

8B-4

**PC BASED
TEMPORARY SHIELDING ADMINISTRATIVE PROCEDURE
(TSAP)**

David E. Olson and Glenn E. Pederson
Engineering Mechanics Division
Sargent & Lundy
55 E. Monroe Street
Chicago, Illinois 60603 USA

Peter N. Hamby
Corporate Health Physics Support
Commonwealth Edison Company
1400 Opus Place; Suite 800
Downers Grove, Illinois 60515 USA

ABSTRACT

A completely new Administrative Procedure for temporary shielding was developed for use at Commonwealth Edison's six nuclear stations. This procedure promotes the use of shielding, and addresses industry requirements for the use and control of temporary shielding. The importance of an effective procedure has increased since more temporary shielding is being used as ALARA goals become more ambitious.

To help implement the administrative procedure, a personal computer software program was written to incorporate the procedural requirements. This software incorporates the useability of a Windows graphical user interface with extensive help and database features. This combination of a comprehensive administrative procedure and user friendly software promotes the effective use and management of temporary shielding while ensuring that industry requirements are met.

INTRODUCTION

Each of Commonwealth Edison Company's (CECo) six nuclear power stations (a total of six boiling water reactor and six pressurized water reactor units) had in place site specific administrative procedures for temporary shielding. A project was implemented to consolidate the best features of each of these procedures and develop an enhanced method for dealing with temporary shielding. A PC-based Temporary Shielding Administrative Procedure (TSAP) was developed for use at all CECo nuclear stations.

An objective of developing this procedure was to implement a consistent approach to shielding use and control at all CECo stations. An additional objective was to ensure compliance with

industry requirements. The TSAP and software incorporate numerous enhanced features that benefit the promotion of temporary shielding use and implementation of administrative controls.

This procedure incorporates all applicable Industry requirements for controlling the use of temporary shielding. Requirements and guidelines issued by the U.S. Nuclear Regulatory Commission (NRC) and the Institute of Nuclear Power Operations (INPO) have been included. Use of the procedure was enhanced through the development of PC-based software. This software serves as a front end to a database, thereby enabling automatic updates and storage of shielding data, along with automated database queries and look-ups. The software includes an interview feature that asks the user applicable questions, and, based on the responses, fills out the appropriate forms. An option to directly fill out the forms is also available. Look-up libraries, hypertext, help features, and auto fills speed completion of the procedural requirements. Mandatory and non-mandatory responses ensure that the requirements are followed.

To assist with the development of the TSAP, existing procedures from numerous stations were obtained. The best features from these procedures were used along with input from personnel experienced in the use of temporary shielding. Applicable industry requirements were also reviewed and incorporated. An oversight committee consisting of Radiation Protection personnel from each of the CECo stations was set up. This committee periodically met to review and provide input to the development of the TSAP and the TSAP software. This oversight committee was a valuable source of input. Additionally the participation of the committee members, who will be the users of the procedure and software, was an effective means of ensuring that the resulting procedure and software would be relevant to each of the stations needs and be readily accepted by the intended users.

INDUSTRY REQUIREMENTS

There are several industry requirements that govern the use of temporary shielding. These requirements address shielding control, tracking, and evaluations necessary to assess the effects that shielding placement has on the design basis response of affected systems, structures and components. NRC IE Information Notice No. 83-64, *Lead Shielding Attached to Safety-Related Systems Without 10 CFR 50.59 Evaluations*, requires the evaluation of shielding effects on piping and the tracking of shielding installations. This Information Notice requires that the effects resulting from the temporary placement of shielding be evaluated in accordance with the requirements of the Code of Federal Regulations, Title 10, Paragraph 50.59. NRC I.E. Circular No. 80-18, *10 CFR 50.59 Safety Evaluations for Changes to Radioactive Waste Treatment Systems*, is referenced by the Information Notice as containing guidelines for completing the necessary evaluations.

To address these requirements, INPO issued Good Practice TS-411, INPO 86-006, *Temporary Lead Shielding*, February 1986. This document provides a recommended program for the control of temporary lead shielding, including shielding evaluations, installation and tracking. These NRC requirements and INPO guidelines have been addressed by the TSAP.

