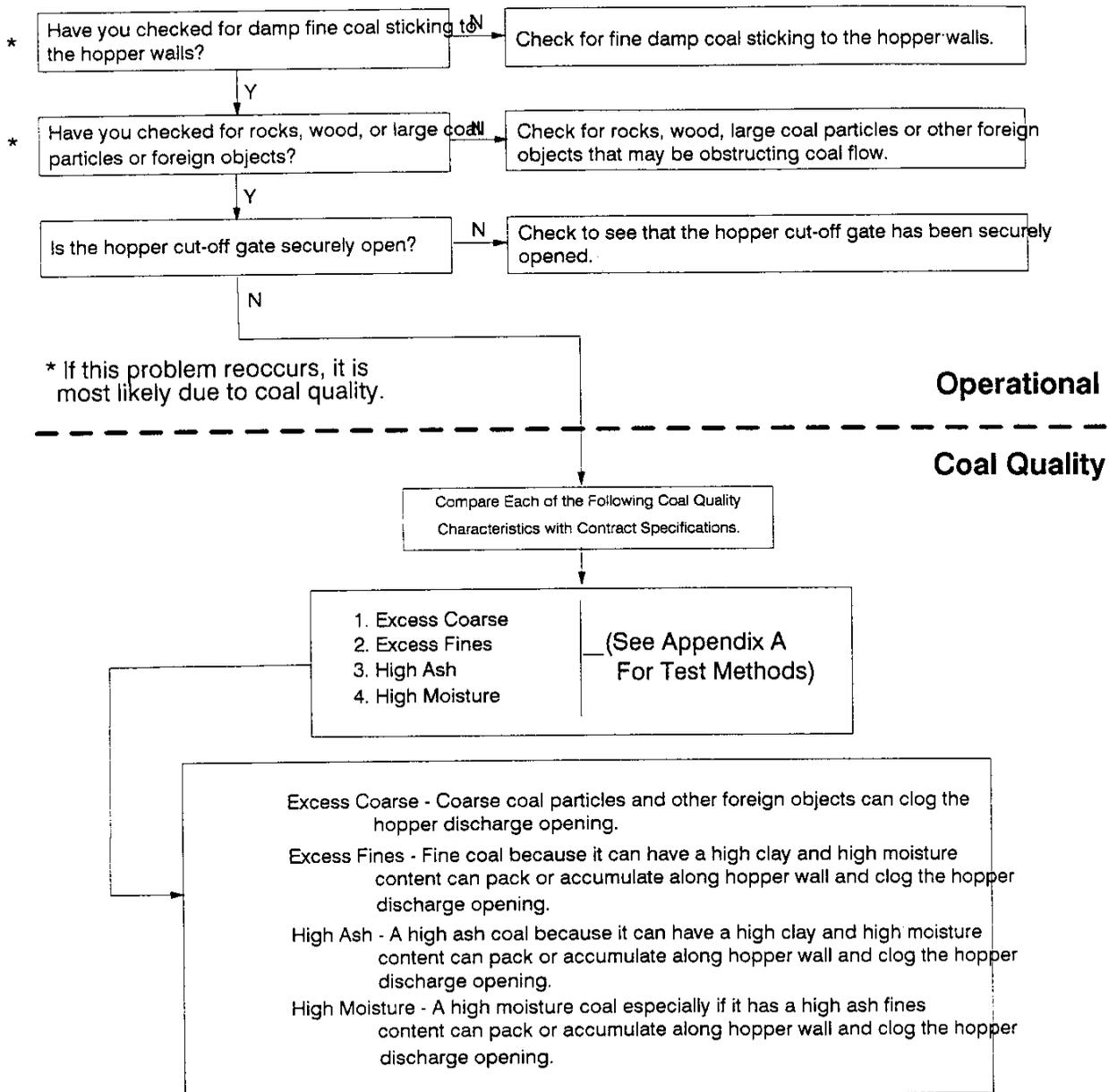


FIG5-47n/2

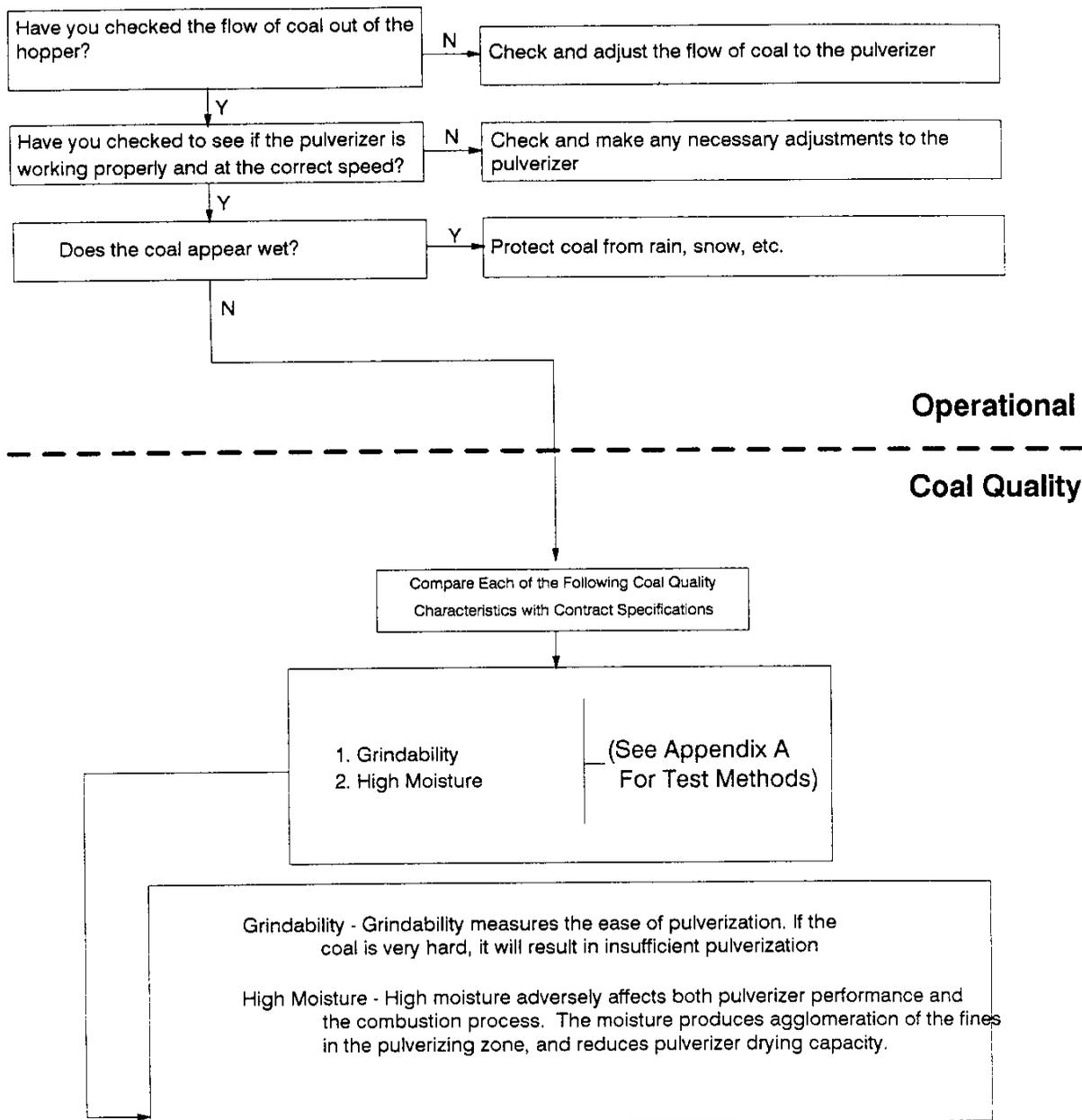
FIGURE 5-48: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
Insufficient Capacity In The Coal Hopper



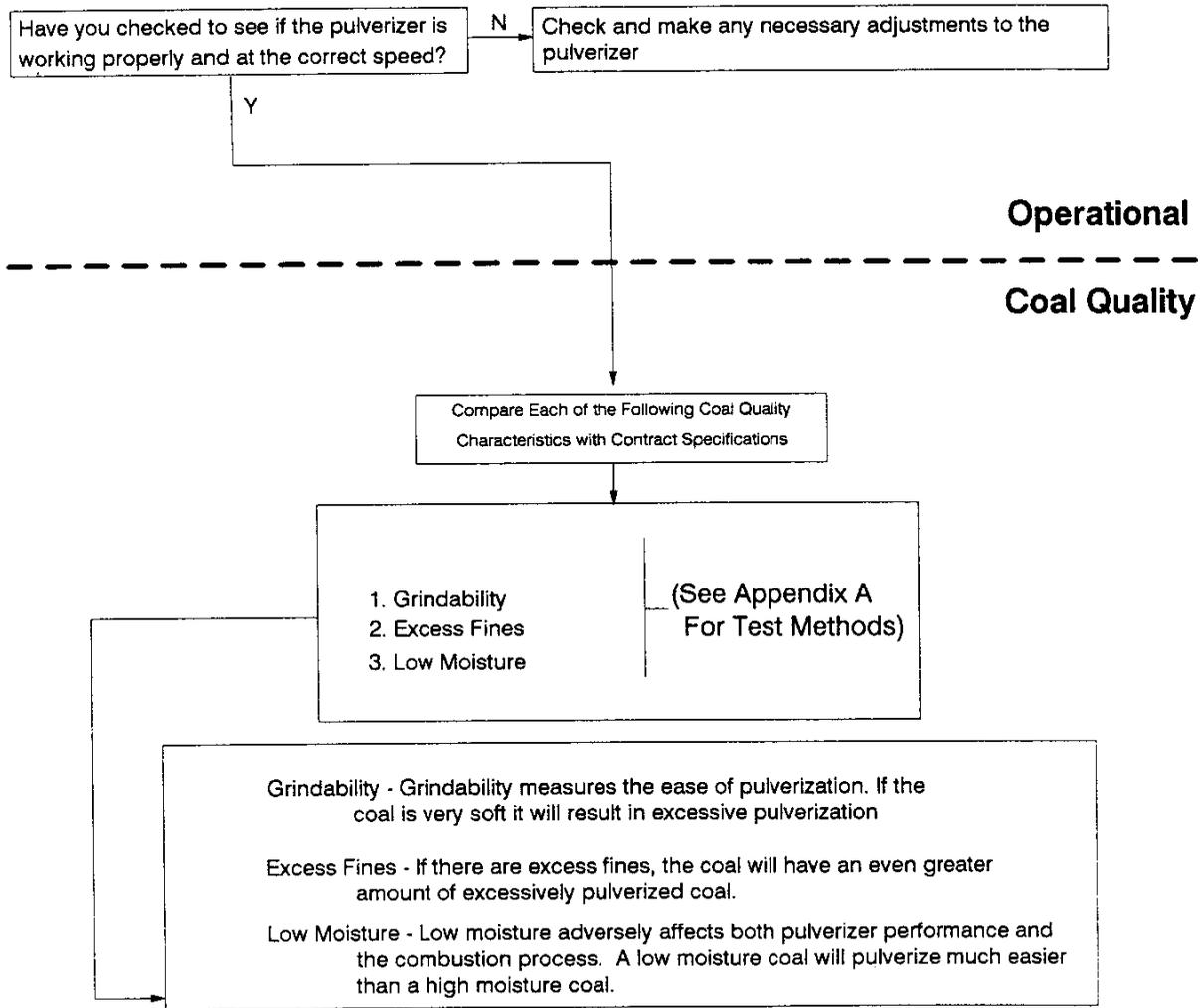
**FIGURE 5-49: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Hopper**



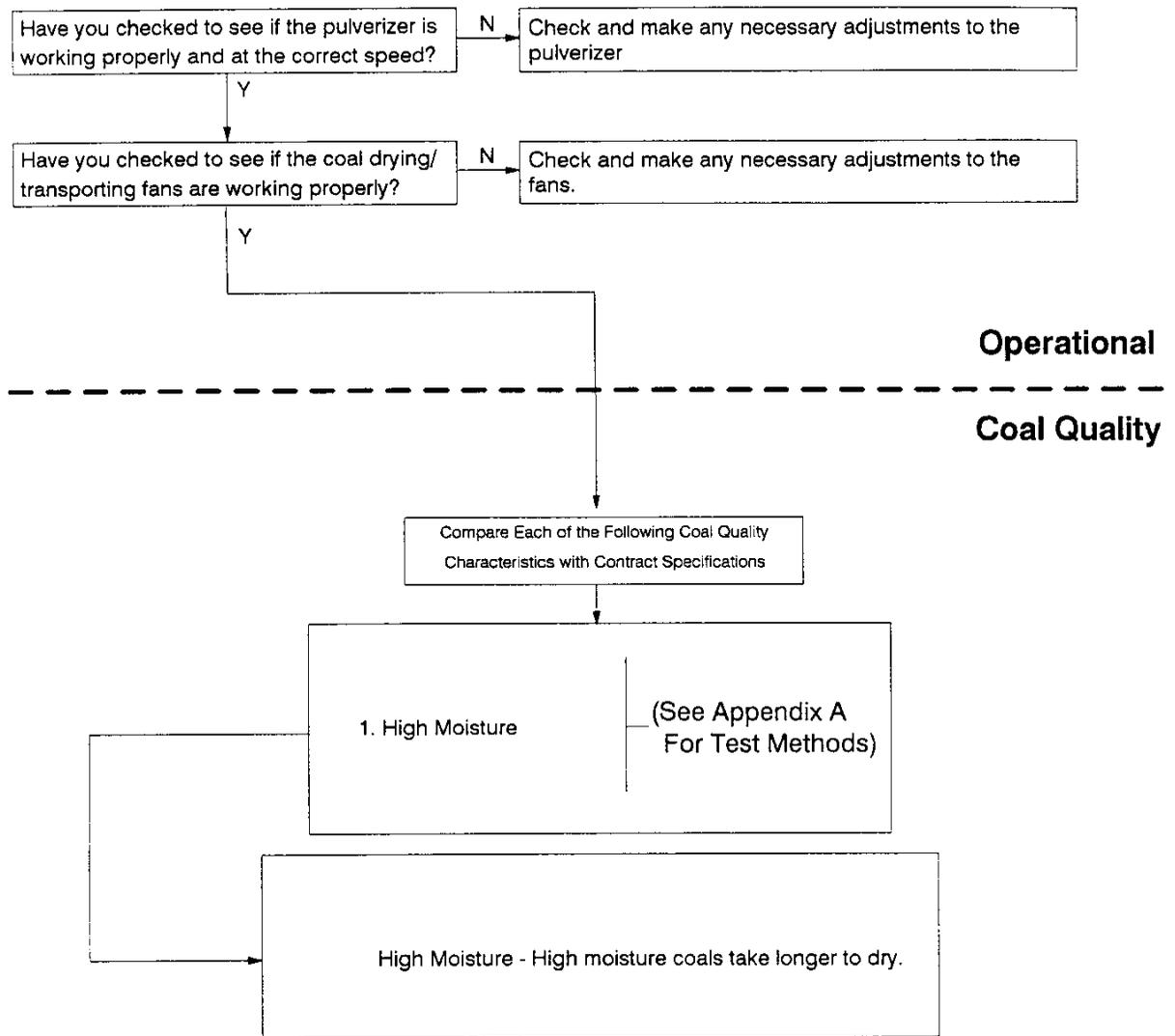
**FIGURE 5-50: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Pulverizing
(Pulverizer)**



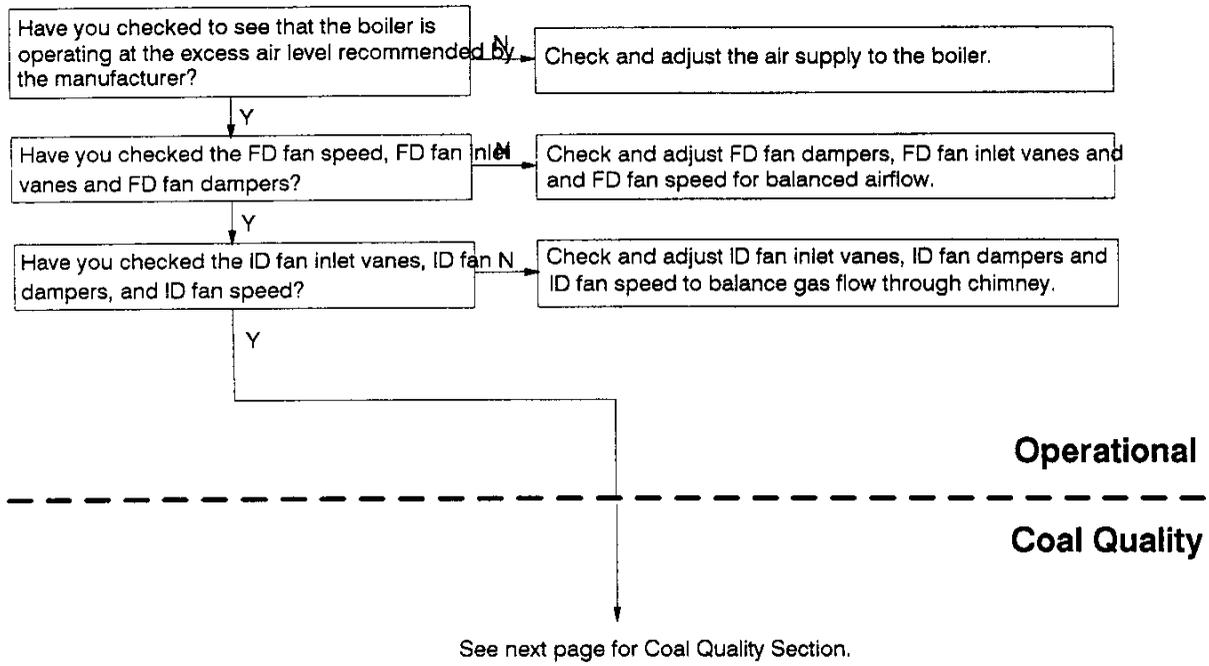
**FIGURE 5-51: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Excessive Pulverizing
(Pulverizer)**



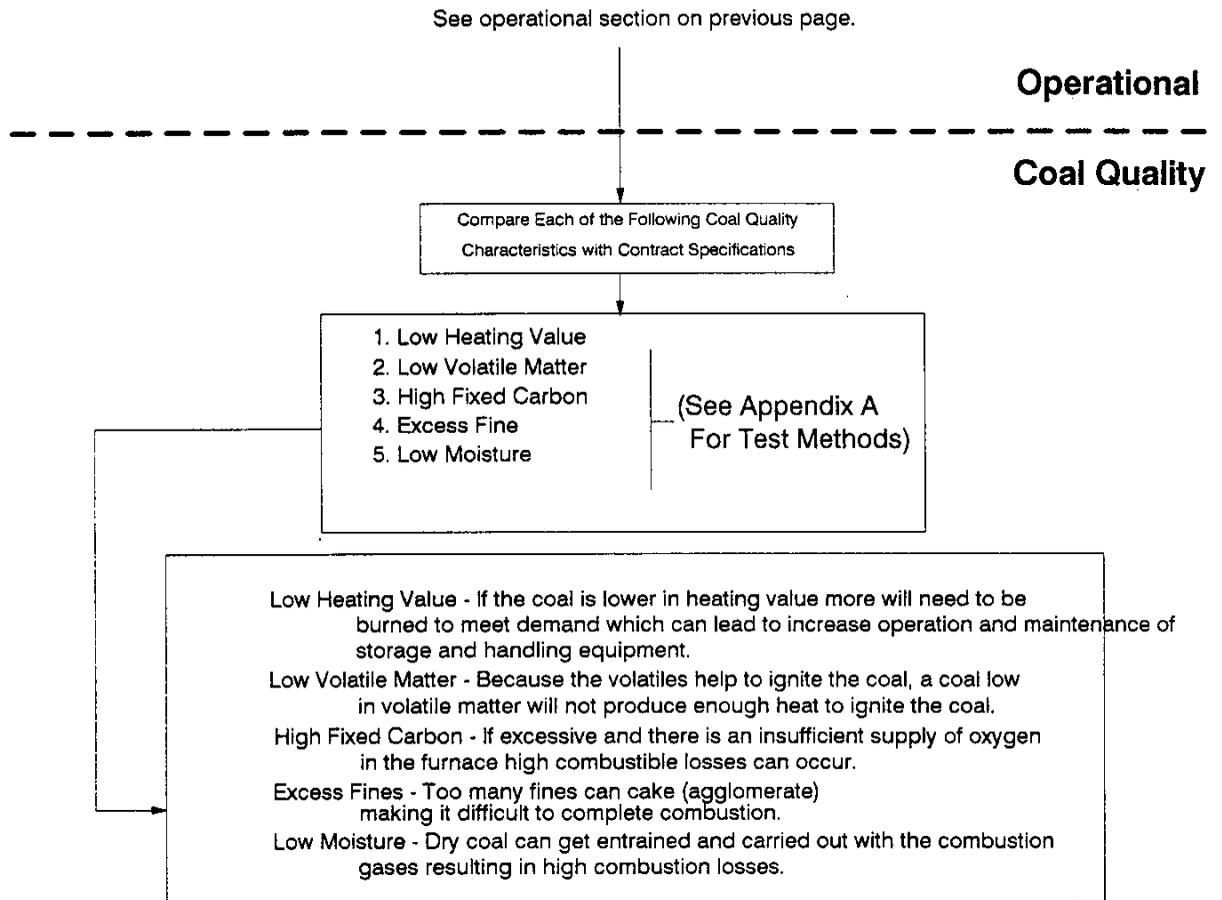
**FIGURE 5-52: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Drying
(Pulverizer)**



