

June 6, 2006

Mr. James Shepherd  
Division of Decommissioning/Waste Management  
U.S. Nuclear Regulatory Commission  
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**SUBJECT: IN-PROCESS/CONFIRMATORY SURVEY PLAN FOR THE  
CONTAINMENT EXCAVATION, THE BACKFILL SOIL PILE, AND  
PORTIONS OF BACKFILLED SURVEY UNITS AND CLASS 3 IMPACTED  
AREAS, BIG ROCK POINT RESTORATION PROJECT, CHARLEVOIX,  
MICHIGAN (DOCKET NO. 50-0155, RFTA NO. 06-009)**

Dear Mr. Shepherd:

Enclosed is the in-process/confirmatory survey plan for the subject areas at the Big Rock Point (BRP) Restoration Project in Charlevoix, Michigan. A spending plan for these activities was previously submitted to the Nuclear Regulatory Commission (NRC). Approval of the spending plan and this survey plan is requested prior to the initiation of survey activities.

If you have any questions, please direct them to me at 865.576.0056 or J. Scott Kirk at 865.574.0685.

Sincerely,



Wade C. Adams  
Health Physicist/Project Leader  
Survey Projects

WCA:ar

Enclosure

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**IN-PROCESS/CONFIRMATORY SURVEY PLAN FOR THE  
CONTAINMENT EXCAVATION, THE BACKFILL SOIL PILE, AND PORTIONS OF  
BACKFILLED SURVEY UNITS AND CLASS 3 IMPACTED AREAS  
BIG ROCK POINT RESTORATION PROJECT  
CHARLEVOIX, MICHIGAN**

**INTRODUCTION AND SITE HISTORY**

The Big Rock Point (BRP) Nuclear Plant was a 67-megawatt (MW) electric boiling water reactor located on the eastern shore of Lake Michigan. The site is owned by Consumers Energy Company (CEC). The operating license for BRP was granted by the Atomic Energy Commission (AEC) on August 30, 1962. This commercial nuclear electric generating station was the first in the state of Michigan and the fifth in the United States. The first five years of plant operation were devoted to research and development as part of the AEC's Power Reactor Demonstration Program. The plant was permanently shut down in August of 1997. It is currently being returned to its natural state (i.e., "green field condition"). The final site release survey will be performed after the site has been returned to the green field condition. Guidance contained in the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) has been applied in preparation for the final status survey (FSS). CEC intends to demolish all of BRP's structures and release the demolition debris to a licensed landfill or other licensed radioactive disposal facility prior to conducting the FSS (CEC 2004).

Currently, the BRP site is at an advanced stage of decommissioning. The only plant systems that will remain onsite at the end of the decommissioning process will be those that support the Independent Spent Fuel Storage Installation (ISFSI), such as systems for potable water, sanitary sewers, construction for electrical power, fire protection and storm sewers. Plant operations, maintenance and security personnel continue to occupy portions of the site in support of BRP site operations and maintenance. In addition, the demolition contractor occupies a portion of the site with temporary office space (trailers) which will be removed at the completion of the decommissioning activities.

The CEC intends to dispose of Low-Level Radioactive Waste generated during decommissioning activities at a site(s) permitted/licensed in accordance with federal, state and local regulations.

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Prepared by the Oak Ridge Institute for Science and Education, under interagency agreement (NRC FIN No. J-5403) between the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy.

However, CEC does not intend to use onsite burial, disposal or incineration of any low-level radioactive waste.

Residual radioactive materials that may remain on-site after completion of decommissioning operations will be at levels that will allow for “unrestricted use” in accordance with Title 10, Code of Federal Regulations (CFR), Part 20.1402 and as described in the license termination plan (LTP) for the Big Rock Point Restoration Project (BRPRP) (CEC 2004).

To support regulatory actions/assessments needed to terminate BRP’s operating license, the Nuclear Regulatory Commission (NRC) has requested that the Oak Ridge Institute for Science and Education (ORISE) perform in-process/confirmatory surveys of the subject areas at the BRPRP.

### SITE DESCRIPTION

The BRP is located in Charlevoix County, Michigan, approximately four miles northeast of Charlevoix, Michigan and approximately eleven miles west of Petoskey, Michigan. The physical address is at 10269 US 31 North, Charlevoix, Michigan, 49720. The site consists of approximately 560 acres exclusive of the US 31 right-of-way.

As specified in the LTP, the site has been subdivided into “Non-Impacted” and “Impacted” areas to support the FSS. The Non-Impacted area consists of approximately 430 acres and is the portion of the site that is Owner-Controlled Area with no evidence or reasonable potential for the presence of radiological contamination resulting from plant operations. The remaining approximately 130 acres have been classified as “Impacted Areas”, for which residual radioactivity attributable to plant operations may exist. As stated in the LTP, the Impacted Area extends over one mile along the Lake Michigan shoreline with the majority of the Impacted Area having little probability of containing residual contamination from the plant based on its remoteness from plant operational activities. Locations with the potential to be contaminated from past operations are confined to the Industrial Area consisting of approximately 20 acres including the Plant Protected Area, the Radwaste Compound, and material transport routes and radioactive material storage locations.

