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Formerly Utilized Sites Remedial Action Program (FUSRAP)
Contract No. DE-AC05-81OR20722

RADIOLOGICAL CHARACTERIZATION PLAN FOR AREA A OF THE SEAWAY INDUSTRIAL PARK

Tonawanda, New York

July 1987

Bechtel National, Inc.

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RADIOLOGICAL CHARACTERIZATION PLAN FOR AREA A OF THE SEAWAY INDUSTRIAL PARK SITE

TONAWANDA, NEW YORK

JULY 1987

Prepared for

UNITED STATES DEPARTMENT OF ENERGY

OAK RIDGE OPERATIONS OFFICE

Under Contract No. DE-AC05-81OR20722

By

[redacted]

Bechtel National, Inc.

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1.0 INTRODUCTION

Radiological characterization of Area A of the Seaway Industrial Park Site (SIPS) is necessary to determine the magnitude and nature of the contamination, since these factors will affect a hazard assessment. The intent of this plan is to document the scope of the characterization effort and the methods to be used.

1.1 HISTORICAL OVERVIEW

1.1.1 Background

The SIPS is located in Tonawanda, New York (Figure 1-1), and covers approximately 100 acres. This characterization is limited to the 10-acre portion of the SIPS included in Area A.

The SIPS is adjacent to Ashland No. 1 (former Haist property)(Figure 1-2), which was used to receive residue from various uranium processing sites during the period from 1944 to 1946. In 1974, approximately 6000 yd^3 of the residue, comprised essentially of low-grade uranium ore tailings, were excavated by Ashland Oil, Inc., the present owner of the former Haist property, and transported to the Seaway property. This residue was dumped into Areas A, B, and C (Figure 1-2). Area A covers approximately 10 acres, and Areas B and C together cover approximately 2 acres. Originally, the residue was left in small, isolated mounds in Areas B and C, but was spread to a depth of less than 2 ft in most places in Area A. Although much of the residue was not covered during placement, it has become mixed and partially covered with clean soil because of moving and spreading activities in recent years. The use of the site as an active landfill has added many feet of clean material to portions of Area A.

In 1976, a radiological survey of SIPS was conducted by Oak Ridge National Laboratory (ORNL) (Ref. 1). The survey indicated that most radioactive residues on SIPS were spread over Area A