PROCEDURAL REQUIREMENTS

The purpose of the TSAP is to further the use of temporary shielding in accordance with ALARA goals and to put in place administrative controls that will ensure compliance with industry requirements. Procedural steps are included to verify that the installation of temporary shielding does not adversely affect the plant's design basis. Additional steps are included to track and document the use, installation and storage of temporary shielding.

The procedure was written to include a number of forms. Each form addresses a specific aspect of the shielding requirements - both mandatory and optional forms are included. Completion of the mandatory forms is required to meet industry and station specific requirements. Completion of the optional forms will improve the documentation of the shielding installations. The TSAP was developed so that when the applicable forms have been completed, all the requirements of the procedure have been met. A listing of the forms along with a description of their objectives are provided below.

Form A - Temporary Shielding Request (TSR). This form is the first step in the shielding process. To promote the use of shielding, it can be completed by anybody to request the installation of shielding.

Form B - Temporary Shielding Justification. This form is completed by Radiation Protection personal to demonstrate that the shielding installation will result in a net dose savings.

Form C - Evaluation of Temporary Shielding. Evaluations completed to assess the shielding installation effects on plant systems, structures and components (SSCs) are documented here.

Form D - Field Installation of Temporary Shielding. This form provides shielding installers with installation instructions, precautions and a sketch of the shielding installation.

Form E - TSR Closeout. This form documents that the shielding has been removed and the affected SSCs have been restored to their required configurations.

Optional Form 1 - Dose Benefit Analysis. Calculations completed to determine dose savings specific to a given shielding installation are documented in this form.

Optional Form 2 - Temporary Shielding Sketch. This form documents the sketch(es) used to request, evaluate and install the shielding.

Optional Form 3 - Temporary Shielding Inspection Requirements. Requirements for any inspections that may be needed to verify that the shielding has been installed and remains installed according to specifications are documented here.

Optional Form 4 - Temporary Shielding Tracking Log. This log tracks the location of the temporary shielding along with the required installation and removal dates.

Optional Form 5 - Dose Information. This form provides for documenting the actual received dose for a particular shielding installation. This information can be used to verify the accuracy of pre-shielding calculations and to increase the accuracy of the documented dose savings resulting from shielding use.

Shielding Summary Form. This form provides a one page summary of all the necessary shielding documentation. The form is automatically completed (by the software) based on user input to the procedural forms.

TSAP SOFTWARE

Objectives

As is demonstrated by the number of forms described above, completing the applicable requirements can involve a significant effort. Therefore the TSAP was computerized to minimize the paperwork, expedite completion of the procedural steps, and ensure compliance with the applicable requirements. The TSAP software was designed to meet the following objectives:

- Reduce the time required to learn the procedure.
- Reduce the time and effort needed to complete the procedural requirements.
- Strengthen compliance with the procedural requirements.
- Enhance compliance with Industry requirements.
- Improve control and documentation of temporary shielding usage.
- Automate data storage and retrieval through use a database.
- Standardize the lead shielding administrative procedure used at all stations.
- Increase acceptance of the TSAP at all stations, through ease of use and fast turnaround of shielding requests.
- Improve accuracy and legibility of the documentation.

Software Features

The TSAP software provides two methods of completing the procedural forms; an interactive interview and a form filler. The features of the software are depicted in Figure 1. The user is able to choose the method of completion or can alternate between the interview and the form filler features. User input is linked to and saved in a database. The database saves all information input to the procedure forms. The user has the option to print completed forms.

Following the flow depicted in Figure 1, the user first chooses a method of completion. The form filler feature is chosen when the user is familiar with the procedural requirements and cognizant of the responses and forms that need be completed. If the form filler option is picked, then the user is presented with a menu of the procedural forms. The user picks the applicable form and then fills in an electronic version of the form. Look-up libraries are available at appropriate form fields to expedite completion of the procedure and provide for consistent input. Repeated information, e.g., TSR numbers, is automatically transferred to the other forms, so that it need only be entered once. The user has the option to switch to the interview feature to continue with the procedural requirements.

