MINUTES OF MEETING

Technical Committee on Heat Recovery Steam Generators

Feb. 28 – Mar 1, 2013
Entergy
New Orleans, LA

I. Attendance:

Principal Members/Staff:
John Van Name, Technical Committee Chair, URS Corporation, NY
Denise Beach, NFPA, MA
Miguel Cancelado, Siemens Energy, FL
D. Paul Cannon, Hurst Technologies, TX
Fedja Drndarevic, Technical Standards and Safety Authority, ON Canada
Dale Evely, Southern Company Services, AL
Gordon Gaetke, The Dow Chemical Company, TX (via teleconference)
Steven Graf, Emerson Process Management, PA
David Hinshaw, Dynegy Inc., NY
Dwight Hyche, Marsh Risk Consulting, MS
David King, American Electric Power Corporation, OH
Randy Kleen, General Electric Company, TX
Stephen Meierotto, Nooter Eriksen, MO (via teleconference)
Michael Polagye, FM Global, MA (via teleconference)
Jimmie Schexnayder, Entergy Corporation, LA
Joseph Vavrek, Sargent & Lundy, LLC, IL
James Walawender, Black & Veatch Corporation, KS
Ilya Yarinovsky, Bechtel Corporation, MD

Alternates:
David Dexter, The Dow Chemical Company, LA
Roy Reeves, Emerson Process Management, PA
Philip Souers, Siemens Power Generation, Inc., FL (via teleconference)

Guests:
Martin Fry, Coen Company
Windy Muehleisen, Forney Corp.
Stewart Wyatt, Alstom Power Inc.
II. Minutes of Meeting:

1. **Call to order.** The meeting was called to order at 8:35 am CST on Feb. 28, 2013.

2. **Introduction.** The Committee members and guests introduced themselves and identified their affiliation.

3. **Minutes Approval.** The minutes from the May 2012 meeting were approved as written.

4. **NFPA Staff Report.** The NFPA Staff Liaison reviewed the new document revision process and tools, including the new terminology, the revision cycle timeline, and the online public input submittal process. ([Attachment A](#)) NFPA Staff reminded the committee that committee actions related to document revisions and public input will be available in the First Draft Report, which will be posted on the NFPA 85 document information page no later than Sept. 6, 2013.

The committee then modified the agenda to review new business before old business.

5. **New Business.**
   
   A. **First Revision of Chapter 8.** The committee reviewed the public input and other requests and created First Revisions in chapter 8 and related annex text.
   
   B. **Review Fundamentals Committee Actions.** The TC briefly discussed changes to 4.10.3. The committee discussed several HRSG-specific definitions that were deleted from chapter 3, but determined that no changes to chapter 8 are needed. There were no other Fundamentals actions identified for discussion.
   
   C. **Request from I. Yarinovsky.** The committee discussed the use of autoignition temperature, specifically as it relates to fuel mixtures. The committee agreed to create a Committee Input of annex text supplied by Mr. Yarinovsky to enable further action in the Second Draft meeting.

6. **Old Business.**
   
   A. **Fresh Air Firing.** The task group discussed the incident that led to forming the task group, but reached no consensus on whether changes to the document are necessary or would have any effect. The task group was discharged with thanks. The task group members are: M. Polagye (chair); M. Fry, S. Meierotto, I. Yarinovsky, and J. Walawender.
   
   B. **Consistency with Fundamentals.** The task group report ([Attachment B](#)) was reviewed. It was noted that the task group chairman submitted several PIs based on the task group recommendations. The committee reviewed the additional items and took no further action. The task group members are: J. Burney; G. Gaetke; D. Hinshaw; and R. Reeves.
   
   C. **Vent Line Sizing for Triple Block/Double Bleed Systems.** The committee established a task group in the pre-FD meeting to review relevant standards regarding sizing the downstream vent valve in a triple block/double bleed system to determine if coverage can be added to chapter 8 that would permit alternate sizing
from the requirement of chapter 4. The task group noted that the Fundamentals committee had submitted a Research Foundation request to look at the vent line size requirements in chapter 4. NFPA Staff will inform the committee when project awards have been made. Mr. Kleen reported that he had run some analyses and will continue to work with the task group on this issue. The task group members are: R. Kleen (chair); P. Cannon; D. Hyche; J. Walawender.

