GPU 39

BLOCK & WILCOX COMPANY
POWER GENERATION GROUP

To: R.D. [illegible] - MANAGER, CUSTOMER SERVICE DEPARTMENT

From: T.A. WHITE - MANAGER, PLANT DESIGN (EXT. 2315)

Dept.

File No. or Ref.

Subj.: RECOMMENDATION FOR "QUICK LOOK" EVALUATION OF ALL B&W NSSS TRIPS

Date: AUGUST 20, 1979

GPU Exh. For ID 39
Trial Ev
CSR 1/27/81

Summary

This memo describes a program to evaluate the performance of the B&W NSSS during reactor trips at all operating plants. This analysis will produce a "quick look" report which describes the cause of the upset, the overall plant response, and recommended corrective action or further analysis to prevent recurrence. Plant staff recommends that this program be initiated immediately and be funded by the small user group. A proposal for such a program is sent to the [illegible] Owners Group.

Introduction

One of the most important lessons learned from the TMI-II incident and its aftermath is that NSS must be more aware of the operating characteristics and problems of the NSSS. The evaluation of the NSS NSS performance during transient and steady state conditions can lead to several advantages for both NSS and the customer.

(1) Plant availability can be improved if lessons learned from problems at one site are applied to other sites.

(2) Potential safety problems can be pinpointed and corrected before serious incidents occur.

(3) A data base of operating histories and problems can provide important information for recovering NRC concerns and for performance improvements.

This memo describes an expanded program for engineering evaluation of all reactor trips at NSS operating plants. This is a necessary first step to achieve the above benefits, and should be undertaken without delay.

Program Description

NSS is presently preparing a pr [illegible] for "Utilization of Operating Plant Data" for review [illegible] at the conference [illegible] November 1, 1979. This program will [illegible] availability all [illegible] trips, major [illegible], major equipment failures, and periodic [illegible] at the participants. A report called the "quick look" report will be [illegible]. The [illegible] within about a week of receipt of all data [illegible] the [illegible] from expected plant performance which [illegible] the [illegible] and recommended [illegible] actions.

Plant Design recommends that independent of the rejection or acceptance of this program, SSR initiate a similar program immediately. This program will prepare a "quick look" report for each reactor trip at a SSR plant. This report will directly support the Division's Site Problem Report resolution program. Table 1 shows the type of analysis and the content of this report. Attachment 1 presents a sample Quick Look report for a reactor turbine trip at TMI-II on March 8, 1979.

Tasks

There are seven tasks to be performed. It is proposed that these tasks be implemented as shown in Table 2 and discussed below.

1. Notification of Reactor Trip

   The resident engineer will be responsible for notifying the Plant Performance Section (D.F. Haliam) that a reactor trip has occurred. This should be done within 24 hours after the trip.

2. Collection of Trip Data

   The proper analysis of any reactor transient requires an accurate and comprehensive set of data. The Plant Performance Services (PPS) section and resident engineer will be responsible for collecting at least the data shown in Table 3. This data should be collected and transmitted to XPCD within 48 hours of the reactor trip.

3. Preparation of Event Sequence

   Using the data in Task 2, PPS will prepare an event synopsis for the reactor trip. In addition, a list of initial conditions and plots of important parameters should be made. (See Attachment 1.) Support and guidance will be given by the Power Systems and Controls Unit (PSCU), if required. The event synopsis, list of initial conditions, plots, and all data collected on site (Table 3) should be transmitted to PSCU (J.D. Carlton) and Training (N.B. Elliott) within one working day of receipt of all data.

4. Review Operating Performance

   PPS and Training should review the data presented in Task 3 and prepare comments for transmittal to PSCU. These comments should include their opinion on the following:

   (a) What unexpected plant behavior was noted?

   (b) Were operator actions timely and appropriate and in accord with existing procedures?

   (c) To what availability category will the test item be assigned?

   These comments should be transmitted to PSCU within one working day of completion of Task 3. (This task should be performed concurrently with Task 3.)

5. Evaluate Performance and Classify Transient

PSAC will evaluate the items of unexpected plant behavior in the event, as defined in Task 3, including the initiating event. The emphasis there should be on how to prevent recurrence and improve plant performance during the trip. PSAC will obtain the assistance of other units in this evaluation for problems affecting their area of responsibility. This task should be complete within one working day of completion of Task 3. (Concurrent with Task 4)

6. Prepare and Issue Quick Look Report

PSAC will prepare and issue a "Quick Look" report summarizing the results of Task 1 through 5. The format should be similar to that in Attachment 1.

This report should be issued within one day of completion of Task 5. The issuance will include a review and signature by the PSAC Unit Manager.

7. Review and Final Release

Managers of the following units or their designee should review and sign the Quick Look Report, indicating their agreement with the conclusions.