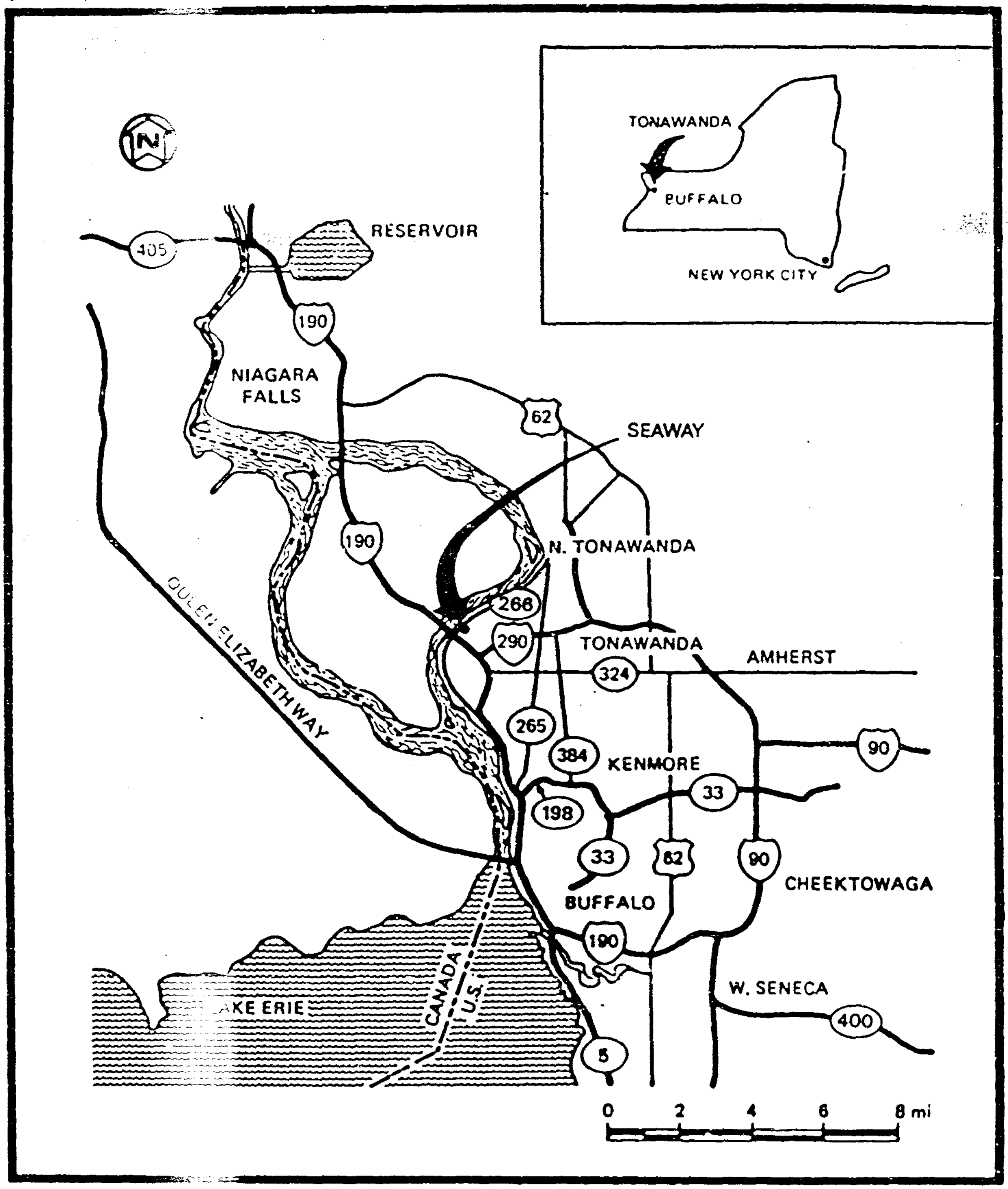

FIGURE 1-1 LOCATION OF THE SEAWAY INDUSTRIAL PARK SITE

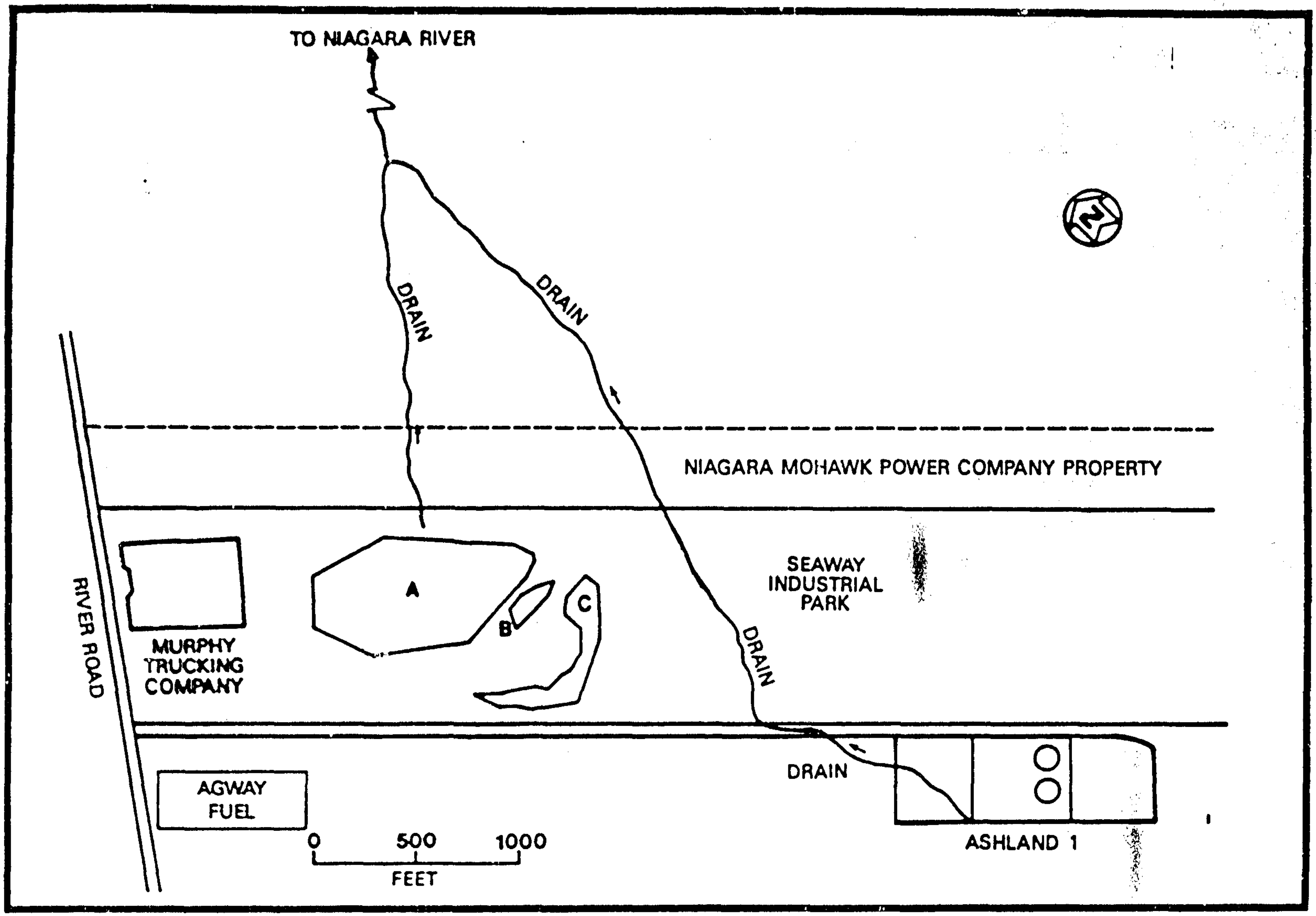

FIGURE 1-2 THE SEAWAY INDUSTRIAL PARK SITE AND ITS IMMEDIATE VICINITY

and extended to a depth of less than 2 ft in most places. The average radium concentration in soil samples taken from Area A was approximately 10 pCi/g.

Areas B and C will not be characterized because they have become covered with 10 to 40 ft of clean fill. As reported in Reference 1, the average concentration of Areas B and C was 18 pCi/g of radium-226 and it is probable that mixing in these areas has lowered the concentration to less than the 15-pCi/g remedial action guideline.

Radiological characterization of Area A of SIPS will be performed under the Formerly Utilized Sites Remedial Action Program (FUSRAP), a U.S. Department of Energy (DOE) program to identify, clean up, or otherwise control sites where low-level radioactive contamination (exceeding current guidelines) remains from either the early years of the nation's atomic energy program or commercial operations causing conditions that Congress has mandated DOE to remedy. As the Project Management Contractor for FUSRAP, Bechtel National, Inc. (BNI) is responsible to DOE. The DOE residual contamination guidelines presently governing the SIPS are given in Table 1-1.

1.1.2 Site Description

The SIPS (farm lot 94, parcel 34-29, of the Town of Tonawanda, Erie County, New York) covers nearly 100 acres, most of which has been used as a municipal landfill for several years. The site is located in a large industrial area, and the areas containing the radioactive residues are more than 1/2 mile from the nearest dwellings. The SIPS is bounded by Ashland Oil, Inc.; Agway Fuel, Inc.; River Road; Murphy Trucking, Inc.; and property owned by Niagara Mohawk Power Corporation. There is little vegetation on SIPS. Some parts of the site are at a higher elevation than the surrounding terrain. Most of Area A is at a slightly lower elevation than the rest of the Seaway site, except for the portion of Area A that is near River Road.

