ATTACHMENT 1 TO AEP:NRC:1260G6

OVERHEAD SLIDES USED DURING
JANUARY 8, 1998, PUBLIC MEETING

9801200084

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COOK NUCLEAR PLANT/NRC MEETING

ADDITIONAL REVIEWS

JANUARY 8, 1998

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INTRODUCTORY REMARKS

JIM KOBYRA

CHIEF NUCLEAR ENGINEER

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BACKGROUND

- December 16, 1997
  - Public meeting on CAL response
- December 22, 1997
  - Public meeting on three follow-up items
    - calculations
    - root cause/short term assessment
    - 50.59 program
  - We agreed to additional reviews

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BACKGROUND
(cont'd)

- LETTER AEP:NRC:1260G4
  - December 24, 1997
  - Summarized December 22 meeting
  - Commitment to perform additional reviews
- Letter AEP:NRC:1260G5
  - December 31, 1997
  - Docketed results of additional reviews

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AGENDA

- Introductory remarks
  - Jim Kobyra
- 50.59 self assessment
  - Jeb Kingseed
- Design change self assessment
  - Terry Postlewait
- Integrated design bases program
  - Gary Weber

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10 CFR 50.59 SELF ASSESSMENT

JEB KINGSEED

MANAGER, NUCLEAR SAFETY

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50.59 SELF ASSESSMENT

AGENDA

- Purpose
- Focus
- Scope
- Team composition
- Observations
- Results

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50.59 SELF ASSESSMENT
PURPOSE

- Evaluate adequacy of 50.59 process

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50.59 SELF ASSESSMENT
FOCUS

- Operability issues
- Acceptability of screenings and evaluations
- UFSAR revision

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50.59 SELF ASSESSMENT

SCOPE

- Random selection of screenings and evaluations from 1/96- 9/97
- 35 procedural 50.59 screenings
  - change sheets and revisions
- 11 procedural 50.59 evaluations
- 25 design change 50.59 evaluations and corresponding screenings

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50.59 SELF ASSESSMENT

TEAM COMPOSITION

- Three teams
  - two procedure teams
  - one 50.59 design change team
- Procedure teams composed of:
  - QA lead auditor
  - nuclear safety 50.59 reviewer
  - operations procedure specialist

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50.59 SELF ASSESSMENT

TEAM COMPOSITION (cont'd)

- 50.59 design change teams composed of:
  - QA lead auditor
  - nuclear safety 50.59 reviewer
  - design engineers

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50.59 SELF ASSESSMENT
OBSERVATIONS

- Conclusions were acceptable.
- 11 of 60 50.59 screenings were not documented to a level of detail that would meet today's standards.
- 1 of 36 safety evaluations did not contain justification that would be considered adequate by today's standards.

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50.59 SELF ASSESSMENT
OBSERVATIONS (cont'd)

- A previously identified and addressed issue was re-verified on DCP-0049 Rev. 0 and 1. CR 97-2491 and LER 97-023 had previously been written to correct and report this issue.

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50.59 SELF ASSESSMENT
OBSERVATIONS (cont'd)

- Improving trend in the adequacy of 50.59 screenings and safety evaluations from 1/96 to 9/97. Fewer negative observations on recent 50.59s.

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50.59 SELF ASSESSMENT

RESULTS

- No new operability issues
- No unacceptable 50.59 screenings
- No new unacceptable 50.59 evaluations
- UFSAR revision as required

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DESIGN CHANGE SELF ASSESSMENT

TERRY POSTLEWAIT

DIRECTOR, DESIGN ENGINEERING

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DESIGN CHANGE SELF ASSESSMENT

AGENDA

- Purpose
- Focus
- Scope
- Team composition
- Results

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DESIGN CHANGE SELF ASSESSMENT

PURPOSE

- Confirm adequacy of safety related design changes approved during same time frame as recirculation sump modifications (RFC-2361, 1979)

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DESIGN CHANGE SELF ASSESSMENT
FOCUS

- Functional objectives
- Design intent
- Configuration drawings
- Design bases
- Operability

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DESIGN CHANGE SELF ASSESSMENT

SCOPE

- Review sample of safety related design changes approved within six months of RFC 2361
- Ten safety related design changes were approved between 10/6/78 and 10/6/79
  - RFC-2361 approved 4/6/79
- Five design changes chosen at random

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DESIGN CHANGE SELF ASSESSMENT

