

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

SUBJECT: Short course on System Safety Engineering offered by MSHA (Mine Safety and Health Administration).

DATE/PLACE: September 17-21, 1990 at the National Mine Health and Safety Academy, Beckley, WV

AUTHOR: Mikko Ahola

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TRIP REPORT

SUBJECT: Short course on System Safety Engineering offered by MSHA (Mine Safety and Health Administration).

DATE/PLACE: September 17-21, 1990 at the National Mine Health and Safety Academy, Beckley, WV

PERSONS PRESENT: Mikko Ahola, Naiem Tanious

BACKGROUND AND PURPOSE OF MEETING

The purpose of the trip was to attend one of the courses offered by the MSHA academy as well as to find out more specifically what is covered in the courses offered by the academy and to determine which courses would be relevant to the NRC regulations for an underground nuclear waste repository. The NRC is mainly interested in the mining regulations that would apply to the repository. Since the NRC would most likely be responsible for enforcing those regulatory requirements specified in 10 CFR 60.131(b)(9), it is necessary for one or more members from the NRC and the Center to attend a number of these courses to obtain a knowledge base regarding the subject of mining regulations. Naiem Tanious had initially suggested 13 MSHA courses to be attended by the NRC and Center staffs over a period of about one year that he thought would be useful.

SUMMARY

The National Mine Health and Safety Academy serves as the central training facility for federal mine inspectors and mine safety professionals of the Department of Labor and other government agencies, and the mining industry. The courses offered by the academy are generally four days in length and the participants of the system safety engineering course were primarily coal mine inspectors who are required to complete two weeks of training at the academy each year. The courses offered by the academy cover a variety of subjects including mine ventilation, electrical hazards, health hazards, explosives, blasting, radiation monitoring, etc.. for both metal and nonmetal mines.

The course on system safety engineering in general covered techniques to recognize, evaluate and control mining hazards. Classroom discussions and small group workshops were held on the

selection and application of system safety analysis techniques related to the mining industry. One of the system safety analysis techniques covered in the group workshops was job safety analysis (JSA). Job safety analysis is a basic approach to developing improved accident prevention procedures. It essentially involves documenting first hand experience of workers and supervisors to determine and document hazards and safe procedures for each step of a job. The basic steps involved in JSA include: 1) selecting a job to be analyzed, 2) separating the job into its basic steps, 3) identifying the hazards associated with each step, 4) controlling each hazard. Another technique covered was failure mode and effect analysis (FMEA). This technique can be used to determine where failures might occur within a system and to assess the impact of such failures. The basic steps involved in FMEA include 1) listing all items within the system that can fail or present a hazard, 2) determining the failure mode, 3) determining the effect of failure on other items within the system and the entire system itself, 4) evaluating the effects to determine which item is most critical to the system. This approach is useful in determining which items would need some sort of secondary backup in order for the entire system to continue performing its intended function. The final system safety analysis technique covered was fault tree analysis (FTA). Fault tree analysis is basically a deductive analytical technique which uses graphical logic trees to show the cause-effect relationship between a single, undesired event at the top of the tree and one or more contributing causes. It presents pathways which can lead to the foreseeable, undesired event. Standard logic symbols are used to interconnect the pathways for these contributing causes.

IMPRESSIONS/CONCLUSIONS

My overall impression of the instructional program at the academy is good. Most or all of the instructors have had many years of experience as mine inspectors. Naiem and myself met with Jim Shoemate who is the technical director at the MSHA academy to discuss the particular needs of the NRC. We all agreed that the particular course on system safety engineering was not the most applicable to the specific needs of the NRC since there was essentially no emphasis on mining regulations or inspection procedures. However, a number of other courses were recommended by the instructor and technical director that would be more beneficial to NRC's goal. These courses included six out of the thirteen courses that Naiem had originally suggested, and include:

- 1) Mine Ventilation
- 2) Roof and Ground Control
- 3) Radiation Monitoring and Control
- 4) Haulage, Transportation, and Machinery Hazards
- 5) Electrical Hazards
- 6) Health Hazards

PROBLEMS ENCOUNTERED: NONE.

PENDING ACTIONS: NONE.

SIGNATURE

Mikko Ahola

Mikko Ahola

10/2/90

Date

CONCURRENCE

Asadul H. Chowdhury

Asadul H. Chowdhury
Manager, RDCO

10/3/90

Date

Allen R. Whiting

Allen R. Whiting
Director, WSE&I

10/3/90

Date