



444 South 16th Street Mall
Omaha, NE 68102-2247

LIC-13-0096
July 29, 2013

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

References: See Reference List on Page 3

SUBJECT: Responses to Third Request for Additional Information Regarding License Amendment Request to Adopt NFPA 805 at Fort Calhoun Station (TAC No. ME7244)

The Omaha Public Power District's (OPPD's) responses to the Nuclear Regulatory Commission's (NRC's) third request for additional information (RAI) regarding the license amendment request (LAR) to adopt National Fire Protection Association (NFPA) 805 at the Fort Calhoun Station (FCS) are provided in the enclosure to this letter.

In the Reference 2 LAR, OPPD requested an amendment to Renewed Facility Operating License No. DPR-40 for FCS, Unit No. 1, to adopt NFPA 805, *Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants (2001 Edition)*. The NRC staff reviewed OPPD's application and determined that additional information was required in order to complete their review and subsequently transmitted RAIs via References 3 and 7. OPPD provided responses to these RAIs in References 4, 5, 6, 8 and 9. The NRC indicated that the staff had reviewed the information provided by the licensee [in References 4-6 and 8-9] and determined that additional information specified in the Reference 10 email is needed for the staff to complete its review.

In Reference 10, the NRC stated that the response to the RAIs (with the exception of SSA RAI 07.01 and SSA RAI 18) would be provided by July 26, 2013, as a clarification phone call was needed on the safe shutdown analysis (SSA) RAIs. This clarification phone call occurred on July 11, 2013, at which time the NRC staff stated they would perform further review of the LAR verbiage and determine whether or not SSA RAI 07.01 will be removed from the RAIs. Depending on the results of the NRC's decision, if necessary, the response to RAI SSA 07.01 will be included in OPPD's responses to the draft PRA RAIs that were received via email on July 7, 2013, which are being tracked by existing action request (AR) 52508.

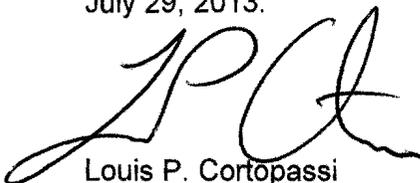
Per discussions with the NRC Project Manager on July 26, 2013, OPPD explained that these responses would be transmitted via electronic information exchange no later than July 30, 2013.

There are no new regulatory commitments being made in this letter as a result of the enclosed NFPA 805 RAI responses. Please note, as indicated in References 4, 5, 8 and 9, OPPD plans to supplement the NFPA 805 transition LAR, which will reflect the applicable information delineated in the enclosed RAI responses. The LAR supplement is being tracked by AR 48249.

In accordance with 10 CFR 50.91, a copy of this letter, without the enclosure, is being provided to the designated State of Nebraska official.

If you should have any questions regarding this submittal or require additional information, please contact Mr. Bill R. Hansher, Supervisor-Nuclear Licensing, at 402-533-6894.

I declare under penalty of perjury that the foregoing is true and correct. Executed on July 29, 2013.



Louis P. Cortopassi
Site Vice President and CNO

LPC/BJV/dll

Enclosure: OPPD's Responses to the Third Round of NFPA-805 RAIs

- c: A. T. Howell, NRC Regional Administrator, Region IV
J. W. Sebrosky, NRC Senior Project Manager
L. E. Wilkins, NRC Project Manager
J. C. Kirkland, NRC Senior Resident Inspector
Manager Radiation Control Program, Nebraska Health & Human Services, R & L Public Health Assurance, State of Nebraska (w/out enclosure)