**FIGURE 5-53: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity And Inability To Meet Load
(Boiler)**



**FIGURE 5-53 (CONT'D): PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity And Inability To Meet Load**



**FIGURE 5-54: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Reduced Boiler Efficiency**

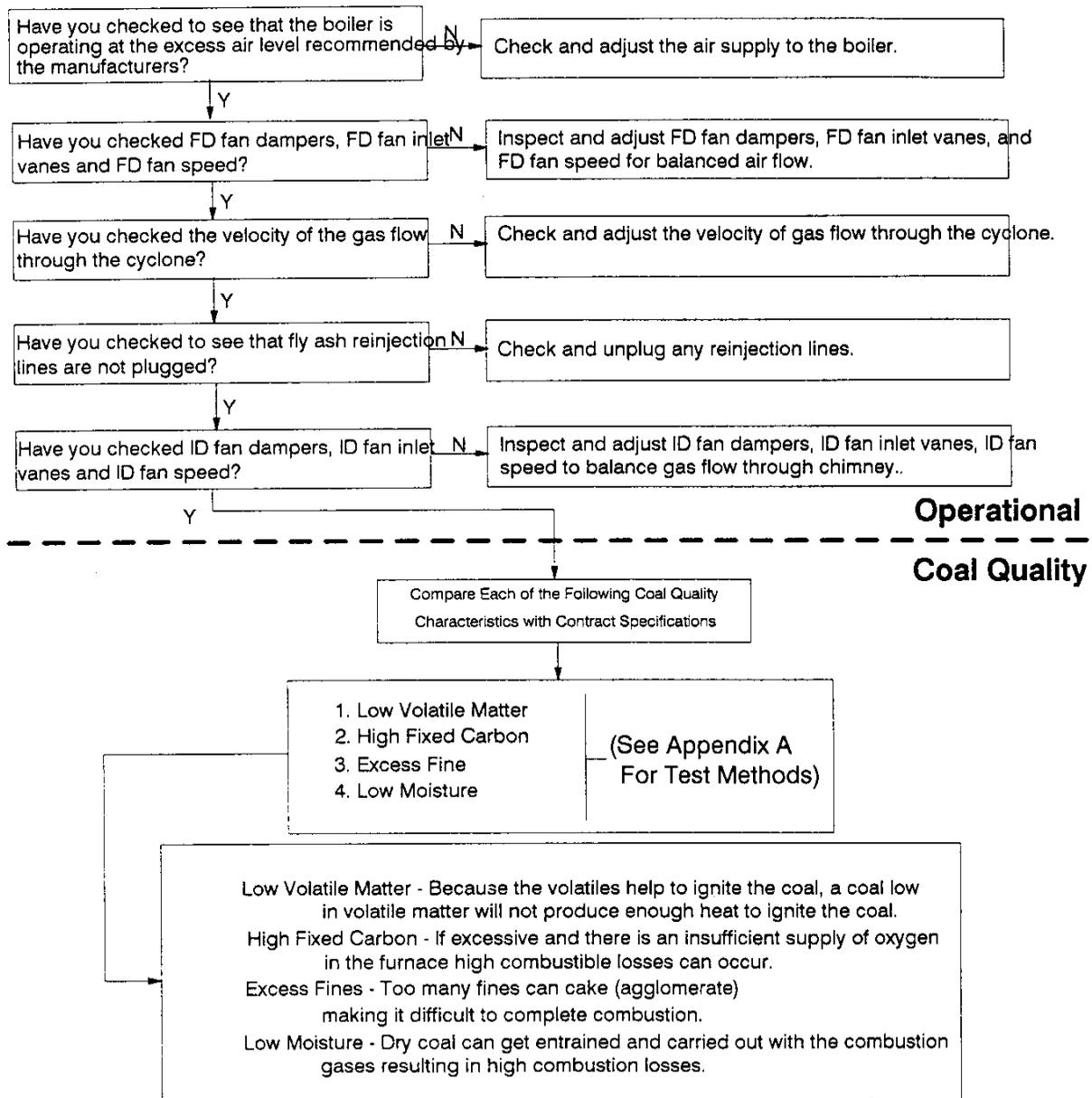
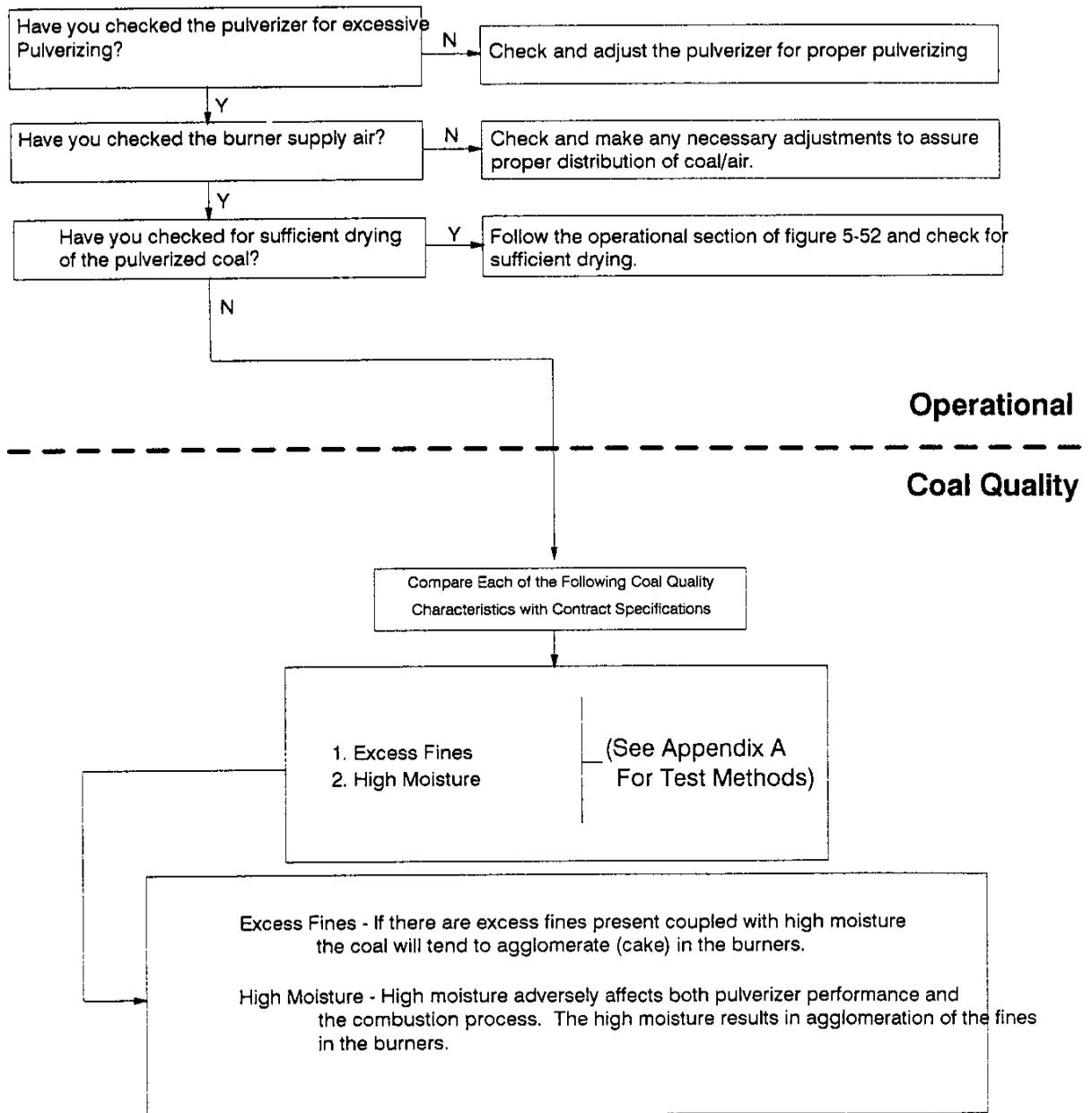
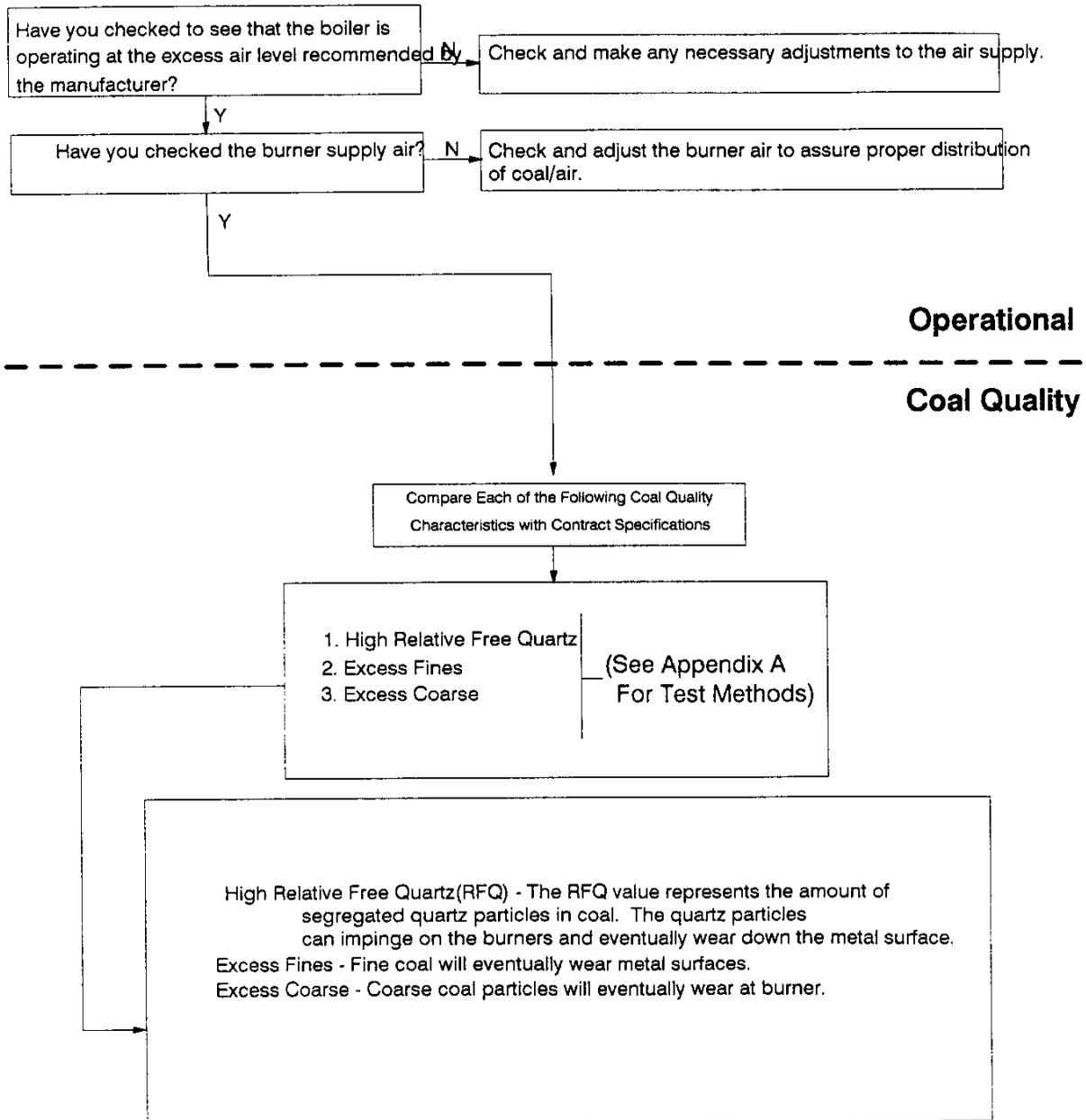


FIG5-54n/2

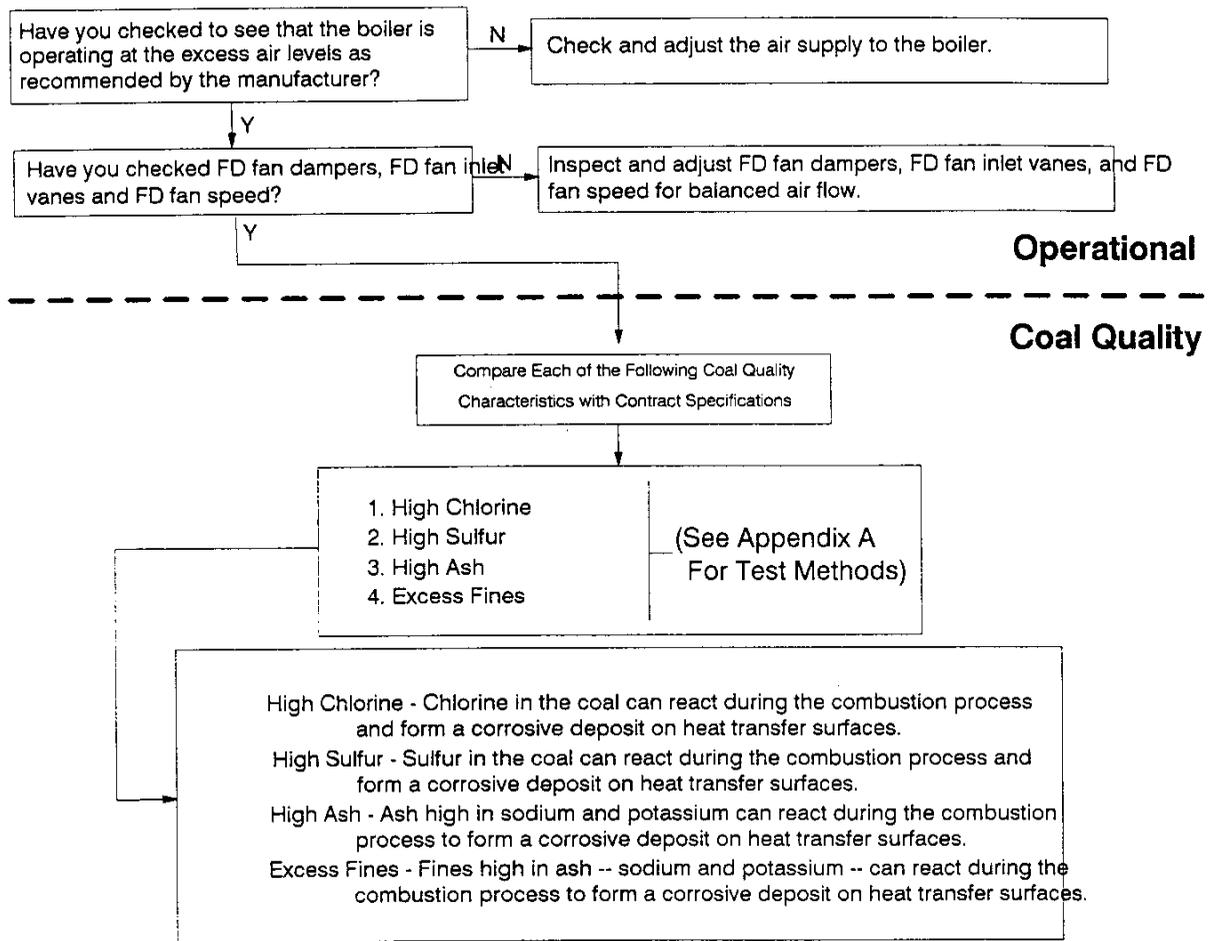
**FIGURE 5-55: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Burners**



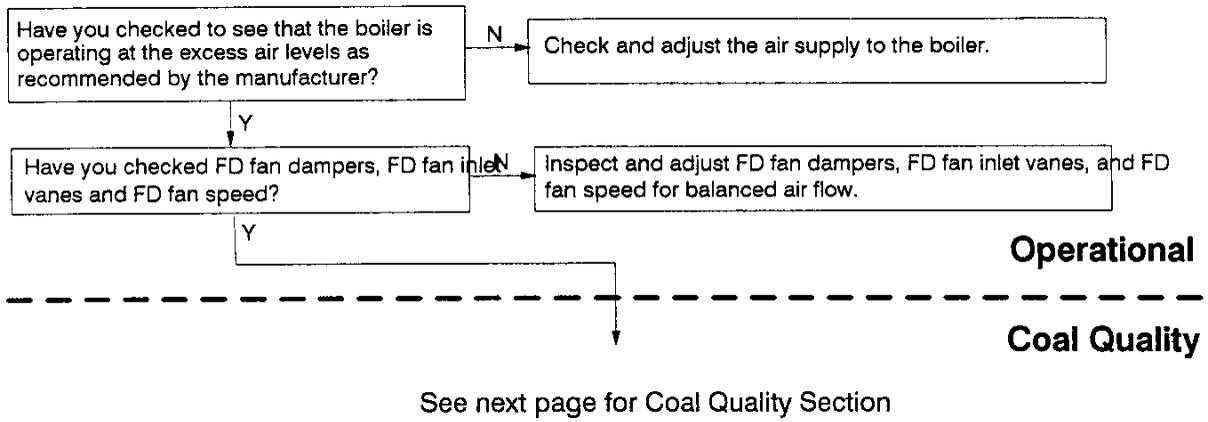
**FIGURE 5-56: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of The Burners**



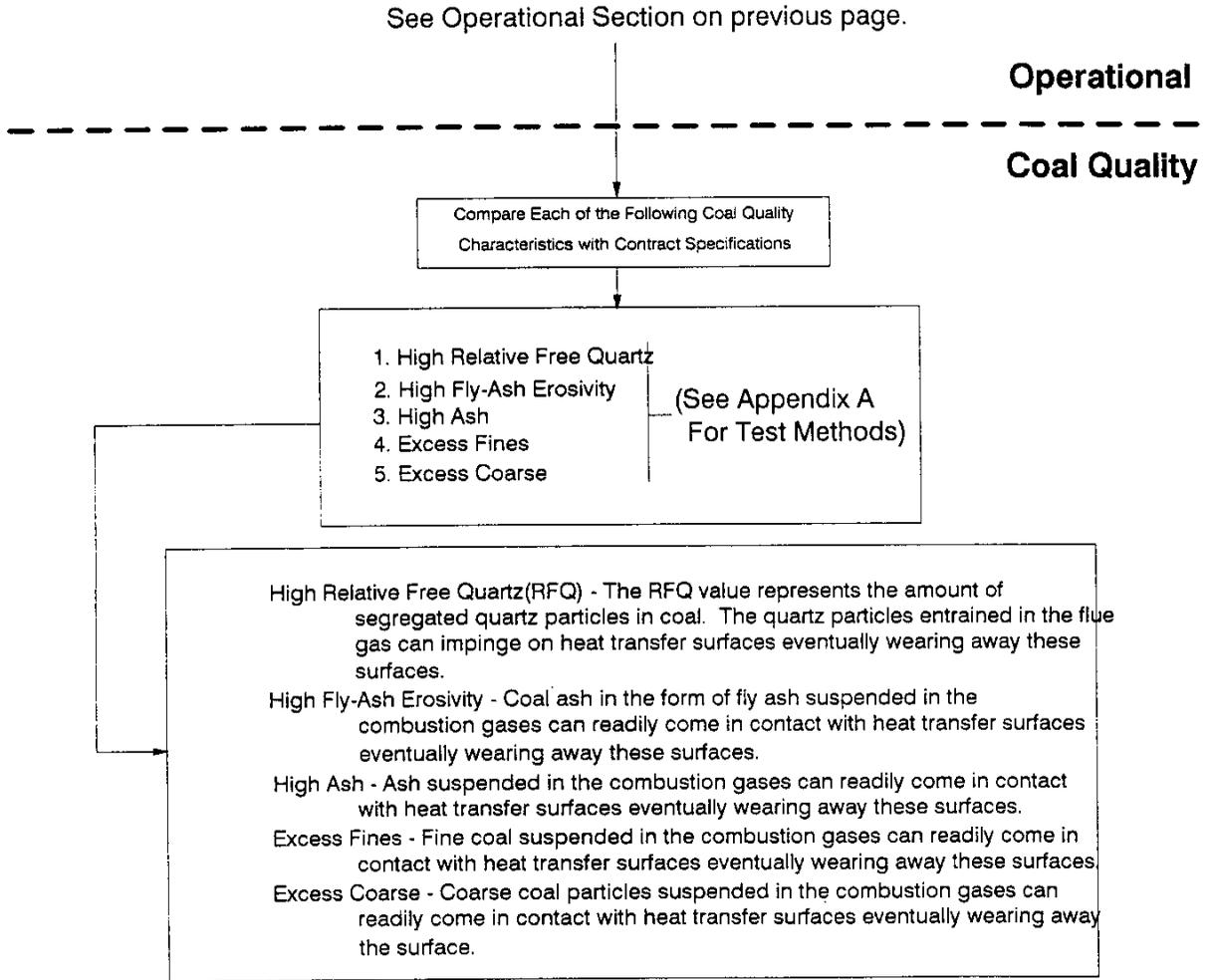
**FIGURE 5-57: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Corrosion Of The Heat Transfer Surfaces
(Boiler Tubes and Water Walls)**