D. Purging of HRSG/Bypass Stack. The committee briefly discussed ambiguity in the coverage on purging of the HRSG where a bypass stack is also present. The committee agreed to create a Committee Input based on text provided by R. Kleen.

E. Pressurizing Air in Double Block and Bleed Systems. The committee briefly discussed this item and determined that no action is needed.

7. Other Items.
   A. Mr. Kleen requested that the committee review 8.8.4.2 because it is being misinterpreted in the field. The committee created a First Revision to the paragraph to provide clarity.
   B. Mr. Hyche requested feedback on adherence to the tightness test requirement. Mr. Hyche reported that his experience is mixed. The committee briefly discussed and determined that the current requirement is adequate and should be enforced.

8. Next Meeting. The Second Draft meeting is scheduled for January 16-17, 2014 in Phoenix, AZ. This meeting will immediately follow the BCS-MBB meeting.

Attachment A:
NFPA Staff Presentation
Welcome TC on Heat Recovery Steam Generators

Feb 28-Mar 1, 2013
Entergy, New Orleans, LA

At this and all NFPA committee meetings we are concerned with your safety. If the fire alarm sounds, please proceed to an exit.

Use of tape recorders or other means capable of reproducing verbatim transcriptions of this or any NFPA meeting is not permitted.

Guests

- All guests are required to sign in and identify their affiliations.
- Participation is limited to those individuals who have previously requested of the chair time to address the committee on a particular subject or individuals who wish to speak to Public Input they have submitted.
- Guest chairs are located around the room as a courtesy.

Members categorized in ANY interest category who have been retained to represent the interests of ANOTHER interest category (with respect to a specific issue or issues that are to be addressed by a TC/CC) shall declare those interests to the committee and refrain from voting on any Public Input, Comment, or other matter relating to those issues.
NFPA First Draft Meetings
New Process

General Procedures
- Follow Robert’s Rules of Order.
- Discussion requires a motion.

Committee member actions:
- Member addresses the chair.
- Receives recognition from the chair.
- Introduces the motion.
- Another member seconds the motion.

Committee chair actions:
- States the motion.
- Calls for discussion.
- Ensures all issues have been heard.
- Takes the vote.
- Announces the result of the vote.

Motions for Ending Debate Previous Question or “Call the Question”
- Not in order when another has the floor
- Requires a second
- This motion is not debatable and DOES NOT automatically stop debate
- A 2/3 affirmative vote will immediately close debate and return to the original motion on the floor. Less then 2/3 will allow debate to continue.
New Process Overview

- Still basically 4 steps:
  - First Draft (Report on Proposals)
  - Second Draft (Report on Comments)
  - NITMAM/CAM
  - Issuance

- NEW opportunities to skip steps:
  - If no public comments are received, the committee can request immediate issuance
  - NITMAMs will only be certified based on public comments.

NFPA First Draft Meetings
New Process – What’s New?

- Changes in Terms:

<table>
<thead>
<tr>
<th>New Term</th>
<th>Old Term</th>
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<tbody>
<tr>
<td>Comment Stage</td>
<td>ROC Stage</td>
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<tr>
<td>Public Comment</td>
<td>Public Comment</td>
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<tr>
<td>Second Draft Meeting</td>
<td>ROC Meeting</td>
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<tr>
<td>Committee Comment</td>
<td>Comment that Failed Ballot (Second Revision that failed ballot)</td>
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<tr>
<td>Second Revision</td>
<td>Committee Comment or Accepted Public Comment</td>
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<td>Second Draft Report</td>
<td>ROC</td>
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Flowchart

The New NFPA Standards Development Process
- Input Stage Pages §4.3

- Public Input
  - PI
  - See Final Revisions
  - Ballot at Final Revisions

- Committee Comment
  - State Question
  - Vote
  - Comment on Committee Proposal or Accepted Public Proposal

- First Draft
  - Proposals
  - Comment to Final Revisions

- Draft
  - Draft
  - Final Revisions

- Wash 14, 2012
NEW Committee Actions and Motions:

