

EXAMPLES of Potential Fire Compliance Process Application at a Plant



Presented by Clarence Worrell, DCP, Nov. 6, 2003

This tool is referred to as "RABBIT" at Diablo Canyon Power Plant. "RABBIT" is an acronym for "Risk Assessment Based Barrier Impairment Tracking". RABBIT would be accessible through a PC in the control room and would be used by operators in response to degraded fire protection features in the plant.

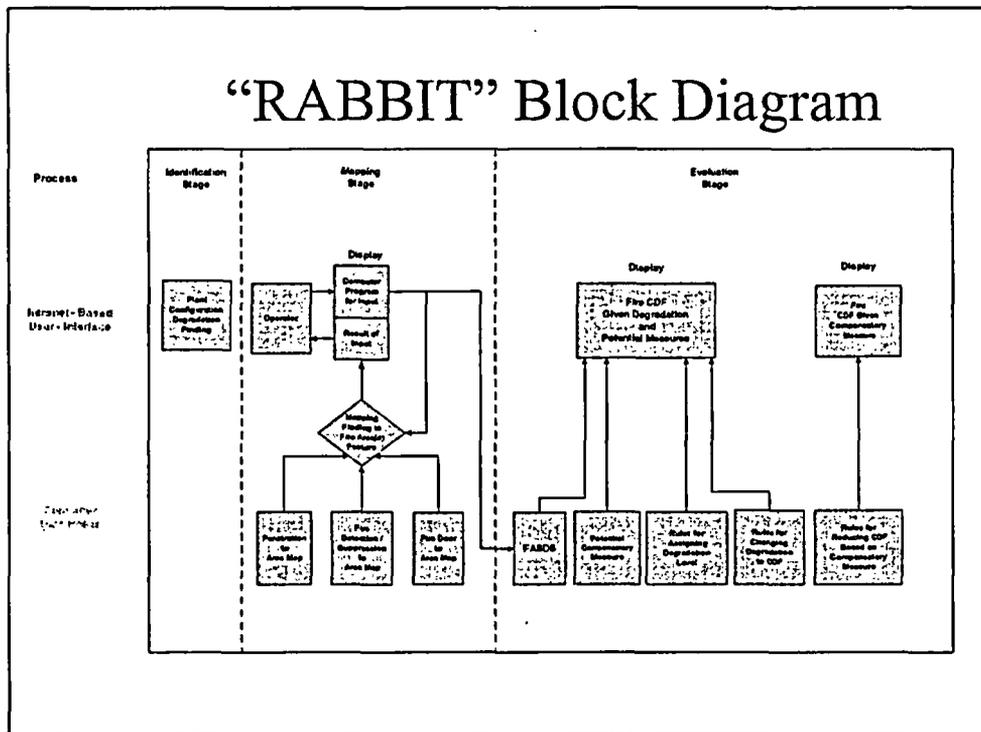


DIABLO CANYON POWER PLANT

EXAMPLES of Potential Fire Compliance Process Application at a Plant

- 1) Two examples are presented in the form of a computerized tool (RABBIT) to choose among compliance alternatives. Examples include:
 - A. Impaired fire door between two Vital Switchgear Rooms
 - B. Impaired automatic sprinkler system in CCW Heat Exchanger Room

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This is a high-level block diagram of how RABBIT might be structured. There are three stages to this program: the "Identification Stage", "Mapping Stage", and "Evaluation Stage". The WOG project will support the Evaluation Stage of RABBIT.

In the "Identification Stage", an impairment is discovered and the impaired component identification number is entered into RABBIT.

In the "Mapping Stage", RABBIT queries a database relating fire protection features to fire areas/zones. The fire areas/zones affected by the impairment are determined in this step.

In the "Evaluation Stage", several databases are queried and manipulated to determine the fire CDF given the degradation and potential compensatory measures. Results from the "WOG Risk-Informed Fire Protection Compliance Process" will be used to populate the following Evaluation Stage databases: Potential Compensatory Measures, Rules for Assigning Degradation Level, Rules for Changing Degradation to CDF, and Rules for Reducing CDF Based on Compensatory Measures.