The “Non-Impacted” portion of the BRP site consists of low wetlands with standing water to mature forested uplands and can be characterized by thick forest and uneven terrain. The remaining site area is largely undeveloped/undisturbed land tracts with the topography ranging from rocky,

open spaces to steep, rocky hillsides that are heavily wooded and overgrown with brush in many locations.

## OBJECTIVES

The objectives of the in-process/confirmatory surveys are to: (1) provide independent contractor field data reviews; and (2) collect independent radiological data for use by the NRC in determining the adequacy and accuracy of the licensee's procedures and FSS results. These in-process/confirmatory surveys are intended to begin the process of providing the NRC with the necessary information needed to determine whether or not residual contamination has been sufficiently removed at BRP to levels that will allow for "unrestricted use" in accordance with 10 CFR 20.1402.

## RESPONSIBILITY

Work described in this survey plan will be performed under the direction of Eric Abelquist, Program Director, Scott Kirk, Survey Projects Manager, and Wade C. Adams, Project Leader, with ORISE. The cognizant site supervisor has the authority to make appropriate changes to the survey procedures as deemed necessary. After consultation with the NRC site representative, the scope of the survey may be altered based on findings as the survey progresses, and additional information provided by the licensee.

## DOCUMENT/IN-PROCESS REVIEWS

ORISE will review the licensee's survey classification supporting documentation and the final radiological survey data for selected survey units (SU) for adequacy and appropriateness, taking into account the commitments contained in the LTP and MARSSIM (CEC 2004 and NRC 2000, respectively). ORISE will also review applicable CEC sampling protocols, procedures, and sampling plans as provided by the NRC site representative. Various aspects of the measurement process that may affect the quality of environmental data results will be evaluated.

## PROCEDURES

Survey activities will be conducted in accordance with the ORISE Survey Procedures and Quality Assurance Manuals (ORISE 2004 and 2005a; respectively). Deviations to the survey plan or procedures will be documented in the site logbook.

### HEALTH AND SAFETY

A walkdown of the project area SUs will be performed to evaluate the area for potential health and safety issues. Additionally, the proposed survey and sampling procedures will be evaluated to ensure that any hazards inherent to the procedures themselves are addressed in current job hazard analyses (JHAs). The procedures entail minimal potential hazards that are addressed in current ORISE JHAs. Personnel will also adhere to the BRP health and safety requirements. Some confirmatory activities are expected to be conducted in areas that may require radiation work permits and/or special dosimetric considerations.

### REFERENCE SYSTEM

Measurements and sampling locations will be referenced to the existing BRP grid system or area landmarks.

### SURVEY UNIT CLASSIFICATION

The FSS process described in MARSSIM includes use of characterization surveys and site history to divide the site into properly classified SUs based, in part, on their appropriate physical characteristics. Modifications to the SU classification can be made based on new survey findings or information. The SUs are limited in size based on their classification, exposure pathway modeling assumptions and site-specific conditions. The licensee has assigned each "Open Land" SU with an initial classification based on the historical site assessment (HSA), operational radiation surveys, and additional measurements/samples obtained during decommissioning activities that were used to confirm the classification of these areas (CEC 2004).

As specified in MARSSIM, the level of survey effort required for a given SU is determined by the potential for residual contamination as indicated by the classification delineation. The SUs with a higher classification, and thus having a higher potential of containing elevated quantities of

radioactivity, will receive a higher degree of survey effort. Accordingly, the licensee is using the following MARSSIM classifications for the Open Land Area (OLA) SUs:

- **Non-Impacted:** Areas where there is no reasonable possibility of residual contamination from site operations.
- **Impacted Areas:** Areas with a possibility of containing residual contamination in excess of natural background or fallout levels. Impacted areas include Class 1, 2, and 3 Areas.
  - **Class 1:** Areas that have, or had prior to remediation, a potential for radioactive contamination (based on site history) or known contamination (based on previous surveys) above the modified derived concentration guideline levels (DCGL<sub>w</sub>). Areas containing residual contamination in excess of the DCGL<sub>w</sub> prior to remediation should be classified as Class 1 areas.
  - **Class 2:** Areas that have, or had prior to remediation, a potential for radioactive contamination or known contamination, but are not expected to exceed the DCGL<sub>w</sub>.
  - **Class 3:** Any impacted areas that are not expected to contain any residual radioactivity, or are expected to contain levels of residual activity at a small fraction of the DCGL<sub>w</sub> based on site operating history and previous radiological surveys.

To assess the levels of radioactivity present at BRP, ORISE confirmatory survey activities coverage within approximately 20% of randomly selected OLA SUs will be as follows:

- **Non-Impacted:** Scanning will be performed on a judgmental basis.
- **Class 1:** 50% to 100% of the surface area will be scanned.
- **Class 2:** 10% to 50% of the surface area will be scanned.
- **Class 3:** Scanning will be performed on a judgmental basis.

