

1/22/07

COMPONENT DESIGN BASES INSPECTION (CDBI)

INSPECTION PLAN

KEWAUNEE POWER STATION

(INSPECTION REPORT NUMBER 05000305/2007006(DRS))

Inspection Objectives

This inspection fulfills the baseline inspection program requirements for biennial Inspection Procedure (IP) 71111.21. The inspection's objective is to verify that design bases have been correctly implemented for the selected risk significant components and that operating procedures and operator actions are consistent with design and licensing bases. This is to ensure that selected components are capable of performing their intended safety functions. This inspection verifies aspects of the Initiating Events, Mitigating Systems, and Barrier Integrity cornerstones for which there are no indicators to measure performance.

Inspection Dates: January 29, 2007, through March 2, 2007

Exit: March 2, 2007

Applicable Inspection Procedures

IP 71111.21 "Component Design Bases Inspection ," dated June 22, 2006
IP 71152 "Identification and Resolution of Problems" (reference)

Prepared By: /RA/ 01/18/2007
Lead Inspector
Zelig Falevits Date

Approved By: /RA/ 01/18/2007
DRS Branch Chief
Ann Marie Stone Date

Reviewed By: /RA/ 01/18/2007
DRP Branch Chief
Pat Loudon Date

INSPECTION PLAN DETAILS

I. INSPECTION TEAM:

Z. Falevits, Senior Engineering Inspector, Lead, x9717, zxf
C. Brown, Senior Engineering Inspector, x9605, ceb1
R. Langstaff, Senior Engineering Inspector, x9747, ral4
A. Dahbur, Engineering Inspector, x9810, akd
S. Burgess, Senior Reactor Analyst, x9752, sdb2
M. Yeminy, Mechanical Consultant, 305-238-4732
G. Skinner, Electrical Consultant, 412-963-9889

F. Tran, Engineering Inspector, Observer, x9623, fpt

II Detailed Inspection Schedule

Lead Inspector Preparation: January 8, 2007

Prep. at Region III Offices: January 22-26, 2007

Inspection Onsite Weeks: January 29 to February 2, 2007
February 12-16, 2007
February 26 to March 2, 2007

In-office Weeks: February 5 to 9, 2007
February 19 to 23, 2007

Entrance Meeting: January 30 at 9:00 a.m.

Exit Meeting: March 2, at 9:00 a.m.

Preparation of Inspection Report:

- Inputs Due: March 9, 2007 COB
- Draft Completed: March 30, 2007
- Management Review and Approval Completed (target): April 6, 2007

Inspection Report Must Be Issued Before April 16, 2007

III Lead Inspector Preparation Activities

Review licensee material received based on information request letter, Review PRA information with the SRAs, select 30 high risk components, and provide the team a copy of the inspection plan.

Information Requests

As part of the inspection preparation, the lead inspector contacted the licensee, informed them of the scope of the inspection, and requested that the necessary information be provided to the inspection team. The information request letter was sent to the license on November 6, 2006.

Distribution of Collected Information

On Monday, January 22, 2007, or sooner, the lead inspector will distribute information provided by the licensee, for the 30 components selected by the SRA and the lead inspector. The majority of the information will be provided electronically. This information will be reviewed by the team members in order to reduce the selected items to about 15-20 high risk/low margin (HR/LM) components and to divide up the components to be reviewed by the team during the onsite inspection weeks. In addition, other items required by the procedure will be selected.

IV Team Preparation Activities

In-office Prep Week to select final 15-20 components and other items based on high risk significance and the least available margin. (January 22-26, 2007)

We will have a team meeting on Monday, January 22nd, at 2:00 pm to discuss inspection logistics and plan. Team members will use this preparation week to review the design related material the licensee provided for the 30 selected components to determine low margin components and to narrow the selection to the final 15-20 HR/LM components to be inspected during the onsite inspection weeks. In addition, HR/LM operator actions, operating experience, and related modifications and condition reports will be selected during this week. The specific team assignments will be determined during this preparation week. A second team meeting will be held on Thursday, January 25, at 10:00 am to discuss specific team assignments, final selection of (15-20) components and other inspection items. In addition, the lead inspector will combine the list of additional team member requested information to be submitted to the licensee so that the information will be ready for review during the first onsite inspection week.

