

- **Date:** June 5, 2006
- **Facility Name:** San Onofre Nuclear Generating Station Units 2 & 3
- **Specific Area of Facility:** Various, associated with Class1E 480V Switchgear- Protection of 480V Power Cable Protection and cable ampacities of 480V power cables.
- **Name:** [REDACTED] 7.C
- **Address:** [REDACTED] 7.C
- **Telephone Number:** [REDACTED] 7.C
- **What are my concerns?**

1. Several safety related breakers (480V load centers B04 & B06, described in calculation E4C-099) will not clear over load and/or abnormal conditions and may damage the cables. Overload conditions are not alarmed. Cable damage may go unnoticed and as a result the safety related loads may not perform its function during an accident condition.

The acceptance criteria, exceptions to the criteria, and analysis stated in the base calculation are ambiguous. The exception to criteria for Short Time Pickup may trip a motor prematurely during starting.

2. The derated ampacity of some of the 480 cables, listed in calculations E4C-065 & E4C-120, is less than the continuous load current. The main drawbacks of these calculations are false assumptions and the methodology. The number of outstanding changes is in hundreds. This is a worst error likely situation and as a result some of the class1E devices may not perform the intended safety function.
3. The first line supervisors are rubber stamping the electrical calculations. As a result, there is lack of uniformity and consistency in electrical calculations.

4. [REDACTED]

When the event or issues arise?

I expressed concern related to electrical protection in [REDACTED] 7.C
 (b)(7)(C) To date, the issue is resolved only for few breakers. The electrical protection calculation, E4C-099 Rev. dated March 1996, is not revised.

I also expressed concerns related to cable ampacity calculations, in [REDACTED] 7.C
 (b)(7)(C) Since then I have expressed concerns related these issues in e-mails and verbal communications with supervisor and manager. To date this issue is not resolved.

I presented the proposal to streamline electrical calculations and software programs to

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maintain the uniformity and consistency in electrical calculations in 2000 through 2002. The last one was in year 2005. The supervisor and manager have not taken corrective actions for these issues.

Outside of Scope

- **Why do I believe this is a potential safety issue?**

Inadequate protection system (not protecting a cable and isolating load which draws abnormal current) is a design deficiency. This deficiency could result in a common mode failure. My main concern is the overload condition can go unnoticed, the breaker set at high value will not trip and a cable or cables' failures may prevent a safety function during a design basis event such as LOCA. There is no other compensatory measure, such as the ammeter, alarm, etc. to detect the problem. To the best of my knowledge there are no means to detect degradation in cable life due to periodic overload.

In some cases the ampacity justification for normal operation is based on emergency rating of cable.

Lack of uniformity and consistency in Electrical Calculations can create error likely situations. End results could be a failure in a safety system.

Retaliation blocks the potential safety concern, which may translate a failure in the safety system.

- **Recognizing that every issue does not have the same degree of safety significance, do I believe that this merits immediate action to resolve it? If yes, why?**

I would say actions are required in near future based on the following:
IEEE STD 242, section 9.2 reads "Cables is the mortar that holds together the bricks of equipment in an electrical system. If the cable system (implies protection system) is inadequate, unsatisfactory operation inevitably results."

NUREG/CR-6681 section 2.2.2, page 8 reads" The failure to appropriately limit cable amapcity can lead to short-term problems . . . The fires that occurred at San Onofre during 1968 is examples of such incidents. . . . Reviewers of an ampacity study must be cognizant that these short-term concerns but will more likely find them selves focusing on the corresponding long -term concerns.". Section 2.2.3 page 9 reads "in long term-view, operation at excessive temperature leads to accelerated aging of the cable, leading to premature degradation of cable such that long-term survival /performance might be threatened . . . Hence, the long term constraints dominate the ampacity assessment process. Section 4.8 page 48, reads "It is recommended that reliance on a cable's emergency overload current ratings not be accepted as the basis for concluding that a

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cable's normal design load is acceptable."

- **Did I observe the underlying event myself?**

Yes, I have reviewed the electrical ampacity and electrical protection calculations. I worked diligently in correcting electrical calculations

- **How did I find out about it?**

I did find out either in my work and/or self assessment.

- **Are there other individuals who can provide additional information to my concerns?**

Yes and No for the following reasons:

Most of the engineers believe that our ampacity calculations, Pre-TMI eras, are conservative. However, they do not recognize that the original margin is diminished by the fire barrier, especially Cerablanket.