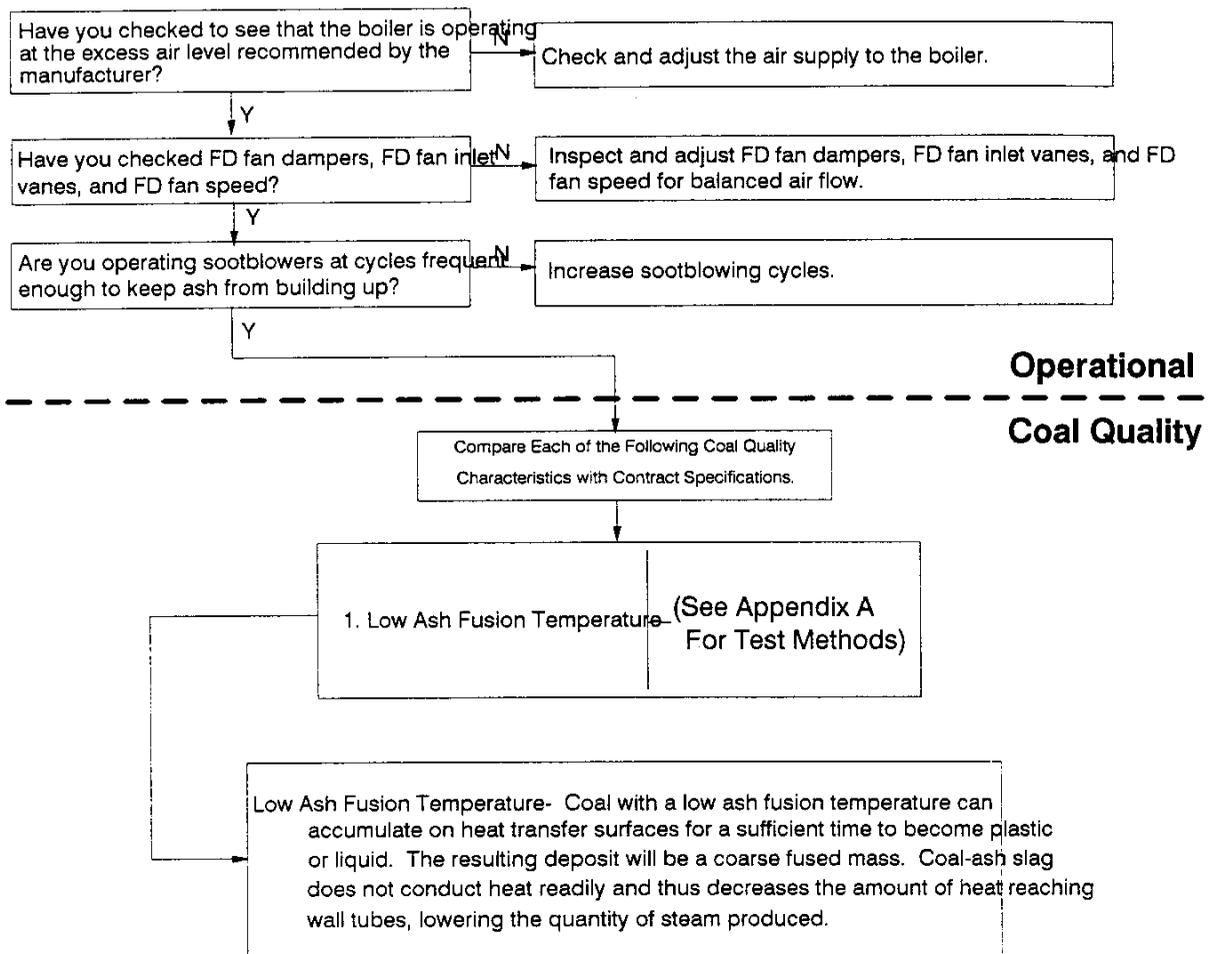
**FIGURE 5-58: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of The Heat Transfer Surfaces
(Boiler Tubes and Water Walls)**



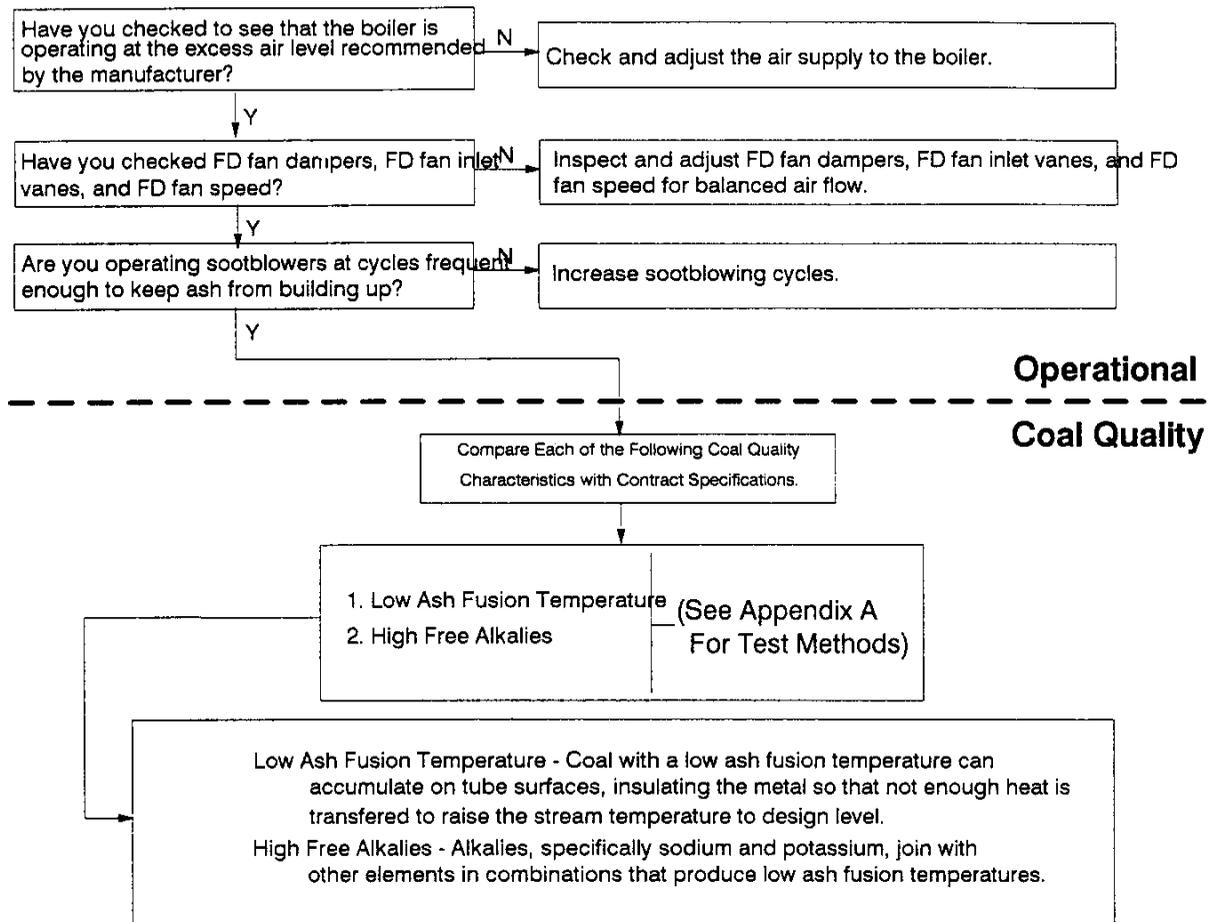
**FIGURE 5-58 (CONT'D): PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of Heat Transfer Surfaces
(Boiler Tubes and Water Walls)**



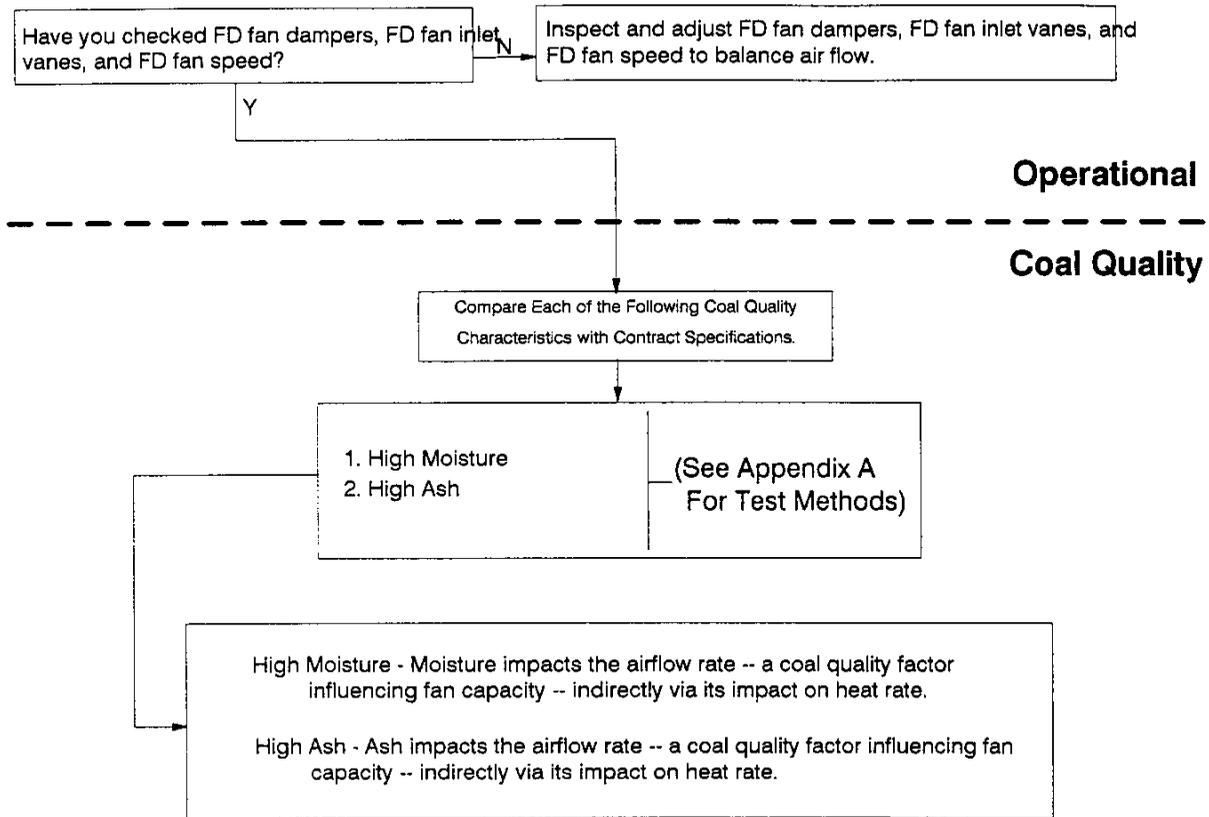
**FIGURE 5-59: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Slagging Of Heat Transfer Surfaces
(Boiler Tubes and Water Walls)**



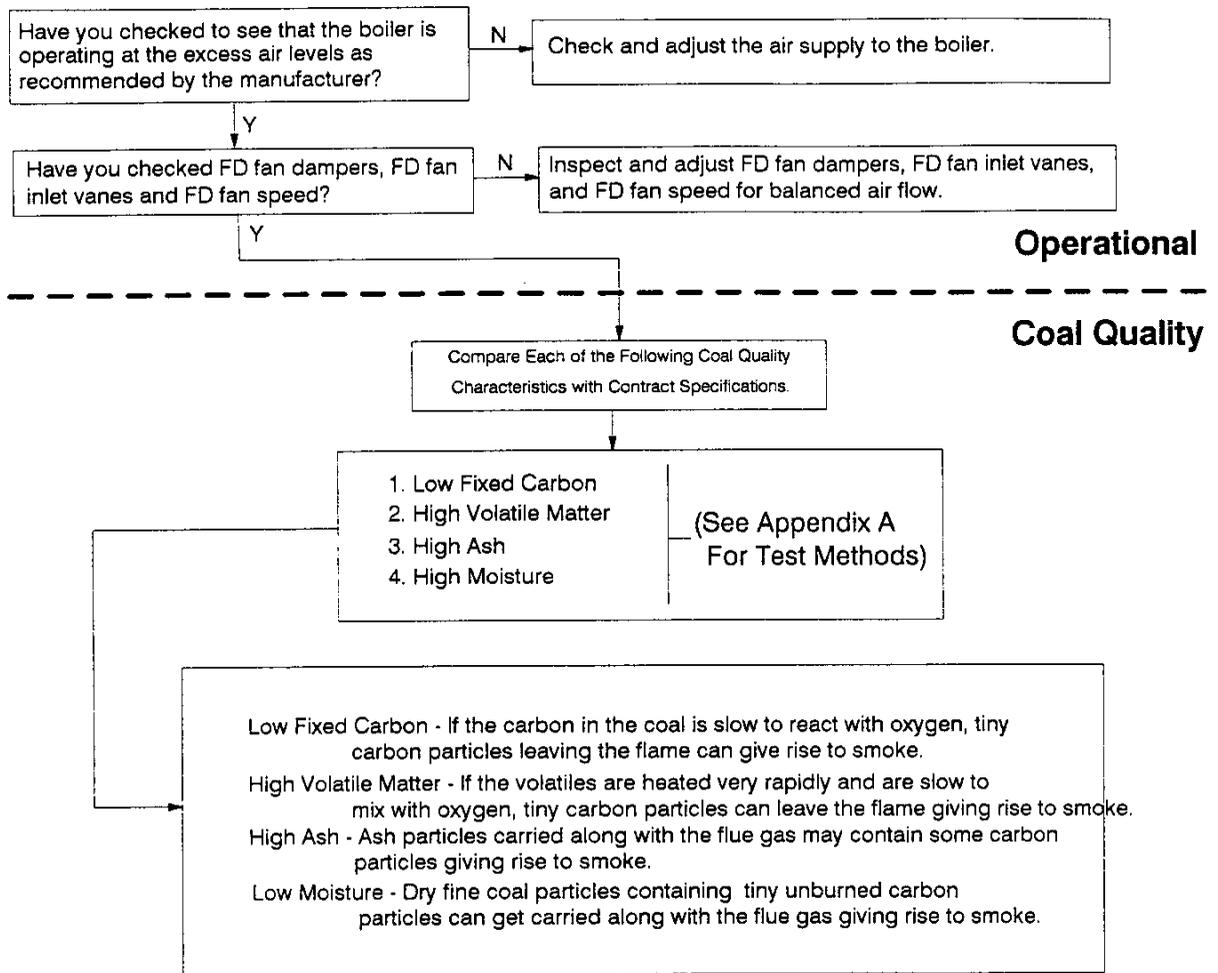
**FIGURE 5-60: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Fouling Of Heat Transfer Surfaces
(Boiler Tubes and Water Walls)**



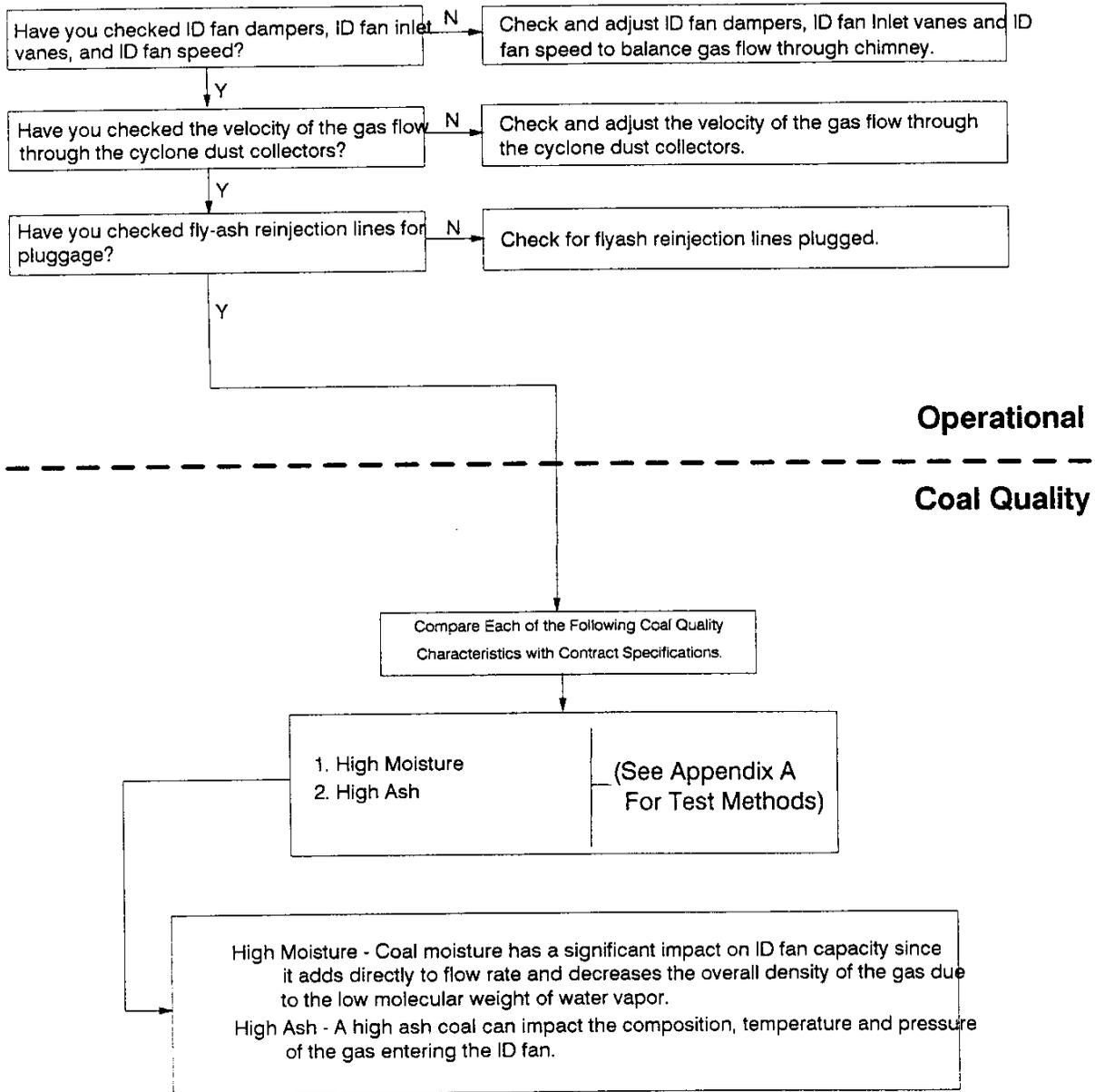
**FIGURE 5-61: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity And Inability To Meet Load
(Forced Draft Fan)**