The inspectors should review the latest revised inspection procedure to familiarize themselves with the process for selection of components, operator actions, and operating experience; and conduct of the inspection. Latest completed CDBI inspection reports, should be reviewed. In particular, review the following RIII issued CDBI inspection reports: Quad Cities 254/265/2006003(DRS) and Duane Arnold IR # 331/2006007(DRS) (Follow latest report format to write your input; **including** the list of documents). Also, please review the Kewaunee CDBI pilot IR #305/2005002(DRS) for attributes and components inspected and be mind full of what was looked at during the pilot inspection to ensure that we do not review the same attributes/documents during this inspection, as much as possible. Also, the inspection procedure and the Matrix provided by the lead inspector identifies a number of component design review attributes and considerations that can be used in support of the inspection to verify certain system or component attributes. Since most of the material may be electronic, inspectors should bring a laptop computer to the site for their use in preparation for the

inspection. Also, if possible, bring a memory stick for efficient information transfer of findings and exit notes between team members and the lead inspector.

A component inspection Matrix will be developed to identify component attributes to be inspected and team member assignments.

Component Selection

The sample selection of 15-20 components should be based on risk significance and the least available margin. The team will initially select more than the minimum required to ensure the minimum number of samples are met. If it is determined that either the team does not have the time or resources to complete all of the selected components, they will not be included as part of the number of completed samples. Design margin is typically defined as the difference between the actual (or predicted) and required performance of a system, component, or operator action (see IP for more details). The procedure states that the following attributes should be considered in evaluating component margin, analytical (design) margin, operations margin, maintenance margin and complexity margin. Margin includes, corrective action insights, maintenance history, design changes, complex design schemes, and maintenance rule insights.

Low margin can be a function of the original design, caused by design modifications, power uprates, or can be due to degraded material conditions. Inspection samples (safety or non-safety risk significant components) should be identified at the major component (e.g. pump, motor operated valve, batteries, etc.) or procedural step level to assist in inspection planning. Included within the sample selected should be passive components such as sump screens, strainers, piping, cables, etc., whose failure could impact system functionality, component design function that involves a lot of operation and human actions, availability/reliability issues, and components design attributes which are not fully demonstrated through testing. To the extent practical, the sample should include a diverse range of equipment. The team in their selection of samples should attempt to limit the number of systems involved (i.e. select pump, valve, strainer, etc, in same system, if possible), which will limit the amount of preparation time required to understand design and system requirements necessary to conduct a successful inspection.

In order to identify low margin areas, the inspectors should review detailed calculations associated with the identified risk-significant components to identify areas of low margin. In this case, the inspector should identify calculations showing little margin between predicted results and calculation and/or regulatory acceptance criteria.

In addition, the margin review should include corrective action program insights and repetitive maintenance summaries associated with the identified risk-significant components as poor performing components may be indicative of inadequate design. Component review should also include evaluation of the impact of plant modifications or licensing basis changes on available margin. In particular, licensing changes that can reduce safety analysis margins, such as extended power uprates, should be considered.

The SRA and SRI will participate and provide information to be used for selecting the samples for review.

Operator Action Selection

The operations inspector should review the list of risk significant operator actions provided by the licensee, and with insights provided by the SRA the resident inspector, and the team leader select 3-5 for review during the inspection. A review of operating procedures, and operator task analysis validation studies should be performed to identify critical operator actions with little margin between the time required and the time available to complete an action. Based on the operator actions selected, the inspector should request from the licensee the procedures necessary to conduct the operations. Select high risk operator actions that have no job performance measure (JPM).

Operating Experience Selection

Based on the components selected, the regional inspectors will review the list of operating experience provided by the licensee and identify selected operating experience issues, either component specific, common cause, or generic issues that the team may want to evaluate. Other operating experience that the inspectors are aware of that may be relevant to the components selected can also be selected for review. In addition, the team should identify for review one or two generic or common cause issues that are not related to the selected samples. Some of the operating experience selected should cover initiating events and barrier integrity cornerstones. Based on those issues identified, the team will narrow down the samples to 4-6, which will be divided between team members, as appropriate.