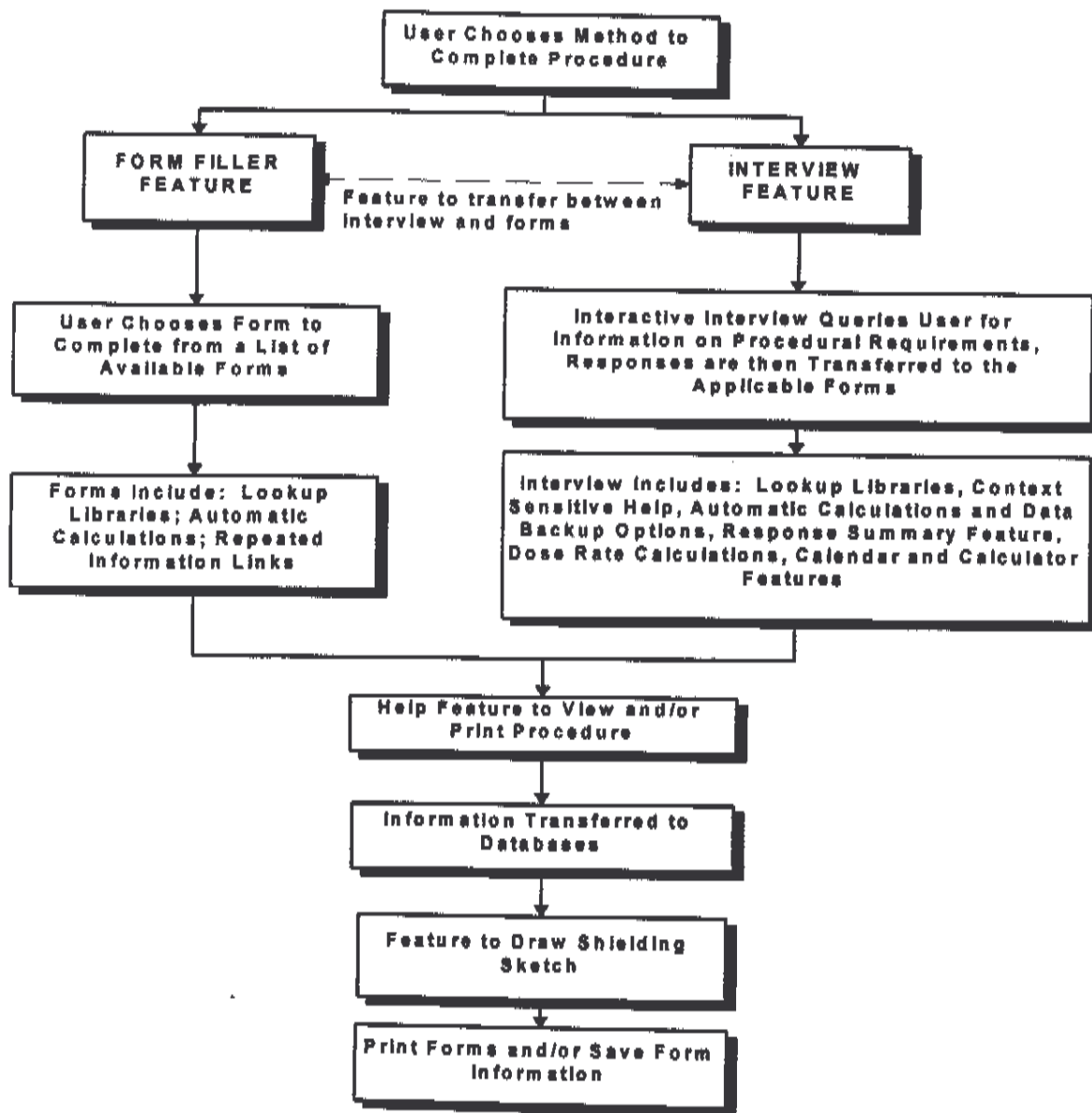


Figure 1

If the interview feature is chosen, the user is then led through a series of questions that walk through the steps of the procedure. Responses to the questions are transferred to the applicable forms through dynamic data exchange (DDE) links. The interview feature leads a user through the successful completion of all the applicable procedural requirements. Additionally, the interview includes a data backup feature with a range of specifiable backup times. If the user input responses are not saved for any reason, the backup files are automatically detected when the TSAP software is reloaded. The user is then given the option to load the responses from the backup file.