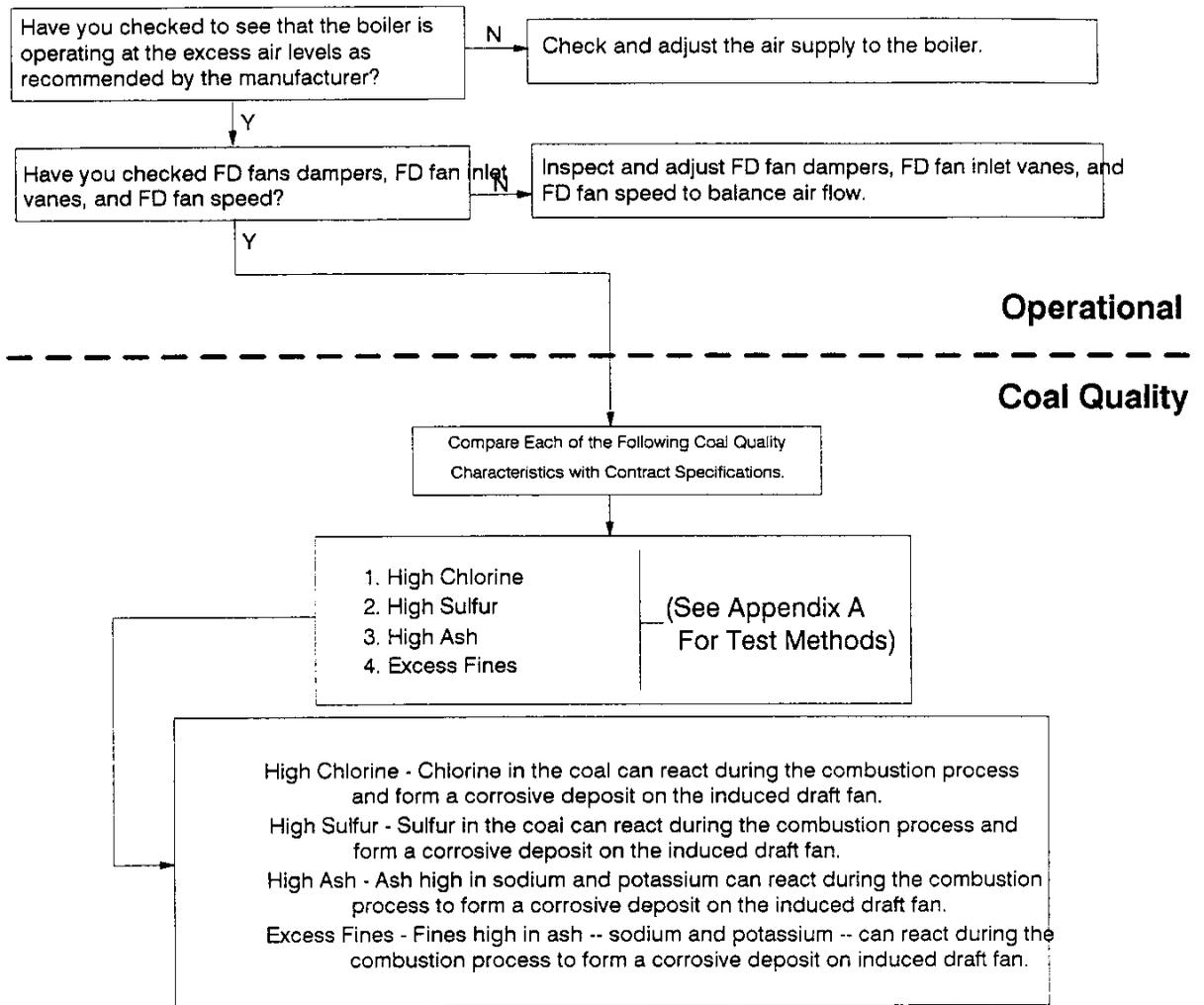
**FIGURE 5-62: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Smoking Around The Forced Draft Fan**



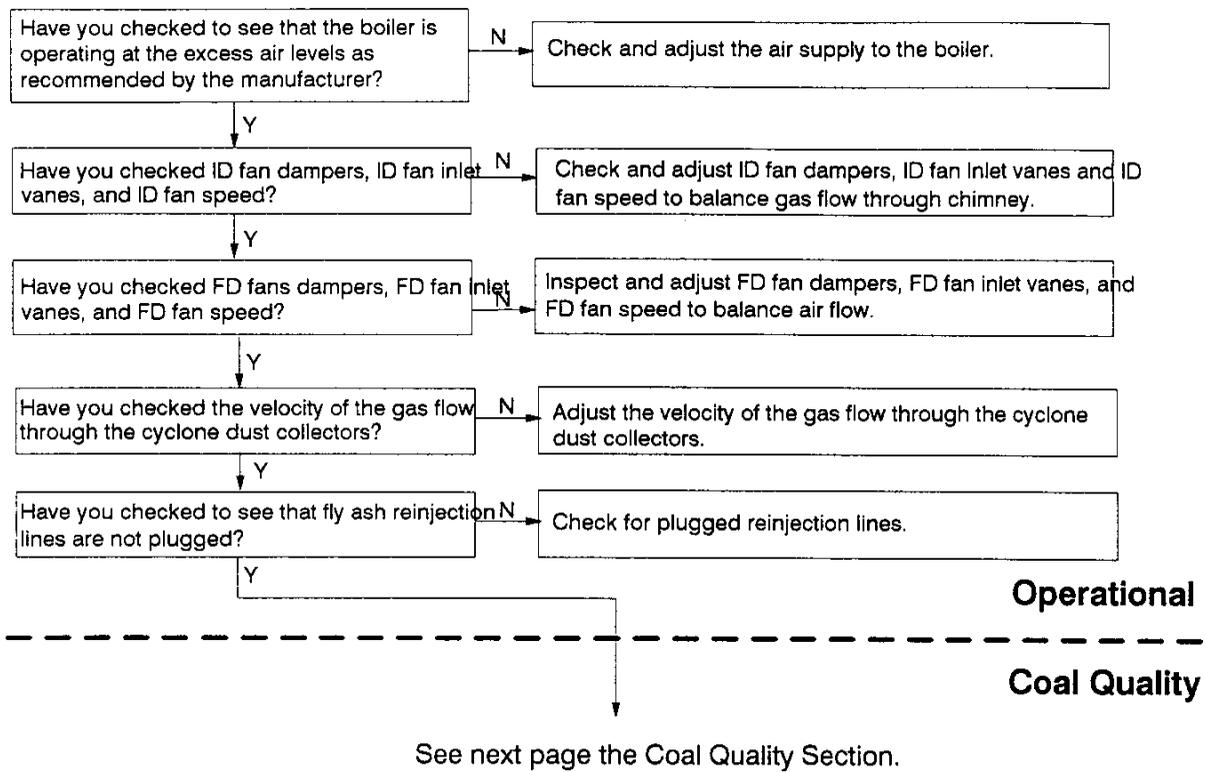
**FIGURE 5-63: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity And Inability To Meet Load
(Induced Draft Fan)**



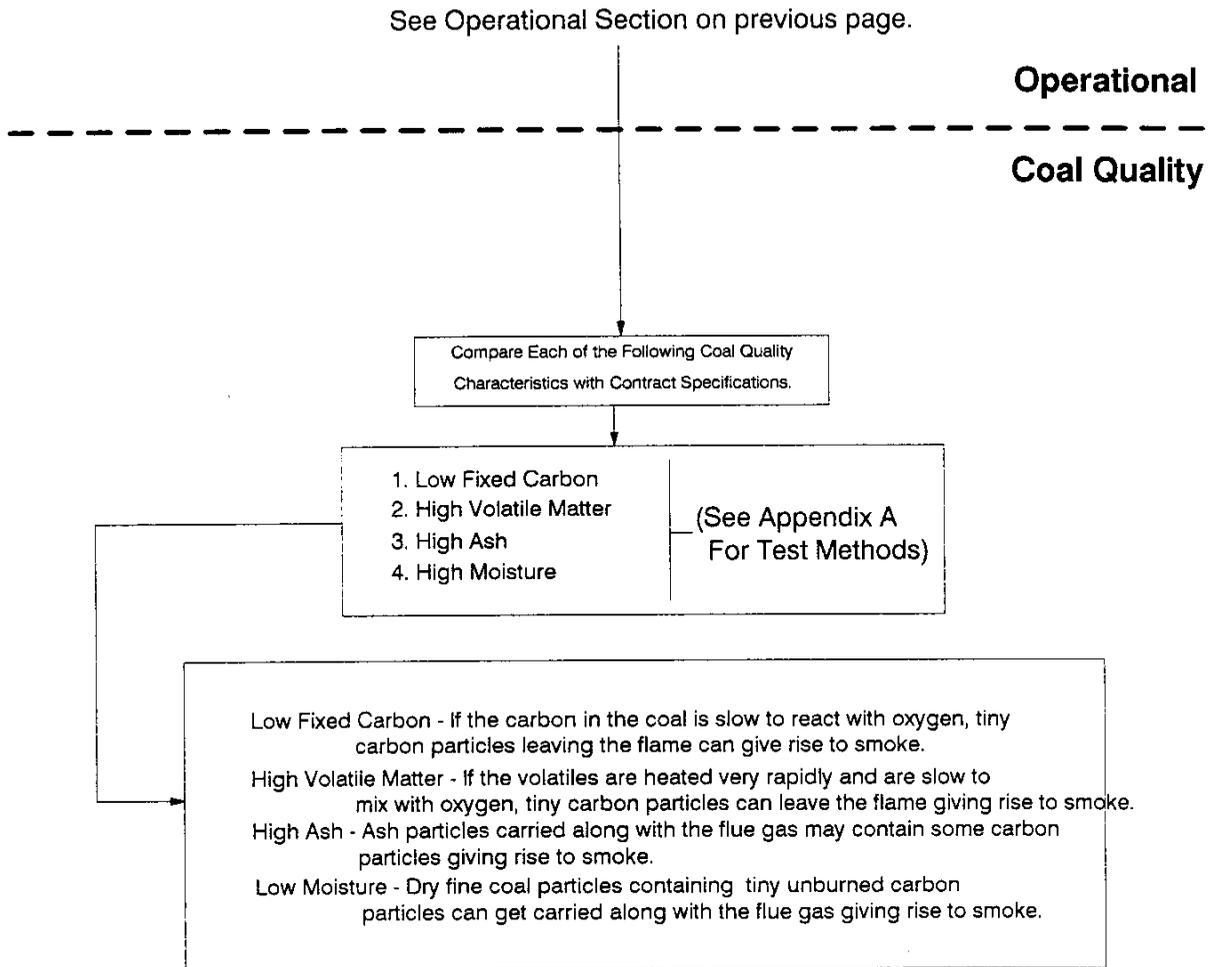
**FIGURE 5-64: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Corrosion Of The Induced Draft Fan**



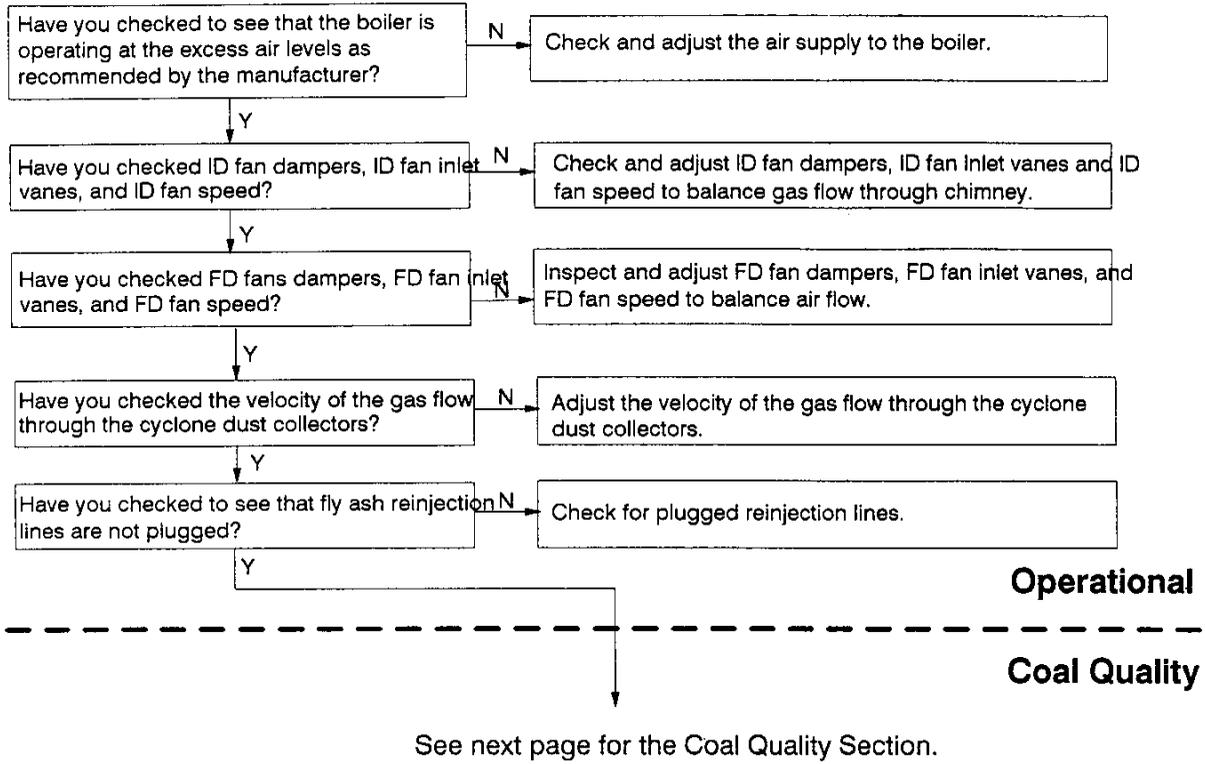
**FIGURE 5-65: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Smoking From The Induced Draft Fan**



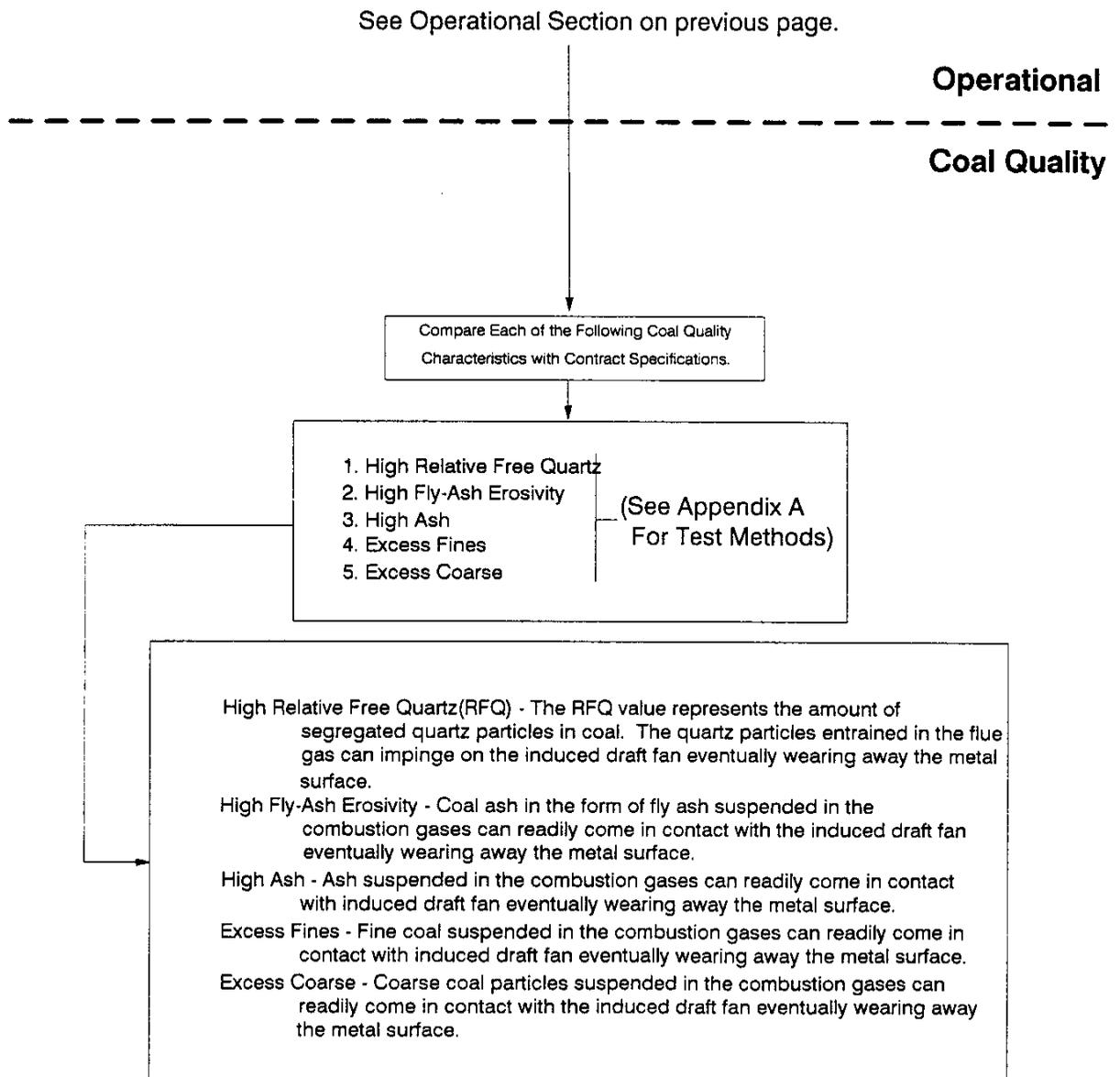
**FIGURE 5-65 (CONT'D): PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Smoking From The Induced Draft Fan**



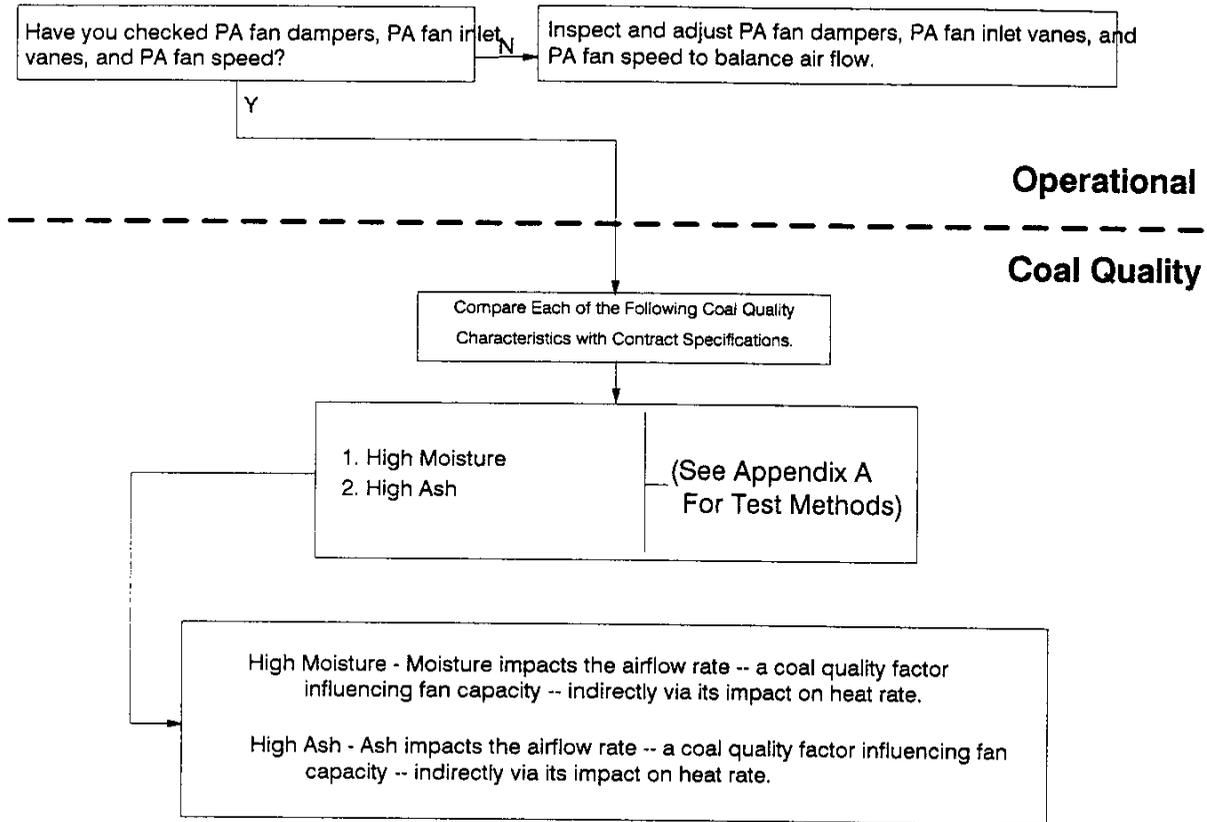
**FIGURE 5-66: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of The Induced Draft Fan**