TABLE 1-1

SUMMARY OF RESIDUAL CONTAMINATION GUIDELINES FOR THE SEAWAY INDUSTRIAL PARK SITE

SOIL (LAND) GUIDELINES (MAXIMUM LIMITS FOR UNRESTRICTED USE)

Radionuclide	Soil Concentration (pCi/g) above background[a,b,c]
Radium-226 Radium-228 Thorium-230 Thorium-232	5 pCi/g, averaged over the first 15 cm of soil below the surface; 15 pCi/g when averaged over any 15-cm-thick soil layer below the surface layer.
Other radionuclides	Soil guidelines will be calculated on a site-specific basis using the DOE manual developed for this use.

[a]These guidelines take into account ingrowth of radium-226 from thorium-230 and of radium-228 from thorium-232, and assume secular equilibrium. If either thorium-230 and radium-226 or thorium-232 and radium-228 are both present, not in secular equilibrium, the guidelines apply to the higher concentration. If other mixtures of radionuclides occur, the concentrations of individual radionuclides shall be reduced so that the dose for the mixtures will not exceed the basic dose limit.

[b]These guidelines represent unrestricted-use residual concentrations above background averaged across any 15-cm thick layer to any depth and over any contiguous 100-m^2 surface area.

[c]Localized concentrations in excess of these limits are allowable provided that the average over a 100-m^2 area is not exceeded.

Some of the drainage from SIPS flows north or northeast into drainage ditches or a creek and is eventually carried to the nearby Niagara River. Some of the drainage from the area just south of Murphy Trucking, Inc., flows down a steep incline toward River Road, and some of this runoff accumulates near Murphy Trucking, Inc. Drainage from the Ashland property normally flows northeast across SIPS through a culvert and eventually into the Niagara River.

1.2 REVIEW OF HISTORICAL INFORMATION

Before field activities for the characterization begin, available information on the SIPS will be reviewed. These reviews will include, but will not be limited to, all known previous characterization reports by various organizations, topographic surveys, aerial photographs, and eyewitness accounts as may be appropriate.

As a result of this effort, a reasonable knowledge of expected site conditions and suspect areas will be obtained. This information will be used to help direct biased sampling activities and will result in a more accurate projection of site conditions while minimizing costs. Review of this information will be completed in time for findings to be made available to the field characterization team for use in performing the survey.

1.3 SCHEDULE

The radiological characterization of Area A of SIPS is scheduled to start in FY 1988.

1.4 SUPPORT SERVICES

Accomplishing this characterization will require two support subcontracts:

- a subcontract for surveying services
- a subcontract for on-site drilling

All of the other field support will be provided by Thermo Analytical/Eberline (TMA/E), the BNI radiological support contractor, and the appropriate BNI field personnel.

2.0 RADIOLOGICAL CHARACTERIZATION

2.1 SCOPE/PURPOSE

Radiological characterization of the Area A of SIPS will be conducted to determine ranges of radionuclide concentrations presently on-site. Individual activities designed to cost effectively accomplish these goals are delineated in a checklist presented in Appendix A. The following subsections provide more detail associated with the checklist.

2.2 CHARACTERIZATION ACTIVITIES

2.2.1 Site Grid System

A land surveyor will establish a 50-ft grid over Area A of the SIPS by staking the intersections of a series of mutually perpendicular lines. Each stake will be marked with grid coordinates. A 2-in.-square wooden hub stake will be installed at each alternate grid intersection (every 100 ft) along every other line. The grid will be tied to the New York State grid system with sufficient detail to reestablish the grid at a later date.

2.2.2 Surface Characterization

Surface characterization will precede subsurface investigations so that an understanding of surface contamination patterns can be gained. Surface characterization will consist of the activities listed below.