The interview feature provides the most assistance in completing the procedure. This feature enables a user with minimal familiarity with the procedure to quickly and accurately implement the procedure and complete the applicable forms. The interview feature asks questions appropriate to the specific shielding application and provides extensive user help. To ensure that the mandatory requirements are completed, mandatory responses must be entered before the user can proceed. The section of the TSAP applicable to a question is displayed directly below the question.

The interview feature also includes comprehensive help and look-up libraries to assist the user and expedite completion of the procedure. Extensive user help includes: providing applicable procedure sections that correspond to the questions, look-up libraries, automatic calculations, calculator and calendar features, a search routine, dose rate calculations, and a help feature containing a copy of the procedure and a glossary of definitions. A help feature enables the user to interactively review the procedure or use a glossary to search for definitions; a search routine is included to locate terms used in the procedure. The look-up library information is also available to the form filler feature. The interview includes the capability to review the procedure and print an uncontrolled copy. A help glossary of definitions is also available.

Included with the interview feature is a summary of all the user responses. This summary is contained in a single table that lists the interview questions and user input responses. From this table the user can go directly to any question by doubleclicking on the question with the mouse. The user may also enter additional notes concerning any of the responses; these notes are then saved together with user input and can be printed along with the forms.

When a form or forms are completed, the user is given the choice to save the information in the database and/or print the form(s). The shielding sketch form is also linked with computer aided drawing (CAD) software, which can be used to complete and electronically save a shielding sketch.

A sample screen from the TSAP software is shown in Figure 2. This screen shows an example of the user interface and options available in the interview feature of the program. This screen has been annotated with explanations of the information fields. Descriptions of various features are also given.

Utilities Help

TSAP - Version 1.0

TSR Number: LS94-001

TSR Identifying Information

Date: 2/1/94

In what building will the shielding be placed?

Response: RB - Reactor Building

Response entry area

Question to be answered

Specific Help/Text from Applicable Section of Procedure

All information in this section [Shielding Information] is mandatory, with the exception of the System(s), Equipment Part No(s) [EPN's] and Pipe Line No(s). The shielding does not necessarily have to be placed on any of these three items. However, if the shielding is placed on equipment, the EPN should be entered. Likewise, if the shielding is placed on piping, the system and line number should be entered.

Form A - Temporary Shielding Request (TSR)

Form & Section Identification

Shielding Information

Navigation

Previous

Next

Go To Forms

Assistance

Help

Notes

Lookup

Summary

File Options

Auto Save

Save

Main Menu

Mouse Location-Sensitive Instructions

21 % Complete

Date: Num

April 4, 1994

1:23 PM

Menus:

Utilities

Calendar
 Calculator
 Dose Rate Calculation
 Shielding Types/Descriptions

Help

View Procedure Text
 Glossary
 About TSAP...

Buttons

- | | | |
|----------------|---|--|
| Previous, Next | - | Used to navigate through the questions and responses |
| Go To Forms | - | Sends user to the Main Menu of the form filler feature |
| Help | - | Displays context-sensitive help for a given question. |
| Notes | - | Allows the user to enter notes specific to the TSR |
| Lookup | - | Brings up a Lookup Library containing all the expected responses to the question, e.g. lists of Buildings, Elevations, System Titles, etc. |
| Summary | - | Brings up a Summary Table which briefly states the Questions and Responses which have been entered. |
| Auto Save | - | Allows the user to set a timed backup of the data. |
| Save | - | Saves the data immediately. |
| Main Menu | - | Returns the user to the Main Menu. |

Figure 2

Data Communication Structure

The data communication structure used by the TSAP software is depicted in Figure 3. The software serves as a front end to databases that store the field entries of the forms. The databases initially will be queried through the interview feature to select a previously completed Temporary Shielding Request (TSR). The user may then continue with and edit previously entered TSR's, or begin a new TSR.

When the interview feature is used, user responses are transferred to the applicable form fields via DDE links. From the form filler feature, responses entered in the form fields are saved in the databases.