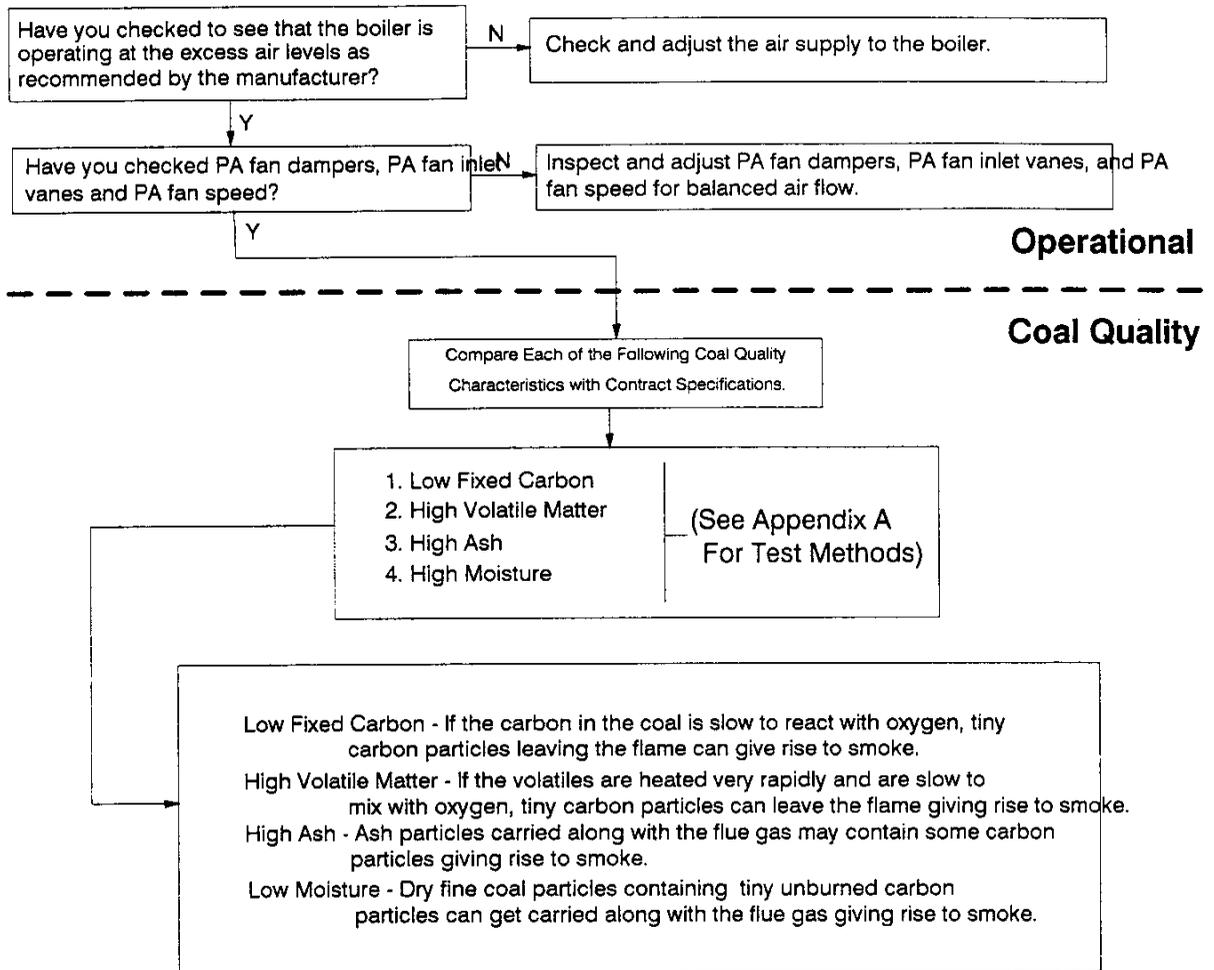
**FIGURE 5-66 (CONT'D): PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of The Induced Draft Fan**



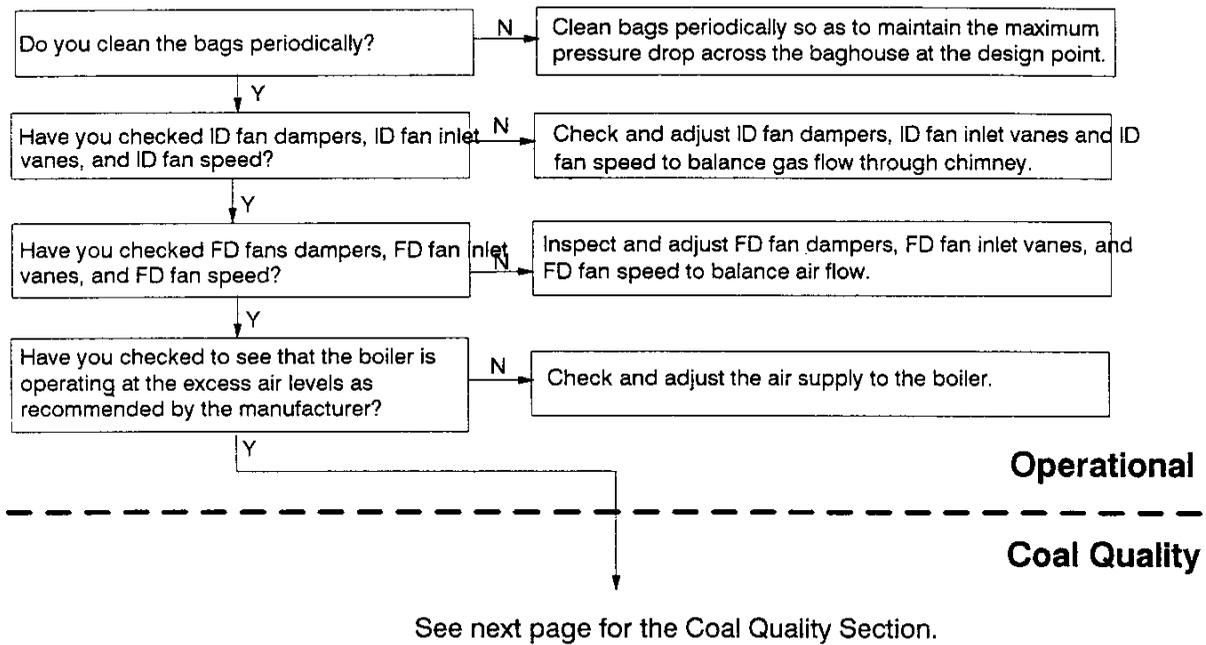
**FIGURE 5-67: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity And Inability To Meet Load
(Primary Air Fan)**



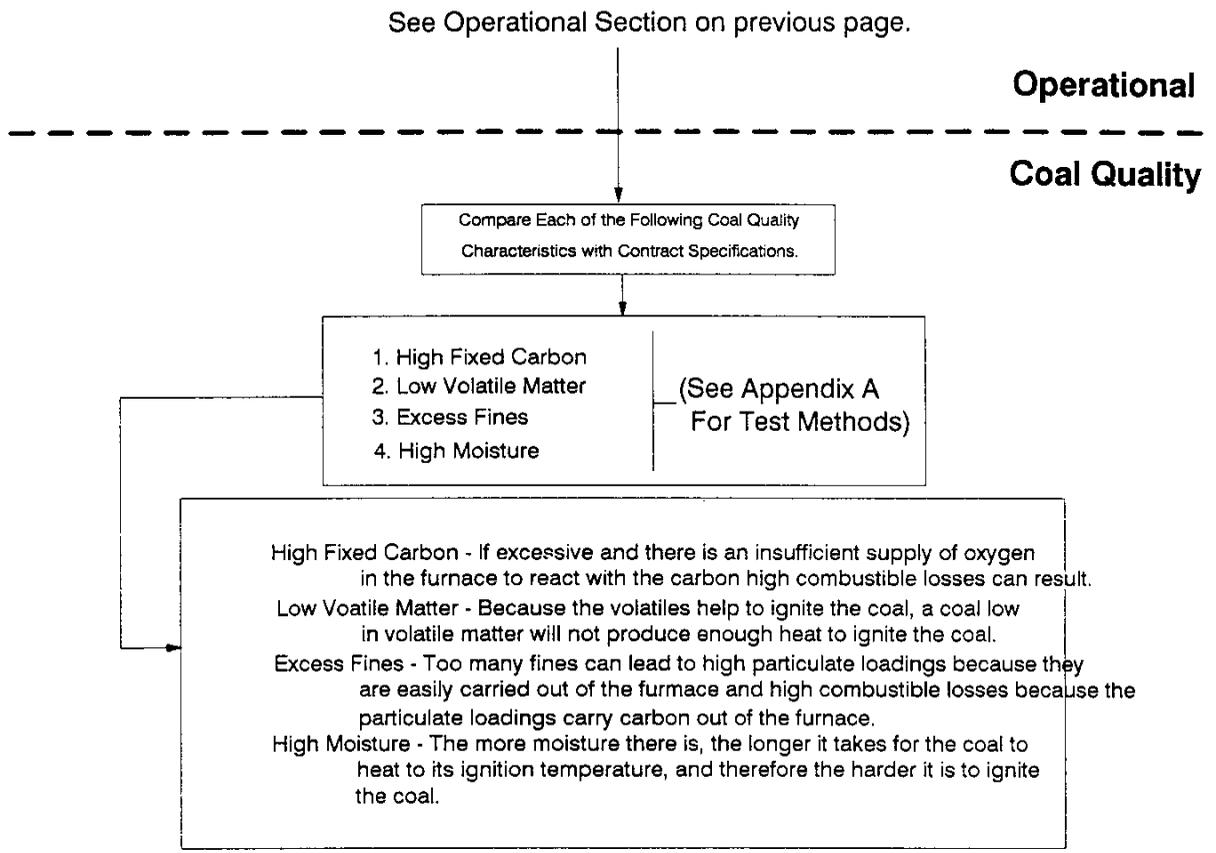
**FIGURE 5-68: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Smoking Around The Primary Air Fan**



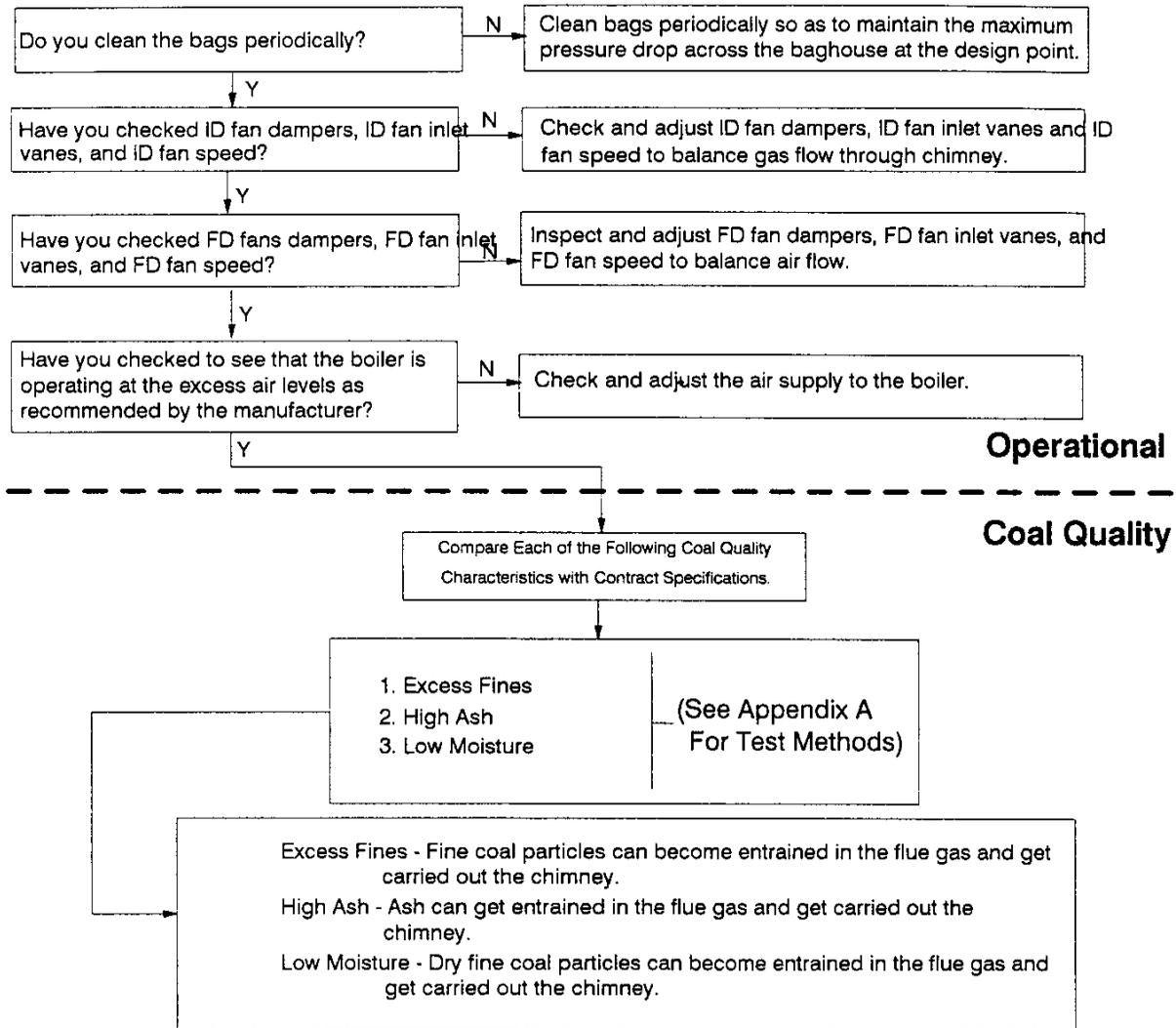
**FIGURE 5-69: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout From The Particulate Removal System
(Baghouse)**



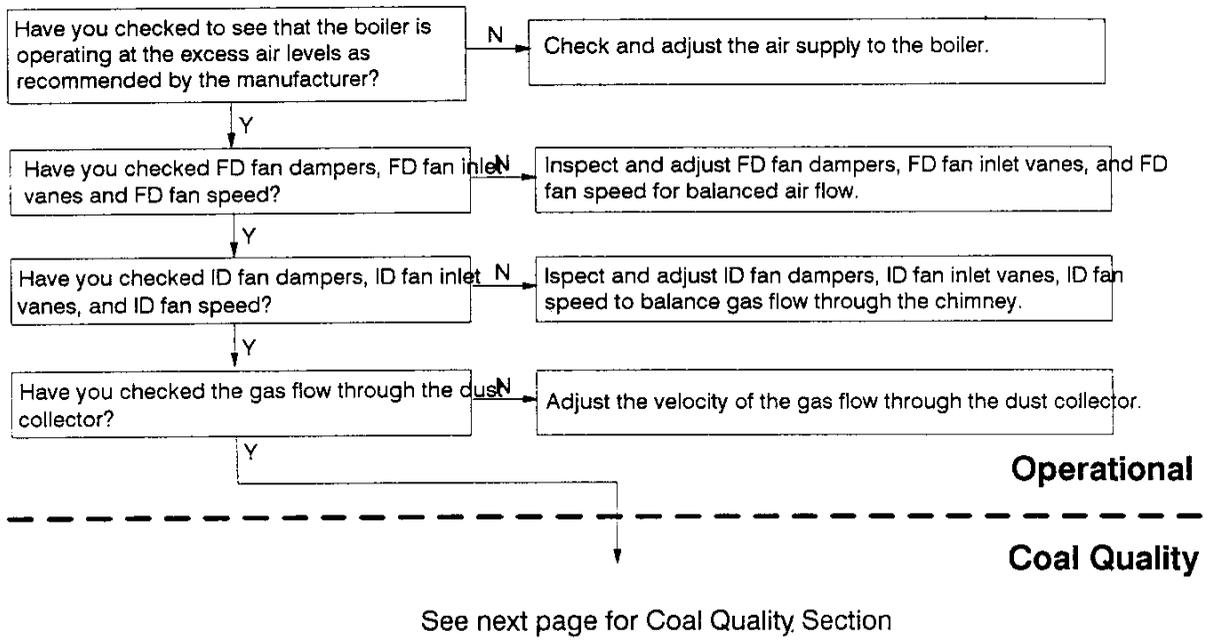
**FIGURE 5-69 (CONT'D): PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout From The Particulate Removal System
(Baghouse)**



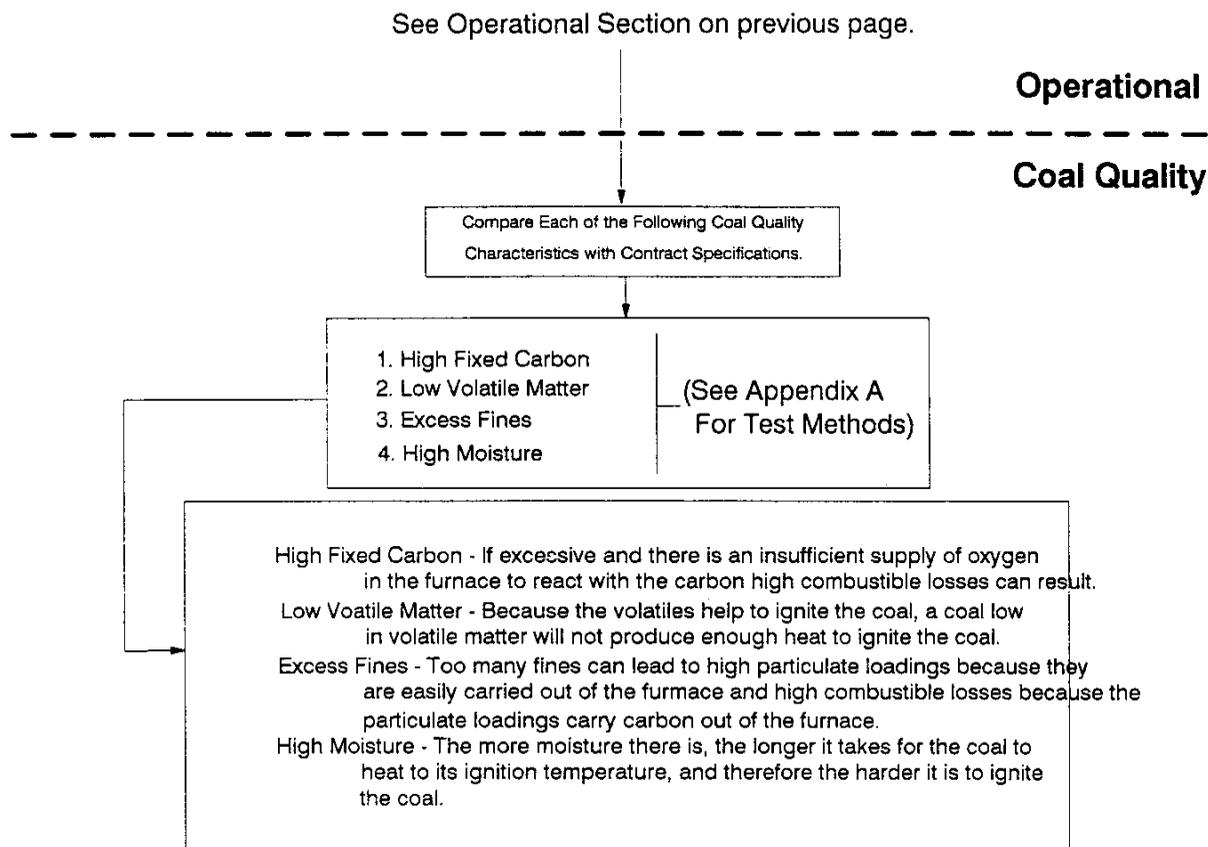
**FIGURE 5-70: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Excess Particulate Emissions From The Particulate Removal System
(Baghouse)**



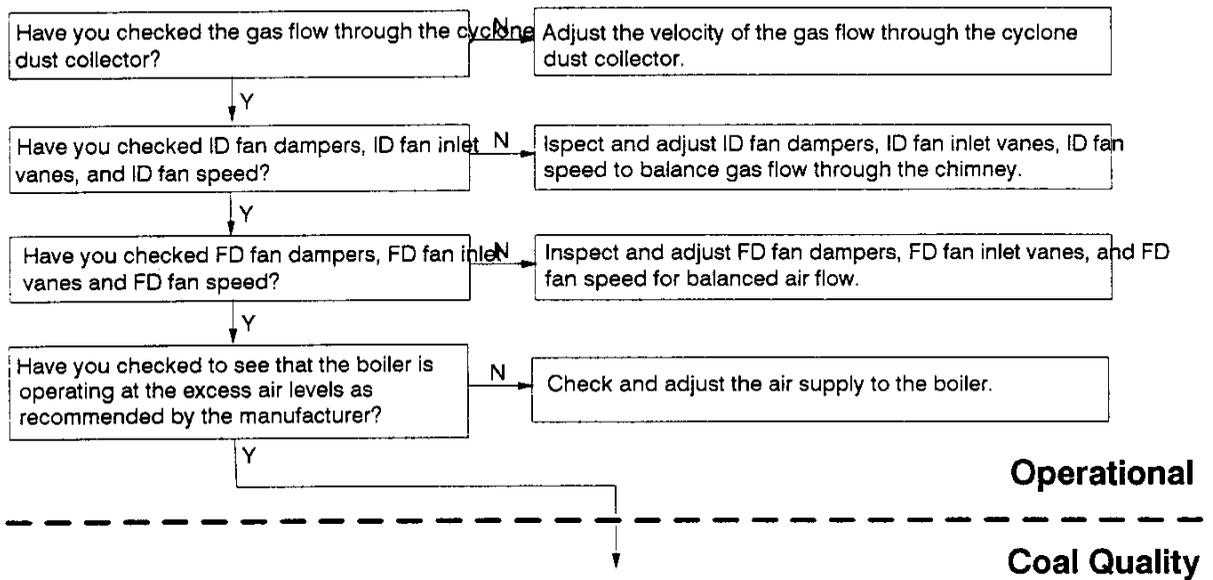
**FIGURE 5-71: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Particulate Removal System
(Cyclone)**