SCOPE

- RFC DC-1-1508: Seismic accelerometers
- RFC DC-12-2213: Upgrade motor CT circuits
- RFC DC-12-2225: RCP motor oil collection
- RFC DC-12-2229: Fire protection hose reels
- RFC DC-12-2276: EDG local controls

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DESIGN CHANGE SELF ASSESSMENT

TEAM COMPOSITION

- Three Teams
  - one each led by experienced mechanical, structural, or electrical/I&C design engineer
  - one or more discipline engineer team members, as required
  - each team had a qualified 50.59 reviewer

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RFC-DC-1-1508 SEISMIC ACCELEROMETERS

- Replaced seismic peak recording accelerometers
- Configuration control issues potentially affecting operability: none
- Other configuration control issues: none
- Other operability issues: none

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RFC-DC-12-2213
UPGRADE 4 KV MOTOR CT CIRCUITS

- Replaced existing cables at current transformers for 4 kv motors
- Configuration control issues potentially affecting operability: none
- Other configuration control issues: none
- Other operability issues: none

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RFC-DC-12-2225

RCP MOTOR OIL COLLECTION SYSTEM

- Replaced original oil collection system supplied by original equipment manufacturer
- Configuration control issues potentially affecting operability: none

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RFC-DC-12-2225
RCP MOTOR OIL COLLECTION SYSTEM (cont'd)

- Other configuration control issues:
  - non-conforming weld identified and dispositioned in 1989, documented under the corrective action program
- Other operability issues: none

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RFC-DC-12-2229

FIRE PROTECTION HOSE REELS

- Added additional hose reels and piping in safety related areas
- Configuration control issues potentially affecting operability:
  - LER 86-003 reported inadequacy of piping supports over safety related components. Rev. 1 to design change corrected by providing seismic supports.

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RFC-DC-12-2229
FIRE PROTECTION HOSE REELS (cont'd)

- Other configuration control issues: none
- Other operability issues: none

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RFC-DC-12-2276

EDG CONTROLS ON LOCAL SUBPANEL

- Provided local start, stop and control of emergency diesel generators (EDG)
- Configuration control issues potentially affecting operability: none

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RFC-DC-12-2276
EDG CONTROLS ON LOCAL SUBPANEL (cont'd)

- Other configuration control issues:
  - could not locate documentation that addressed additional relay loads to EDG inverter. This has been dispositioned.
  - several relays were not found in a vendor technical manual.

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RFC-DC-12-2276

EDG CONTROLS ON LOCAL SUBPANEL (cont'd)

- Other configuration control issues: (cont'd)
  - condition report 97-3587 written 12/11/97 to document reversed wires on U2 EDGs potentiometers. Drawings correct. U2 CD wires corrected. U2 AB scheduled 1/9/98.
- Other operability issues: none

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DESIGN CHANGE SELF ASSESSMENT

RESULTS

- No instances found where operability of SSCs is adversely affected
- Appropriate drawings reflect these design changes

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CONCLUSIONS

- No new operability issues
- 50.59 screenings and evaluations are appropriately completed
- Recent 50.59's properly update UFSAR
- Early design changes met functional objectives
- Results support our confidence that safety related systems are operable

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INTEGRATED DESIGN BASES PROGRAM

Gary Weber
Executive Staff Engineer

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INTEGRATED DESIGN BASES PROGRAM

- Purpose
- Scope
- Schedule

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INTEGRATED DESIGN BASES PROGRAM

PURPOSE

- Solidify understanding of and control over plant design and licensing bases
- Prepare for license renewal
- DBD validation
- UFSAR validation
- Assessment and resolution of issues

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INTEGRATED DESIGN BASES PROGRAM

SCOPE

- Integration of ongoing efforts
  - DBD reconstitution
  - UFSAR revalidation
  - NOP upgrade
  - record document control and indexing

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INTEGRATED DESIGN BASES PROGRAM

SCOPE (cont'd)

- Assessment activities
  - effectiveness of DBDR and UFSAR projects ongoing
  - system assessment of DBD validation
    - auxiliary feedwater
    - emergency core cooling
    - emergency diesel generators
    - 4 KV
    - 250 volt DC
  - calculation index pilot study

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INTEGRATED DESIGN BASES PROGRAM

SCOPE (cont'd)

- Technical assessment group
  - dedicated team for assessment and resolution of issues
  - issue tracking
  - augmented through task authorization mechanism

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INTEGRATED DESIGN BASES PROGRAM

SCHEDULE

- Planning nearing completion
- Staffing and logistics in place mid-January
- Draft procedures issued for review (per requirements of Appendix B)
- DBDR/UFSAR assessment complete
- Calculation index pilot study in progress
- System assessment start after unit restart