- Resolve Public Input
- Create a First Revision
- Create a Committee Input (Trial Balloon)

Resolve a Public Input (PI)

- Committee develops a Committee Statement (CS) to respond (resolve) a Public Input.
- Committee must clearly indicate reasons for not accepting the recommendation in CS and/or point to a relevant First Revision.
- PI does not get balloted

Create a First Revision (FR)

- Committee wants to make a change to a current section or add new text.
- Committee develops a Committee Statement (CS) substantiating the change. (do not refer to PI as the reason)
- Ensure any associated PIs get a committee response, often simply referring to the relevant FR.
- Each FR gets balloted

Create a Committee Input (Trial Balloon)

- Committee wants to receive Public Comment on a topic, but not ready to incorporate it into the draft.
- Need to have a Committee Statement.
- Does not get balloted
Committee Statements (Substantiation):
- All Public Input must have a Committee Statement
- Must include a valid technical reason
- No vague references to “intent”
- Explain how the submitter’s substantiation is inadequate

Formal voting
- Voting during meeting is used to establish a sense of agreement (simple majority)
- Secured by letter ballot (2/3 agreement)
- Only the results of the formal ballot determine the official position of the committee on the First Draft

Ballots are on the First Revisions (FR) ONLY
- Public Input and Committee Input not balloted
- Reference materials are available:
  - First Draft, PI, CI, CS, etc

Ballot form allows you to vote:
- Affirmative on all FR
- Affirmative on all FR with exceptions specifically noted

Ballot form provides a column for affirmative with comment
- Note: This box only needs to be checked if there is an accompanying comment.

Reject or abstain requires a reason.
First Draft New Process

- Initial ballot
- Circulation of negatives and comments
- Members may change votes during circulation
- First Revision that fails letter ballot becomes Committee Input (CI) – just like the trial balloon version of CI – so as to solicit Public Comment

Balloting
- Ballots will be an online format
- Alternates are strongly encouraged to return ballots

NFPA First Draft Meetings

- No New Material after the Public Input Stage
- What constitutes new material is to some extent a judgment call
- Online submittal of comments through Terra

NFPA New Process Overview

- Comment phase works similar to old process
- HOWEVER, comments that do not contain specific action will no longer be accepted
  - NO – “Reverse committee action”
  - NO – “I agree with the committee action”
  - NO – “Use submitter’s original material”
- No new material after the Public Input Stage
  - What constitutes new material is to some extent a judgment call
- NITMAMs will be certified ONLY on comments
  - “Nitmammers” must participate in the entire process
**Legal**

**Patent**: Disclosures of essential patent claims should be made by the patent holder, but others may also notify NFPA if they believe that a proposed or existing NFPA standard includes an essential patent claim.

**Antitrust**: The single most important provision—Federal law prohibits contracts, combinations, or conspiracies which unreasonably restrain trade or commerce. *Section 1 of the Sherman Act*

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**Doc Info Pages**

- Document scope
- Current/Previous Edition information
- Issued TIAs, FIs and Errata
- Archived revision information
- Standard Council Decisions
- Articles and Reports
- Read only document

**Next Edition**

- Meetings and Ballots
- ROP/ROC or First Draft Report and Second Draft Report
- NITMAM and Standard Council Decisions
- Submission of Public Input/Comment
- Private TC info
- Ballot circulations, informational ballots and other committee info

**Technical Committee**

- Committee name, responsibility and scope
- Staff liaison
- Committee list
- Private committee contact information
- Current committee documents in PDF format
- Committees seeking members and committee online application

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**NFPA First Draft Meetings**

Thank you for participating!

Any questions?
Attachment B:
Consistency with Fundamentals
Task Group Report
Fundamentals Consistency Review by HRSG Task Group

Task Group: David Hinshaw, Roy Reeves, John Burney and Gordon Gaetke
January 3, 2013

Task group reviewed general definitions, Chapter 4 and chapter 8 for consistency. Following are recommendations to Fundamentals and HRSG TC’s for changes to document. The recommendations are followed by general comments and observations to HRSG TC of potential improvements to chapter 8.

Chapter 3 Recommendations for Consistency with Chapter 8

1. 3.3.3.6.4 Primary Air (for purposes of equipment within the scope of chapter 8)

Recommendation: Remove 3.3.3.6.4. The phrase “Primary Air” is not used in chapter 8.