(a) Plant Performance Section (D.F. Mailman)

(b) Training (M.S. Elliott)

PSAC will be responsible to obtain these reviews and approvals to complete the report. PPS will be responsible for maintaining, distributing, and storing the Quick Look Reports.

Action Requested

1. Work Flow and Responsibilities: The proposed responsibilities for the performance of this task, as stated above, have resulted from discussions which have included Messrs. Han and Hallman of Customer Services. Your concurrence with this working arrangement is requested.

2. Collection of Data: Under the proposed task responsibilities, the Customer Service PPS unit assumes responsibility for obtaining accurate data (initial specification in Table 3) to support these assessments. We encourage and recommend the automation of this process through the use of the RECALL system as quickly as possible. We will look to Customer Services to pursue aggressively the RECALL system implementation, meanwhile providing data "manually".

3. Funding: Funding estimates are shown in Tables 4 and 5. In order to begin this work without delay, Engineering will authorize initial funding for some items of from Ginna's Engineering Reserves. We request that Customer Services authorize the funds for its effected cost centers. RA's are attached for this purpose.

In accord with discussions with R.E. Ham, I understand that he will be seeking Owners Group financial support for this program and will provide resources from that source as soon as authorization is received.

Allen Wrmack

RAM/dmh

cc: J.D. Carlton
E.R. Ellison
R.F. Hallman
R.E. Ham
E.R. Kane
R.A. Karrasch
F.J. Lewandoski
R.E. Roy
J.H. Taylor
R.S. Elliott
J.J. Kelly
F.R. Pohland
R.E. [illegible]

TABLE 1

Initial Analysis/Quick Look Report

An evaluation of the system response on the basis of expected response.

Identification of unexpected performance and the cause or suspected causes, and suggested remedies.

A preliminary evaluation of availability concerns and suggested improvements.

A preliminary evaluation of safety implications, particularly as related to challenges to the safety system.

An evaluation of the event as related to its allowable operating transient cycle classification and the margin to next classification (plant unique data).

Comparison to Abnormal Transient Operating Guidelines (if available) and identification of need for correction or additions.

Identification of changes or additions needed to training program.