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INTEGRATED DESIGN BASES PROGRAM

SCHEDULE (cont'd)

- UFSAR revalidation - October 1998
- DBDR- System ~ March 1999
- NOP - ~ March 1999
- STP - December 1999
- DB validation - pending results of five system pilot

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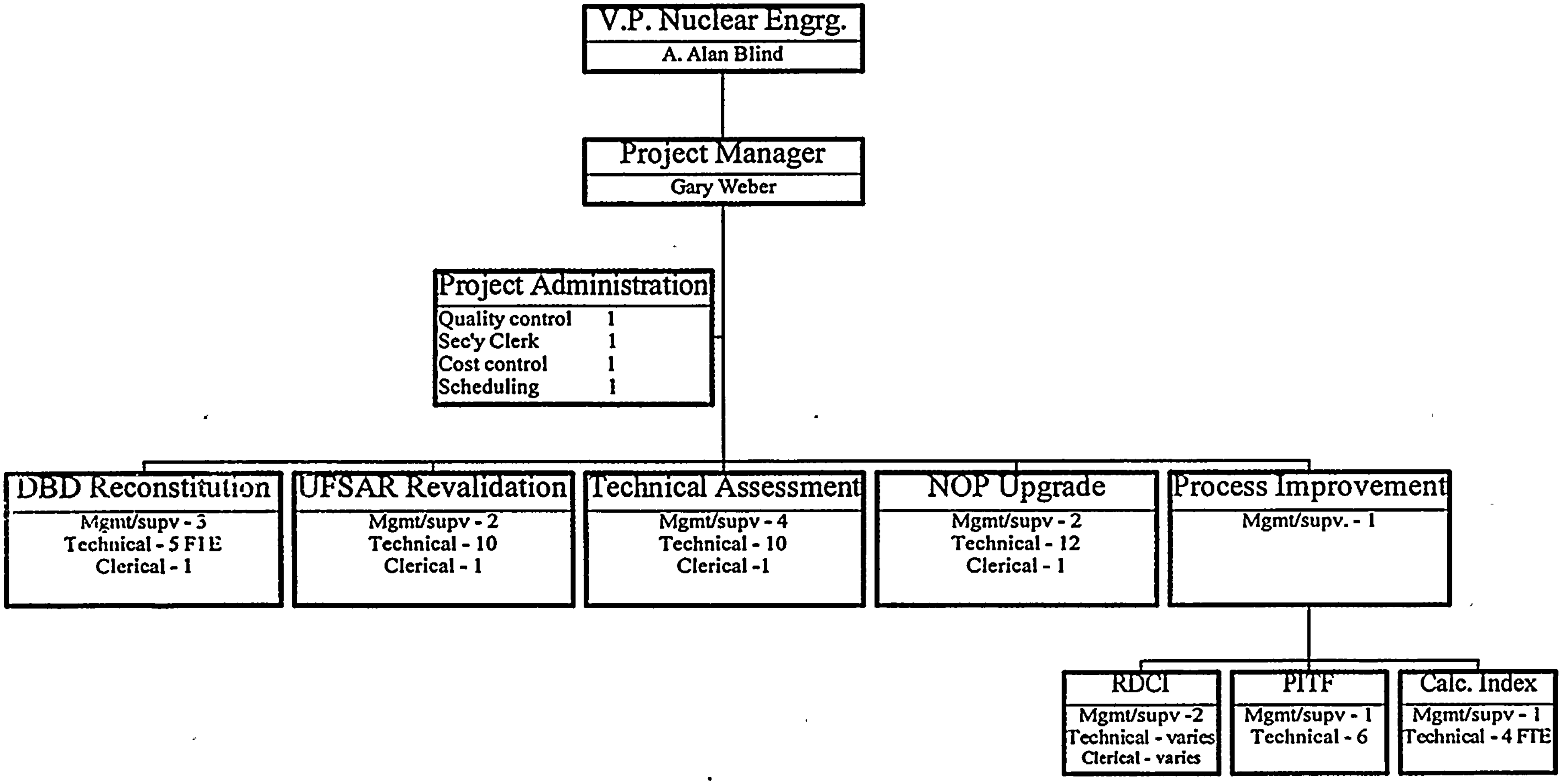
INTEGRATED DESIGN BASES PROGRAM