2. 3.3.44.2.2 Combustion Control System in HRSG Systems.

Recommendation: Integrate elements of “Combustion Control System in HRSG Systems” into “HRSG Control System”. Then delete 3.3.44.2.2 Combustion Control System in HRSG Systems.

3. 3.3.107 Operating Range.

Recommendation: Modify definition of “Operating Range” to address several applications of this phrase such as operating range of unit, boiler, HRSG, etc. which is beyond current definition. The phrase
“Operating Range” is used in context other than stable burner flame in Chapter 8 and elsewhere in NFPA 85. A few examples listed below.

3.3.107 Operating Range. The range between the maximum fuel input and minimum fuel input within which the burner flame can be maintained in a continuous and stable manner.

3.3.44.2 Combustion Control System. The control system that regulates the furnace fuel and air inputs to maintain the air-fuel ratio within the limits that are required for continuous combustion and stable flame throughout the operating range of the boiler in accordance with demand.

3.3.44.2.1 Combustion Control System in a Fluidized Bed. In a fluidized bed, the control system that regulates the furnace fuel input, furnace air input, bed inventory, and other bed heat transfer mechanisms to maintain the bed temperature and the air-fuel ratio within the limits necessary for continuous combustion and stable bed operation throughout the operating range of the boiler in accordance with demand.

4.7.2 Compatibility. The fuel-burning system shall be sized to meet the operating requirements of the unit, shall be compatible with other component systems, and shall be capable of being controlled for the full operating range of the unit.

8.3.2 Project Inception. In the project inception phase, the following shall be accomplished to ensure a plant design that meets expected operating modes and reliability needs:
(1) Establishment of plant operating parameters
(2) Identification of site-related constraints
(3) Review of the steam cycle, including generation of a family of heat balance diagrams for the expected operating ranges and modes…

4. 3.3.141.2 Emergency Shutdown (HRSG or other combustion turbine exhaust system).

Recommendation: Modify definition of “Emergency Shutdown” to address its frequent use throughout NFPA 85 beyond chapter 8, or delete the definition. A word search found one occurrence of “Emergency Shutdown” in chapter 8 as 8.8.9 Duct Burner Emergency Shutdown. No use of this phrase for combustion turbine’s was found in chapter 8 requiring a unique definition for the combustion turbine.

3.3.141.2 Emergency Shutdown (HRSG or other combustion turbine exhaust systems). An event resulting in the rapid shutoff of all fuel to the combustion turbine along with a master fuel trip.
Chapter 4 Recommendations for Consistency with Chapter 8

1. Fuel Supplies to Boilers and HRSGs

Recommendation: Add HRSG to 4.8 requirements. Multiple HRSGs at a site are common and the requirements are applicable to HRSGs.

4.8 Multiple Boilers or HRSGs.
4.8.1 Where multiple boilers or HRSGs are supplied from the same fuel supply source, there shall be a means of manual isolation for each boiler and HRSG.

4.8.2 Dedicated safety shutoff valving, with related alarm, interlock, and control instrumentation, shall be provided for each boiler and HRSG.

2. Isolation of feeds to Flue Gas Path

Recommendation: Exclude HRSGs from requirements of 4.10.3. The HRSG enclosure could be considered to be a flue gas path, at least downstream of the duct burners. Chapter 8 only requires single safety shutoff valves at each runner, not double block and vent valve arrangements. Chapter 8 would then be in conflict with the requirements of 4.10.3.2. Based on the description in A.4.10.3, HRSGs do not seem to apply although there are SCRs with reagent feeds in HRSGs and other combustion turbine exhaust systems.

4.10.3* Flue Gas Path Auxiliary Systems — Fuel and Feedstock Piping. Positive means to prevent leakage of fuel or feedstock into an idle furnace or flue gas path shall be provided.
4.10.3.1 For gaseous fuels or feedstocks, provisions shall include a double block and vent valve arrangement on the fuel or feedstock supply, separate from any other double block and vent valve arrangements for other systems.
4.10.3.2 For gaseous fuels or feedstocks, a double block and vent valve arrangement shall be provided in the fuel or feedstock line associated with each flue gas path injection point.
4.10.3.3 For liquid or blown-in powder fuels or feedstocks, provisions shall include a double block valve arrangement on the fuel or feedstock supply, separate from any other double block valve arrangements for other systems.