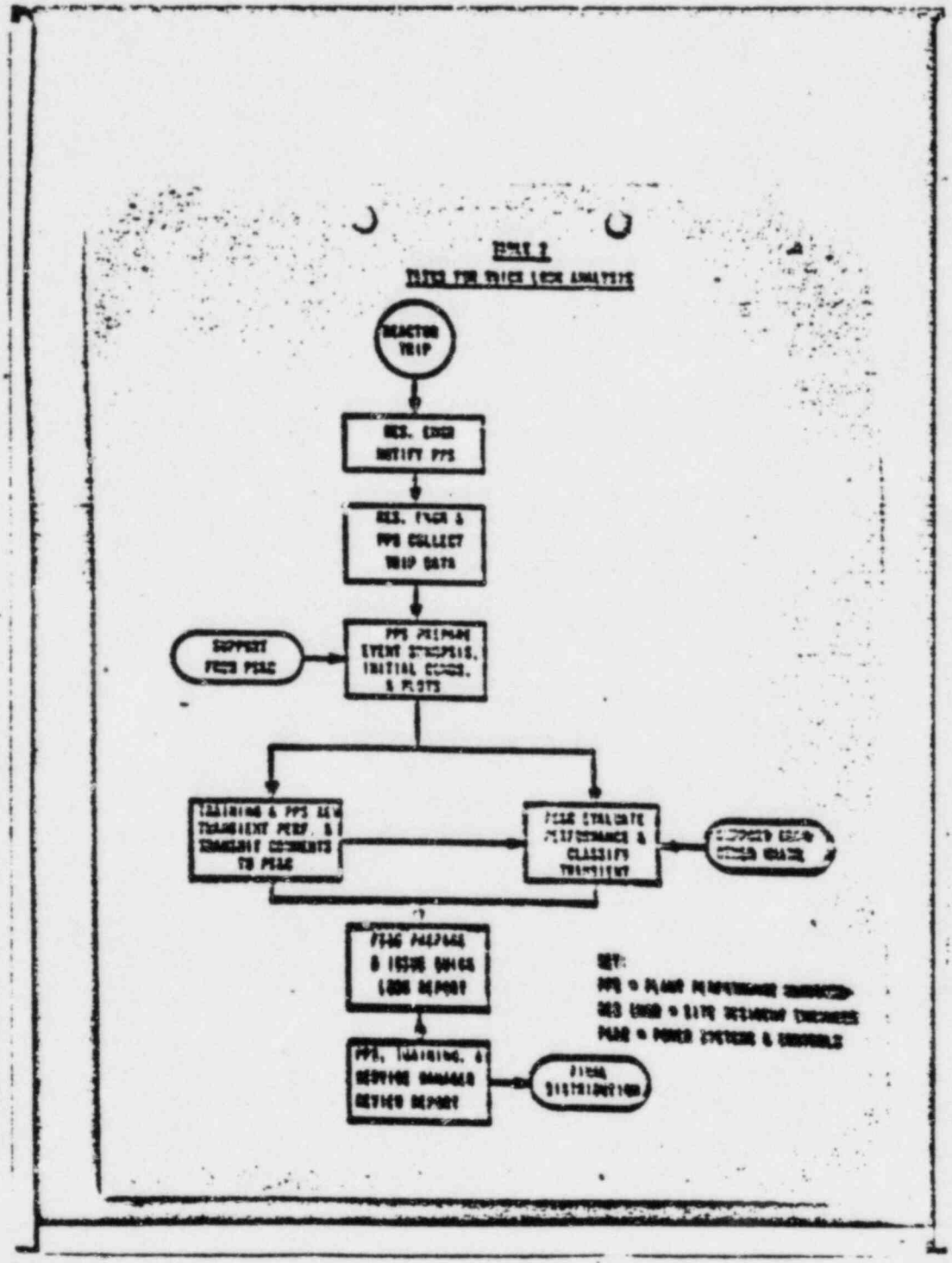

REACTOR TRIP

TABLE 3

DATA REQUIREMENTS FOR "QUICK LOOK" REVIEW

- Initial Plant Conditions
  - **Plant Parameters
    - RC Average Temperature
    - RC Hot Leg Temperature
    - RC Cold Leg Temperature
    - Neutron Power
    - RC Pressure
    - Pressurizer Level
    - Steam Pressure
    - OTSG Level (Startup or Operate Level as appropriate)
  - Equipment Configuration
    - Key equipment out of service
    - Hand/Auto Stations in manual
    - Special operating conditions (e.g. temporary setpoints)
- Transient Plant Conditions
  - **Key Parameters
    - RC Hot Leg Temperature
    - RC Cold Leg Temperature, Wide Range
    - Neutron Power
    - RC Pressure, Narrow Range unless Wide Range is required to span the extremes of the transient
    - Pressurizer Level
    - Steam Pressure, OTSG Outlet
    - OTSG Level, Startup Range unless Wide Range is required to span the extremes of the transient
    - Feedwater Flow Rate
    - Emergency Feedwater Flow Rate
    - [illegible] Primary System Injection and Letdown Flow Rates
  - Sequence of Events
  - Key Operator Actions

**Both A and B loop data should be provided whenever such data points for these parameters

TABLE 6

Nonlabor Resource Requirements Per Trip

Task Number	Task	Engineer/Clerk Hours
1	Notification of Reactor Trip	1/0
2	Collection of Trip Data	8/0
3	Preparation of Event Sequence	8/0
4	Review of Operating Performance	8/0
5	Evaluate Performance and Classify Transient	12/0
6	Prepare & Issue Quick Look Report	8/0
7	Review and Final Issue	12/0