Additional Prep Activities

Once it is determined which components, operator actions, and operating experience samples will be reviewed, they will be assigned to individual inspectors. Once this designation has been accomplished, the inspectors should obtain sufficient familiarity with the chosen components, operator actions, and operating experience samples and their associated systems to understand the design and safety requirement for the samples selected and their associated system. The inspectors should also review the flow paths (mechanical) and control logic circuitry (electrical) for the selected components to verify if other components in those flow paths or control logic could potentially affect their function. For each component or inspection area assigned, the inspector needs to develop a list of attributes (see IP 71111.21, section 02.02, Appendix 1 and Appendix 2 for examples) that will be reviewed during the inspection. The inspectors review should also identify potential areas where the interface between engineering and operations procedures can be reviewed by the operations inspector to ensure design requirements are adequately implemented into procedures.

The inspectors should review the list of modifications performed on their assigned components to determine whether any are either complex, reduced margin, required for power uprate, etc., such that the modification should be considered for review during the inspection. Although the inspection procedure does not identify a specific number of

modifications that need to be reviewed, the team will select approximately 4-6 modifications for review (one per inspector). These modifications will be selected by the team from those identified by individual team members. Note that a modification/50.59 inspection was performed by the NRC in November 2006 which looked at modifications completed in the last 2 years. Make sure we do not select the same modifications for review during this inspection.

Requests for Additional Information

During the course of the inspection, team members should request their licensee contact to provide any specific information and/or documents they want to have readily available when they return to the site. This might include any specific modification packages, calculations, drawings, condition reports, procedures, and scheduling interviews or walkdowns, etc. Licensee computers may be available in the conference room with access to mainly calculations, condition reports and procedures.

V Onsite Inspection Activities

Plant Walkdowns

The inspectors are expected to walkdown their assigned components and their associated systems by discipline groups (electrical, mechanical, operations). The intent of the component/system walkdowns is for the inspectors to obtain basic familiarity with the systems, material condition of equipment, where components are located, etc. in order to accomplish inspection objectives. During the walkdowns, the inspectors are also asked to be aware of general plant material conditions. Any abnormal or questionable conditions should be brought to the lead inspector to discuss with the resident staff and the licensee.

Inspection

Successful completion of the CDBI inspection procedure requires a full understanding of how the components and their associated system operates, and is supposed to operate. Inspection of some broad-based attributes, such as those described in the inspection procedure, cannot be accomplished by a single inspector working independently of the rest of the team. However, to avoid duplication of work, each individual will be assigned primary responsibility for the attributes being inspected. For example, if a mechanical inspector is assigned to review a motor-operated valve, they may need an electrical inspector to review the degraded voltage calculation. The team lead will facilitate these types of reviews and will attempt to assign them at the start of the inspection to equalize the work load between inspectors.

Inspectors should plan their workload so that all major areas are preliminarily reviewed prior to the end of the first two onsite weeks of the inspection. Most of the last onsite week should primarily be spent reviewing responses to questions previously asked, resolving issues, and developing any findings. This does not mean that new inspection can't be done; just that doing so leaves little time to develop issues before the end of the inspection.

Inspection Objectives (IP 71111.21, Sections 02.02a thru e)

For the inspection attributes and inspection activities identified during the prep week, conduct a detailed design review of the selected components' calculations, surveillances, and other associated system documentation to confirm each of the specified attributes for your assigned areas (02.02a). Perform plant walkdowns of selected components to verify as-built condition is consistent to design requirements and inspect component for material condition; and review components corrective action and maintenance history that could affect the components to function (02.02b). The operations inspector should verify performance of risk significant operator actions, along with a walk-through of a sample operations procedures for the selected components (02.02c). Review permanent plant modifications to ensure design bases, licensing bases, and performance capability have not been degraded (02.02d). Review the licensee's evaluation and disposition of selected operating experience to ensure it has been adequately addressed (02.02e).

Identification and Resolution of Problems

Identifying Design Issues - threshold and corrective action program.
Sample of Problems - verify appropriateness of corrective actions.