3. HRSG Continuous Trend Displays

Recommendation: Modify 4.15.1 and add a new paragraph 4.15.1.2 referring to chapter 8 for HRSG continuous trend display requirements. HRSGs do not require monitoring of total airflow rate as specified in 4.15.1. Additionally, chapter 8 does not require trending of combustion chamber draft. Chapter 8 lists required trend displays for HRSGs in 8.7.2.3.

4.15.1 Except as noted in 4.15.1.1 and 4.15.1.2, continuous trend display of steam flow, feed water flow rate, total fuel flow rate, and total airflow rate as a percentage of the maximum unit load, drum level, final steam temperature, main steam pressure, and furnace or combustion chamber draft shall be simultaneously available at the operating location.

4.15.1.2 For HRSGs, continuous trend display requirements are specified in Chapter 8.
Annex K Recommendation

**Recommendation:** Add HRSGs to Fuel Hazards in Annex K.

K.2 (6) Most natural gas that is supplied to boilers or HRSGs typically is lighter than air and presents no special problems in the atmosphere over and above those addressed in this code. Because of developing energy cost considerations, …

Chapter 8 Consistency Check with Fundamentals

**Recommendations to HRSG Technical Committee.**

1. **8.4.3.2.1.8 Fuel Piping**

**Recommendation:** Delete 8.4.3.2.1.8 because it is redundant with 4.10.1 and does not offer anything unique to chapter 8.

8.4.3.2.1.8 The fuel piping materials and system design shall be in accordance with ASME B31.1, *Power Piping*, or ASME B31.3, *Process Piping*.


2. **8.4.3.4.5 HRSG Enclosure Purge**

**Recommendation:** Change “HRSG enclosure purge” to “Duct Burner Purge” in 8.4.3.4.5. HRSG enclosure purge is not a defined term. There are defined terms for “HRSG Enclosure”, “HRSG Purge”, “Duct Burner Purge” and “Combustion Turbine Purge”. The definition for HRSG Purge is a reference to other definitions and not a definition in itself; therefore not a clear requirement for 8.4.3.4.5. Paragraph 8.4.3.4.5 is under section 8.4.3 HRSG Fuel-Burning System so Duct Burner Purge seems to be appropriate requirement instead of Combustion Turbine Purge. [Note to editors: change “Aflow” to “A flow” in 3.3.118.3.]

8.4.3.4.5 The ignition transformer shall not be energized before the HRSG enclosure Duct Burner purge is completed, and shall be de-energized at the end of the igniter trial for the ignition period.

3.3.118.3 Duct Burner (HRSG) Purge. Aflow of combustion turbine exhaust gas or air at purge rate through the HRSG enclosure for a number of volume changes sufficient to effectively remove any gaseous or suspended combustibles and replace them with the purging medium.

3.3.83.1 HRSG Enclosure. All ductwork from the combustion turbine exhaust through the steam generator to the stack, including any bypass duct connection.

3.3.83.2 HRSG Purge. See 3.3.118.1, Combustion Turbine Purge; 3.3.118.3, Duct Burner (HRSG) Purge; and 3.3.119, Purge Rate.

3. **8.5.4.1 Exhaust Duct Expansion**
**Recommendation:** Modify 8.5.4.1 to provide a better description of duct elements affected by expansion movement. By definition the combustion turbine exhaust duct is part of the HRSG enclosure, so it is unclear of intent of original wording in treating them as separate entities. Because the transition duct from the combustion turbine exhaust to the HRSG is prone to thermal expansion due to the very high thermal temperatures and is an interface location, the original requirement may have been trying to specifically identify this transition duct in the requirement. The recommended wording may better define this piece in addition to referring the user to the entire HRSG enclosure.

8.5.4.1 Expansion provision shall be made for the movement of the duct between the combustion turbine exhaust duct and the HRSG, and HRSG enclosure and other combustion turbine exhaust systems.

