



## University of Pittsburgh

SCHOOL OF LIBRARY AND INFORMATION SCIENCE  
Interdisciplinary Department of Information Science

PDR: 4/27/82

CT-1426

TO: Mr. Richard Savio, NRC  
FROM: Anthony Debons, Ph.D.  
Consultant  
DATE: March 3, 1982  
SUBJECT: Technical Review of Clinton Plant Visit  
Decatur, Illinois, February 25-26, 1982.



### 1.0 General Assessment

Visit did not allow for the detailed study of the many aspects of human factors that could be applied to total plant operations (including training, career development, habitat, etc.). To best of available knowledge there is no Human Factors representation at the staff level of the plant organization. Human Factors is accounted through services of a Human Factors consultant. There is a need for a well formulated research program for the test and validation of present display formats developed by the applicant. The Remote Control "shut down" Display Panel requires careful study both in terms of console configuration and location. Training program needs careful examination of underlying career assumptions.

### 2.0 Human Factors Representation

The magnitude and importance of human involvement with technology and plant procedures suggest that human factor (ergonomic) principles can be extended to the following areas:

- 2.1 Main control room display design and operations.  
This includes the Remote "shut down" Control Display Console.
- 2.2 Quality control in the present construction program and subsequent maintenance requirements.

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2.3 To the environmental conditions projected for operational status. This includes such factors as general habitat, lighting-heating conditions under prolonged work schedules, noise, vibrations, etc.

2.4 Training.

The impact of career ladder structure on motivation and ultimately on productivity. These considerations need to be carefully integrated into the present policies for training of personnel, if not presently included.

3.0 Control Display Console

The applicant is proud of present display formats included in the Control Display Console. The display formats, however, appear crowded. At present it is not possible to correlate the effectiveness of display formats with human performance requirements.

The Remote "shut down" Control Display Console seems primitive. It leaves the impression that it was included as an after thought in the design of the overall plant configuration.

Variations in electric source output can severely influence the resolution of data on displays particularly those which require high levels of visual acuity. On the other hand information presented by the applicant suggest that this factor has been acknowledged.

4.0 Quality Control

Numerous incidences reflecting inadequate quality control in the construction activities were reported. Quality control practices by the contractor were defended. Specific instances of good quality control were cited in contrast to the many other quality control violations. In most of these cited instances there was a recognition of symptoms rather than causes. In some instances of inadequate quality control cited in the literature, failure in quality control can be traced to poor acknowledgment of human factors parameters (i.e. poor lighting, poor work habits, fatigue, motivation, etc.).

## 5.0 Environmental Conditions

Plant configuration and mission suggest that operational personnel will be shielded during work hours from the environment outside of the plant. Further, it is reasonable to speculate that the nature of the work environment can promote possible states of uncertainty and stress. These conditions can lead to a sense of isolation and at times, depression - the extent of which should be identified and studied. Other factors include the influence of prolonged noise, heat and other ambient conditions which could seriously impact on human performance (e.g. tracking, vigilance, etc.).

## 6.0 Training

The training program seems well formulated. Liaison with local educational institutions has been established. Career ladders - for progressive career development and training - are available. The following aspects underlying the training program however need to be examined.

- 6.1 The requirement for college level achievement to meet specific work levels.
- 6.2 Retraining concepts based on technological state-of-the-art developments.
- 6.3 Criteria for validating training effectiveness.
- 6.4 Inclusion of Human Factors study in current college level curriculum.

## 7.0 Recommendations

- 7.1 Develop a specifically defined and well delineated research program for the study of display formats for the Control Room Display Console.
- 7.2 A study should be initiated on Human Factors problems related directly to quality control aspects. The findings of this study should clearly suggest a program for the generating of policies which insure that Human Factors are sufficiently acknowledged in instances of quality control non-compliance and breakdown.