

Human Factors Considerations and Drivers

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Abstract

The "Human Factors Assessments of Environmental Technologies" program is a cooperative agreement between the U.S. Department of Energy, Federal Energy Technology Center and the Operating Engineers' National HAZMAT Program (OENHP). The OENHP program is being conducted in new facilities constructed on the campus of the MSHA Training academy in Beaver, West Virginia. The agreement is for five years and is currently in the third year.

The purpose of the human factors assessment program is to facilitate the deployment of new technologies within DOE by working with the developers to eliminate/mitigate hazards and operational hindrances and to assist the developers in providing structured information to the technology user to aid effective transition from development to utilization. Three classifications of technologies have been defined as a means to facilitate the human factors assessment process: TYPE I, TYPE II and TYPE III.

- **TYPE I** technologies are those involving new technologies which are worker protection technologies. An example is an advanced worker protective system (AWPS) which incorporates respiratory protection and body cooling.
- **TYPE II** technologies are those which involve new remediation technology equipment. Contaminated concrete and metal surface removal systems and vitrification technologies are examples.
- **TYPE III** technologies are robotics systems. Examples are remotely operated drum inspection and inventory robots, a universal operator station for remotely controlled robots, and a robotics system for removal of asbestos from piping.

Assessments are conducted based upon technology-specific assessment protocols which are developed with input from the developer, the COR, EH-5, and consultants expert in the technology area. Products of the human factors assessment program include:

- **Topical Reports**
- **TSDS:** Technology Safety Data Sheets
- **ERDS:** Emergency Response Data Sheet
- **Technology-specific training module**

- **SOP's:** Standard operating procedures (assistance to the developer)
- **MOP's:** Maintenance operations procedures (assistance to the developer)
- **Other technical support**

Additional elements are being developed which have broader impact and utility than for a single technology with specific emphasis on enhancing deployment efficiency and effectiveness. These include:

- Robotics systems minimum operator and maintenance personnel qualifications guidelines. National technical work shop scheduled for 5 - 7 November 1997 at National Institute of Standards and Technology, Gaithersburg, MD.
- Criteria for hazardous waste operations heat stress management programs.
- New environmental technology certification/acceptance criteria guidelines specific to worker and public safety, health and risk. National technical workshop being developed.

Individual assessment protocols are prepared for each technology assessment (Type I, Type II and Type III). The draft protocol is provided to the FETC COR, EH-5, and the technology developer a minimum of 30 days prior to the scheduled assessment. The protocol is revised based upon comments received and issued at least 15 days prior to the assessment.

- **Type I** assessments are keyed to comparisons of existing field practices and procedures as baselines and include additional test procedures selected to provide data associated with comparative tasks.
- **Type II** assessments are based upon the use of existing standard hazard assessment procedures and practices, including the Job Safety Analysis (JSA), Failure Mode and Effects Analysis (FMEA), What-if Analysis, or similar approaches.
- **Type III** assessments will utilize mission-oriented evaluations similar to the DOE Safety Analysis and Review (SAR)

Each technology assessment is followed with a number of reports and products intended to serve a range of diverse audiences. These include:

- A 2-page summary of the assessment results.
- A "chapter" for the specific technology "Green Book".
- A comprehensive technical report.
- A TSDS - Technology Safety Data Sheet.
- An ERDS - Emergency Response Data Sheet.
- A technology-specific training module intended for the on-site training required by the hazardous waste operations and emergency response standard. This module is intended to be used by the contractor employing the technology.
- Supplemental visual aid materials such as video tapes and slides specific to the technology.