- Walkover surveys will be performed that consist of gamma radiation scans of individual 50-ft by 50-ft grid blocks. Areas in which readings exceed twice normal background levels will be marked on a site drawing. The walkover survey covers essentially 100 percent of the ground surface and ensures that hotspots between grid points are detected.

- Cone-shielded gamma scintillometer measurements will be made at no greater than 12.5-ft intervals in areas of contamination identified during the walkover survey. These measurements, taken every 12.5 ft, will minimize discrepancies in the size of a given area that might have been created by lateral gamma flux (shine) from other contaminated areas nearby. Data obtained from this survey will permit refinement of the boundaries of contaminated areas established on the basis of the walkover scans.

- Gamma exposure rates will be made 3 ft above the surface in areas where the walkover survey indicates surface contamination. The exposure rates will be made using a pressurized ionization chamber (PIC).

- Surface soil samples (0 to 6 in.) will be collected from selected biased locations. Locations will be selected after review of the gamma scanning data. Samples will be analyzed for uranium-238, thorium-232, radium-226, and thorium 230. The samples will be selected to determine radionuclide concentrations in areas where the surface scan data are ambiguous.

- Sediment samples will be collected from drainage pathways including ditches, swales, culverts, and creeks. These samples will be analyzed for total uranium, thorium-232, radium-226, and thorium-230. Sample locations will be selected and analyzed to determine routes of contaminant migration from the SIPS Area A.

For each of these activities background measurements or samples will be collected from three offsite locations.

2.2.3 Subsurface Investigation

Systematic subsurface investigation will be conducted by drilling boreholes at 15 selected grid intersections. Borehole locations will be selected to determine the radiological conditions of subsurface deposits in Area A. For this investigation, no biased boreholes are planned since Area A has been used as an active landfill and has been covered with large amounts of additional fill material since the 1976 ORNL survey of the property. Because of this additional fill and the analysis in the 1978 ORNL report, contamination is suspected to be at a depth of less than 20 ft. Therefore, sample collection to undisturbed soil is believed adequate to characterize subsurface conditions. The drill holes from which samples are collected will be logged with gamma-sensitive equipment.

Once drilled, each characterization hole will be temporarily lined with a closed-end, 4-in.-diameter PVC casing while it is gamma logged. Gamma logging will be conducted by lowering a gamma scintillometer into the borehole. Gamma radiation measurements will be made typically at 1-ft vertical intervals; however, the interval may be smaller near the boundaries of contamination to more accurately determine the boundary between clean and contaminated soil. Once sampled and logged, all holes will be closed by returning the augered soils, and adding grout, if required.

All samples will be analyzed for radium-226, thorium-232, and uranium-238 by high-resolution gamma spectrometry. The processing techniques used during MED activities also could have produced thorium-230; therefore, based on preliminary analysis results, some samples will be analyzed for the presence of thorium-230.

2.2.4 Geologic Characterization

Geologic characterization of the Seaway Industrial Park is not included in the plan because the site has been partially described geologically in Reference 2, a report prepared for the owners of the Seaway property, and because geologic characterization is part of the planned activities for the adjoining Ashland 1 and Ashland 2 sites, southeast and northwest of the Seaway site, respectively. The findings of the two geologic characterization activities planned for the adjoining properties, the existing geologic report prepared for the Seaway owners, and the regional continuity of geologic conditions should permit correlation of geologic features across the Seaway site; so, further investigation is not believed to be warranted.

2.2.5 Data Review

Meetings of the field characterization team will be held after each successive stage of the characterization to review and discuss the findings to date. At these meetings, problem areas and inconsistencies with current and historical data will be identified, and a strategy for continued investigation will be developed. The meetings will serve to structure the characterization sequentially so that information collected in each phase is built upon and clarified throughout the course of the survey.

Field data will be submitted to the BNI Oak Ridge office on a daily basis for interpretation by the BNI health physics staff. This will allow monitoring of progress and real-time resolution of problems. Changes in methodology may be implemented to refine the characterization and gain better information in a cost-effective manner. Such changes will be implemented via verbal directions, followed by written directions, to field personnel.