In-office Inspection

Inspectors should be aware of the direct inspection hour limits for this inspection. The number of hours used during the in-office weeks should be carefully monitored as to not exceed the total hours allotted for this inspection. The lead inspector will track both the preparation and direct inspection hours used for each inspector, including contractors. This information should be provided to the lead inspector every Monday, on a weekly basis, via e-mail. If significant issues arise that require use of more hours, the lead inspector and branch chief should be informed prior to expending the resources.

VI Issues and Findings

Any issues arising from the inspection are to be preliminarily evaluated using MC 0612, MC 0609 and the Kewaunee specific Phase 2 worksheets prior to more than 4 hours inspection time being spent on them. The lead inspector will have copies of the worksheets available on site. Doing a preliminary evaluation will ensure that inspection effort is focused on risk significant activities and will provide direction for areas needing exploration in order to confirm a finding.

Unless an issue can be shown to be greater than minor, additional inspection time (over the 4 hours) should not be spent. If an issue appears greater than minor, then sufficient questions need to be asked of the licensee to enable the inspectors to confirm any assumptions and complete the Phase 1 and 2 worksheets. Green findings will be documented in the inspection report. Findings that appear to be "other than green" or a potential operability issue shall be immediately brought to the lead inspector's attention so that it can be discussed with the licensee and the senior reactor analyst. If a color

cannot be determined by the end of the inspection, the issue will be described as an "unresolved item," pending final determination of the appropriate risk significance. Enforcement action will be handled in accordance with the Enforcement Policy.

VII Documentation

Inspection Questions

Detailed design inspections normally result in a number of questions being raised. These questions are to be given to the licensee verbally — or, if written, the licensee must copy the information and the inspector must retain the written document. No written information is to be provided to the licensee.

Questions should not be "stored up" to the end of the day, but given to the licensee reasonably soon after being generated. As part of the daily interfaces with the licensee, the lead inspector will go over the status of outstanding questions. Therefore, the team members need to keep the lead inspector apprized of any concerns regarding the timeliness or quality of responses to questions.

Lack of response to questions will not be accepted as a reason for any delay in providing an input unless the licensee did not respond in a reasonable time frame (usually 24 hours), the lead inspector has been informed of the delay and has discussed it with the licensee prior to the exit, and the issue is one that has been determined to be potentially "greater than minor." Any document requests generated on the day of the debrief or afterwards must be approved by the lead inspector, must pertain to areas already inspected and must be only for the purpose of finalizing a finding or ensuring an accurate document list entry.

Report Preparation

The report will be prepared in accordance with the guidance in MC 0612, MC 0620, Region III model inspection report, and regional procedure 1220. It's recognized that RP 1220 does not strictly apply; however, it provides the best guidance available for formatting of the report and document lists. Input will primarily consist of a list of the documents reviewed, unless a finding meets the guidance for documentation. Issues which an inspector considers as meeting the criteria for inclusion in the report shall be discussed with the lead inspector prior to preparing an input. Finding input shall consist of both the detailed write-up for the body of the inspection report and the associated paragraphs for the summary of finding section of the inspection report. Also, make sure you evaluate each finding for cross cutting aspects, discuss the cross cutting aspect with the team lead and during team meetings and document it in the report input. Inputs are to be e-mailed to the lead inspector within 5 working days (10 calendar days) of the exit.

In keeping with the requirements of MC 0620 (see latest revision changes), only those documents which were reviewed as part of meeting an inspection attribute are to be included. The document list does not include procedures reviewed as part of

preparation for the inspection. Corrective action documents generated as a result of the inspector's questions shall be called out separately from corrective action documents that were in the licensee's system prior to the inspection. It is strongly recommended that inspectors keep a list of documents up-to-date to ensure that no documents are missed.

XIII HRMS Information

Overall Time Management

The baseline inspection hours primarily encompasses only those hours spent starting with the first on-site inspection week and prior to the exit meeting. Time spent during the three in-office preparation weeks are to be charged to prep. They do not include time spent in travel, entrance or exit meetings, major licensee debriefs, checking on e-mail, or keeping track of hours to correctly credit them. However, they do include time spent in team meetings and in preparing for team meetings. Between 10 to 15% of the baseline hours are to be spent in evaluating problem identification and resolution efforts.