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Intranet-Based User-Interface

Welcome to the RABBITS
User-Interface

Enter Component Identification Number Below
Then Press "Next"

Comp ID

Door 309

Cancel Next >

In this first example, an operator discovers that Door 309 is failing to close completely due to a problem with the automatic door closure device. The door is labeled "FIRE DOOR Notify Shift Foreman if Inoperable". The operator calls the shift foreman with the door number and describes the impairment. The shift foreman opens the RABBIT program through the company intranet and enters the impaired door number.



Public Service Company of New Jersey

Update of Involved Areas

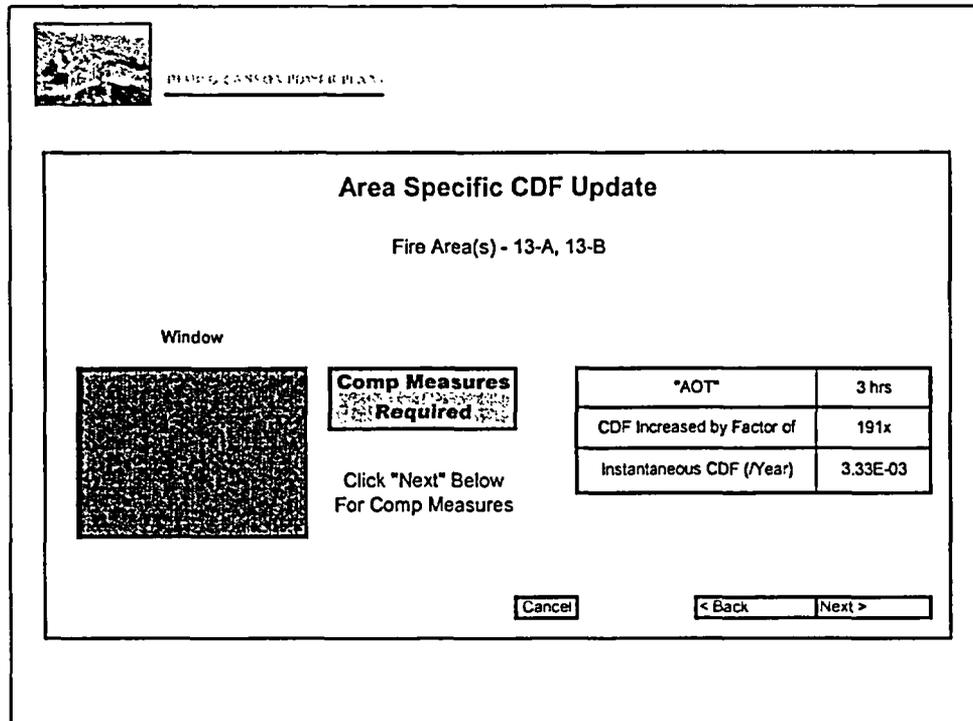
Fire Feature - Fire Door
Feature Type - 1-1/2-hour rated

| Item | Fire Area | Area Description | Area Location | Include in Calculation |
|------|-----------|--------------------------------|--------------------------|------------------------|
| 1 | 13-A | 4.16 kV Switchgear Room, F Bus | NE Turb Bldg EL. 119' | Y |
| 2 | 13-B | 4.16 kV Switchgear Room, G Bus | NE Turb Bldg EL. 119' | Y |
| | | | | |

Select Level of Feature Degradation
Then Press "Next"

High
 Medium
 Low

RABBIT queries a database with the Door I.D. and returns the affected fire areas/zones. The operator is then prompted to select the level of degradation (High, Medium, or Low) based on established fire protection rules. Similar to the Fire SDP, the "WOG Risk-Informed Fire Protection Compliance Process" will define a set of impaired states for characterizing the level of degradation as High, Medium, or Low. A drop-down menu may be included here to provide guidance to the operator.



RABBIT uses information about the impaired feature and affected fire areas/zones to produce an area specific CDF update. This display is similar to the operations tool O-S, which is used for a(4) risk assessment. The operator is presented here with a visual indication of risk level for the particular impairment:

- Red "High" Risk Impairment
- Yellow "Medium" Risk Impairment
- Green "Low" Risk Impairment

In this example, the impairment is determined to have a high risk impact and require immediate attention.