4. **Electrical Area Classification**

**Recommendation:** Change the Electrical Area Classification appendix reference from A.8.6.4 to A.8.3.3.3 and remove the reference from 8.6.4. Paragraph 8.3.3.3 is the only requirement for defining Electrical area classification in chapter 8. The appendix provides references for determining that classification which seems better suited to 8.3.3.3 than 8.6.4. Paragraph 8.6.4 addresses electrical design requirements for hazardous locations.

8.3.3.3 Electrical area classifications shall be established by the owner or the owner’s designated representative and shall be provided to the system designer prior to commencement of detailed design.

8.6.4 Where an area is identified as a hazardous location as defined by Article 500 of NFPA 70, National Electrical Code, the equipment design, the types of enclosures, and the wiring methods shall be as specified by that code.

A.8.3.3.3 A.8.6.4 For guidance in determining area classification, see NFPA497, Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas; NFPA 499, Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas; NFPA 70, National Electrical Code, Article 500; and either API RP 500, Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2, or API RP 505, Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1, and Zone 2.

5. **8.6 Application of NFPA 70 and Electrical Requirements**

**Recommendation:** Change 8.6.2 and delete 8.6.3 and 8.6.4 as shown. The original paragraphs require following NFPA 70 for wiring compliance, marking high voltage equipment, and design of hazardous locations. There could be other electrical equipment requirements which are not addressed. The recommended wording provides a more encompassing requirement that includes the original intent. It also is consistent with other chapters addressing electrical design. Lastly, it avoids creating a definition
for “high voltage” which is a term used, but not defined, in 8.6.3. NFPA 70 may define “high voltage”, but HRSG TC’s application of high voltage could be different than NFPA 70.

It may be prudent for Fundamentals TC to contain these Electrical requirements in chapter 4 since multiple chapters are showing redundancy. Paragraphs 8.6.2 – 8.6.4 do not appear to contain any unique requirements for HRSGs or other combustion turbine exhaust systems. Paragraphs 8.6.1.1, 8.6.1.2, 8.6.5 and 8.6.6 all seem to be fundamental requirements which could be of value to all TC’s.

8.6.2 All electrical equipment and wiring shall conform to NFPA 70, National Electrical Code. All wiring shall comply with the requirements of NFPA 70, National Electrical Code.

8.6.3 All high voltage equipment shall be marked in accordance with the requirements of NFPA 70, National Electrical Code.

8.6.4 Where an area is identified as a hazardous location as defined by Article 500 of NFPA 70, National Electrical Code, the equipment design, the types of enclosures, and the wiring methods shall be as specified by that code.

6. 8.7.4.3 (12) Duct Burner Master Fuel Trip

Recommendation: Change from “boiler control” to “HRSG control” in 8.7.4.3 (12) as shown. Definition of boiler refers to furnace which is not representative of HRSGs. HRSG is a defined term and more fitting than boiler. Term “boiler” used one time in chapter 8 at 8.7.4.3(12) so eliminating term in this paragraph will eliminate “boiler” from chapter 8.

8.7.4.3 Duct Burner Master Fuel Trip. For an operating duct burner, including the start-up or shutdown sequences, a duct burner master fuel trip shall be initiated by the following conditions: (12) Loss of energy supply for boiler HRSG control, burner management, or interlock system.

7. 8.7.3.2.2.2 Gas Flow meter Upstream Pressure

Recommendation: Change 8.7.3.2.2.2 from “combustion control system” to “HRSG control system” as shown. “Combustion Control System” is a defined term which contains phrases or concepts not applicable to Chapter 8 such as “furnace fuel”, “air inputs”, “air-fuel ratio”. The phrase “HRSG Control System” is a defined term that seems more applicable here. “Combustion Control System” was used only one time in chapter 8 - at 8.7.3.2.2.2.

8.7.3.2.2.2 The pressure at the gas flowmeter shall be monitored at the upstream tap if the gaseous fuel flowmeter is part of the combustion HRSG control system and is not pressure compensated.

3.3.44.2 Combustion Control System. The control system that regulates the furnace fuel and air inputs to maintain the air-fuel ratio within the limits that are required for continuous combustion and stable flame throughout the operating range of the boiler in accordance with demand.