2.3 DOCUMENTATION

All radiological data collected during the survey will be transmitted to the BNI Oak Ridge office via the TMA/E Oak Ridge office in an approved format (graphically whenever possible). Before the start of field activities, the field team will be provided with blank grid drawings on which to plot field measurements. The field team will assign a scale to the grid blocks, which will permit later interpretation of the drawings. These drawings will show:

- Surface walkover scan findings in the form of grid blocks showing radiation levels greater than twice background
- All cone-shield readings in counts per minute

- Locations of all surface soil and sediment samples, identified in such a way that the results of laboratory analyses for each location can be clearly associated with the corresponding point on the drawing
- Locations of all bore holes with identification number corresponding to gamma logs and soil samples
- Sketches of surface obstructions, irregularities, drainage pathways, culverts, fences, roads, landmarks, (to rough scale)

2.4 REPORTING

The initial hazard assessment, Pathways Analysis for the Seaway Industrial Park Areas A, B, and C (Ref. 3), dated May 1987, will be revised based on the results of this survey. The main objectives of this assessment will be to determine the potential radiation dose which could be received by the general public as a result of the radiologic wastes on-site at SIPS.

3.0 PERSONNEL HEALTH AND SAFETY

BNI is responsible for the health protection of personnel assigned to work at the site. As such, all subcontractors and their personnel must comply with the provisions of the applicable project instructions cited in this section or directed by the on-site BNI representative.

3.1 SUBCONTRACTOR TRAINING

Before the start of work, all subcontractor personnel must attend a training program to meet the requirements of OSHA regulation 1910.120. This program will provide information to the workers so that he/she can:

- Safeguard the health and safety of all employees and the public by complying with all laws, rules, and regulations.
- React responsibly to emergencies and handle emergency situations in a safe manner.
- Complete their work in a safe, efficient, and timely manner.

3.2 SAFETY REQUIREMENTS

Depending on site-specific circumstances, subcontractor personnel must comply with the following BNI requirements.

- Bioassay - Subcontractor personnel shall submit bioassay samples before or at the beginning of on-site activity, upon completion of the activity, and periodically during site activities as requested by BNI.
- Protective Clothing/Equipment - Subcontractor personnel must wear the protective clothing/equipment specified in the subcontract or as directed by the BNI representative.
- Dosimetry - Subcontractors are required to wear, and return daily, the dosimeters and monitors issued by BNI.
- Controlled Area Access/Egress - Subcontractor personnel and equipment entering areas wherein access and egress are controlled for radiation and/or chemical safety purposes will be surveyed by the BNI representative for contamination before leaving those areas.

- o. <u>Medical Surveillance</u> - Upon written direction from BNI, subcontractor personnel, who work in areas where hazardous chemicals may exist, will be given a baseline and periodic health assessment defined in BNI's Medical Surveillance Program.

Radiation and/or chemical safety surveillance of all activities related to the scope of work will be under the direct supervision of personnel representing BNI.

The health physics requirements for all activities that involve radiation or radioactive materials are defined in Project Instruction No. 20.01 (Ref. 4), the Project Radiation Protection Manual, and implementing procedures.

The environmental hygiene requirements for activities that involve chemical or chemically contaminated materials are defined in Project Instruction No. 26.00 (Ref. 5), the Environmental Hygiene Manual, and implementing procedures.

Copies of these project instructions will be available for subcontractor use.

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REFERENCES

1. Oak Ridge National Laboratory. Radiological Survey of the Seaway Industrial Park Site, Tonawanda, NY, 1978, Final Report Prepared for the U.S. Department of Energy (DOE/EV-0005/6).

2. Recra Research, Inc. and Wehran Engineering, P.C. Hydrogeologic Investigation, Seaway Industrial Park Sanitary Landfill, Tonawanda, Erie County, New York, March 1979.