Baseline Inspection (BI) Charges

The hours given for the this procedure is as follows:

Procedure	Nominal	Minimum	Maximum
71111.21	347	408	470

As a result, each inspector should be able to charge approximately 102 hours over the 3-week inspection period (4 x 102 = 408 +/- 15%). Contractors are allotted approximately 272 hours of direct inspection effort (136 each).

Preparation Charges

The lead inspector has estimated that each inspector should charge approximately 60 hours (60 X 4 = 240) to BIP for this inspection over the three weeks preparation period. If an inspector is unable to prepare due to other work demands, please discuss this with the lead inspector (who will then work with management to ensure proper inspection preparation occurs.)

Documentation Charges

During the inspection, any time spent documenting items which have been reviewed is to be charged to BID. Also, the time spent on the exit meeting is to be charged to BID. If the inspector has no findings, documentation time should be about 6-8 hours. Documentation of findings should take about 20 hours, or more, depending on their complexity. Please note that this does not change the time period over which the input is due: It still will be five working days following the exit.

Checking E-mail and Other Such Activities

For planning purposes, the lead inspector has assumed that each inspector will spend a maximum of 2 hours during each on-site week of the inspection, maximum of 6 hours, checking e-mail, HRMS, or doing other activities not directly related to the inspection. This time, if used, should be charged to general administration.

Travel Charges

All travel time is to be charged in HRMS to an IPE code of "AT", including travel during non-regular hours (see below). For planning purposes, a total of approximately 21 hours is allotted to each inspector for travel to site and back during this inspection (7 per week).

Overtime

Overtime for each regional inspector should be minimal and normally not to exceed 4 hours per onsite week. The overtime is to only be requested and used to meet the inspection requirements or if an issue comes up at the end of the day that requires prompt resolution. Inspectors need to inform the team leader if overtime will be used. Overtime must be claimed in HRMS if used. Any overtime spent traveling (although there shouldn't be any) also must be claimed in HRMS using the overtime code of "CPETV".

IX Interface and Coordination Meetings

Entrance Meeting:

The team will conduct the entrance meeting on Monday, January 30, 2007, tentatively scheduled for 9:00 a.m. Team members are expected to arrive onsite to attend the entrance meeting. A field walkdown will be conducted after the team entrance meeting.

Licensee Debriefings

Daily debriefings with the licensee will start Tuesday, January 30th at approx. 9:30 am. These daily meetings will normally be between the lead inspector and the licensee, with team member attendance only on an as-needed basis.

Routine Interactions

Throughout the inspection, team members are expected to have routine interactions with licensee employees. It is expected that these interactions will be professional in nature and will normally be conducted without the lead inspector present. Inspectors should keep track of any questions or requests for further information arising from these meetings.

Team Meetings at RIII Office

Team meetings during the in-office prep week will be held on Monday, January 22nd, at 2:00 p.m. and on Thursday, January 25th, at 10:00 am. The intent of these meetings is to discuss the selection of components, operator actions, and operating experience that will be reviewed during the inspection, the following week. Final selection of components, operator actions, operating experience, and modifications should occur during this in-office prep week.

Team meetings will also be held during the last two in-office weeks on Tuesdays at 10:00 a.m. in the DRS conference room. Contractors will be tied into the meeting via teleconference, as appropriate due to inspection hour considerations.

Team Meetings Onsite

Team meetings during the onsite inspection weeks will be held starting Tuesday, January 30th, at 3:00 p.m. The meetings should last approximately 45 minutes. The intent is to allow each inspector, including the lead inspector, to briefly discuss the day's activities/issues, status of inspection activities, and any administrative or logistics items.

An extensive team meeting will be held on Wednesday, February 28th to discuss the team's findings and determine what issues will be presented at the exit. This meeting will probably begin at 2:00 p.m. and will probably run longer than normal team meetings.

Final De-brief

The final de-brief with the licensee will be held on Thursday, March 1st around 2:00 p.m. Inspectors should be ready to discuss in detail the areas they inspected, observations, and any potential violations/findings.