ORGANIZATIONAL CHART



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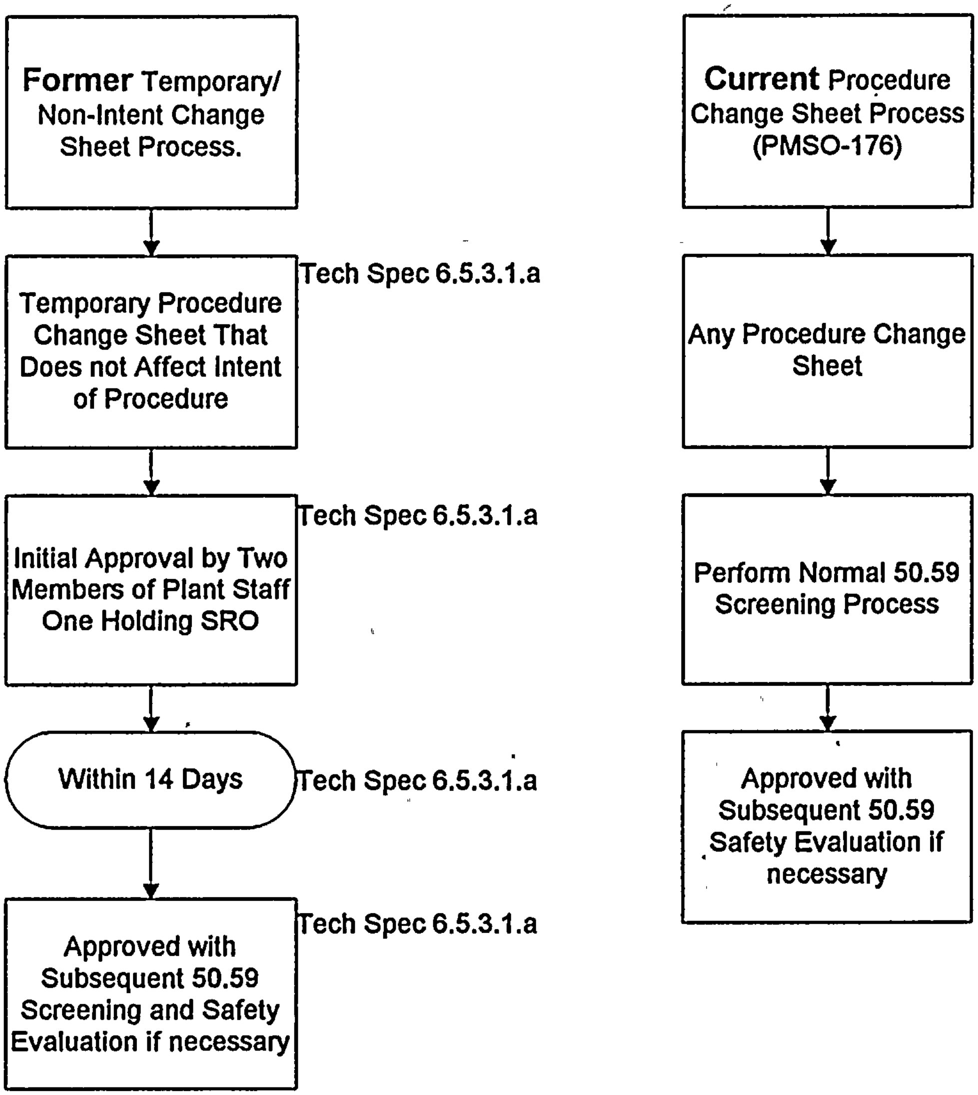
SELF ASSESSMENT OF 1988 - 1994 CHANGES

- Review cases where changes may have been made without a 50.59 evaluation during the period 1988 - 1994
- Results by January 31, 1998

Previous and Current Procedure Change Sheet Processes At Cook Nuclear Plant



ATTACHMENT 2 TO AEP:NRC:1260G6

CONTAINMENT SUMP OPERABILITY DETERMINATION

UNIT 1 CONTAINMENT RECIRCULATION SUMP OPERABILITY ASSESSMENT

Background

Resolution of the August/September, 1997 AE Design inspection issue on fibrous material in containment led to extensive reviews of both the design basis of and threats to the containment recirculation sump. This document provides an assessment of the operability of the Cook Nuclear Plant Unit 1 containment recirculation sump considering the licensing and design basis of the sump. It also includes a review of the validity of the assumed sump blockage, given the plant configuration and materiel condition and following work during the Fall, 1997 outages. A separate assessment will be provided for the Unit 2 containment recirculation sump upon completion of planned containment work during U2R97.