Reference List

1. Docket No. 50-285
2. Letter from OPPD (J. A. Reinhart) to NRC (Document Control Desk), *License Amendment Request 10-07, Proposed Changes to Adopt NFPA 805, Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants (2001 Edition) at Fort Calhoun Station*, dated September 28, 2011 (LIC-11-0099) (ML112760660)
3. Letter from the NRC (L. E. Wilkins) to OPPD (David J. Bannister), *Fort Calhoun Station, Unit No.1 - Request for Additional Information Re: License Amendment Request to Adopt National Fire Protection Agency Standard NFPA 805 (TAC No. ME7244)*, dated April 26, 2012 (NRC-12-0041) (ML121040048)
4. Letter from OPPD (D. J. Bannister) to NRC (Document Control Desk), *Responses to Requests for Additional Information Re: License Amendment Request 10-07 to Adopt NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants," 2001 Edition, at Fort Calhoun Station*, dated July 24, 2012 (LIC-12-0083) (ML12208A131)
5. Letter from OPPD (D. J. Bannister) to NRC (Document Control Desk), *Responses to Requests for Additional Information Re: License Amendment Request 10-07 to Adopt NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants," 2001 Edition, at Fort Calhoun Station*, dated August 24, 2012 (LIC-12-0120) (ML12240A151)
6. Letter from OPPD (L. P. Cortopassi) to NRC (Document Control Desk), *Responses to Requests for Additional Information Re: License Amendment Request 10-07 to Adopt NFPA 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants," 2001 Edition, at Fort Calhoun Station*, September 27, 2012 (LIC-12-0135) (ML12276A046)
7. Email from NRC (L. E. Wilkins) to OPPD (D. L. Lippy), *DRAFT: Fort Calhoun NFPA 805, Second Round (ME7244)*, dated February 22, 2013 (NRC-13-0014)
8. Letter from OPPD (M. J. Prospero) to NRC (Document Control Desk), *Responses to Second Request for Additional Information Re: License Amendment Request to Adopt NFPA 805 at Fort Calhoun Station (TAC No. ME7244)*, dated April 23, 2013 (LIC-13-0033)
9. Letter from OPPD (L. P. Cortopassi) to NRC (Document Control Desk), *Remaining Responses to Second Request for Additional Information Re: License Amendment Request to Adopt NFPA 805 at Fort Calhoun Station (TAC No. ME7244)*, dated May 21, 2013 (LIC-13-0060)
10. Email from NRC (J. M. Sebrosky) to OPPD (D. L. Lippy), *Fort Calhoun NFPA 805, Third Round of RAIs (ME7244)*, dated June 27, 2013 (NRC-13-0081)

**Omaha Public Power District's (OPPD's)
Responses to Third Request for Additional Information License Amendment Request
to Adopt National Fire Protection Association Standard 805
Performance-Based Standard for Fire Protection for Light Water Reactor Generating Plants
at Fort Calhoun Station, Unit 1 (TAC No. ME7244)**

By letter dated September 28, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML112760660), as supplemented by letters dated December 19 and 22, 2011, and March 20, 2012 (ADAMS Accession Nos. ML113540334, ML11363A077, and ML12083A147, respectively), Omaha Public Power District, (the Licensee), submitted a license amendment request (LAR) to transition their fire protection licensing basis at the Fort Calhoun Station, Unit 1, from Title 10 of the Code of Federal Regulations (CFR), Section 50.48(b), to 10CFR50.48(c), National Fire Protection Association Standard NFPA 805 (NFPA 805).

A review team, consisting of U.S. Nuclear Regulatory Commission (NRC) staff and contractors from Pacific Northwest National Laboratory (PNNL) and the Center for Nuclear Waste Regulatory Analyses (CNWRA) participated in a regulatory audit of Fort Calhoun in Blair, NE from March 5-9, 2012. By letter dated April 26, 2012 (ADAMS Accession No. ML12198A406), the NRC issued requests for additional information (RAIs). By letters dated July 24, 2012 (ADAMS Accession No. ML12208A131), August 24, 2012 (ADAMS Accession No. ML12240A151), and September 27, 2012 (ADAMS Accession No. ML12276A046), the licensee provided responses to the RAIs. The NRC staff reviewed the information provided by the licensee in response to the first set of RAIs and determined that additional information was needed for the staff to complete its evaluation. Consequently, the staff issued a second round of RAIs on February 22, 2013 (ADAMS Accession No. ML13053A226). The licensee responded to these RAIs in letters dated April 23, 2013 (ADAMS Accession No. ML13116A015) and May 21, 2013 (ADAMS Accession No. ML13144A814).

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the information provided in your application and determined that additional information is required in order to complete its review. Based on discussions with you, it was agreed that a response to this RAI (with the exception of SSA RAI 07.01 and SSA RAI 18) would be provided by July 26, 2013.