3. Bechtel National, Inc. Pathways Analysis for the Seaway Industrial Park Areas A, B, and C, Oak Ridge, TN, May 1987.

4. Bechtel Nationai, Inc. Radiological Protection Program Manual, Vol. I, Oak Ridge, TN, 1982.

5. Bechtel National, Inc. Generic Occupational Health/Industrial Hygiene Plan for FUSRAP/SFMP Sites, FUSRAP Project Instruction 26.00, Oak Ridge, TN, January 1985.

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APPENDIX A

RADIOLOGICAL CHARACTERIZATION CHECKLIST FOR THE SEAWAY INDUSTRIAL PARK SITE

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APPENDIX A

RADIOLOGICAL CHARACTERIZATION CHECKLIST FOR THE SIPS

Action	Completed: Initials	Completed: Date
1. Review of Historical Information		
a. previous radiation surveys		
b. operations descriptions		
c. photos		
d. interviews		
1) operations personnel (hire as consultants?)		
2) neighbors		
3) others		
e. Aerospace Research resources		
f. others		
2. Property Surveys		
a. obtain blank grid drawings		
b. obtain old and new topographical drawings		
c. confirm that the property is staked at 50-ft intervals		
3. Walkover Tour of Site (note on drawings)		
a. rubble		
b. surface obstructions		
c. buried utility lines		
d. utility poles		
e. culverts		
f. stockpiles		
g. grates, drains		
h. others (wells, etc.)		

4. Characterization Team Review of Preliminary Information
   a. compare old and new topographic maps for changes ______ ______
   b. develop sketches of properties from historical and walkover information ______ ______

5. Surface Gamma Surveys
   a. walkover with unshielded gamma scintillometer ______ ______
   b. cone-shielded gamma survey to define boundaries of contaminated areas ______ ______

6. Team Meeting to Review Gamma Scans
   a. map areas exceeding preselected limits with unshielded scan ______ ______
   b. map areas exceeding preselected limits with cone-shield results ______ ______
   c. check consistency of surface scans with historical information ______ ______
   d. plan locations for systematic and biased surface soil samples ______ ______
   e. plan locations for systematic subsurface soil samples ______ ______
   f. plan locations for sampling around Item 3 problem areas ______ ______
   g. plan sediment sampling locations
      1) culverts ______ ______
      2) drainage ways ______ ______
      3) inside storm sewers ______ ______
      4) outfalls ______ ______
      5) others ______ ______

7. Surface Soil Sampling (as planned in 6d) ______ ______

8. Sediment Sampling (as planned in 6g) ______ ______

9. Subsurface Investigations (as planned in 6e)
   a. boreholes will be placed at each planned location ______ ______

b. obtain surface elevation of boreholes ______ ______

c. gamma log bore holes ______ ______

d. review gamma logs for uniformity of contamination layers ______ ______

10. Team Meeting to Review Sampling

a. were all planned samples collected? ______ ______

b. were sufficient samples collected to

1) establish background? ______ ______

2) calibrate cone shield? ______ ______

3) calibrate unshielded gamma walkover survey? ______ ______

4) calibrate bore hole gamma logs? ______ ______

c. were problem areas from Item 3 characterized?

1) sides? ______ ______

2) bottoms? ______ ______

3) top? ______ ______

d. was a borehole drilled in each area of surface contamination? ______ ______

e. identify all areas that are unmeasurable ______ ______

f. graphically review data to ensure that all areas have been characterized ______ ______

g. select depths of thorium-230 samples ______ ______

11. Review of Data for Consistency with Historical Information ______ ______

12. Field Sample Collection Forms

a. do coordinates on samples match those on forms? ______ ______

b. are all samples on collection forms? ______ ______

c. were all logged samples shipped? ______ ______

d. was copy of field sample collection sent to TMA/E Oak Ridge office? ______ ______

e. was copy of collection form sent with samples to laboratory? ________ ________

13. Transmittal of All Field Notes, Data, and Drawings to TMA/E Oak Ridge Office ________ ________

14. Development of hazard assessment ________ ________