**FIGURE 5-71 (CONT'D): PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Particulate Removal System
(Cyclone)**

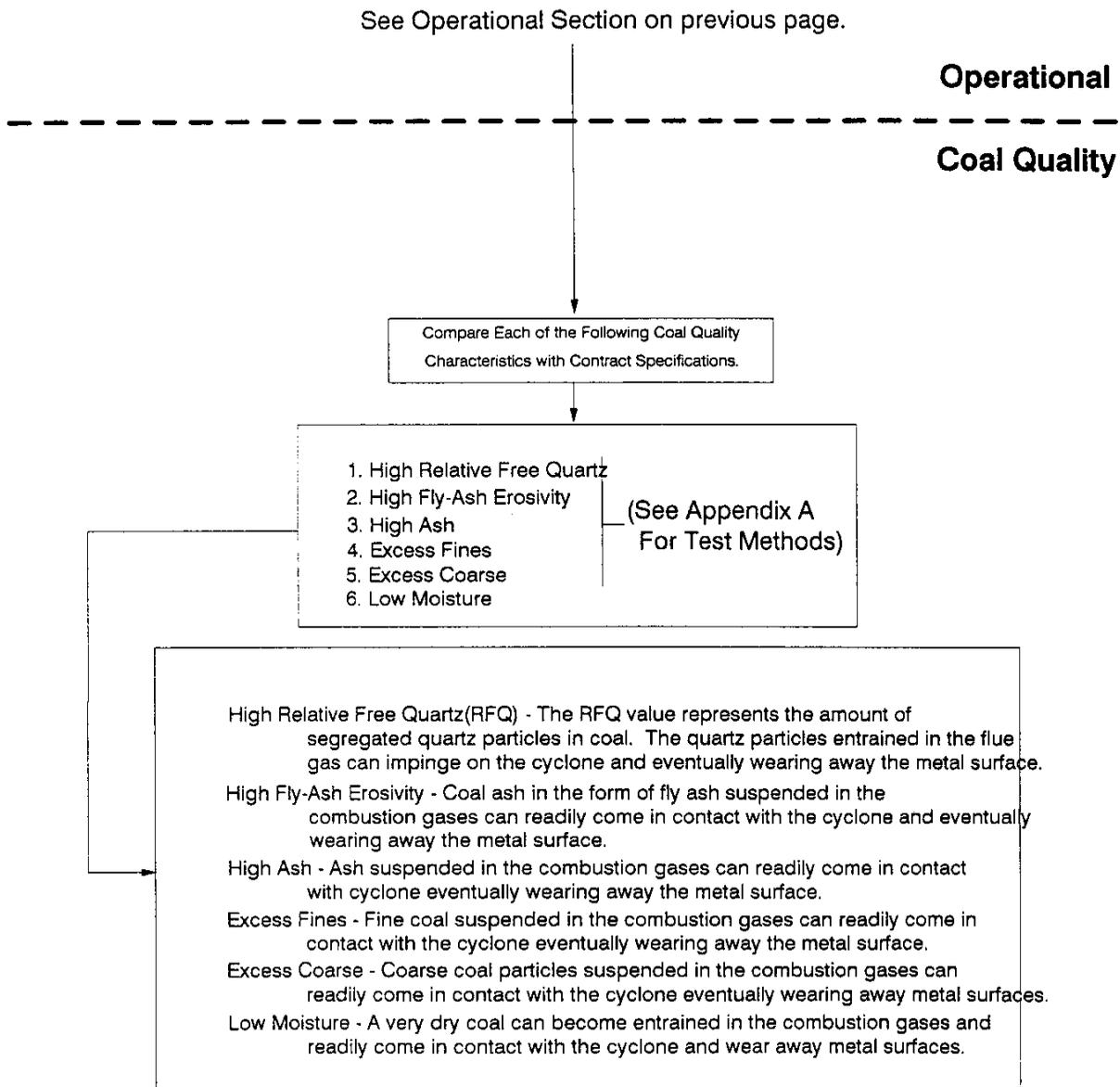


**FIGURE 5-72: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erosion In The Particulate Removal System
(Cyclone)**

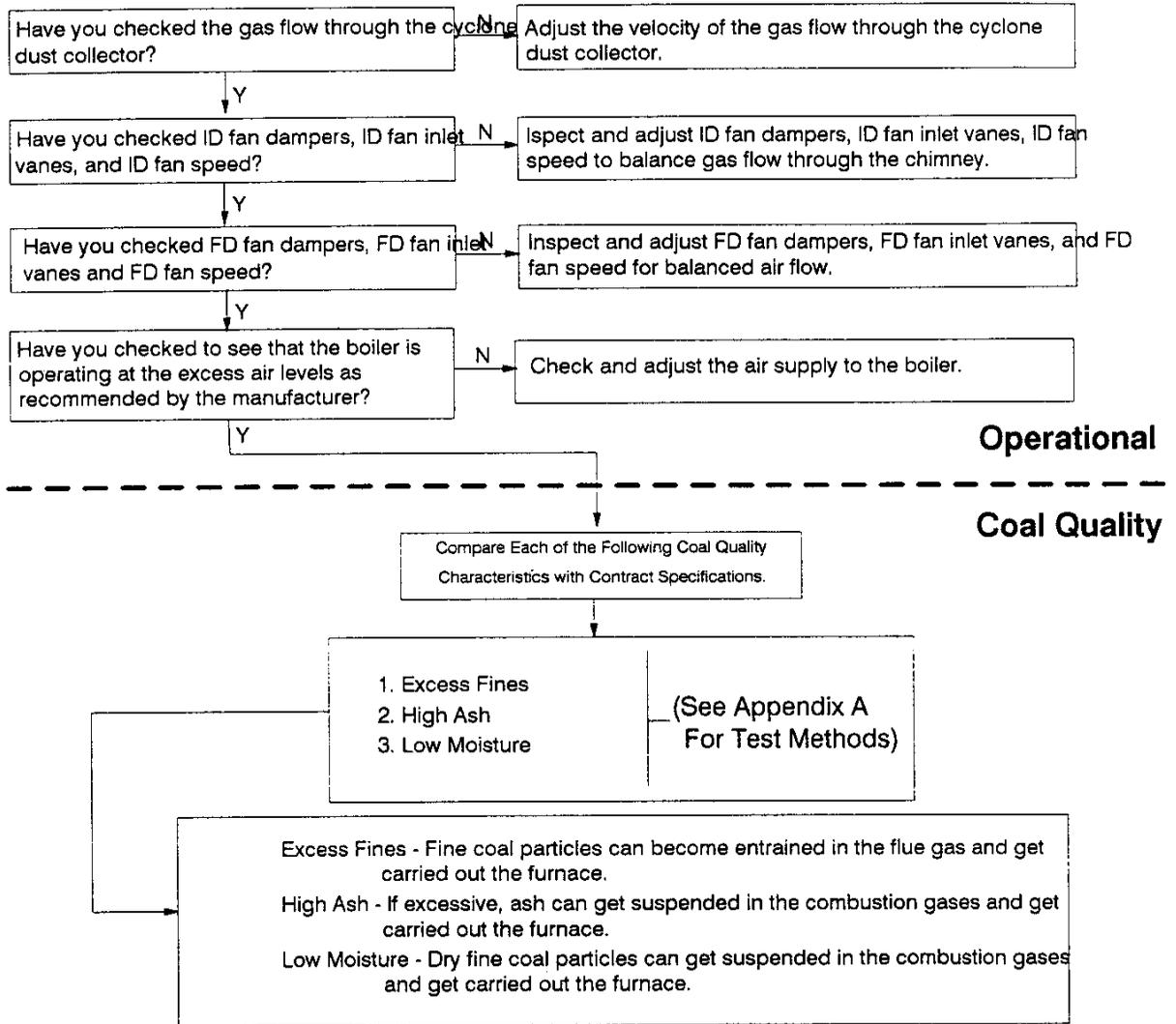


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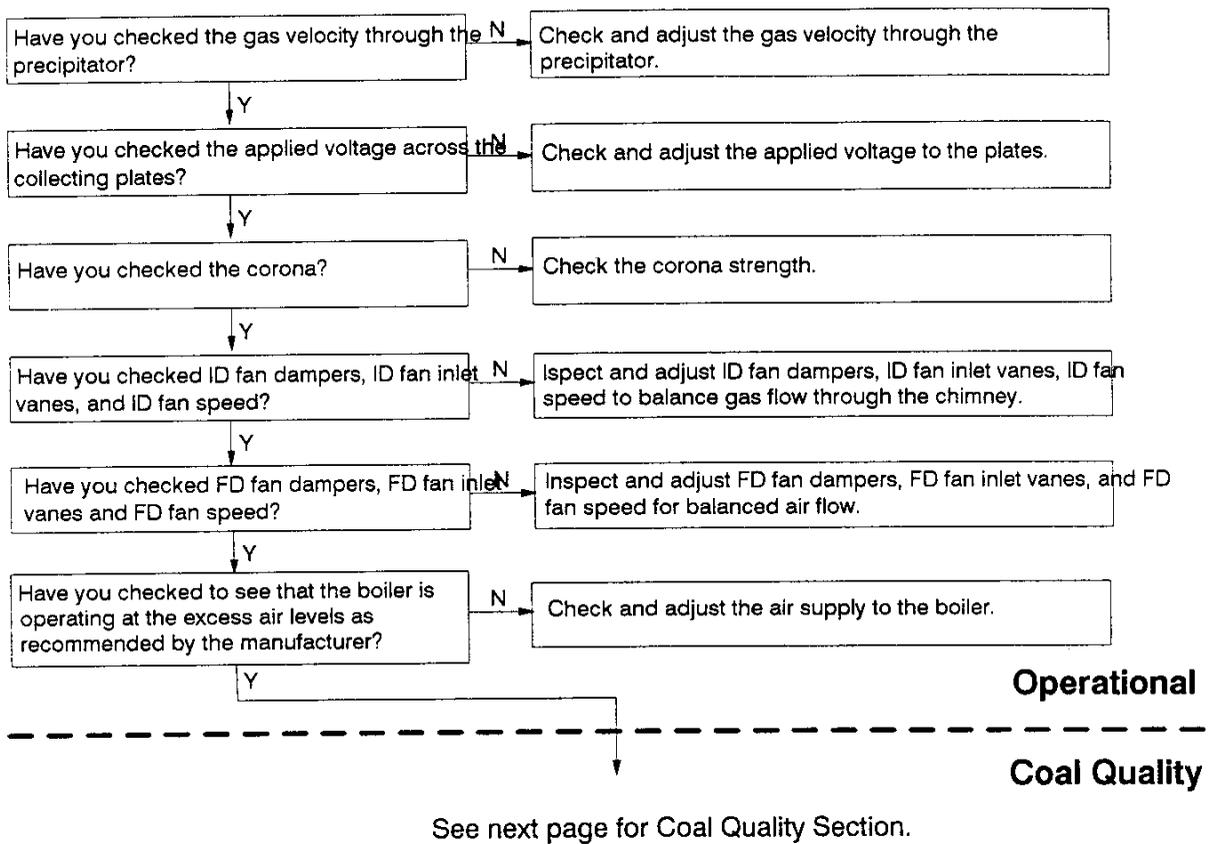
**FIGURE 5-72 (CONT'D): PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erosion In The Particulate Removal System
(Cyclone)**



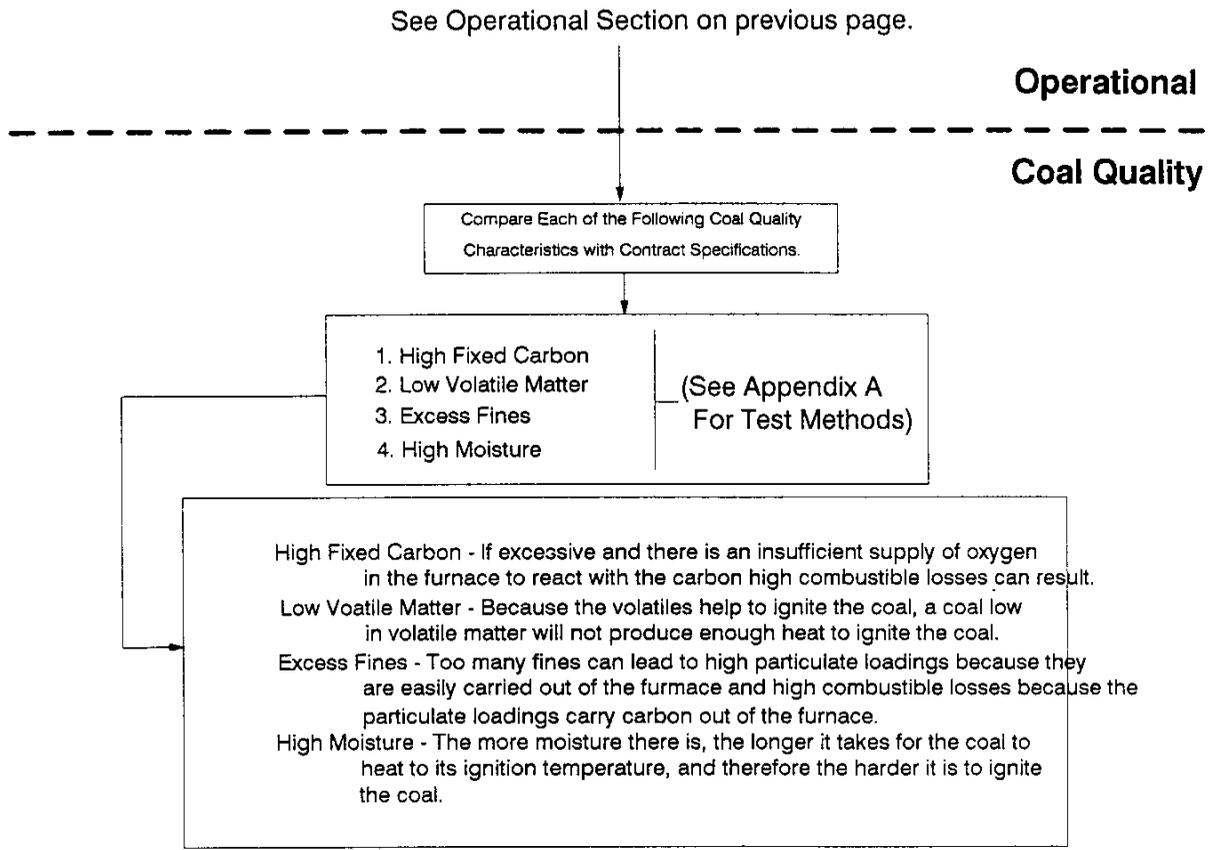
**FIGURE 5-73: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Excess Particulate Emissions From The Particulate Removal System
(Cyclone)**



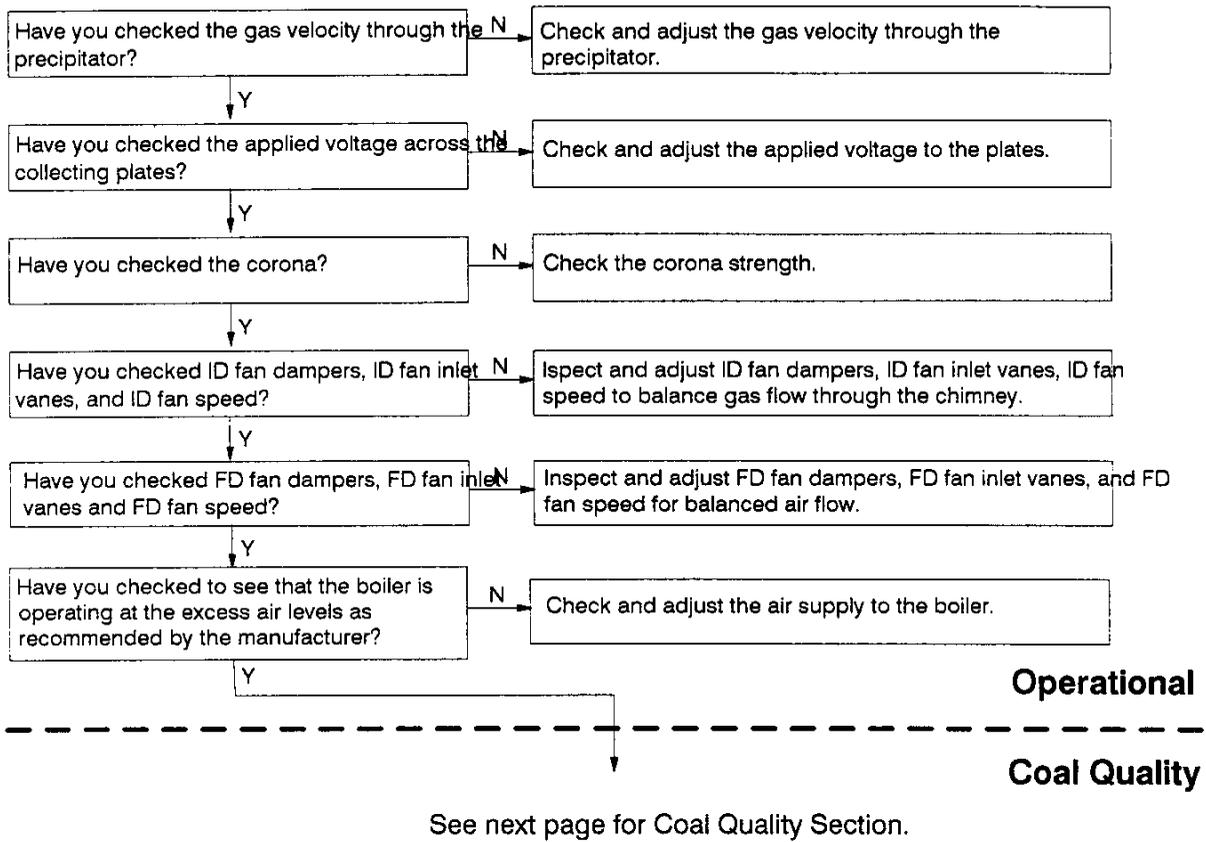
**FIGURE 5-74: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Particulate Removal System
(Electrostatic Precipitator)**



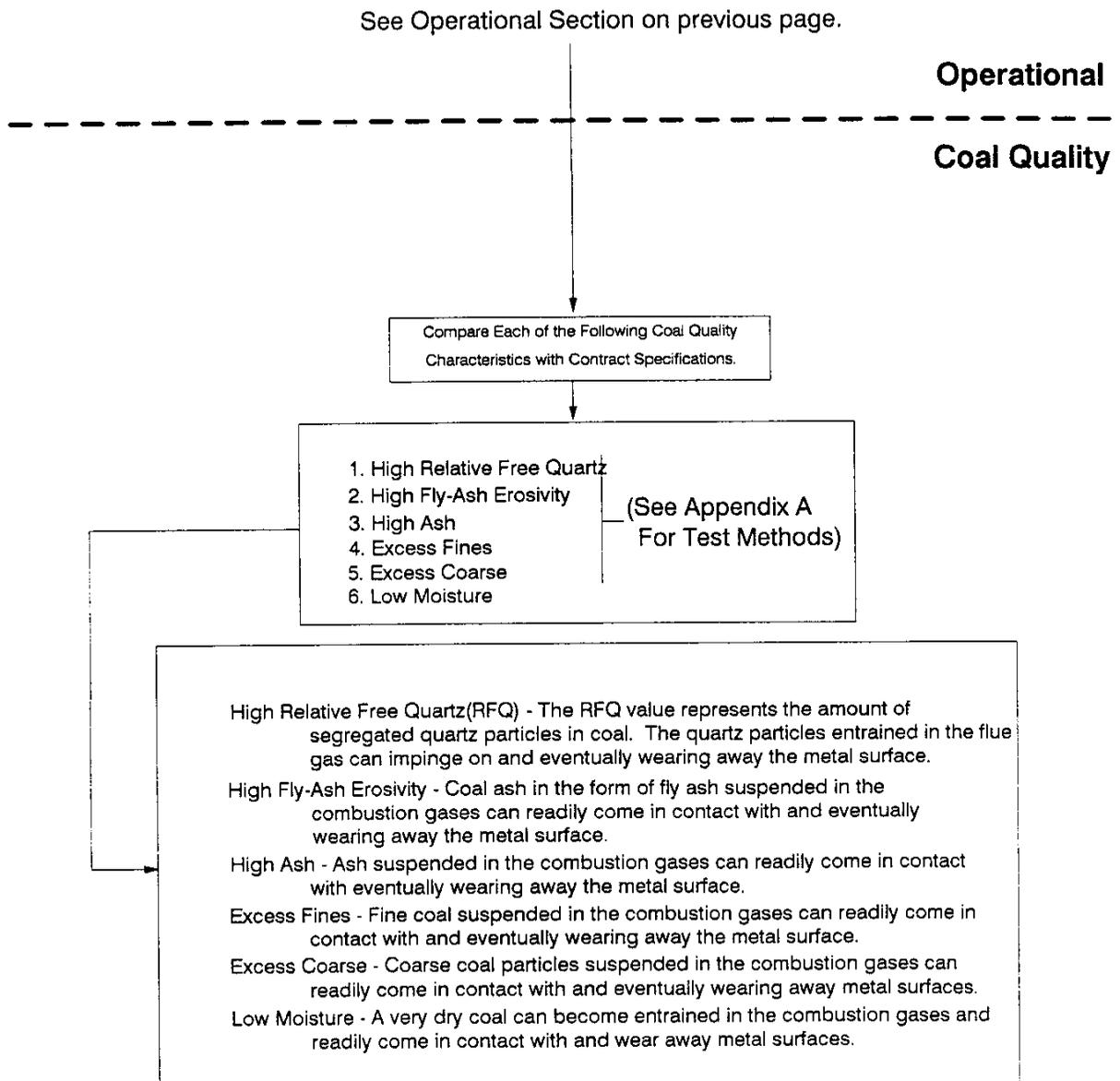
**FIGURE 5-74 (CONT'D): PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Particulate Removal System
(Electrostatic Precipitator)**