Per discussions with the NRC Project Manager on July 26, 2013, OPPD explained that these RAI responses would be transmitted via electronic information exchange no later than July 30, 2013.

Fire Modeling RAI 06.01:

In a letter dated May 21, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13137A128), the licensee responded to Fire Modeling RAI 06.a, which asked the licensee to explain how the effect of the increased heat released rate (HRR) due to vertical propagation in cable trays on the zone of influence (ZOI), and the resulting targets selected for damage in the probabilistic risk assessment (PRA), were determined.

In the response to FM RAI 06.a the licensee indicated that three damage states were considered in the FCS Fire PRA (FPRA):

1. Only the ignition source is damaged,
2. All targets within the ZOI of the ignition source are damaged, and
3. All targets in the compartment are damaged (hot gas layer (HGL) development)

For the second damage state the ZOI consists of a cylinder that extends from floor to ceiling. In addition, for this damage state the ZOI is expanded when the 35° upward fire propagation in cable trays spreads outside the radial dimension of the ignition source ZOI. However, based on observations from additional walkdowns, the licensee did not identify any targets that are outside the radial ZOI of the ignition source and within the 35° fire propagation angle. The response to FM RAI 06.a indicates that the licensee did not account for the effect of the additional HRR from cable trays and recalculate the radial dimension of the ZOI based on the combined HRR of the ignition source and cable trays.

Clarify if the guidance provided in NUREG-CR/6850 Appendix-R was used to calculate vertical fire propagation through a stack of cable trays and to determine ignition of and propagation through an adjacent cable tray stack. Also clarify, if additional targets were identified for damage due to vertical and horizontal propagation through one or more cable tray stacks. In case additional targets are identified, re-quantify the risk (core damage frequency (CDF), large early release frequency (LERF), delta (Δ) CDF and Δ LERF) to account for damage to these targets.

OPPD's Response to Fire Modeling RAI 06.01:

NUREG/CR-6850, Section R.4.2 provides guidance for modeling fire propagation through cable tray stacks. The FCS fire PRA applies this guidance, or in some aspects a more conservative version of this guidance, as described in the following paragraphs.

Consistent with NUREG/CR-6850, Section R.4.2.1, the FCS fire PRA models ignition of the lowest tray within the stack and subsequent horizontal propagation at an angle of 35° as the fire propagates upward through the stack (per Figure R-5 of NUREG/CR-6850). Note that the use of the cable damage temperature is a conservatism in the FCS process, as ignition is more likely to occur at the cable ignition temperature, which is generally higher than the damage temperature. As a further conservatism, no credit is taken for ignition time delay due to cable thermal inertia. The burning length, and resulting heat release rate contribution, at each level of the stack are calculated per the equations cited in Section R.4.2.1 of NUREG/CR-6850, i.e.,

$$L_{n+1} = L_n + 2(h_{n+1} * \tan(35^\circ)) \text{ and } \dot{Q}_{ct} = (0.45)(\dot{q}_{bs})(A).$$

Consistent with NUREG/CR-6850 Section R.4.2.2, the FCS fire PRA models the timing of fire propagation upward through a tray stack using the "4-3-2-1-1 rule". That is, the first tray ignites when the plume temperature exceeds the cable damage temperature at the tray location. The second tray ignites four minutes after the first. The third tray ignites three minutes after the second. The fourth tray ignites two minutes after the third. The fifth tray ignites one minute after the fourth, and finally the balance of trays in the stack ignites one minute after the fifth.

NUREG/CR-6850, Section R.4.2.2 provides guidance for modeling the spread of fire from within a burning tray stack to an adjacent tray stack. Specifically, this guidance recommends the lowest tray in the second stack be assumed to ignite seven minutes after lowest tray in the first stack. Then, the subsequent spread of fire up through the second stack is recommended to mimic the continued growth of fire within the first stack. This guidance applies to tray stacks on either or both sides of the original stack. The FCS fire PRA conservatively does not credit the delayed ignition of and subsequent fire growth within the adjacent stacks. Instead, the FCS fire PRA models ignition of the first tray in the adjacent stacks at the same time at which the first tray in the original stack ignites. Similarly, the FCS fire PRA conservatively models fire growth within the adjacent stacks mimicking the original stack (without a delay time).