TABLE 6

Preliminary Recovery Requirements Per Cost Center

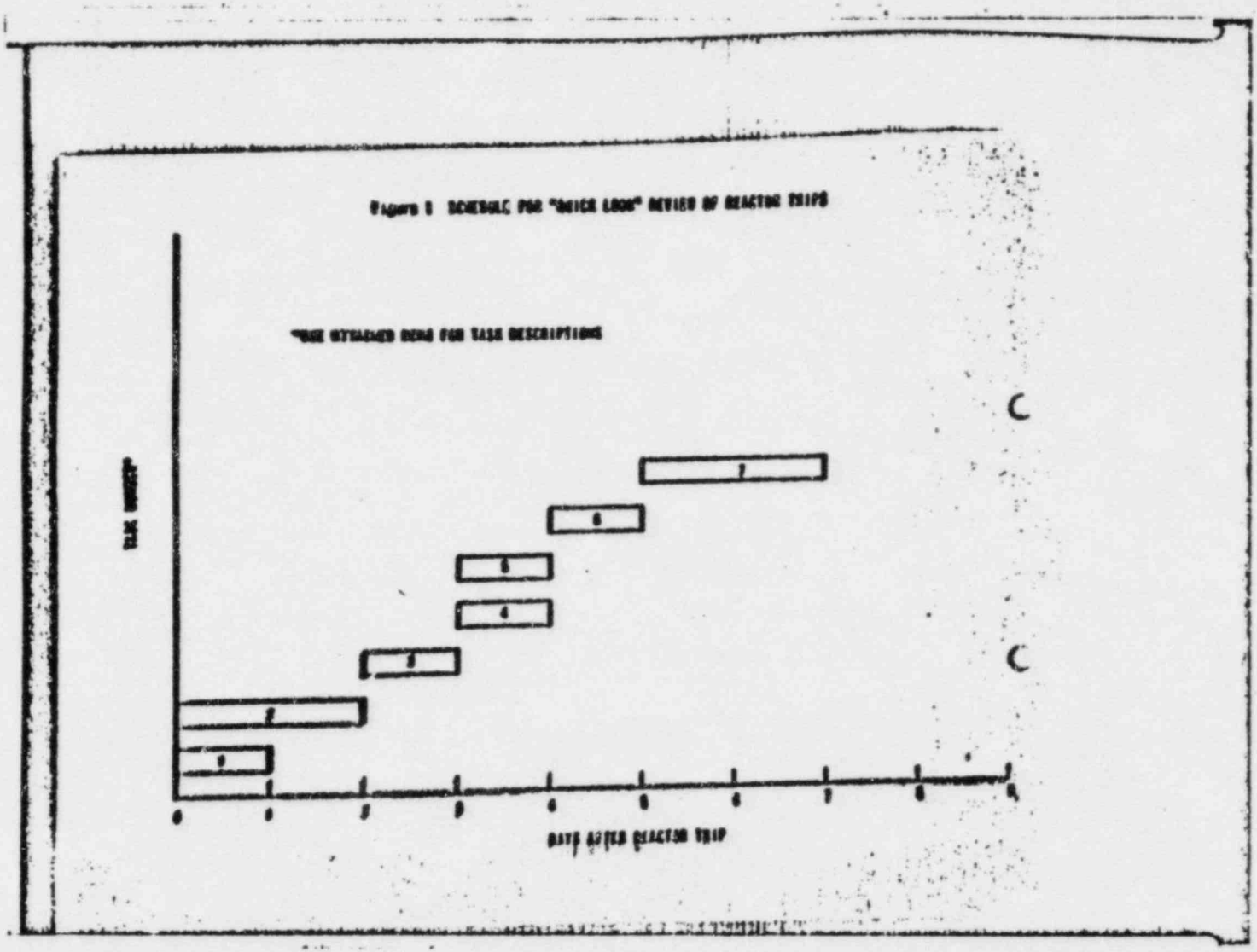
Group or Individual	Cost Center	Reviewer/CCC hours Per Trip	Reviewer/CCC hours [illegible]
Plant Performance Section	205	16/0	[illegible]
Power System & Controls	203	16/0	[illegible]
Assistant Engineer	126	7/0	147/0
Service Manager	135	4/0	84/0
Training	200	8/0	168/0
Other	202[b]	4/0	84/0
Total		57/0	1197/0

*Please Note

(a) Estimates have not been approved by the participating sections and should be considered preliminary until such approval is given.

(b) The manhour estimate assumes 21 total trips for September through December 31, 1979 (3 trips/plant X 7 plants).

[b]These hours are allocated to PSAC (CC202). However, they will be used by other groups in support of PSAC.



analysis for this type of B&W plant is reported in BAW-10052[2] and BAW-10064[3]. A discussion of the applicability of this work under the guideline of the new rule presented in BAW-10104, Appendix A.

6.2. Break Location Study

To determine the worst-break location, calculations are performed for an 8.55-ft^2 double-ended break with C_D = 1.0 at the pump discharge and the pump suction, and a 14.14-ft^2 double-ended hot leg break with C_D = 1.0. The double-ended (DE) break (C_D = 1.0) was chosen over a split break because it has previously been shown to be the worst type of cold leg break for Category 1 plants. The hot leg break, though normally very low in temperature, is analyzed for completeness. The location of the hot leg break negates the potential for ECCS bypass, and breaks in the hot leg piping have historically been less severe.

6.2.1. 8.55-ft^2 DE Break at Pump Discharge, C_D = 1.0

The 8.55-ft^2 DE break is the largest possible break in the cold leg pump discharge piping. Its simulation depicts a complete severance of the pipe with enough lateral movement to prevent the interaction of fluid discharge from either side of the break. A C_D of 1.0 was assumed for this break. The resulting system pressure transient for this break is shown in Figure 6-1, with the end of blowdown occurring at 24.4 seconds. The rapid blowdown creates an early negative hot spot core flow, as shown in Figure 6-2, which recovers by 0.6 second. Core flow starts to decrease at about 5.0 seconds and finally becomes negative at 14.0 seconds. This decrease in core flow is caused by the loss of head across the pumps in the unbroken loops due to two-phase flow effects. Figure 6-12 shows the core power transient for this break.

The reflooding rate from the REFLOOD code is shown in Figure 6-3. At the end of blowdown, 1532.0 lbm of water is left in the reactor vessel. This quantity of liquid is not sufficient to fill the lower plenum, resulting in a refill period of 11.0 seconds before flooding starts. The carryout rate fraction was calculated utilizing the CRFT correlation.

The hot pin cladding temperature response is calculated using the THETA code. The hot pin is modeled as a 2.0-ft section. Figure