Exit Meeting

The team will conduct the exit meeting on Friday, March 2nd tentatively scheduled for 9:00 a.m. Team members are expected to attend the final exit meeting and to be prepared to present any of their findings to the licensee.

X Logistics

Travel

Kewaunee is approximately 220 miles from the RIII office. The lead inspector has allotted approximately 4.0 hours of driving travel time each way. There is no need for Sunday travel. Additionally, the lead inspector requests that everyone use good judgement in all travel arrangements. If severe weather conditions arise, it is expected that inspectors will take sensible precautions during traveling.

The following hotel is in the area around Kewaunee. Per diem is (60/39/99).

Hotel

Telephone

Country Inn Suites, Green Bay, WI (Phone # 920-336-6600)
Residence Inn, Green Bay, WI (Phone # 920-435-2222)

Inspection Location

The inspection team will be located in room ATF-107 (1st week) and Administration Assembly Room (2nd and 3rd weeks) rooms are inside the protected area. The telephone extension in ATF-107 is **Later** and in the AAR is **Later**.

Hours of Work

Inspectors are expected to generally adhere to their normal working hours, as much as possible. Significant changes should be coordinated with the lead inspector but will be accommodated if possible. However, compressed days off should be changed to a non-onsite week. Inspectors desiring to work overtime on their compressed days off need to individually coordinate this with their branch chief prior to the inspection.

Work at Home

It is acceptable to the lead inspector for inspectors to have work-at-home for the in-between week, the documentation week, and for parts of the prep weeks. Team meetings will occur during these weeks and it is expected that inspectors working at home will be available via teleconference for these meetings. If you desire to do work-at-home, please note that work-at-home must be approved by the appropriate branch chief.

DESIGN REVIEW QUESTIONS

During the design review, inspectors should consider the following questions:

Valves

1. Are the permissive interlocks appropriate?
2. Will the valve function at the pressures that will exist during transient/accident conditions?
3. Will the control and indication power supply be adequate for system function?
4. Is the control logic consistent with the system functional requirements?
5. What manual actions are required to back up and/or correct a degraded function?

Pumps

1. Is the pump capable of supplying required flow at required pressures under transient/accident conditions?
2. Is adequate net positive suction head (NPSH) available under all operating conditions?
3. Is the permissive interlock and control logic appropriate for the system function?
4. Is the pump control adequately designed for automatic operation?
5. When manual actions are required, do the operating procedures appropriately describe necessary operator actions?
6. What manual actions are required to back up and /or correct a degraded function?
7. Has the motive power required for the pump during transient/accident conditions been correctly estimated and included in the normal and emergency power supplies?
8. Do vendor data and specifications support sustaining operations at low flow rates?
9. Is the design and quality of bearing and seal cooling systems acceptable?

Instrumentation

1. Are the required plant parameters used as inputs to the initiation and control system?
2. If operator intervention is required in certain scenarios, have appropriate alarms and indications been provided?
3. Are the range, accuracy, and setpoint of instrumentation adequate?
4. Are the specified surveillance and calibrations of such instrumentation acceptable?

Circuit Breakers and Fuses

1. Is the breaker control logic adequate to fulfill the functional requirements?
2. Is the short circuit rating in accordance with the short circuit duty?
3. Are the breakers and fuses properly rated for the load current capability?
4. Are breakers and fuses properly rated for DC operation?

Cables

1. Are cables rated to handle full load at the environments temperature expected?
2. Are cables properly rated for short circuit capability?

DESIGN REVIEW QUESTIONS

3. Are cables properly rated for voltage requirements for the loads?

Electrical Loads

1. Have electrical loads been analyzed to function properly under the expected lowest and highest voltage conditions?
2. Have loads been analyzed for their inrush and full load currents?
3. Have loads been analyzed for their electrical protection requirements?

As-built System

1. Are service water flow capacities sufficient with the minimum number of pumps available under accident conditions?
2. Have modified equipment components falling under the scope of 10CFR 50.49 been thoroughly evaluated for environmental equipment qualifications considerations such as temperature, radiation, and humidity?
3. Are the modifications to the system consistent with the original design and licensing bases?