The databases are an important feature of the software. Use of these databases enable effective tracking of current shielding installations and help make efficient use of historical data on past shielding applications.

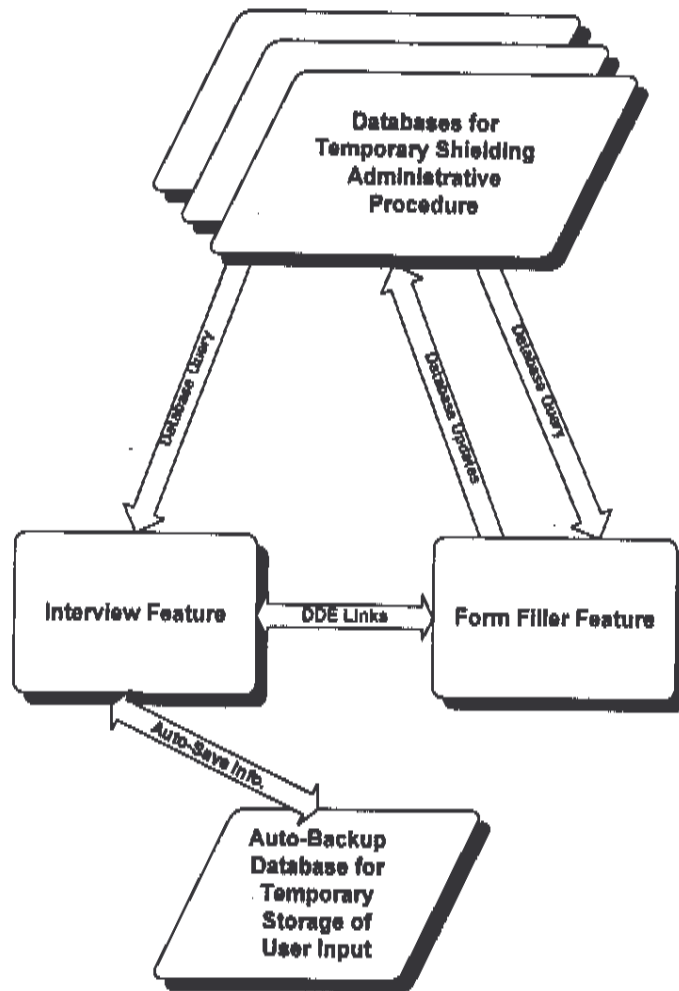


Figure 3

SUMMARY

A completely new Temporary Shielding Administrative Procedure was developed to promote the use of temporary shielding at Commonwealth Edison Company's six nuclear stations. This procedure also effectively addresses industry requirements for the use and control of shielding. This comprehensive procedure is implemented through the completion of a number of forms.

The procedure was computerized to expedite completion of the forms and to minimize the time and effort expended in completing the paperwork. The software was completed using an easy to use Windows interface and an innovative interview feature, with extensive help features to speed completion of the procedural requirements. This results in numerous benefits, including enhanced compliance with, and fast implementation of the procedure. Additional benefits are improved quality of the necessary paperwork and record keeping. This software has been well received by the Radiation Protection personnel responsible for implementing the shielding programs.

Author Biography

David Olson is a Senior Project Engineer at Sargent & Lundy. His responsibilities include the design, analysis, and in-plant testing of piping systems and associated structures. As part of this, he has been actively involved in the use and evaluation of temporary shielding. This includes the development of software for the control and evaluation of shielding. He has also been responsible for the development of administrative procedures for temporary shielding. He has a BS in mechanical/structural engineering from the University of Illinois and an MBA from the University of Chicago.

**Sargent & Lundy
Engineering Mechanics Division
55 E. Monroe Street
Chicago, IL 60603 USA**

**Phone: 312 269 6785
Fax: 312 269 7503**

PAPER 8B-4 DISCUSSION

- Baum:** What is the availability of this software? Is it something that you sell or is it provided as a service?
- Olson:** It is something that we sell. The status of the program is that we have a copy and one at Commonwealth Edison stations for beta testing. We are putting the finishing touches on it now, and the plan is to install it at all six stations this summer.