All cables within the ignition source zone of influence, and all cables within trays affected by the fire propagation model described above, are identified as targets and failed during fire scenario quantification.

Fire Protection Engineering (FPE) RAI 08.01:

The compliance statement for LAR Table B-1, Element 3.4.1 (c) [On-Site Fire-Fighting Capability] is “Complies, with Required Action”. The associated implementation item REC-009 (LAR Attachment S) will revise the current configuration of the fire brigade leader and one other member from operations, and three members from security. In a letter dated July 24, 2012, (ADAMS Accession No. ML12208A131) the licensee responded to Fire Protection Engineering RAI 08 by stating that the new configuration “will ensure the brigade leader and two other members will have sufficient knowledge and training of nuclear safety systems to understand the effects of fire and fire suppressants on nuclear safety performance criteria. Operations personnel would complete Equipment Operator – Nuclear Auxiliary non-license classroom training.”

However, this response does not clarify full compliance with NFPA 805, Section 3.4.1(c), specifically with regards to the fire brigade leader maintaining sufficient knowledge and training.

Describe how the requirements of NFPA 805 Section 3.4.1(c) are met, namely “the brigade leader...shall have sufficient training and knowledge of nuclear safety systems to understand the effects of fire and fire suppressants on nuclear safety performance criteria”.

An approach acceptable to the staff for meeting this training and knowledge requirement is provided in Regulatory Guide 1.189, Revision 2, Section 1.6.4.1, Qualifications:

“The brigade leader and at least two brigade members should have sufficient training in or knowledge of plant systems to understand the effects of fire and fire suppressants on safe-shutdown capability. The brigade leader should be competent to assess the potential safety consequences of a fire and advise control room personnel. Such competence by the brigade leader may be evidenced by possession of an operator’s license or equivalent knowledge of plant systems.”

OPPD’s Response to FPE RAI 08.01:

Although FAQ 13-0069 is currently being discussed between the Nuclear Energy Institute (NEI) NFPA 805 Task Force and the NRC, regarding how this question will be approached by the industry at large, OPPD is addressing this response via implementation item REC-009.

The NFPA 805 requirement is met for FCS via REC-009 in that fire brigade training “will ensure the brigade leader’s knowledge to assess the potential safety consequences of a fire and advise control room personnel is commensurate with successful completion of Licensed Operator class room or equivalent certification training. The two other operations brigade members will have sufficient knowledge and training of nuclear safety performance criteria as demonstrated by successful completion of Equipment Operator Nuclear-Auxiliary non-license classroom training.” This will be reflected in LAR Attachment S of the NFPA 805 transition LAR supplement. **[AR 48249]**

FPE RAI 21.01:

- a. In a letter dated April 23, 2013, (ADAMS Accession No. ML13116A015) the licensee's response to FPE RAI 21.a stated that "commonly available equipment as referred to in LAR, Attachment L, Approval Request 1, includes wood that is an integral part of portable tools, equipment, pallets, or other apparatus." The NRC staff does not believe pallets or other apparatus containing untreated wood represents a similar amount of wood as a hand tool (e.g., screw driver with wooden handle). Provide further justification for these items or modify the request to only include small hand tools and portable equipment. As necessary, clarify how station order SO-G-91, Revision 28, Section 5.2.12, will be revised to reflect these changes.

OPPD's Response to FPE RAI 21.01.a.:

OPPD originally used the existing SO-G-91 definition of "commonly available equipment" to include "wood that is an integral part of portable tools, equipment, pallets or other apparatus" for consistency. However, based on further review, this definition will be changed to only include small hand tools and portable equipment within the power block. Therefore, as part of implementation, SO-G-91 will be revised accordingly and LAR implementation item REC-144 has been generated as part of the Transition Report, Attachment S, Table S-3. The updated LAR Attachment S, including this implementation item REC-144, will be reflected in the NFPA 805 transition LAR supplement. [AR 48249]

- b. In the licensee's response to FPE RAI 21.b.i, station order SO-G-91, Rev 28, Section 5.2.13, states in part that "wood (including that treated with flame retardant) shall not be retained in the containment, auxiliary building, or intake structure for longer than necessary to support an activity."