Compensatory Measures Screen

Fire Area(s) - 13-A, 13-B

Feature - Fire Door

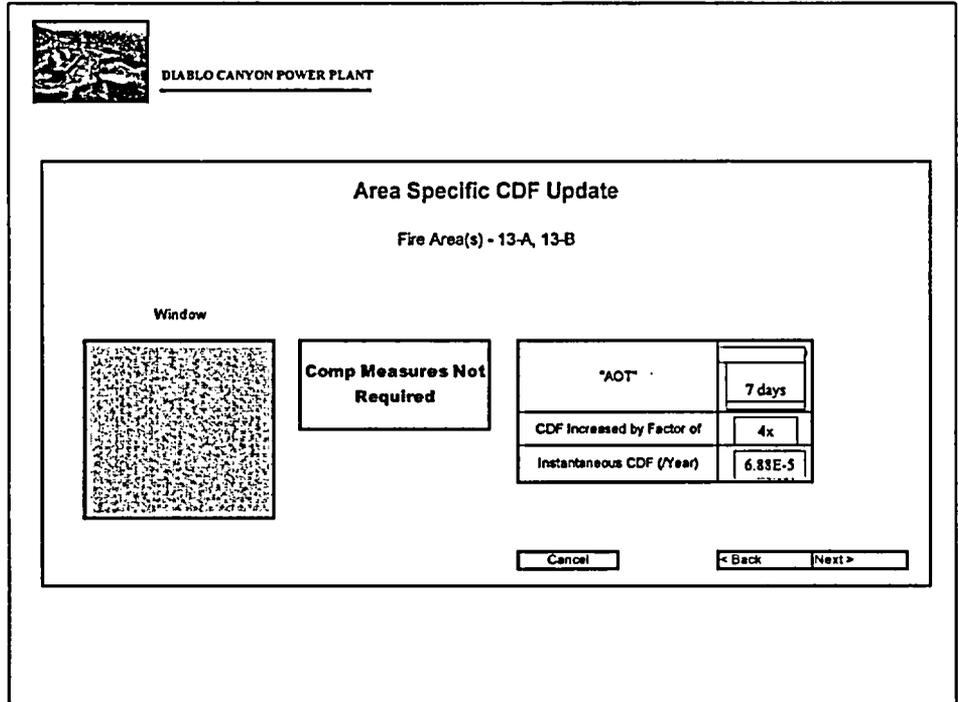
| Number | Action | Risk Reduction Associated With Comp Measure | Comp Measure Lowers Immediate CDF to New Value Below | "AOT" |
|---------------------------------------|---|---|--|----------------------|
| 1 | Repair Door Problem with No Compensatory Measure | 0% | 3.33E-03 | 3 hrs |
| Possible Compensatory Measures | | | | |
| 2 | Continuous Fire Watch | 98.4% | 6.88E-05 | 7 days |
| 3 | Continuous Fire Watch w/ Staged Fire Fighting Equip | 99.8% | 2.94E-05 | 1 mo. |
| 4 | Continuous Fire Watch w/ Staged FF Equip and Hot Work Restrict. | 100% | 1.74E-05 | as soon as practical |

Cancel

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With this screen, the operator is presented with a list of ranked compensatory measures. The operator chooses the most appropriate compensatory measure based on the amount of time required to repair the degradation. This helps operations to more cost-effectively utilize their resources.

The WOG project will initially investigate the most common forms of compensatory measures (i.e. continuous fire watches, roving fire watches, and possibly portable detection systems), but the methodology may be extended to include other compensatory measures like a roving watch specifically to verify that combustible loading limits have not been exceed, staged firefighting equipment, taking temporary credit for manual actions, etc.



The program then returns a new update screen that includes the change in risk level based on the chosen action. The values in this screen will change depending on the action selected.

In this particular example, the operator chose to repair the door immediately given the risk significance of the degradation.



DIVISION OF CONSTRUCTION

Second Example

- Auto sprinkler system in CCW Heat Exchanger Room out of service

Maintenance personnel replacing a check valve had to isolate a portion of the turbine building sprinkler system. This placed the CCW HXR Room sprinkler system out of service.