Affected System/Structure/Component (SSC)

The affected structure is the containment recirculation sump. Blockage of the containment recirculation sump could have an adverse effect on the Emergency Core Cooling (ECCS) and Containment Spray (CTS) systems.

SSC Safety Function

The function of the containment recirculation sump is to provide a reliable source of water for the long term cooling of the reactor coolant system and containment building following postulated accidents, which require entry into the recirculation mode of ECCS and/or CTS System operation. The recirculation sump was designed to handle postulated debris threats, while precluding vortexing and air entrainment for the suction of the Residual Heat Removal (RHR) and CTS pumps and also while providing adequate Net Positive Suction Head (NPSH) to these same pumps. Postulated debris threats considered in the sump design included up to 50% plate blockage of the sump screen. Besides meeting the NPSH requirements for the RHR and CTS pumps, the sump is also designed to preclude the entry of particles greater than 1/4" in size to the recirculation sump, which ensures the 3/8" CTS spray nozzles will not be blocked by debris. The sump screen also provides particle exclusion protection for small ECCS valves.

SSC Deficiency

Questions have been raised regarding the ability of the recirculation sump to meet design basis requirements and credible debris threats, including debris blockage with different characteristics than the 50% plate blockage assumed during original sump design. Specific design requirements in question relate to the effective area of the sump opening, and the ability of the sump to provide sufficient flow across the sump opening with an acceptable pressure loss such that RHR and CTS NPSH requirements are met. Assessment of the sump operability must consider whether design basis assumptions for blockage are reasonable, based on determination and consideration of credible post-accident debris threats.

Assessment of Impact of Deficiency on Ability of Recirculation Sump to Perform Its Safety Function

The Cook Plant containment recirculation sump design was modeled extensively during the late 1970s (reference 1) to "verify that the sump would perform satisfactorily without the development of any severe vortices or other flow irregularities that could affect operation of the pumps in the Emergency Core Cooling System (ECCS) during its recirculation mode." A by-product from the model testing, which included testing for various "plate blockage" schemes at the sump entrance, included empirical head loss data at the sump screen, at minimum water level (El. 602'- 10"). Sump entry screen blockage of up to 50% was modeled. Loss coefficients (C_L) determined for various test schemes, and are represented by the equation:

$$C_L = \frac{h_L}{v^2 / 2g}, \text{ where}$$

h_L = the head loss in ft
v = fluid velocity at the sump exit pipes
g = 32.2 ft/sec^2

Data from the Alden Test report indicated that the configuration with the highest observed head loss at the sump entrance occurred with a loss coefficient and corresponding flow of 0.26 and 13.79 ft/sec, respectively. For these conditions, the corresponding flow was 15,400 gpm (7,700 gpm per sump outlet pipe). This data is taken from Table 10 of the 1978 Alden Labs report. The observed head loss with these conditions was 0.77 ft.

Although the configuration modeled by Alden Labs was similar to the current Cook Plant sump configuration, it is not identical. The existing sump entrance design employs two aligned layers of coarse grating sandwiching a single layer of stainless fine mesh, while the modeled configuration consisted of a single coarse grating and a single fine mesh screen. For the existing (as-left) sump screen design, the open flow area, after subtracting structural elements of the grating such as screen and grating ligaments, is approximately 37.9 ft^2 (reference calculation ENSM971210TWF). As a point of information, the sump screen was recently aligned as an enhancement under design change DCP-869 to optimize open flow area. Prior to this optimization, the worst case open flow area was determined by calculation, assuming possible grating misalignment, to be as low as 18 ft^2 (reference calculation ENSM971128TWF). By way of comparison, the areas of the two 18" Schedule 40 pipes exiting the recirculation sump represent a total area of 3.1 ft^2.

Calculation ENSM970128AF, Rev. 1 has been performed to determine the available NPSH for the ECCS pumps. The head loss through the existing sump screen was analytically determined to be 0.62 ft at 15,600 gpm flow for the existing sump configuration with 50% plate blockage, consistent with the plant licensing basis. Since this analytically determined head loss correlated well with empirical results from the Alden sump model tests (0.77 ft at 15,400 gpm), a conservative head loss of 1 ft across the sump screen was assumed in the NPSH calculation, at 15,600 gpm. Using this head loss, NPSHA was calculated for the RHR and CTS pumps. NPSHA was found to exceed required NPSH for both the CTS and RHR pumps with margin (NPSH margin was 9 ft for the RHR pumps and 22 ft for the CTS pumps for worst case conditions). Thus, for sump screen blockage assumed in the licensing basis (50% plate blockage), for the existing sump design, NPSH margin is preserved.