However, NFPA 805, Section 3.3.1.2(1) requires controls on wood throughout the power block. Provide justification for not applying these controls throughout the power block.

OPPD's Response to FPE RAI 21.01.b.:

The purpose of SO-G-91, *Control and Transportation of Combustible Materials*, Revision 28, is to establish requirements for the storage and handling of combustible materials, including aerosols, flammable and combustible liquids, flammable gases, and solids such as wood, paper, cloth, plastic, cable insulation, resin, filters, etc. Adherence to this procedure ensures that proper housekeeping requirements are being maintained from a fire protection standpoint. Controls on wood are used *throughout* the power block. As identified in the response to FPE RAI 21.b.1, SO-G-91, Revision 28, Section 5.2.12: "All wood (except wood that is an integral part of portable tools, equipment, pallets or other apparatus) used within the Protected Area shall be treated with a flame retardant." (Emphasis added.) This meets the requirement of NFPA 805 Section 3.3.1.2(1).

The statement in question from Section 5.2.13 of SO-G-91, Revision 28, states that "wood ... shall not be retained in the Containment, Auxiliary Building, or Intake Structure for longer than necessary to support an activity." The wood being discussed in this section still falls under the statement in SO-G-91, Revision 28, Section 5.2.12, which requires that "all wood... shall be treated with a flame retardant." Section 5.2.13 provides for *additional* controls for these buildings only, and is in excess of the requirement from SO-G-91, Revision 28, Section 5.2.12, which meets the requirement of NFPA 805 Section 3.3.1.2(1).

- c. **NFPA 805, Section 3.3.1.2(3) states that "waste, debris, scrap, packing materials, or other combustibles shall be removed from an area immediately following the completion of work or at the end of the shift, whichever comes first." Provide justification for SO-G-91 not requiring "...or at the end of the shift, whichever comes first" as stated in NFPA 805.**

OPPD's Response to FPE RAI 21.01.c.:

As part of implementation, SO-G-91 will be revised via REC-144 to require that waste, debris, scrap, packing materials, or other combustibles shall be removed from an area immediately following the completion of work or at the end of the shift, whichever comes first. As part of implementation, SO-G-91 will be revised accordingly and the associated REC-144 will be reflected in Table S-3 of the NFPA 805 transition LAR supplement. **[AR 48249]**

FPE RAI 29:

LAR Table B-1, Section 3.11.4(b), indicates a compliance statement of "Complies, with Required Action." However, based on the references to existing engineering equivalency evaluations (EEEEs) in the compliance bases section and the lack of an implementation item assigned to this element, it appears that the appropriate compliance statement should be "Complies with Use of EEEEEs." Clarify the correct compliance statement. If "Complies, with Required Action" is correct, revise the compliance bases section and provide the applicable required action (i.e., implementation item).

OPPD's Response to FPE RAI 29:

The correct compliance statement for Section 3.11.4(b) is "Complies with Use of EEEEEs." The updated LAR Transition Report Attachment A (Table B-1), with the correction to the compliance statement in response to this RAI will be reflected in the NFPA 805 transition LAR supplement. **[AR 48249]**

Safe Shutdown Analysis (SSA) RAI 07.01:

In a letter dated July 24, 2012, (ADAMS Accession No. ML12208A131) the licensee responded to SSA RAI 07 and indicated that the service building (SB) was excluded from the power block in order to prevent having to meet NFPA 805 chapter 3 requirements for this low fire risk structure. However, because the fuel oil transfer pump for the diesel driven auxiliary feedwater (AFW) pump is in the SB and the pump is identified as a component necessary to achieve the NFPA 805 performance goals, the response to SSA RAI 07 is considered insufficient justification for excluding this facility from the power block.

LAR Attachment I, Page I-3, states that “the service building (NFPA 805 fire area 45...identified for the service building in EA-FC-97-001) is excluded from the power block on the basis that it contains only the fuel oil transfer pump (and its associated power cable) for diesel driven AFW pump, FW-54.” The NRC staff finds the justification to exclude the SB is not sufficient to warrant exclusion from the controls of the power block from NFPA 805.