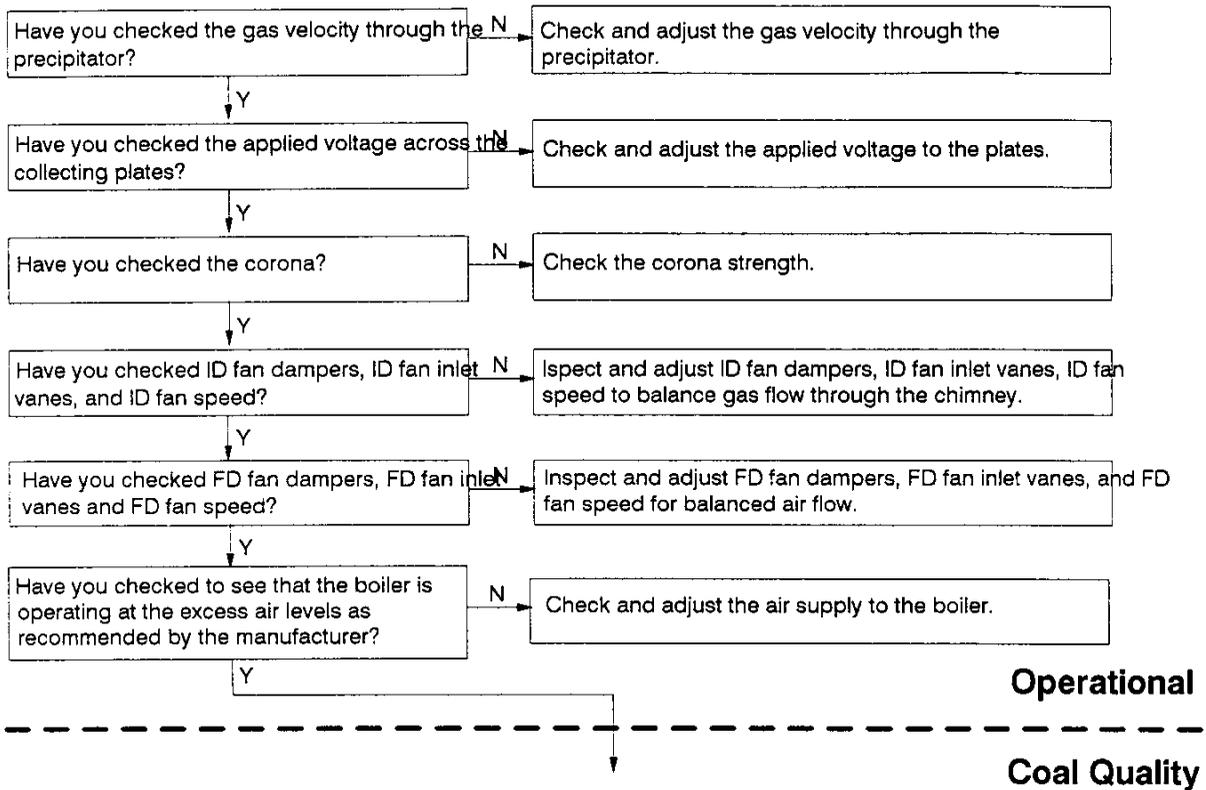
**FIGURE 5-75: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of The Particulate Removal System
(Electrostatic Precipitator)**



**FIGURE 5-75 (CONT'D): PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of The Particulate Removal System
(Electrostatic Precipitator)**

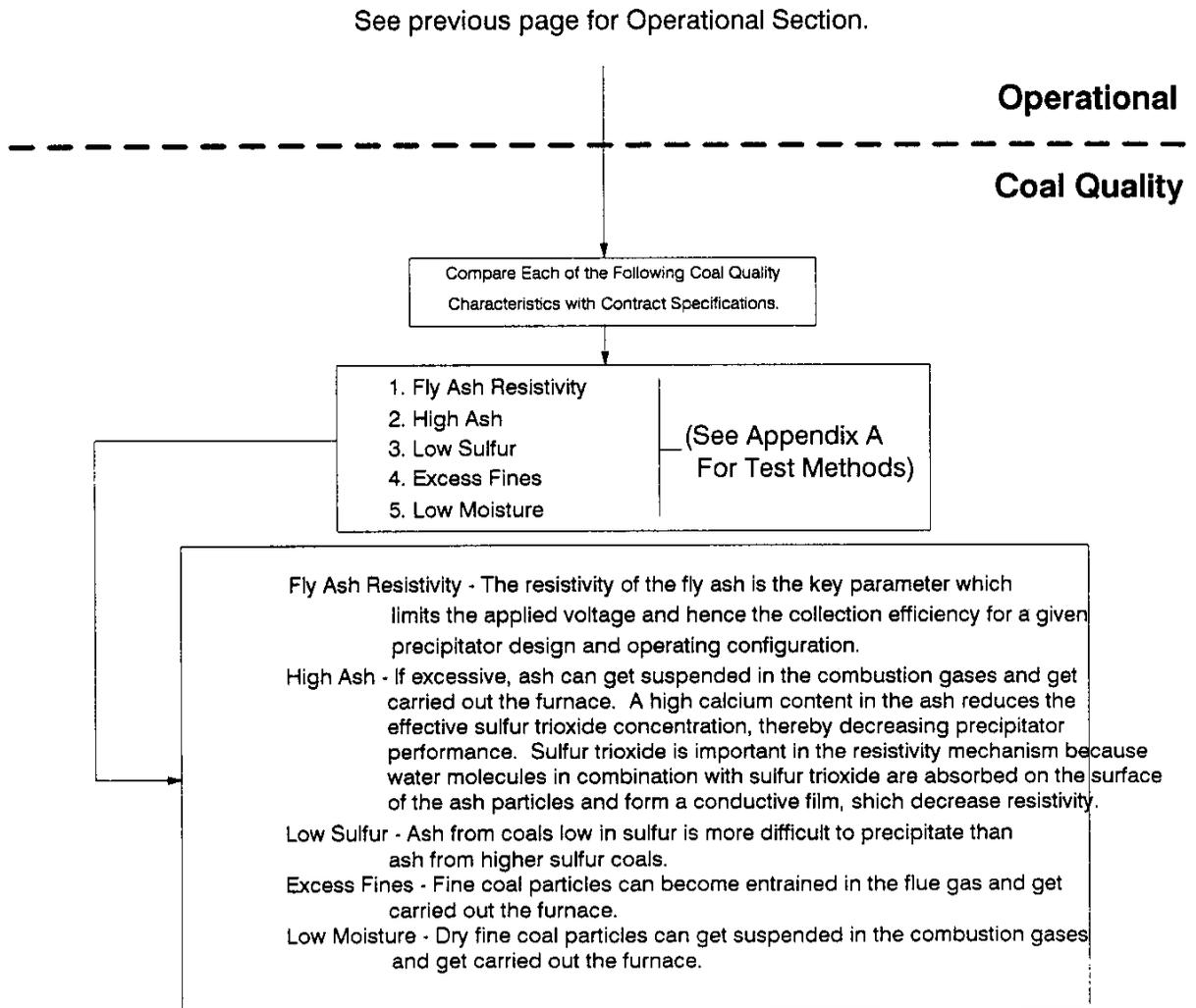


**FIGURE 5-76: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Excess Particulate Emissions From The Particulate Removal System
(Electrostatic Precipitator)**

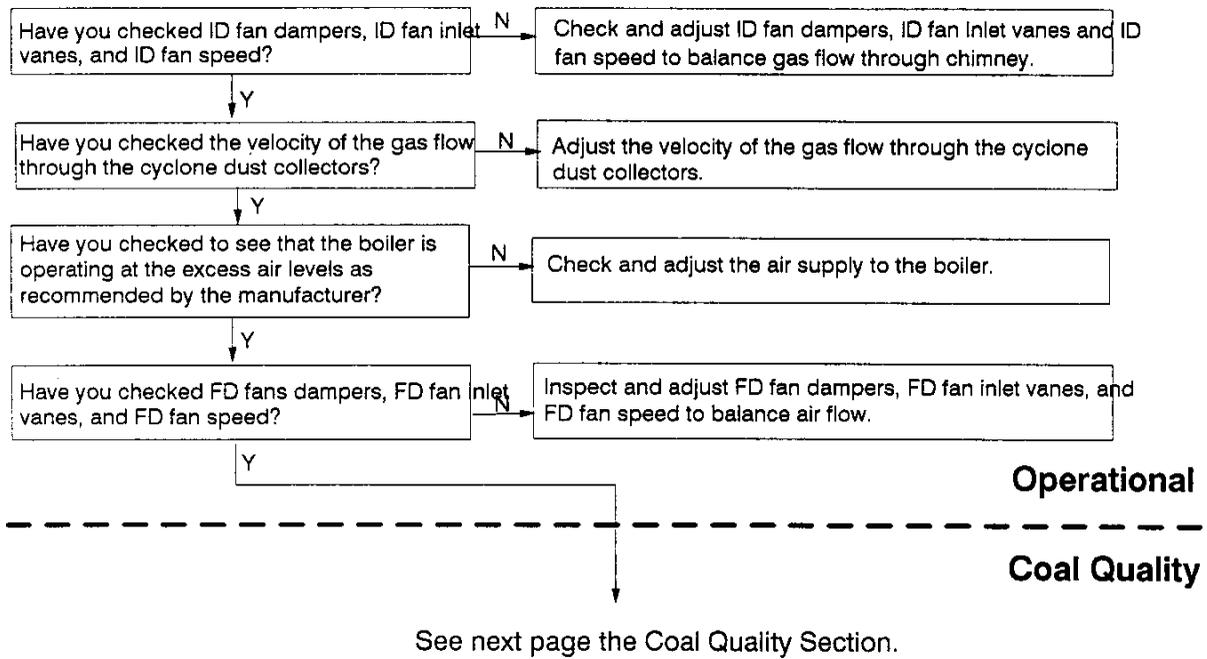


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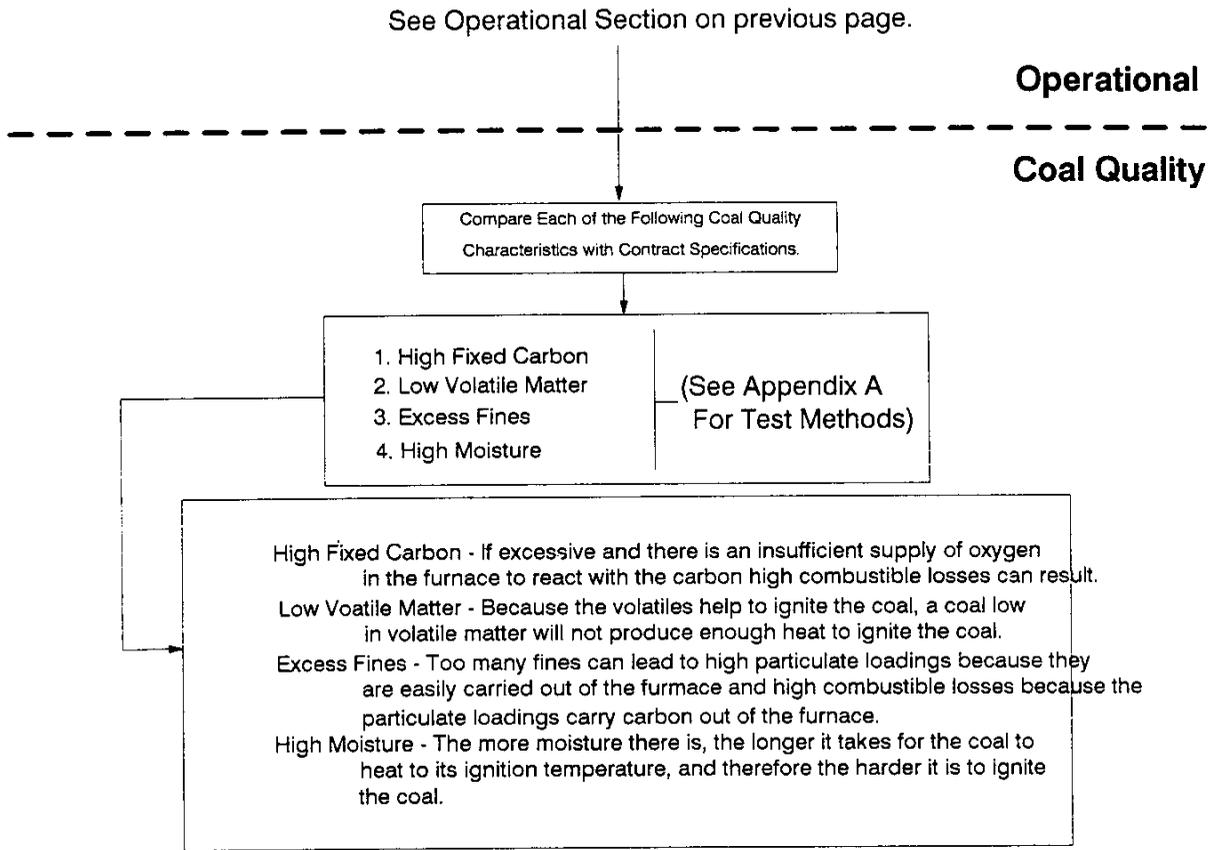
**FIGURE 5-76 (CONT'D): PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Excess Particulate Emissions From The Particulate Removal System
(Electrostatic Precipitator)**



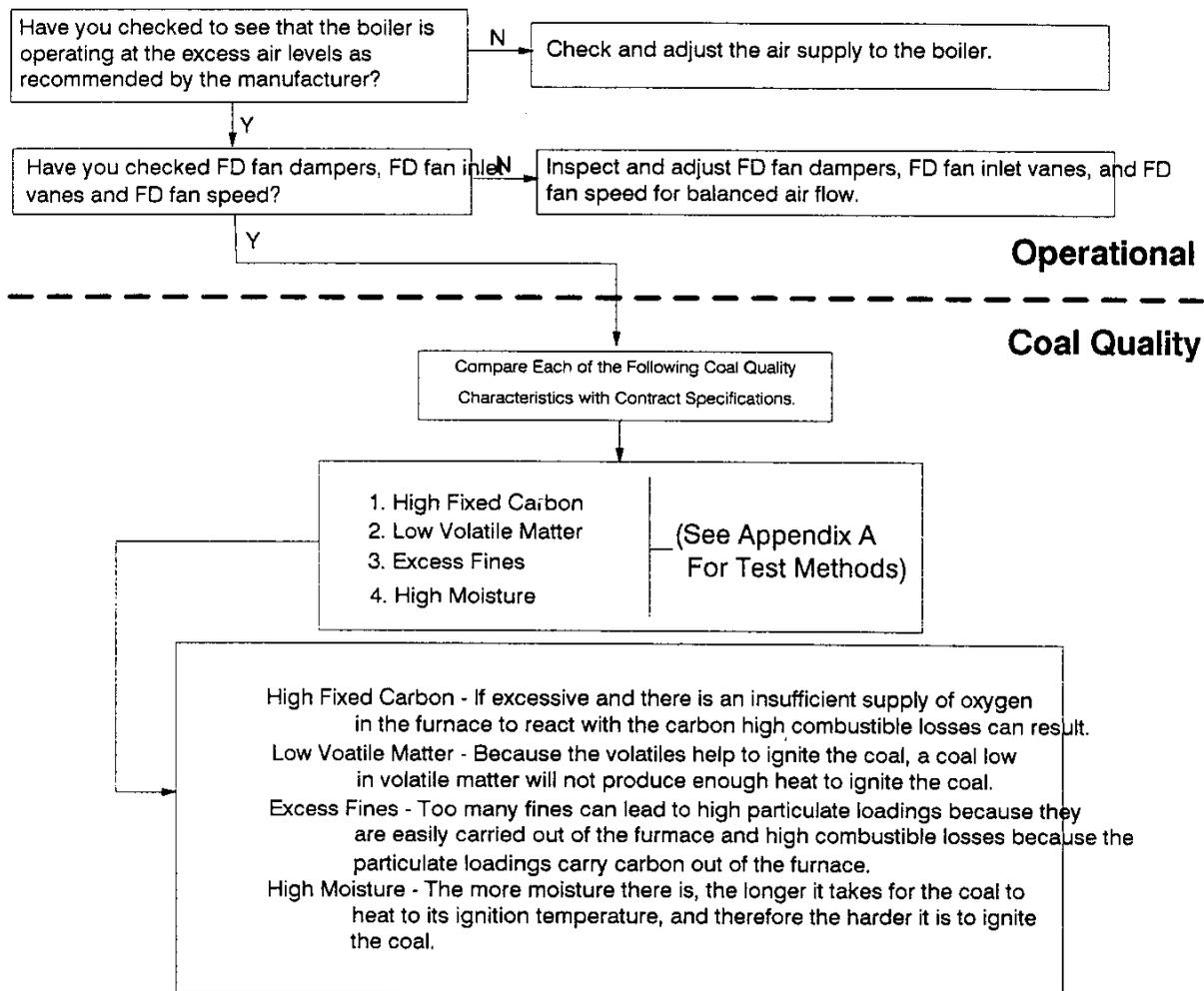
**FIGURE 5-77: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Fly-Ash Recycle**



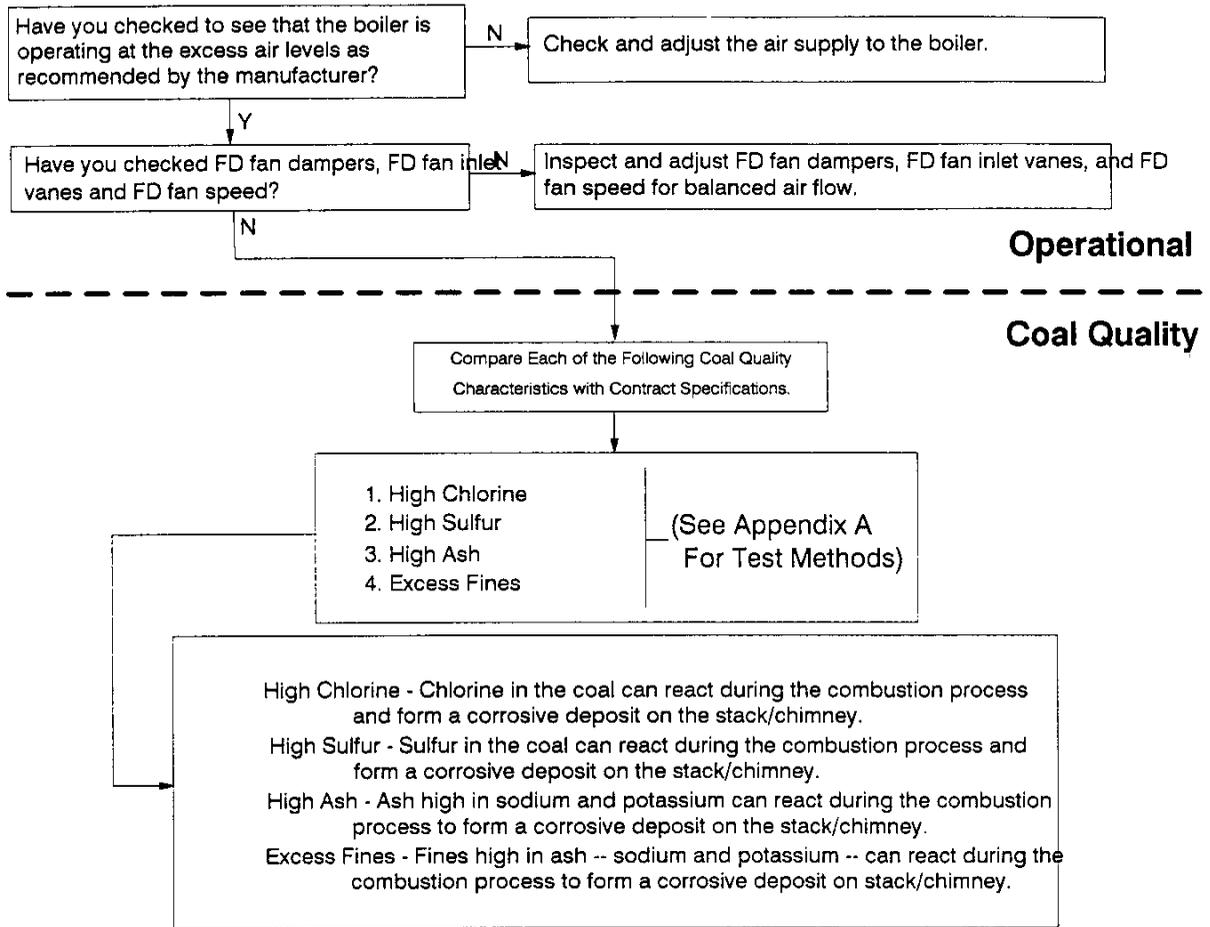
**FIGURE 5-77 (CONT'D): PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Fly-Ash Recycle**