As a point of information, the theoretical amount of sump screen area blockage required to achieve a head loss equivalent to NPSH margin is calculated below, to determine how much screen blockage could be tolerated. The grating and screen arrangement was treated as an orifice, which is consistent with the methodologies presented in the Handbook of Hydraulic Resistance republished for the Atomic Energy Commission. Using equations from Cameron Hydraulic Data, flow through an orifice is determined by the equation:

$Q = 19.636\ C\ d_1\ h^{1/2}$, where,

Q = flow, in gpm
d_1= diameter of orifice or opening
h = differential head, in ft of liquid
C = discharge coefficient (0.61 for square edge orifice)

The diameter of an orifice which would result in a head loss of 9 ft (RHR pump NPSH margin) at a flow of 15,600 gpm was determined to be 20.83 inches, which corresponds to a 2.4 ft^2 for a circular flow area. This open flow area corresponds to blockage of 94% of the current sump area (37.9 ft^2). Considering that the sump outlet pipes total 3.1 ft^2 in area, this result is not unexpected.

Although it has been shown above that blockage of much higher than 50% can be tolerated before NPSH margin is completely eroded, it remains important to acknowledge the licensing basis of 50% plate blockage, and to provide a basis for why the 50% sump blockage assumption is a reasonable one. Consideration of the 50% blockage assumption must include review of possible post-accident debris generation, and the potential for transport of the debris to the sump.

Debris Generation

Resolution of the AE design inspection issue on fibrous material in containment resulted in numerous reviews of the containment for potential debris threats to sump blockage and operability. Extensive walkdowns of containment were performed to identify potential debris sources. Among the threats identified and considered were fibrous insulation materials, coatings, material stored in containment, tape, cable tie-wraps, anti-slip tape on ladders and labels.

Fibrous Insulation Materials

It is well documented that LOCA generated debris represents a potential threat to the operability of the ECCS and CTS as a result of containment sump blockage. Pipe and equipment insulated with fibrous materials is a potential significant debris source.

The piping and components within the containment that are insulated have been reviewed to determine the location of fibrous material. A portion of fibrous insulation within areas of most concern in the containments (the lower volume or active sump) has been removed; however, it is impractical to perform a 100% removal of all fibrous insulation at this time. A review was performed of the impact of the remaining fibrous material. They key remaining locations of fibrous material within the lower volume of the containments include the first few elbows on the steam and feedwater lines near the top of the steam generators in both units. Additionally, the girth welds (except for the channel head to barrel welds) of the Unit 1 steam generators are insulated with pads containing fibrous material. Potential break locations on the RCS piping were considered to assess if there was fibrous insulation in proximity (considered to be within approximately five pipe diameters) to the postulated break locations. For this review no credit was taken for leak-before-break. The fibrous material on the steam generator girth welds is largely shielded from a postulated RCS pipe break by the steam generator lower supports, which are large steel frames that surround the base of the SG just above the channel head. The shielding afforded by these frames, and also by nearby floor grating, would limit jet impingement and consequently debris generation to localized areas. The fibrous insulation on the steam and feedwater lines is sufficiently removed from the RCS piping that debris generation from RCS piping jet impingement on these lines was not considered likely. Once again, any effects from jets would be localized. Breaks of the steam and feedwater lines themselves are addressed separately, below.

Based on the limited locations of the fibrous materials, the probable localized nature of jets from RCS pipe breaks, and considering shielding from structural elements, debris generation from fibrous materials due to postulated RCS pipe breaks is not considered to be sufficient to challenge the recirculation sump beyond its capabilities.

A break of either the a main steam line or a feedwater lines was considered to evaluate if the break could generate fibrous debris that could potentially challenge the ECCS recirculation sump screen. The sources of the fibrous material are on the main steam line at elevation 635' close to the reactor building penetration, the main steam line close to the top of the steam generator at elevation 686', the feedwater line at elevation 661', and assorted fiber pads at the top, middle and lower portion of the Unit 1 steam generators. Either a main steam line or feedwater line break (MSLB or FLB) would initiate containment spray operation for containment pressure greater than 2.9 psig. The outflow of the containment spray will transport some of the fibrous debris to the lower containment floor and will result in the formation of a pool of water on the containment floor. Analysis for the main feedwater line break concluded that the switchover to recirculation mode is not required. Approximately 30 minutes after a steam line rupture, both RHR and containment spray trains' suction would be switched from the RWST to the ECCS recirculation sump. At the time of switchover, the lower containment water pool depths are approximately 7 ft over the minimum required for pump suction (reference 4). The debris generated by the break could potentially challenge the ECCS recirculation sump by clogging the sump screen with debris.