Provide a revised Table I-1 – “Power Block Definition” to include the appropriate portions of the SB applicable to the fuel oil transfer pump for AFW pump FW-54. The appropriate portions of the SB should be considered only those locations in the SB in which any part of the fuel oil transfer pump, power cables, power supplies, or control circuits would be located.

OPPD’s Response to SSA RAI 07.01:

Based on discussions with the NRC, it was agreed that the responses to the SSA RAI 07.01 would not be included with this submittal. In addition, via teleconference with the NRC staff on July 11, 2013, the NRC staff indicated they would review the LAR submittal to determine if RAI SSA 07.01 will be removed from the docketed RAI request or not. This decision is still pending.

SSA RAI 18:

Provide the following pertaining to non-power operations (NPO) discussions provided in Section 4.3 and Attachment D of the LAR:

- a. **Identify and describe the changes to outage management procedures, shutdown risk management tools, work control, and any other document resulting from incorporation of KSF [key safety functions] identified as part of NFPA 805 transition.**

OPPD’s Response to SSA RAI 18a:

The following changes will be implemented to incorporate the NPO assessment results:

- The Station Fire Plan (Standing Order (SO) G-28) and the Shutdown Operations Protection Plan (SOPP) (SO-O-21) will be revised via REC-094 to include defined entry conditions for NPO fire risk management controls.
- SO-G-28 and the SO-O-21 (SOPP) will be revised via REC-094 to include defined exit conditions for NPO fire risk management controls.
- SO-G-28 will be revised via REC-094 to include NPO fire risk management controls for plant fire areas where one or more NPO KSF could be lost due to a deterministic fire event (identified as “NPO pinch point fire areas”). The NPO fire risk management controls for the NPO pinch point fire areas are based on the results of the NPO Assessment (FCS Engineering Analysis (EA) 10-042, *Non-Power Operation Modes Transition Review*).

- SO-G-28 will be revised via REC-094 to include NPO fire risk management controls for plant fire areas that are considered to be NPO pinch point fire areas when a redundant structure, system, or component that is required for one or more NPO KSFs is placed out of service. The NPO fire risk management controls for these fire areas are based on the results of the NPO Assessment (FCS EA10-042).
 - The procedure governing temporary modification control (SO-O-25) will be revised via REC-136 to consider temporary modifications resulting in changes to plant configuration. Temporary changes to plant configuration may necessitate additional NPO fire risk management controls be identified and implemented during the highest risk time periods associated with NPO.
- b. Provide a description of any actions, including pre-fire staging actions, being credited to minimize the impact of fire-induced spurious actuations on power operated valves (e.g., air operated valves (AOVs) and motor operated valves (MOVs)) during NPO (e.g., pre-fire rack-out, "pinning" valves, or isolation of air supply).**

OPPD's Response to SSA RAI 18b:

The Station Fire Plan (SO-G-28) identifies pre-fire plans for each plant fire area, and is being revised to include a station plan during NPO for NPO pinch point fire areas. There are 23 NPO pinch point fire areas, and six (6) areas that are considered to be NPO pinch point areas when a redundant structure, system, or component that is required for one or more NPO KSFs is placed out of service. The associated NPO fire risk management controls for these 29 areas are limited to the following options:

- Verification that installed detection and/or suppression systems are in service, and an hourly fire watch
- Continuous fire watch
- Manage transient combustible storage and maintenance activities

Other pre-fire actions, including pre-fire rack-out, pre-positioning of valves, or isolation of air supply, are not credited to minimize the impact of fire-induced spurious actuations on power operated valves.

- c. Identify those recovery actions relied upon in NPO by physical analysis unit (PAU) and describe how recovery action feasibility is evaluated. Include in the description whether these have been or will be factored into operator procedures supporting these actions.**

OPPD's Response to SSA RAI 18c:

Engineering Analysis EA10-042 identifies "proposed" Recovery Actions as one of the allowable means to address specific NPO component failures (NPO pinch-points); however, consistent with other NFPA 805 sites, administrative controls will be relied upon for management of fire risk during NPO at FCS as described in the OPPD responses to RAI 18.a and RAI 18.b. Administrative controls are another one of the allowable means to address specific NPO component failures (NPO pinch-points).