

## **MARSAME Applications at Humboldt Bay Power Plant - 14529**

William Barley,\* John Albers,\*\* Martin Erickson \*\*\*

\*Rosbar, Phoenix, Arizona

\*\*Pacific Gas and Electric, Eureka, California

\*\*\* Bartlett Nuclear Inc., Plymouth, Ma.

### **ABSTRACT**

The *Multi-Agency Radiation Survey and Assessment of Materials and Equipment* manual (MARSAME) is a supplement to the *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) providing information on planning, conducting, evaluating, and documenting radiological disposition surveys for the assessment of materials and equipment. MARSAME is a multi-agency consensus document that was developed collaboratively by four Federal agencies having authority and control over radioactive materials: Department of Defense (DOD), Department of Energy (DOE), Environmental Protection Agency (EPA), and Nuclear Regulatory Commission (NRC).

The objective of MARSAME is to provide a multi-agency approach for planning, performing, and assessing disposition surveys of materials and equipment, while at the same time encouraging an effective use of resources. As more nuclear sites enter into decommissioning there becomes an inherent need to efficiently and economically address the disposition of potentially contaminated materials and equipment. MARSAME has been applied to various projects at the Decommissioning of the Humboldt Bay Power Plant (HBPP) in Eureka, Ca. The process is customized to particular waste streams and provides a more consistent graded approach for determining material disposition. Disposition options have included free release for reuse, recycling, and multiple waste disposal alternatives, which are optimized to better manage project costs. The process has been successfully applied to construction demolition debris, steel recycling, concrete, soils and other commonly encountered media and equipment.

### **INTRODUCTION**

There are large quantities of materials and equipment (M&E) potentially affected by radioactivity present at decommissioning sites throughout the United States. The owners of M&E potentially affected by radioactivity need to determine acceptable disposition options for M&E currently under their control. MARSAME surveys have been used at the HBPP decommissioning project for this purpose.

The HBPP site was comprised of a 63 MWe natural circulation boiling water reactor which operated from 1963 to 1976. Also present on the site were four fossil-fueled units; two steam boiler plants (52 and 53 MW for units 1 and 2 respectively) and two trailer-mounted Mobile Emergency Power Plants (MEPPs), rated at 15 MWe each [1]. The energy supply plan for Northern California required the shutdown and removal of the operating fossil units and the decommissioning of the previously nuclear unit in

SAFSTOR since 1985. Power generation has been replaced by the Humboldt Bay Generating Station (HBGS), a 10 unit 165 MWe natural gas fired reciprocating engine power plant. Figure 1 depicts the layout of the HBPP site.



**Fig. 1.** Fossil Units 1 & 2 shown within the circle. Nuclear Unit 3 situated adjacent to the right of the fossil units.

During its operational period, Unit 3 potentially impacted the adjacent structures and components associated with the fossil units which necessitated a disposition determination. The large amounts of materials associated with the demolition of the fossil units needed to be categorized and assessed in the most efficient and cost-effective manner.

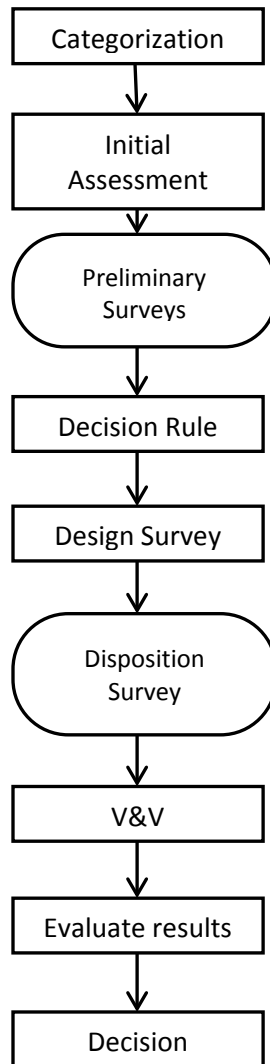
## **METHODOLOGY**

Since the MARSAME protocol was a relatively new concept relative to the commercial nuclear industry, the first step was to administer a two day MARSAME instructional session to the HBPP managerial and supervisory personnel. This provided an avenue to familiarize site personnel as well as receive feedback on the applicability of the process relative to HBPP site demolition.

The next step in the process was to divide the various structures and components into survey units, much the same process as afforded in the MARSSIM protocol. HBPP contracted Bartlett Nuclear to develop MARSAME packages for the survey units incorporating the process as illustrated in figure 2.

The package survey designs were planned using the iterative Data Quality Objective (DQO) process [2]. The DQO process iterations take place at different times during the

disposition process. Each disposition survey was designed utilizing a graded approach and the results of the survey compared to the disposition option action levels outlined in the package. Where necessary, materials within the survey unit that exceeded the preferred disposition option action levels were segregated as authorized by MARSAME.



**Fig. 2.** MARSAME process

During implementation of the surveys, the descriptions of measurement techniques were compared to the Measurement Quality Objectives (MQOs) which were defined during the survey planning. A measurement method was selected based on its ability to meet the MQOs. The number and type of measurements specified in the documented survey design were performed at the locations specified in the survey design.

In instances where the action levels were designated as volumetric values, surface activity was correlated to a volumetric value based on the density of the material measured. This methodology allowed for surface scans to be taken for comparison to the disposition action levels.

## **MATERIALS**

As was stated earlier, packages were initially developed for the materials and components associated with the fossil units with a preferred disposition option of recycle. Subsequent MARSAME packages were developed for various materials to determine the most cost effective disposal option. The miscellaneous demolition materials included concrete, steel, insulation materials and other debris. The advantage of performing these disposition surveys utilizing MARSAME is that it provides a more streamlined efficient survey process, a package documenting evaluations, and a clear decision process for material disposition.

## **CONCLUSION**

A substantial cost savings was realized at HBPP by utilizing the MARSAME protocol by 1) Allowing for the recycle of materials, 2) Determining the most cost-effective disposal option, 3) Allowing for the segregation of materials and 4) Providing for the most efficient survey and 5), Providing a formal process to evaluate the requirements of the survey.

While MARSAME may not be well suited to sites containing limited amounts of materials needing disposition, the HBPP decommissioning is realizing substantial benefits in the utilization of the MARSAME process through not only the past fossil fuel facilities demolition, but also the Unit 3 nuclear unit decommissioning.

## **REFERENCES**

1. *Humboldt Bay Power Plant*. (n.d.). Retrieved December 11, 2013, from pge.com: <http://www.pge.com/en/about/environment/pge/minimpact/humboltdbay/index.page>
2. NUREG-1575, Supp. 1. (2009, January). *MULTI-AGENCY RADIATION SURVEY AND ASSESSMENT OF MATERIALS AND EQUIPMENT MANUAL (MARSAME)*.