To challenge the ECCS sump screen, the debris must be transported to the sump screen. Most of the debris transport from the area around the break location to the lower containment floor will occur in the first few minutes following the break and containment spray activation. There is no break flow for the steam or feedwater line breaks (other than right at the time of the break) and the containment sprays and ice melt are the only source of water for buildup of the water pool on the floor of the lower containment. As such, any turbulence in the floor pool will be limited to the top few inches, with no viable turbulence mechanism available for the water close to the floor. Consequently, it is anticipated that any of the debris that would be initially suspended in the pool will sediment to the bottom of the floor prior to switchover. The debris on the floor would then need to be transported by water flow to the sump screen. Based on NUREG-0897, the minimum flow velocity needed to transport debris is 0.2 ft/sec. For conservatism, a bulk flow velocity of greater than 0.1 ft/sec is assumed to be required to transport debris. The maximum flow through the ECCS recirculation sump for a MSLB is 6,400 gpm (2 trains of CTS flow). A cross-sectional area greater than 142 ft^2 yields flow velocities less than 0.1 ft/sec (142 ft^2 = [6400 gpm / 450] / 0.1). Using the minimum pool height of 10 ft (approximately 7ft above elevation 602'-10"), at distances greater than a radius of 4.5 ft from the center of the sump screen, the horizontal bulk flow velocity would be less than 0.1 ft/sec.

Most of the break locations would generate debris that would reach the containment floor and sediment at distances sufficiently removed from the sump screen such that transport to the sump screen is not considered likely. Furthermore, given the lack of turbulence, it is unlikely that the debris that could be transported to the sump screen would be uniformly distributed across the entire axial extent. It is expected that the upper portions of the screen would remain relatively debris free. Therefore debris generated by potential steam or feedwater line breaks will not adversely impact the performance of the ECCS recirculation sump.

In summary, fibrous material has been removed from the containments with the exception of a few select areas, which are jacketed with stainless steel, consistent with the plant licensing basis. These select areas have been evaluated and determined not to be a significant threat to recirculation sump screen blockage. Additionally, thermal insulation has been extensively inspected during numerous walkdowns during the Fall, 1997 outages, and repairs have been made where the insulation jacketing was not in good repair. This included ensuring that jacketing adequately covers insulation material (no excessive joints) and that insulation is secure (banding is tight). Based on these observations and repair, fibrous insulation material other than that in the direct vicinity of a break, is not expected to come loose and migrate to the recirculation sump.

Coatings

The coatings systems in both units have undergone extensive investigation and it is concluded that, following work completed during the Fall, 1997 outages, these systems will not have an adverse effect on the performance of the recirculation sump screens following postulated accidents.

The existing coatings systems can be categorized as either qualified (N-grade), unqualified (typically manufacturer's standard paints on such things as electrical boxes/cabinets, pumps, fans and motors) or indeterminate (coating systems that appear to be qualified but where there is incomplete documentation). The coatings at risk for disbondment include unqualified coating systems, indeterminate coatings and qualified coatings that are in need of repair.

After examining the available original construction coating application and inspection records, a large percentage of items previously believed to be indeterminate were in fact found to be qualified coatings. This includes the coating systems and their applications on the containment liner, the concrete floors and walls, major equipment provided by Westinghouse, the polar and manipulator cranes and most structural steel. This greatly limits the potential quantity of loose coating particles that could affect the sump screens during a LOCA.

Another key aspect in the evaluation of the containment coating systems was to determine which coated surfaces are at risk for adversely effecting the sump screens. Determinations were based not only on the potential for disbondment of the coatings, but the potential for these particles to reach the screens. Potential for such particles to reach the screens is related to their potential flow path, the settling characteristics of disbonded coating particles and existing obstructions such as curbs and walls. For example, coating particles released in the annulus were considered a relatively minor threat to the recirculation sump based on the lack of high energy lines, the distance from and path to the recirculation sump.