3.3.44.3 HRSG Control System. The group of control systems that regulate the HRSG process, including the combustion control system but not the burner management system.
8. Paragraph 8.7.5 Burner Management System Logic

Recommendation: Delete 8.7.5 because it is redundant with 4.11.6 (12).

8.7.5 Burner management system logic shall be maintained either in nonvolatile storage or in other memory that retains information on the loss of system power.

4.11.6* The design of the logic system for burner management shall include and accommodate the following requirements:

(12) Logic shall be maintained either in nonvolatile storage or in other memory that retains information on the loss of system power.
General Comments for Chapter 8

1. Directional Blocking

The term “Directional Blocking” utilizes the phrase “HRSG process variables” in its definition. Directional Blocking is not use anywhere in chapter 8. Are there any places where the term could be utilized?

3.3.49 Directional Blocking. An interlock that, upon detection of a significant error in furnace pressure or HRSG process variables, acts to inhibit the movement of all appropriate final control elements in the direction that would increase the error.

2. Master Fuel Trip Relay

The phrase “Master Fuel Trip Relay” is used extensively in NFPA 85 but not in chapter 8. Chapter 4 uses the term in design of Burner Management Systems so the relay is required. Should the phrase be utilized in chapter 8?
One possible location may be 8.7.4.1.5 as a new requirement.

3.3.99* Master Fuel Trip. An event resulting in the rapid shutoff of all fuel, including igniters; for HRSGs, an event resulting in the rapid shutoff of all fuel to the duct burners, including igniters.

3.3.100 Master Fuel Trip Relay. An electromechanical relay(s) utilized to trip all required equipment simultaneously when a master fuel trip is initiated.

4.11.6* The design of the logic system for burner management shall include and accommodate the following requirements:
(1) Diagnostics shall be included in the design to monitor processor logic function.
(2) Logic system failure shall not preclude proper operator intervention.
(3) Logic shall be protected from unauthorized changes.
(4) Logic shall not be changed while the associated equipment is in operation.
(5) System response time (through-put) shall be short to prevent negative effects on the application.
(6) Protection from the effects of noise shall prevent false operation.
(7) No single component failure within the logic system shall prevent a mandatory master fuel trip.
(8) The operator shall be provided with a dedicated manual switch(es) that shall actuate the master fuel trip relay independently and directly.
(9) At least one manual switch referenced in 4.11.6(8) shall be identified and located remotely where it can be reached in case of emergency.
(10)*The logic system shall be monitored for failure.
(11) Failure of the logic system shall require a fuel trip for all equipment supervised by the failed logic system.
(12) Logic shall be maintained either in nonvolatile storage or in other memory that retains information on the loss of system power.

8.7.4.1.5 The design of an interlock system shall include the following:
(1) Supervision of the starting procedure and operation
(2) Tripping of the minimum amount of equipment in the required sequence when the safety of personnel or equipment is jeopardized
(3) Indication of the initiating cause of the trip and prevention of the start of any portion of the process until operating conditions are established
(4) Coordination of the trip devices into an integrated system
(5) Provisions of instrumentation to enable the operator or automatic equipment to complete the operating sequence
(6) Provision for preventive maintenance
(7) Interlocks that do not require defeating in order to start or operate equipment
(8) The independence of mandatory duct burner master fuel trip sensing elements and circuits from all other control elements and circuits except as permitted in 8.7.4.1.5.1 and 8.7.4.1.5.2
(9) Prevention of the misoperation of the interlock system due to an interruption or restoration of the interlock energy supply

3. **Trial for Ignition Period**
The phrase “Trial for Ignition Period” would be applicable to chapter 8 but is not used. Should the phrase be adopted in 8.4.3.4.5, 8.8.5.8.2.3 or 8.8.5.8.2.5?

3.3.161 **Trial for Ignition Period (Igniter).** The interval of time during light-off in which a safety control circuit permits the igniter fuel safety shutoff valve(s) to be opened before the flame detection system is required to supervise the igniter flame.

3.3.162 **Trial for Ignition Period (Main Burner).** The interval of time during light-off in which a safety control circuit permits the main burner fuel safety shutoff valve(s) to be opened before the flame detection system is required to supervise the main burner flame only.