In general, the licensee has designated classification delineation for all assigned SUs. Accordingly, the SUs located within the confines of the Industrial Area (consisting of the Protected Area, the Radwaste Compound, and all material transport routes and storage locations) have been assigned a Class 1 status. In addition, the impacted areas immediately outside the Class 1 areas have been designated as Class 2 SUs. These buffer zones are areas where radionuclides may have migrated

beyond the Class 1 SU boundaries. All remaining impacted areas have been assigned by the licensee as Class 3 SUs.

The majority of the land surrounding the industrial area of the site has been classified as Non-Impacted (comprising approximately 430 acres) that will not be surveyed since these areas have no reasonable possibility of containing licensed radioactive materials.

#### **SURFACE SCANS**

Surface scans for gamma radiation will be performed systematically for Class 1 and 2 SUs, as well as at judgmentally selected locations in all selected OLA SUs where radioactivity may have concentrated during operations. These locations may include transport routes, drainage areas, streambeds, and areas of known radiological releases.

Additional area scans may be performed, depending on findings as the survey progresses and project time-constraints. Particular attention will be given to cracks and fissures in the surfaces, areas of known radiological releases from the BRP, and other locations where material may have accumulated. All detectors will be coupled to ratemeters or ratemeter-scalers with audible indicators. Locations of elevated direct radiation will be marked for further investigation.

#### **SOIL SAMPLING**

ORISE will collect surface (0 to 15 cm) soil samples at up to five judgmentally selected locations per SU from within each SU that is selected for confirmatory survey activities. Selected sample locations will focus on known areas of radiological releases from BRP and major transport, shoreline, and trafficked areas. Additionally, locations exhibiting gamma radiation distinguishable from background will be selected for sampling. The number of soil samples collected will depend upon findings as the survey progresses.

Additionally, an evaluation of the soil sampling protocols (including soil sampling techniques) used by the licensee will be conducted.

#### **SAMPLE ANALYSIS AND DATA INTERPRETATION**

Samples and data will be returned to ORISE's laboratory in Oak Ridge, Tennessee for analysis and interpretation. Samples will be analyzed in accordance with the ORISE Laboratory Procedures

Manual (ORISE 2005b). Soil and sediment samples will be analyzed by gamma spectroscopy and results reported in picocuries per gram (pCi/g). The radionuclides of interest are Co-60 and Cs-137. However, spectra also will be reviewed for other gamma-emitting fission and activation products associated with the BRPRP, and other identifiable total absorption peaks (TAPs). After reviewing the gamma spectroscopy results for these samples, analyses for additional radionuclides, such as H-3, Sr-90, and transuranics, may be performed at the direction of the NRC.

The data generated will be compared with the applicable site-specific guidelines established for the BRP site (CEC 2004). Results will be presented in a draft report and provided to the NRC for review and comment. Data and samples collected, as part of this survey, will be archived by ORISE.

### GUIDELINES

The primary contaminants of concern for the BRP are beta-gamma emitters (i.e., fission and activation products) resulting from reactor operation. However, Cs-137 and Co-60 have been identified during characterization as the predominant radionuclides present. The BRP has developed site-specific derived concentration guideline levels (DCGLs) based on dose modeling to ensure that the average member of the critical group will not exceed an annual total effective dose equivalent (TEDE) of 25 millirem, excluding background radioactivity. The DCGLs for soil will include the site-specific DCGLs of 3.21 pCi/g for Co-60 and 13.2 pCi/g for Cs-137, in addition to the application of the unity rule. Table 1 provides a summary of the soil DCGLs.



**TABLE 1**

**SUMMARY OF SOIL DCGLs  
FROM TABLE 6-10 OF THE LICENSE TERMINATION PLAN  
BIG ROCK POINT RESTORATION PROJECT  
CHARLEVOIX, MICHIGAN**

<b>Radionuclide</b>	<b>Radionuclide Concentration (pCi/g)</b>
H-3	327
Mn-54	13.7
Fe-55	3.58 E+05
Co-60	3.21
Sr-90	2.48
Cs-137	13.2
Eu-152	7.35
Eu-154	6.78
Eu-155	287

**TENTATIVE SCHEDULE**

The following activities are planned to be conducted in accordance with the following schedule:

- Field Measurements                                  June 2006
- Sample Analysis                                          June/July 2006
- Draft Report                                                  July 2006

The final report will be issued within 15 days of the receipt of the NRC comments on the draft report.

## REFERENCES

Consumers Energy Company (CEC). Big Rock Point Restoration Project, License Termination Plan Revision 1. Charlevoix, Michigan; July 1, 2004.

Oak Ridge Institute for Science and Education (ORISE). Survey Procedures Manual for the Environmental Survey and Site Assessment Program. Oak Ridge, Tennessee; September 2, 2004.

Oak Ridge Institute for Science and Education. Quality Assurance Manual for the Environmental Survey and Site Assessment Program. Oak Ridge, Tennessee; July 28, 2005a.

Oak Ridge Institute for Science and Education. Laboratory Procedures Manual for the Environmental Survey and Site Assessment Program. Oak Ridge, Tennessee; June 20, 2005b.

U.S. Nuclear Regulatory Commission (NRC). Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). NUREG-1575; Revision 1. Washington, DC; August 2000.