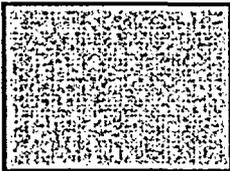


RABBIT CALM (CALM) OVERVIEW

Area Specific CDF Update

Fire Area(s) - 14-E (CCW HXR Room)

Window



**Comp Measures
Required**

Click "Next" Below
For Comp Measures

| | |
|----------------------------|----------|
| "AOT" | 2.5 yrs |
| CDF Increased by Factor of | 25x |
| Instantaneous CDF (Year) | 4.12E-07 |

RABBIT presents the following CDF Update screen for this scenario. In this example, the risk-level of the impairment was determined to be relatively low (i.e. green).



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Compensatory Measures Screen

Fire Area(s) - 14-E (CCW HXR Room)

Feature - Sprinkler System

| Number | Compensatory Measure | Risk Reduction Associated With Comp Measure | Comp Measure Lowers Immediate CDF to New Value Below | "AOT" |
|--------------------------------|---|---|--|----------------------|
| 1 | Repair Sprinkler Problem with No Compensatory Measure | 0% | 4.12E-07 | 2.5 yrs |
| Possible Compensatory Measures | | | | |
| 2 | Roving Fire Watch (24 hrs) | 98.4% | 2.29E-05 | 156 yrs |
| 3 | Roving Fire Watch (12 hrs) | 99.6% | 1.81E-05 | 626 yrs |
| 4 | Continuous Fire Watch | 100% | 1.65E-05 | as soon as practical |

Cancel

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The "AOT" for the impaired sprinkler system with no compensatory measure is shown as 2.5 years. It is important to note here that it IS NOT THE INTENT of this project to justify taking a longer time than normal to repair a degradation. The degradation should be repaired as soon as practical. The intent of this project is to determine a compensatory measure commensurate with safety while repair efforts are in process. To prevent the "Risk Informed Fire Protection Compliance Process" from being used to justify long maintenance times, DCPD is considering a performance-based approach similar to the Maintenance Rule that would flag situations where maintenance takes longer than it has historically for similar types of repairs.

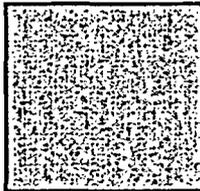


PEARL CANAL POWER PLANT

Area Specific CDF Update

Fire Area(s) - 14-E (CCW HXR Room)

Window



**Comp Measures Not
Required**

| | |
|----------------------------|----------|
| PRA AOT | 2.5 ys |
| CDF Increased by Factor of | 25x |
| Instantaneous CDF (Year) | 1.65E-08 |

Cancel

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In this low-risk example, the operator has the option of not placing a compensatory measure provided the repair is completed prior to the risk-based "AOT" or the normal repair time indicated by DCPD historical performance data, whichever is shorter.



Thoughts on Licensing Issues

- Per DCCP Operating License:
 - “PG&E may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.”



Thoughts on Licensing Issues (Cont.)

- Impairment Scenario 1
 - RI FP Compliance Process indicates that impairment has a **HIGH RISK IMPACT**, and that compensatory measures specified by existing program are not sufficient. Additional compensatory measures should be taken and degradation repaired immediately.



Thoughts on Licensing Issues (Cont.)

- Impairment Scenario 1(cont.)
 - RI FP Compliance Process improves safety and does not adversely impact ability to achieve and maintain safe shutdown.
 - No prior NRC approval necessary for this change.



Thoughts on Licensing Issues (Cont.)

- Impairment Scenario 2

- RI FP Compliance Process indicates that impairment has a **LOW RISK IMPACT**, and that compensatory measures specified by existing program are of minimal benefit. Currently specified compensatory measures may be reduced to match the risk-significance of the impairment.



Thoughts on Licensing Issues (Cont.)

- Impairment Scenario 1(cont.)
 - RI FP Compliance Process, applying the concept of minimal increase in risk (RG 1.174), indicates that the compensatory measures can be reduced without adversely affecting the ability to achieve and maintain safe shutdown.
 - We propose that no prior NRC approval necessary for this change.
 - How comfortable is the NRC with industry use of RG 1.174 approach to Fire Protection LBIE?

There is no industry guidance as to whether PRA can be used to answer the Fire Protection LBIE “no adverse affect question”. The WOG team is proposing a risk-informed approach similar to the 50-59 process.