The myth: Both units are running for so many years and cable ampacity problems would have surfaced by this time.

The myth: Comparison of the electrical protections with non-motor operated valves (MOV) for which the overload is bypassed.

- **Are there any records NRC should review that may be relevant to my concern?**

Yes, the action requests [redacted] (b)(7)(C) and the paper trail. Also various e-mails, evaluation reports, PPA, etc. At this stage, I believe, it would be prudent to address the issues and concerns. However, I will provide all the relevant documents as and when required by NRC.

7.8

- **Have I discussed this with my supervisor or other licensing official? If not why? If so what was the response, explain why?**

Yes, I did discuss each concern and/or issue with the supervisor and manager, as described below:

Initially they were not interested in discussing my concern regarding electrical protection. However, after generating the [redacted] (b)(7)(C) they were forced to evaluate the issues. They agreed to change the settings of two breakers per unit and for other issue there was a phase of sweet talk that they are taking actions. However, to date, the electrical protection calculation E4C-099 Rev. 01, dated March 1996, is not revised. The protection settings are not based on the cable ampacity stated in calculation E4C-051. To the best of my knowledge, there is no valid reason for this long delay. I suspect that they do not want to spend money to change the setting. Under the present AR system the supervisor and/or manager can manipulate the priority and hide problems for long time. This important

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calculation is excluded from the system level calculations. In other word, this is not an important calculation.

For cable ampacity issue the manager formed a committee to resolve ampacity problems. He invited me to attend a couple of meetings. They consulted other division of SCE to evaluate the problems independently. The report did not produce a favorable result for them. Then they hire another consultant. I was transferred to other group and was dropped from the discussion of cable ampacity issues.

I presented various alternates to improve the uniformity and consistency in electrical calculations. They did like my suggestions but did not implement. Recently, I revealed lack of the uniformity and consistency is the root cause of errors in cable ampacity calculation, E4C-051.

I did discuss and document the issues in Performance Partnership Agreement (PPA). There was no response from either manager or human resource department.

- I am not satisfied with the response for the following reasons:**

Four years passed by and the committed actions not fully resolved.

Class 1E electrical protection calculation, E4C-090, is not revised.

There is no confidence in adequacy of the 480Vcable ampacity calculations (E4C-065 & E4C-120). The number of outstanding changes is in hundreds. It is difficult to assess the impact of cumulative changes. Engineers in the calculation groups think that the report produced by the consultant for cable ampacity is useless. The supervisor is trying to get hold the consultant while the engineers within the group are trying to solve the problems using a heat transfer expert from a mechanical group. The engineers in the group have accepted my idea of extracting data from data base and consistent approach for evaluating cable ampacity, i.e., evaluate the path of power cable from origin to destination and derate the cable based on the worst raceway from the view point cable ampacity. However, based on the historical performance, the confidence level in resolution is very low.

The worst part is that solvable problems are not resolved in timely manner.

- Why did I decide to bring my concerns to the NRC?**

Our company expects the employee to have questioning attitude and express safety concerns via the Action Request (AR) system and/or discussed with supervisor and manager, document in e-mails and of course the verbal discussion without fear of retaliation. As expected, I have raised the safety concerns and also provided solution to correct the problems.

My first and most important reason is the safety issues.

The upper management is serious about implementing the above policy. However, in my opinion and observation the first line supervisor and the manager of our department are

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aggressive in meeting their own agenda and schedules. They consider the above issues as low risk items, i.e., do not fix until it is broken. It appears to me that either the importance of above issues does not reach to the upper management or they are not practicing what they are preaching.

I have patiently waited for corrective actions for several years. There is always some action or talk about solving the problems, especially whenever the INPO and/or NRC inspectors are scheduled to visit the plant. However, the enthusiasm has a short life and we go back to square one. I have reasons to believe that the corrective action will not take place unless it is imposed by NRC. For example outstanding changes for calculation E4C-120 will be implemented before INPO visits us. However, this calculation will not document the cable ampacity of cables routed in raceways with barriers (E4C-065). The supervisor believes that INPO will not catch other problems.

The second reason is violation of laws and/or NRC requirements.

Outside of Scope

Below is the brief summary of

Outside of Scope

(b)(7)(C)

Conclusion

(b)(7)(G)

I would like to discuss the safety concerns with NRC representative with open mind.

[redacted] are against the law and/or NRC regulations. I would like to discuss this in detail with NRC representative.