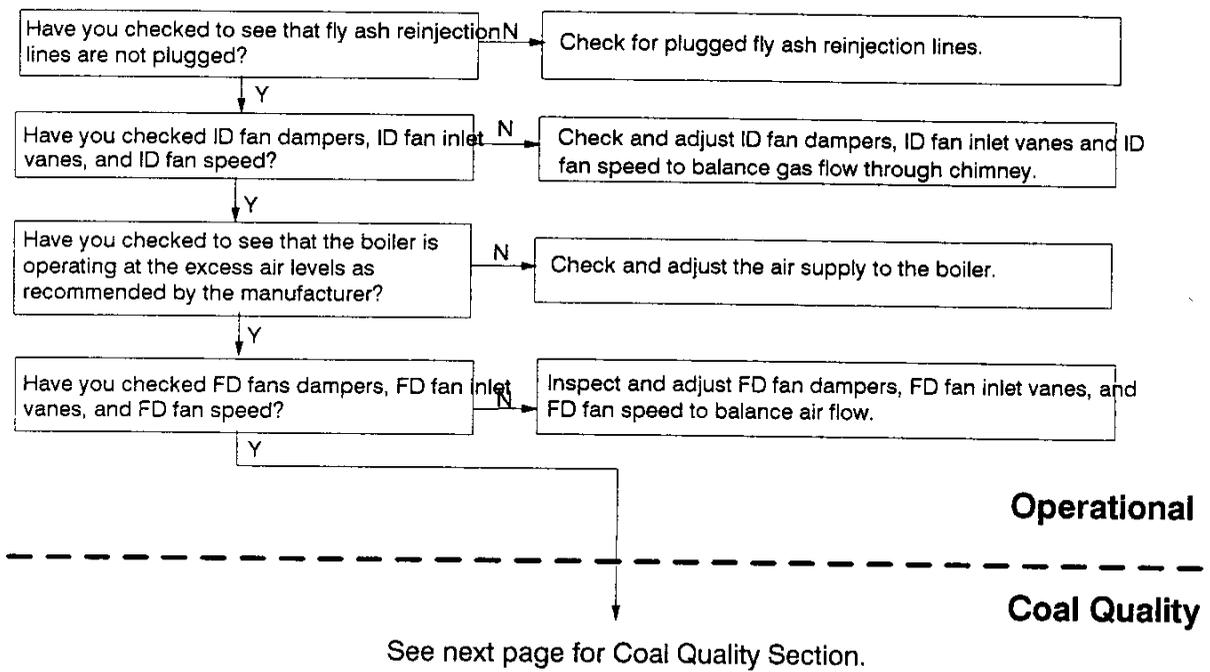
**FIGURE 5-78: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Ash Hopper/Pit**



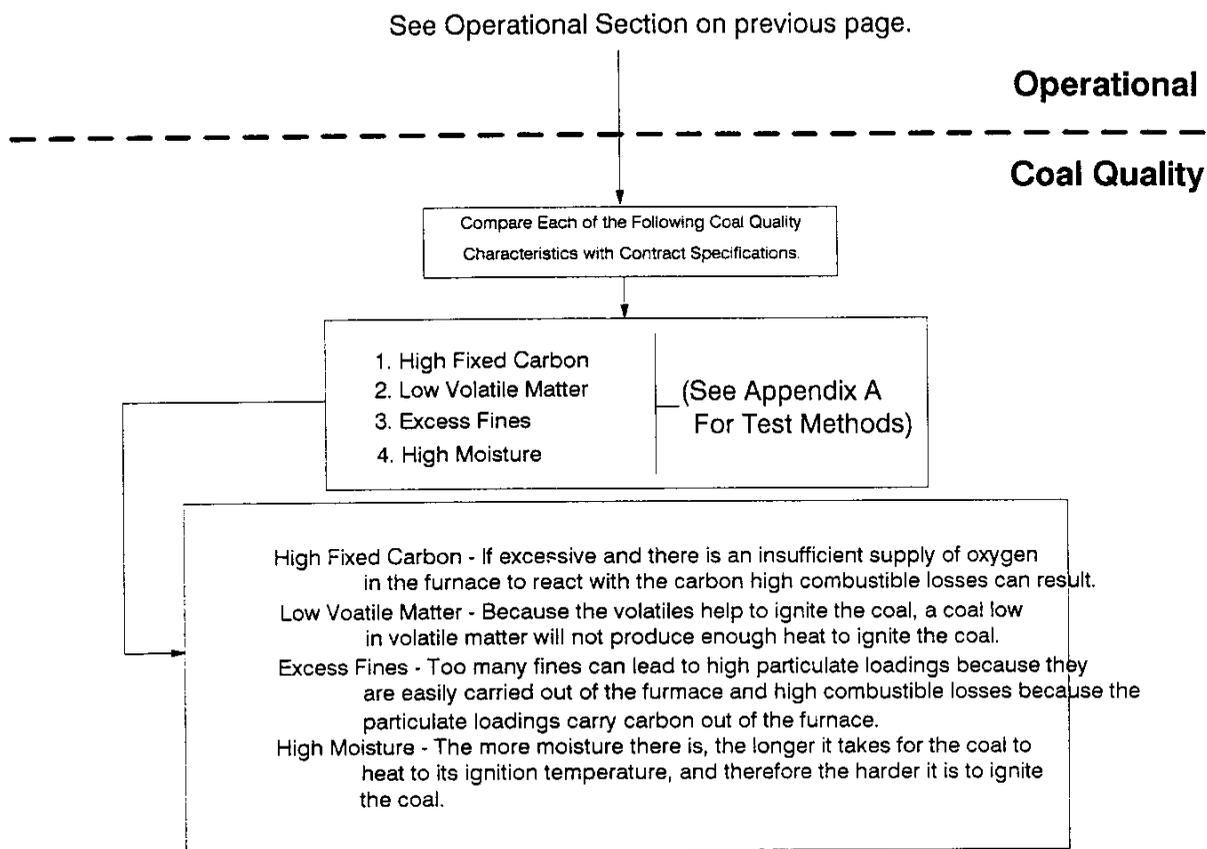
**FIGURE 5-79: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Corrosion Of The Stack/Chimney**



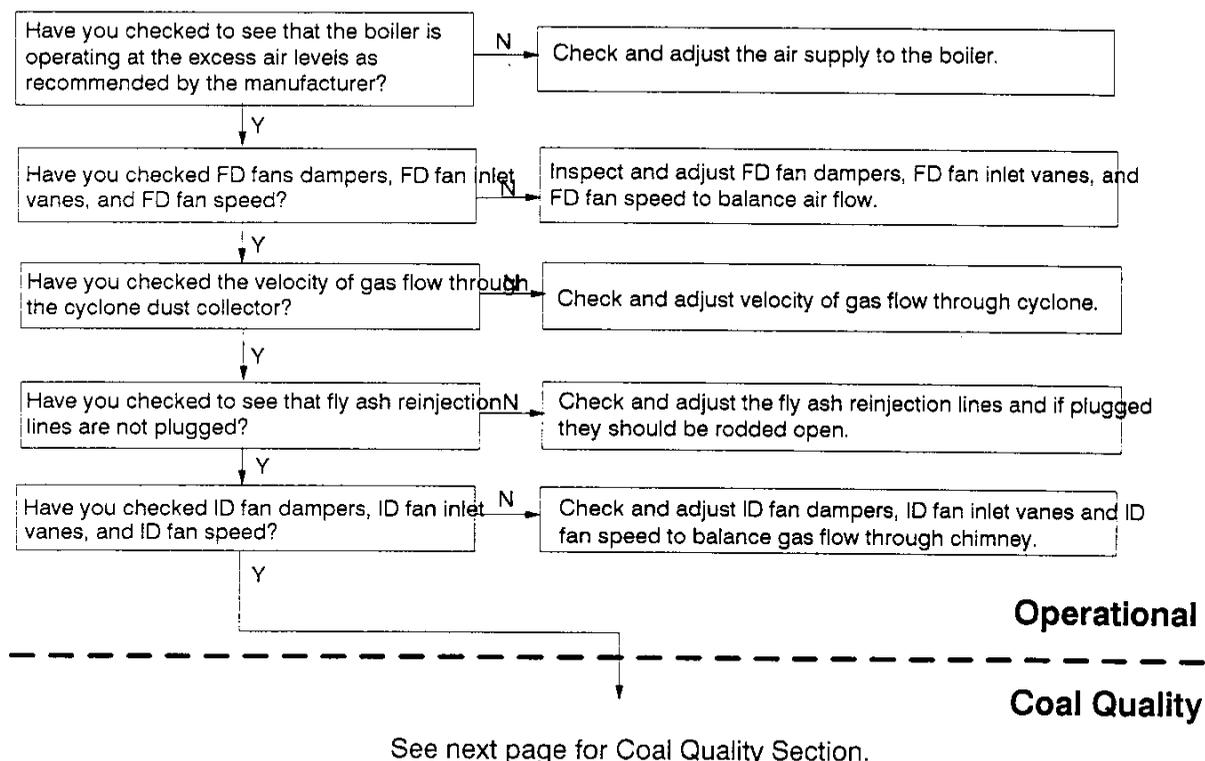
**FIGURE 5-80: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Stack/Chimney**



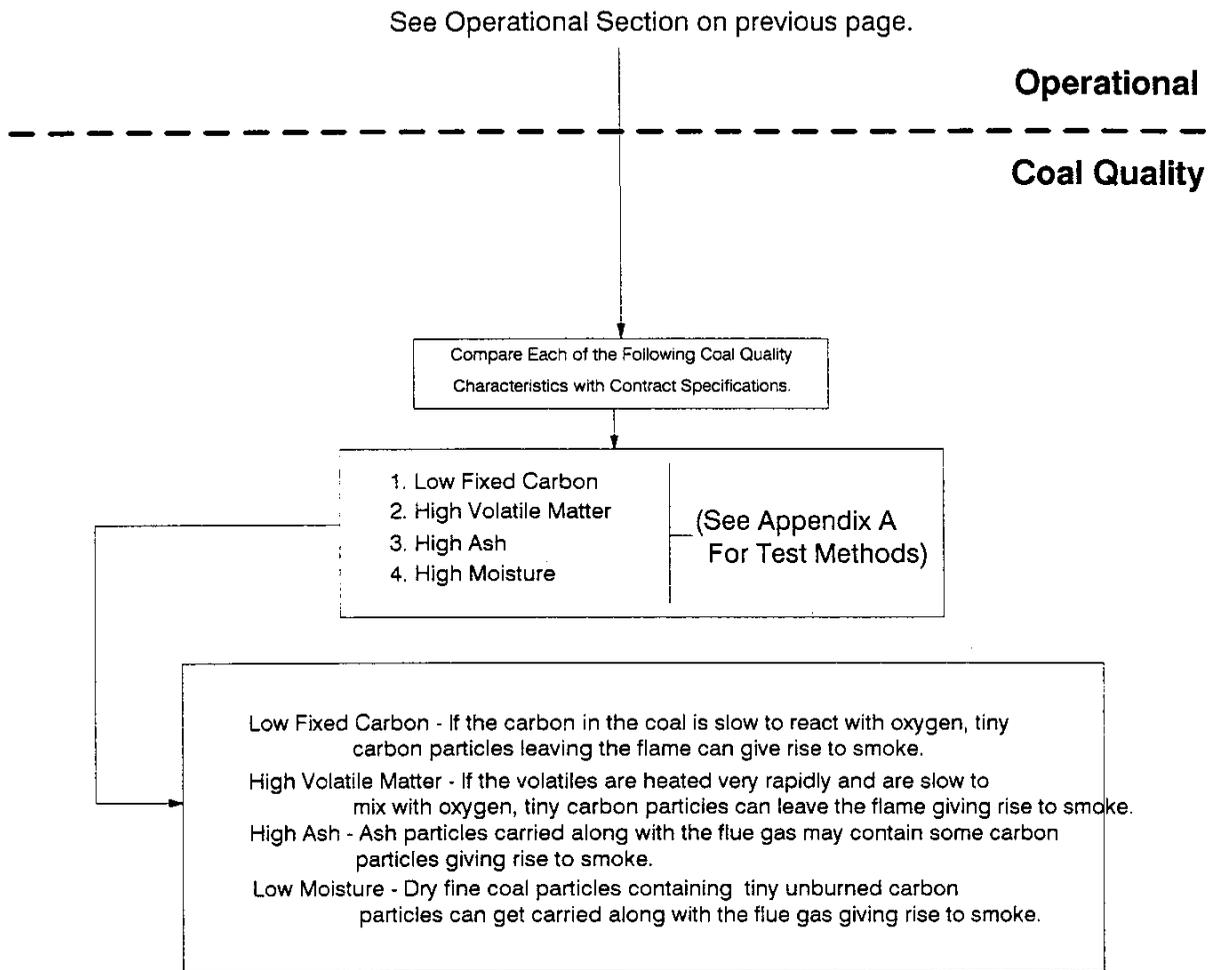
**FIGURE 5-80 (CONT'D): PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Stack/Chimney**



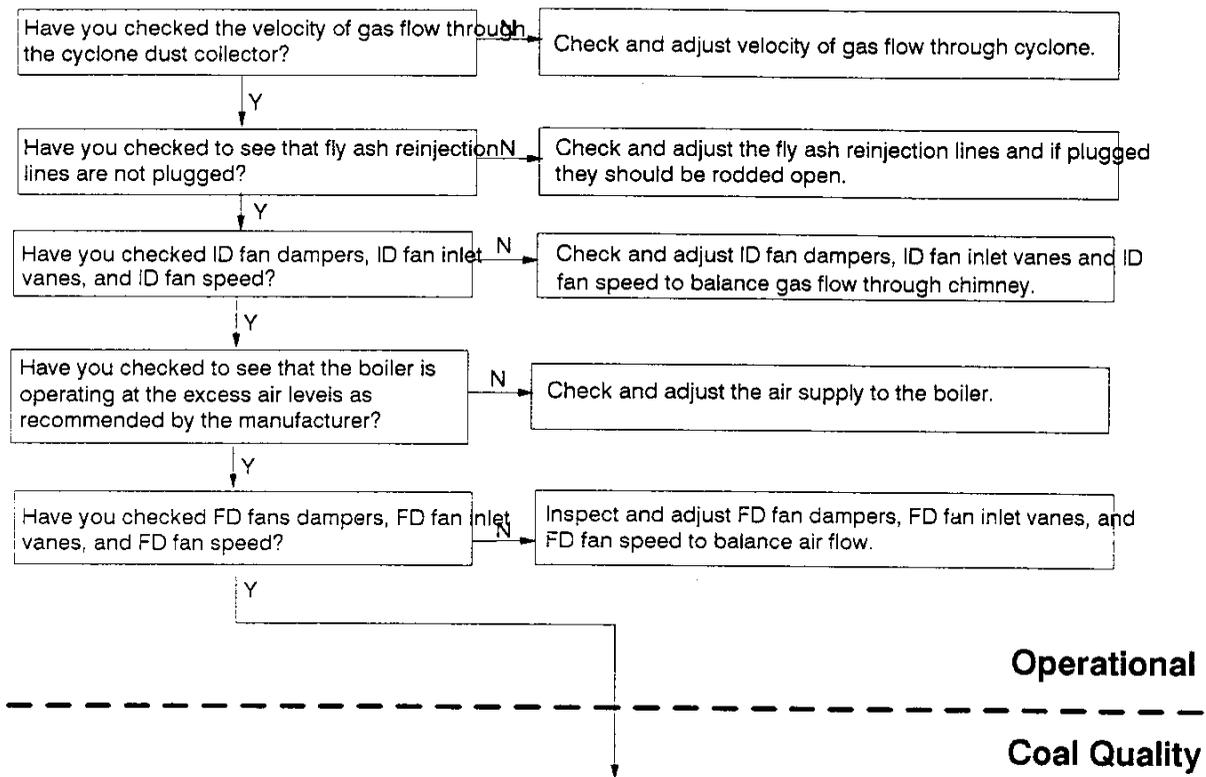
**FIGURE 5-81: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Smoking From Stack/Chimney**



**FIGURE 5-81 (CONT'D): PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Smoking From Stack/Chimney**

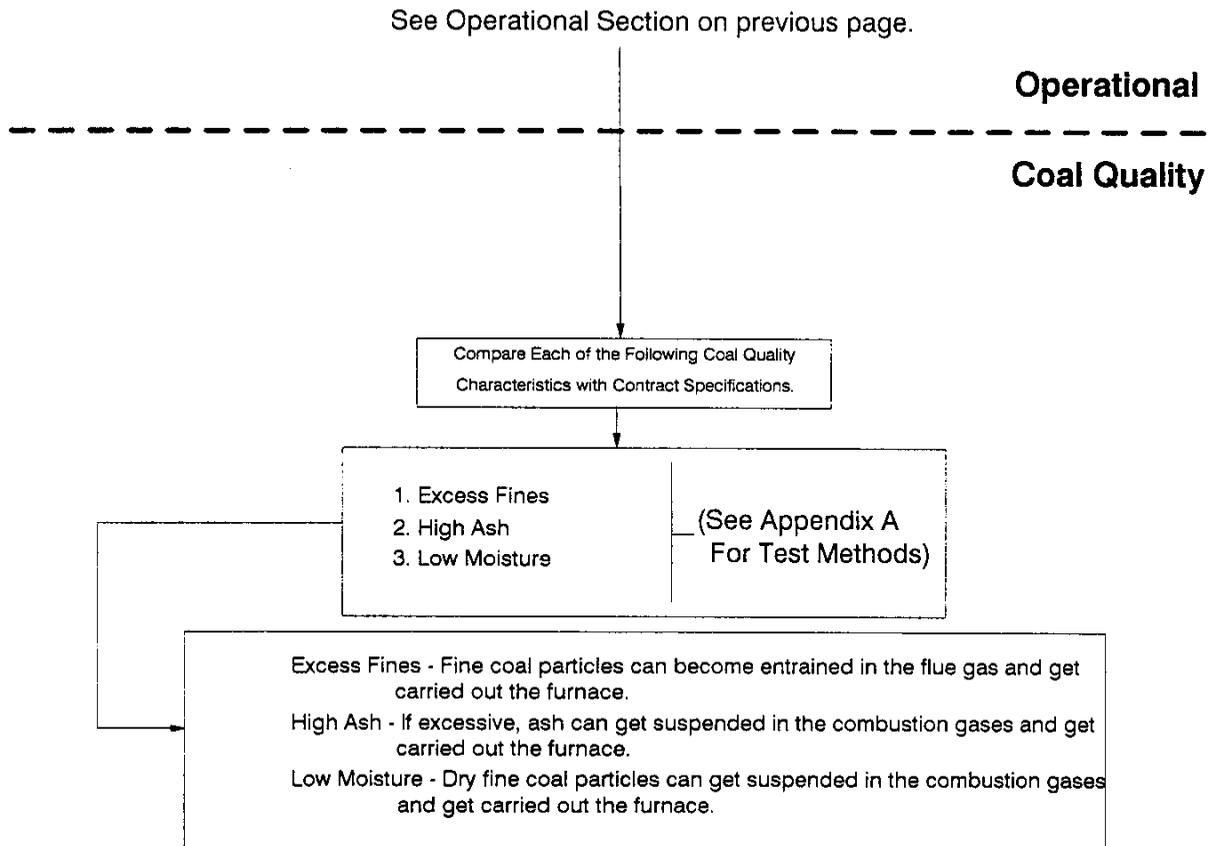


**FIGURE 5-82: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Diagnosing Excess Particulate Emissions From The Stack/Chimney**



See next page for Coal Quality Section.

**FIGURE 5-82 (CONT'D): PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For Diagnosing Excess Particulate Emissions From The Stack/Chimney**



**FIGURE 5-83: PULVERIZED COAL TROUBLESHOOTING LOGIC DIAGRAM
For SO₂ Emissions From The Stack/Chimney**