Investigation of the coating systems in containment found the following estimated quantities of unqualified and indeterminate coatings:

UNIT #1

Unqualified Coating Materials	Square Feet
Lower containment	1358
Upper containment	1826
Annulus	1984
Total	5168

UNIT #2

Unqualified Coating Materials	Square Feet
Lower Containment	1365
Upper Containment	1830
Annulus	1686
Total	4881

The primary indeterminate coatings identified included piping, including the Containment Purge Air Supply piping and other piping found to have an unusual appearance when compared to the qualified coating system, and structural steel including that associated with the steam generators. This relatively small amount of unqualified and indeterminate coating material is considered insignificant compared to the total amount of coatings in the containments. Loose coatings have been removed, and in many cases, surfaces were repainted. Based on work completed to examine coatings, including removal of any loose coatings, application of new qualified coatings and on the relatively small amount of unqualified or indeterminate coatings, this material is not considered to pose a significant threat to the recirculation sump. However, as a point of information, plans will be formulated to further improve coatings during future outages, consistent with industry guidance (pending Generic Letter on coatings) to be issued in early 1998.

Material Stored in Containment

Walkdowns of containment led to the identification of various items that were intentionally stored in the containments during past operation. Reviews were conducted prior to their storage in containment and typically included evaluation for seismic restraint. Typical items stored in the containments included vacuums, welding machines and lift-a-lofts. The majority of the items of concern were stored in the lower volume, in the refueling cavity tunnel area. Further consideration indicates that these items could generate debris when exposed to impingement from jets. Additionally, these items may be coated with unqualified coatings, and their presence may result in local flow acceleration for water flowing to the sump, which could enhance debris transport. Therefore, items which are not required to remain in containment, have been removed. This includes the containment charcoal auxiliary ventilation units, which were removed under design change DCP-860.

Tapes

Various tapes used in the containment building were also considered. These included white glass tape and black electrical tape, in addition to duct tape. Duct tape has been aggressively removed as it was identified. Although qualification documentation could not be produced for white and black tapes identified, this material has been extensively examined through walkdowns. Loose tape was removed. Tape that is tightly affixed is not being removed, since it was judged that due to typical installation methods for tape (tightly wrapped), it is unlikely that the tape would become completely free and transportable following a postulated accident. Furthermore, much of the tape identified was in the annulus regions of the containment, which is not in good communication with the active sump containing the recirculation sump. Ladder rung (anti-slip) tape is being removed. In summary, tapes remaining in the containments are not considered a significant threat to the recirculation sump given planned work and inspections during the Fall, 1997 outages.

Cable Tie Wraps

Cable tie wraps were also considered as to potential to threats the recirculation screen. Experience indicates that the tie wrap material may become brittle with age. However, it has also been demonstrated that the tie wraps are negatively buoyant (i.e., they sink). Therefore, considering that many of the cable tie wraps are enclosed in cable trays, that the containment design includes curbing to trap debris, and finally, that this material has been shown to sink, the existence of these materials is not considered a significant threat to the recirculation sump.

Labels

Labels were dispositioned similar to tape and coatings in that they were reviewed to determine qualifications, and they were extensively examined during walkdowns. Labels that were qualified for post accident environment were left in place, provided they were in good repair. Labels which were not qualified for the post-accident environment were removed from the lower volume (active sump). Unqualified labels in other areas of the containment were examined and left in place provided they were tightly adhering and in good condition. Labels in poor repair were removed. In summary, labels left in containment were either qualified, or they were not considered a threat to the sump based on their tight adherence and their distance from and path to the sump.

General

Combined with the consideration of the sump blockage threats posed by specific materials, the general state of the containment materiel condition was also considered.

Miscellaneous materials (such as dirt, rust, etc) are important since any fibrous material that transports to the recirculation sump will act as a filter, and any fines can fill in flow paths through the fibrous material, significantly increasing head loss across the sump screen. Although containment cleanliness has been on an improving trend in recent years, containment remediation efforts during the Fall, 1997 outages included extensive focused cleaning of the containments. An example of this focused effort involved the removal of steam generator walkway platforms, so that the areas beneath could be vacuumed. These efforts further reinforce the confidence that the sumps will not be subject to excessive blockage during postulated accidents.

Conclusion

In conclusion, credible post-accident debris threats have been shown to be limited. Thus, there is reasonable assurance that the design basis assumption of 50% sump screen blockage can be met. Furthermore, the calculated head loss across the sump screen for assumed blockage results in acceptable NPSHA for the RHR and CTS pumps, with margin. Finally, the recirculation sump screen has been shown to be capable of handling significantly greater than 50% blockage, and still providing adequate NPSH to the most limiting pumps. Based on the preceding discussion, the containment recirculation sump is considered capable of performing its function, and therefore should be considered operable.

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