8.4.3.4.5 The ignition transformer shall not be energized before the HRSG enclosure purge is completed, and shall be de-energized at the end of the igniter trial for the ignition period.

8.8.5.8.2.3 The individual igniter safety shutoff valve(s) shall be opened, and the ignition transformer(s) shall be energized with the following conditions observed:
(1) If an igniter’s flame is not proven within 10 seconds after its igniter safety shutoff valve has been opened, its safety shutoff valve shall be closed.
(2) The cause of failure to ignite shall be determined and corrected.
(3) With turbine exhaust flow maintained, repurge shall not be required, but at least 1 minute shall elapse before a retrial of any igniter(s) is attempted.

8.8.5.8.2.4 The main fuel control valve shall be set to and proven to be at the burner light-off position.

8.8.5.8.2.5 Where igniter flames are proven, the individual burner safety shutoff valve(s) shall be opened under the following conditions:
(1) If no burner flame is proven within 5 seconds after main fuel enters the duct, a duct burner master fuel trip shall occur.
(2) Where flame is not proven on an individual burner, that individual burner’s safety shutoff valve and individual igniter safety shutoff valve shall close.
(3) The cause for failure to ignite shall be determined and corrected.
(4) At least 1 minute shall elapse before the next light-off is attempted.

4. **Owner’s Representative**
Chapter 4 uses the phrase “owner or owner’s representative”. In chapter 8 at 8.3.3.3, 8.3.4 and 8.10.2.3 the phrase “owner’s designated representative” is used. Should “designated” be dropped for consistency with chapter 4? Note to Fundamentals: A.4.1 (9) uses term “designated”.

4.1.1 The owner or the owner’s representative shall, in cooperation with the manufacturer, …
4.2.3 The owner or owner's representative, the engineering consultant, the equipment manufacturer …

4.4.2.1.1* The owner or the owner’s representative shall be responsible for establishing a formal training program …

4.4.2.1.3 The owner or owner’s representative shall verify that operators are trained … etc.

8.3.3.3 Electrical area classifications shall be established by the owner or the owner’s designated representative and shall be provided to the system designer prior to commencement of detailed design.

8.3.4* Project coordination, including proper integration of the various system components, shall be the responsibility of the owner’s designated representative from system inception through commercial operation in order to enhance equipment reliability and personnel safety.

8.10.2.3 For fresh air firing, the owner or the owner’s designated representative shall assess the following operational modes:

A.4.1 Safety in any plant is directly influenced by an extensive upfront effort in the engineering, design, and selection of equipment for each individual application.

Project inception phase. In the project inception phase, the following should be accomplished to ensure a plant design that meets expected operating modes and reliability needs:

9) Establishment of electrical area classifications by the owner or the owner’s designated representative in conjunction with the boiler or HRSG system designer.

5. Bypass Systems

There are multiple references to “bypass system” in 8.9 Combustion Turbine Exhaust Bypass Systems. Is a definition for “bypass system” needed to clarify where these requirements apply? If a definition is formed, avoid conflict with the phrase in A.6.9.2 which is the only other occurrence found in NFPA 85.

8.9.2.1.1 A purge of both the HRSG enclosure and the bypass system shall be completed as required in 8.8.4 prior to the admission of combustion turbine exhaust gas into the HRSG.

8.9.2.2.1 A purge of both the HRSG enclosure and the bypass system shall be completed as required in 8.8.4 prior to the admission of combustion turbine exhaust gas into the HRSG.

A.8.3.3.1 The following factors, at minimum, should be considered during the design evaluation:

1) Single versus multiple steam pressure levels
2) Allowable combustion turbine exhaust backpressure
3) Supplementary, auxiliary, or augmented firing
4) Combustion turbine exhaust bypass system

A.6.9.2 Since SCRs with bypass systems can be purged with flue gas into operating precipitators, a more positive means of isolation of ammonia and other combustible materials is required for long-term shutdown of the SCR. Some SCR catalysts
are extremely sensitive to oil contamination. For coal-fired
boilers with oil-fired igniters, it might be necessary to bypass
the SCR while the igniters are firing in a cold furnace to prevent
poisoning of the catalyst with oil soot.